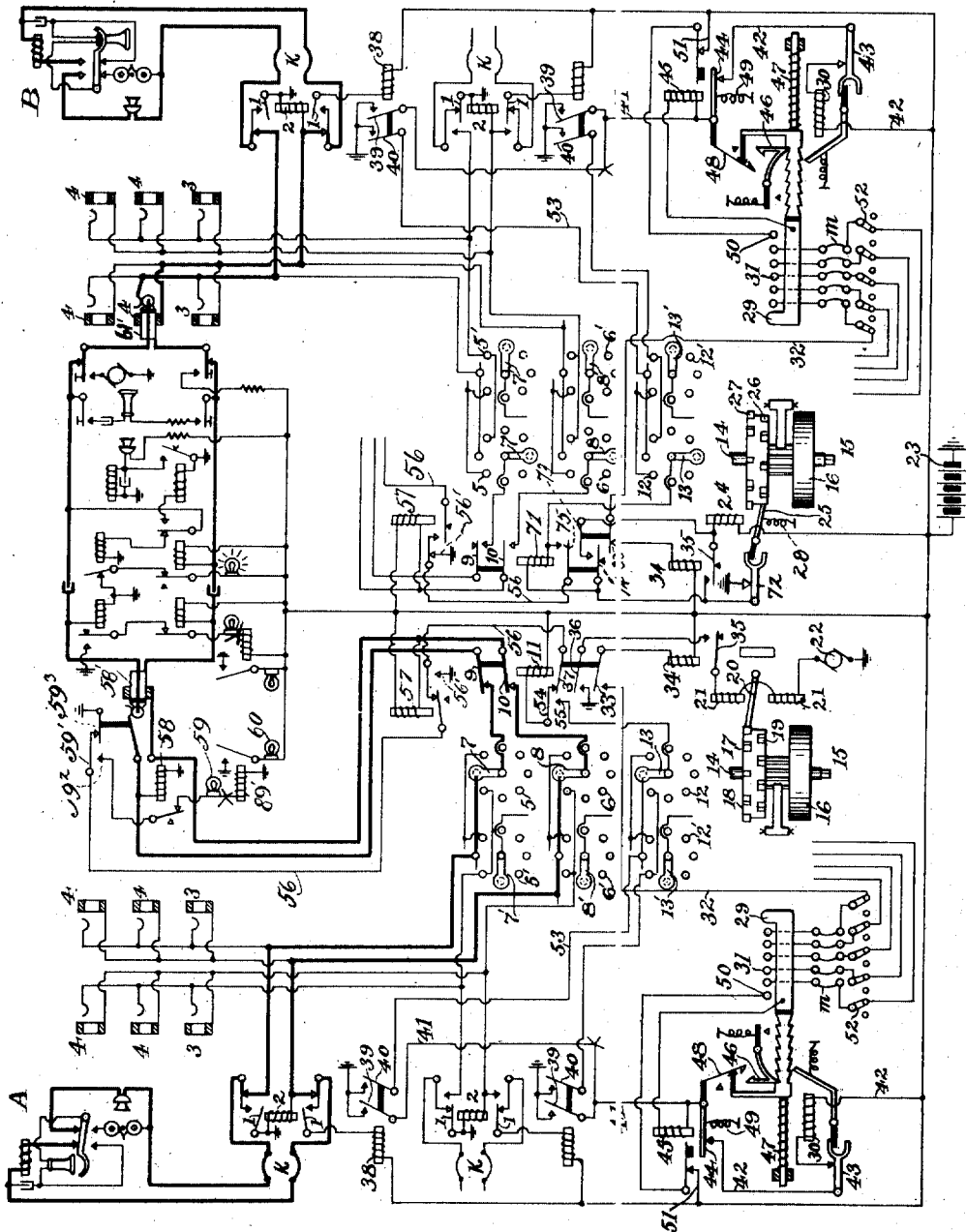


1,223,349.



Witnesses:
A. J. Ostrander
Leon Stroh

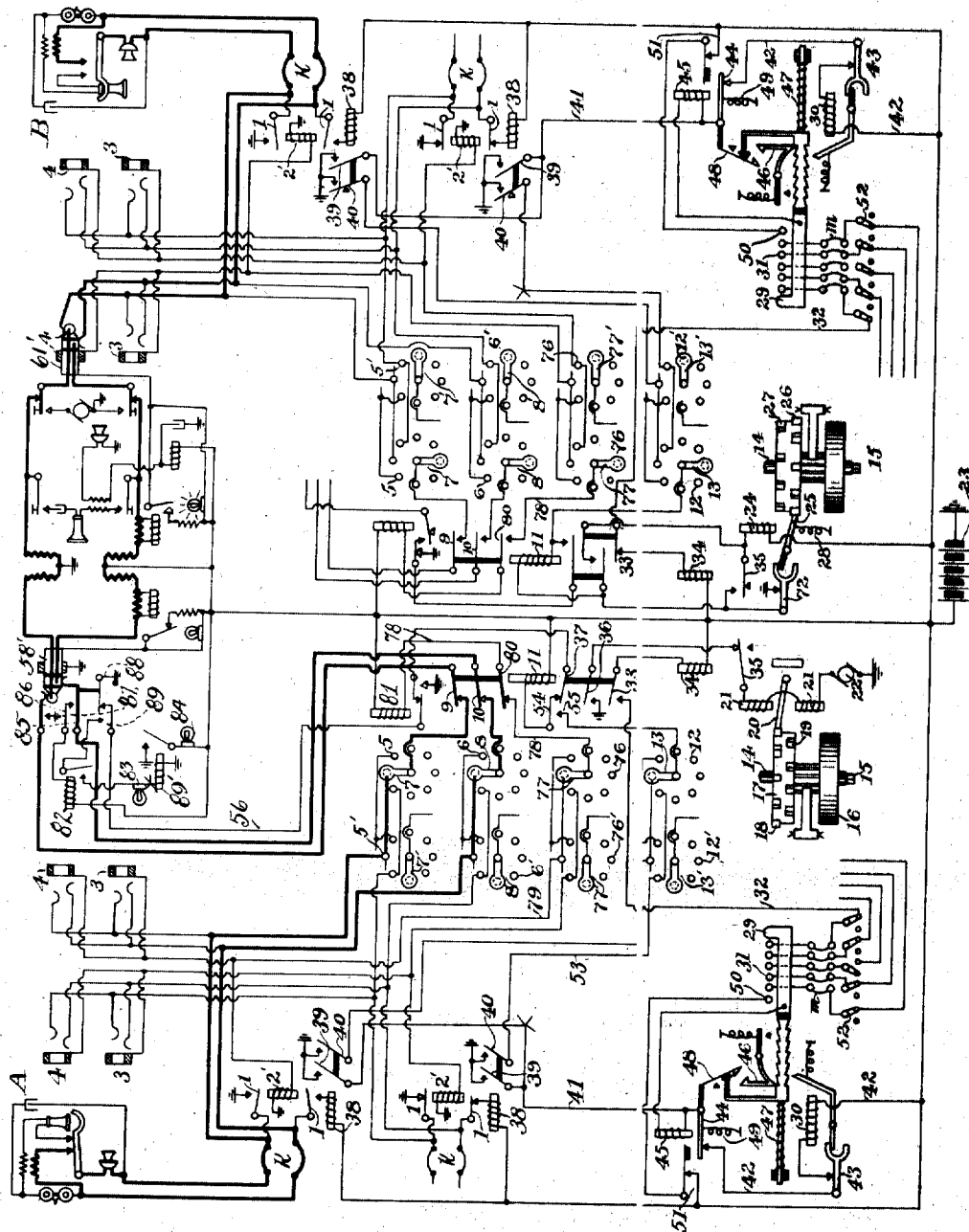
Fig. 1.

Inventor:
Francis W. Dunbar
By *G. L. Gray* Atty.

1,223,349.

F. W. DUNBAR.
TELEPHONE SYSTEM.
APPLICATION FILED DEC. 30, 190.

Patented Apr. 17, 1917.
5 SHEETS—SHEET 2.



Witnesses:
A. J. Ostrander
Leon Stron

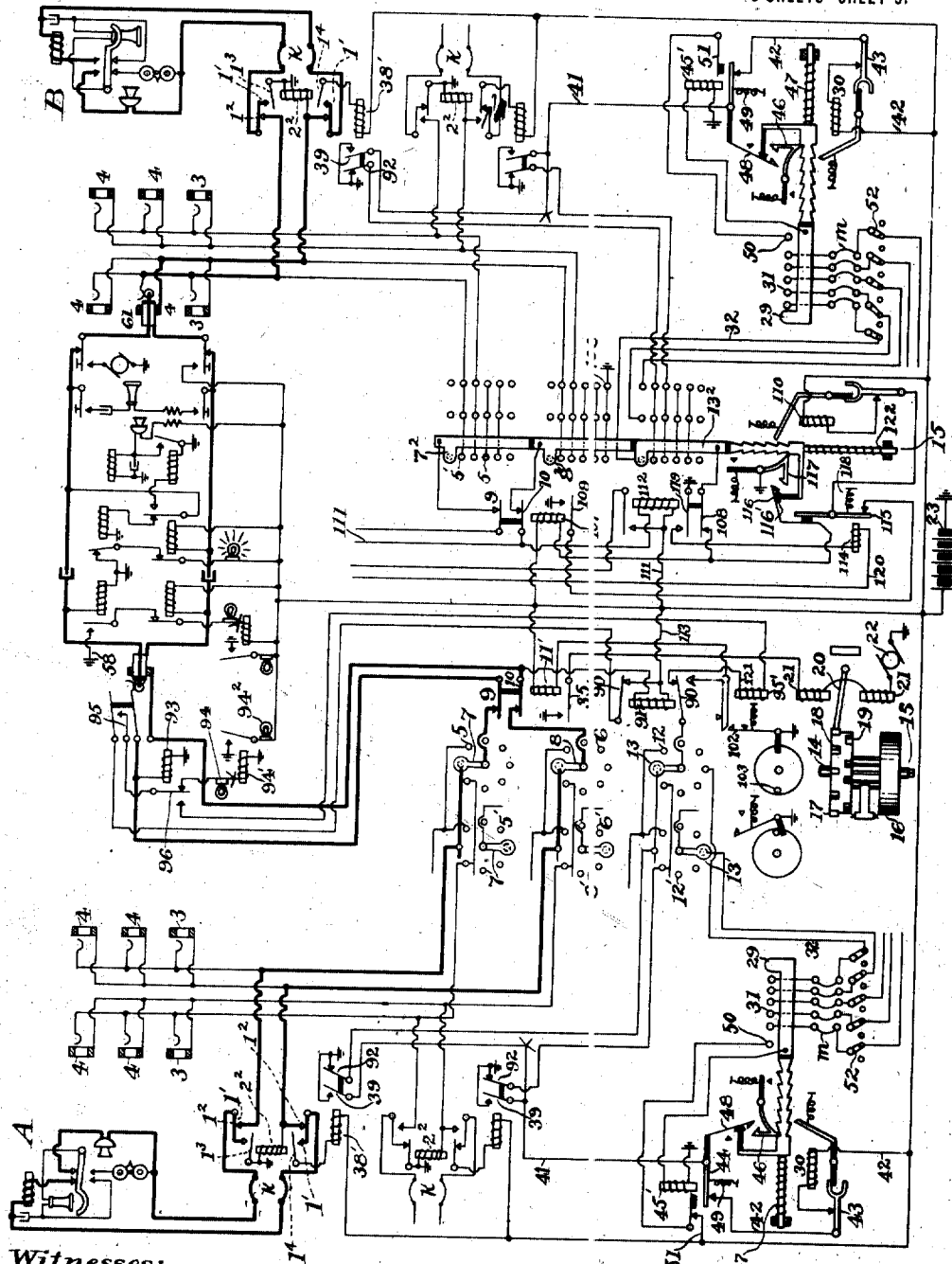
Fig. 2.

Inventor:
Francis W. Dunbar
By G. K. Crapp Atty.

1,223,349.

Patented Apr. 17, 1917.

5 SHEETS—SHEET 3.



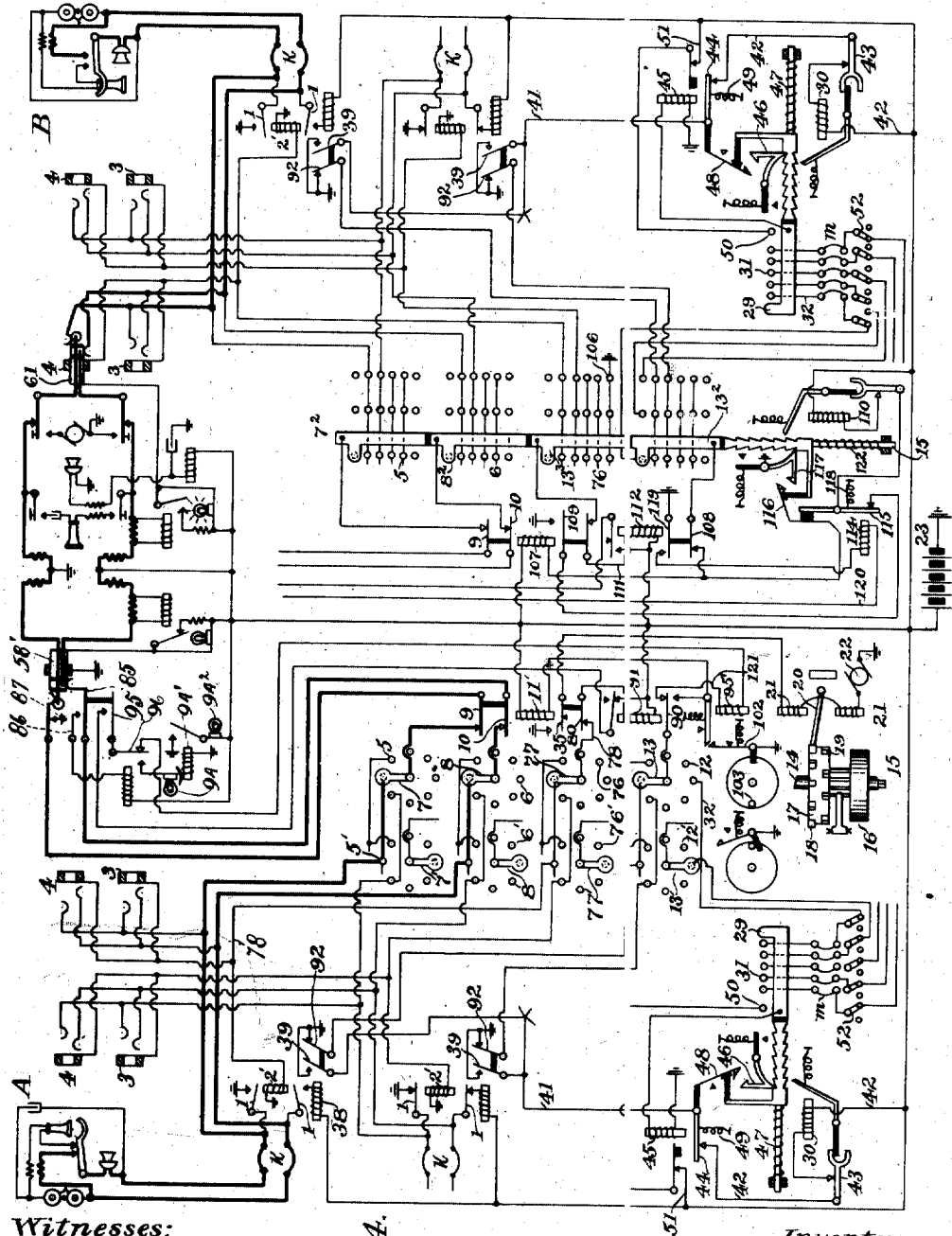
Witnesses:
A. J. Osterander
Leon Stroh

Fig. 3.

