

April 14, 1936.

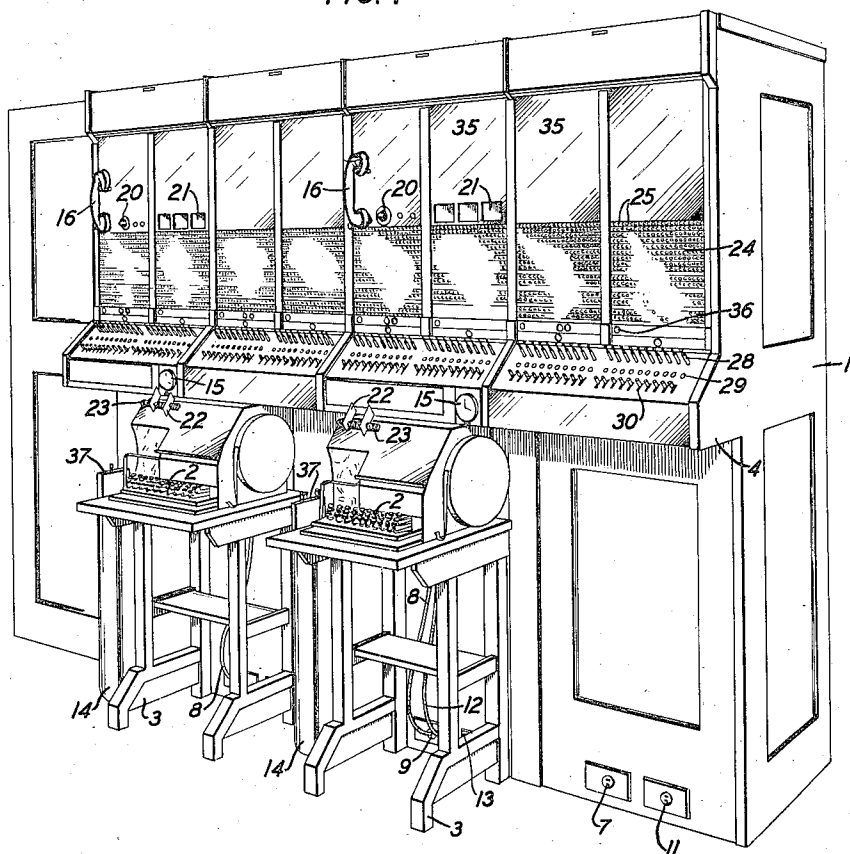
A. A. BURGESS ET AL
TELETYPEWRITER SWITCHBOARD

