

March 8, 1938.

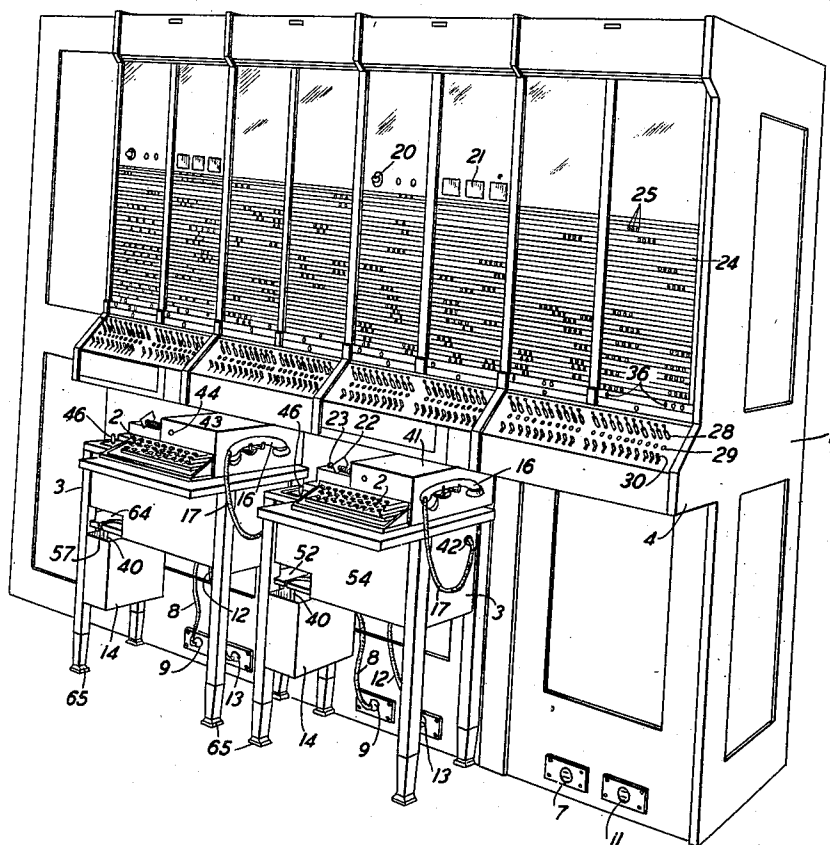
A. A. BURGESS
TELETYPEWRITER EQUIPMENT

2,110,286

Filed Aug. 8, 1936

3 Sheets-Sheet 1

FIG. 1



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3 Sheets-Sheet 2