Inventor:
Francis W. Dunbar
By *H. L. Giff* Atty.

1,223,349.

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5 SHEETS—SHEET 4.



Witnesses:
A. J. Ostrander
Leon Stroh

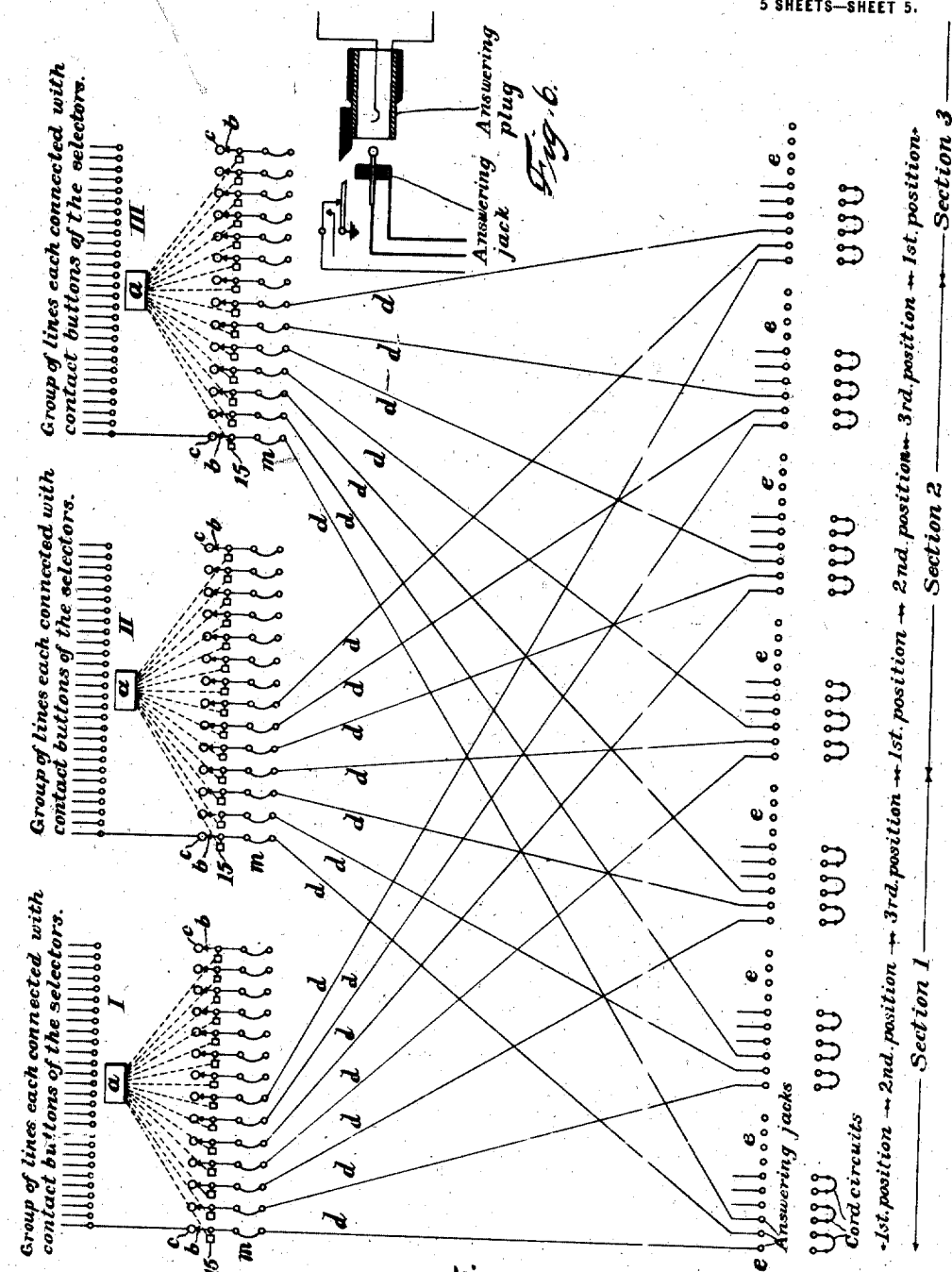
Fig. 4.

Inventor:
Francis W. Dunbar
By *L. L. Croff* Atty.

1,223,349.

F. W. DUNBAR.
TELEPHONE SYSTEM.
APPLICATION FILED DEC. 30, 1904

Patented Apr. 17, 1917.
5 SHEETS—SHEET 5.



Witnesses:
A. J. Ostrander
Leon Strick

Fig. 5.

Inventor:
Francis W. Dunbar
By: A. L. Craft
Atty.

UNITED STATES PATENT OFFICE.

FRANCIS W. DUNBAR, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
KELLOGG SWITCHBOARD & SUPPLY COMPANY, A CORPORATION OF ILLINOIS.

TELEPHONE SYSTEM.

1,223,349.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed December 30, 1904. Serial No. 238,957

To all whom it may concern:

Be it known that I, FRANCIS W. DUNBAR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone exchange systems, and has for its object the simplification of operators' line equipment present upon the operator-boards, and also has for its object the provision of improved distribution of the instrumentalities employed for uniting subscribers for conversation whereby the efficiency of the equipment may be greatly increased. My invention is practised by providing answering-jacks (either in the sense such term is used in multiple switch-board practice or in the sense of any jack used with which cord circuit connection is made to answer a calling subscriber) for a plurality of telephone lines and selective switching mechanism in circuit relation with the lines whereby these jacks may become connected with calling telephone lines, whereafter suitable cord connecting apparatus, such, for example, as commonly employs two plugs to each cord outfit, may be used for uniting a calling line with a called subscriber's line, the answering plug of an operator's cord circuit being for the purpose engaged with the jack selectively connected with a calling line, the line-jack, preferably permanently connected, of the called line receiving the connecting plug. Reference is here made to my co-pending application, Serial No. 237,445, filed December 19, 1904. The present application differs from said co-pending application by connecting the selective switches with the answering jacks. There are comparatively few answering-jacks as compared with the group of telephone lines with which they are associated and there may be as many cord circuits as there are answering-jacks or the cord circuits may be somewhat in excess of the number of answering-jacks provided to allow for impairment of such cords. The jacks are desirably in the form of sleeves or thimbles, behind which are

disposed springs that constitute the jacks' "spring jacks" and the elements of the cord circuits that are designed for engagement with these jacks are formed into corresponding plugs. I do not wish to be limited, however, to the shape of the jacks nor to the shape of the answering ends of the cord circuits that are manually applied thereto. For example the answering-jacks might be in the form of plugs mounted upon the operator's board and the answering-plugs might be in the form of sleeved elements to ride over the answering-jacks, in the form of plugs, to effect the desired connection of the cord circuits with calling lines. I, therefore, use the term "answering-jacks" and "answering-plugs" in the broad sense here indicated, as I do not wish to be limited to the mechanical construction of the answering-jacks, nor to the mechanical construction of the answering-terminals of the cord circuits manually manipulated by the operators to connect the cord circuits with said answering-jacks. The line-jacks are most preferably in the form of sleeved members with springs behind the same and the manually manipulated ends of the cord circuits are of corresponding plug construction adapted for insertion within said sleeved members.

In multiple switch-board practice every effort has been made to provide room upon the multiple boards for as many jacks as possible. To this end the jacks have been placed on three-tenths inch centers vertically and horizontally, while the lamps in association with the answering-jacks have been placed on centers three-tenths of an inch apart horizontally and one-half an inch apart vertically. In the present switch-board practice there are from three hundred to five hundred answering-jacks and as many line-signals to each three position section of a multiple board, which obviously take up a great deal of room that would be very desirable for line-jacks.

It is one of the objects of my invention, as hitherto stated, to reduce the operators' line equipment and I am enabled by means of my invention to dispense with most of the answering-jacks and line-signals, as by means of my invention thirty jacks, whether of the sleeved or plug construction, may

serve for each section of the switchboard and a corresponding number of lights may be employed. The calling lights may be placed upon the horizontal shelf of the operator's board, while the jacks are preferably, though not necessarily, mounted upon the vertical face of the board.

Another object of my invention is to simplify mechanical inter-relation of the cord circuits and the answering-jacks, which object is accomplished by having the selecting mechanism associated with the lines select the jacks in their order, say from left to right rather than promiscuously, so that the answering-ends of the cords will lead to the answering-jacks in an orderly fashion one after the other, instead of being indiscriminately distributed into association with the answering-jacks of the switchboards according to present practice, for with multiple switch-boards now in use the indiscriminate distribution of the answering-ends of the cords is accompanied by an inter-weaving of these cord ends, so that it is difficult in effecting disconnection to pick out the connecting ends that mate with the answering ends, which confusion is greatly lessened, if not altogether dispensed with, by means of my invention.

In accordance with another feature of my invention the lines, the answering-jacks and the selective switching mechanism controlling the association of the answering-jacks with the lines, are so inter-related that the operators at one section of the board are fully supplied to their capacity before the operators at an ensuing section are employed, the operators at said ensuing section being fully supplied with work before the operators at the next section are employed, and so on throughout the system, whereby the most economical method of operating the exchange is provided.

In multiple switch-board practice it is well understood by those skilled in the art that each line has in addition to the multiple jacks distributed throughout the boards of the system, an answering-jack and a line-indicator, the answering-jack and indicator of each line being collocated. These indicators and jacks are distributed in groups of uniform quantity among the different sections of the switch-board, so that there is disposed at all operators' positions the same number of answering-jacks and the same number of line-signals. It is, of course, apparent that telephone operators possess varying degrees of skill and speed in handling calls. The uniform distribution of answering-jacks and line-indicators renders it difficult and impracticable, in accordance with present practice, to apportion work to suit the capacity of the different operators. The ordinary skilled operator can properly attend to two hundred seventy

calls in an hour, if the calls be uniformly distributed throughout the sixty minutes. The average time or length of each call is, approximately, one minute twenty seconds, thus allowing each cord circuit to complete forty-five calls per hour, if kept busy throughout the sixty minutes. Six cord circuits kept uniformly busy throughout the hour can, therefore, handle two hundred seventy calls during the hour—the work of the ordinary operator. Certain operators can, however, handle in a proper manner more than two hundred seventy calls per hour, while others, less skilled, are unable to handle properly as many as two hundred seventy. I preferably provide means whereby one or more answering-jacks at each operator's position may be thrown out of operation or out of operative relation with respect to the lines, whereby each operator may be given as many answering-jacks in operative relation to the line-circuits as can properly be attended to by her. Thus, certain operators may have but three or four answering-jacks in operative condition while others, highly skilled, may have eight, nine or even ten answering-jacks placed in operative relation to the lines. By this means each operator may be kept as busy as her degree of skill will permit and paid according to her ability or skill, the number of answering-jacks which she can attend to efficiently being a correct gage or measure of the number of calls which she can handle efficiently per hour.

It may be properly assumed that one-eighth of the total number of calls made during the entire twenty-four hours of the day will occur during the busiest hour. The switch-board must be designed to handle the business at all hours of the day. Consequently the number of sections of switch-board is determined by the number of operators required to handle the business during the busiest hour. If during this busiest hour or moment, each operator be employed at her maximum efficiency, the necessary switch-board equipment will be minimum.

In the present systems of manual telephony it is customary to provide an "intermediate distributing board" whose function is to present facilities for distributing the answering-jacks and calling signals throughout the various sections of switch-board, so as to cause as uniform a distribution as possible of the calls during this busiest hour or moment. At best, however, owing to the daily fluctuations in the amount of business from certain groups and from all classes of lines, it is impossible to distribute the said jacks and calling signals so as to secure more than a rough approximation to a uniform distribution of calls.

By means of my invention, however, a

distribution of calls may be automatically secured, such that when the number of answering-jacks in operative relation with the calling lines is properly proportioned among and according to the skill of the individual operators, each operator will be working at her maximum efficiency not only during the busy hour but at all hours. Consequently the necessary number of sections of switch-board will be decreased and fewer operators at all hours of the day will be required.

In all present systems of telephony the calls at all hours of the day are distributed throughout the entire switch-board, this requiring the presence of one or more operators at each section of the board at all times, save certain of the night hours, when the business is so slack that from one to ten operators—depending upon the size of the exchange—can handle the entire number of calls by walking from section to section and picking up the various calls as they may come in. At all such times the efficiency of the operators—reckoned on a basis of number of calls answered per hour—is very low, the result being that the average number of calls handled per operator per hour throughout the twenty-four is less than half the number which the average operator is able to handle efficiently were she kept uniformly busy.

By means of my invention I am enabled to distribute the calls so that during the night hours all the calls will appear at the first section of the switch-board—or at the first two or three—depending upon the size of the exchange and the volume of night business, so that, as the business increases, operator after operator may be added as required—the first or lower numbered sections being always busy and the higher numbered sections coming gradually into operation as the busy hours approach. I am thus enabled to secure the same average number of calls answered per operator per hour throughout the twenty-four as is secured during the busiest hour of the day—resulting in a decrease in operating expense of 50% or more. I do not contemplate, however, in large exchanges providing the necessary switching facilities, so that each line may be connected with any one of all the answering-jacks, although in smaller switch-boards it would be preferable to do so. In large exchanges I prefer to divide the lines into groups of several hundred each and divide the answering-jacks into a corresponding number of groups, so that any line in a certain group may be connected with any answering-jack assigned to that group, if the lower numbered answering-jack of that group already be busy. If that particular one be not busy, the first idle answering-jack thus selected, will automatically make connection with a calling subscriber.

For example I will assume an exchange of four thousand five hundred lines and provide a group of thirty answering-jacks for each five hundred lines, thus making two hundred seventy answering-jacks in all, divided equally between nine sections of switch-board, or thirty answering-jacks to the section (instead of three hundred to five hundred as hitherto) and ten to the operator. During the night hours, therefore, all calls will appear at the first section of the switch-board, unless in some particular group of five hundred lines there were more than three calling lines simultaneously connected in conversation—in which case the fourth line of that group making a call while the other three calling parties of the same group were still connected, would indicate at the first position of the second section. A fifth call from the same group occurring while the other four were still conversing, would appear at the second position of the second section and would necessitate the operator leaving her position at the first section to attend to it. Such a condition would not be apt, however, to arise, as it would require (assuming one operator only was needed for the business at this time) five-sixths of the total business which this single operator could efficiently handle, to originate in a group containing only one-ninth of the total number of lines.

