Sept. 27, 1932. D. A. CHRISTIAN 1,880,072

MOUNTING ARRANGEMENT FOR ELECTRICAL APPARATUS

Filed April 14, 1930 2 Sheets-Sheet 1

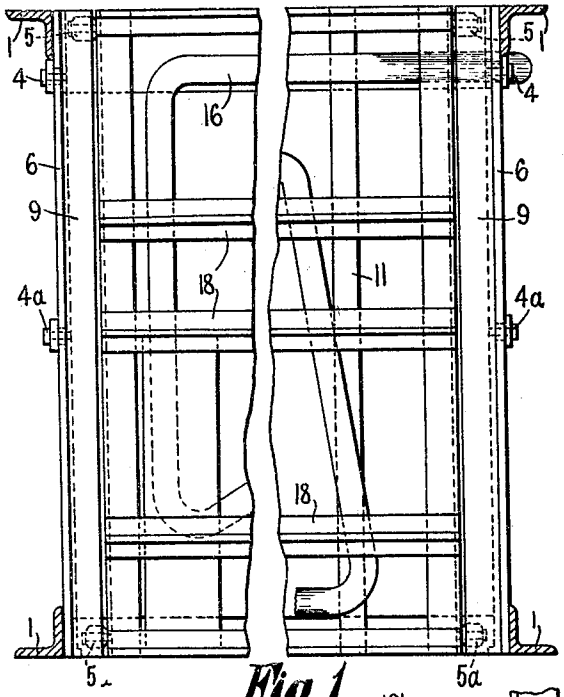


Fig. 1.

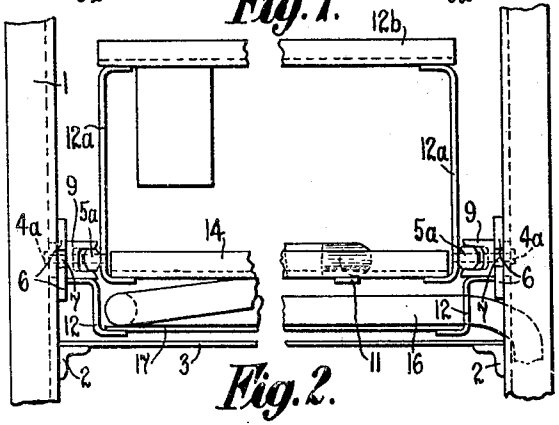
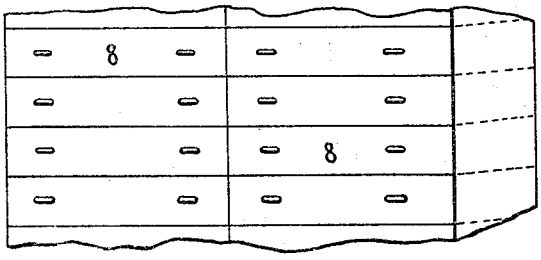


Fig. 2.

Fig. 3.



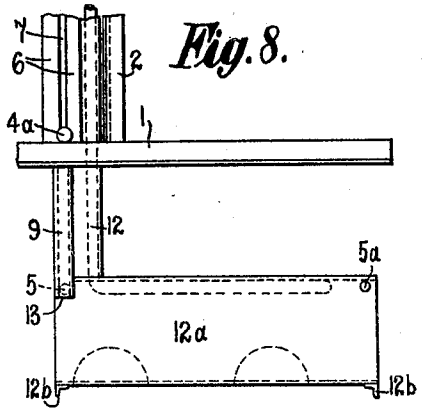


Fig. 8.

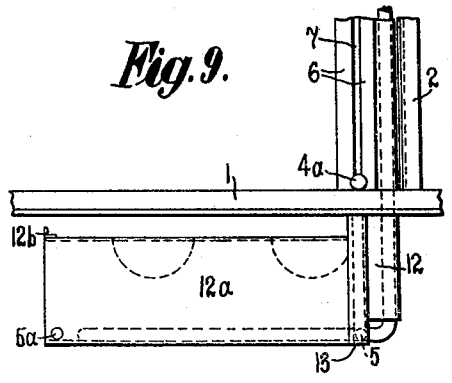


Fig. 9.

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MOUNTING ARRANGEMENT FOR ELECTRICAL APPARATUS

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Fig. 4.

