Oct. 15, 1929. T. M. SNYDER 1,731,756

ELECTRIC SWITCH

Filed May 28, 1927 3 Sheets-Sheet 1

Fig. 4

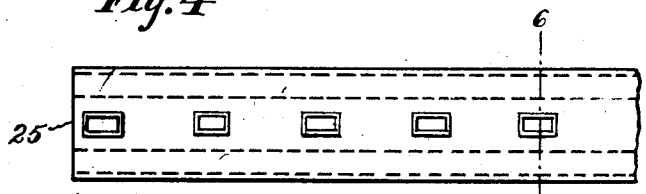


Fig. 5

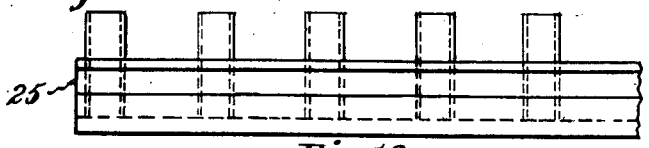


Fig. 6

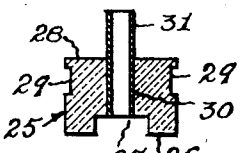


Fig. 10

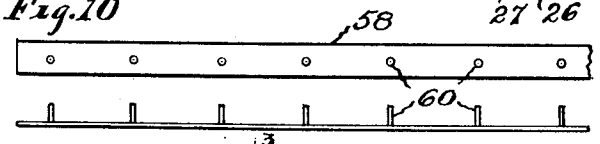


Fig. 1

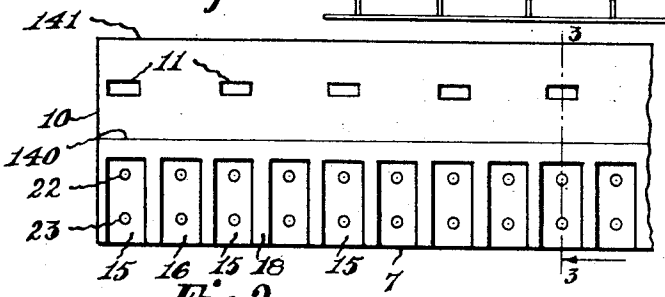


Fig. 2

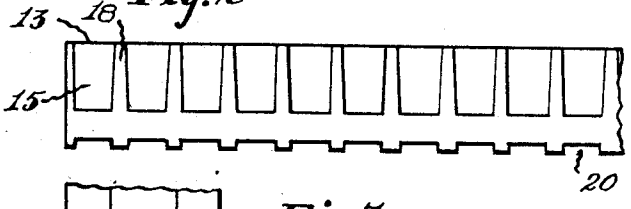


Fig. 3

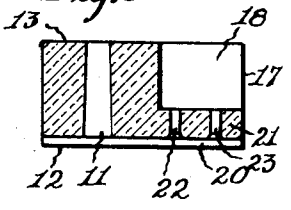


Fig. 7

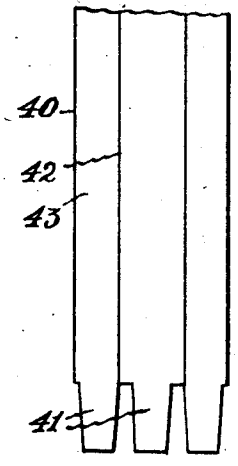
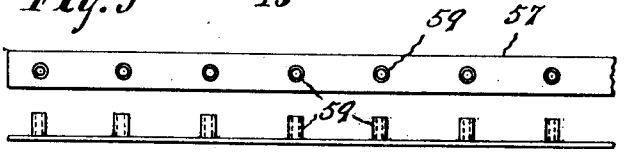


Fig. 8



Fig. 9



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Oct. 15, 1929. T. M. SNYDER 1,731,756