In the example chosen as an illustration, I would employ thirty selector switches for each group of five hundred lines, each selector switch including five hundred sets of line terminal contacts.

In the embodiment of my invention herein specifically set forth, the answering-jacks are each provided with a pair of moving terminals (the switch-board illustrated being a metallic switch-board, the application of the invention to grounded lines being well understood by those skilled in the art) and motor mechanism jointly controlled by the answering-jack apparatus and a calling subscriber's apparatus for effecting engagement between these terminals, which I shall call "answering-jack terminals" and the terminals of a calling line. This motor mechanism has such an association with the answering-jack circuit and apparatus that only the idle answering-jacks are automatically connected with calling lines. This motor mechanism is desirably not constantly operated, but is preferably only operated on the initiation of a call. I preferably employ motor controlled switching apparatus governed by a calling subscriber and governing the motor mechanism that operates or causes to travel the answering-jack contacts, preferably the first set encountered. These answering-jack contacts may comprise traveling switch-arms adapted to pass over terminals of telephone lines and may,

in accordance with one embodiment of the invention, be mounted on a rotating shaft operated by a motor mechanism, when set in operation by the motor controlled switching mechanism set into actuation by a calling subscriber. The traveling switch-arms constituting the answering-jack terminals have associated with them as many sets of line-terminals as there are telephone lines assigned to a particular group of answering-jacks. The motor controlled switching mechanism, which may easily be set into operation by a calling subscriber, is so inter-related with the answering-jack circuits and electro-magnetic mechanism governing the operation of the motor mechanism actuating the answering-jack terminals, that only such answering-jack terminals that are associated with idle answering-jacks are operated by the motor mechanism in mechanical relation therewith. In other words, in the embodiment of the invention herein specifically set forth the calling subscriber causes the motor mechanism associated with the answering-jack terminals of an idle answering-jack to bring said terminals into connection with the terminals of a calling line. Upon such connection of the traveling terminals of an idle answering-jack with a calling line, the motor belonging to the answering-jack is caused to stop, preferably by means of electro-magnetic mechanism whose circuit conditions are changed upon this establishment of connection between an idle answering-jack and a calling line, such electro-magnetic mechanism thereupon effecting the stoppage of the motor, which result is accomplished where the motor is an electric motor, preferably by altering the circuit of said motor. The motor controlled switching mechanism governed by a calling subscriber, is preferably common to each group of lines, there being as many such switching mechanisms as there are groups. I do not wish, however, to be limited to such an arrangement. Where such motor controlled switching mechanism is made common to a group of lines, conductors from all the answering-jack circuits belonging to a particular group are placed in electrical association therewith and said switching mechanism is caused to travel over terminals of these conductors. The electrical condition of these terminals depends upon the condition of use of the answering-jacks. If the answering-jacks are idle, the electrical character of the terminals is such that when the motor controlled switching device comes into contact with the first of such terminals associated with an idle answering-jack, the electro-magnetic mechanism is operated to permit the actuation of the answering-jack motor corresponding to the said terminals, whereby said answering-jack terminals corresponding to the answering-jack motor are

caused to engage the terminals of a calling line, whereupon said answering-jack motor is thrown out of action. When the terminals engaged by the motor controlled switching device have their associated answering-jacks busy, the electro-magnetic mechanism immediately governing the operation of the answering-jack motor has no operative effect upon said motor, which thereby remains quiescent. I shall term the motor controlled switching device governed by calling subscribers the "subscriber's governor motor" and the motor which directly operates the answering-jack terminals the "answering-jack motor", as such terms have previously been used. In order that special line signals will be dispensed with, a signaling device, preferably a signaling lamp, is associated with each answering-jack and suitable governing apparatus whereby it may manifest a signal to the operator when a calling subscriber initiates a call. A call having been initiated, the operator manually associates the answering end of a cord circuit with the answering-jack of a calling line and manually associates the connecting end of the same cord circuit with a line-jack of the called subscriber's line. This provision of a line-jack to each line in addition to the terminals of each line that are multiplied together and are associated with the traveling answering-jack terminals, is an important feature of my invention, inasmuch as by its provision the connecting end of each cord circuit may in conjunction with its connecting plug, be under the manual control of the operator. The traveling answering-jack terminals move over their companion sets of line terminal contacts (which latter contacts are, as stated, multiplied together) when their corresponding motors are set into operation. Thus, in the example specifically chosen, each line has thirty sets of line terminal contacts in coöperative relation with the traveling terminals of thirty answering-jacks and each answering-jack has its traveling terminals in coöperative relation with five hundred sets of telephone line terminal contacts.

I shall term the conductors that extend between the different groups of lines and the answering-jacks "answering-jack circuits," each jack having such a circuit. Preferably the first answering-jack circuit has its traveling answering end (meaning the traveling terminals of the answering-jack) connected with the answering-jack appearing at the first position of the first board section, the second answering-jack circuit having its answering end connected with the answering-jack at the second operator's position of the first board, the third answering-jack circuit having its answering end connected with the answering-jack at the third operator's position of the first board, the

fourth answering-jack circuit having its answering end connected with the answering-jack at the first operator's position of the second section of the board, the fifth answering-jack circuit having its answering end connected with the answering-jack at the second operator's position of the second section, the sixth answering-jack circuit having its answering-end connected with the answering-jack at the third operator's position of the second section, and so on.

I have indicated ten answering-jacks at each operator's position, and, in order that no operator may receive calls to such an extent that she cannot attend to them, provision is made whereby answering-jack circuits may be made to correspond with busy answering-jack circuits artificially, in order that when a less efficient operator has reached her capacity, her answering-jack circuits which have been incapacitated will not be connected with a calling line, but, on the other hand, connection will be effected between said calling line and an idle answering-jack circuit at another operator's position. It will be seen that if each of the thirty answering-jack circuits is worked to its maximum efficiency, said circuits will be capable of taking care of forty-five calls per hour, or a total of one thousand three hundred fifty calls during the busy hour, representing an average of 2.7 calls per subscriber during the busy hour, or 21.6 per subscriber per day. Ample margin is thus present for a reduction in the total number of answering-jack circuits in service to an average of seven or eight per operator, whereby facilities are furnished for handling a greater number of calls per day than will originate in an average exchange of the size chosen as an example.

While I have herein specifically described mechanism wherein the answering-jacks are provided with answering-terminals that travel in order to select a calling line, I do not wish to be limited in all embodiments of the present invention to the precise way in which connection is automatically effected between calling lines and answering-jacks.

While the apparatus of my invention is particularly serviceable in connection with multiple switch-board practice, I do not wish to be limited in all embodiments of the invention to such practice.

I will explain my invention more fully by reference to the accompanying drawings illustrating the preferred embodiments thereof, in which—

Figures 1, 2, 3 and 4 illustrate somewhat fully telephone exchange systems equipped with the apparatus of my invention.

Fig. 5 is a general diagrammatic view illustrating one distribution of the answering-jack circuit which may be varied to suit different exchanges.

Fig. 6 is a view illustrating another construction of line-jack and answering-plug.

Like parts are indicated by similar characters of reference throughout the different figures.

Each subscriber's station A—B is provided with customary common battery subscriber's apparatus, a switch-hook at each station serving operatively metallically to unite the sides of the line when the receiver is removed. I do not deem a detailed description of the subscriber's station apparatus to be essential, as the illustration is sufficient to make the same understood by those skilled in the art. Although I have illustrated one arrangement of subscriber's station apparatus, it will be obvious to those skilled in the art that other arrangements may be employed at the substations, and I do not wish to be limited to the arrangement and apparatus shown, nor do I wish to be limited in all embodiments of the invention to its application to a common battery system. The subscribers' lines indicated are metallic lines and each extends in two branches to the exchange, where they terminate in armatures 1—1' of a cut-off relay 2. The alternate contacts of the armatures constitute terminals of the office end of the line which is supplied with the line-jacks 3 that I have spoken of. The system illustrated being a multiple switch-board system, there are also provided upon other sections of the board than where jack 3 is located, other jacks 4 in connection with the said alternate contacts and the office end of the line similar to the connection of jack 3. Multiplied terminals 5—5' and multiplied terminals 6—6' are provided for each line which are connected with the alternate contacts of the cut-off relay switches and form what I have herein spoken of as the telephone line terminal contacts when the armatures 1—1' of said relay are attracted. The contact buttons or terminals 5—6 are desirably arranged in circular rows over which sweep the answering-jack terminals 7—8 and 7'—8', which answering-jack terminals are desirably not normally connected with the answering-jack, but which, as indicated in connection with the terminals 7—8, are caused to form continuations of the answering-jack circuit upon the operation of an armature-switch including a tip switch contact 9 and a sleeve switch contact 10 governed in their movement by a relay 11 under circumstances to be hereinafter set forth. There is also an additional circular row of contact buttons 12—12' over which sweep contact arms 13—13' that take part in controlling the motion of the terminals 7—8 and 7'—8'. The number of contact buttons 5 and also 5', the number of contact buttons 6 and also 6' and the number of contact buttons 12 and also 12', each equals the num-

ber of telephone lines to which a group of answering-jack circuits has been assigned. For example, if thirty answering-jack circuits have been assigned to a group of five hundred lines, the contact buttons 5 number five hundred, one connected with each line, the number of contact buttons 6 equals five hundred, one connected with each line, and the number of contact buttons 12 equals five hundred, one for each line. The contact arms or brushes 7, 8 and 13 constitute a set and there are as many sets of such contact brushes as there are answering-jack circuits assigned to a group of telephone lines. Said contact arms of each set are desirably operated by a common prime mover, there being a shaft 14 forming a part of the common prime mover upon which it may be understood the arms 7, 8 and 13 are mounted. There are thus as many prime movers as there are answering-jack circuits. The prime mover 15 illustrated upon the left of each of the drawings is composed of a spring motor 16 in driving engagement with the shaft 14 and a wheel 17 upon said shaft, which wheel is provided with a plurality of off-set teeth 18—19 arranged in peripheral rows, across which teeth the polarized armature 20 of the motor is adapted to oscillate by the agency of the field windings 21 and the source of alternating current 22 when said source of current is included in a closed circuit with said windings. The said armature in operating is removed from engagement with one tooth 18 into the path of an off-set tooth 19, whereupon the spring motor may move the wheel a step, whereafter the armature is oscillated to its initial position into the path of a new tooth 18 that is off-set with respect to the previously engaged tooth 19, whereupon the spring motor may move the wheel 17 another step, and so on, until the source of current 22 has the circuit including the same opened.

In the motive device shown upon the right of Figs. 1 and 2, a source of direct current, as the common battery 23, may be employed to operate the field winding 24, which is alternately energized and deenergized, so that the armature 25 may be attracted from engagement with the teeth in the row 26 and brought into the path of the teeth in the row 27 offset with respect to the teeth 26. Upon this attraction of the armature, the circuit through the magnet 24 is opened, whereupon the spring 28 restores the armature to its initial position. In this way a spring motor, which is assumed to be in driving engagement with the wheel bearing the teeth 26—27, may cause the answering-terminals of the answering-jack circuit to move from one line-contact to the next, upon the deenergization of the magnet 24, and as the result of the retraction of the spring 28.

I will explain the circuit arrangements of

the magnets 21—22 and the apparatus by which such arrangements are controlled more fully hereinafter.

When a subscriber initiates a call, the answering end of an idle answering-jack circuit, in this case the first, is automatically connected with a set of terminal contacts, as the contacts 5—6, for example, this automatic connection being occasioned by the operation of the said answering-jack circuit's motor. Only one answering-jack circuit motor, that corresponding to an idle answering-jack circuit, is preferably operated in automatically effecting the movement of the answering-terminals of said answering-jack into contact with the terminals of a calling line. To this end I preferably employ selective mechanism, constituting an electric motor, that serves to select the answering-jack circuit motor that is to be operated, which selecting motor may be termed the "calling subscriber's governor motor" and there is preferably only one such motor common to a group of telephone lines. Referring again more particularly to the system illustrated in Fig. 1, this governor motor includes in one embodiment of the invention a traveling switch 29 operated by the armature of an electro-magnet 30, as will hereinafter be particularly set forth, which switch 29 rides over a series of contact buttons 31, constituting terminals of conductors extending to the various answering-jack circuits of a group, there being as many contacts 31 as there are answering-jacks of a particular lot assigned to a group of lines; there are in the example chosen thirty such contact buttons 31. A complete conductor 32 is shown extending from one of the contact buttons 31 to the answering-jack circuit that is shown uniting the subscribers' stations A and B. Normally, that is, when its answering-jack circuit is idle, this conductor 32 is connected with the grounded battery 23 by way of the switch 33 governed by the relay 11. The switch 29 is normally disconnected from ground, but, as will hereinafter be more fully set forth, has ground connected therewith by a subscriber in initiating a call, whereby the circuit including the conductor 32 is completed. The winding of a magnet 34 is included in the conductor 32, so that, when this conductor is included in a closed circuit, the armature-switch 35, constituting a terminal of the generator 22, is attracted to complete the circuit through the magnet 21 and said generator, the switch 36 controlled by magnet 11, then being upon its grounded contact. When, therefore, the switch 29 is moved by a calling subscriber into connection with a conductor 32 that is completed at 33, the answering-jack circuit motor of the answering-jack circuit corresponding to said conductor is set into operation. But where the

switch 29 encounters the terminal of a conductor 32 that is open at 33, as is always the case where the corresponding answering-jack circuit has been automatically connected with a calling line, said switch is caused to pass said opened conductor and to continue its operation until it encounters a conductor that is closed at 33; that is, a place similar to 33. When the switch 29 encounters the terminal of a conductor 32 that is closed at 33 and the corresponding answering-jack circuit motor has moved the switches 7-8 into connection with the telephone line terminals and the switch 13 into connection with the conductor associated with the calling telephone line, the magnet 11 becomes energized in a manner more fully hereinafter to be set forth, to operate the armature switches 9-10, to complete the connection of the answering-jack with the said line-terminals, to open the conductor 32 at 33, to open the circuit of the answering-jack circuit prime mover at 36, and to close a subsidiary path through the winding of magnet 11 to maintain it energized irrespective of subsequent changes occurring in the apparatus associated with the calling line, the armature-switch 37 engaging its contact, which is a pivoted one, before said contact breaks connection with the contact it in turn normally engages. As one of the results of these circuit changes, the answering-jack circuit motor ceases its operation, so that the answering end of the selected answering-jack circuit may remain in the position to which it has been placed by its operating motor.

Having thus in a general way outlined some of the operations taking place in automatically effecting connection between a calling subscriber and an idle cord circuit, I will now more particularly describe the operation of the apparatus entering into my invention.

