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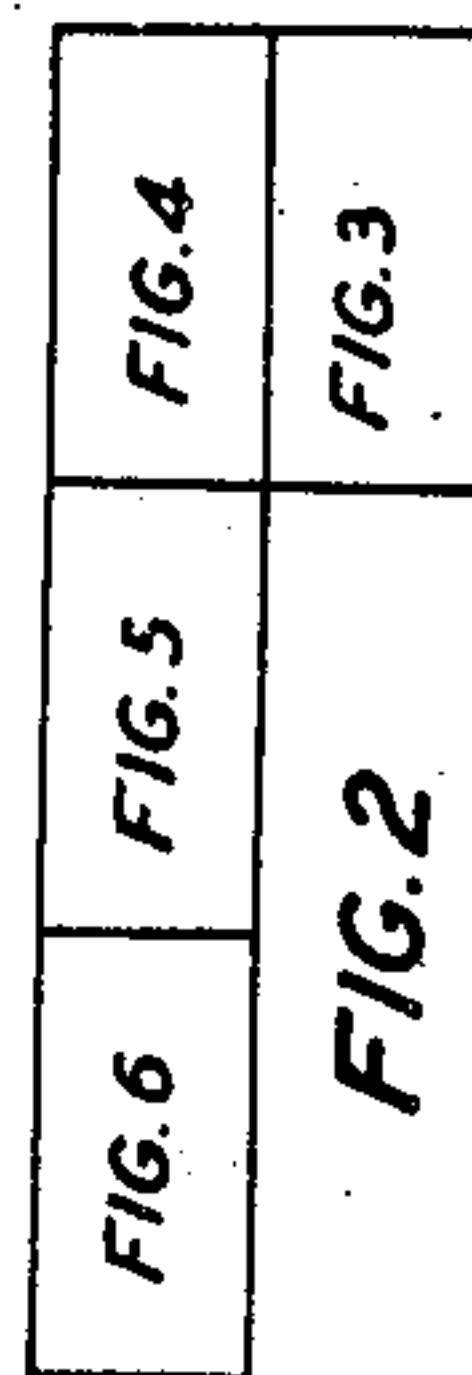
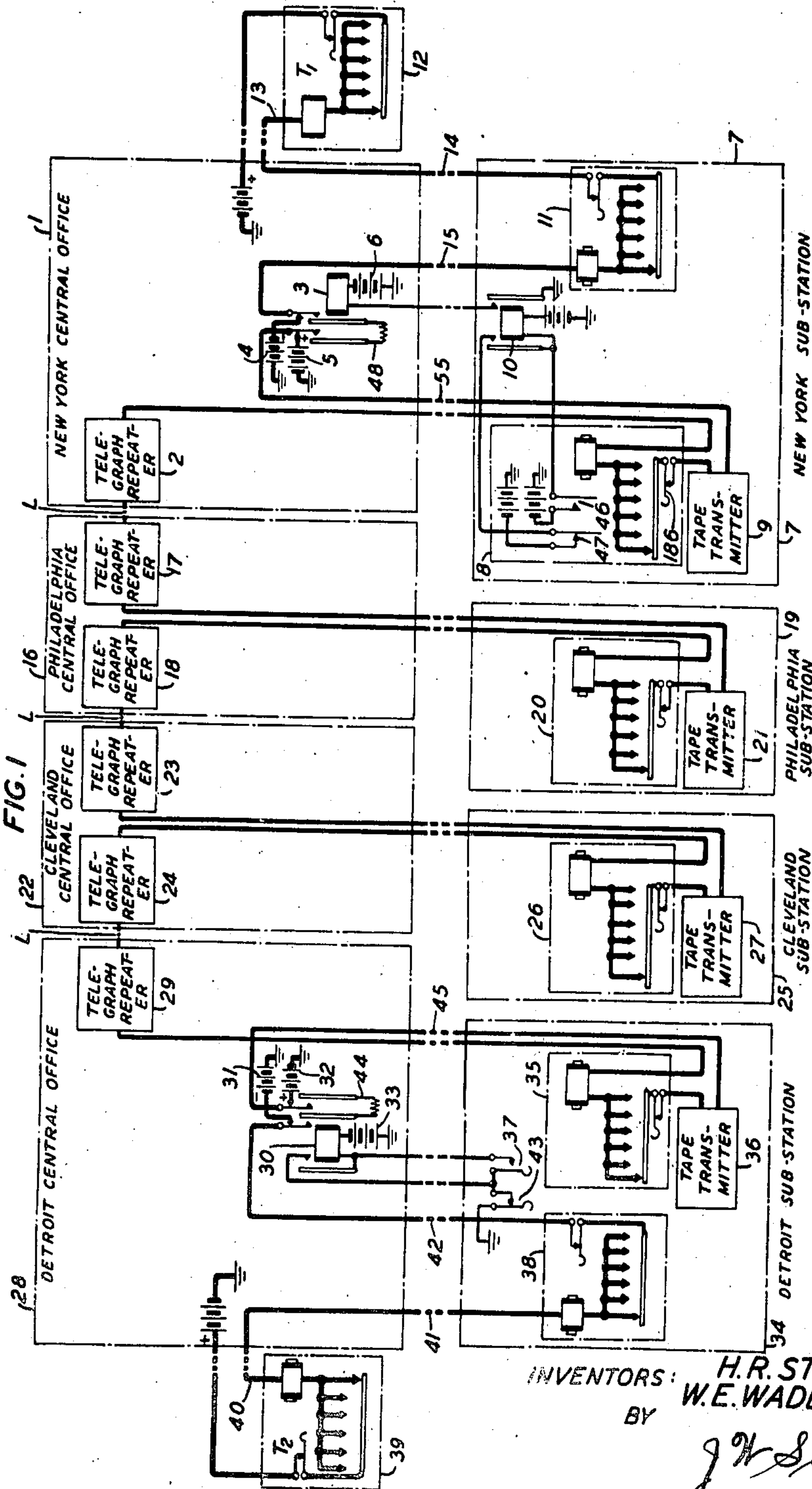
H. R. STARR ET AL

2,336,373

TELETYPEWRITER SWITCHING SYSTEM

Original Filed June 17, 1937

5 Sheets-Sheet 1



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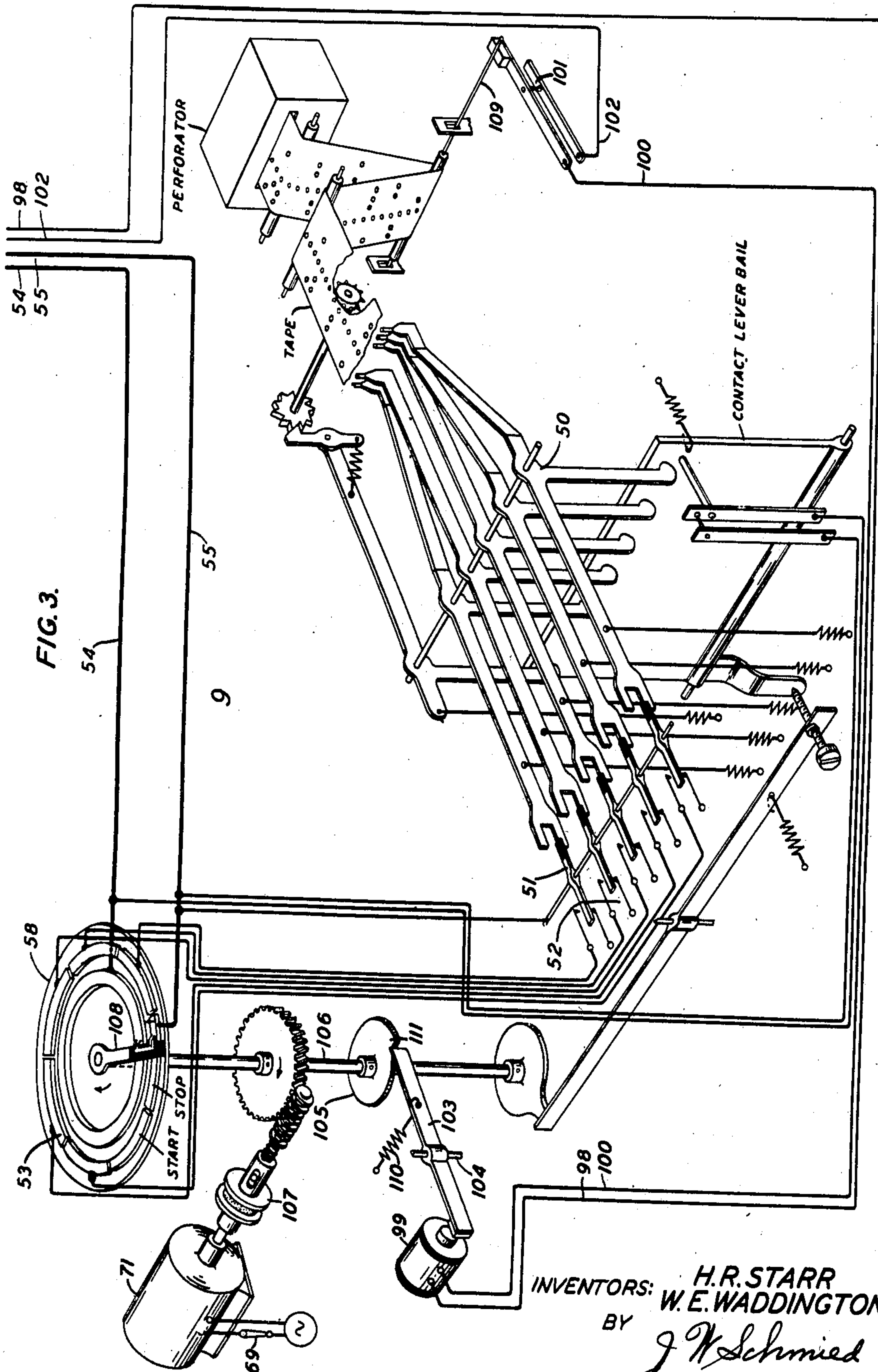
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TELETYPEWRITER SWITCHING SYSTEM