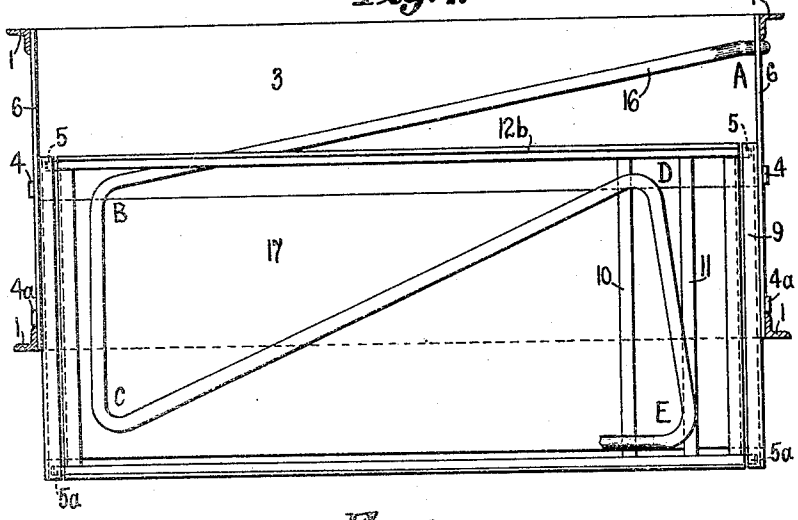


Fig. 5.

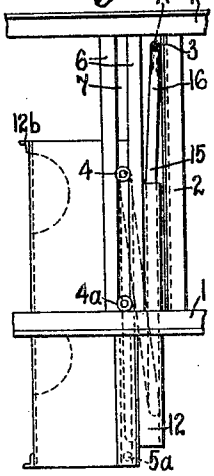


Fig. 6.

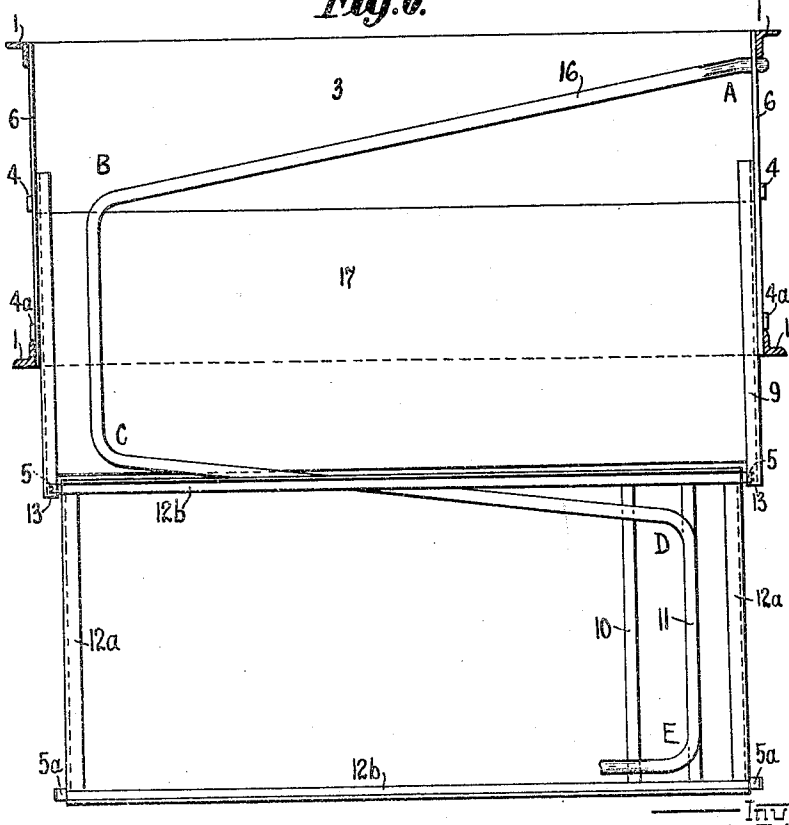
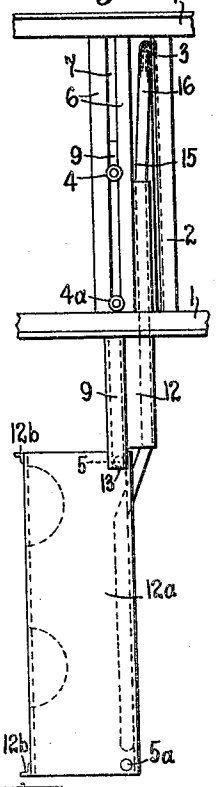


Fig. 7.



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1,880,072

UNITED STATES PATENT OFFICE

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MOUNTING ARRANGEMENT FOR ELECTRICAL APPARATUS

Application filed April 14, 1930, Serial No. 444,324, and in Great Britain April 29, 1929.

