

Sept. 2, 1958

W. F. NOLDEN ET AL  
ATTACHABLE COMBINED LATCHING AND LOCKING MEANS  
FOR PUSHBUTTON TYPE ELECTRIC SWITCHES

2,850,587

Filed June 25, 1956

2 Sheets-Sheet 1

Fig. 1

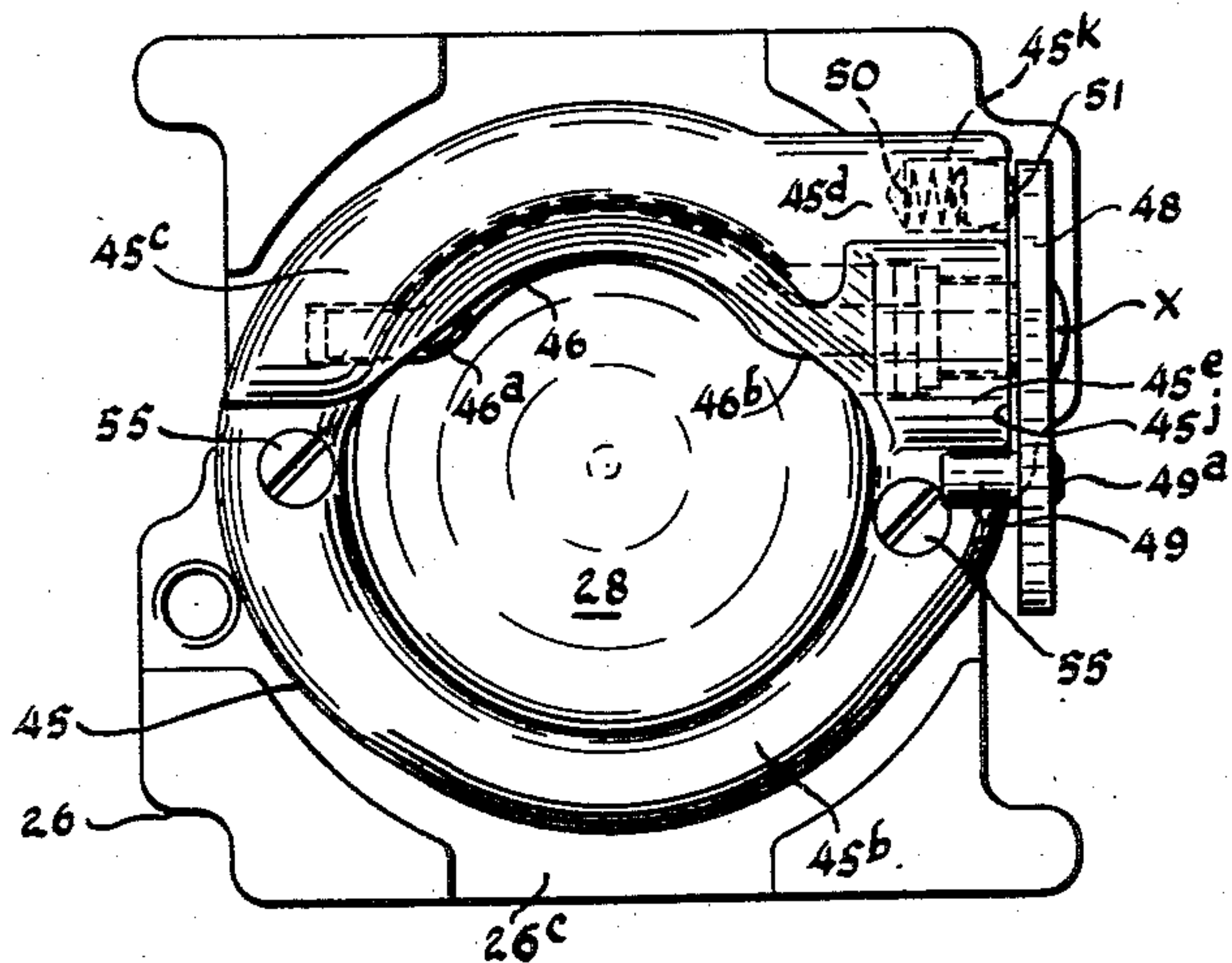