Original Filed June 17, 1937

5 Sheets-Sheet 2



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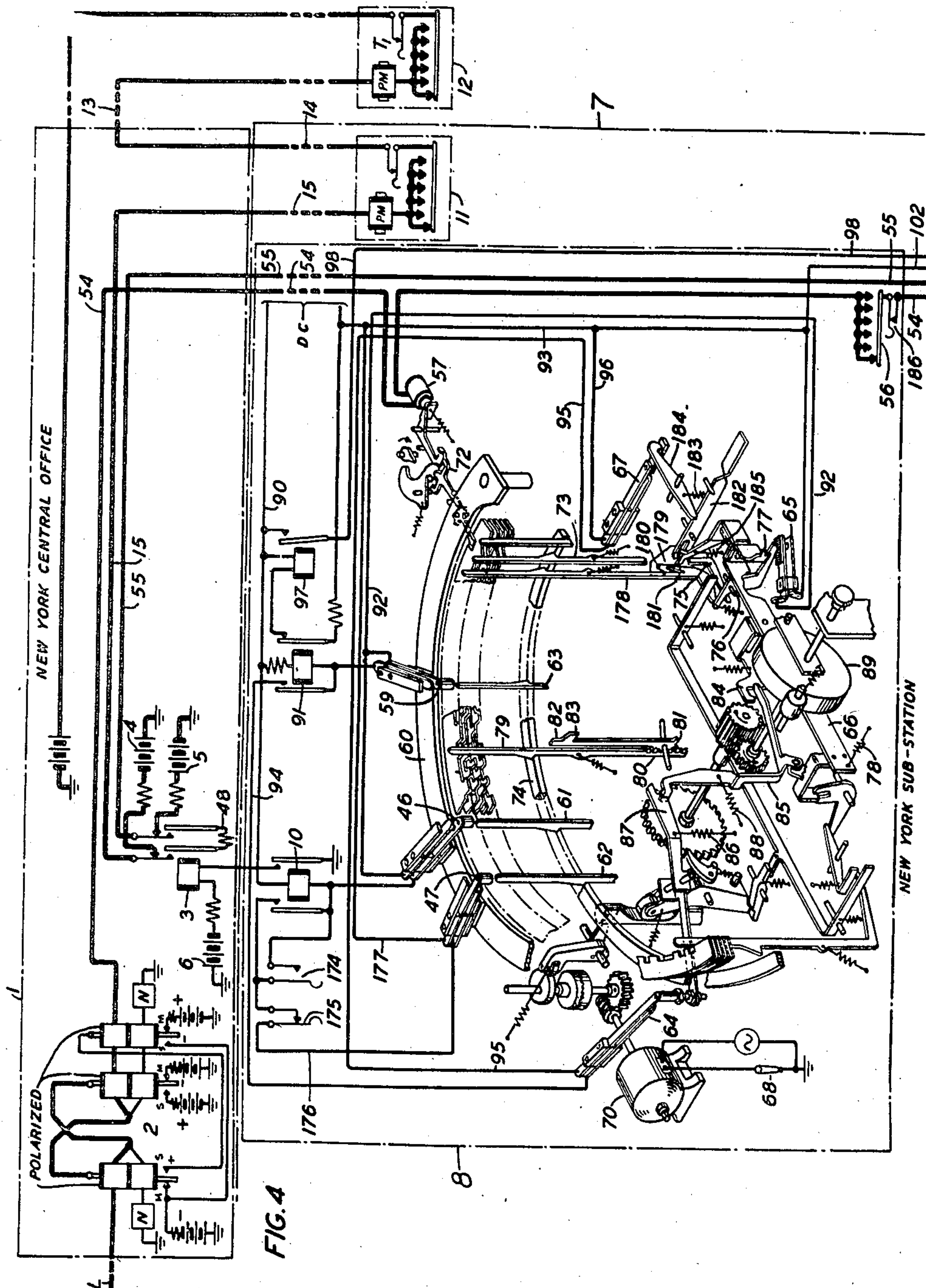
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TELETYPEWRITER SWITCHING SYSTEM

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5 Sheets-Sheet 3



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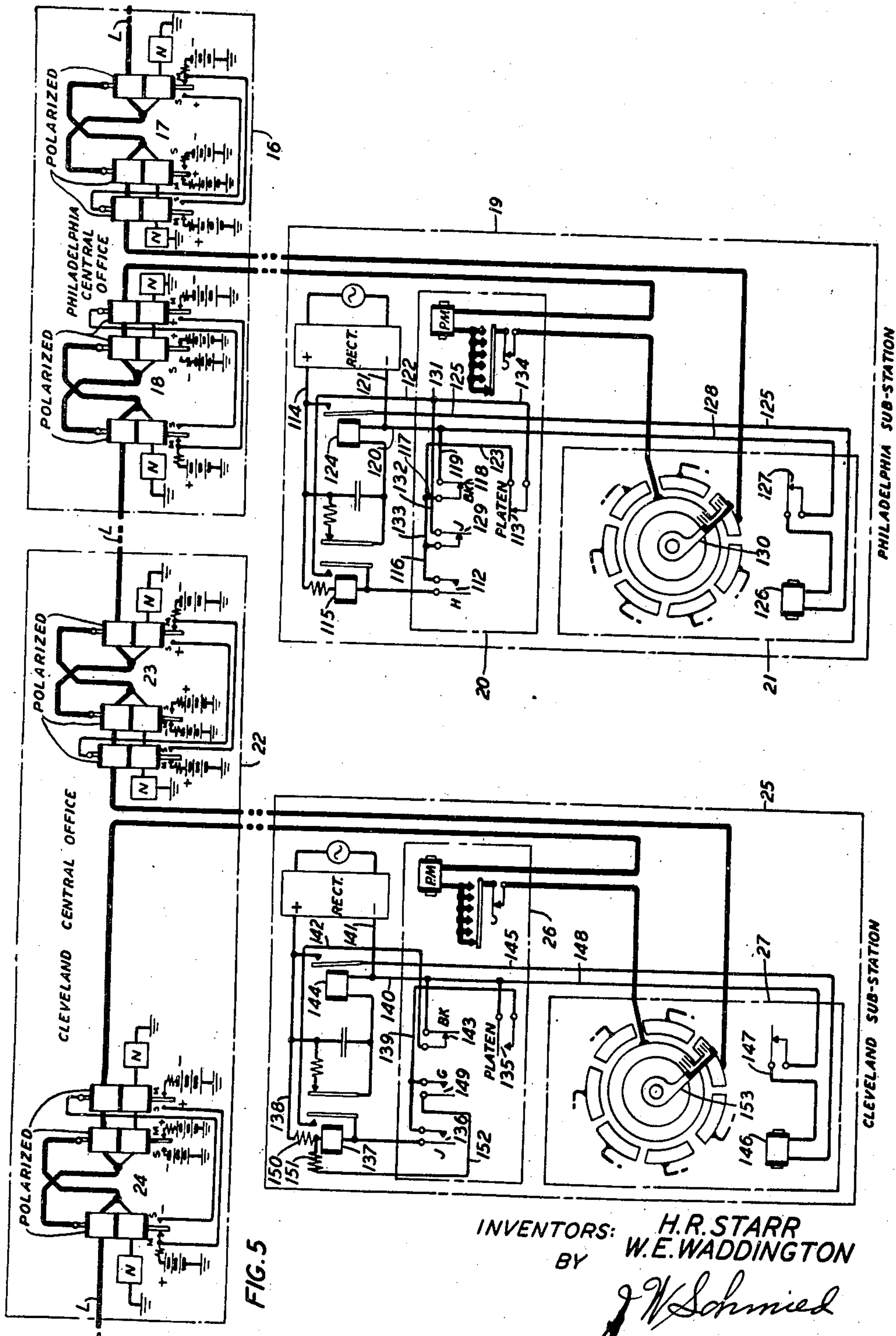
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TELETYPEWRITER SWITCHING SYSTEM

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5 Sheets-Sheet 4



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TELETYPEWRITER SWITCHING SYSTEM