ELECTRIC SWITCH

Filed May 28, 1927 3 Sheets-Sheet 2

Fig.11

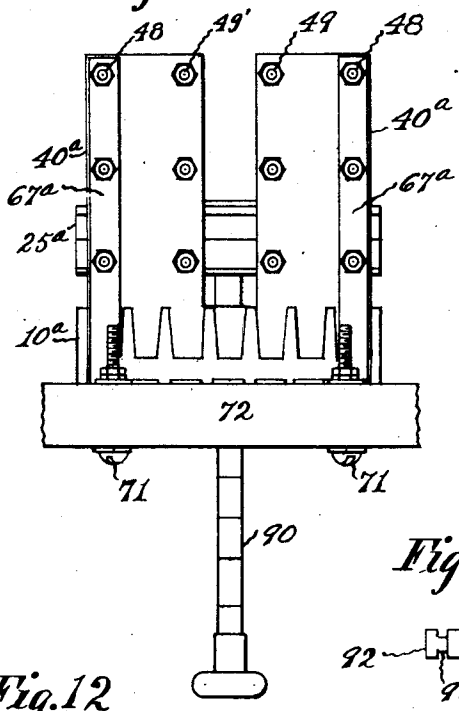


Fig.13

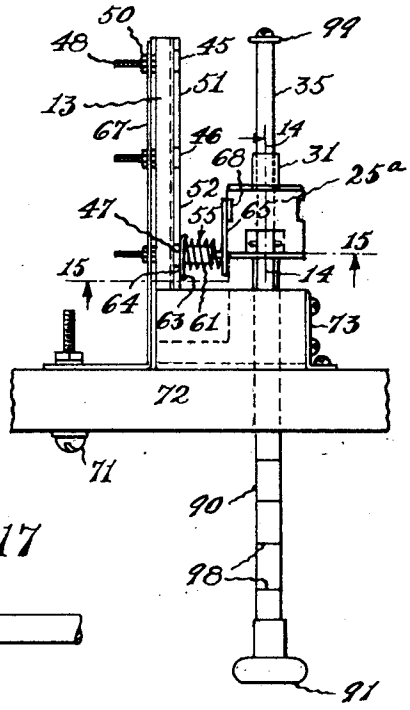


Fig.17

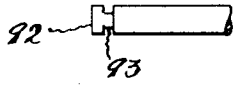


Fig.12

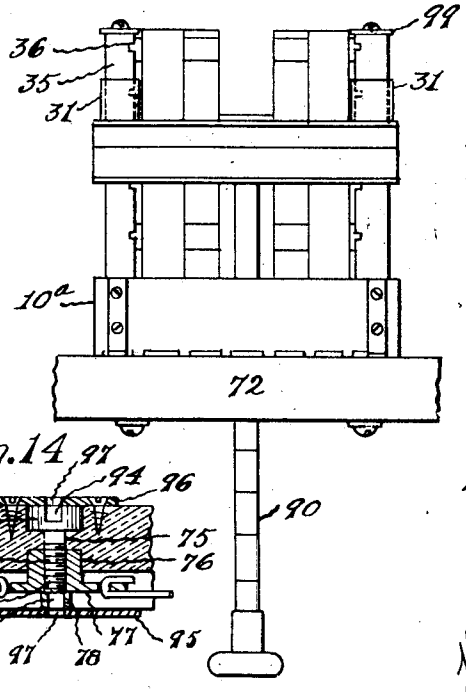


Fig.15

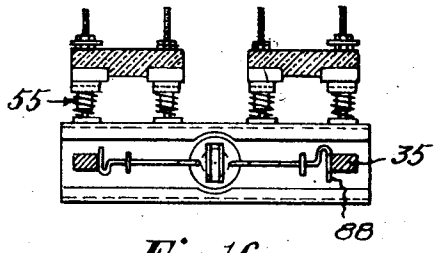


Fig.16

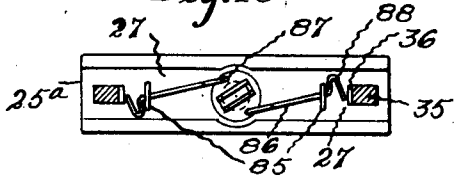


Fig.14

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Oct. 15, 1929. T. M. SNYDER 1,731,756