2,037,193

Filed Dec. 1, 1934

3 Sheets-Sheet 1

FIG. 1

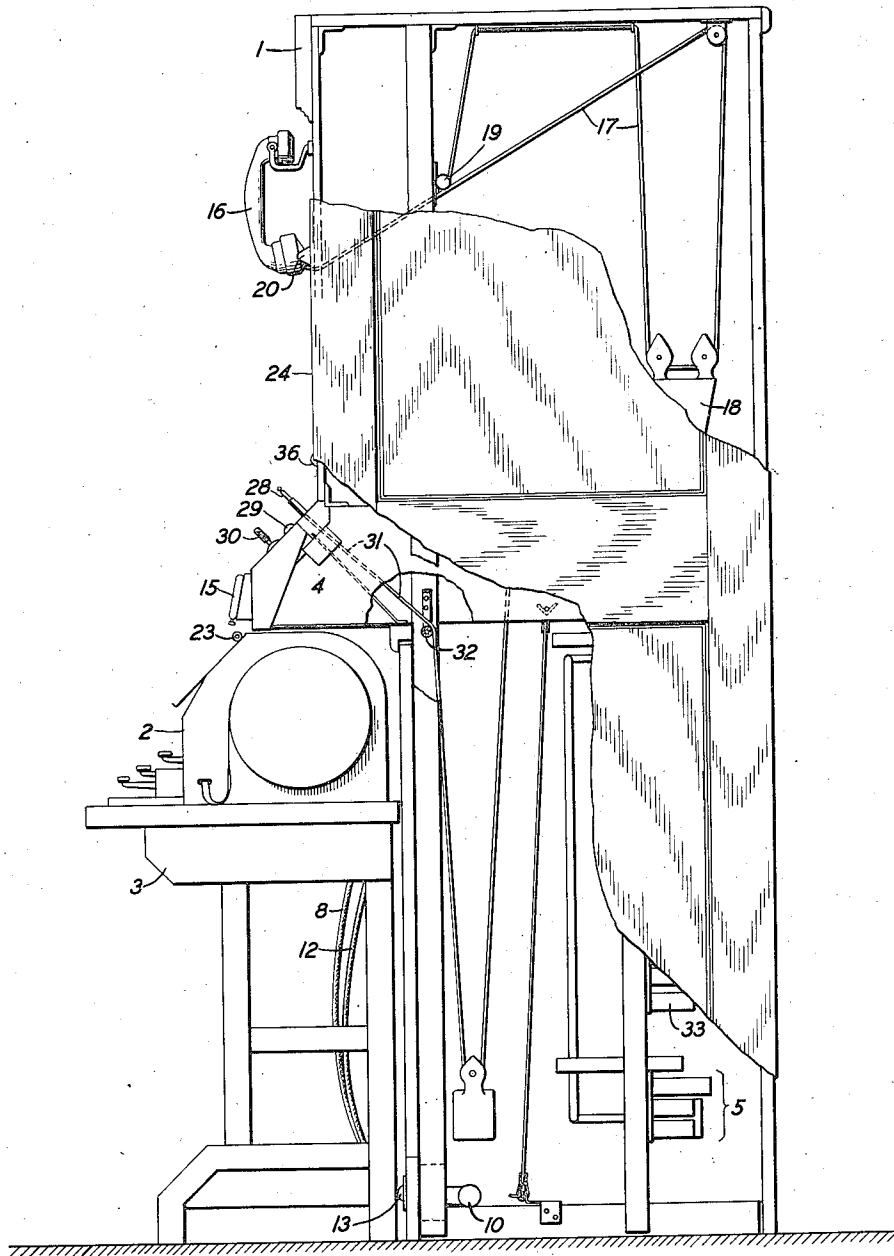


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FIG. 2



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FIG. 3

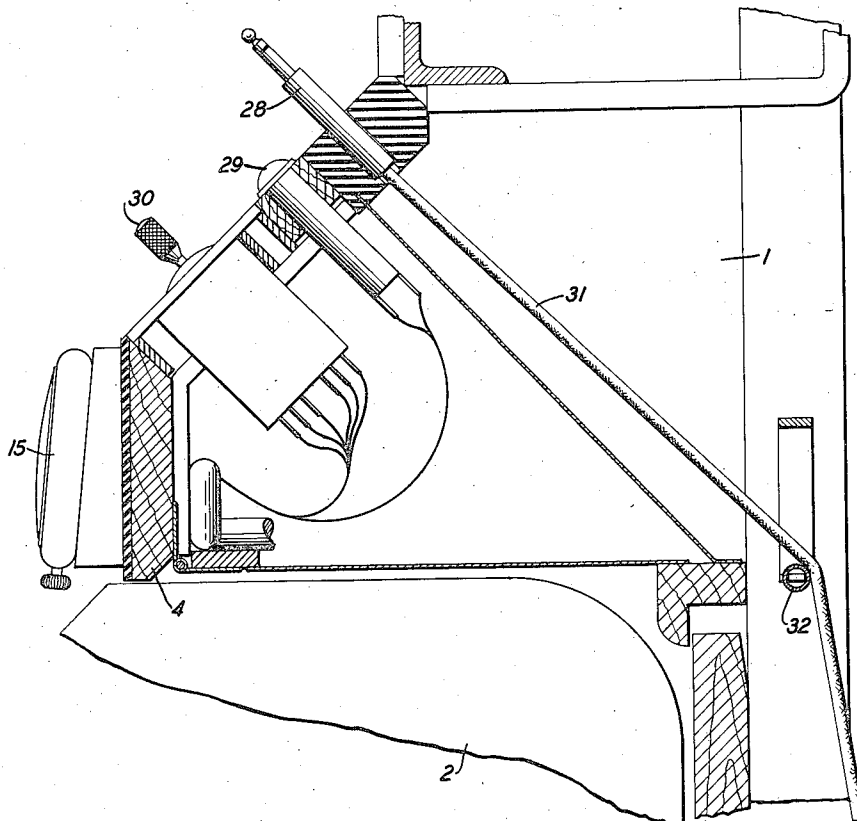
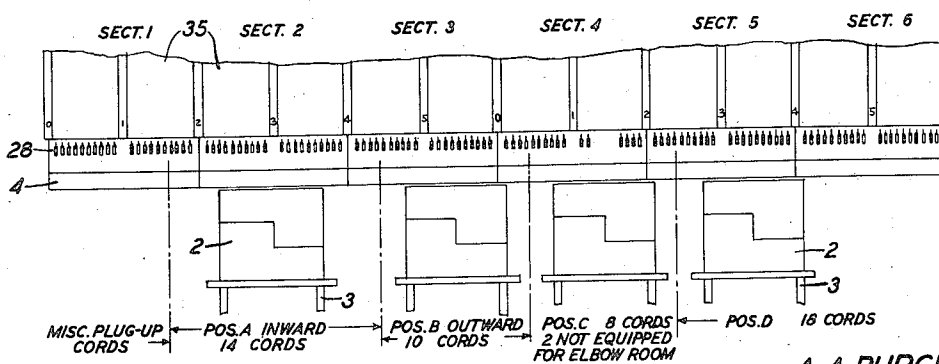


