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VIBRATOR SWITCH CONSTRUCTION

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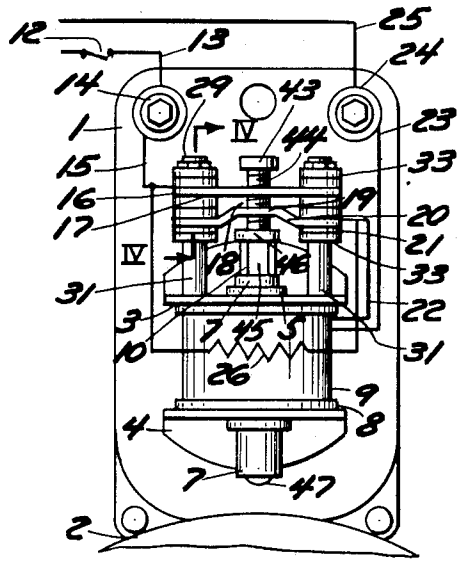


FIG 1

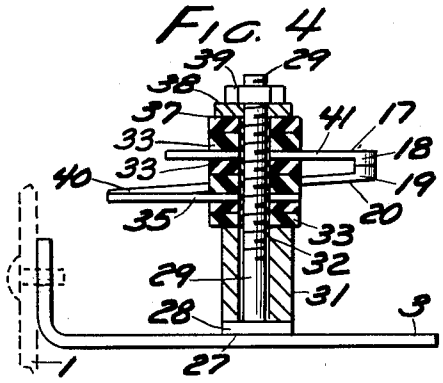


FIG. 4

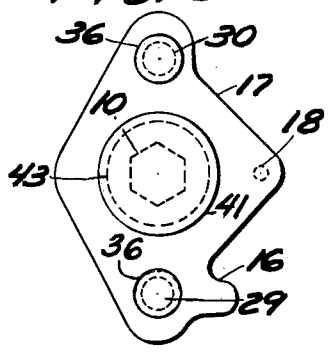


FIG. 5

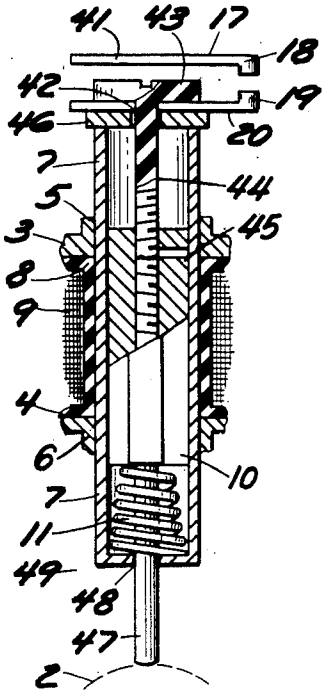


FIG. 2

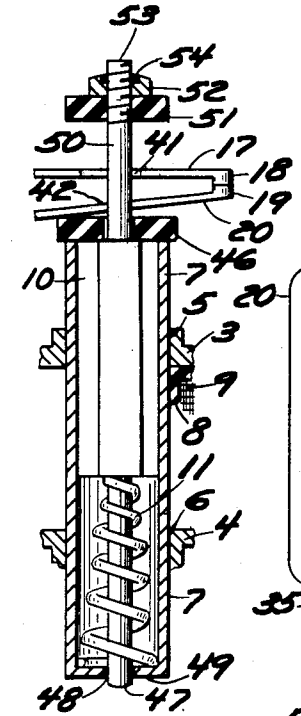


FIG. 3

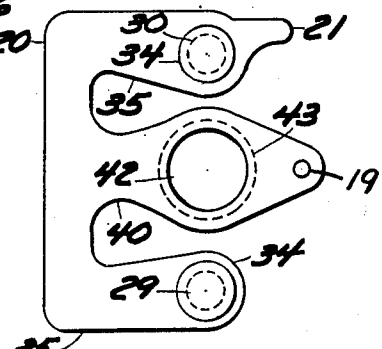


FIG. 6

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VIBRATOR SWITCH CONSTRUCTION

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5 Claims. (Cl. 200—90)

1

This invention relates to features of electric switch construction and mounting.

This invention has utility when incorporated in multiple operation or vibratory type of electric switches, more particularly as in signal circuits, as for the operation of bells, gongs, buzzers and chimes. There is simplified configuration of parts contributing to manufacturing economies, with advantanges for adjustment as well as efficiency over extended periods of use.

Referring to the drawings:

Fig. 1 is a side elevation, with parts broken away, of an embodiment of the invention in a gong operator;

Fig. 2 is a side elevation, with portions in section, of the plunger or striker for the gong of Fig. 1, at the energized or thrown position of the plunger;

Fig. 3 is a view similar to Fig. 2, wherein instead of an insulation adjusting screw head to open the breaker switch as in Fig. 2, a metal stem from the plunger or core carries an insulation washer threaded on the stem, the position here being that of non-thrown or idle position for the plunger;

Fig. 4 is a section on the line IV—IV, Fig. 1, on an enlarged scale, showing one of the posts for the breaker switch mounting;

Fig. 5 is a detail, in plan view, of the upper plate of the breaker switch, with dotted line showings in the central port therethru of the plunger or core and the insulation head or washer clearance to pass thru such port; and

Fig. 6 is a plan view detail of the second or lower plate for the breaker switch, as complementary to the plate of Fig. 5, the dotted line showing about the port suggesting the striking or breaker switch opening position of the insulation head or washer.