The subscriber, as A, having initiated a call, includes the winding of a magnet 38 in circuit with a grounded battery 23, whereupon the armature-switches 39-40 operated by said magnet 38 are moved against their grounded contacts, 39 being preferably grounded before 40. The switch 39 is connected with a conductor 41 that is common to all of the lines and which extends to the switch 29 and which is the conductor that is grounded in order to complete the circuit containing the conductor 32, when said latter conductor is closed at 33 as heretofore set forth, whereby results that have hitherto been specified are accomplished. This same conductor 41 has a branch 42 that is connected with the grounded battery 23, which conductor 42 includes the winding of the motor 30, the switch-arm 43 governed in its operation by the armature of said motor 30 and the armature 44

with its contact, said latter armature belonging to the relay 45. Thus, the switch 29 is not only grounded at 39, but the magnet 30 is included in a grounded circuit, which circuit is intermittently opened by the separation of the lazy arm 43 from its contact, due to the operation of the armature of the magnet 30 and the coöperation of an extension of said armature between the bifurcated ends of said arm. The arm 43 is forced away from its contact upon the attraction of the armature by the magnet 30 and is restored to engagement with its contact by the spring in connection with said armature, the said armature being thus intermittently attracted as long as the circuit containing the magnet 30 is otherwise closed. Said armature coöperates with the teeth of an extension of switch 29, whereby the said switch is caused to travel as the armature is intermittently attracted. The dog 46 engages the said teeth to prevent the restoring spring 47 from operating until required, so that the switch 29 is maintained in any position, for the time being, in which it has been placed by the motor 30. When the switch 29 encounters a conductor 32 that is closed at 33, circuit through the magnet 45 is obviously closed, the winding of this magnet being included in the conductor 41, whereupon the armature 44 is attracted to bring the catch 48 into connection with the catch upon the dog or detent 46 preparatory (but not at this time in connection with the system shown in Fig. 1) to releasing the said detent from mechanical locking engagement with the switch 29 to permit the spring 47 to restore the said switch to its normal or initial position. The magnet 45 remains energized until the circuit containing the conductor 32 is open at 33, which only is accomplished when the answering-jack circuit motor selected by the subscriber's governor motor has brought the answering-contacts of its associated answering-jack circuit into connection with calling line terminal contacts. The connection of the answering-jack circuit with the calling telephone line having thus been effected, circuit through the magnet 45 is opened at 33, whereupon the spring 49 lifts the dog or detent 46, permitting the spring 47 to withdraw or restore the switch 29 to its initial position. In order that the switch 29 may not through some fault in the operation of the apparatus, or in case all answering-jacks are busy, pass all of the contacts 31 without causing the selection of an answering-jack circuit and thereafter be not restored, I provide a supplemental contact button 50 which is engaged by the brush 29 on reaching the limit of its excursion, whereupon circuit is completed that may be traced from the ground at 39 occasioned by the calling subscriber, the magnet 45, the switch 29, the

contact button 50 and the grounded battery 23, whereupon the armature 44 is attracted, with the results hitherto specified, the circuit through the magnet 45 is opened at 51 and the spring 49 is permitted to withdraw the detent 46, whereupon the spring 47 restores the switch 29. In order that some of the answering-jack circuits may be rendered inoperative, so that work assigned to less efficient operators may be reduced, the conductors 32 may each include a switch 52 that may produce a break in said conductor similar to that produced at 33 when the magnet 11 is energized, so that the switch 29 will not pause at a contact terminal of said conductor, but will pass the same as if the answering-jack circuit associated therewith were busy. In order that my invention may be effectively practised, the magnet 11 (which is the one that determines the connection of the selected answering-jack circuit with the calling telephone line, determines the continuity of the circuit including the governor motor, and controls the electrical character of the buttons 31 by controlling the conductors 32 and 33) is preferably included in a circuit that is distinct from the talking circuit, which circuit includes a conductor 53 that terminates in the armature-switch 40, there being one such armature-switch 40 and one such conductor 53 for each telephone line. This conductor 53 is connected with the contact buttons 12—12', etc., associated with the answering-jack circuits, there being, as hitherto stated, as many such contacts 12 and as many such contacts 12' as there are telephone lines in a particular group. The switch-arm 13, for example, cooperates with the contact buttons 12, the said switch-arm moving with the switch-arms 7—8 until it encounters the conductor 53 that is grounded at 40 by the calling subscriber, whereupon circuit is closed from said ground at 40 through the grounded battery 23 by way of the switch-arm 13, the button 12 engaging the same and the pivoted switch-contact 54 engaging its normal contact 55. The magnet 11 is thus energized to bring the switch-arms 9—10 into connection with the contacts of the calling subscriber's line, while the armature-switches 33, 36 and 37 are moved by said magnet when thus energized, whereby the said magnet is included in a circuit containing the battery 23, the contact 54, the switch 37, and the conductor 56 normally grounded at 56'. Circuit is also established from the grounded battery 23 through the answering-jack circuit relay 57, the sleeve side of the answering-jack circuit, the armature-switch 10, the answering terminal switch 8, the ground at the cut-off relay 2 and also the ground at the relay 58 that is connected with the tip side of the answering-jack circuit and which ground is reached over the subscriber's line by way of the answering-terminal 7 and the armature-switch 9. The operation of relay 57 permits relay 11 to continuously hold its armatures attracted, since when the armature of relay 57 is attracted, it engages its alternate contact, and when breaking connection 56, 56', completes a maintaining circuit for relay 11, through contact 59', 59², attracted armature of relay 58, signal 59, relay 89', to ground, the armature of relay 58 being attracted in time to prevent retraction of those of relay 11. The magnet 11 will thus be unresponsive to any change in the position of the switch 40 and the cut-off relay 2 will be energized, whereupon the armatures 1—1 will be attracted and the switches 39—40 restored to their normal positions, whereby the connection between an idle answering-jack circuit and a calling line is completely established. Upon such completion of the connection of a selected answering-jack circuit and a calling line, the calling indicators 59—60 are operated in a manner to be specified, whereupon the operator connects the answering-plug 58' of an idle cord circuit with the answering-jack connected with the calling line. This answering-jack may be of the form commonly in use or it may be of the form illustrated in Fig. 6. I do not, therefore, wish to be limited to the construction of the answering-jacks or the construction of the plugs designed for association with the jacks, nor to a plug that is adapted for insertion within the jacks as contradistinguished from jacks that are adapted to be received by the plugs as indicated in Fig. 6. I use the term "jack", therefore, in the broad sense of a switch element adapted for association with cord circuits, and have used the term "plug" in the broad sense of any manually operated switch part belonging to a cord circuit adapted for engagement with the contacts of the jack. When the plugs are out of engagement with the jacks and an answering-jack has automatically been connected with a calling line, a part of the circuit through the calling signal 59 is made up of the pivoted contact 59' engaging the contact 59², the contact 59' being then removed from the grounded contact 59³. When the operator engages the answering-plug with the selected answering-jack, circuit through the line-signaling apparatus is broken at 59², but the contact 59' engages the grounded contact 59³ through the agency of the plug that brings the contacts 59' and 59³ together and thereby separates the contacts 59' and 59². The ground 59³ is placed upon the conductor 56 before it is removed at 59², so that circuit through the magnet 11 will still remain intact for the purposes that have been specified. After the operator has engaged the answering-plug with an answering-jack, she ascertains

the connection desired, inserts the connecting plug companion to the answering-plug into the jack of the called for subscriber, and signals the called for subscriber with any suitable apparatus, such as that indicated and which is so well understood by those skilled in the art as to need no description. The entire cord circuit apparatus including the supervisory apparatus that I have shown is so well understood by those skilled in the art that a description thereof would be superfluous. The circuits including and controlling calling signals 59—60 will be apparent and need not be described.

If the calling subscriber had restored his telephone before the operator inserted the answering-plug, circuit through magnet 58 would have been opened at the calling subscriber's switch-hook, so that circuit through the magnet 11 would have been opened at the released armature of magnet 58. After the operator, however, has inserted the answering-plug, the control of the magnet 11 is had by her at 59'—59". The operator when breaking connection between calling and called subscribers, withdraws the plugs of the cord circuit to open circuit through magnet 11 at 59' and 59", the armature of magnet 58 being then unattracted because of the opening in the circuit of said magnet occurring at the switch-hook. Upon the de-energization of the relay 11, the armature-switches 9, 10, 33, 36 and 37 are released, whereupon the calling line is automatically disconnected and the answering-jack circuit is restored to its idle condition of use.

The selecting mechanism illustrated upon the right of Fig. 1 is generally similar to that illustrated upon the left. The answering-jack circuit motor operating the answering end of the answering-jack circuit shown in association therewith is of the same general character as that illustrated upon the left of the drawing, but the escapement 25 is operated through other agency than is the escapement 20, the escapement 20 being moved alternately altogether by magnetic attraction, while the escapement 25 is moved in one direction by the magnet 24 and in the other direction by the spring 28. Teeth 26—27 are also preferably spaced with respect to each other somewhat differently from the teeth 18—19, so that, when the detent 25 is disengaged from a tooth 26, the wheel carrying the teeth is moved a lesser distance than when said escapement is disengaged from a tooth 27, to be brought into connection with a tooth 26. This permits the answering end of the answering-jack circuit to be very quickly operated without danger of moving the same beyond the line terminal contacts of a calling subscriber. The apparatus upon the right includes similar armature-switches 9—10 associated with the answering terminal contacts 7—8 just as

in the left of the drawing. The magnet 71 operates the armature-switches 9—10 for the same purpose that the magnet 11 operates its armature-switches 9—10. The magnet 24 is included in a circuit that contains the battery 23 and the bifurcated lazy arm 72 when engaged with its grounded contact through the agency of the spring 28.

The subscriber's governor motor upon the right of the drawing is similar in construction, operation and arrangement to that shown upon the left of the drawing, like parts and connections of both governor motors being given similar characters of reference. Other parts of apparatus and circuits illustrated upon the right of Fig. 1 that have functions and arrangements corresponding to similar parts upon the left of the figure, are also given similar characters of reference, though in some cases the mechanical association may not be absolutely identical. After circuit through the conductor 32 has been closed upon the selection of an idle answering-jack circuit switch by the calling subscriber (now speaking of the apparatus upon the right) the magnet 34 is operated to attract its armature and complete circuit through the magnet 24, which may be traced from the grounded battery 23 through the magnet 24, the armature 35 of magnet 34, to the bifurcated lazy arm 72, when engaging its grounded contact. After each attraction of the armature 25, circuit through the magnet 24 is opened by the separation of the lazy arm 72 from its grounded contact, whereby the armature 25 is released and is thereupon removed to a reverse position by the spring 28, which spring at the same time causes the restoration of the lazy arm to its initial position, whereupon circuit through the magnet 24 is again closed, which operation is continued until the answering-jack circuit motor has operated the answering ends of the idle answering-jack circuit, to bring the same into connection with a calling subscriber's line terminal contacts. When this result is achieved, the arm 13 is grounded by way of the armature-switch 40 of the calling subscriber, whereby the magnet 71 is included in a circuit that may be traced from the grounded battery 23 through the magnet 24, the armature 35, its contact, the magnet 71, the switch-arm 13, to the grounded armature-switch 40, whereby the armature 25 remains attracted by the magnet 24, whereby the magnet 71 is energized. The energization of the magnet 71 establishes a supplemental circuit for the magnet 24 which may be traced from the grounded battery 23 through said magnet 24, the contact 73, the armature 74 of magnet 71, the winding of magnet 71, the armature contact 75, to the conductor 56 that has a ground 56' established thereupon. After a calling line has selected an idle answering-

jack circuit and connection has been established, the magnets 24 and 71 are maintained energized until the cord again becomes idle. Another result of the energization of the magnet 71 is apparent in the deenergization of the magnet 34, whereby the governor motor may be restored without the danger of being re-stepped at the end of a connection. The provision of the circuit afforded by the armature contact 75 and the ground 56' upon conductor 56 is for the purpose of maintaining circuit through the winding of magnets 71 and 24, which otherwise would be broken upon the disconnection of ground from the armature-switch 40 upon the operation of the armature-switches 9—10 which cause in the manner heretofore set forth, the operation of the cut-off relay 2 and the consequent removal of the armature-switch 40 from ground.

Should there be two or more subscribers in any group calling at the same time, it is apparent that the answering-jack circuit traveling switch of the first idle answering-jack would select and make connection with the first of the calling lines which the arms 7, 8 and 13 encountered and that the switch 29, being then released, would immediately select the next idle answering-jack circuit, owing to the ground still present on conductor 41, this operation continuing until all of the calling subscribers in a group have been answered.

A feature of my invention resides in the provision of the supplemental sets of contacts 12—12' in addition to the talking terminals of each telephone line in conjunction with the switch-arms 13—13' cooperating with said contacts, all operating in conjunction with the answering-jack circuits.

A very useful feature of my invention is the provision of local circuits including subscriber operated switches, as 40, desirably located at the exchange and adapted to include a switch-arm, as 13, in circuit when placed in engagement with one of the said supplemental line contacts, as 12, and apparatus included by said arms in any local circuit thus established, which apparatus will serve to effect the restoration of the answering-jack selecting mechanism, so that said mechanism may be used in perfecting other connections.

In the precise embodiment of the invention illustrated there are, as has been stated, as many supplemental line contacts 12 and as many supplemental line contacts 12' as there are telephone lines in a particular group. There are as many sets of these contacts 12—12' and arms 13—13' as there are answering-jacks assigned to such group. In the embodiment of the invention illustrated, there are thus many more subscriber operated switches 40 provided for the local cir-

cuits than there are sets of contact buttons 12—12' and arms 13—13', but the said arms and contact buttons are adapted to be included in local circuit with switches 40 of calling lines. I do not wish to be limited, however, to the precise arrangement illustrated.