ELECTRIC SWITCH

Filed May 28, 1927 3 Sheets-Sheet 3

Fig. 18

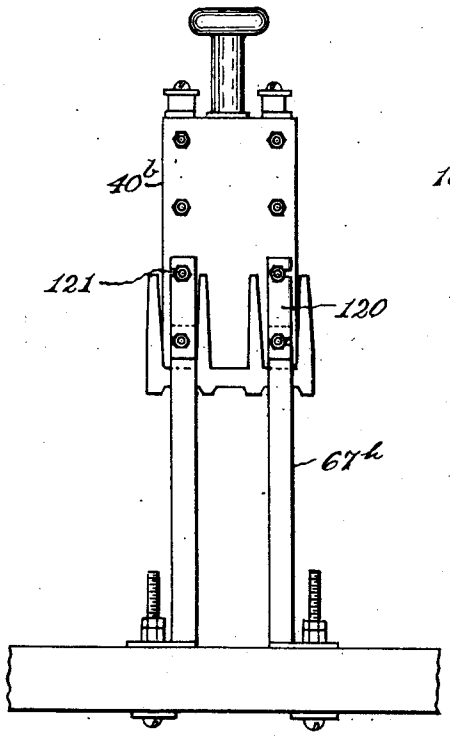


Fig. 19

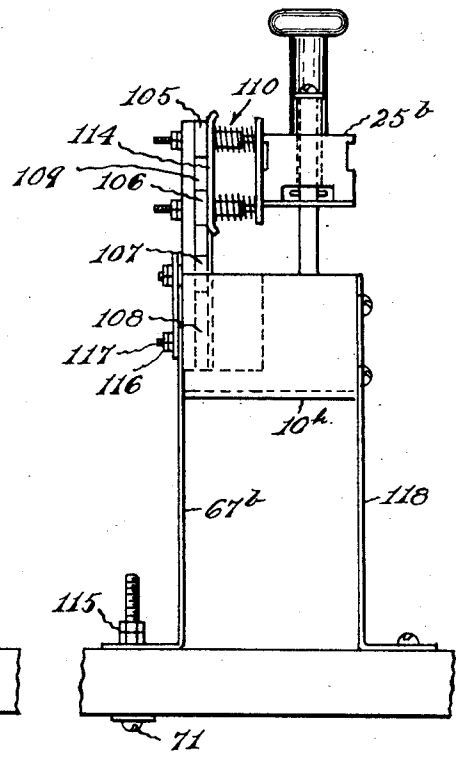


Fig. 20

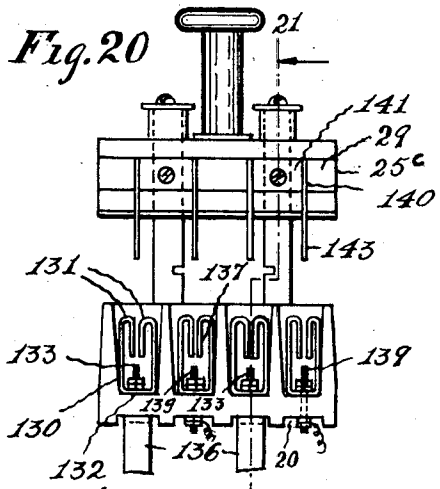


Fig. 21

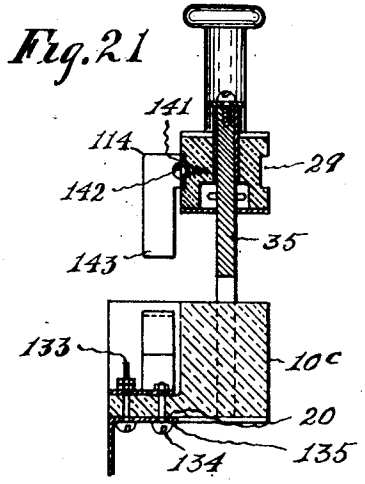
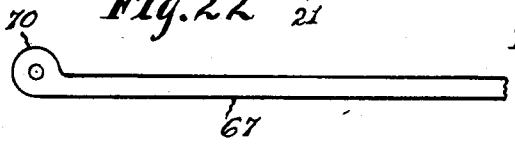


Fig. 22



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed May 28, 1927. Serial No. 195,074.

This invention relates to electric switches and more particularly to economically manufactured stock and switch parts and to switches constructed therefrom, though it is noted that the invention is not limited to parts constructed from this stock nor in some respects even to switches.

One object of the invention is to provide suitable standardized switch parts from which a large variety of switches can be constructed at a minimum of expense, said parts being interchangeable to make any combination of circuits desired.

Another object of the invention is to provide a switch of this kind operated by a plunger bar, making it possible to build a switch to occupy a minimum space, and to avoid hinge blades and springs; and in multi-contact use to eliminate turning drums.

Another object of the invention is to provide a simple rugged device of this kind capable of withstanding any duty imposed upon it.

Another object of the invention is to provide an extremely rugged, compact apparatus or device of this kind which may be operated either from the front or back of the switch board, and from which the handle may be removable if desired.

Another object of the invention is to provide, in an apparatus or device of this kind, a suitable key controlled lock and locating device to insure accuracy of contacts and avoid accidental slipping, the key serving as a removable handle.

Other objects of the invention are to improve generally the simplicity, compactness, efficiency and ruggedness of such devices and to provide a device or apparatus of this kind which is economical, durable and reliable in operation, and economical to manufacture.

Still other objects of the invention will appear as the description proceeds; and while herein details of the invention are described and claimed, the invention is not limited to these, since many and various changes may be made without departing from the scope of the invention as claimed in the broader claims.

The inventive features for the accomplishment of these and other objects are shown herein in connection with improved apparatus which, briefly stated, includes:

Switch-forming parts including molded elongated base-stock provided with openings and marginal recesses, and plunger bar stock provided with a series of openings, said stock being made in long or suitable lengths and being adapted to cut off in different lengths for different sizes and kinds of switches.