FIG. 2

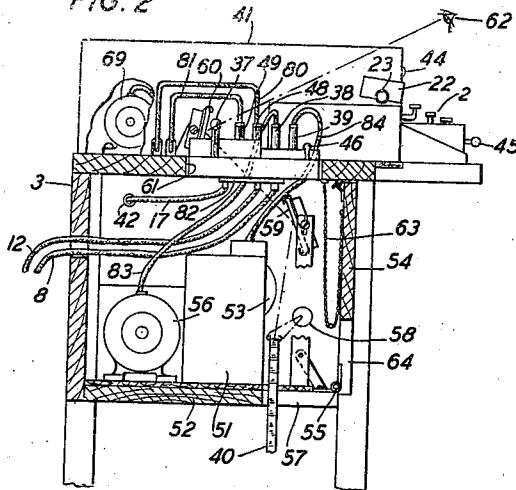


FIG. 3

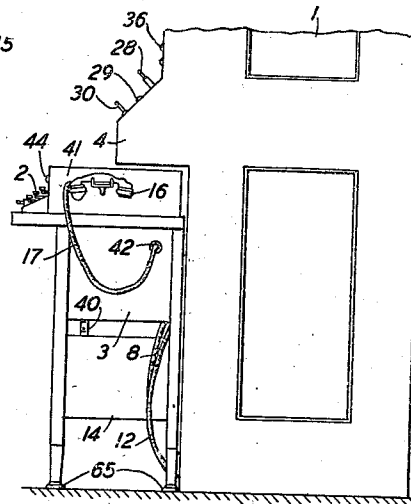


FIG. 4

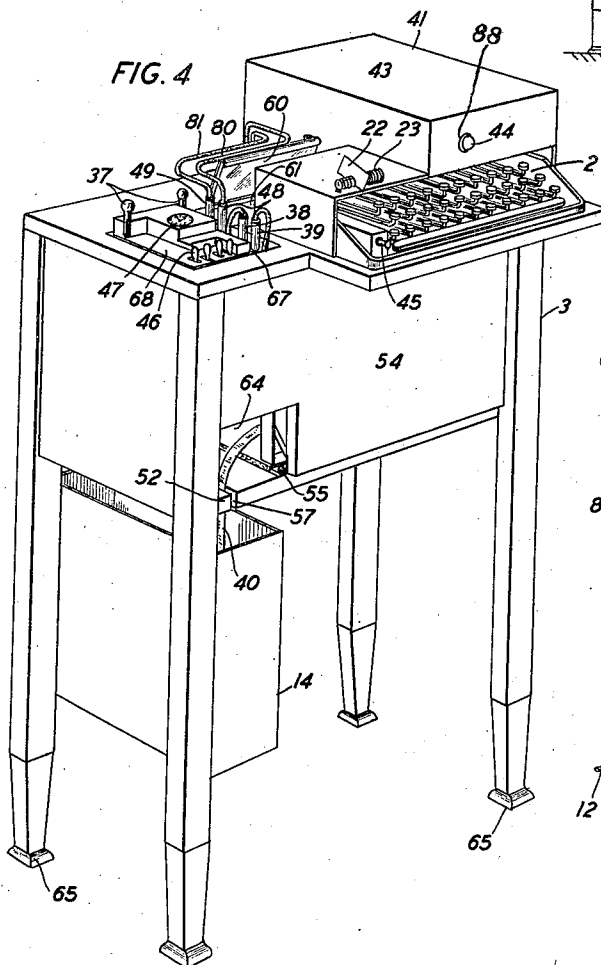
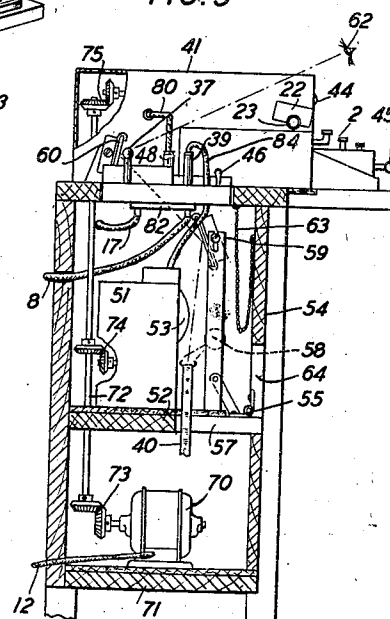