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5 Sheets-Sheet 5

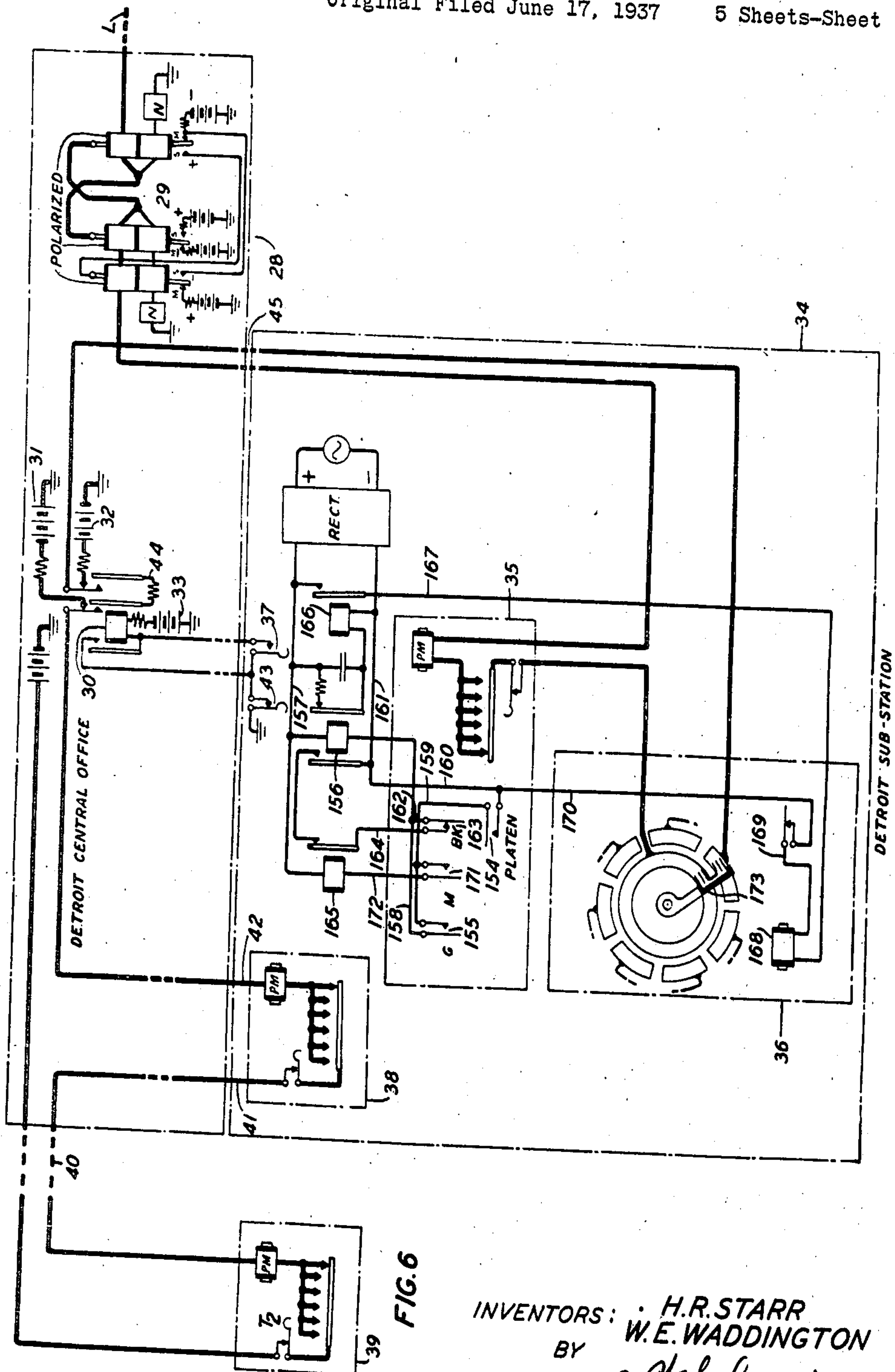


FIG. 6

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UNITED STATES PATENT OFFICE

2,336,373

TELETYPEWRITER SWITCHING SYSTEM

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Continuation of application Serial No. 148,652, June 17, 1937. This application June 15, 1940, Serial No. 340,704

37 Claims. (Cl. 178—4)

This invention relates to teletypewriter systems and, more particularly, to an automatic sequential switching teletypewriter system. It is an object and feature of this invention to automatically start and stop the sending mechanisms, such as tape transmitter-distributors, of teletypewriters at subscribers' stations connected into a teletypewriter system.

This is a continuation of application Serial No. 148,652, filed June 17, 1937.

It is also an object and feature of this invention, in a teletypewriter system having a plurality of subscribers' teletypewriter stations connected therein, to automatically condition the sending mechanisms, such as tape transmitter-distributors, of the teletypewriter stations in any desired sequence for the transmission of messages.

A further object and feature of this invention is to automatically control the sending mechanisms of teletypewriters connected into a teletypewriter system, so that, when one teletypewriter stops sending, a preselected teletypewriter will automatically be conditioned for sending and this procedure repeated in any desired sequence.

These objects and features are attained by providing control contacts in the teletypewriters of a teletypewriter system. These contacts are located in the teletypewriters just above the pull bars and are adapted to be operated by the pull bars when the pull bars are elevated by the reciprocating printing bail of the teletypewriters in response to preassigned permutation code signals. When one of these preassigned permutation code signals is transmitted over the system, it will effect the operation of a contact in a teletypewriter at each of two different stations. The operation of the contact in one of these teletypewriters will stop the transmitter-distributor of that teletypewriter and the operation of the contact in the other of the teletypewriters will automatically condition the sending mechanism of that teletypewriter for operation.

The operator of this latter teletypewriter will now transmit messages from that teletypewriter for a selected period of time, at the end of which the operator transmits a different preassigned permutation code signal. The transmission of this second code signal operates a contact in the operator's teletypewriter to stop his sending mechanism and also operates a contact in a teletypewriter at a different station thereby starting the sending mechanism of this teletypewriter. This procedure is repeated until the last teletypewriter in the system has been conditioned

for sending, after which the last of the preassigned code signals is sent to effect the stopping of the transmitter-distributor in this teletypewriter together with the starting of the transmitter-distributor in the first teletypewriter of the system. The whole procedure is then repeated throughout the duration of the business day thereby permitting a continuous and uninterrupted flow of transmission regardless of the number of subscribers. It also permits a "one-message" rotation system whereby each subscriber may perforate messages in his tape in advance of their transmission and the transmitters will automatically pick up one message from each subscriber in proper rotation or sequence thereby reducing the over-all transmission time.

These and other features of the invention will be more fully described in connection with the following detailed description of the drawings in which:

Fig. 1 is a schematic representation of the system as a whole;

Fig. 2 shows the relation of Figs. 3, 4, 5 and 6 and the manner in which they are to be connected;

Fig. 3 illustrates the tape transmitter-distributor at the terminal station shown in Fig. 4, this transmitter-distributor mechanism being typical of that at each of the main subscribers' teletypewriter stations;

Fig. 4 represents one of the terminal teletypewriter stations of the system having a subsidiary teletypewriter station with means for automatically connecting this subsidiary station to the main transmission system;

Fig. 5 shows two intermediate teletypewriter stations in the system; and

Fig. 6 shows another terminal teletypewriter station of the system having a subsidiary teletypewriter station with means for manually connecting the subsidiary station through the system.

For the purpose of illustration, Fig. 1 has been drawn to illustrate a specific teletypewriter system having terminal stations at New York and Detroit with intermediate stations at Cleveland and Philadelphia, and a subsidiary teletypewriter station at each end of the system connected by a local line to the nearest terminal station. It is to be understood that the specific number and arrangement of stations is shown purely for illustrative purposes and that the invention is not limited to the number of stations shown nor is it limited to the particular arrangement of the stations shown.

In Fig. 1, the New York terminal is shown to include a central office 1 having a telegraph repeater 2, a switching relay 3, and a plurality of sources of power supply comprising batteries 4, 5, and 6. Connected to central office 1 is a New York subscriber's station 7 having a teletypewriter 8, a tape transmitter-distributor 9, a switching relay 10, and an auxiliary teletypewriter 11. The transmitter-distributor 9 is of the type shown in detail in Fig. 3 and is fully described in Patent 2,055,567, granted September 29, 1939, to E. F. Watson. The disclosure of this Watson patent is incorporated herein by reference as a part of this specification. Also connected to central office 1 is a subsidiary subscriber's station 12 having a teletypewriter T₁. During business hours, the teletypewriter 8 at the subscriber's station 7 is normally connected through repeater 2 at central office 1 to the main line L, whereas during this period the teletypewriter T₁ at station 12 is ordinarily connected by conductor 13 to the central office 1, over conductor 14 to the auxiliary teletypewriter 11 at station 7, and then over conductor 15 to battery 4 at central office 1. Thus, subscriber's station 12 is subsidiary to the subscriber's station 7 in that it usually is connected for communication only with the auxiliary teletypewriter 11 and is not ordinarily connected into the main transmission circuit leading out over line L.

From central office 1, a main transmission path L leads to the intermediate teletypewriter central office 16 at Philadelphia which is provided with telegraph repeaters 17 and 18. Connected to central office 16 is a Philadelphia subscriber's station 19 which includes a teletypewriter 20 and a tape transmitter-distributor 21 similar to transmitter-distributor 9. After passing through central office 16, the main transmission path L leads to the intermediate teletypewriter central office 22 at Cleveland which is also supplied with two telegraph repeaters 23 and 24. Connected to central office 22 is a Cleveland subscriber's station 25 having a teletypewriter 26 and a tape transmitter-distributor 27 similar to transmitter-distributor 9.

After leaving central office 22, the main transmission path L terminates in the terminal teletypewriter central office 28 at Detroit. Central office 28 includes the telegraph repeater 29, a switching relay 30, and a plurality of sources of power supply comprising batteries 31, 32, and 33. Connected to central office 28 is a Detroit subscriber's station 34 having a teletypewriter 35, a tape transmitter-distributor 36 similar to transmitter-distributor 9, manually operable switching keys 37 and 43, and an auxiliary teletypewriter 38. Also connected to central office 28 is a subsidiary subscriber's station 39 having a teletypewriter T₂. During business hours, teletypewriter 35 at the subscriber's station 34 is normally connected through repeater 29 at central office 28 to the main line L, whereas during this period the teletypewriter T₂ at station 39 is ordinarily connected by conductor 40 to the central office 28, over conductor 41 to the auxiliary teletypewriter 38 at station 34, and then over conductor 42 to battery 31 at central office 28. Thus, subscriber's station 39 is subsidiary to subscriber's station 34 in that it usually is connected for communication only with the auxiliary teletypewriter 38 and is not ordinarily connected into the main transmission circuit leading out over line L.

In this particular embodiment of the inven-

tion, the subscribers' stations 7, 19, 25, and 34 are ordinarily connected to each other through their respective central offices 1, 16, 22, and 28 during business hours. The operation of the system is then begun by the subscriber at one station, such as the New York station 7, transmitting a message, or series of messages, out over the main transmission line L to each of the other subscribers' stations 19, 25, and 34 by means of the transmitter-distributor 9. This message, or series of messages, will be recorded on each of the teletypewriters 8, 20, 26, and 35. The termination of transmission from station 8 may be determined arbitrarily by the subscriber, such as by transmitting all the messages that happen at that time to be perforated on the tape of the transmitter-distributor 9. However, in a busy system, it may be found to be more efficient to limit the sending period either to just one message at a time or to a definite pre-assigned interval of time, such as two minutes.

In either event, the subscriber terminates his transmission with a preassigned character, such as upper case H. The transmission of the permutation code signal for upper case H operates selecting mechanism in the teletypewriter 8 (shown in detail in Fig. 4) which effects the momentary operation of a special contact 64 (Fig. 4) in teletypewriter 8 which, in turn, effects the stopping of the subscriber's transmitter-distributor 9. This upper case H signal is received by teletypewriters 20, 26, and 35 and operates mechanism in the teletypewriter 20 which effects the operation of a contact which, in turn, effects the starting of the transmitter-distributor 21 at station 19 in a manner which will be more fully described hereinafter.

The subscriber at the Philadelphia station 19 now transmits messages out over line L which will be recorded on each of the teletypewriters 8, 20, 26, and 35. At the end of his transmission period, the subscriber at station 19 transmits a particular preassigned permutation code signal, such as upper case J. When this permutation code signal passes through teletypewriter 20, it actuates selecting mechanism in teletypewriter 20 to effect the momentary operation of a special contact (Fig. 5) in teletypewriter 20 which, in turn, effects the stopping of the subscriber's transmitter-distributor 21. This upper case J code signal is received by teletypewriters 8, 26, and 35 and operates mechanism in teletypewriter 26 which effects the operation of a contact which, in turn, effects the starting of the transmitter-distributor 27 at station 25 in a manner that will be described hereinafter.