FIG. 4



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2,037,193

TELETYPEWRITER SWITCHBOARD

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4 Claims. (Cl. 178—75)

This invention relates to an improved teletypewriter exchange switchboard designed to enable the size of an operator's position to be readily varied to meet different traffic requirements without requiring major alterations of the switchboard apparatus.

A large factor in the cost of a switchboard is the subscriber and toll line multiple. Therefore, it is desirable that the multiple be common to as many operators as possible in order to cut down the first cost. In telephone practice, many years of experience have formulated certain well established principles. However, the teletypewriter art is relatively new and factors that are easily determined in advance in an established art are, in the early stages of this new art, continually in a state of flux as the service expands and as the development of new and improved circuits increases operating efficiency. Because of the uncertainty of the future trend of calling rates and operators' loads in the teletypewriter business, it appears to be sound economic policy to design teletypewriter exchange switchboards so that they can be readily adjusted to meet changing traffic conditions without requiring major alterations of their apparatus.

Accordingly, it is an object of this invention to provide a teletypewriter exchange switchboard with greater flexibility than has heretofore been possible.

It is also an object of this invention to enable the operators' teletypewriters to make efficient use of the switchboard multiple.

Each switchboard comprises a number of operators' positions, the number being determined by the amount of traffic handled during the peak load and the amount of traffic each operator is capable of handling. Because the switchboard multiple is an expensive item, it is desirable, in order to make efficient use of it, to place the maximum number of operators before it by making each operator's position as narrow as possible.

The major factor governing the width of the operators' positions is the number of cords required per operator. The number of cords required per operator is determined by the average working time together with the average holding time which, in turn, depend on traffic conditions in the particular area and also on the efficiency of the circuits at the disposal of the operator. Another factor governing the width of the positions is the minimum space required by an operator in which to work. Efficiency demands that the operators be placed on as close centers as possible, the minimum centers being determined by

the elbow room required for efficient operation.

However, in teletypewriter switchboards, there is an important element which decreases the efficiency of the use of the multiple; namely, the operator's teletypewriter. This is approximately sixteen inches in width and ten and one half inches in height. The width of a particular operator's position as based on the past switchboard design, shown in Patent 1,867,333 granted July 12, 1932 to E. M. Smith where the teletypewriter and the cord circuit keys and plugs are placed at approximately key-shelf height, would be determined by the number of cords plus sixteen inches.

At the present time, it is thought that each operator will require about ten cords. The width of her position will, under the conventional design methods, be at least ten times $27/32$ plus sixteen inches or about twenty-four and one half inches. Constructional details will increase this figure to about twenty-seven and one half inches. While the number of cords per position is now considered to be ten, this is a very uncertain estimate due to changing traffic and operating circumstances.

The factors determining the number of cords are: the time necessary to build up a connection; and the conversation time. It is, of course, reasonable to hope that the development of the art will reduce the connection, or working, time. The conversation time is likely to vary considerably in areas, seasons, and with the increased use of the system. Therefore it does not appear probable that the number of cords can be determined with any degree of accuracy for some length of time yet to come. Consequently, it seems highly desirable that teletypewriter switchboards should be designed to permit great flexibility as to the number of cords assigned to each operator. At the same time, efficiency demands that this flexibility be obtained without too great expense.

The disadvantages resulting from the use of teletypewriter switchboards of the type shown in the above-mentioned patent to E. M. Smith are: that, because the teletypewriter is placed at the same level as the cords, the width of the operator's position is made larger than that of the operator's position at a telephone switchboard; and it requires that a definite fixed number of cords be assigned to each teletypewriter or operator. Consequently, a predetermined fixed number of cords per operator has to be provided in the initial design of the switchboard. As stated above, this makes for inefficiency when changing

traffic conditions vary the optimum number of cords per operator.

The present invention enables an operator's teletypewriter to be associated with any number of cords with little change of apparatus and, at the same time, the width of the operator's position is reduced. This is accomplished by locating the cord equipment on an overhanging key-shelf above the teletypewriters and locating the teletypewriters on individual tables which can be placed anywhere in front of the switchboard. Because the teletypewriters are mounted on tables in front of the switchboard, they may be moved up and down the switchboard to any desired location in accordance with prevailing traffic conditions.