The system illustrated in Fig. 2 is similar in general respects to that indicated in Fig. 1. The system illustrated in Fig. 2 has as a modification of the system shown in Fig. 1 additional sets of subscribers' contacts 76—76' equaling in number the contacts 5—5', 6—6', etc., the provision of switch-arms 77—77' for sets of added contacts 76—76' and circuit conductors 78—79, in which conductor 78 there is included an auxiliary armature-switch 80 and relay 81 and in which conductor 79 there is included the cut-off relay 2', the conductor 79 being extended to the multiplied spring-jacks, the particular system shown being a multiple switch-board system, whereby the cut-off relay may be operated from any section of the board as well as upon the connection of the answering end of an answering-jack circuit with a calling line. In the system shown in Fig. 1 a side of the talking circuit is employed in the operation of the relay 2, whereas in the system illustrated in Fig. 2 the conductor that establishes the circuit for the relay 2' is not a section of the talking circuit, but is a third or-supplemental conductor employed for the purpose of this control of the cut-off relay and the control of the supervisory apparatus associated with the answering-jack circuit. The parts of the system illustrated in Fig. 2 having the same general purpose and arrangement as those illustrated in Fig. 1, are given similar reference characters. In general, the functions performed by the added conductor are similar to the functions performed by one of the talking conductors shown in the system of Fig. 1. The relay 81 corresponds in function to the relay 57. The relay 82 corresponds in function to relay 58. The lamps 83—84 correspond in function to the lamps 59—60. The contacts 85—86 cooperate with each other in opening and closing the circuit of the magnet 82. The circuit of the magnet 82 is preferably traced from the grounded battery 23 through the winding 82, the contacts 86—85, the sleeve strand of the answering-jack circuit, through the subscriber's line, back to the tip strand of said circuit, to the tip line spring and the ground 87 engaging said line-spring when the plug 58' is withdrawn, so that the circuit containing said magnet 82 is not only opened at 85—86, but is also opened at the ground 87, whereby said magnet 82 is entirely disconnected in the system shown in Fig. 2 rather than being connected with one side of the line terminal, as is the case of mag-

net 58 of the system shown in Fig. 1. Upon the insertion of the answering-plug 58' within an answering-jack, a circuit that is maintained during the presence of such plug in said jack, is established for the magnet 11 and which may be traced from the grounded battery through the helix of said magnet, the armature switch 37, the conductor 56, to the ground 88 thrown into connection with the contiguous and pivoted contact terminal of said conductor 56 by the answering-plug and elements of the answering-jack operated thereby; this circuit being established for the same purpose as that for which circuit was established through magnet 11 of the system shown in Fig. 1 at 59^a, the grounds 88 and 59^a having similar functions. In order that the calling signal 83 may positively be disconnected from the line, an auxiliary circuit opening and closing switch 89 is provided. In each of the systems of Figs. 1 and 2 a relay 89' is included in circuit with the signals 59 and 83, respectively, for operating the auxiliary calling lamps 60 and 84, respectively, whose circuits will readily be understood by an inspection of the diagrams. The cord circuit apparatus illustrated in Fig. 2 including the answering-plug 58' and connecting plug 61' corresponding to similar plugs of the system of Fig. 1, is well understood by those skilled in the art and a description of the instrumentalities comprising the same would be superfluous. I have indicated in Figs. 1 and 2 those systems that are most commonly employed throughout the United States in large exchanges, the two being illustrated in order that the wide applicability of my invention may be readily understood. I do not deem it essential to illustrate further systems and the application of my invention thereto.

In the system illustrated in Figs. 3 and 4 the same general systems have been illustrated that are shown in Figs. 1 and 2 respectively.

It will have been observed that the main function of the switch 29 and the elements in coöperative relation therewith has been performed as soon as an answering-jack circuit motor corresponding to an idle answering-jack circuit has been set into operation, the said switch 29 being restored to its initial condition as soon as the selected answering-jack circuit motor has brought the answering end of the answering-jack associated therewith into connection with the contacts of a calling line, so that another subscriber may use the said switch in initiating another call. I have indicated one such switch 29 upon the left of the drawing and another upon the right of the drawing for the purpose of clearness, but it is understood that I prefer to use only one such organization to a group of lines.

In the system illustrated in Figs. 3 and 4 the subscriber's governor motor is restored to its initial condition immediately upon the selection of the answering-jack circuit motor, so that the said governor motor is at once in a condition to be used by another calling subscriber, this arrangement being preferred to that illustrated in Figs. 1 and 2 in which the governor motor is thrown out of service until the answering-jack circuit motor selected by it has finished its operation in connecting the answering end of the selected answering-jack circuit with the line terminal contacts of a calling subscriber. In the arrangement illustrated in Figs. 3 and 4 the answering terminal contacts of the answering-jack circuits have initial positions to which they are restored when their answering-jack circuits are disconnected and placed out of service, this arrangement differing from that illustrated in Figs. 1 and 2, where the traveling answering ends of the answering-jack circuits remain in the positions where they were last used. By this arrangement it is apparent that several answering-jack circuit motors corresponding to a group of telephone lines may be successively started before the controlling ground at the switch 39 is removed. It will be apparent that by this apparatus the governor motor common to a plurality of lines may be operated in very quick succession as it is released after starting an answering-jack circuit motor without having to be maintained in the position to which it has been actuated by a calling subscriber until the answering-jack circuit motor has effected connection between a calling subscriber and an idle answering-jack circuit. Several answering-jack circuit motors may thus be operating at the same time, the first selected idle answering-jack circuits having connection effected with calling lines. That is, the idle answering-jack circuits are connected with calling telephone lines in the order in which they have been selected by the subscriber's governor motor, those started by the governor motor in excess of the number calling, which are the last to be started, returning to their normal positions. By this arrangement the answering ends of the answering-jack circuits in sweeping over the line terminal contacts of a number of calling subscribers stop at the nearest calling line terminal contacts independently of the answering-jack circuit motors started by calling subscribers. That is, of a number of calling subscribers in a group of telephone lines, one subscriber may cause one answering-jack circuit motor to start, which answering-jack circuit motor may effect connection of another lower numbered calling subscriber with an idle answering-jack circuit.

Referring now more particularly to Fig. 3, each subscriber's station, A—B, is pro-

vided with the customary common battery subscriber's apparatus, a switch-hook at each station serving operatively metallically to unite the sides of the line when the receiver is removed. I do not deem a detailed description of the subscriber's station apparatus to be essential, as the illustration is sufficient to make the same understood by those skilled in the art, and other arrangements may be employed at the sub-station. As in the case of the systems shown in Figs. 1 and 2, the system indicated need not be limited to common battery practice. Each subscriber's line indicated is a metallic line and extends in two branches to the exchange where it terminates in contacts 1'—1' of a cut-off relay 2'. These contacts are normally engaged by the armatures of said cut-off relay and are preferably pivoted contacts and are swung upon their pivots by said armatures when unattracted, to discontinue the telephone line at the contacts 1'—1'. The upper armature 1' of the relay constitutes a terminal thereof and is grounded. The lower armature 1' constitutes a terminal of the magnet 38'. The system illustrated being a multiple switch-board system, the contacts 1' constitute terminals of the office end of the line, which end is supplied with the line-jacks 3, and there are also provided upon other sections of the board than where jack 3 is located, other jacks 4 in connection with the said contacts 1'—1'. Multiple terminals 5—5' and multiple terminals 6—6' are connected with the terminals 1'—1' and constitute the telephone line terminal contacts, as will be understood. The contact buttons or terminals 5—6 are arranged in circular rows over which sweep the answering-terminals 7—8 and 7'—8', which answering-terminals are normally connected with the answering-jack associated therewith, but which connection is preferably broken at the armature-switches 9—10 in the course of the selection of an answering-jack circuit, so that the apparatus illustrated may be effective for the purpose of the invention, the said armature-switches 9—10 being included in the tip and sleeve sides of the answering-jack circuit, respectively, and being serially included in circuit with the switch-arms 7—8 and the contacts 1'—1' when said contacts are in connection with said switch-arms. There are also provided the additional rows of contact buttons 12—12' whose general purpose is similar to the purpose of the correspondingly designated contacts of Fig. 1, but whose circuit relations are somewhat modified in view of the altered character of the system of Fig. 3. The contact or switch-arms 13—13' sweep over contact buttons 12—12', these contact arms being provided for the same general purpose for which the correspondingly designated contact arms of

Fig. 1 are provided. These arms are pivoted at the centers of their circular rows of contacts and are preferably flared or enlarged at their free ends, so that they will make contact with adjacent buttons at the same time, so that one button will not be freed from connection with a corresponding arm until after the succeeding button has been engaged thereby. In the system shown in Fig. 3 it may be understood, for example, that thirty answering-jack circuits have been assigned to a group of five hundred lines, that the contact buttons 5 number five hundred, one connected with each line, that the number of contact buttons 6 equals five hundred, one connected with each line, and that the number of contact buttons 12 equals five hundred, one for each line. The contact brushes 7, 8 and 13 constitute a set and there are as many sets of contact brushes as there are answering-jack circuits assigned to a group of telephone lines. Said contact arms of each set are desirably operated by a common prime mover 15; that is, there is one prime mover provided for each of said sets, which prime mover may include the shaft 14 upon which said brushes or arms 7, 8 and 13 are mounted, the spring motor 16, the wheel 17 upon shaft 14, the said wheel carrying teeth 18—19, arranged in peripheral rows, across which teeth the polarized armature 20 of the motor is adapted to oscillate by the agency of the field-windings 21 and the source of alternating current 22 when said source of current is included in a closed circuit with said windings, this prime mover being similar in its operation to the prime mover illustrated upon the left hand of Fig. 1.

When a subscriber initiates a call, the answering end of an idle answering-jack circuit, in this case the first, is automatically connected with a set of terminal contacts, this automatic connection being occasioned by the operation of the said answering-jack circuit's motor. In order that the subscriber's governor motor may immediately be used after causing an answering-jack circuit motor to start, so that another answering-jack circuit motor may be soon started by another calling subscriber without waiting for the first answering-jack circuit motor to complete its operation in selecting an idle answering-jack circuit, the arrangement illustrated is preferably employed. The governor motor shown upon the left and that shown upon the right each includes a switch 29 operated by the armature of an electromagnet 30, as will be hereinafter more particularly set forth; which switch 29 rides over a series of contact buttons 31 constituting terminals of conductors extending to the various answering-jack circuits of a group, there being as many contacts 31 as there are answering-jacks of a particular lot assigned

to a group of lines, there being in the example chosen thirty such contact buttons. A complete conductor 32 is shown extending from one of the contact buttons 31 to the answering-jack circuit that is shown uniting the subscribers' stations A—B. Normally, that is, when its answering-jack circuit is idle, this conductor 32 is connected with the grounded battery 23 by way of the switch-arm 13 whose normal position is upon the contact button that engages the switch-arm 13 to effect connection of said conductor with said battery. The switch-arm 29 is operated by the magnet 30 included in a circuit that may be traced from the grounded battery 23, over the conductor 42, the winding 30 adapted for intermittent inclusion in said conductor, the armature-switch 44 of relay 45', the armature-switch 39, to the ground placed upon said armature-switch upon the initiation of a call by a calling subscriber, this armature-switch being attracted to effect connection with said ground because a circuit is established by said subscriber through the magnet 38' operating switch 39 when he removes his telephone for the purpose of making a call, which circuit may be traced from the grounded battery 23, through the winding of magnet 38', the armature 14, over the subscriber's telephone line to the contact 12, to the grounded armature-switch 13. The subscriber's governor motor including the switch 29, the operating magnet 30 and associated parts, is similar to the subscriber's governor motor described particularly in connection with Fig. 1 and a repetition of this description will not, therefore, be required. A calling subscriber in initiating a call, effects the travel of the switch-arm 29 over the contact buttons 31 until a contact button that is connected with a conductor 32 that is associated with an idle answering-jack circuit is encountered, whereupon the motor corresponding to said answering-jack circuit is set into operation, as will be hereinafter set forth. As soon as the answering-jack circuit motor is set into operation; that is, as soon as a contact 31 corresponding to an idle answering-jack circuit (in the case of this system the first idle answering-jack circuit becoming associated with the switch-arm 29) is engaged by the switch-arm or switch 29 said arm is immediately reciprocated to its initial position because the said switch-arm is permanently grounded through the winding of a magnet 45', circuit through said magnet being therefore completed when a conductor 32, grounded, as has been specified, at the battery 23, is connected with the element 29, the magnet 45' serving to attract the armature 44 to engage the hook 48 with the detent 46. In order that the spring 49 may become effective in withdrawing the detent 46 from engagement with the serrated extension of the switch 29, the circuit established through the magnet 45' by the switch 29 must be open, so that the said spring will not be counteracted by the attraction of said magnet. This result is accomplished by the movement of the switch-arm, as 13, operated by the corresponding answering-jack circuit motor from the contact of the conductor 32 normally engaged by said switch-arm, thereby disconnecting the battery 23 from said conductor 32 to open the circuit including the magnet 45', whereafter the spring 49 may lift the detent 46 by pulling the catch 48 upwardly, whereupon the switch 29 may be restored by the spring 47. Thus, directly after an answering-jack circuit motor has been started to operate by a governor motor operated by a calling subscriber, the said governor motor is released, permitting it to act without delay in starting another answering-jack circuit motor in case another subscriber of the group to which the governor motor has been assigned initiates a call. A supplemental contact 50 is provided so that the switch arm 29 may be restored in case all the conductors 32 are associated with busy answering-jacks or the switch-arm 29 has otherwise traveled its full course without having started an answering-jack circuit motor. The contact button 50 is connected by way of the switch 51 with the grounded battery 23, so that, when the switch 29 engages said button 50, circuit through the magnet 45' will be completed to draw up the armature 44 and effect engagement of the catch 48 with the detent 46, immediately whereafter circuit through the magnet 45' is opened at 51 so that said magnet 45' is deenergized and spring 49 is free to lift the detent 46 by the elevation of the catch 48, whereupon the spring 47 reciprocally moves the switch 29. The switch-arm 13 operated by the selected motor, together with the companion switch-arms 7—8, sweep about their associated circular rows of contacts until the contacts corresponding to the calling line are thereby engaged. Prior to the connection of the talking terminal contacts 7—8 at the answering end of an answering-jack circuit with a calling subscriber's line, the armature-switches 9—10 are attracted by the magnet 11' through which circuit is at once established, which circuit may be traced from the grounded battery 23, through the winding of said magnet 11', to the then unattracted armature-switch 90 of magnet 91, to the contact button in engagement with the selected conductor 32, to the ground at the magnet 45'. In the system illustrated in Fig. 3 each of the contacts 12 is normally grounded at the armature-switch 92 operated by the magnet 38', these grounds being present when the corresponding telephone lines are idle, but being removed when the magnet 38' is energized,