This invention relates to mounting arrangements for automatic telephone and like selecting switches and other apparatus used in telephone and remote control systems.

It is customary in automatic telephone exchanges and other telephone exchanges employing automatic switches to mount switches and relay sets by attaching them to or hanging them on the vertical faces of frames or racks.

According to one feature of the invention apparatus is mounted on a frame or panel suitably disposed and supported in a rack and arranged to be drawn forward from the rack until the rear edge of the panel reaches the front of the supporting member. The panel may have sides or ends which are supported in horizontal channel members carried by the rack framework.

According to a further feature of the invention a panel, when drawn forward to a limiting position may be turned about an axis so as to swing in a direction at right angles to its former movement.

A number of panels may be arranged side by side in rows or tiers and the same rack may support a number of rows or tiers one above the other.

In the case of switches which depend on gravity for part of their movement a vertical disposition of the apparatus is necessary and panels for such apparatus may be arranged in vertical planes. For apparatus which does not depend on gravity for its operation, such as preselectors, relay sets and the like, a horizontal disposition may be employed and the panels arranged in horizontal planes.

In one form, the panel at each side or end, has projecting pins near each end thereof, which pins project into a horizontal channel member. A stop is provided which is fixed in the channel member and prevents the panel being completely withdrawn from the supporting rack by reason of the rear pin abutting on to the same. This stop may be shaped so as to partially enclose the rear pin and form a bearing about which the panel can pivot.

As regards the electrical connections to the panel apparatus, knife contacts may be provided on the panel and on a rear plate of the rack supporting the channel members. Additional contacts may be provided at the front of the supporting rack so that connections may be made when the apparatus is being inspected. Alternatively it is possible to bring the connecting cable up or down a vertical member, turn it into a horizontal plane, extend it across the rack and bring it to the front of the panel and then turn it more or less back on itself across the panel to the side from which it first entered the rack and bring it to the front of the panel for connection to the apparatus mounted on the panel. The arrangement of the cable in the panel is such that when the panel is turned about its pivot the principal flexure of the cable is substantially of a twisting nature. A tray may be provided underneath the panel and may either remain within or partly within the rack when the panel is withdrawn so as to render the apparatus easily accessible for inspection, or it may be detachably fixed to the panel and withdrawn with it. The tray may serve to support the cable connecting the apparatus when the cable is so provided and arranged.

The front, ends or sides, and back of the panel may be closed in so that with all the panels in their normal position, the apparatus is to a large extent protected from dust.

In order to make clearer the invention, reference will now be had to the accompanying drawings which show by way of example an arrangement of horizontal panels, adapted to be mounted one above the other in a rack.

Fig. 1 shows a plan view looking down upon the top of the rack with a panel in position.

Fig. 2 is an elevation of one of the panel sections taken at right angles to Fig. 1 looking from the bottom of that figure.

Fig. 3 shows in perspective a part of two adjacent racks with the panels closed.

Fig. 4 shows in plan one of the sliding panels partly drawn out and Fig. 5 is an elevation of the same taken from the right of Fig. 4.

Figs. 6 and 7 are similar views respectively

to Figs. 4 and 5 with the panel completely withdrawn.

Fig. 8 is a view similar to Fig. 7 with the panel turned into a vertical direction downwards so that the front of the panel may be easily inspected.

Fig. 9 shows a similar view to Fig. 8 but with the panel turned upwards into a vertical direction so that the back of the panel may be easily accessible for inspection or other purpose.

The panels are built up of four angle-iron members connected by plates which serve as sides, and the apparatus is mounted on the angle-iron members so as to lie within the parallelopiped so formed which can be drawn out from the rack when required and rotated into a vertical position for inspection and test purposes. These panels are mounted one above the other in a rack, and a number of racks are placed side by side, so that they present an appearance when all the panels are pushed home, similar to that shown in perspective in Fig. 3. The fronts of the panels may be provided with handles to enable them to be easily withdrawn. The rack may be provided with sides, back and top for the protection from dust of the apparatus on the panels inside.

The rack consists of four vertical angle-iron members 1, one at each corner of a rectangle, connected and held in position by means of horizontal angle-irons 2. These angle-irons 2 are spaced along the vertical members 1 as required and form separate chambers into which the individual panels of apparatus slide. Resting on the horizontal portions of the members 2 is a flat sheet 3 of metal or other material forming a floor to the chamber and which serves to support the cable 16 when the panel is withdrawn.