Fig. 2

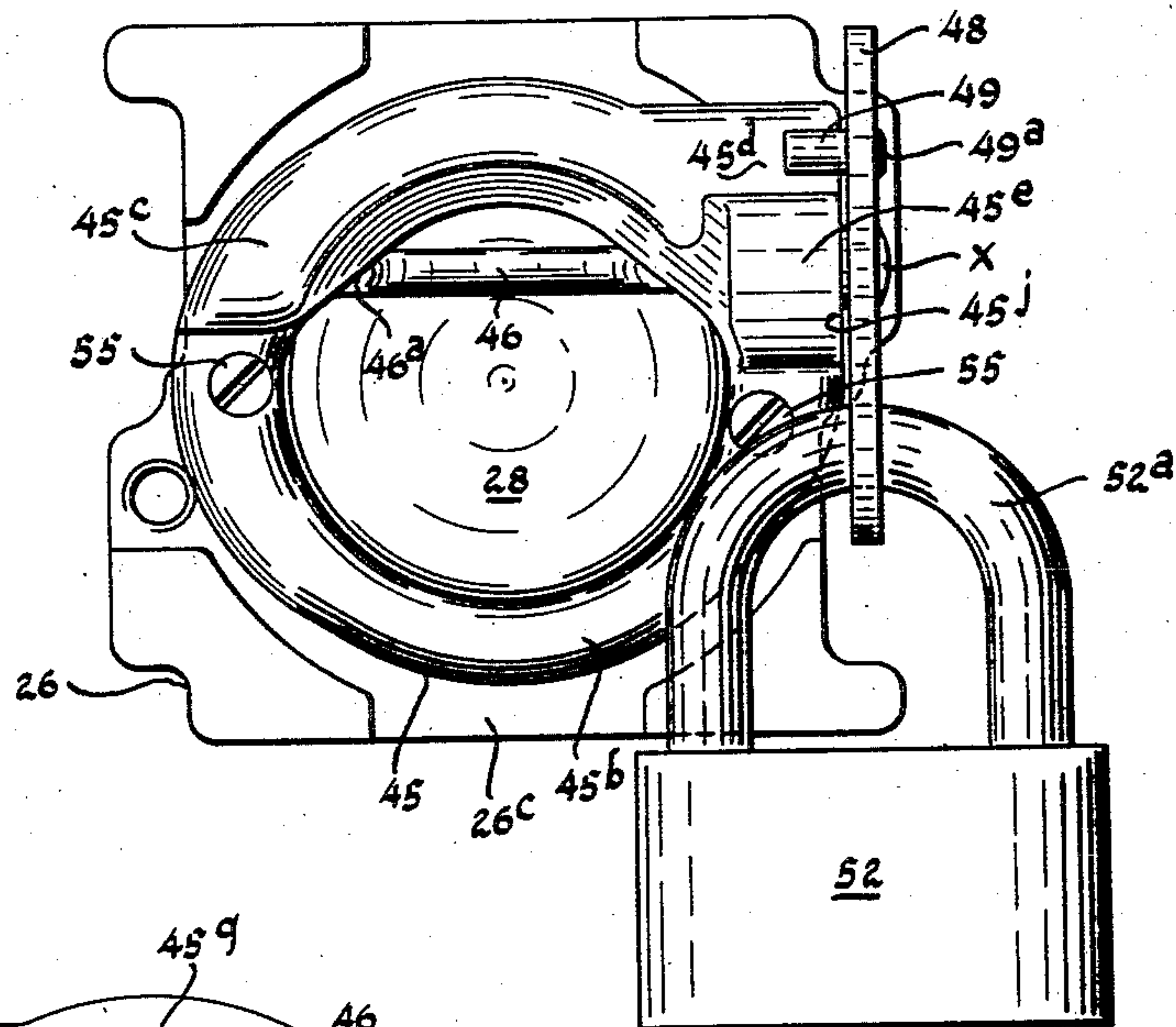
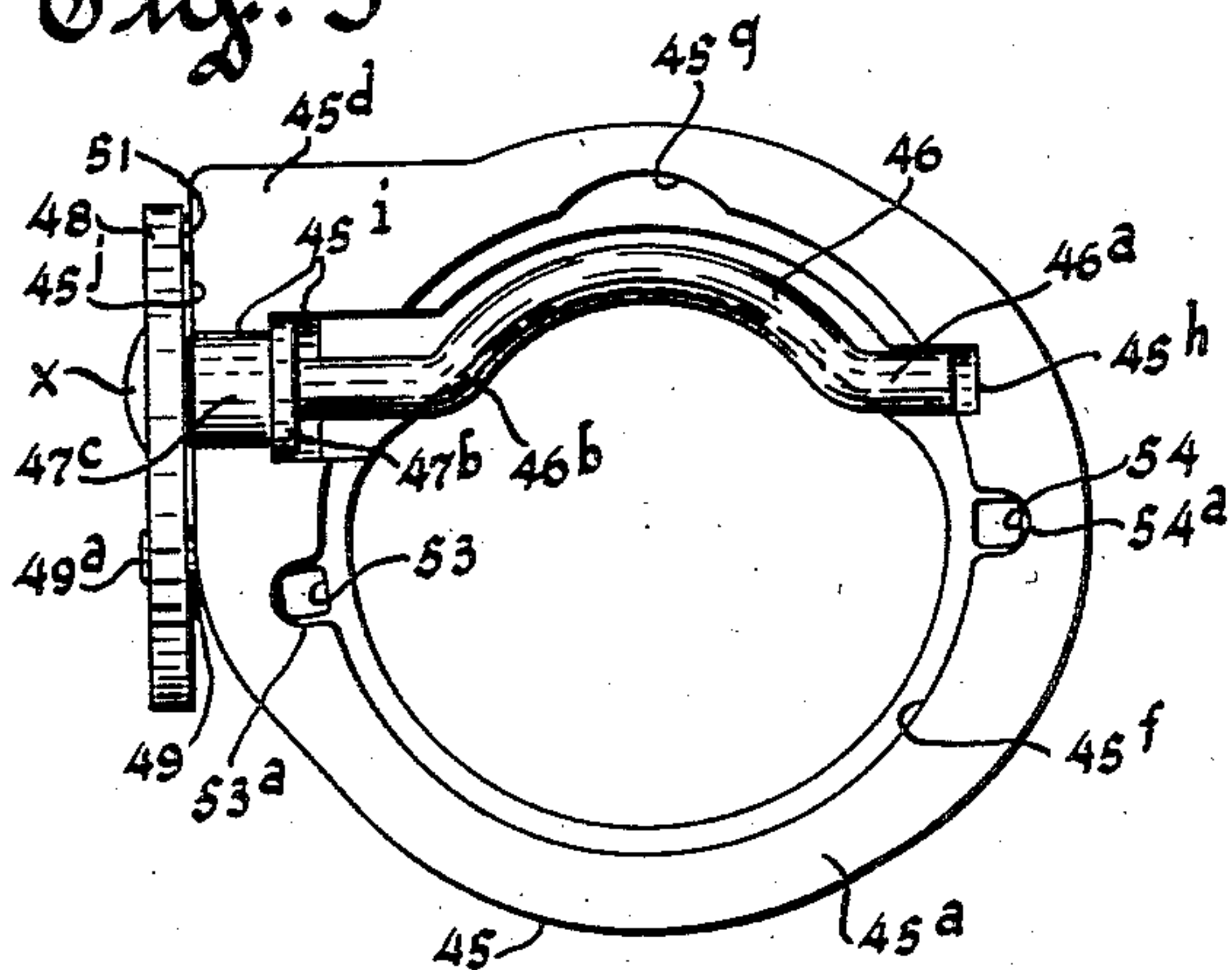