which occurs when a subscriber first initiates a call, the ground at 92 being restored as soon as the cut-off relay 2² is energized. There is thus only a brief interval in which the contacts 12 (also 12', etc.) are free of ground. The flared end of the arm 13 is consequently grounded at the points 92, maintaining the magnet 11' energized until the said flared end encounters a button 12 from which the ground at 92 has been removed by the operation of the magnet 38', whereupon the magnet 11' is deenergized to release the armature-switches 9-10, which thereupon complete the connection of the selected answering-jack circuit with a calling line. The magnet 91 serves to attract the armature switch 90 for the purpose of preventing the magnet 11' from becoming energized when the ground 92 has been restored. The energization of magnet 91 is effected by the closure of the circuit that may be traced from the grounded battery 23, through the winding of said magnet 91, the sleeve side of the answering-jack circuit, the armature-switch 10, the arm 8, the winding of the cut-off relay 2², to the ground of said cut-off relay. Upon such energization, the armature-switch 90 is operated to open the circuit containing the magnet 11'. When the magnet 11' is energized, its armature-switch 35 is grounded to set the selected answering-jack circuit motor in operation. Such energization, as has been stated, is effected immediately upon the engagement of the switch 29 with a button 31 that is in connection with a switch, such as 13, in circuit with an armature-switch 90 that is unattracted because of the association of its operating magnet 91 with an idle answering-jack circuit. In this way the selected answering-jack circuit motor is started to operate at once when the subscriber's governor motor has performed its function, said governor motor thereupon being released as has been specified. When the magnet 11' has its circuit opened, the prime mover or answering-jack circuit motor 15 is thrown out of service, as the circuit of the windings 20 is thereupon opened at 35. This opening of the circuit occurs and is maintained, as has been stated, by the attraction of the armature-switch 90 which is occasioned upon the connection of the grounded cut-off relay 2² with the magnet 91, which latter result is not occasioned until the calling subscriber's line is connected with an answering jack circuit. Obviously, such connection of the grounded cut-off relay with the winding of magnet 91 cannot occur until the switch 10 has been released by the magnet 11'. This release is effected when the armature-switch 90 included in circuit with the magnet 11' has its associate arm 13 come into contact with the button 12 of a calling line from which the ground at 92 is at this particular instant removed, the circuit through the winding 11' being thereby opened at 92. This ground 92, as hitherto stated, is restored to the contact 12 engaged by the arm 13 when the cut-off relay is included in circuit, but the magnet 91 has in the meantime operated the switch 90 to open the circuit including the winding 11', so that the switches 9-0 are permitted now to remain in their unattracted position during connection, while at the same time the motor windings 21 are caused to remain passive because their circuit is opened at 35, whereby the answering-terminals of the answering-jack remain in engagement with the selected line-contacts of a calling subscriber. The calling signal relay 93 is now brought into circuit that is completed by way of the subscriber's switch-hook and which circuit includes the grounded battery 23, as will be apparent, said relay thereupon being energized to attract its armature and close another circuit containing the calling lamp 94 and the relay 94' governing the circuit including the auxiliary or pilot signal lamp 94². The operator in response to this signal, inserts the answering-plug 58' into the selected answering-jack and thereby opens at 95 the circuit containing the elements 94-94'. The operator in response to the signal at 94, ascertains the connection desired and effects connection with the called subscriber in a manner well understood and which need not be described, nor need the cord circuit apparatus, with the aid of which she is able to perform her work, be described, as the apparatus illustrated and its functions are well understood by those skilled in the art. Prior to the insertion of the answering-plug, the calling subscriber may effect a restoration of the motive apparatus associated with the answering ends of the answering-jack that have been moved into connection with his line, as will be understood by the description shortly to be given. After the answering plug has been inserted, however, the restoration of the said apparatus is within the control of the operator. In order to effect the restoration of the traveling ends of the answering-jack circuits, the switches 7, 8 and 13 continue in their previous direction of rotation, but the polarized armature 20 for this purpose must again be set into motion, to which end the magnet 11' must now be energized to ground the switch 35. This result is accomplished by the operator on withdrawing the answering-plug 58' by closure of the contacts 95, the contacts 96 being closed because of the deenergization of the magnet 93 occurring upon the restoration of the receiver upon the switch-hook at the calling subscriber's station. Correspondingly, if the plug 58' had never been inserted, such energization of the magnet 11' would be occasioned at the con-

tacts 96, the contacts 95 being then closed, the calling subscriber, of course, having restored his telephone upon its switch-hook. Circuit thus established at 95-96 may be traced from the grounded battery 23, to the switch 90; the contacts 95-96, the magnet 95', the armature-switch 90, to the ground at 92 now present. The armature of magnet 95' is thereupon attracted, whereupon the grounded catch 102 engages the armature of said magnet 95', whereby circuit through magnet 11' is established for the purpose specified, which circuit may be traced from the grounded catch 102, the armature of magnet 95', the winding of magnet 11', to the grounded battery 23, whereupon the windings 21 of the alternating current motor are set into operation, circuit through winding 11' being maintained mechanically at 102, as the arm 13 in being restored might encounter the groundless contact 12. When the initial positions have been reached, the pin 103 strikes an insulated finger projecting from the pivoted contact or catch 102, thereby withdrawing the said catch from engagement with the armature of magnet 95' to open the circuit of magnet 11' and thereby cause a cessation of the polarized armature 20, so that the switch parts 7, 8 and 13 remain in their initial or normal positions.

The apparatus shown upon the lower right hand corner of Fig. 3 is similar in electrical function to and in some respects is different in mechanical construction from the apparatus illustrated upon the left of the figure. The arms 7², 8² and 13² correspond in function to the arms 7, 8 and 13, but the former arms are designed for rectilinear travel, to which end certain modification is required in the prime mover or answering-jack circuit motor that effects the travel of said arms, for they must be adapted for reciprocation instead of travel in a continuous direction to effect their purpose. The contact buttons associated with the arms 7², 8² and 13² are similar in function to the contacts provided in association with the arms 7, 8 and 13, respectively. There is, however, an additional but ground contact 106 for each answering-jack circuit equipped with the arms 7², 8² and 13², so that in case the said arms should travel their fullest extent without effecting the connection of a cord circuit with a calling line, said arm 8² will be grounded to effect the restoration of said contact arms 7², 8² and 13² as will be specified. The subscriber's governor motor upon the right of Fig. 3 is similar to that shown upon the left and similar parts are given similar characters of reference. When a conductor 32 has been engaged by a switch-arm 13², circuit through the magnet 107 is closed, which circuit may be traced from the grounded battery 23, through the winding of magnet 107, the armature switch 108, the

switch-arm 13², the conductor 32, the switch-arm 29, to the ground at magnet 45', with results that will be understood in view of the description of the left hand subscriber's governor motor. The armature-switch 109 is thereby operated to close circuit through the winding 110 of the motor operating the switch-arms 7²-8² and 13² in a manner that is obvious when the way in which the switch-arm 35 is operated is understood from the description previously given, and I will not, therefore, describe the motor operating mechanism except to describe certain circuit changes that occur to change its operative condition. When in answering-jack circuit has been connected with a calling line, circuit through the winding 110 is opened at 109 similarly to the opening of the circuit through the windings 20 at 35; hence, a detailed description of the operation of the magnet 107 will not be given. The conductor 111 that includes the magnet 112 has the same circuit relations, connections and changes in connections that the conductor 113 has; therefore, when the calling subscriber has been connected with an answering-jack circuit, the magnet 112 is energized to close circuit through the magnet 114 to operate the armature-switch 115 to effect connection of the catch 116 with the detent 117, so that the spring 118 may pull upon said catch and effect the withdrawal of the detent 117, so that the arms 7²-8² and 13² may be restored by the spring 122. Circuit through the magnet 114 may be traced from the ground thrown upon the armature 119 upon the energization of magnet 112, through the winding of said magnet 114, over a conductor 120 in association with the answering-jack circuit selected corresponding to conductor 1:1, the upper armature-switch of magnet 1:2, to the grounded battery 23. While the magnet 114 is energized only when the switches 7², 8² and 13² are to be restored, the magnet 112 is energized immediately upon the connection of a calling line with an answering-jack circuit, whereby the circuit including the magnet 107 is opened at 108 to maintain magnet 107 de-energized until disconnection. The engagement of the parts 116 and 117, (occurring upon disconnection as above described,) part 117 being grounded, effects the closure of circuit through magnet 107, which circuit may be traced from the grounded battery 23, to the magnet 107, the parts 116 and 117, to the ground upon part 117. The spring 122 restores the answering-jack circuit motor switch-arms when the dog 117 is withdrawn. Although such circuit is established, it will now have no control of the winding 110, circuit through which winding is opened at 115, but the switches 9-10 will be moved to disconnect the connecting end of the answering-jack circuit from the calling line.

The circuit containing the magnet 114 is open at a point corresponding to the point 95 or 96, as will be understood, permitting the spring 118 to withdraw the detent 117.

5 The insulating post 116' has separable engagement with the contact 116 for the mechanical purpose of effecting separation between the elements 116 and 117 when the restoration has been completed, this structural characteristic being similar to the
10 similarly illustrated parts of the subscribers' controller motors. In case the switch-arms 7², 8² and 13² should travel to their extreme positions, as would occur should an
15 answering-jack switch fail to find any calling subscriber after having been started by the operation of switch 29, switch-arm 8² will engage the grounded contact 106 and the circuit through switch-arm 13² will be
20 opened. The opening of said latter circuit will cause the deenergization of magnet 107 and the stopping of the motor magnet 110 just as though a calling line had been found. The closing of circuit through the ground
25 106 will result in the energization of magnet 112 and the consequent operation of magnet 114. The restoration of the switch-arms to their normal positions is thus secured by the engagement of hook 116 with detent 117 and
30 the consequent operation of magnet 107 and deenergization of magnets 112 and 114 just as though a disconnection were being completed after connection with a subscriber's line.

35 In Fig. 4 is illustrated a system that partakes of the characteristics of the systems shown in Figs. 2 and 3 and parts of the system and circuits of Fig. 4 corresponding in function to parts and circuits of Figs.
40 2 and 3 are given similar characters of reference, and I do not deem a further description of the system shown in Fig. 4 to be essential in view of the extended descriptions hitherto given of the other systems and
45 the clearness of the diagram, except that it might be stated that the magnet 91 corresponding in function to the similarly designated magnet of Fig. 3, is connected with the added conductor 78 which includes the
50 magnet 2' in its circuit. In both cases the said magnet 91 is caused to operate as soon as the circuit through the cut-off relay 2' (Fig. 4) or 2² (Fig. 3) is completed.

55 In Fig. 5 I have illustrated the general arrangement of the circuits and apparatus that I prefer, but in this figure I have not had sufficient room to illustrate to the fullest extent all of the apparatus involved, but the general features of the system will be under-
60 stood by reference to the following description.

I have illustrated three groups of telephone lines, I, II and III. Each group may be understood as containing five hundred
65 lines to carry out the illustration set forth

in the introduction to this specification. The rectangular figures *a*—*a*—*a* each indicates a subscriber's governor motor or selecting switching mechanism that may have
70 suitable control, preferably by means of the circuits and apparatus illustrated (either in Figs. 1 and 2 or Figs. 3 and 4), of the answering-jack circuit motors 15. The operative connections between the elements *a* and
75 15 are indicated by dotted lines. The answering ends of the answering-jack circuits including the traveling switch-arms 7—7', 8—8' and 13—13', etc., in the case of
80 Figs. 1 and 3, and also the switch-arms 77—77', etc., in the case of Figs. 2 and 4, are indicated at *b*. The contacts over which the traveling switch-arms last mentioned
85 move are indicated by the circles *c*, each circle indicating a complete group of line contacts in operative association with the answering end of the answering-jack circuit, each telephone line having a set of contacts
90 in each group *c*, all as hitherto fully set forth. The contact devices *b* are connected by the conductors *d*, representing talking strands of the answering-jack circuits, with
95 the answering-jacks *e*. It is understood that there are thirty devices *b* with their operating answering-jack circuit motors to each group of telephone lines in the system shown
100 as an example. It will be apparent by the description previously given and by the illustration in Fig. 5, that the first idle answering-jack circuit is connected with a
105 calling line, the busy answering-jack circuits or those answering-jack circuits made to correspond to busy answering jack circuits by the elements 52 being skipped. Reading
110 Fig. 5 from left to right, the answering end *b* of the first answering-jack circuit (referring now to group I of the lines) is connected with the first answering-jack at the first position of the first section of the board;
115 the answering end of the second answering-jack circuit is connected with the first answering-jack at the second position of the first section of the board; the third answering
120 end is connected with the first answering-jack at the third position of the first section of the board; the fourth answering end is connected with the first answering-jack at the first position of the second section of the board; the fifth answering end is connected with the first answering-jack at the second position of the second section of the board; the sixth answering end is connected with the first answering-jack at the third position of the second section of the board; the seventh answering end is connected with the first answering-jack at the first position of the third section of the board; and so on throughout the thirty positions (there being thirty answering ends of the answering-jack circuits at ten sections of the board).

Referring to group II, the first answering 130

end is connected with the second answering-jack at the first position of the first section of the board; the second answering end is connected with the second answering-jack at the second position of the first section of the board; the third answering end is connected with the second answering-jack at the third position of the first section of the board; the fourth answering end is connected with the second answering-jack at the first position of the second section of the board; the fifth answering end is connected with the second answering-jack at the first position of the second section of the board; the sixth answering end is connected with the second answering-jack at the third position of the second section of the board; the seventh answering end is connected with the second answering-jack at the first position of the third section of the board; and so on.

The first answering end associated with group III for the lines is connected with the third answering-jack at the first position of the first section of the board; the second answering end is connected with the third answering-jack at the second position of the first section of the board; the third answering end is connected with the third answering-jack at the third position of the first section of the board; the fourth answering end is connected with the third answering-jack at the first position of the second section of the board; the fifth answering end is connected with the third answering-jack at the second position of the second section of the board; the sixth answering end is connected with the third answering-jack at the third position of the second section of the board; the seventh answering end is connected with the third answering-jack at the first position of the third section of the board; and so on.

The answering ends corresponding to additional groups of telephone lines (not illustrated) are in the same order connected with the different answering-jacks at the different positions of the different sections of the board.

In this way the answering-jack conductors extending from the selective switching devices corresponding to each group of subscribers, are subdivided into a plurality of groups that are extended to answering-jacks at different sections of the board. Each group of answering-jack conductors contains as many such conductors as there are groups of telephone lines, each group of telephone lines having one answering-jack conductor in each group of answering-jack conductors. The first group of answering-jack conductors is preferably assigned to the first section, the second group to the second board section, the third group to the third board section, and so on. The first group of answering-jack conductors thus

includes those answering-jack conductors extending to the first three answering ends corresponding to each group of telephone lines; the second group of answering-jack conductors includes the three answering-jack conductors extending to the second lot of the three answering ends corresponding to each group of telephone lines, and so on.

Each group of subscribers' lines, therefore, has the answering ends of the answering-jack circuits associated therewith subdivided into a plurality of groups corresponding in number to the board sections, the answering-jack conductors of each of such groups being distributed, preferably in their order, among the different positions of the sections to which the said answering-jack conductors extend.

The groups of answering-jack conductors corresponding to each group of lines are preferably connected with the board sections in the same order in which automatic selection is effected between the calling lines and the answering-jack circuits, as indicated in the diagram and as has been explained, whereby each group of telephone lines has a group of answering-jack conductors extending to each of the board sections, the group extending to the first board section being first adapted for automatic connection with calling lines, as their answering ends are the first to encounter the line contacts of the calling lines, the operators at the second board section, therefore, having no work until the first operators have reached their capacities, the operators at the third board having no work until the operators at the second board section are fully occupied, and so on. It will have also been observed that the answering-jack conductors of each group are distributed to the various operators' positions at the section to which said group of answering-jack conductors extend to equalize as far as possible the work of the operators at the sections receiving calls.

In the system of my invention there need not be any intermediate line distributing boards, the main distributing board, indicated at *k* in Figs. 1 to 4, inclusive, being, however, preferably retained. An answering-jack conductor distributing board, indicated at *m*, may, if desired, be employed to assist in the distribution of the answering-jack conductors.

While the different switch-board sections are arranged in serial order, it is obvious that my invention does not depend upon the physical disposition of the sections relative to each other.