Notched guide posts adapted to be mounted in said base to slidably receive said bar, and uprights having end tenons adapted to fit in said recesses, are also made in lengths adapted to cut off in different lengths for different kinds of switches.

I provide fixed contacts adapted to be disposed along the inner face of the uprights, and contact-strip-stock comprising a pair of yieldably connected conducting strips also adapted to be cut off in desired lengths. One of the pieces may be cut off and turned at the ends to form a shoe, the other piece being adapted to be secured on the bar, in position to cause said shoe to press and slide against said fixed contacts.

In addition to, or instead of, the uprights and co-operating parts, I provide contact clips adapted to be mounted in said recesses, and blade members carried by said bar, each having its ends receivable by adjacent clips.

By means of the above stated parts I can build up a large variety of switches for a great variety of testing and other uses, suitable connections being attached to said contacts.

In order to faciliate the use and increase the safety of the switches, I provide a locking means comprising a rotary member adapted to be mounted in said bar between said posts and provided with key slots at both ends and bolts pivoted eccentric to the member and

having portions engageable in said notches to lock the bar. A combined handle and key has an elongated bit adapted to fit in either of the slots; and plates secured on the bar over said slots are each provided with an elongated key hole registerable with the slot, the slots being transverse to the keyholes when in unlocking position to prevent the removal of the key except when the bar is locked.

In the accompanying drawing, showing by way of example, a few of many possible embodiments of the invention,

Figs. 1 and 2 are a fragmental plan and side elevation showing the base stock;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows of said line;

Figs. 4 and 5 a fragmental plan and side elevation showing the plunger bar stock;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 4.

Fig. 7 is an inner face elevation showing the upright;

Fig. 8 is a bottom plan of the upright;

Fig. 9 shows a fragmental plan and side elevation of one strip of the sliding contact stock;

Fig. 10 shows similar views of the other strip of the sliding contact stock;

Fig. 11 is a side elevation showing one face of one form of switch which may be made from the switch stock;

Fig. 12 is a similar view of the opposite face;

Fig. 13 is an end elevation showing the same switch;

Fig. 14 is a fragmental longitudinal vertical sectional view, partly in elevation, showing parts of the locking means on an enlarged scale, the section being taken on the line 14—14 of Fig. 13, looking in the direction of the arrows of said line;

Fig. 15 is a horizontal sectional view, partly in bottom plan showing the locking means in locking position, the section being taken on line 15—15 of Fig. 13, looking in the direction of the arrows of said line;

Fig. 16 is a similar view, parts being omitted, showing the locking means in unlocking position;

Fig. 17 is a fragmental side elevation showing the bit end of the combined handle and key;

Fig. 18 is a plan or elevation showing another form of switch made from the stock parts;

Fig. 19 is an elevation showing the same switch viewed from a direction at right angles to the direction of Fig. 18;

Fig. 20 is a fragmental plan or elevation showing still another form of switch made from said stock parts;

Fig. 21 is a fragmental sectional view taken on the line 21—21 of Fig. 20;

Fig. 22 is a fragmental plan showing the stock for making conductor legs and direct connectors.

Each of the switches herein described comprises a base, posts mounted thereon and a plunger bar provided with openings slidably received on said posts. The base and, either directly or indirectly, the bar carry the switch contacts.

The switch base is preferably formed of molded elongated rectangular base stock 10 (Fig. 1) of insulating composition material provided near one side face with a series of post-receiving openings 11 of elongated rectangular cross-section and slightly tapering from the inner face 12 (Fig. 3) to the outer face 13 of the base. At the other side this stock is provided with a series of mortise like recesses 15, 16 (Fig. 1) open at the outer face 13 and the adjacent side face 17 of the base, forming intervening barriers 18, the recesses tapering toward and extending to near the inner face. Alternate recesses 15 are opposite said openings 11 respectively.

The inner face 12 (Fig. 3) is provided with a plurality of shallow transverse recesses 20 registering with the mortise recesses 16 and separated therefrom by an intevening web 21 and connected therewith by a pair of stud-receiving holes 22, 23 passing through the web.

The base stock is made in long or suitable lengths and is adapted to be cut off in different lengths for different sizes and kinds of switches.

The plunger bar is formed preferably of molded plunger bar-stock 25 (Figs. 4 to 6) of insulating composition material provided on its inner face 26 (Fig. 6) with a wide longitudinal lock-receiving groove 27, at the side faces near the outer face 28 with longitudinal conductor bar receiving grooves 29, said bar being also provided with a series of rectangular sleeve-receiving openings 30 passing from said outer face 28 into the wide groove 27.