Fig. 3



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Fig. 4

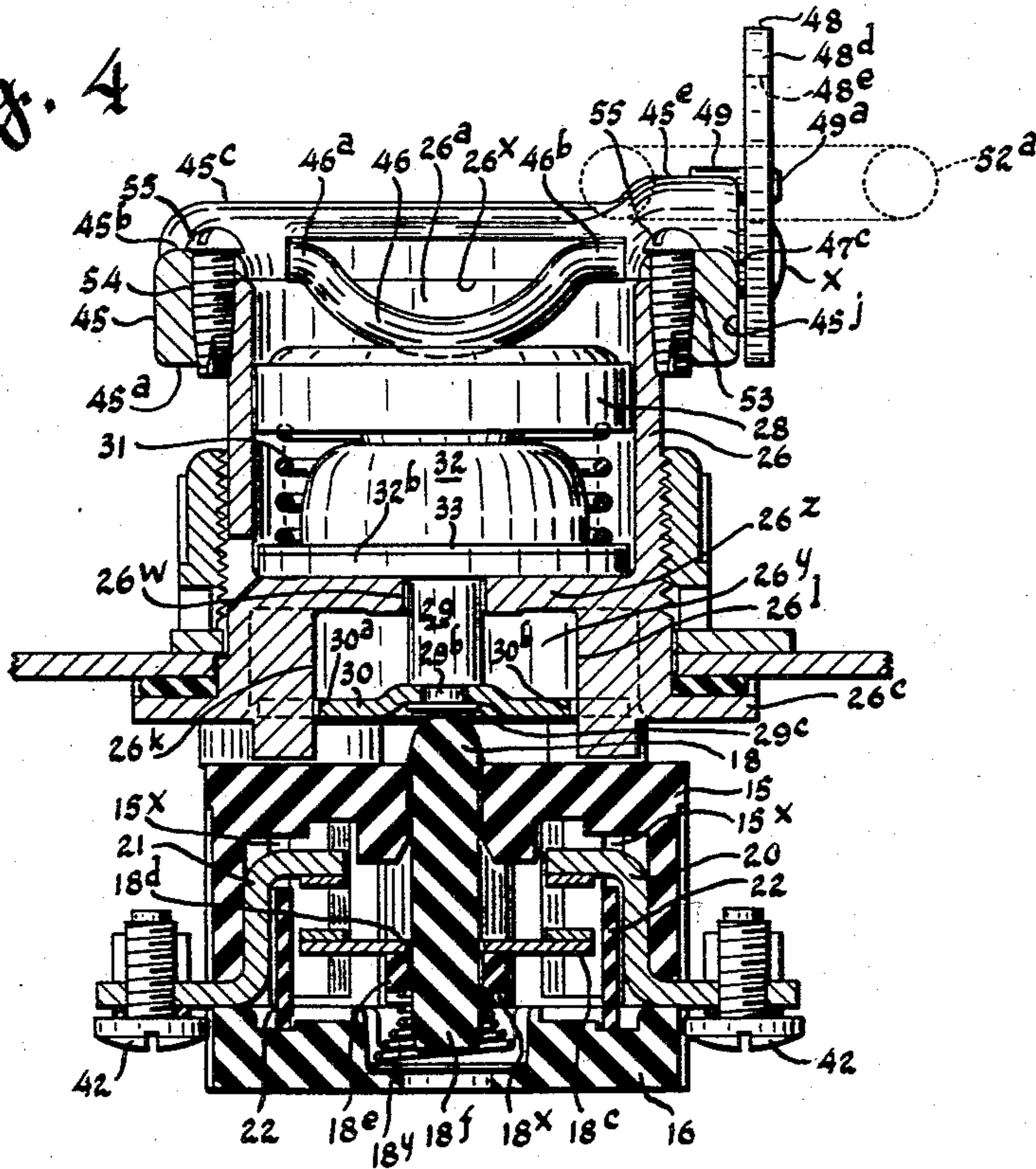