The subscriber at the Cleveland station 25 now transmits messages out over line L which will be recorded by each of the teletypewriters 8, 20, 26 and 35. At the end of his transmission period, the subscriber at station 25 transmits a particular preassigned permutation code signal, such as upper case G, which momentarily operates a contact in the teletypewriter 26 and a contact in the teletypewriter 35. The operation of the former contact effects the stopping of the transmitter-distributor 27 and the operation of the latter contact effects the starting of transmitter-distributor 36 as will be described in more detail hereinafter.

The subscriber at the Detroit station 34 now takes his turn at transmitting messages out over line L which will be recorded by each of teletypewriters 8, 20, 26, and 35. At the end of his transmission period, the subscriber at station 34

will transmit a different preassigned permutation code signal, such as upper case M, which momentarily operates the contact in each of teletypewriters 8 and 35. The operation of the contact in teletypewriter 35 effects the stopping of the transmitter-distributor 36 while the operation of the contact in teletypewriter 8 effects the starting of transmitter-distributor 9 as will be explained hereinafter.

The subscriber at the New York station 7 now takes another turn at transmitting messages out over line L to be recorded by teletypewriters 9, 20, 26, and 35. At the end of his transmission period, the subscriber at station 7 again transmits the particular permutation code signal, H, which has been assigned to stop his transmitter-distributor 9 and to start the transmitter-distributor 21 at the next station 19 in the sequence of the circuit. The procedure of operation described above is repeated for the duration of business hours with each subscriber closing his transmission period by transmitting a particular preassigned permutation code signal designed to stop his transmitter-distributor and to start the next transmitter-distributor in the sequence of the circuit.

A preferred method of operating this circuit is for each subscriber to perforate a length of tape which will require two minutes to transmit and to end this section of tape with the code character assigned to that subscriber's station. The subscriber can then perforate another two-minute section of tape and end it with the same code character and so on throughout the business day. This renders the operation of the system more automatic as the transmitter-distributors will be automatically started and stopped. It also permits a higher rate of speed in transmitting because, since the tape is perforated in advance, there will be no delays, such as would otherwise be caused by an operator in the ordinary method of perforating tape for immediate transmission. This method of operation also gives each subscriber an equal amount of line time for transmission and reduces transmission time in that it does not require the usual "call" and "go ahead" signals. The same results can be obtained by perforating a switching signal at the end of each message instead of at the end of each two-minute section.

In the event that one subscriber had no message to transmit during a certain portion of the business day, that subscriber would perforate in his transmitting tape a succession of perforations corresponding to a series of the code character assigned to his station. Then, whenever his transmitter-distributor should be started, it would merely transmit one of these code characters which would immediately stop his transmitter-distributor and start the next transmitter-distributor. In this way, the full line time would be more efficiently utilized without departing from the automatic and sequential method of starting and stopping each subscriber's transmitter-distributor. It is to be understood that the invention is not limited to this preferred embodiment but that the sequence and time of transmission may be varied as desired.

At the Detroit end of the system is a subsidiary subscriber's station 39 connected to the central office 28 by a local line 40. Normally, station 39 is connected by conductors 41 and 42 to an auxiliary teletypewriter 38 at station 34 and to battery 31 at central office 28. The sub-

scriber at station 34 can communicate with the subscriber at station 39 by means of the auxiliary teletypewriter 38. In the event that the operator at station 39 wishes to connect his teletypewriter T₂ to the main transmission line L for reception or transmission of messages, he can record this desire on the auxiliary teletypewriter 38 at station 34.

In response to this request, the subscriber at station 34 manually operates key 37 momentarily. The operation of key 37 applies ground from key 43 to the switching relay 30 at central office 28 thereby closing a path for battery 33 to energize relay 30. Upon being energized, relay 30 operates its armatures and locks-up through its left armature to the ground on key 43. At the same time, the inner right armature of relay 30 is operated and switches conductor 42 from battery 31 to the joining conductor 44 while the outer right armature switches conductor 45 from battery 32 to the joining conductor 44 and thence to conductor 42. This switching operation serves to switch station 39 into the main transmission line L or, in other words, the main transmission line L is extended to station 39.

The subscriber at station 34 can restore the system to its normal condition at any time by manually operating key 43 momentarily. The opening of key 43 opens the locking-up circuit of relay 30 by removing the ground on key 43. When the locking-up circuit is opened, relay 30 will release its armatures thereby switching conductor 42 to battery 31 and conductor 45 to battery 32. Thus, it can be seen that station 39 is subsidiary to station 34 because it is normally connected for transmission with the auxiliary teletypewriter 38 and can be connected into, or disconnected from the main transmission line L only when the subscriber at station 34 operates key 37 or key 43.

At the New York end of the system is another subsidiary subscriber's station 12 connected to central office 1 by a local line 13. Normally, station 12 is connected by conductors 14 and 15 to an auxiliary teletypewriter 11 at station 7 and to battery 4 at central office 1. The subscriber at station 7 can communicate with the subscriber at station 12 by means of the auxiliary teletypewriter 11.

If it is desired to connect the subsidiary subscriber's teletypewriter T₁ to the main transmission line L, this can be effected by the transmission by the subscriber at station 7, or by any of the other subscribers at the other connected stations, of a preassigned permutation code signal, such as upper case A, over the line L for reception by all of the connected teletypewriters. However, the teletypewriter 8 at station 7 is the only teletypewriter which is adapted to make particular use of this signal because teletypewriter 8 is provided with a special contact 46 which is adapted to be momentarily operated by the selecting mechanism in teletypewriter 8 in response to the reception by teletypewriter 8 of upper case A.

When contact 46 is momentarily closed in response to the reception of upper case A, it closes a path for energizing the control relay 10 which operates its armatures and locks-up over a path through its left armature and contact 47. The operation of the right armature of relay 10 closes a path for enabling battery 6 to energize switching relay 3 which operates its armatures and remains energized as long as relay 10 holds its right

armature operated. The operation of the inner armature of relay 3 switches conductor 15 from battery 4 to the joining conductor 48 while, at the same time, the outer armature of relay 3 switches conductor 55 from battery 5 to the joining conductor 48 and thence to conductor 15. This switching operation serves to switch station 12 into the main transmission line L, or in other words, the main transmission line L is extended to station 12.

Whenever desired, station 12 can be disconnected from line L and the system restored to normal by the transmission of another preassigned permutation code signal, such as upper case S. This particular signal may be sent from any of the teletypewriters 8, 20, 26, 35, or T₁. It may also be sent from teletypewriter T₂ if this teletypewriter happens to be connected into line L at this time. Regardless of what teletypewriter the signal is transmitted from, it is received by teletypewriter 8 where it actuates selecting mechanism to effect the momentary operation of contact 47. The opening of contact 47 serves to open the locking-up circuit of control relay 10, which, consequently, releases its armatures. The release of the right armature of relay 10 opens the energizing circuit of switching relay 3 with the result that relay 3 releases its armatures thereby switching conductor 15 to battery 4 and conductor 55 to battery 5. This switching action disconnects station 12 from line L and leaves station 12 in its local circuit through the auxiliary teletypewriter 11. From this description it is evident that station 12 is subsidiary in its nature because it can be connected into or disconnected from the main transmission line L only by the operation of contacts at station 9.

It is to be understood that two different systems, one a mechanical system and the other a manual system, have been shown for switching the two subsidiary stations 12 and 39 for purposes of illustrating the wide scope of the invention which is not limited to the specific arrangements shown and is also not limited to only two subsidiary stations. The invention is flexible in that it may be varied to meet the requirements of different circuit installations. Thus, by means of this invention, transmitter-distributors at a plurality of subscribers' stations can be automatically started and stopped in any desired sequence and subsidiary teletypewriter stations may be automatically switched into, or disconnected from, a teletypewriter circuit, or communication line, at another station.

As was stated above, Fig. 2 shows the relation of Figs. 3, 4, 5, and 6 and the manner in which they are to be connected. Fig. 3 illustrates the tape transmitter-distributor 9 which is employed at the New York subscriber's station 7 and which is typical of that used at each of the main subscribers' stations. This transmitter-distributor is similar to that disclosed and described in the aforementioned Watson Patent 2,055,567, except that the transmitter-distributor shown in this Watson patent is adapted for use in transmitting a six-unit permutation code, whereas the transmitter-distributor 9 in Fig. 3 is designed to transmit a five-unit code. Watson's six-unit transmitter-distributor can be readily converted to a five-unit transmitter-distributor by substituting a distributor face-plate 58 having a transmitting segmented ring with seven segments instead of the eight segments shown in the Watson patent and by removing one of the contact levers with its

contact tongue, set of spacing and marking contacts, and associated conductors.

To initiate transmission, the subscriber at station 7 closes his manually operable switches 68 and 69 to start his teletypewriter motor 70 and the motor 71 of the transmitter-distributor 9.

Before operating the transmitter-distributor 9, the subscriber at station 9 first perforates permutation code combinations in his transmitting tape by means of his perforator which may be of any well-known type, such as that disclosed in Patent 2,019,505, granted November 5, 1935, to A. H. Reiber. The disclosure of this Reiber patent is incorporated herein by reference as a part of this specification. The perforated tape travels from the perforator to the contact levers 50 which are selectively operated by the perforations in the tape to similarly selectively operate contact tongues 51 and their associated spacing and marking contacts 52 thereby closing circuits leading to the segmented ring 53 of the distributor face-plate 58. The circuit for transmitting the permutation code signals from transmitter-distributor 9 leads from battery 5 over conductor 55, over the rings of the distributor face-plate 58, conductor 54, teletypewriter 8, break key 136 (Fig. 4), sending contacts 56, receiving magnet 57, central office telegraph repeater 2, and then out over line L to the next central office 16.

The teletypewriter 8 is shown to be provided with three sets of contacts 46, 47, and 59 mounted in teletypewriter 8 on a plate 60. It can be seen in the drawings that contacts 46 and 59 are normally open while contact 47 is normally closed and that the contacts 46, 47, and 59 are located over the tops of pull bars 61, 62, and 63, respectively. Teletypewriter 8 is also provided with a normally closed contact 64, which is operable by a system of levers, a normally open contact 65, operable by the platen assembly 66, and another normally closed contact 67, operable by a particular arrangement of the teletypewriter mechanism.