Rectangular metal guide sleeves 31 are disposed fast in said openings as with a driven fit, flush with the bottom of the wide groove 27. Said sleeves project from the outer face 28 of the bar and are alinable with said openings 11 of the base when the bar is disposed over the base as in the switches shown.

Said bar stock with the guide sleeves therein is also made in long or suitable lengths and adapted to be cut off in different lengths for different sizes and kinds of switches.

Guide posts 35 (Figs. 12 and 16) of rectangular cross-section disposable in said tapering openings of the base may be held therein with a tight driven fit or by set screws or in any desired manner and when so disposed are adapted to slidably receive said guide sleeves 31. Said posts are provided in adjacent edges with a series of locking notches 36 and may be made in long or suitable lengths

to be cut off in different lengths for different kinds of switches.

The switch forming parts will now be further described in connection with the switch of Figs. 11 to 16 comprising a base 10^a formed of said base stock and carrying posts 35 and uprights 40^a mounted thereon, and a plunger bar 25^a provided with sleeves 31 slidably received on said posts.

The uprights or spacers 40^a are cut off from stock 40 having at one end a plurality of tapered tenons 41 (Figs. 7, 8 and 11) adapted to fit tight in said mortises 15, and provided on the inner face with a medial longitudinal spacing rib 42 forming marginal contact receiving flanges 43 at both side edges of the upright.

In the switch of Figs. 11 to 13, a plurality of fixed contacts 45, 46, 47 (Fig. 13) disposed along the inner face of said flange 43 the upright adjacent to said rib are provided with conducting studs 48, 49 (Fig. 11) passing through the flange and provided with binding nuts 50.

Insulating pieces 51, 52 are interposed fast on said flanges between, and flush with adjacent fixed contacts.

Yieldable contact means 55 carried by the bar, in position to slide against said fixed contacts, are preferably made from contact bar stock comprising a pair of conducting strips 57, 58 (Figs. 9 and 10) respectively provided with a plurality telescoping cups 59 and pegs 60 soldered or brazed or otherwise secured perpendicular to said strips, and springs 61 (Fig. 13) on said cups adapted to be compressed between said strips.

Said stock may be cut off in desired lengths, to include one or more cups and pegs, one piece of strip being turned up at the ends 63 to form a shoe or sliding contact 64, the other piece 65 of strip being secured across the adjacent side face of the plunger bar 25^a, in position to cause said springs to press the shoe 64 against said fixed contacts whereby the shoe may slide from one contact to the adjacent insulating piece and then to another contact when the plunger bar is slid up or down on the guide posts.

The switch of Figs. 11 to 13 has a pair of uprights 40^a each having contacts 45, 46, 47 disposed along both edges, and conducting strips 67^a, secured by the binding nuts 50, connecting all of the contacts of one margin of each upright.

Two pairs of contact shoes 64 are carried by the plunger bar, in position to slide against fixed said contacts, one contact shoe of each pair engaging one fixed contact only at each margin of the upright.

Conductor bars 68 connect the contact shoes of each pair.

The conductor strips 67^a are made from conducting strip stock 67 (Fig. 22) having a perforated rounded end 70 for securing to an instrument stud 71 (Fig. 13) passing through a switch board panel 72. Said stock 67 is adapted to cut in the desired length and perforated to receive said studs 48 thereby to form direct connectors or conducting legs holding the base 10^a on the panel. Angle pieces 73 secure the opposite edge of the base.

Locking and accurate locating means are provided for holding the plunger bar in adjusted position and the shoes on the required contacts. To this end, the plunger bar is provided between said posts 35 with a vertical bore 75 (Fig. 14) countersunk at both ends and receiving a cylinder block 76 provided with a threaded axial bore, a marginally perforate lower disk 77 and a pair of ribs 78 forming a diameteric lower key slot 79. A retaining screw 80 in said threaded bore having a transversely slotted cylindrical head 81 in the upper countersink has its threaded shank disposed in said threaded bore and upset at the lower end 82 to lock the screw in the bore.

A pair of screw-eyes 85 screwed in the bar 25^a (Fig. 16) midway of the wide groove 27 near said posts receive a pair of rods 86 forming locking bolts bent to form hooks 87 received in the marginal perforations of the disk and each having its outer end bent laterally and back transversely to form a locking portion 88 disposable in said notches when the disk is turned to the position of Fig. 15 and retracted from the notches when the disk is in the position of Fig. 16.