The panel on which the apparatus is mounted is made up of the two angle-iron pieces 12*b* which form the upper edges of the panel. Immediately below these, two further angle-iron members 14 form the bottom edges of the panel, the four angle members 12*b* and 14 being assembled on side-plates 12*a* which have bent-over edges as shown in Fig. 2.

The members 14 carry flat bars 10, 11, which run the depth of the panel and provide supports for one end of the cable 16 connecting the apparatus. Parallel with the members 12*b* and carried by the side-plates 12*a* are T pieces 18 (Fig. 1) on which the apparatus is mounted. The dotted semi-circles shown in Figs. 5, 7, 8 and 9 represent preselectors and are shown in order to indicate the positions assumed by such apparatus on the panel.

The side plates 12*a* carry four rollers, two on each side, situated one at the back, designated 5, and one at the front designated 5*a*. The back rollers 5 are rather wider than the front rollers 5*a*. These rollers slide in channel members 9 extending the depth of the panel, there being one channel member on each side of the rack.

The channel members 9 have at each end a stop, the one at the back end completely filling the channel, whilst the stop 13 at the front end allows the rollers 5*a* to pass out of the channel but not the rollers 5.

In order that, when the panel is withdrawn the weight shall not come unexpectedly on the hands when the rollers leave the channel members, stops may be provided so that when the panel reaches the position shown in Fig. 4 it must be raised slightly to enable the rollers to clear the stops. In this case the back and front rollers may be the same length and the top of the channel members may be cut away at their front ends to enable the rollers to clear the stops.

Each channel member 9 has fixed to it two rollers or pins, one 4 near its rear, and another 4*a* about halfway along its length. These rollers run in a slot 7 between two parallel horizontal bars 6 fixed to the upright members 1, and running the depth of the rack. The rollers are prevented from coming out of contact with the slot 7 by being passed right through it and having enlarged ends.

Fixed to the channel members 9 are the Z-sectioned side plates 12, which carry, resting on their lower horizontal limbs, a plate 17, which acts as a support for the cable running to the apparatus, and also prevents any detached parts from falling into the apparatus below, the plates 12 and 17 together forming a tray. The back end of each of the side walls 12 is cut away at 15 (see Figs. 5, 7) so that when the panels are pushed right home, the cable running at the back of the chamber will not be damaged or cut by the edge of the walls coming up against it.

The cable 16 to the apparatus is brought up or down one of the back angle-iron members 1. As shown in Figs. 4–7 it is the one on the right at A. The cable 16 enters the chamber over the floor 3 and thence on to the bottom of the tray 17 itself at the other side of the chamber. At B, the cable is turned so as to run from back to front of the tray 17 to the point C where it is turned slightly upwards and carried across the panel to the other side to a point D at the back of the panel where it rests on the cross-bars 10, 11, and is again turned towards the front of the panel being supported by bars 10 and 11 until it reaches the point E. The cable is now turned towards the opposite side of the panel on to the bar 10 from whence the wires constituting the cable are run to their respective connecting points on the apparatus. The cable may be fastened to the vertical member 1 and at the point E to the bar 11, the portion between the points A and E being free to move and being supported by the plate 3 and

tray 17 within which it lies, and by the bars 10, 11.

The panels are pulled out by means of handles affixed to the front plates 8. The weight of the panel and the apparatus on it at first prevents the panel from sliding relatively to the channel members 9, and in the initial stages of the drawing-out operation the channel members 9 with their rollers 4 and 4*a* slide in the slots 7 until the front pair of rollers 4*a* engage against the front upright members 1 of the rack. Any further movement of the channel members in the forward direction is thus prevented. In this position, approximately half the length of a channel member 9 is outside the rack. This is the position shown in Figs. 4 and 5.

If the panel is further pulled it slides relatively to the channel members 9, and the rollers 5*a* pass the stops at the end 13 of the members 9, whilst the back of the panel is supported by the rollers 5. When the panel is fully out, the rollers 5 come up against the stops 13 and further motion of the panel in a horizontal direction is prevented. This is the position shown in Figs. 6 and 7.

In this position the panel may be turned into a vertical direction about a pivot formed by the rollers 5. If the front of the panel is to be inspected it may be turned down, and if the back is to be inspected it may be turned up. These two positions are shown respectively in Figs. 8 and 9.

When the panel is withdrawn from the compartment, the main flexure of the cable is a twisting movement of vertical section at the point A and the fastening of the cable to the member 1 is so arranged that a considerable length of cable is free to take up the twisting movement. When the panel has been withdrawn and is turned about its pivots, the flexure of the cable will be a twisting movement along the portion CD, which then lies approximately along the axis about which the panel is turned.