Since the main transmission circuit L has already been set up by the operators at the various central offices in the system, the subscriber at station 7 is now in a position to initiate transmission. This he does by first transmitting from his teletypewriter 8 the permutation code combination for "figures." This code combination is known as the "upper case" signal because it operates the selecting mechanism 72 to effect the selection and operation of the figures pull bar 73. Elevation of pull bar 73 by the reciprocating bail 74 elevates extension 75 of pull bar 73 thereby tilting bell crank 76 which releases catch 77 to allow spring 78 to pull the platen assembly 66 forward into its upper case position. In moving forward, the platen assembly 66 carries latch 77 forward along the edge of bell crank 76 thereby forcing downward the right end of bell crank 76 to close the platen contact 65 which remains closed during the entire time that platen 89 remains in its upper case position.

The subscriber then operates his teletypewriter 8 to transmit an "M" code combination signal which operates his selecting mechanism 72 to select pull bar 63 for operation by bail 74. The momentary elevation of pull bar 63 serves to momentarily close contact 59 thereby closing a path for positive current to pass from the positive terminal of the local source of direct current over conductor 90, through the winding of relay 91, over contact 59 (now closed), conductor 92, over contact 65 (now closed), and then along conductor 93 to the negative terminal of the local

source of power supply. In response to the closing of this circuit, relay 91 becomes energized and operates its armatures and locks-up over a path through its left armature, along conductor 94, through the normally closed contact 64, conductor 95, through the normally closed break contact 67, conductor 96, and then along conductor 93 to the negative terminal of the local source of power supply.

At the same time, the right armature of relay 91 opens the energizing circuit of relay 97 which, accordingly, releases its armature. The release of the armature of relay 97 closes a circuit leading from the positive power terminal along conductor 99, over the armature of relay 97, conductor 98, through the winding of stop magnet 99 (Fig. 3), conductor 100, over the tape tension contact 101, conductor 102, and then along conductor 93 to the negative power terminal. This serves to energize control magnet 99 which operates the stop arm 103 about its pivot 104 to move the left end of stop arm 103 out of engagement with the shoulder 111 formed by the periphery of the stop cam 105 mounted on the main drive shaft 106. This allows the friction clutch 107 to effect continuous rotation of the distributor brush arm 108 for the transmission of signals by the transmitter-distributor 9 out over conductors 54 and 55.

This condition continues until either contact 64 or 67 is operated by a code signal or until the tape tension contact 101 is operated by the stop lever 109 in the manner described in the Watson patent to effect the opening of the energizing circuit of magnet 99. Should this occur, then magnet 99 would release the stop arm 103 which would then be pulled around its pivot 104 by the spring 110 and would engage with the shoulder 111 of the stop cam 105. This would stop shaft 106 and brush arm 108 from rotating and would disengage the friction clutch 107. However, if it be assumed that none of these contacts are now operated, then the subscriber at station 7 will be able to transmit messages from his transmitter-distributor 9 out over line L to the connected teletypewriters 20, 26, and 35 for the full length of his transmission time. Due to the fact that the contacts 46, 47, 53, and 64 in his teletypewriter 8 are effective for performing their special switching function only when the platen assembly 66 is in its upper case position, the subscriber at station 7 may use the lower case code combinations for operating the pull bars 61, 62, 63, and 79 for performing their ordinary printing functions.

After the subscriber at station 7 has used his full transmission time, he concludes his transmission with the permutation code combination for "figures" followed by the code combination for "H." As was described above, the "figures" signal is known as the "upper case" signal because the reception of this signal causes selecting mechanism 72 in each of the connected teletypewriters in the system to effect the selection and operation of their figures pull bar corresponding to pull bar 73 in teletypewriter 8. As was also described above, elevation of bar 73, by the printing bail 74, elevates extension 75 of pull bar 73 thereby tilting ball crank 76 which releases latch 77 to allow spring 78 to pull the platen assembly 66 forward into its upper case position.

The reception of the "H" code combination causes the selecting mechanism 72 to effect the operation of pull bar 79 which, by means of the

rack and pinion gears 80 and 81 move the type bar 82 downward in an arcuate path. Projection 83 on bar 82 will consequently strike lever 84, pivotally attached to the platen assembly 66, thereby driving downward the right end of lever 85. This causes the top end of lever 85 to move to the right to allow spring 86 to pull down the right end of lever 87 into latching engagement with the top end of lever 85. At the same time, the left end of lever 87 is driven upward to open the normally closed contact 64. However, this opening of contact 64 is only momentary because the reciprocating bail 74 soon comes down and forces down the left end of lever 87 thereby allowing contact 64 to close and, at the same time, forcing the right end of lever 87 upward to allow spring 88 to pull lever 85 back into its normal position.

In this connection, it should be noted that this system of levers can only be operated by an upper case H signal because, when a lower case H signal is received, the platen assembly 66 is back in its lower case position so that the projection 83 of bar 82 would not then be able to hit against lever 84 due to lever 84 being pulled back with the platen assembly 66 to which it is attached. Consequently, the circuit to contact 64 need not pass through the platen contact 65.

The momentary operation of contact 64 serves to open the locking-up circuit for relay 91 which, accordingly, releases its armatures. The right armature of relay 91 now closes the energizing circuit for relay 97 which operates its armature thereby opening the energizing path of magnet 99 over conductors 99, 98, 100, and 102. Consequently, magnet 99 releases the stop arm 103 and allows spring 110 to pull stop arm 103 around its pivot 104 for engaging with shoulder 111 of the stop cam 105. This stops shaft 106 and brush arm 108 from rotating and disengages the friction clutch 107. Motor 71 now runs idle and no transmission can be effected by transmitter-distributor 9 until the energizing circuit for magnet 99 is again closed.

At the same time, the "H" code signal combination is transmitted out over line L to the other connected teletypewriters 20, 26, and 35 where it causes their selecting mechanism, similar to selecting mechanism 72 in teletypewriter 8, to effect the operation of a pull bar, similar to pull bar 79. In the teletypewriter 20 at the Philadelphia subscriber's station 19 (Fig. 5), the operation of this pull bar effects the operation of a type bar, similar to type bar 82, which, in turn, operates a system of levers, similar to levers 84, 85, and 87. This results in the momentary operation of a contact 112 which is similar to contact 64 except that contact 112 is the reverse of contact 64 in that it is normally open and is so designed that the upward thrust of the lever in teletypewriter 20 which corresponds to lever 87 in teletypewriter 8 will momentarily close contact 112.

The closing of contact 112 closes a circuit leading from the positive terminal of the local source of power supply, along conductor 114, through the winding of relay 115, contact 112, conductor 116, conductor 133, conductor 117, normally closed break contact 118, conductor 119, conductor 120, and then over conductor 121 to the negative terminal of the local source of power supply. Consequently, relay 115 operates its armatures and locks-up over a circuit traced from its inner armature and along conductor 122 to junction 131. Here the locking-up path divides

into two paths, one path leading over conductor 132, normally closed contact 129, conductor 133, conductor 117, break contact 118, conductor 119, conductor 120, and then over conductor 121 to the negative terminal of the local source of power supply.

The other path leads from junction 131, and over conductor 134 to the normally closed platen contact 113. This platen contact 113 is the reverse of the platen contact 65 in Fig. 4 in that it is normally closed. At this particular moment, contact 113 is open due to the transmission and reception of the "figures" signal. However, as soon as a "letters" signal is transmitted, the platen (not shown) in teletypewriter 20 will be shifted to its lower case position to close a branch of the locking-up path from conductor 134, over contact 113, conductor 123, conductor 117, break contact 118, conductor 119, conductor 120, and then over conductor 121 to the negative terminal of the local source of power supply.

At the same time, the outer armature of relay 115 opens the energizing circuit of relay 124 which, accordingly, releases its armature to close a path from the positive terminal of the local source of power supply over conductor 114, armature of relay 124, along conductor 125 to the transmitter-distributor 21, through the winding of magnet 126 which is similar to magnet 99 in Fig. 3, tape tension contact 127 which is similar to contact 101 in Fig. 3, conductor 128, conductor 120, and then along conductor 121 to the negative terminal of the local source of power supply. The energization of magnet 126 effects the operation of a stop arm (not shown) which is similar to stop arm 103 in the transmitter-distributor 9 and which performs the same function in transmitter-distributor 21 that stop arm 103 does in transmitter-distributor 9. This conditions the transmitter-distributor 21 at the Philadelphia subscriber's station 19 for the transmission of messages out over line L.

The locking-up circuit for relay 115 will remain closed until a "figures" signal is sent followed by a "J" signal because, although a "figures" signal would open contact 113, the other side of the locking-up circuit would remain closed through the "J" contact 129. When the platen is in its lower case position, opening of the "J" contact 129 would only open one branch of the locking-up circuit because the other branch would be closed through contact 113.

After the subscriber at station 19 has used his full transmission time, he concludes his transmission period by transmitting the permutation code combination for "figures," which opens the locking-up path through contact 113, followed by the code combination for "J." This "J" signal actuates the selecting mechanism of the subscriber's teletypewriter 20 to effect the operation of a pull bar which momentarily opens the normally closed contact 129 which is similar to the pull bar contact 47 (Fig. 4) except that it is located over the top of the "J" pull bar in teletypewriter 20 instead of the "M" pull bar.

When contact 129 opens, it opens its branch of the locking-up circuit and, since both branches of the locking-up circuit are now both open at the same time, relay 115 will become deenergized and will release its armatures thereby closing the energizing circuit of relay 124. Relay 124 now operates its armature to open the energizing circuit over conductor 125 to magnet 126 which releases its associated stop arm (not shown) for engagement with the shoulder of the stop cam

(not shown) in the transmitter-distributor 21. Brush arm 130 will now be prevented from further rotation and no transmission can be effected by transmitter-distributor 21 until magnet 126 is again energized.