A combined key and plunger-bar-handle 90 (Figs. 11 to 13) cut off from suitable rod stock to which is added a handle portion 91 at its outer end has an intermediate shank and a transverse bit 92 (Fig. 17) at its inner end. The bit is of greater length than the diameter of the reduced shank portion 93 right at the bit and is of a size operatively to fit in the slot 79 of said cylinder or the slot 94 (Figs. 14) of the head. Inner and outer cover plates 95, 96 are secured on the plunger bar over said slots respectively and each is provided with an elongated keyhole 97 registerable and alinable with the adjacent slot 79 or 94 when said disk is in locking position, whereby the key may be withdrawn only when the plunger bar is locked, the slots of the head and disk being transverse to the keyholes when the disk is in unlocking position whereby the key is retained in the slot when the plunger is not locked.

In this switch said handle key 90 is passed through holes drilled in the base 10^a and the panel 72 into the inner key hole 97 and is provided with graduations 98 on its shanks which may be provided with marks indicating which fixed contact 45, 46, 47 are engaged by the shoe, or whether the shoe engages an insulating piece 51, 52.

Stop washers 99 secured by screws on the

top of the posts engage the sleeves and limit the upward movement of the bar.

This switch is suitable for at will connecting a volt meter to the lines of a 3-phase system, in which case the volt meter would be connected to the studs 71, and the ground to the series of studs 49 at the inner edge of one of the uprights 40^a; while the lines of the three phases would be respectively connected to the studs 49′ of contacts 45, 46, 47 at the inner edge of the other upright 40^a. With this arrangement, obviously when the shoes are on any one of the contacts 45, 46, 47, the volt meter is connected between the corresponding phase and the ground.

This switch can also be connected up as a cross-phase switch or as a double-pole triple throw switch; and other obvious uses will suggest themselves or may be devised.

In the switch of Figs. 18 and 19 a series of contacts 105, 106, 107, 108 and intervening insulating pieces 109 are disposed along each edge of the upright 40^b and a pair of contact means 110 is mounted on the bar 25^b in position to hold and slide the shoes 114 against the respective series of contacts, said shoes being disposed longitudinal to said series respectively, and being long enough to reach from one fixed contact to another.

Conducting legs 67^b made of said conducting leg-stock 67 are received on the instrument stud 71 against the panel and secured by the binding nuts 115, 116 to the instrument studs 117 and the studs of the lowest fixed contacts while structure legs 118 are secured to the opposite side of the base, all of said legs serving to hold the base 10^b spaced from the panel to permit wiring between, the panel and base. Removable test links 120 having laterally open notches 121 are receivable on the studs of the lower contacts.

This switch is adapted for a large number of uses. By short circuiting the studs of contacts 105 and connecting the circuit to the studs of contacts 106, this switch may become a short circuiting switch.

When the contacts 105 are thus short circuited and the plunger bar is raised and the current of the line passes through, the contacts 106, 114, 105 and the short circuit, there will be no current and either one or both test links may be removed to permit testing apparatus to be inserted between contacts 107 and 108, in which case the lowering of the plunger rod would cause the testing current to pass through said testing apparatus and also through the instrument on studs 71.

Alternatively, when the plunger bar is raised and the current passes through the short circuit between contacts 105 and is thus off contacts 107, the test links may be removed and the testing apparatus connected across contacts 107 permitting the passage through the testing apparatus of current which would normally pass through the instrument connected to the studs 71.

The switch of Figs. 20 and 21 comprises the base 10^c carrying posts 35 on which is slidably received a plunger bar 25^b, the uprights being omitted. Spring contact clips 130 are mounted in the mortise recesses 15, 16 and comprise opposed spring contact jaws 131 and a base portion 132 mounted on said web. Conducting studs 133 and structure studs 134 (Fig. 21) passing through the holes 23 in the web hold said base portion on the web; and the conductor strip stock 67 of Fig. 22 may be cut in the desired length and perforated at the end to form a rectangular perforated end 135 disposed in the shallow recess 20 the rounded end being adapted to be secured by the instrument studs, thereby to form direct connectors 136 or conducting legs holding the base on the switch board, or spaced therefrom to permit wiring therebeneath if desired. If desired the base and direct connectors may both engage flat against a switch board or table. The studs 139 adjacent to the conducting studs 133 may receive regular conductors for supplying current to the instruments connected to the direct connectors 136, and the testing leads may be clipped or otherwise fastened on studs 133 when the plunger bar 25^c is raised in order to test instrument when disconnected from the line.

Blade members 140 are carried by the plunger bar and each comprises a bar-shaped yoke portion 141 secured by screws 142 in the adjacent bar receiving groove 29, and outwardly bent downturned ends 143 receivable by adjacent contact clips 130 when the bar is lowered on the posts, thereby to electrically connect adjacent clips and connect said legs 136 to said studs 139 and the conductors connected thereto.