FIG. 5



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3 Sheets-Sheet 3

FIG. 7

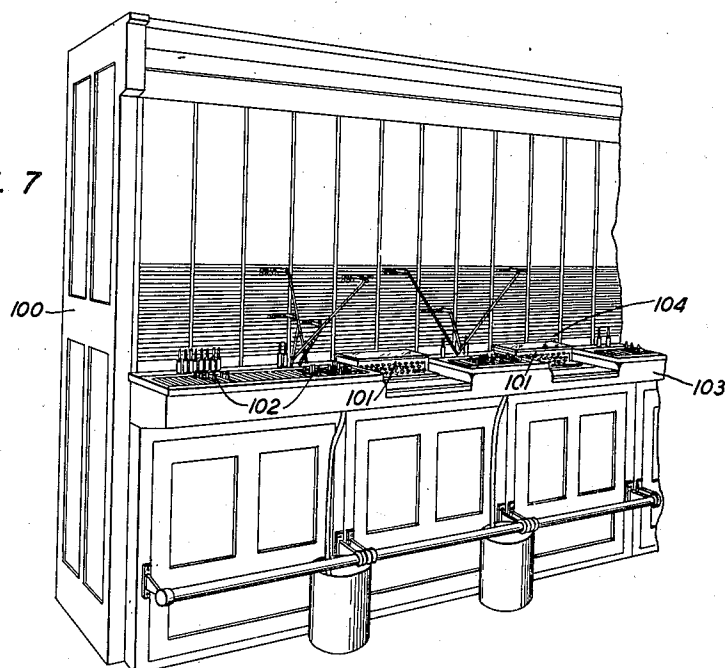


FIG. 8

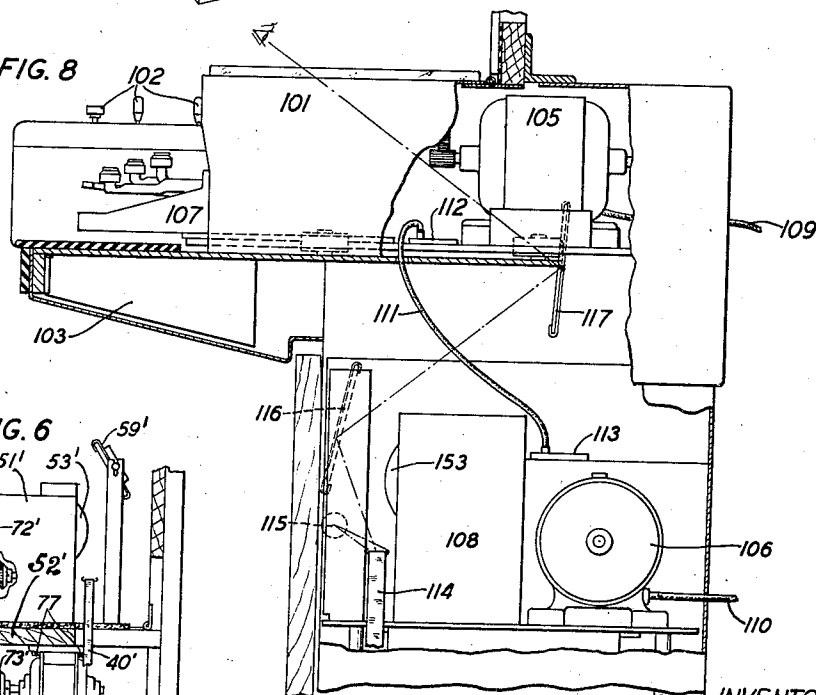
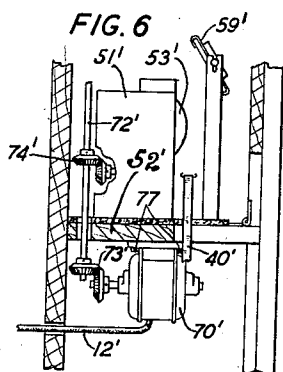


FIG. 6



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2,110,286

TELETYPEWRITER EQUIPMENT

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Application August 8, 1936, Serial No. 94,909

12 Claims. (Cl. 178—75)

This invention relates to an improved teletypewriter exchange switchboard of the type shown in Patent 2,037,193 granted April 14, 1936 to A. A. Burgess et al, and, more particularly, to means for increasing the area, available to an operator, of the jack-field of the switchboard multiple.

The practices used in operating telephone exchange switchboard cannot all be followed in operating teletypewriter exchange switchboards. For example, a telephone operator can place her chair close to the switchboard multiple and the extent of the area of the jack-field then available to her will be limited by the length of her arm. However, in teletypewriter exchange switchboard practice the area of the jack-field available to an operator is limited by a factor not found in telephone switchboard practice. This factor is the operator's teletypewriter which is located in front of her thereby blocking off an amount of the jack-field equal in dimension to the length and height of the teletypewriter. Thus, when the operator wishes to insert a plug in a jack, she reaches up above her teletypewriter to the jack-field, the top row of which is determined by the limit of her reach. However, the effectiveness of her reach is limited by the height of her teletypewriter since the height of the jack-field available to her is roughly equal to the length of her reach minus the height of her teletypewriter.

The teletypewriters ordinarily employed at teletypewriter exchange switchboards are usually about ten and one-half inches high. These teletypewriters are generally placed just below the front of the switchboard multiple with the result that the multiple commences about ten and one-half inches above the possible operating level which is at the keyboards of the teletypewriters. Thus, the number of rows of jacks that can be reached by an operator is distinctly limited by this construction since the total number of multiple jacks that an operator is able to reach is less than if her teletypewriter were lower in height.

Accordingly, it is an object of this invention to increase the area of the jack-field available to an operator at a teletypewriter exchange switchboard.

It is also an object of this invention to provide a teletypewriter exchange switchboard with a novel teletypewriter table and assembly.

These objects are accomplished by decreasing the effective height of the operator's teletypewriter so as to enable the operator to reach a greater amount of the jack-field of the switch-

board multiple. To obtain this decrease in the effective height of the operator's teletypewriter, the usual keyboard and typing mechanism of the teletypewriter are separated, or dissociated, and the keyboard mechanism is then placed upon the top of the operator's table while the typing mechanism, instead of being located above the keyboard mechanism as it usually is, is located underneath on a shelf below the top of the table. The electrical connection between the units and the switchboard and between the units themselves is accomplished by means of flexible cords terminating in plugs and jacks to facilitate dissociating the units for maintenance purposes.