At the same time, the "J" code signal combination is transmitted out over line L to the other connected teletypewriters 26, 35, and 8 which have already moved their platen assemblies into their upper case positions in response to the "figures" signal which preceded the "J" signal. In the teletypewriter 26 at the Cleveland subscriber's station 25, the normally open platen contact 135, which is similar to the platen contact 65 shown in Fig. 4, is closed in response to the reception of the "figures" signal. When the "J" signal is received by teletypewriter 26, it causes the selecting mechanism in teletypewriter 26 to select the "J" pull bar for operation by the bail of teletypewriter 26. In operating, the "J" pull bar closes the "J" contact 136 thereby completing an energizing circuit for relay 137 from the positive terminal of the local source of power supply, over conductor 138, resistance 150, through the winding of relay 137, over contact 136, conductor 139, through the platen contact 135 (now closed), conductor 140, and then along conductor 141 to the negative terminal of the local source of power supply.

This serves to energize relay 137 which operates both its armatures and locks-up over its inner armature, conductor 142, normally closed break contact 143, conductor 140, and then over conductor 141 to the negative terminal of the local source of power supply. The outer armature of relay 137 opens the energizing circuit for relay 144 which, accordingly, releases its armature to close an energizing circuit over conductor 145 to transmitter-distributor 27, through the winding of magnet 146 which is similar to magnet 99 in Fig. 3, tape tension contact 147, conductor 148, conductor 140, and then over conductor 141 to the negative terminal of the local source of power supply. The energization of magnet 146 effects the operation of a stop arm (not shown) which is similar to stop arm 103 in the transmitter-distributor 9 in Fig. 3 and which performs the same function in transmitter-distributor 21 that stop arm 103 performs in transmitter-distributor 9. This conditions the apparatus at the Cleveland subscriber's station for the transmission of messages out over line L.

When the Cleveland subscriber at station 25 concludes his transmitting period, he finishes his transmission with a permutation code combination for "figures" followed by the code combination for "G." The "figures" signal effects the closing of the platen contact 135 and the "G" signal effects the operation of a pull bar in teletypewriter 26 which momentarily closes the normally open contact 149 thereby closing a path for shunting magnet 137. This shunt path leads from the positive terminal of the local source of power supply, along conductor 138, through resistances 150 and 151, conductor 152, contact 149, conductor 139, contact 135, conductor 140, and then over conductor 141 to the negative terminal of the local source of power supply.

The value of the resistance 151 is small and is designed to be sufficiently less than the resistance of relay 137 so that the closing of the circuit through the "G" contact 149 will effectively shunt relay 137 which will then release its armatures. The release of the inner armature of relay 137

will open the locking-up circuit of relay 137 and the release of the outer armature will close the circuit for energizing relay 144. Relay 144 will now operate its armature to open the circuit for energizing magnet 146 which releases its associated stop arm (not shown) for engagement with the shoulder or the stop cam (not shown) in the transmitter-distributor 27 thereby holding brush arm 153 from further rotation at this time. No transmission of messages can now be effected by the transmitter-distributor 27 at station 25 until magnet 146 is again energized by the release of the armature of relay 144.

This "figures" signal is received by the teletypewriter 35 at the Detroit subscriber's station 34 where it effects the closing of a platen contact 154 similar to the platen contact 65 in teletypewriter 8 in Fig. 4. The "G" code signal causes the selecting mechanism of the teletypewriter 35 to select the "G" pull bar which is elevated by the reciprocating bail of teletypewriter 35 to close contact 155. The closure of these two contacts closes a path for energizing relay 156 from the positive terminal of the local source of power supply, along conductor 157, through the winding of relay 156, conductor 158, over contact 155, conductor 159, platen contact 154, conductor 160, and then along conductor 161 to the negative terminal of the local source of power supply.

Relay 156 now operates its armatures and locks-up over a path traced from the positive terminal of the local source of power supply, over conductor 157, through the winding of relay 156, conductor 162, through the normally closed break contact 163, conductor 164, over the non-operated armature of relay 165, operated left armature of relay 156, and then along conductor 161 to the negative terminal of the local source of power supply. At the same time, the right armature of relay 156 is operated to open the energizing circuit of relay 166, which accordingly releases its armature to close an energizing circuit over conductor 167 to transmitter-distributor 36, through the winding of control magnet 163 which is similar to magnet 99 in Fig. 3, tape tension contact 169, conductor 170, conductor 160, and then along conductor 161 to the negative terminal of the local source of power supply. The energization of magnet 168 effects the operation of a stop arm (not shown) which is similar to stop arm 103 in the transmitter-distributor 9 in Fig. 3 and which performs the same function in transmitter-distributor 36 that stop arm 103 performs in transmitter-distributor 9. This conditions the apparatus at the Detroit subscriber's station for the transmission of messages out over line L.

When the Detroit subscriber at station 34 concludes his transmitting period, he finishes his transmission with a permutation code combination for "figures" followed by the code combination for "M." The "figures" signal effects the closing of a platen contact 154 and the "M" signal effects the operation of a pull bar in teletypewriter 35 which momentarily closes the normally open contact 171 thereby closing a path for energizing relay 165 from the positive terminal of the local source of power supply through the winding of relay 165, conductor 172, contact 171, conductor 159, platen contact 154, conductor 160, and then along conductor 161, to the negative terminal of the local source of power supply.

Upon being energized, relay 165 operates its armature which opens the locking-up circuit of relay 156 which, accordingly, releases both its armatures. The release of the left armature of relay 156 will completely open the locking-up circuit of relay 156 and the release of the right armature will close the circuit for energizing relay 166. Relay 166 will now operate its armature to open the circuit for energizing magnet 168 which thereupon releases its associated stop arm (not shown) for engagement with the shoulder of the stop cam (not shown) in the transmitter-distributor 36 thereby holding brush arm 173 from further rotation at this time. No transmission of messages can now be effected by the transmitter-distributor 36 until magnet 168 is again energized by the release of the armature of relay 166.

The "figures" signal is received by the teletypewriter 8 at the New York subscriber's station 7 where it effects the closing of the platen contact 65 in the manner described above. The "M" code signal causes the selecting mechanism 72 of teletypewriter 8 to select the "M" pull bar 63 which is thereupon elevated by the reciprocating bail 74 and closes the "M" contact 59 momentarily. The closure of contacts 59 and 65 completes a circuit for energizing relay 91 over a path traced from the positive terminal of the local power supply source, along conductor 90, through the winding of relay 91, contact 59, conductor 92, contact 65, and then along conductor 93, to the negative terminal of the local source of power supply.

Upon being energized, relay 91 operates both its armatures and locks-up over its left armature along conductor 94, through the normally closed contact 64, conductor 95, over the normally closed break contact 67, conductor 96, and then along conductor 93 to the negative terminal of the local source of power supply. The right armature of relay 91, upon being operated, opens the energizing circuit for relay 97 which thereupon releases its armature to close a circuit traced from the positive terminal of the local power supply source along conductor 90, over the armature of relay 97, along conductor 98 to the transmitter-distributor 9, magnet 99, conductor 100, tape tension contact 101, conductor 102, and then along conductor 93 to the negative terminal of the local source of power supply. As was described above, the energization of magnet 99 effects the operation of a stop arm 103 and swings it about its pivot 104 to remove it from locking engagement with shoulder 111 of the stop cam 105. Friction clutch 107 is now able to effect the rotation of drive shaft 106 and brush arm 108 thereby conditioning the transmitter-distributor 9 for the transmission of messages out over line L.

At the termination of his transmission period, the subscriber at the New York station 7 concludes his transmission with the permutation code combination for "figures" and "H." The transmission of these two signals effects the operation of contacts 64 and 112 (Fig. 5) thereby stopping transmitter-distributor 9 and starting transmitter-distributor 21 in the manner described above. The operating sequence described above is then repeated throughout the duration of the business day.

Connected to the Detroit central office 23 is a subsidiary subscriber's station 39 having a teletypewriter T₂ which, as was described above, is connected during business hours through central

office 28 to the auxiliary teletypewriter 30 at the Detroit subscriber's station 34. Whenever it is desired to connect teletypewriter T₂ into the main transmission line L, the subscriber at the Detroit subscriber's station 34 manually closes his normally open key 37 momentarily thereby closing a circuit for energizing the switching relay 30 from battery 33. Relay 30 now operates its armatures and locks-up through its left armature. At the same time, the inner right armature of relay 30 is operated and switches conductor 42 from battery 31 to the joining conductor 44, while the outer armature of relay 30 switches conductor 45 from battery 32 to the joining conductor 44 and thence to conductor 42. This switching operation serves to switch station 39 into the main transmission line L or, in other words, the main transmission line L is extended to station 39.

As was described above, the subscriber at station 34 can restore the system to its normal condition at any time by manually opening the normally closed key 43 momentarily to open the locking-up circuit of relay 30. Relay 30 will now release its armatures thereby switching conductor 42 to battery 31 and conductor 45 to battery 32.

A similar subsidiary subscriber's station 12 is connected to the New York central office 1 by a local line 13 and is normally connected by conductors 14 and 15 to an auxiliary teletypewriter 11 at station 7 and to battery 4 at central office 1.

The subscriber at the New York subscriber's station 7 can connect teletypewriter T₁ at station 12 into the main transmission line L by manually closing the normally open key 174 momentarily. This closes a path from the positive terminal of the local source of power supply, along conductor 90, through the winding of control relay 10, contact 174, over the normally closed key 175, conductor 176, normally closed contact 47, and then along conductor 177 to the negative terminal of the local source of power supply. Relay 10 now operates its armatures, and locks-up over its left armature, through key 175, conductor 176, normally closed contact 47, and then along conductor 177 to the negative terminal of the local source of power supply.

At the same time, the right armature of control relay 10 closes a path for enabling current from battery 6 to pass through and energize switching relay 3 which remains energized as long as relay 10 remains energized. Relay 3 now operates its armatures; the inner armature switches conductor 15 from battery 4 to the joining conductor 48 and the outer armature switches conductor 55 from battery 5 to the joining conductor 48 and thence to conductor 15. This switching operation serves to switch station 12 into the main transmission line L, or in other words, the main transmission line L is extended to station 12.

The subscriber at the New York subscriber's station 7 can disconnect the teletypewriter T₁ at station 12 from the main transmission line L at any time by momentarily opening the normally closed key 173 which opens the locking-up circuit of relay 10 which thereupon releases its armature to open the energizing circuit of the switching relay 3. Relay 3 now releases its armatures thereby switching conductor 15 to battery 4 and conductor 55 to battery 5. This switching action disconnects station 12 from line L and leaves station 12 in its local circuit through the auxiliary teletypewriter 11.