The bars 10 and 11 may be dispensed with and a tray may then be attached to the panel so that it is withdrawn with it. When the panel is in its normal position, the tray will then prevent any part which may become detached from falling into the apparatus beneath. To render the apparatus mounted on the panel accessible, the tray may be detachable.

The actual electrical connections to the apparatus may be made alternatively by knife contacts, and this is convenient when the number of conductors entering the panel is small. The knife contacts may be arranged at the rear edge of the panel so that they disengage when the panel is drawn forward, and a further set of contacts may be provided in the line taken up by the rear edge of the panel when it is fully withdrawn to engage the blades carried by the panel to enable the apparatus to be connected for testing purposes.

It will be realized by those skilled in the art that the invention is not limited to the precise arrangement shown in the drawings. Without departing from the spirit of the invention, a vertical disposition of apparatus on the panels may be employed, the panels then lying in a vertical plane like books in a case, and being withdrawn in a similar manner. The guides would then be provided at the top and bottom ends of a panel. A number of such panels may be arranged side by side in tiers and a rack may contain a number of tiers.

With the vertical disposition of the apparatus, by leaving the sides of the panel open, no provision for turning the panel is required and the electrical connections to the panel would be obtained by giving a radial movement to a portion of the cable.

Panels of apparatus may be arranged back to back so that one set may be withdrawn from one side of the rack and the other set of panels from the other side.

What I claim as new and desire to secure by Letters Patent is:

1. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels arranged horizontally in said supporting rack for mounting said apparatus, said panels slidable in and out of said supporting rack, means for limiting the sliding movement of said panels, and means for moving said panels to a vertical position with respect to said supporting rack when the panels are at the limit of one of their in and out movements.

2. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels arranged horizontally in said supporting rack for mounting said apparatus, means for supporting said panels in said rack so they are slidable in and out therefrom, means for preventing the complete removal of the panels from the rack when in their outermost position, and means for rotating said panels to assume a vertical position with respect to said supporting rack when they are in their outermost position.

3. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said supporting rack for mounting said apparatus, means for supporting said panels so they are slidable in and out of said rack, and means for rotating said panels about an axis lying in the plane of the panel after they have been fully slid out of said rack.

4. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said rack for mounting said apparatus, channel members in said rack for slidably supporting said panels in and out of said rack, means for slidably supporting said

channel members in said rack so that they slide relatively to the rack and in the same direction as the panels, and means for rotating said panels either up or down from the end of said channel members after they have been fully slid out of said rack.

5. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said rack for mounting said apparatus, channel members in said rack for slidably supporting the panels in and out of said rack, means for slidably supporting said channel members in said rack so that they slide relatively to the rack and in the same direction as the panels, said panels having rolling members fixed thereto sliding in said channel members, and means for preventing the disengagement of said rolling members from the channel members until a lifting motion is applied to the panels.

6. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said supporting rack for mounting said apparatus in a horizontal position, means for supporting said panels so they are slidable in and out of said supporting rack, a cable connected with the apparatus on each of the panels in the rack, and a tray positioned below each of the panels for supporting the cable.

7. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said rack for mounting said apparatus, channel members for slidably supporting the panels in and out of the rack, means for slidably supporting said channel members in the rack so that they slide relatively to the rack and in the same direction as the panels, a cable connecting the apparatus on each of the panels in the rack, and a tray supported by said channel members below each of the panels for supporting said cable.

8. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said supporting rack for mounting said apparatus, means for supporting said panels so they are slidable in and out of said rack, means for rotating the panels about an axis lying in the plane of the panel after they have been fully slid out of the rack, a cable connected to the apparatus on each of said panels and the supporting rack, said cable so arranged that when the panel is slid in and out of the rack or rotated the principal flexure of the cable is of a twisting nature.

9. In a mounting arrangement for telephone apparatus and the like, a supporting rack, panels in said rack for mounting said apparatus, means for slidably supporting said panels in a horizontal position in and out of said rack, means for rotating the panels about an axis lying in the plane of the panels after they have been fully extended from the rack, a cable connected to the apparatus on the panels and the supporting rack, said cable extending from its entrance with one side of a panel, then across to the other side of the panel, then in a diagonal direction to the side of the panel in which it entered where it is secured and connected to the apparatus on the panel, and a tray mounted below each of said panels for freely supporting the section of the cable lying within said panels.

In testimony whereof I affix my signature.

DAVID ADAM CHRISTIAN.