Since the tape is associated with the unit comprising the typing mechanism, it is also located beneath the top of the operator's table and is, in its new location, obscured from direct view. Therefore, a mirror mounted alongside the typing mechanism is employed to reflect the characters typed on the tape to a second mirror, mounted at table top level, in which the characters are viewed by the operator. A length of tape about four inches long, which is more than sufficient to meet the operator's typing requirements, may be viewed in this manner.

As the unit comprising the keyboard mechanism is only about five inches high, by placing the typing unit beneath the top of the table a saving in operating height of the switchboard multiple of about five and one-half inches is obtained in which additional line circuits may be terminated in jacks placed in this additional space in the multiple. Thus, the separation of the keyboard and typing mechanisms enables the bottom of the jack-field to be lowered about five and one-half inches to provide, on a six-panel multiple, space for approximately 720 additional jacks to be connected to an additional 720 subscriber lines. This increase in the area of the jack-field available to the operators, increases the capacity of the operators' positions. In view of the steadily increasing demand for teletypewriter exchange facilities, this increase in the capacity of the operators' positions become of increasing importance. Furthermore, this lowering of the bottom of the jack-field of the switchboard multiple decreases the average amount of reach in answering and completing calls thereby reducing the amount of time required to answer and complete calls and likewise reducing the amount of fatigue experienced by the operators in doing this type of work. As a result of this reduction in both time and fatigue, the efficiency of the operators will be increased.

This design also takes into consideration the fact that the optimum width of one section of a teletypewriter exchange switchboard is approximately twenty and one-half inches, as this spacing is considered to be a minimum spacing for operators and permits a maximum number of operators to be placed alongside a given length of switchboard. In other words, it enables a minimum length of switchboard to serve a particular number of subscriber lines.

A modification of the invention is arranged with the teletypewriter motor located on a shelf below the shelf on which the typing unit is located. This increases the amount of knee room available to an operator. It also permits the table to be made narrower to enable the operator to sit closer to the jack-field.

Another modification of the invention incorporates features described above into a switchboard by mounting the teletypewriter in a switchboard section, such as somewhat along the lines of the disclosure of Patent 1,867,333 granted July 12, 1932 to E. M. Smith.

The above features and other novel features of this teletypewriter table and assembly will be explained in more detail in connection with the drawings in which:

Fig. 1 is a three-dimensional view of a portion of a teletypewriter central office having a small teletypewriter exchange switchboard with two operators' tables and teletypewriters arranged in front of it and constructed in accordance with the invention;

Fig. 2 is a cross-sectional side view of one of the operators' teletypewriters mounted upon its table;

Fig. 3 is a side view of this operator's teletypewriter mounted upon its table and located beneath the key-shelf of the switchboard;

Fig. 4 is a three-dimensional view of the teletypewriter assembly together with its table and associated apparatus;

Fig. 5 is a modification of the invention in which the teletypewriter motor is located on a shelf which is beneath the shelf upon which the typing unit is located;

Fig. 6 is somewhat similar to a portion of Fig. 5 but shows the motor inverted and suspended from the bottom of the shelf;

Fig. 7 is a modification of the invention in which the teletypewriters are mounted in the switchboard itself; and

Fig. 8 is a cross-sectional view of a portion of the switchboard, shown in Fig. 6, together with one of its teletypewriters.

Fig. 1 represents a small teletypewriter exchange switchboard 1 similar to that disclosed in Patent 2,037,193 granted April 14, 1936 to A. A. Burgess et al. The disclosure of this Burgess et al patent is incorporated herein by reference as a part of this specification. Returning now to the consideration of Fig. 1, the upper front portion of the teletypewriter exchange switchboard 1 has a jack-field 24 comprising rows of jacks 25. Just above the jack-field 24 are busy test lamps 20 and ticket boxes 21 for storing message rate tickets 22. Immediately below the jack-field 24 are the position splitting keys 36.

Slightly lower down on the switchboard 1 is the projecting, or overhanging, key-shelf 4 having a row of calling and answering plugs 28, a row of supervisory lamps 29, and a row of supervisory keys 30. Behind the lower portion of each section of switchboard 1 is position relay equipment (not shown) which is wired to terminal

strips (not shown) and to outlets 7. Also behind the lower portion of the switchboard 1 is a conduit (not shown) leading from the local source of power supply (not shown) and connected to outlets 11.