Any of the subscribers at any of the con-

5 nected subscribers' stations, including the subscriber at the New York station 7, can connect the teletypewriter T₁ at station 12 into the main transmission line L by transmitting the code combinations for "figures" and "A." This closes the platen contact 65 in the manner described above and also actuates the selecting mechanism 72 to effect the elevation of pull bar 61 by bail 74, thereby closing contact 46 momentarily. 10 The closing of these two contacts closes a path for energizing relay 10 from the negative terminal of the local source of power supply, over conductor 90, through the winding of relay 10, contact 46, conductor 92, platen contact 65, and then along conductor 93 to the negative terminal of the local source of power supply. This causes 15 relay 10 to operate its armatures and to lock-up over a path from its operated left armature, through the normally closed contact 175, conductor 176, normally closed contact 47, and then along conductor 177 to the negative terminal of the local source of power supply. The operation of the right armature of relay 10 closes the energizing circuit for relay 3 which switches the teletypewriter T₁ into the main transmission line L in the manner described above. 25

Whenever desired, any of the connected subscribers, including the subscriber at the subsidiary station 12, can switch the teletypewriter T₁ from the main line L back into its local circuit by transmitting a "figures" signal followed by an "S" signal. The "figures" signal effects the closing of the platen contact 65 and the "S" signal effects the operation of pull bar 62 which 35 opens momentarily the normally closed contact 47 thereby opening the locking-up circuit of relay 10. Relay 10 now releases its armatures thus opening the energizing circuit of relay 3 which also releases its armatures to switch teletypewriter T₁ back into its local circuit. 40

It will be noted that the platen contact 65 is not connected into the locking-up circuit through contact 47. This is because teletypewriter 8 is of the type disclosed in Patent 1,904,164 granted April 18, 1933, to S. Morton et al. and, in teletypewriters of this type, the pull bar 62 is operated in response to an "S" signal only when the platen 89 is in its upper case position. Pull bar 62 is known as the "bell" pull bar because 50 ordinarily, in teletypewriters of this type, its operation effects the ringing of a signal bell in the teletypewriter to attract the attention of the teletypewriter attendant. The mechanism for restricting the operation of pull bar 62 to an upper case signal includes a sixth selecting vane and is fully described in the Morton et al. patent, the disclosure of this patent being hereby incorporated herein by reference as a part of this specification. Therefore, since contact 47 can 60 only be closed when platen 89 is in its upper case position, this leaves the lower case "S" signal free to perform its ordinary printing function.

In fact, it should be noted that all of the code operated contacts can be operated only when the platen 89 of each teletypewriter is in its upper case position. This prevents unnecessary interference with the ordinary printing functions of the pull bars and their associated type bars because all the pull bars are free to perform their ordinary printing functions. In this connection, it should be stated that, in Fig. 4, the locations of the particular pull bars 61, 62, 63, 73, 79 and 178 have been diagrammatically shown for illustrative purposes in order to simplify the drawing. 75

Each teletypewriter has also been shown to be provided with a normally closed break contact connected in series with the locking-up circuit of the switching relays. This is for the purpose of "breaking," or discontinuing, a switching connection in response to the transmission and reception of a so-called "break" signal preceded by a "figures" signal. The "figures" signal causes the platen assembly 66 to be pulled forward into its upper case position by spring 78. In moving forward, the platen assembly 66 pulls lever 179 forward sufficiently to remove slot 139 from the path of travel of extension 181 of pull bar 178.

Now, when a "break" signal is received by the connected teletypewriters, due to the momentary manual opening of the break key 136 in any of the connected teletypewriters, their selecting mechanism 72 will effect the elevation of the break pull bar 178 by bail 74 with the result that extension 181 of pull bar 178 engages with the left end of lever 179 and raises it up. This elevates the left end of lever 182 and, consequently, lowers the right end of lever 182 thereby allowing spring 183 to pull down the left end of lever 184. As a result, the right end of lever 184 is raised up and allows the normally closed spring contact 67 to open.

However, this opening of contact 67 is only momentary because pull bar 178 is soon lowered by bail 74 with the result that lever 179 is restored to its normal condition by spring 185 thereby causing lever 184 to be returned to its normal position. Nevertheless, the momentary opening of the break contact 67 is sufficient to open the locking-up circuit of all the switching relays which will, consequently, discontinue any of the switching connections that happen to be set up at that time.

It is to be understood that this specific embodiment of the invention has been shown and described for purposes of explaining the principles and features of operation of the invention. Many changes may be made in the construction shown without departing from the scope of the invention. More switching contacts to be operated by other pull bars of the teletypewriters may be added whenever desired to perform any other functions that may be required. Likewise, the circuit connections of the various subscribers' stations may be varied as desired to meet the requirements of any particular communication system. It is also to be understood that the particular letter code combinations assigned for operating the switching contacts need not always be used as other letter code combinations may be employed by merely shifting the pull bar contacts from their present positions to positions over the tops of the pull bars corresponding to the desired letters. Consequently, the scope of the invention is to be limited only by the claims appended hereto.

What is claimed is:

1. A teletypewriter switching and transmission system including in combination a plurality of subscribers' stations each having a teletypewriter and a transmitter-distributor, a transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of permutation code combinations of signal impulses, switching means for stopping the transmitter-distributor at one station while starting the transmitter-distributor at another station, and instrumentalities for operating the switching means in response to the transmission of pre-

assigned permutation code combinations of signal impulses over the system.

2. A teletypewriter switching system including in combination a plurality of subscribers' stations each having a teletypewriter and a transmitter-distributor, a transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of permutation code combinations of significant current variations, switching means for stopping the transmitter-distributor at one station while starting the transmitter-distributor at another station, a plurality of contacts for controlling the operation of the switching means, and operating means for selectively operating the contacts in response to the transmission over the system of certain preassigned permutation code combinations of significant current variations.

3. A teletypewriter switching system including in combination a plurality of subscribers' stations each having a teletypewriter with pull bars and a transmitter-distributor, a plurality of contacts mounted in each teletypewriter in operative relation with the pull bars, a transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of permutation code combinations of significant current variations, selecting mechanism in each teletypewriter for operating the pull bars in response to the transmission over the system of permutation code combinations of significant current variations, switching means for stopping the transmitter-distributor at one station while starting the transmitter-distributor at another station, and a circuit at each station connected in series with one of the contacts in each teletypewriter for controlling the energization of the switching means.

4. A teletypewriter system including in combination a plurality of subscribers' stations each having a teletypewriter and a transmitter-distributor, a transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of permutation code combinations of signal impulses, switching means for switching transmission from a transmitter-distributor at one station to a transmitter-distributor at another station, and control means for controlling the operation of the switching means to effect transmission from the transmitter-distributors in any desired sequence.

5. A teletypewriter system including in combination a plurality of subscribers' stations each having a teletypewriter with a tape perforator and a transmitter-distributor, a common transmission line for interconnecting the teletypewriters at all the subscribers' stations for the transmission of permutation code combinations perforated in the various tapes, switching means for switching transmission from a transmitter-distributor at one station to a transmitter-distributor at another station, and control means for controlling the operation of the switching means in accordance with signals perforated in the tape of each station as its transmitter-distributor transmits in its turn.

6. A teletypewriter system including in combination a plurality of subscribers' stations each having a teletypewriter with a tape perforator and a transmitter-distributor, a common transmission line for interconnecting the teletypewriters at the subscribers' stations with the transmitter-distributors for the transmission of permutation code combinations perforated in each tape in succession, switching means for

switching transmission from a transmitter-distributor at one station to a transmitter-distributor at another station, and control means for controlling the operation of the switching means for determining which station shall have its transmitter-distributor started.

7. A teletypewriter switching system including in combination a plurality of subscribers' stations each having a teletypewriter and a transmitter-distributor, a transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of permutation code combinations of signal impulses, control means at one of the subscribers' stations for controlling the operation of the transmitter-distributor at that station, a normally open energizing circuit for energizing said control means, a first instrumentality for preparing said energizing circuit in response to the transmission of a preassigned permutation code signal combination over the system, and a second instrumentality for completing said energizing circuit in response to the transmission of a different permutation code signal combination over the system.

8. A teletypewriter switching system including in combination a plurality of subscribers' stations each having a teletypewriter, a main transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of signal impulses, one of said subscribers' stations having an auxiliary teletypewriter, a subsidiary subscriber's station having a teletypewriter, a subsidiary circuit for connecting the teletypewriter at the subsidiary subscribers' station to said auxiliary teletypewriter, and instrumentalities at the station having said auxiliary teletypewriter for extending the main transmission line over the subsidiary circuit to the teletypewriter at the subsidiary subscribers' station in response to preassigned significant current variations previously transmitted over said main transmission line.

9. A telegraph system including in combination a plurality of subscribers' stations each provided with a printing telegraph instrument, a transmission channel for connecting said printing telegraph instruments, starting means for causing the printing telegraph instrument at one subscriber's station to transmit messages out over the transmission channel for recording by the printing telegraph instruments at the other subscribers' stations, instrumentalities for terminating transmission from this subscriber's station and for switching the initiation of the transmission of messages from the subscriber's station that is transmitting messages to one of the subscribers' stations that is recording the transmitted messages, and operating means for operating said instrumentalities in response to a preassigned operation of the printing telegraph instrument which is transmitting messages at that time.

10. In a telegraph system, a transmission channel, a subscriber's station connected into said transmission channel and provided with a printing telegraph machine having printing mechanism including pull bars and also provided with a transmitter-distributor for transmitting messages over the transmission channel, a start magnet for conditioning said transmitter-distributor for operation, a control contact connected in parallel with said start magnet, and means for opening and closing said control contact in response to the operation of a preassigned pull bar whereby the effectiveness of said start magnet is controlled.

11. In a telegraph system, a transmission channel, a subscriber's station connected into said transmission channel and provided with a printing telegraph machine having printing mechanism and shift mechanism and also provided with a transmitter-distributor for transmitting messages over the transmission channel, a start magnet for conditioning said transmitter-distributor for operation, a shunt path connected in parallel with said start magnet, a plurality of control contacts connected into said shunt path for opening and closing the shunt path whereby the start magnet may be rendered ineffective, means for operating one of said contacts in response to the operation of the shift mechanism, and means for operating another of said contacts in response to a preassigned operation of the printing mechanism.