It is obvious that my invention lends itself to a variety of arrangements, associations and groupings of answering-jack circuits to suit differing practices, and I do not, therefore, wish to be limited to the precise group-

ing and arrangement shown, nor to the application thereof to multiple switch-board and common battery systems. It is also obvious that many changes may be made in the embodiments of my invention herein shown and particularly described without departing from the spirit of the invention, and I do not, therefore, wish to be limited to the embodiments shown, but having thus described my invention, I claim as new and desire to secure by Letters-Patent:—

1. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

2. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

3. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

4. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism and answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

5. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

6. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

7. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to

answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

8. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus, to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

9. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into

groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

10. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

11. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of

the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

12. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

13. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for

each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

14. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-

jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering plugs for engagement with said jacks, substantially as described.

15. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

16. A telephone exchange system including a plurality of telephone lines provided with line-jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-

jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation

10 with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second

15 switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

25 17. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation

30 with the lines and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group

40 to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

50 18. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation

60 with the lines and including traveling

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answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

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19. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

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20. A multiple switch-board telephone exchange system including a plurality of tele-

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phone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

21. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism oper-

ating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

22. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, a automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

23. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism in circuit relation with the lines and including traveling answering-terminals of the an-

swering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, whereby the answering ends of the answering-jack circuits are connected with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

24. A telephone exchange system whose telephone lines have line-jacks and answering-jack circuits provided with answering-jacks, selective switching mechanism in circuit relation with the lines for uniting calling telephone lines with idle answering-jack circuits and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal-contacts engaged by said answering-terminals, apparatus governed by the answering-jack circuits and selective switching mechanism influencing the selective switching mechanism to enable it to operate when the answering end of an answering-jack circuit connects with a calling line thereupon to cause the arrest of said answering end, mechanism for causing the idle answering-jack circuits to cooperate with the selective mechanism as if said latter idle answering-jack circuits were busy, whereby they may be passed by the selective mechanism, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

25. A telephone exchange system whose telephone lines have line-jacks and answering-jack circuits provided with answering-jacks, selective switching mechanism in circuit relation with the lines for uniting calling telephone lines with idle answering-jack circuits and including traveling answering terminals of the answering-jack circuits and multiplied telephone line terminal contacts

engaged by said answering-terminals, a calling signal apparatus operatively associated with each answering-jack circuit and operated by a calling subscriber, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, the connecting plugs cooperating with the answering-jacks to efface line signals, substantially as described.

26. A telephone exchange system whose telephone lines have line-jacks and answering-jack circuits provided with answering-jacks, selective switching mechanism in circuit relation with the lines for uniting calling telephone lines with idle answering-jack circuits and including traveling answering-terminals of the answering-jack circuits and multiplied telephone line terminal contacts engaged by said answering-terminals, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, said relay mechanism being jointly controlled by the apparatus of a connected subscriber and the operators' cord connectors, substantially as described.

27. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

28. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor se-

lecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said latter mechanism and regulated by the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

29. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

30. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including

nism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

31. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

32. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including

said mechanism and regulated by the governor motor, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

33. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

34. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack

circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

35. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

36. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack cir-

tors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may coöperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

38. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with the line terminal contacts of a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when the associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

39. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said con-

tacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

40. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

41. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines,

whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

42. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

43. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is op-

erated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

44. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

45. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the an-

swering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at substations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

46. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

47. A telephone exchange system including a plurality of telephone lines having

line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

48. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at substations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling

line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

49. A telephone exchange system including a plurality of telephone lines having line jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

50. In a telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the

answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

51. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

52. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

53. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with the line terminal contacts of a calling line, answering-jack circuit relay mechanism operating to permit

the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

54. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

55. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack,

answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

56. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit reoperation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

57. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for

said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said latter mechanism and regulated by the governor motor, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

58. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

59. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the

answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism, and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits, and set into action upon engagement of a traveling answering end with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

60. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, a apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for en-

gement with said jacks, substantially as described.

61. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

62. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuits and set into action upon engagement of a traveling answering

end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

63. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated cord circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

64. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for

said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

65. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the

answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

66. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling-line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in associa-

tion with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

67. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.
68. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at substations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering

end with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

69. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at substations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

70. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack

circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

71. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

72. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the

answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

73. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operat-

ing upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

74. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

75. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a

call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

76. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and per-

mit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

77. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, relay mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

78. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said gov-

ernor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with a answering-plugs for engagement with said jacks, substantially as described.

79. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, mechanism effecting the operation of the answering-jack circuit motors, circuits including said mechanism and regulated by the governor motor, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mech-

anism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

80. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits, adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling line, answering-jack circuit relay mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the relay mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

81. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, an-

swering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors regulated by the answering-jack circuits and set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling line, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

82. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for checking the operation of the answering-jack circuit motors set into action upon engagement of a traveling answering end with the line terminal-contacts of a calling line, mechanism operating to permit the answer-

ing-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated answering-jack circuits are busy, apparatus whereby idle answering-jack circuits may cooperate with the mechanism that prevents the operation of the answering-jack circuit motors to cause idle answering-jack circuits to act upon said relay mechanism as if said idle answering-jack circuits were busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

83. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective mechanism in circuit relation with the telephone lines, elements in association with said answering-jack circuits and selective mechanism and serially ordered with respect to the selective mechanism, apparatus governed by the answering-jack circuit apparatus and placing said elements in different operative conditions, according to the busy or idle conditions of the answering-jack circuits, an instrumentality cooperating with said serially ordered elements when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first element, whose operative condition is thus changed, to become operatively associated with the selective mechanism and a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

84. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective switching mechanism in circuit relation with the telephone lines, contacts in association with said answering-jack circuits and selective switching mechanism and serially ordered with respect to the selective switching mechanism, apparatus governed by the answering-jack circuit apparatus and placing said contacts in different

electrical conditions, according to the busy or idle conditions of the answering-jack circuits, electro-magnetic mechanism cooperating with said serially ordered contacts when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first contact, whose operative condition is thus changed, to become operatively associated with the selective switching mechanism and a calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

85. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective mechanism in circuit relation with the telephone lines, elements in association with said answering-jack circuits and selective mechanism and serially ordered with respect to the selective mechanism, apparatus governed by the answering-jack circuit apparatus and placing said elements in different operative conditions, according to the busy or idle conditions of the answering-jack circuits, an instrumentality cooperating with said serially ordered elements when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first element, whose operative condition is thus changed, to become operatively associated with the selective mechanism and a calling line, mechanism for releasing the selective mechanism, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

86. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective switching mechanism in circuit relation with the telephone lines, contacts in association with said answering-jack circuits and selective switching mechanism and serially ordered with respect to the selective switching mechanism, apparatus governed by the answering-jack circuit apparatus and placing said contacts in different electrical conditions, according to the busy or idle conditions of the answering-jack circuits, electro-magnetic mechanism cooperating with said serially ordered contacts

when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first contact, whose operative condition is thus changed, to become operatively associated with the selective switching mechanism and a calling line, mechanism for releasing the selective switching mechanism, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

87. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective mechanism in circuit relation with the telephone lines, elements in association with said answering-jack circuits and selective mechanism and serially ordered with respect to the selective mechanism, apparatus governed by the answering-jack circuit apparatus and placing said elements in different operative conditions, according to the busy or idle conditions of the answering-jack circuits, an instrumentality cooperating with said serially ordered elements when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first element, whose operative condition is thus changed, to become operatively associated with the selective mechanism and a calling line, mechanism for causing some of the elements to have their operative condition continuously similar to the operative condition of those elements associated with busy answering-jack circuits to reduce the number of answering-jack circuits available for connection with calling line, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

88. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective switching mechanism in circuit relation with the telephone lines, contacts in association with said answering-jack circuits and selective switching mechanism and serially ordered with respect to the selective switching mechanism, apparatus governed by the answering-jack circuit apparatus and placing said contacts in different electrical conditions, according to the busy

or idle conditions of the answering-jack circuits, electro-magnetic mechanism cooperating with said serially ordered contacts when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first contact, whose operative condition is thus changed, to become operatively associated with the selective switching mechanism and a calling line, mechanism for causing some of the contacts to have their operative condition continuously similar to the operative condition of those contacts associated with busy answering-jack circuits to reduce the number of answering-jack circuits available for connection with calling lines, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

89. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts and each having an answering-jack, selective mechanism in circuit relation with the telephone lines, elements in association with said answering-jack circuits and selective mechanism and serially ordered with respect to the selective mechanism, apparatus governed by the answering-jack circuit apparatus and placing said elements in different operative conditions, according to the busy or idle conditions of the answering-jack circuits, an instrumentality cooperating with said serially ordered elements when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first element, whose operative condition is thus changed, to become operatively associated with the selective mechanism and a calling line, mechanism for releasing the selective mechanism, mechanism for causing some of the elements to have their operative condition continuously similar to the operative condition of those elements associated with busy answering-jacks to reduce the number of answering-jack circuits available for connection with calling lines, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

90. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with

said contacts and each having an answering-jack, selective switching mechanism in circuit relation with the telephone lines, contacts in association with said answering-jack circuits and selective switching mechanism and serially ordered with respect to the selective switching mechanism, apparatus governed by the answering-jack circuit apparatus and placing said contacts in different electrical conditions, according to the busy or idle conditions of the answering-jack circuits, electro-magnetic mechanism cooperating with said serially ordered contacts when their operative conditions have been changed by their corresponding answering-jack circuits becoming idle, to cause the answering-jack circuit corresponding to the first contact, whose operative condition is thus changed, to become operatively associated with the selective switching mechanism and a calling line, mechanism for releasing the selective switching mechanism, mechanism for causing some of the contacts to have their operative condition continuously similar to the operative condition of those contacts associated with busy answering-jack circuits to reduce the number of answering-jack circuits available with calling lines, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

91. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, auxiliary multiplied contacts associated with said lines, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts, each circuit having an answering-jack, electro-magnetic apparatus in circuit relation with the telephone lines for changing the electrical character of said auxiliary contacts when calls are initiated, motor mechanism for effecting movement of said traveling switches, electro-magnetic mechanism for stopping said traveling switches and regulated by the auxiliary contacts of a calling subscriber's line, the engaging traveling switch and the circuit including said contact and switch, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

92. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, auxiliary multiplied contacts associated with said lines, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends and each having an auxiliary traveling switch, said traveling, answering and auxiliary switches being adapted for engagement with the multiplied

terminal contacts and auxiliary contacts, respectively, each answering-jack circuit having an answering-jack, electro-magnetic apparatus in circuit relation with the telephone lines for changing the electrical character of said auxiliary contacts when calls are initiated, motor mechanism for effecting movement of said traveling switches, electro-magnetic mechanism for stopping the said traveling switches and regulated by the auxiliary contacts of a calling subscriber's line, the engaging auxiliary traveling switch and the circuit including said contact and switch, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

93. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, auxiliary multiplied contacts associated with said lines, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends adapted for engagement with said contacts, each circuit having an answering-jack, electro-magnetic apparatus in circuit relation with the telephone lines for changing the electrical character of said auxiliary contacts when calls are initiated, motor mechanism for effecting movement of said traveling switches, local circuits including the auxiliary contacts and the traveling switches engaging the same, electro-magnetic mechanism for stopping said traveling switches and regulated by the auxiliary contacts of a calling subscriber's line, the engaging traveling switch and the circuit including said contact and switch, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

94. A telephone exchange system including telephone lines having line-jacks and multiplied terminal contacts, auxiliary multiplied contacts associated with said lines, a plurality of answering-jack circuits for said telephone lines having traveling switches at their answering ends and each having an auxiliary traveling switch, said traveling, answering and auxiliary switches being adapted for engagement with the multiplied terminal contacts and auxiliary contacts, respectively, each answering-jack circuit having an answering-jack, electro-magnetic apparatus in circuit relation with the telephone lines for changing the electrical character of said auxiliary contacts when calls are initiated, motor mechanism for effecting movement of said traveling switches, local circuits including the auxiliary contacts and the traveling switches engaging the same, electro-magnetic mechanism for stopping the said traveling switches and regulated by the auxiliary contacts of a calling subscriber's

er's line, the engaging auxiliary traveling switch and the circuit including said contact and switch, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

95. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

96. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, apparatus for checking the operation of the answering-jack circuit motors set into action upon the engagement of a traveling answering end with a calling line, and cord circuits in association with said answering-

jacks provided with answering-plugs for engagement with said jacks, substantially as described.

97. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack corresponding to said answering-jack circuit motor with a calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said answering-jack circuit motors when their associated cord circuits are busy, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

98. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, apparatus associated with the subscriber's

governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

99. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, apparatus for checking the operation of the answering-jack circuit motors set into action upon the engagement of a traveling answering end with a calling line, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

100. A telephone exchange system including a plurality of telephone lines having line-jacks and multiplied terminal-contacts, a plurality of answering-jack circuits for said telephone lines having switches at the answering ends of the answering-jack circuits adapted for engagement with said contacts and each having an answering-jack, answering-jack circuit motors operating the answering ends of the answering-jack circuits, an answering-jack circuit motor selecting mechanism or governor motor in circuit relation with switches at sub-stations of said lines, whereby said governor motor is operated on the initiation of a call, said governor motor operating to select and effect the operation of an answering-jack circuit motor to connect the answering end of an answering-jack circuit corresponding to said answering-jack circuit motor with a

calling line, apparatus for releasing the governor motor after said motor has completed its operation without selection of an answering-jack circuit, whereby said governor motor is again placed in operative condition, mechanism operating to permit the answering-jack circuit motors to actuate the answering ends of the answering-jack circuits when said answering-jack circuits are idle and to prevent the operation of said cord circuit motors when their associated answering-jack circuits are busy, apparatus associated with the subscriber's governor motor operating upon the selection of an idle answering-jack circuit's motor thereupon to release and permit re-operation of the governor motor, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

101. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

102. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling line, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said

answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

103. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

104. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' position at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy cords, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

105. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple

switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

106. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

107. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism,

answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

108. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

109. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to

enable the selective switching mechanism to avoid busy answering-jack circuit apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

110. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism connected to the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

111. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

112. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

113. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

114. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plu-

ality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

115. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism to connect the idle answering-jack circuits operating with the answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

116. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

117. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-

jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jacks circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

118. A telephone exchange system including a plurality of telephone lines provided with jacks and divided into groups, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

119. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines,

the first group of cords corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

120. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

121. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selec-

tive mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

122. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism connected to the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

123. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines

extending to the first switch board section, the second group to the second switch-board, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

124. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

125. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selec-

tive switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

126. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits, for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operating with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

127. A multiple switch-board telephone exchange system including a plurality of telephone lines divided into groups and multiplied to different sections of the multiple switch-board, a plurality of answering-jack circuits for each group of telephone lines also divided into groups and extending to answering-jacks at different sections of the switch-board, the answering-jacks of each group being distributed among the operators' positions at each section, automatically operated selective switching mechanism associated with the telephone lines and the answering ends of the answering-jack circuits for connecting said answering-jack circuits with calling lines, apparatus for checking the operation of the selective switching mechanism, answering-jack circuit apparatus governing the aforesaid apparatus to enable the selective switching mechanism to avoid busy answering-jack circuits, apparatus for changing the electrical character of the answering-jack circuits to cause them, when idle, to cooperate with the selective switching mechanism as if they were busy, to enable the said mechanism to pass the same into cooperation with an idle answering-jack circuit that may be used, the first group of answering-jack circuits corresponding to each group of telephone lines extending to the first switch-board section, the second group to the second switch-board section, and so on, said selective mechanism operated with the answering-jack circuits to connect the idle answering-jack circuits with calling lines in the order in which the groups of answering-jack circuits are connected with the switch-board sections, and cord circuits in association with said answering-jacks provided with answering plugs for engagement with said jacks, substantially as described.