Directly in front of switchboard 1 are the operators' teletypewriters, each of which is mounted upon a table 3. For the sake of simplicity only two teletypewriters and tables have been shown and it is to be understood that more may be readily employed if desired. As is shown in Fig. 3, key-shelf 4 projects outward a distance sufficient to permit a teletypewriter and its table 3 to fit underneath to the extent of about half their width to enable the operators to sit close to the jack-field 24 for efficient operation. Tables 3 may be readily moved up and down the length of the switchboard 1 in accordance with different traffic requirements.

The feet of each table 3 are provided with a base 65 composed of non-resilient material, such as hard rubber. To insure that the top of table 3 will be level and to obviate jiggling of table 3, the bases 65 may be removed to permit the insertion of a stabilizing device, after which the bases 65 may be replaced. An alternative means of stabilizing table 3 over an uneven floor surface is to use bases composed of resilient or compressible material, such as a rubber composition, which is designed to be compressible in accordance with the unevenness of the surface of the floor of the switchboard room to reduce tipping or jiggling of the table 3. If the floor of the switchboard room is sufficiently level, then the legs of these tables 3 may be provided with cup-shaped feet of hard brass to facilitate sliding the tables 3 up and down the length of the switchboard in accordance with different traffic requirements.

Each operator's teletypewriter includes a keyboard transmitter unit 2 which is similar to that described in Patent 1,595,472 granted August 10, 1926 to H. L. Krum. The disclosure of this Krum patent is incorporated herein by reference as a part of this specification. This keyboard unit 2 is shown to be operated by a motor 69 which is also positioned upon the top of table 3. As is also shown in the drawings, the keyboard unit 2 is mounted upon the top of the operator's table 3 and is provided with a cover 41. This cover has a flat top 43 which offers a writing surface to the operator for use in writing on the message rate tickets 22 which are then placed in the ticket spring clip 23 attached to the lower part of cover 41. The front of cover 41 has a hole 88 through which the end-of-line indicator lamp 44 may be viewed. At the left of the keyboard is a control switch 45 for controlling current supplied from the local source of power supply.

The mechanism which comprises the typing unit 51 of each operator's teletypewriter is mounted upon shelf 52 which is located about ten inches below the top of table 3. This typing unit 51 is shown to be operated by a motor 56 which is also mounted upon shelf 52. Although two separate motors 56 and 69 have been shown in this embodiment of the invention, it is to be understood that this is a matter of choice and that a single motor located with either unit and suitably connected to the other unit, such as the arrangement shown in Fig. 5, may be used if desired.

The operator's position equipment is located at the left of the keyboard unit 2 and is mounted upon a readily removable panel 68 to facilitate

removal for maintenance or modification to meet different requirements of different installations. This position equipment includes an electric calculagraph 47 used by the operators to time messages as a basis for determining the amount to be charged for a particular call. Calculagraph 47 is provided with levers 37, one of which is used to indicate on a message rate ticket 22 the time when the message began, and the other to indicate on ticket 22 the time the message ended. The position equipment also includes the operator's position keys 46 for performing the supervisory functions of ringing on the answering cord, cord circuit splitting, recall, and recall-release. These keys 46 are connected by leads (not shown) to a connecting block 82 located on the underside of the table top near the jack panel 67.

This position equipment is connectible to the switchboard 1 by the line cable 8 and the power cable 12. Line cable 8 has a plug 9 which is adapted to fit into any of the outlets 7, at the base of switchboard 1, leading to the position relay equipment (not shown) inside switchboard 1. Power cable 12 has a plug 13 which is adapted to be inserted into any of the power outlets 11, at the base of switchboard 1, leading to the local source of power supply (not shown).

Just to the right of panel 68 and immediately to the left of the typing unit 2 is a small jack panel 67 mounted in the top of table 3. This jack panel 67 is connected by leads (not shown) to the keys 46 and is provided for receiving the plugs 38, 39, 48, and 49. Attached to the plugs 48 and 49 are the teletypewriter line cord 80 and power cord 81 which pass behind the mirror 60 and then into the keyboard unit 2. These cords 80 and 81 form a link in the electrical connection between the keyboard unit 2 and the connecting block 82 to permit ready removal of the keyboard unit 2 if desired. A cord 83 is attached to plug 38 for connecting the power supply to motor 56 of typing unit 51. Another cord 84 is connected to plug 39 for forming the electrical connection between the keyboard unit 2 and the typing unit 51 through the connecting block 82. These cords 83 and 84 permit ready removal of the typing unit 51 if desired.