12. A telegraph system including in combination a transmission channel, a subscriber's station connected in to the transmission channel, said subscriber's station having transmitting means for transmitting messages over the transmission channel and printing mechanism including a platen assembly, a relay for controlling the operability of the transmitting means, energizing means for energizing the relay, a locking-up circuit for said relay, said locking-up circuit being divided into two parallel branches, a control contact connected into one branch of the locking-up circuit and another control contact connected into the other branch of the locking-up circuit, means controlled by the platen assembly for operating one contact, and means controlled by another portion of the printing mechanism for operating the other contact whereby the locking-up circuit of the relay may be completely opened.

13. A teletypewriter system including in combination a plurality of subscribers' stations, a teletypewriter and transmitter-distributor at each station, a communication channel interconnecting said teletypewriters for the transmission of signals, switching means for establishing switching connections for starting and stopping said transmitter-distributors in a predetermined sequence, a break contact located in each teletypewriter connected into the communication channel, breaking means for effecting the operation of the break contact in all of the teletypewriters connected into the system whereby any of the switching connections that happened to be set up at a particular time are discontinued.

14. In a teletypewriter switching system including in combination a plurality of subscribers' stations, each having a teletypewriter and a tape perforator with a transmitter-distributor, and a communication channel for connecting said stations for the transmission and reception of permutation code combinations of significant current variations, the method of sequential operation of the transmitter-distributors which comprises perforating preassigned permutation code signals with one tape perforator, transmitting the signals over the system, operating a device at one station in response to the transmission of certain of the signals over the system to stop one transmitter-distributor, and operating another device at another station in response to the transmission of said certain signals over the system to start another transmitter-distributor for operation thereof.

15. A printing telegraph system comprising in combination a plurality of subscribers' stations each provided with a printing telegraph machine

having at least one control contact, operating means for selectively operating the control contacts, a transmission channel for connecting the printing telegraph machines at the subscribers' stations for the transmission of messages, starting means for causing the printing telegraph machine at one subscriber's station to transmit messages out over the transmission channel for recording by the printing telegraph machines at the other subscribers' stations, and instrumentalities for switching the initiation of the transmission of messages from the subscriber's station that is transmitting messages to one of the subscribers' stations that is recording the transmitted messages in response to the selective operation of at least one control contact at each of a plurality of the subscribers' stations.

16. A printing telegraph system comprising in combination a plurality of subscribers' stations each provided with a printing telegraph machine having at least one control contact, operating means for selectively operating the control contacts, a transmission channel for connecting the printing telegraph machines at the subscribers' stations for the transmission of messages, starting means for causing the printing telegraph machine at one subscriber's station to transmit messages out over the transmission channel for recording by the printing telegraph machines at the other subscribers' stations, switching means for rotating the initiation of the transmission of messages from the subscriber's station that is transmitting messages to one of the subscribers' stations that is recording the transmitted messages only in a predetermined sequence in response to the selective operation of the control contacts.

17. A teletypewriter switching system including in combination a plurality of subscribers' stations each having a teletypewriter, a main transmission line for connecting the teletypewriters at the subscribers' stations for the transmission of signal impulses, one of said subscribers' stations having its teletypewriter equipped with a control contact and also having an auxiliary teletypewriter, means for operating said control contact, a subsidiary subscriber's station having a teletypewriter, a subsidiary circuit for connecting the teletypewriter at the subsidiary subscriber's station to said auxiliary teletypewriter, an instrumentality located at the station having a teletypewriter equipped with a control contact for extending the main transmission line over the subsidiary circuit to the teletypewriter at the subsidiary subscriber's station, operating means for operating said instrumentality, and means for controlling said operating means in accordance with the operation of said control contact.

18. A system comprising a plurality of permutation code storage transmitters associated at geographically separated points with a channel of telegraphic transmission, means operable from a station remote from a plurality of said points for sending upon said channel permutatively coded impulses, and selective means operable under the influence of said impulses according to the permutation thereof to initiate transmission selectively from one of said transmitters upon said channel.

19. A plurality of permutation code transmitters each controlled by a storage instrument for mechanical storage of code combinations, a channel of transmission associable with said transmitters, and means whereby code combinations

terminate transmission upon said line from an active source of transmission and selectively initiate transmission from one of said transmitters.

20. A permutation code switching and transmission system including in combination a plurality of stations each having a permutation code recording instrument and a telegraph transmitter, a transmission channel for connecting the transmitters at said stations for the transmission of permutation code combinations of signal impulses, switching means for stopping the transmitter at one station while starting the transmitter at another station, and instrumentalities for operating the switching means in response to the transmission of preassigned permutation code combinations of signal impulses over the system.

21. A system including, in combination, a plurality of stations each having a permutation code recording instrument and an automatic telegraph transmitter, a transmission channel for connecting the transmitters at the stations for the transmission of permutation code combinations of significant current variations, switching means for stopping the transmitter at one station, switching means for starting the transmitter at another station, permutatively controlled means for controlling the operation of both of said switching means, and operating means for selectively operating said permutatively controlled means in response to the transmission over the channel of certain preassigned permutation code combinations of significant current variations.

22. A plurality of stations each having a transmitter of permutation code combinations and a receiving selector of permutation code combinations, a channel of transmission to which all of said transmitters may transmit and by which all of said receiving selectors may be actuated selectively, interconnections between certain of said selectors and associated transmitters whereby said selectors may be actuated to cause said transmitters to transmit one at a time in sequence.

23. A system of telegraphic permutation code transmission having two or more geographically separated stations each provided with elements capable of being selectively actuated by permutation code and an emitter of permutatively coded electrical variations, and devices including at least one such said selector for substantially coincidentally causing one emitter to begin emitting and another to cease emitting.

24. A system of telegraphic message transmission and distribution which comprises a telegraphic channel of transmission having stations operably associated therewith at separated places, each station being provided with a storage medium for storing telegraphic code combinations in physical form, a telegraphic transmitter controlled by said medium to transmit code combinations under the control of and in accordance with the combinations stored therein, and means associated with said stations for controlling remotely over said channel the initiation of transmission successively by a plurality of said transmitters.

25. A system of telegraphic message transmission and distribution which comprises a telegraphic channel of transmission, a plurality of automatic telegraph transmitters associable therewith to transmit thereover, a plurality of storage devices for storing variable sequences of telegraphic code combinations in physical form for controlling transmission from the respective

ones of said transmitters, selective means whereby transmission may be selectively initiated from one of said transmitters, and means at a point remote from said one transmitter for controlling the selective operation of said selective means over said channel.

26. A system of telegraphic message distribution having a plurality of automatic telegraph transmitters, each provided with a storage medium for message code combinations to control the transmission thereof, means for storing code combinations representing separate messages independently in any one of said storage media with control combinations, a plurality of receiving stations, means for transmitting a particular one of said messages to one of said stations and recording it thereat, and means adapted for selective operation under the control of said control code combinations for determining whether some other station also receives and records the same said message.

27. The method of telegraphing which comprises supplying a series of automatic storage type telegraphic transmitters located remotely from each other with stored material for transmission and causing the transmitters to transmit in sequence under control of the stored material automatically by interlocking control.

28. The method of deriving messages from a plurality of geographically separated storage devices each controlling a transmitter connected to a channel of transmission which comprises impressing upon the channel successive selective impulses and causing the transmitters to transmit successively under control of the impulses.

29. The method of telegraphic transmission which consists in supplying automatic transmitters connected to a channel of transmission with stored message material in physical form and causing by automatic control over said channel successive transmission by said transmitters.

30. The method of telegraphic control of a plurality of widely separated transmitters which comprises automatically and successively by remote control over a channel of telegraphic transmission causing each of the transmitters in turn to transmit over said channel telegraphic code combinations and controlling the beginning of transmission from one transmitter as an incident to and substantially simultaneously with the termination of transmission from another.

31. A plurality of telegraph transmitters associable with a channel of telegraphic transmission and means remotely controllable over said channel of transmission to initiate and terminate successive transmission upon said channel by said transmitters.

32. A plurality of telegraph transmitters associable with a channel of telegraphic transmission, storage means suppliable with permutation codes in physical form for a plurality of said transmitters and individual thereto, and means remotely controllable over said channel of transmission by selected stored permutation codes to initiate and terminate successive transmission upon said channel by said transmitters.

33. A permutation code system having a station including a tape controlled transmitter for transmitting code combinations according to the storage of its tape, means for emitting permutation code combinations from a point remote from said station, and means at said station operable independent of the storage of said tape, selectively effective under the control of said last-named code combinations according to the permutation thereof to change said transmitter from a non-transmitting to a transmitting condition.

34. A system comprising a plurality of permutation code storage transmitters associated with a channel of telegraphic transmission, means operable from a remote station for sending permutatively coded impulses, and selective means operable under the influence of said impulses according to the permutation thereof to initiate transmission selectively from one of said transmitters upon said channel, said selective means being operable independently of the storage of the device from which transmission is initiated.

35. In combination, a channel of telegraphic transmission, more than one transmitter of telegraphic impulses having controlling contacts which are capable of controlling impulse transmission over said channel, said transmitters being geographically separated, selective means associated with said channel, and interconnections between said selective means and said transmitters whereby suitably chosen combinations of impulses upon said channel actuate said selective means and through said interconnections initiate transmission upon said channel from one of said transmitters at a time.

36. In combination, a channel of telegraphic transmission, more than one transmitter of telegraphic impulses controlling contacts which are capable of impulse transmission over said channel, selective means associated with said channel, and interconnections between said selective means and said transmitters whereby suitably chosen combinations of impulses upon said channel actuate said selective means and through said interconnections automatically initiate transmission upon said channel from one of said transmitters at a time.

37. A permutation code transmission system having permutation code transmitter means operably related to a channel of transmission, mechanical code storage means for supplying codes to be transmitted by said transmitter, other permutation code transmitter means operably related to said channel of transmission, other mechanical code storage means for supplying codes to be transmitted by said other permutation code transmitter means, said transmitter means being located geographically remote from said other transmitter means, and means whereby permuted code impulses impressed upon said channel by one of said means initiates transmitting operation by another thereof.

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