The general structure

A base or plate 1 provides mounting for an audible signal or gong 2. Also mounted on the base 1 is a pair of angle brackets 3, 4, providing a pair of aligned openings 5, 6, for a guide or sleeve 7 of non-magnetic material. Insulation 8 about the sleeve 7 between the brackets 3, 4, locates an electric coil 9 to be energized and thereby draw into its magnetic field a polygonal plunger or core 10. A compression spring 11 is of sufficient expansion property to poise or shift the temporary magnet core 10 partially out of the magnetic field to be developed by the coil 9.

A remote signal-operating switch 12 as closed places electric conductor line 13 in circuit to a

2

terminal 14 at the plate 1. A lead 15 from the terminal 14 is to arm 16 at plate 17, switch contact 18 of which is normally engaged by complementary contact 19 of a second breaker plate 20. The plate 20 has an arm 21 with a lead 22 therefrom to the coil 9. From the remote portion of the coil 9 there extends a lead 23 to a terminal 24 at the plate 1 in a companion position as to the terminal 14. An electric conductor line 25 is connected to this terminal 24, and with the line 13 there is thus completed electric circuit for energizing the coil 9, effective thru its magnetic field to draw into such field the core or plunger 10. In this operation, the points or contacts 18, 19, are separated, resulting in de-energizing of the coil 9, for the spring 11 which had been overcome by the energized coil, now to act in shifting the core 10 for the contacts 18, 19, as a switch to be again closed for a repetition of the cycle of operations as the switch 12 be still closed.

Ranges of current and voltage may be adopted to conform to special conditions for installation, in some of which the ampere turns of the wire in the coil 9 may be selected to be in keeping therewith, as well as the gage of the wire and strength or character of the insulation. A counterelectromotive force factor may be minimized or fully eliminated as a disturbing element by placing a resistance 26 between the plates 17, 20, in parallel with the points or contacts 18, 19.

The breaker assembly

One on each side of the opening 5 in the angle bracket 3 (Figs. 1, 4) upper side is a weld 27 anchoring a head 28 of a machine screw or externally threaded post 29, 30, which are axially approximately coplanar with the opening 5 and parallel to the base 1. On each post 29, 30, is a spacer or sleeve 31 having terminally thereagainst remote from the bracket 3 a minor outside diameter insulation sleeve 32. Insulation washers, as a pair 33 on the sleeve 32 against the sleeve 31 provide support at openings 34 (Fig. 6) in the plate 20 as riding over the posts 29, 30 and the sleeves 32. Additional or second washer pair 33, against the upper side of outer arms 35 of the plate 20, are on the posts 29, 30, and the sleeves 32 to provide support at openings 36 in the plate 17 (Fig. 5). This breaker plate assembly is completed by a third pair of insulation washers 33 against the plate 17. Washer 37, lock washer 38 and nut 39 may complete this assembly, in which the plate 17 may

be flat or in a plane, while an intermediate arm 40 of the plate 20 may be flexed or pitched slightly upward sufficiently for the contact 19 to ride against the complementary contact 18.

The breaker operator

The plate 17 has aligned with the core 10 an opening 41 sufficiently large for clearance of an actuator for the breaker to pass thru this opening 41 but to engage the arm 40 of the plate 20 having an opening 42 somewhat smaller in diameter than the opening 41.

The actuator proper is an insulation disk 43, in Figs. 1, 2, being the head of an insulation screw having a stem 44 entering the core 10 to provide adjustment. A side slot 45 in the core 10 may provide for pinch anchoring of the insulation screw 43, 44, as a lock feature in a minimum number of parts adjustment maintenance assembly. The external diameter of the disk 43 has peripheral clearance to pass thru the opening 41 of the plate 17 and engage about the rim of the opening 42 of the plate 20.

The energizing of the coil 9 causing the core 10 to compress the spring 11, carries with the core 10 the disk 43 in the passage of the disk 43 thru the opening 41 in the plate 17 and to strike the bounds of the opening 42 in the arm 40 of the plate 20. This flexed arm 40 is thereby shifted toward planar position with the arms 35 of the plate 20. At this thrown limit there is provided a stop or insulation disk 46 adapted to be lodged on the top of the non-magnetic sleeve 7 of the plunger guide.

The adjustment of the spacing for the disk 43 relatively to this stop 46, determines the stroke length for the core 10. The core 10 has an extension or striker pin 47 protruding thru an opening 48 at internally flanged portion 49 of the sleeve 7, which provides a ledge or stop for the spring 11 away from the core 10. A nicety of impinging action may be achieved for the tip of the pin 47 in its striking against the audible signal imparting element or gong 2.