Table 3 is also equipped with a telephone 16 which is mounted on the right end of cover 41 of the keyboard unit 2. This telephone 16 is connected to the switchboard 1 by a cord 17 which passes through a hole 42 in the right end panel of table 3 and then to the connecting block 82. The telephone circuit then passes from connecting block 82 over a conductor in cable 8 and through jack 7 to the relay equipment inside switchboard 1.

The line circuit passes from the position relay equipment inside switchboard 1, through outlet 7 and plug 9, over cable 8, through the connecting block 82, jack panel 67, line plug 48, line cord 80 which goes behind mirror 60 and then through a hole in cover 41 to the keyboard unit 2, back over another conductor in cord 80 and plug 48, through connecting block 82 and jack panel 67 to plug 39, over cord 84, through a hole in the top of table 3 to the typing unit 51, and then back over another conductor in cord 84 to cable 8. Likewise, the power circuit leads from the local source of power supply over a conduit (not shown) inside switchboard 1, through outlet 11 and plug 13, over cable 12, and then to the connecting block 82. Here the power circuit divides, one path passing through the jack panel 67, power plug 49, over power cord 81 which passes

behind mirror 60 and through a slot in cover 41 to the motor 69 of the keyboard unit 2, and then back again over another conductor in cord 81. The other power path simply leads from the connecting block 82 and jack panel 67, over plug 38 and cord 83 through a hole in the top of table 3 to motor 56 of the typing unit 51, and then back again over another conductor in cord 83. It might be mentioned here that cover 41 is provided with slots to facilitate uncovering the typing unit 2 when desired.

Since the tape 40 must pass through the typing unit 51, the tape reel 53 is conveniently mounted on the right end of the typing unit 51. To facilitate insertion and removal of the tape reel 53, the front side panel 54 of table 3 is mounted upon hinges 55 to act as a hinged door so that it may be pulled outward. One end of a chain 63 is attached to the underside of the table top and the other end is attached to the inside top portion of panel 54. Chain 63 is provided for the purpose of preventing panel 54 from dropping down when opened and, instead, to hold it out in the manner of a shelf for the convenience of a maintenance man. It is to be understood that this is merely the preferred embodiment of the invention and that other arrangements may be constructed. For example, the right end panel of table 3 may be arranged to drop, or slide downward. Also, the tape reel 53 need not be mounted directly on the typing unit 51 but may be placed in other locations, such as upon the side panel 54.

The tape 40 passes from the supply reel 53, through the typing unit 51, through a slot 57 in shelf 52, and then to the used tape storage receptacle, or container, 14 with which each table 3 is provided. Panel 54 has a cut-out portion, indicated at 64, for enabling an operator to quickly insert her hand therein to free the tape 40 if it becomes snarled or tangled prior to its passage through slot 57.

In order for the operator to see conveniently what is typed upon the tape 40, it is advisable to cut out a portion of the top of the table 3 as indicated at 61 and to employ a small lamp 58 and two adjustably mounted mirrors 59 and 60. The tape illuminating lamp 58 has a shade which is designed to concentrate the light upon the printed portion of the tape 40. This light then shines upward to the mirror 59 which is so adjusted as to reflect it to the mirror 60 which, in turn, is adjusted to reflect the image of the printed tape 40 to the eyes of the operator indicated at 62. The line of vision from the operator's eyes 62 to the printed tape 40 is indicated in Fig. 2 by the broken line. If desired, the interior of table 3 may be painted white to reduce absorption of the light rays.

It is to be understood that this is the preferred form of the tape projecting means and that various modifications may readily be made to suit the requirements of a particular installation. A length of tape about four inches long, more than sufficient to meet operators' typing requirements may be viewed in this manner. In the event that it should become necessary for an operator to read back used tape 40 which has passed by the mirror 59, she may conveniently do so by reaching through the cut-out portion 64 of the panel 54 and pulling tape 40 out of the slot 57. She may then readily pull as much of tape 40 out of the used tape container 14 as may be necessary.

A modification of the invention is shown in Fig. 5 in which a single motor 70 is used to operate

both the keyboard unit 2 and the typing unit 51. This motor 70 is placed upon an additional, or second, shelf 71 which is located beneath the shelf 52 a distance sufficient to accommodate motor 70. With this arrangement, the power circuit, coming out of the switchboard 1 over cable 12, passes directly to motor 70. A drive shaft 72, connected by gears 73 to motor 70, forms the power connection between motor 70 and the typing unit 51 and keyboard unit 2. Shaft 72 is connected to the typing unit 51 by gears 74 and to keyboard unit 2 by gears 75. The rest of the construction of this modification is practically the same as that described above.