These and other features of the invention will now be described in detail in connection with the drawings in which:

Fig. 1 is a three-dimensional view of a central office having a small switchboard constructed in accordance with this invention and having two operator's teletypewriters arranged in front of it;

Fig. 2 is a semi-cross-sectional side view of the central office switchboard shown in Fig. 1 and one of the operator's teletypewriters;

Fig. 3 is a cross-sectional view of the key-shelf and part of the switchboard; and

Fig. 4 illustrates the manner in which the size of an operator's position may be quickly varied to meet changing traffic conditions.

The central office, shown in the drawings, has been shown as having only two operators' teletypewriters 2—2 mounted upon tables 3—3 and arranged in front of the teletypewriter switchboard 1. This has been done for the sake of simplicity and it is to be understood that it may readily be made longer and have more teletypewriters arranged in front of it if desired. It can be seen in the drawings that the switchboard 1 has a projecting, or overhanging, key-shelf 4. This is because the depth of the teletypewriters 2—2 makes it necessary to employ the overhanging key-shelf 4 in order to enable the operators to sit close enough to the jack-field 24 for efficient operation. Since the tables 3—3 are movable, they may be moved up and down the length of the switchboard as desired. Containers 14—14 are provided for receiving the printed tape emitted by the teletypewriters 2—2.

Each section of the switchboard is provided with position relay equipment 5 which is wired to terminal strips (not shown) and to multi-contact jacks 7—7, below the front panel of the switchboard. The position circuit 5 may be connected to a teletypewriter 2 on a table 3 by means of a flexible cord 8 and plug 9. The power for the operation of the teletypewriters is supplied by a conduit 10 and taken from outlets 11—11, located beside the jacks 7—7, by means of another flexible cord 12 and plug 13.

At intervals along the front of the key-shelf 4, clocks 15—15 are provided to enable the operators to time messages as a basis for determining the amount to be charged. Telephones 16—16 are located at intervals along the top front of the switchboard 1. These telephones 16—16 are connected to cords 17 inside the switchboard 1 and held down by weights 18—18. The cords 17—17 terminate at a connecting block 19. Located near the telephones 16—16 are the visual busy test lamps 20—20 and ticket boxes 21—21 for storing the message rate tickets 22—22 held by the ticket spring clips 23—23 on the teletypewriters 2—2. Lower down on the front of the

switchboard 1 are the jacks 25—25 in the jack-field 24.

Next comes the projecting key-shelf 4 with the plugs 28—28, supervisory lamps 29—29 and keys 30—30. The conventional method of locating the plugs 28—28 is to place the calling plugs all in one row and the answering plugs in another. However, to conserve multiple space by keeping its height at a minimum and to reduce the depth of the key-shelf 4, this conventional method has been departed from and all the plugs 28—28 have been placed in one row, the right plug 28 of a pair being the calling plug and the left plug 28 being the answering plug. Differentiation between the two types of plugs 28—28 may be obtained by any suitable means, such as by equipping the calling plug with a red plug shell and the answering plug with a black shell.

The plugs 28—28 are connected to cords 31—31 which, with keys 30—30 are wired to terminal strips (not shown) in the rear of the switchboard. Due to the overhang key-shelf 4, it is necessary that the cords 31—31 be run back into the switchboard 1 so that the operators' teletypewriters 2—2 can be moved up and down directly beneath the projecting key-shelf. To enable the cords 31—31 to be pulled out without incurring any appreciable amount of friction, a sloping top has been provided for the key-shelf 4. This top slopes at an angle of about 45° from the perpendicular thereby enabling the cords 31—31 to be slid straight out from inside the switchboard. This arrangement produces so little friction that the cords 31—31 can be turned over a stainless steel bar 32 instead of the customary pulleys. Because of this slight amount of friction, there is relatively very little wear and tear of the cords 31—31 over a long period of use.

The cord relay equipment is mounted in units 33—33 equipped with terminal strips (not shown). These units 33—33, which are very similar to conventional relay rack units, are mounted in the rear of the switchboard immediately below the terminal strips (not shown) provided for the cords.

Distributing rings (not shown) are provided above these terminal strips so that any cord relay equipment 33 may be cross-connected to any cord 31 in the key-shelf 4 either in the same or in a different section of the switchboard 1 by cross-connecting between the terminal strips. This facilitates furnishing the minimum number of wired and equipped units 33—33, allows additional cords 31—31 to be equipped with little effort, and permits quick reassignment of the cords.