When thus connected the switch of Fig. 20 is obviously a single throw double-pole switch; but by increasing the length of base and bar and the number of clips and blades, it may be made into a multi-contact switch of any number of contacts.

All of the switches herein described may be increased in size indefinitely by adding to length of base and plunger bar and increasing the number of contacts; and the herein described switches are merely illustrative of the practically unlimited variety of switches which may be made from the small number of standardized parts described; and while herein I have shown only one type of switch on the same base at the same time, rather than making the base longer and placing a plurality of switches of the same or different or many kinds thereon, it is obvious that the invention is not thus limited. The handle key 90 may remain to the rear of the switch base or extended to the front as desired in any of the switches.

While I show only one margin of the base stock 10 provided with mortise recesses, the invention is not thus limited; and it is obvious that the base stock may be molded with the recesses at both margins or pieces of base stock may longitudinally cut in two in the plane of the axes of the post openings, and the pieces so formed carrying the mortise recesses placed together at the plane of cutting to form a double base with rows of recesses at both margins, whereby switches may be built carrying uprights or contact clips or both and their co-operating parts at both margins of the double base, or blade members may be disposed across the ends of the plunger bar and the downturned ends received by clip contacts at opposite margins of the double base.

Instead of cutting the base through the post openings as above stated to form the double base, I may mold the base with a guide line 140 (Fig. 1) near the recesses, the same distance from the post openings 11 as is the opposite face 141, whereby a piece of base stock may be cut along the guide line and the cut face placed against the face 141 of an incut piece of base stock, to form a double base for the above stated purposes. Obviously the cut could be made at the same place if the line 140 were omitted.

One of the advantages of my present invention relates to means provided upon the switch, which permits taking tests at the board through the switch connections which are provided with means for connecting thereto terminals of meters of varous kinds whereby readings may be taken therefrom without interrupting or disconnecting the circuit through the switch.

The switch may be so constructed as to throw the apparatus on which it is mounted directly on its separate test source which is primarily in non-electrical connection and associated therewith permanently. In other words the testing may be done from a separate point at which the necessary masters and the like are mounted and test wires led to the switch so that tests may be made of the apparatus which it controls on a separate test circuit and cutting out this apparatus without affecting the operation of the circuit as a whole which is controlled by that switch. In other words on a through circuit which controls several pieces of apparatus in operation, this particular apparatus may be isolated for testing without disconnecting the other associated apparatus in the circuit.

Testing may be done to apparatus without disconnecting the apparatus or removing any wires by means of the test links or by extra slips and blades built on the same switch.

Instruments may be disconnected from their direct connections to the switches without disturbing the permanent wiring which is already in place on the switches due to the use of the direct connector to the instrument studs.

I claim as my invention:

1. An insulating base provided with a longitudinal series of post-receiving openings and at the one side edge with mortise recesses open at adjacent faces of the base.

2. Switch stock comprising an elongated insulating member provided with a longitudinal series of post-receiving openings and at the one side edge with mortise recesses open at the outer and adjacent side face of the base; said stock being made in long or suitable lengths and being adapted to cut off in different lengths for different sizes and kinds of switches.

3. Base stock for switch bases comprising a molded elongated rectangular composition slab of insulating material having inner and outer wide faces and side faces and provided near one side face with a series of post-receiving openings of elongated rectangular cross-section and slightly tapering from the inner face to the outer, and at the other side face with a series of mortise like recesses open at the outer and adjacent side faces of the base and forming intervening barriers therebetween, said recesses tapering toward and extending to near the inner face, alternate recesses being opposite said openings respectively; said inner face being provided with a plurality of shallow marginal recesses registering with the mortise recesses and separated therefrom by an intervening web and connected therewith by a pair of stud-receiving holes passing through the web; said base stock being made in long or suitable lengths and being adapted to be cut off in different lengths for different sizes and kinds of switches.

4. A switch comprising an elongated base provided with mortises; a plunger bar provided with openings; posts mounted in said base and openings to slidably support said bar; a cylinder rotatably mounted in said bar and provided with a key slot at the end; bolts retracted by the cylinder and engageable with said posts; a plate on the bar over said slot and provided with an elongated key hole registerable and alined with the slot only when the slot is in locking position; contacts carried by the base; contact means carried by the bar and engageable with said contacts.

5. An insulating plunger bar provided in one face with a longitudinal lock-receiving groove and in adjacent faces with bar-receiving grooves; said bar being also provided with a longitudinal series of openings passing from said wide groove to the opposite face of the bar.

