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2,896,047

GANG SWITCH

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FIG. 1

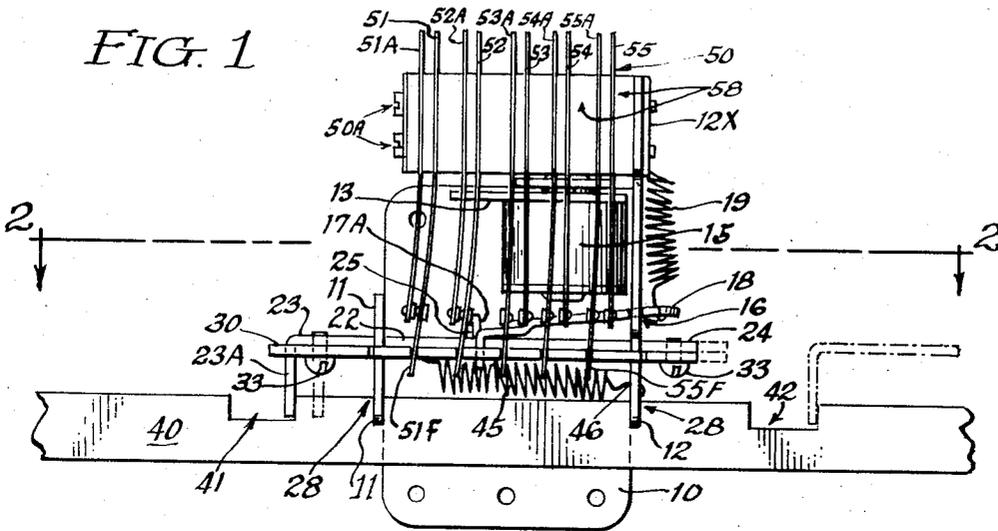


FIG. 2

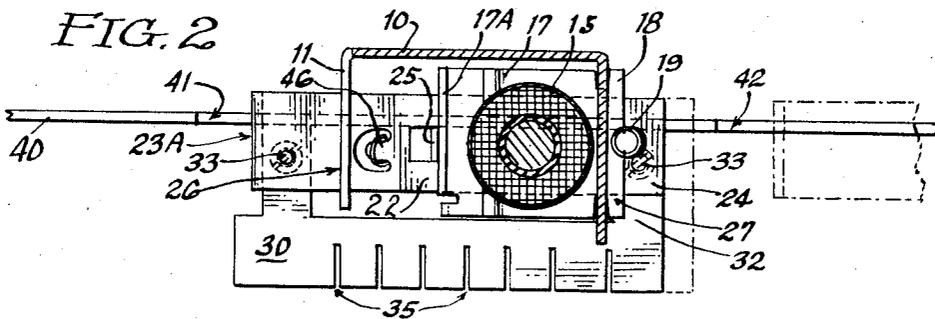


FIG. 3

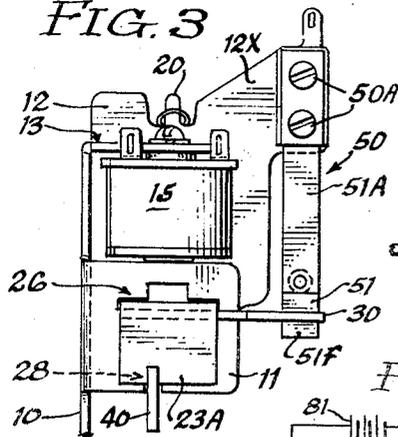


FIG. 4

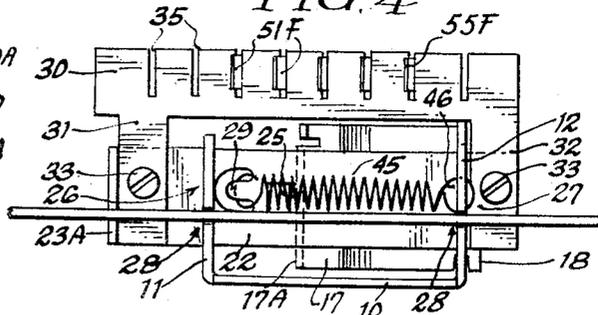
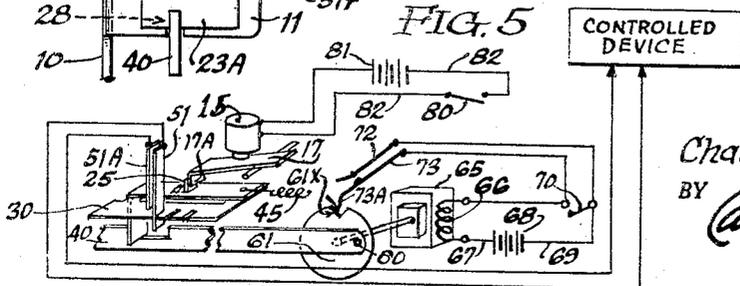


FIG. 5



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GANG SWITCH

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2 Claims. (Cl. 200-104)

This disclosure relates to switches and switch-operating mechanism, and provides improvements in a locking type gang switch characterized, among other features, by a simplified economically manufactured construction with particular respect to the provision of a switch-blade shifting member mounted on a reciprocable combination carrier and lock bar which has a tab arranged to lock behind an edge of a magnet armature to provide a simple but effective interlocking means for holding the carrier and blade-shifting member in locked position.