To obtain greater flexibility, the cords 31—31 may be arranged with a splitting key 36—36 between each set of five cords, similar to the straightforward trunking method to enable the size of an operator's position to be quickly varied. The operator's position keys 37—37 for recall release, toll disconnect, and ring-on-answer cord functions are mounted on her teletypewriter table 3 and may be plugged into the jack 7 of any position relay equipment. Thus, any number of adjacent pairs of cord relay equipment 33—33 may be cross-connected to a position relay equipment 5. In addition, each pair of cords 31—31 is arranged for teamwork with the adjacent position to the left or right, those in the left half of the position with the position to the left, and those in the right half of the position with the position to the right.

Considerable flexibility is thereby obtained to meet different traffic requirements because any

number of cords 31—31 may be assigned to an operator, cross-connected at the terminal strips in the rear of the switchboard to the nearest position relay equipment 5, and a teletypewriter 2 and table 3 moved in front of the group of cords 31—31 and plugged into the jack 7 and outlet 11 for that particular position. This enables an operator's position to have the number of cords required for the most efficient operation under prevailing traffic conditions with very little changes of the switchboard equipment.

This feature of the invention is illustrated in Fig. 4 which shows schematically five sections of a typical teletypewriter switchboard 1' with four operators' teletypewriters 2—2 mounted on tables 3—3 and arranged in front of the switchboard 1' for optimum use of the switchboard 1' at a particular time. It can be seen that each section of the switchboard 1' is made up of two panels 35—35. This particular switchboard 1' is shown, purely for purposes of illustration, to be a six panel multiple in which the equipment in the panels 35—35 is repeated after every sixth panel. Of course, this may be readily varied at will to meet different conditions in different localities. At the left end of the switchboard 1' are miscellaneous plugs 28—28 for testing and plugging-up. To the right of these miscellaneous plugs is operator's position A which is shown to have fourteen pairs of plugs 28—28. Next come ten pairs of cords which are assigned to operator's position B. Operator's position C has only eight pairs of cords. It will be noticed that there are two idle pairs of cords in position C. This is to separate the operators so as to provide sufficient elbow room. Operator's position D has eighteen pairs of cords. This method of assigning cords to the operators can, of course, be readily applied to a longer switchboard and can be varied at will, as described above, to meet different traffic requirements. All that need be done is to slide the tables 3—3 up and down the length of the switchboard 1' to the desired location, assign the cords by cross-connection, and then insert the plugs 9—9 and 13—13 into jacks 7—7 and outlets 11—11.

The above arrangements of apparatus have been shown and described in order to illustrate the principles and features of operation of this invention. It is to be understood that different arrangements employing the principles and features of operation of this invention may be designed. Accordingly, the invention is not to be limited to the arrangements shown in the drawings but is to be restricted only by the claims appended hereto.

What is claimed is:

1. A teletypewriter central office comprising in

combination a teletypewriter exchange switchboard having a projecting key-shelf, and a plurality of operators' teletypewriters mounted upon tables located underneath the key-shelf, said tables being adapted to be moved up and down the length of the switchboard for readily varying the size of an operator's position to meet different traffic requirements without requiring major alterations of its apparatus.

2. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard having a projecting key-shelf, and a plurality of operators' teletypewriters mounted upon tables located underneath the key-shelf, said tables being adapted to be moved up and down the length of the switchboard for quickly varying the size of an operator's position to meet different traffic requirements without necessitating major alterations of its apparatus, said key-shelf having its plugs all in one row for reducing the depth of the key-shelf to enable the operators to be closer to the jack-field.

3. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard having a projecting key-shelf, a plurality of operators' teletypewriters mounted upon tables located underneath the key-shelf, said tables being adapted to be moved up and down the length of the switchboard for readily varying the size of an operator's position to meet different traffic requirements, said key-shelf having a sloping top for enabling the operators to be located closer to the jack-field, and plugs with cords attached thereto located on the sloping top of the key-shelf at an angle of about forty-five degrees from the perpendicular to allow the cords to pass in a straight line from the front of the key-shelf to the inside of the switchboard to save that wear and tear of the cords caused by friction generated in pulling them in and out.

4. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard having a projecting key-shelf, a plurality of operators' teletypewriters mounted upon tables located underneath the key-shelf, said tables being adapted to be moved up and down the length of the switchboard for readily varying the location of an operator's position in accordance with different traffic requirements, said key-shelf having cords and plugs, and instrumentalities for enabling the optimum number of cords for a given traffic condition to be assigned to each operator, said instrumentalities including cord relay equipment located inside the switchboard and adapted to be cross-connected to any cord in the key-shelf.

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