A modification (Fig. 3) shows in lieu of the stem 44 integral with the insulation disk 43, a stem 50 fixed with and protruding upwardly from the core 10 thru the openings 42, 41, in the plates 20, 17, and there having a threaded end upon which is fixed by thread assembly thereon an insulation disk 51, functioning similarly to the insulation disk 43. A nut 52 on threaded end 53 of the stem 50, has a fiber or lock section 54 as friction holding means for maintaining the adjustment for the disk 51. This assembly adjustment locking coacts as does the pinch locking from the slot 45 on the stem 44. The stop disk 46 on the sleeve 7 surrounds the stem 50 as with the stem 44.

Rapid assembly is achieved, due to the straight stacking on the posts in approaching parallelism with the faces of the sleeves and washers, of the breaker plate pair 17, 20. The flexed arm 40 is shielded against overstrain exposure during operation. Manufacturing economy is in the flat plate general form.

The disks 43, 51, are insulation elements carried by and movable with the plunger core 10. The polygonal configuration of the core 10 provides holding region, as for a wrench, as there be occasion to adjust the range for reciprocation determined by the stop elements 46. The adjustment is thru turning of the element 43 for its stem 44 to move relatively to the core 10 and at such adjustment to be frictionally held by the pinch action developed from the slot 45, or by the nut 52 on the stem 50.

The plates 17, 20, in their mounted position on the pair of posts 29, 30, are parallel, except for the flexing of the arm 40 of the plate 20. Accordingly, the pair of plates establish a mean plane which is perpendicular to or at right angles to the plane thru the axes of the posts 29, 30. The plate 17 has its arm or terminal connection 16 at one side of the complementary contact pair 18, 19, while the plate 20 has its arm or terminal connection 21 at the opposite side of such contact pair.

The plate 17 of general diamond shape, as mounted, has at its central region, the opening 41 in alignment with the stroke direction for the plunger 10. The companion three-armed plate 20, has its lesser diameter opening 42 as to the opening 41, also in the stroke direction for the plunger 10. The lesser diameter provides in its bounds an impact-receiving-region for the element 43 or 51 in its movement toward the stop 46.

What is claimed and it is desired to secure by Letters Patent is:

1. For a vibrator switch construction comprising a base, a bracket extending therefrom, a coil on one side of the bracket, and a core for the coil, there being an opening for the core thru the bracket; a pair of posts fixed with the bracket, one on each side of the opening and extending oppositely from the coil, said posts and opening defining a plane parallel to the base, insulation means along the posts, a pair of plates mounted on the posts and by said insulation means spaced from the posts, the bracket and each other, said plates between the posts having openings partially out-of-register, and further said plates providing a switch of a pair of complementary contacts, one of which contacts is on a flexible arm of one of said plates, said arm, spaced from its contact, having an impact-receiving-region, and an insulation element movable with the core, upon energizing of the coil, to pass clear of one of said openings and strike the impact-receiving-region in proximity to the other opening and thereby operate the switch at the plates.

2. For mounting on a pair of parallel posts, a planar switch plate having a contact and a terminal connection spaced from the contact, a second plate having coplanar and of general U-form, a pair of arms with connection therebetween, one of said arms having a terminal connection, there being a third relatively flexible intermediate arm having a contact complementary to the contact of the other plate, each of said plates having three openings in a row with the end openings for the posts, and a switch actuator operable thru the intermediate openings.

3. For an electric-coil-energized plunger having a stem, a switch construction comprising a pair of parallel posts; a generally diamond-shaped planar plate having a first contact, a three-armed plate having an intermediate arm with an opening bounded by an impact-receiving-region, said intermediate arm extending to a second contact complementary to the first contact, insulation means mounting the plates in approximate parallelism to each other on the posts, there being an opening in the diamond-shaped plate aligned with and of greater extent than the intermediate arm opening of the three-armed plate, said stem extending thru the aligned openings in the plates to carry an insulation element beyond the larger opening remote from the smaller opening, whereby upon plunger action the element

traverses clear of the larger opening to impact the bounds of the smaller opening and thereby flex the intermediate arm of the three-armed plate for operating the switch.

4. For an electric vibrator construction comprising a base with a bracket extending therefrom, a coil on one side of the bracket, a core for the coil, there being an opening for the core thru the bracket, a stem from the core carrying an insulation disk for movement with the core, and a circuit for energizing the coil; a pair of posts rising from the bracket parallel to the stem, a pair of contact-carrying plates having insulation mounting on and extending between the posts approximately parallel to the diametrical plane of the coil, said plates providing a switch in said coil-energizing circuit, and means in said circuit in series with the switch at the plates which means coacts to energize the coil to shift the core and disk to operate the switch at the plates.

5. The electric vibrator construction of claim 4

wherein one of said plates has an opening with clearance for the stem-carried disk to pass therethru for said stem-carried insulation disk to contact the other plate in flexing the latter plate to operate said switch.

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