6. A switch plunger bar of insulating material provided on one longitudinal face with a wide longitudinal groove and at the adjacent faces with longitudinal bar-receiving grooves, said bar being also provided with a

series of sleeve-receiving openings passing into the wide groove; and metal sleeves disposed fast in said openings flush with the bottom of the wide groove and projecting from the opposite face of the bar.

7. Molded plunger bar stock of insulating material having outer, inner and side faces and provided on its inner face with a wide longitudinal lock-receiving groove, at the side faces near the outer face with longitudinal conductor bar receiving grooves, said bar being also provided with a series of rectangular sleeve receiving openings passing from said outer face into the wide groove; and rectangular metal guide sleeves disposed fast in said openings flush with the bottom of the wide groove and projecting from the outer face of the bar and alinable with said openings of the base when the bar is disposed over the base; said stock with the guide sleeves therein being made in long or suitable lengths and being adapted to be cut off in different lengths for different sizes and kinds of switches.

8. Guide post stock of rectangular cross-section and provided in its edges with a series of locking notches, made in long or suitable lengths to be cut off in different lengths for different kinds of switches.

9. A switch comprising a base; posts mounted thereon; a plunger bar provided with openings slidably received on said posts; key operated locking on said bar for locking the latter with said posts; contacts carried on the base and contact means carried by the bar, in position to engage said contacts; a combined key and handle for said lock; and means for holding the key in the lock when the lock is unlocked.

10. A switch comprising a base; posts mounted thereon having edge notches; a plunger bar provided with openings slidably received on said posts; means on said bar for locking the latter with said posts; said bar being provided between said posts with a bore countersunk at both ends; a cylinder block the inner countersink provided with a disk in said lock-receiving groove and a key slot; a screw in said block having a slot in the outer countersink; bolts pivoted to the margins of the disk and each having a locking portion engageable in said notches; a handle key having a bit of greater length than the diameter of the shank at the bit and adapted to fit in the slot of said cylinder or head; cover plates on the plunger bar over said slots respectfully and each provided with an elongated key hole registerable with the adjacent slot the slots being disposable transverse to the keyholes when the disk is in unlocking position whereby the key is retained; contacts carried by the base; contact means carried by the bar and engageable with said contacts.

11. Switch elements forming uprights or spacers each comprising at one end a plurality of tapered tenons adapted to fit tight in tapered mortises, said uprights being provided on the inner face with a medial longitudinal spacing rib forming marginal contact-receiving flanges at both side edges of the upright.

12. A switch comprising a base; uprights mounted thereon each having a longitudinal rib on its inner face forming marginal flanges; a plunger bar adjustably disposed spaced from the base; a plurality of fixed contacts disposed along the inner face of the upright adjacent to said rib and provided with conducting studs passing through the flange and provided with binding nuts; insulating pieces interposed on said flanges between adjacent contacts; and contact shoes yieldably carried by the bar and engageable with said contacts.

13. Contact bar stock comprising a pair of conducting strips, respectively provided with a plurality of telescoping cups and pegs secured perpendicular to said strips, and springs on said cups adapted to be compressed between said strips; said stock being adapted to be cut off in desired lengths, to include one or more cups and pegs, whereby one piece of strip may be turned up at the ends to form a shoe or sliding contact, the other piece of strip being adapted to be secured across the face of a support in position to cause said springs to press and slide the shoe against suitable contacts.

14. A switch comprising an elongated base; pairs of posts and wide uprights mounted thereon; a plunger bar provided with openings slidably received on said posts; means on said bar for locking the latter with said posts; contacts disposed along both edges of both uprights; conductors connecting all of the contacts of one margin of each upright; two pairs of yieldable contact means carried by the bar, in position to slide against said contacts, one contact means of each pair engaging one contact only at each margin; and conductors connecting the contact means of each pair.

15. A switch comprising a panel; a base mounted on the back of the panel; posts and spacers mounted thereon; a plunger bar provided with openings slidably received on said posts; key operated means on said bar for locking the latter with said posts; a handle key for said means by which the plunger bar may be moved; fixed contacts disposed along the spacers; yieldable contact means carried by the bar, in position to slide against said contacts; said handle key being passed through an opening in the panel.

16. A switch comprising a panel; a base mounted on the back of the panel posts and spacers mounted thereon; a plunger bar provided with openings slidably received on said posts; key operated means on said bar for

locking the latter with said posts; a handle key for said means by which the plunger bar may be moved; fixed contacts disposed along the spacers; yieldable contact means carried by the bar, in position to slide against said contacts; said handle key being passed through an opening in the panel and provided with graduations on its shanks indicating which fixed contact are engaged by the yieldable contacts.

Signed at Newark in the county of Essex and State of New Jersey this 26th day of May, A. D. 1927.

THEODORE M. SNYDER.