Additional features of the switch device relate to a gang-setting structure whereby a number of the gang switch units can be set by one common bar reciprocated by certain motor means.

Additional objects relate to details of the construction and operation of the preferred embodiment of the invention described hereinafter in view of the annexed drawing, in which:

Fig. 1 is a top plan view of the switch with fragmentary portions of a gang setting bar shown in setting position;

Fig. 2 is an inverted section taken along lines 2-2 of Fig. 1;

Fig. 3 is a side elevation of the switch as it would be seen looking from the left toward the right in Fig. 1;

Fig. 4 is a front elevation of the switch as it would be seen looking in a direction opposite to lines 2-2 of Fig. 1;

Fig. 5 is a schematic operating and circuit diagram.

The switch, as viewed in Figs. 1 and 4, consists of a base stamping including a bottom section 10 and two opposite side flanges 11 and 12 upset therefrom, the flange 12 being longer lengthwise of the bottom. At the rear of the bottom section there is a third upset flange 13 to which is secured an electromagnet 15 (Fig. 3).

Rockably mounted as at 16 on the longer side flange 12 is an armature 17 having attached to the outermost free end 18 thereof one end of a spring 19, the opposite end of which is anchored on an offset lug 20 (Fig. 3) struck out from the longer side flange 12. This spring acts to urge the armature outwardly to a normal position for automatic latching engagement with part of a switch-operating member, as will more fully appear hereafter.

Referring to Fig. 4, an elongated slide plate 22 is mounted on a pair of aligned slots 26, 27 respectively punched out of the opposite side flanges, said bar having its respective end portions 23, 24 projecting beyond said flanges for support with a slotted switch-operating plate 30 having spaced downwardly extending legs 31, 32 each attached, as by screws 33, threaded into one of the ends of the slide bar, so that as the latter is shifted slidably back and forth the operating plate 30 is similarly shifted for purposes to appear.

The slide bar 22, as viewed in Fig. 1, has one of its free ends offset to provide a setting tongue 23A engageable in the wide over-travel notch 41 of a long gang setting bar 40 which has partial guided support in oppositely aligned edge-opening notches 28 (Figs. 3, 4)

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punched respectively in the vertical edges of each of the side flanges of the base stamping.

The gang setting bar 40 will generally have a plurality of the tongue setting notches 41, 42, etc., each serving one of a number of additional switch units (not shown) identical to that illustrated in Fig. 1, there usually being from four to eight such switch units all served by one common setting bar 40, the latter usually having further operative support (not shown) in addition to the guided support thereof in notches like the edge notches 28.

As seen to advantage in Fig. 2, the slide member 22 has an offset latching ear 25 punched therefrom to engage behind the offset latching flange 17A on armature 17 which automatically finds its way in behind said latching ear 25 owing to the urgency of the armature by spring 19, so that when the slide bar 22 is shifted far enough from the dotted-line to the full-line position, shown in Figs. 1 and 2, the latching flange 17A will snap in behind the latching ear and prevent the member from returning until the electromagnet is energized.

Spring means normally urging the slide bar 22 to a resting or starting position includes a spring 45 (Fig. 4) anchored at one end 46 in holes punched in the longer base side-flange 12, and having its opposite end hooked onto an ear 29 struck out from the slide, or latching bar 22 to maintain the latter yieldingly in the normal starting position shown in Fig. 4.

As depicted in Figs. 1 and 3, a multiple switch assembly, in the preferred form of a stack switch generally indicated at 50, is mounted, as by long screws 50A (Fig. 3) on an upwardly offset bracket extension 12X on the longer side flange 12.

The stack switch is a well-known type of construction and needs description only to the extent of pointing out that it includes a plurality of elongated spring contact blades 51, 52, 53, 54, 55, in such number as may be required, each secured at one end in a stack of insulating wafers 58; and each of said blades has operatively associated with it in the stack at least one companion blade 51A . . . 55A, etc., which is usually shorter in length. These switch blades are biased in a normal open- or closed-circuit contact relation to their companion blades, both arrangements being shown in Fig. 1.