The advantage of this modification of the invention resides in the fact that, since the motor 67 need not be on the top of table 3, table 3 may be made narrower to enable the operator to sit closer to the jack-field 24 of switchboard 1. Likewise, since motor 56 need not be placed on shelf 52, shelf 52 may be made narrower thereby providing more knee-room for the operator.

Another modification of the invention is illustrated in Fig. 6 which shows a single motor 70' inverted and suspended by any suitable means, such as screws 77, from the underside of shelf 52' for operating both the keyboard unit and the typing unit by means of gears 73'—74' and drive shaft 72'. The advantages inherent in this modification are that better ventilation is obtained for motor 70' and more foot-room is provided for the operator.

Still another modification of this invention is shown in Figs. 7 and 8. In Fig. 7, a switchboard 100 is shown provided with teletypewriters 101 partially built into, or mounted in, the switchboard 100. These teletypewriters 101 are the same type as the teletypewriters shown in the other figures of the drawings. Although two separate motors have been shown in this embodiment of the invention, it is to be understood that this is a matter of choice and that a single motor located with either unit and suitably connected to the other unit may be used if desired. It can be seen in the drawings that, with the switchboard construction employed, the tops of the teletypewriters 101 are almost on the same level as the top of the key-shelf 103. The advantage of this construction resides in the fact that it enables the jack-field 104 to be extended downward further than would otherwise be possible. This, of course, increases the number of subscriber lines available to the operators.

As can be seen in Fig. 8, a teletypewriter 101 is provided with two motors 105 and 106. Motor 105 operates the keyboard unit 107 and motor 106 operates the typing unit 108. Power for operating motor 105 comes in from conduit 109 and the power for operating motor 106 comes in over conductor 110. The typing unit 108 is electrically controlled by the keyboard unit 107 over a conductor 111 which leads from the conducting block 112 in the keyboard unit 107 through a connecting block 113 in the typing unit 108. Since the tape 114, which comes from a supply roll 153, is inside the switchboard 100, it is made visible to an operator by being illuminated by a source of light, such as lamp 115, and is then reflected to the eyes of the operator by mirrors 116 and 117. The line of vision is indicated by the dot-dash line in Fig. 7.

It can thus be seen that the invention is not restricted to teletypewriters mounted upon movable tables but is equally applicable to teletypewriters built into a switchboard. In both types,

the invention effects a decrease in the effective height of an operator's teletypewriter which results in an increase in the area of the jack-field available to the operator. This enables the operators to make more efficient use of the switchboard multiple. Since the switchboard multiple is an expensive item, the initial and overhead costs of a switchboard multiple having the bottom of its jack-field lowered by means of these teletypewriter and table assemblies are considerably less than they would be for an ordinary switchboard multiple having an equal number of jacks. It is to be understood that additional modifications within the scope of the principles herein outlined are within the scope of the invention as herein set forth and claimed.

What is claimed is:

1. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard including a switchboard multiple having a jack-field, an operator's teletypewriter mounted beneath the jack-field of the switchboard multiple, said teletypewriter having a keyboard unit and a typing unit, means for reducing the effective height of the operator's teletypewriter for increasing the effective height of the jack-field, said means including first supporting means for supporting the keyboard unit below the jack-field and second supporting means for supporting the typing unit beneath the keyboard unit.

2. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard having a jack-field and a projecting key-shelf, an operator's teletypewriter mounted upon a table located underneath the key-shelf, said table being adapted for movement up and down the length of the switchboard for readily varying the location of the operator's position in accordance with different traffic requirements, and means for increasing the area of the jack-field available to the reach of an operator, said means comprising a teletypewriter keyboard mounted on top of the table and a teletypewriter typing unit located underneath the top of the table whereby the effective height of the operator's teletypewriter is lowered.

3. In a teletypewriter central office having in combination a teletypewriter exchange switchboard and an operator's teletypewriter having a keyboard unit and a typing unit, said switchboard including a switchboard multiple having a jack-field, the method of increasing the area of the jack-field accessible to an operator, said method comprising separating the keyboard mechanism of the operator's teletypewriter from the typing mechanism, mounting the keyboard unit beneath the jack-field, and positioning the typing unit beneath the keyboard unit.

4. In combination, an operator's teletypewriter and table including a keyboard unit and position equipment mounted upon the top of the table, said table having a shelf, a typing unit mounted upon the shelf, a motor mounted upon the shelf for operating the typing unit, and an electrical connection between the keyboard unit and the typing unit for enabling the operation of the typing unit to be controlled by the keyboard unit.