128. A telephone exchange system whose telephone lines have connecting jacks and have answering-jack circuits provided with answering-jacks, selective switching mechanism for uniting calling telephone lines with idle answering-jack circuits and including line terminals in addition to the line-jacks, and also including contacts connected with the answering ends of the answering-jack circuits, apparatus governed by the answering-jack circuits and selective switching mechanism influencing the selective switching mechanism to enable it to operate when the line terminals of said mechanism encounter the terminals of the answering ends of the busy answering-jack circuits and causing the arrest of the switching mechanism when said line terminals connect with the answering-terminals of idle answering-jack circuits, mechanism for causing the idle answering-jack circuits to cooperate with the selective mechanism as if said latter idle answering-jack circuits were busy, whereby

they may be passed by the selective mechanism, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

129. A telephone exchange system whose telephone lines have connecting jacks and having answering-jack circuits provided with answering-jacks, selective switching mechanism for uniting calling telephone lines with idle answering-jack circuits and including line-terminals in addition to the line-jacks and also including contacts connected with the answering ends of the answering-jack circuits, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, said relay mechanism being jointly controlled by the apparatus of a connected subscriber and an operator's plug, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

130. A telephone exchange system whose telephone lines have connecting jacks and have answering-jack circuits provided with answering-jacks, selective switching mechanism for uniting calling telephone lines with idle answering-jack circuits and including line-terminals in addition to the line-jacks and also including contacts connected with the answering ends of the answering-jack circuits, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, said relay mechanism being jointly controlled by the apparatus of the calling subscriber and an operator's plug, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

131. A telephone exchange system whose telephone lines have connecting jacks and have answering-jack circuits provided with answering-jacks, selective switching mechanism connected to the answering-jack circuits for uniting calling telephone lines with idle answering-jack circuits and including line terminals in addition to the line-jacks and also including contacts connected with the answering ends of the answering-jack circuits, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, mechanism at the exchange for resetting the moving contacts of the selective switching mechanism to their normal or initial positions, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

132. A telephone exchange system whose telephone lines have connecting jacks and

have answering-jack circuits provided with answering-jacks, selective switching mechanism for uniting calling telephone lines with idle answering-jack circuits and including line-terminals in addition to the line-jacks and also including contacts connected with the answering ends of the answering-jack circuits, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, said relay mechanism being jointly controlled by the apparatus of a connected subscriber and an operator's plug, mechanism at the exchange for resetting the moving contacts of the selective switching mechanism to their normal or initial positions, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

133. A telephone exchange system whose telephone lines have connecting jacks and have answering-jack circuits provided with answering-jacks, selective switching mechanism for uniting calling telephone lines with idle answering-jack circuits and including line-terminals in addition to the line-jacks and also including contacts connected with the answering ends of the answering-jack circuits, relay mechanism connected with each answering-jack circuit and governing the selective switching mechanism to release the same, said relay mechanism being jointly controlled by the apparatus of the calling subscriber and an operator's plug, mechanism at the exchange for resetting the moving contacts of the selective switching mechanism to their normal or initial positions, and cord circuits in association with said answering-jacks provided with answering-plugs for engagement with said jacks, substantially as described.

134. A telephone system including subscribers' lines, multiple terminals therefor at the exchange normally unselectable in character, mechanism responsive to initiation of a call over a line for altering the character of the line's terminals to render them selectable, progressive selective switches at the exchange for selecting calling lines, starting means common to a plurality of lines for distributively starting said switches, answering jack terminals connected to said switches and manual link circuits for connection with said jack terminals for use in extending connections to called lines.

135. A telephone system including subscribers' lines, multiple terminals therefor at the exchange, selective progressive switches for selecting terminals of calling lines, a common starting circuit for said lines connections controlled by said starting circuit for starting said switches selectively, answering jack terminals connected

to said switches and manual link circuits for connection with said jack terminals for use in extending connections to called lines.

136. A telephone system including a telephone line having multiple terminals normally on open circuit, a line relay for operation to ground said terminals and a progressive switch initially controlled by said relay adapted to engage one of said terminals, said switch including an electromagnetic device adapted to arrest its progress responsive to the ground condition of an encountered contact, an answering jack terminal connected with said switch, and a link circuit for connection to said answering jack terminal for extending a call in the direction of a called telephone line.

137. A telephone system including a telephone line having multiple line terminal contacts at the exchange, a line relay adapted for operation upon initiation of a call over said line, idle progressive switches adapted for connection to said terminals, means controlled by said relay for starting only one of said idle switches and arresting movement thereof upon connection with one of said terminals, answering jack terminals for said progressive switches, and link circuits for use in extending connections from said terminals to called lines.

138. A telephone system including a telephone line having multiple terminal contacts at the exchange, a source of current, a line relay adapted for operation upon removal of the receiver from its switch-hook at the calling substation upon initiation of a call over said line for connecting a terminal of said source with said contacts, a progressive switch initially controlled by said relay and adapted to engage a multiple contact of said line, means responsive to connection of a terminal of said source to the contact to stop the progress of said switch, an answering jack terminal connected with said progressive switch, and a link circuit for use in extending a connection from said jack terminal to a called line.

139. A telephone system including telephone lines, multiple terminals for said lines at the exchange for use when the lines are calling lines, a central source of current disconnected from said terminals while in their normal electrical condition rendering said terminals unselectable, line relays individual to said lines for operation responsive to currents over the respective lines, switching mechanisms controlled by said relays for connecting said source to the terminals of their respective lines to render them selectable, link-circuits at the exchange, progressive selective switches for said circuits, test means therefor enabling them when traveling to avoid terminals of lines disconnected from said source and to select terminals connected with a pole of said source where-

by said link-circuits are connected with calling lines, answering jack terminals for said progressive switches, and link circuits for extending connections from said jack terminals to lines of called subscribers.

140. A telephone system including telephone lines, multiple terminals for said lines at the exchange for use when the lines are calling lines, a central source of current disconnected from said terminals while in their normal electrical condition rendering said terminals unselectable, line relays individual to said lines for operation responsive to currents over the respective lines, switching mechanisms controlled by said relays for connecting said source to the terminals of their respective lines to render them selectable, link circuits at the exchange, progressive selective switches for said circuits, test means therefor enabling them when traveling to avoid terminals of lines disconnected from said source and to select terminals connected with a pole of said source whereby said link circuits are connected with calling lines, means for restoring an unselectable condition to terminals of a line on selection made, answering jack terminals for said progressive switches, and link circuits for extending connections from said jack terminals to lines of called subscribers.

141. A telephone system including telephone lines, multiple terminals for said lines at the exchange for use when the lines are calling lines, a central source of current disconnected from said terminals while in their normal electrical condition rendering said terminals unselectable, line relays individual to said lines for operation responsive to currents over the respective lines, switching mechanisms controlled by said relays for connecting said source to the terminals of their respective lines to render them selectable, link circuits at the exchange, progressive selective switches for said circuits, test means therefor enabling them when traveling to avoid terminals of lines disconnected from said source and to select terminals connected with a pole of said source whereby said link circuits are connected with calling lines, means for restoring an unselectable condition to terminals of a line on selection made, common starting means for said lines responsive to operations of their line relays for distributively initiating travel of said switches, answering jack terminals for said progressive switches, and link circuits for extending connections from said jack terminals to lines of called subscribers.

142. A telephone system including telephone lines, multiple terminals therefor at the exchange, said terminals being normally on open circuit, a central source of current, line relays respectively individual to telephone lines for operation to connect the terminals of calling lines to a pole of said

source, selective switches at the exchange, a common starting conductor connected to switching mechanisms of said line relays, for starting an indifferent idle selective switch responsive to operation of a line relay, and traveling test wipers for said switches enabling them to pass over terminals on open circuit to come to rest when engaging a terminal connected to said source whereby said switches are connected to calling lines, answering jack terminals for said selective switches, and manually controlled link circuits for extending connections from said answering jack terminals to called lines.

143. A telephone system including telephone lines, multiple terminals therefor at the exchange, said terminals being normally on open circuit, a central source of current, line relays respectively individual to telephone lines for operation to connect the terminals of calling lines to a pole of said source, selective switches at the exchange, a common starting conductor connected to switching mechanisms of said line relays, for starting an indifferent idle selective switch responsive to operation of a line relay, traveling test wipers for said switches enabling them to pass over terminals on open circuit to come to rest when engaging a terminal connected to said source whereby said switches are connected to calling lines, link circuits, one connected with each selective switch, connection devices for extending the circuits of said link circuits to connection with any telephone line, answering jack terminals for said selective switches, and manually controlled link circuits for extending connections from said answering jack terminals to called lines.

144. A telephone exchange system including an electrical circuit, selective switches, multiple terminals pertaining to said circuit at said switches, normally unselectable in character, a magnet individual to said circuit for operation to directly render said terminals selectable in character, means for operating said magnet, apparatus for starting a switch responsive to said magnet to select said circuit, answering jack terminals for said selective switches, and means for extending connections from said answering jack terminals to called subscribers' lines.

145. A telephone exchange system including an electrical circuit, selective switches, multiple terminals pertaining to said circuit at said switches, normally unselectable in character, a magnet individual to said circuit for operation to render said terminals selectable in character, means for operating said magnet, apparatus responsive to an initial energization of said magnet to start a switch in search of said terminals, circuit connections effective on selection made to render said terminals unselectable, answering jack terminals for said selective switches,

and means for extending connections from said answering jack terminals to called subscribers' lines.

146. A telephone exchange system including an electrical circuit, a magnet individual to said circuit, selective switches, multiple terminals pertaining to said circuit at said switches unselectable in character when said magnet is inert, means for operating said magnet responsive to currents over said circuit to render said terminals selectable by said switches, test means for said switches enabling them to select said terminals when said magnet is operated, means automatically effective on selection made to render said magnet inert, answering jack terminals for said selective switches, and means for extending connections from said answering jack terminals to called subscribers' lines.

147. A telephone exchange system including a telephone line, a line relay normally operatively connected therewith and individual thereto, selective switches adapted to select said line, multiple terminals pertaining to said line at said switches unselectable in character when said relay is inert, means for operating said relay responsive to currents over said line to render said terminals selectable by said switches, test means for said switches enabling them when traveling to select the terminals of any line encountered by them whose relay is operated, answering jack terminals for said selective switches, and means for extending connections from said answering jack terminals to called subscribers' lines.

148. A telephone system including subscribers' lines, a series of selective switches adapted to select said lines, a distributor switch having a series of contacts corresponding to said series of switches and normally occupying a position preceding said series of contacts, mechanism controlled by currents over said lines for initiating travel of said distributor switch, test means for said distributor switch enabling it to select and start the first idle selective switch of said series, mechanism for automatically restoring said distributor switch to its normal position, answering jack terminals for said selective switches, and means for extending connections from said answering jack terminals to called subscribers' lines.

149. A telephone system including telephone lines, selective switches adapted to select said lines, a distributor switch for starting said selective switches, line relays, one for each line, a connection from each said relay to said distributor switch, connections from said distributor switch to all of said selective switches, mechanism controlled over circuits including the relay connections for initiating travel of said distributor switch on operation of any relay, answering jack terminals for said selective switches,

and means for extending connections from said answering jack terminals to called subscribers' lines.

150. The combination with a telephone line, of a relay normally operatively connected thereto, selective switches adapted to select said line, multiple terminals for said line at said switches, a device for selectively starting said switches, switch contacts of said relay determining on operation thereof the electrical condition of said terminals and the operation of said device, answering jack terminals for said selective switches, and means for extending connections from said answering jack terminals to called subscribers' lines.

151. A telephone system including a telephone line, a line relay normally operatively connected thereto, a selective switch, a terminal for said line at said switch normally unselectable thereby, a switch contact for said relay, means controlled on energization of said relay to directly close a circuit through said contact to said terminals to render them selectable, an answering jack connected with said selective switch, and a link circuit provided with terminal plugs for connection with said answering jack for extending a connection to a called line.

152. The combination with an electrical circuit, of a selective switch, a terminal of said circuit at said switch normally unselectable in character, a magnet and switch contacts controlled thereby associated with said terminals and individual to said circuit for operation to render said terminal selectable upon initial energization of said magnet, mechanism responsive to said magnet for starting said switch, means for operating said magnet, an answering jack connected with said selective switch, and a link circuit provided with terminal plugs for connection with said answering jack for extending a connection to a called line.

153. The combination with a telephone line, of multiple contacts therefor, automatic selecting switches for making connection therewith, a relay individual to and sensitive to currents over the two sides of said line, mechanism responsive to said relay for altering the normal electrical character of said terminals and for starting an idle one only of said switches, answering jack terminals connected with said selective switches, and manual link circuits for extending connections from said jack terminals to called lines.

154. A telephone system including telephone lines, selective switches associated with and adapted to select said lines, a starting circuit common to said switches and lines, line relays one for each line and controllable over the two sides of the line in series, branch connections from said starting circuit to each of said relays, whereby any

line may operate said starting circuit, answering jack terminals connected with said selective switches, and manual link circuits for extending connections from said jack terminals to called lines.

155. A telephone system including telephone lines, selective switches associated with and adapted to select said lines, an electromagnetically driven starting device for sequentially initiating travel of said switches, line relays, one for each line, a conductor extending from each line relay to operative connection with said device, whereby any line relay may operate said device, answering jack terminals connected with said selective switches, and manual link circuits for extending connections from said jack terminals to called lines.

156. A telephone system including telephone lines, terminals for said lines disposed in multiply related groups, selective switching mechanisms, one for each group normally at rest, a distributor switch common to said switches and lines, line relays, one for each line, a connection extending

from the line relay of said line to its multiple terminals, a conductor for said distributor switch, branch connections from said conductor to said line relays, armature mechanism for each relay controlling said connections adapted, when a relay is operated by currents over its line, to alter the normal electrical condition of the multiple terminals of its line to render them selectable and actuate said distributor switch, connections between said distributor switch and said selective switching mechanism whereby the actuation of said switch is effective to start an idle mechanism, answering jack terminals connected with said selective switches, and manual link circuits for extending connections from said jack terminals to called lines.

In witness whereof, I hereunto subscribe my name this twenty eighth day of December, A. D. 1904.

FRANCIS W. DUNBAR.

Witnesses:

G. L. CRAGG,
LEON STROH.