The free ends 51F . . . 55F of the longer blades project through open-ended edge slots 35 in the switch-operating plate 30, as variously illustrated in each of the drawing views, with the result that when the operating plate 30 is shifted from its normal position toward the left (Fig. 1) the longer switch blades will be flexed into or out of contacting relation to their respective companion blades.

The operation of the new gang switch in one of its applications is illustrated in the schematic circuit diagram of Fig. 5, wherein the stack switches represented by contacts 51A, 51 are connected to control any "controlled device," as indicated; and the gang setting bar 40 is pivotally connected to a crank pin 60 on a crank disc 61 rotated by a geared-down motor 65 having its winding 66 connected by conductor 67 to one side of a power source 68, and by conductor 69 and switch 70 to the other side of said power source, such that closure momentarily of switch 70 will start the motor.

Starting switch 70 is shunted by a holding and cycling switch having normally open contacts 72 and 73, the latter having a notched end 73A which presses into a notch 61X in the motor crank disc at a position which corresponds to the fully-retracted or normal starting position for the gang setting bar 40, in which condition the contacts of the cycling and holding shunt switch are open.

Closure of the starting switch 70 will start the motor 65 running sufficiently to move the crank-disc notch 61

away from the offset end 73A of the cycling switch and force the latter and its appertaining contact portions into closed-circuit engagement with the companion contact 72 and thereby complete a shunt around the starting switch for the duration of one cycle of the crank disc, that is, until notch 61X comes around again to switch part 73A to open the motor holding circuit. During each such cycle the setting bar 40 will be reciprocated to shift the slide plate 22 to latched condition by armature parts 17, 17A with return of the setting bar to its starting position at which the shunt or holding switch is again opened by the notch 61X in readiness for the ensuing operating cycle to be started by a subsequent closure of switch 70.

Such shifting of the slide bar to latched condition actuates the gang switch contacts 51A, 51 to either open- or closed-circuit condition, as the case may be, with the required control effects as respects the "controlled device."

Resetting or release of the gang switch is effected by closure of a resetting switch 80 to connect power from source 81 via conductors 82 to energize the electromagnet 15, thereby attracting the latching means or armature 17 and withdrawing the latch projection or flange 17A thereof from behind the latching ear 25 on the slide bar, whereupon the return spring 45 positively returns the slide bar 22 and switch-operating plate 30 to normal position.

I claim:

1. A gang switch of the latching type comprising a base, a switch-operating plate and means mounting the same to slide back and forth on said base, said plate having a plurality of blade notches spaced along an edge thereof extending in the direction of its movement aforesaid; a gang of flexible switch blades arranged side by side in supporting means engaged with said base, each blade having a free end portion extending into one of said slots for movement of the blade responsive to movement of the operating plate as aforesaid; spring means acting on said operating plate to move the same to a normal starting position and dispose said switch blades correspondingly; a setting bar having at least partial guided support for sliding movement on said base in a direction paralleling that of the movement of said operating plate; and means having connection with said operating plate and projecting into a wide notch in said setting bar for engagement and movement by the latter in a direction opposite to that of the effort of said spring to move the operating plate to an advanced switch-operating position, the width of said notch substantially equalling the required travel of said operating plate for actuating the switch blades as aforesaid; an electromagnet carried on said base and having an armature spring-

urged into a normal latching position from which it is withdrawn by attractive action of the electromagnet when energized; and latch means movable with said operating plate and positioned by the latter when in switch-operating position to be latchingly engaged by said armature to latch the operating plate in such position; said electromagnet being energizable to withdraw said armature from normal latching position relative to the operating plate as aforesaid to release the latter for spring return to said normal position; and means for reciprocating said setting bar through a complete setting stroke the length of which is substantially the same as the width of said notch.

2. In a latch-type gang-reset switch, a base plate having a pair of guide flanges struck up from opposite sides thereof, said flanges having aligned guide slots formed therein; a reciprocable latch bar slidable linearly in said slots; an insulated blade plate carried by said bar at an elevation above said base plate and having a series of open-ended blade slots formed along an edge above and paralleling said bar in its direction of sliding movement, each blade slot opening at one end into said edge to receive therein a switch blade; a blade switch structure mounted on a portion of said base plate at an elevation thereabove and having certain switch blades substantially opposite and each extended into one of said blade slots for movement by said blade plate; spring means acting on said latch bar to urge the same from an advanced to a normal position; a further flange struck up from said base plate and having mounted thereon substantially beneath said switch an electromagnet with an armature rockable toward and away from the plane of said bar, the latter having lug means engageable with said armature in the non-energized condition of the electromagnet for locking the latch bar in an advanced position, energization of the electromagnet attracting the armature to release said bar; an offset driving lug on said bar; and a reset bar having a notch to receive said driving lug; and means part of said base plate for guidedly receiving said reset bar for coaction with said driving lug; movement of said reset bar in a certain direction setting said latch bar in said advanced condition.

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