5. In combination, an operator's teletypewriter and table including a keyboard unit and position equipment mounted upon the top of the table, said table having a shelf, a typing unit mounted upon the shelf, a first motor mounted upon the shelf for operating the typing unit, a second motor mounted upon the top of the table for operating the keyboard unit, and an electrical connection

between the keyboard unit and the typing unit for enabling the operation of the typing unit to be controlled by the operation of the keyboard unit.

5 6. In combination, an operator's teletypewriter and table including a keyboard unit and position equipment mounted upon the top of the table, said table having a shelf, a typing unit mounted upon the shelf, a motor, a plurality of gears for
10 mechanically connecting the motor to both the keyboard unit and the typing unit for enabling the motor to operate both the keyboard unit and the typing unit, and an electrical connection between the keyboard unit and the typing unit
15 for enabling the operation of the typing unit to be controlled by the operation of the keyboard unit.

7. In combination, an operator's teletypewriter and table including a keyboard unit and position equipment mounted upon the top of the table, said table having an upper shelf and a lower shelf, a typing unit mounted upon one of the shelves, a motor located upon the other shelf, means for mechanically connecting the motor to
25 the keyboard unit and to the typing unit for enabling the motor to operate both the keyboard unit and the typing unit, and an electrical connection between the keyboard unit and the typing unit for enabling the operation of the typing unit
30 to be controlled by the operation of the keyboard unit.

8. In combination, an operator's teletypewriter and table including a keyboard unit and position equipment mounted upon the top of the table, a
35 typing unit mounted beneath the top of the table, a motor for operating the typing unit, a supply of paper located beneath the top of the table for being printed upon by the typing unit, a source of light located beneath the top of the table for
40 illuminating the printed portion of the paper, and a plurality of mirrors for enabling the printed portion of the paper to be viewed by an operator.

9. In combination, a teletypewriter exchange switchboard having a key-shelf, an operator's
45 teletypewriter built into the switchboard and having a keyboard unit and a typing unit, the keys of the keyboard unit being on a level with the key-shelf and the typing unit being located inside the switchboard on a level below that of
50 the key-shelf and keyboard unit, a motor located inside the switchboard for operating the typing unit, and an electrical connection between the keyboard unit and the typing unit for controlling the operation of the typing unit from the key-
55 board unit.

10. In combination, a teletypewriter exchange switchboard having a key-shelf, an operator's teletypewriter mounted in the switchboard and

having a keyboard unit and a typing unit, the keys of the keyboard unit being on a level with the key-shelf and the typing unit being located inside the switchboard on a level below that of the key-shelf and keyboard unit, a first motor
5 located inside the switchboard on a level with the key-shelf for operating the keyboard unit, a second motor located inside the switchboard beneath the level of the key-shelf for operating the typing unit and an electrical connection between
10 the keyboard unit and the typing unit for controlling the operation of the typing unit by the operation of the keyboard unit.

11. In combination, a teletypewriter exchange switchboard having a key-shelf, an operator's
15 teletypewriter mounted in the switchboard and having a keyboard unit and a typing unit, the keys of the keyboard unit being on a level with the key-shelf and the typing unit being located inside the switchboard on a level below that of
20 the key-shelf and keyboard unit, a motor located inside the switchboard for operating the typing unit, an electrical connection between the keyboard unit and the typing unit for controlling the operation of the typing unit from the key-
25 board unit, a supply of paper located inside the switchboard for being printed upon by the typing unit, a source of light located inside the switchboard for illuminating the printed portion of the paper, and a plurality of mirrors for enabling
30 the printed portion of the paper to be viewed by an operator.

12. A teletypewriter central office comprising in combination a teletypewriter exchange switchboard including a switchboard multiple
35 having a jack-field, an operator's teletypewriter mounted beneath the jack-field of the switchboard multiple, said teletypewriter having a keyboard unit and a typing unit, means for reducing the effective height of the operator's teletype-
40 writer for increasing the effective height of the jack-field, said means including first supporting means for supporting the keyboard unit below the jack-field, second supporting means for supporting the typing unit beneath the keyboard unit,
45 an electrical connection between the keyboard unit and the typing unit for enabling the operation of the typing unit to be controlled by the operation of the keyboard unit, a supply of paper leading through the typing unit for being printed
50 upon by the typing unit, a source of light located beneath the keyboard unit for illuminating the printed portion of the paper, and a plurality of mirrors located in viewing relation with the printed portion of the paper for enabling the
55 printed portion of the paper to be viewed by an operator.

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