Fig. 5

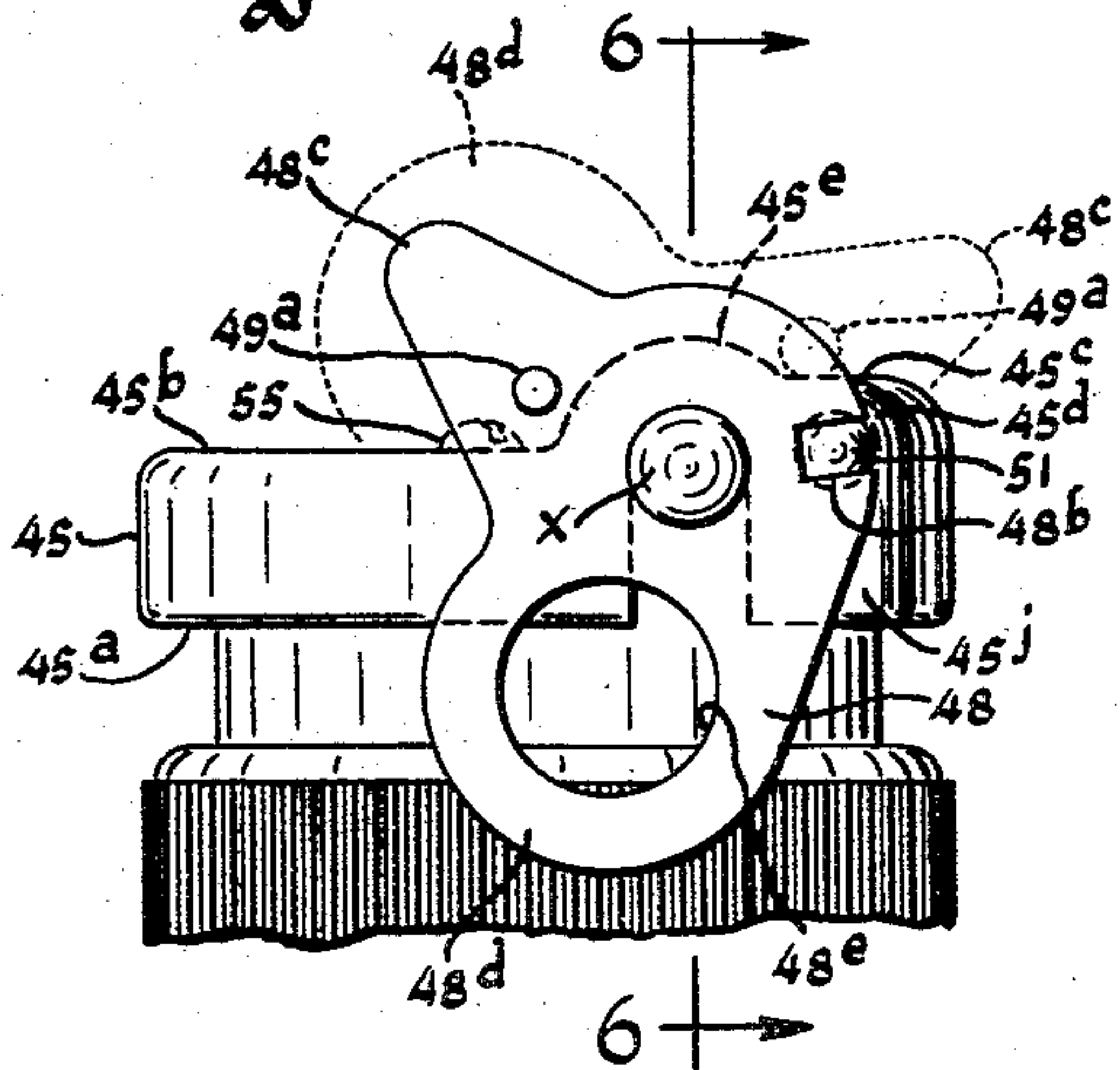
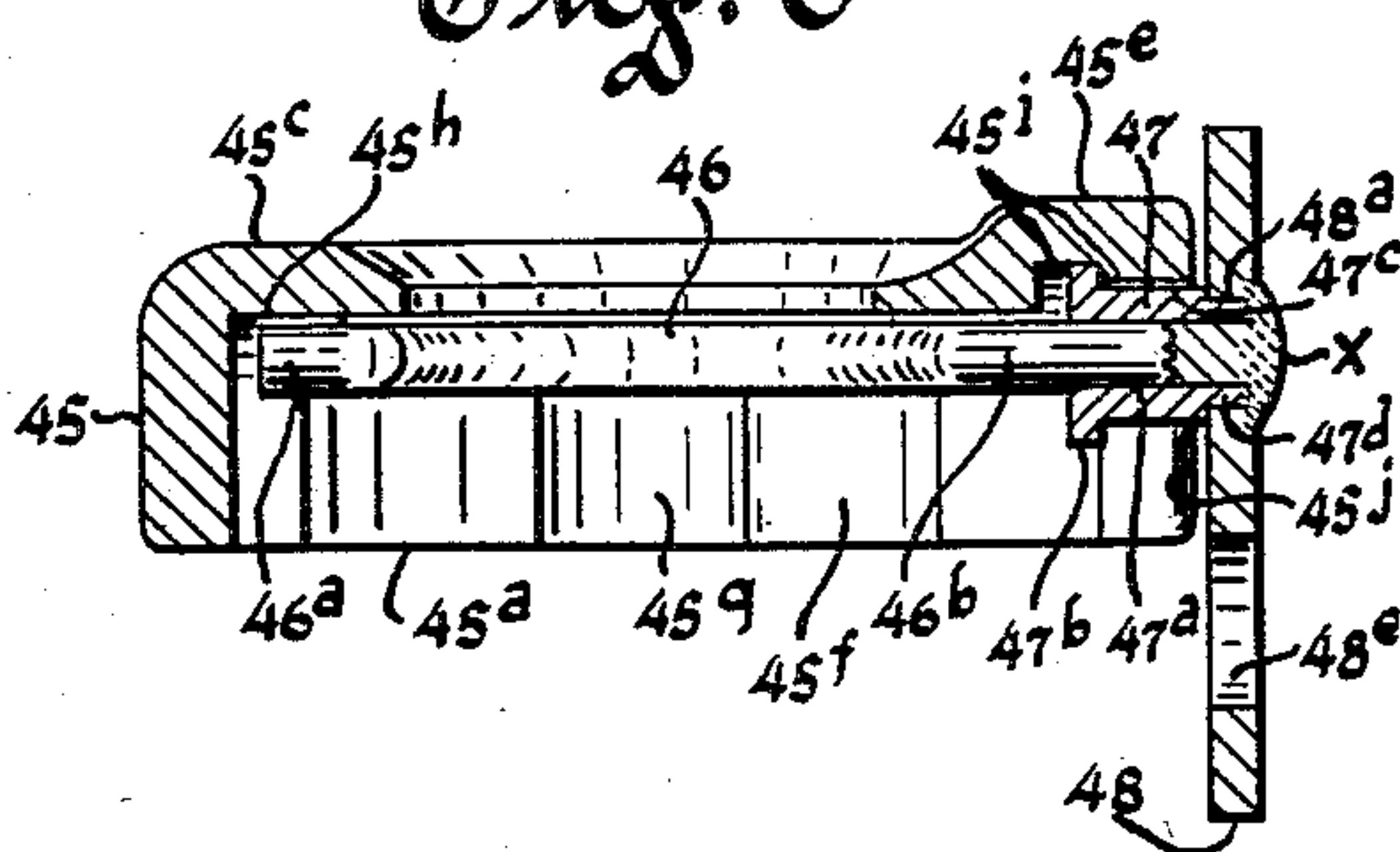


Fig. 6



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## ATTACHABLE COMBINED LATCHING AND LOCKING MEANS FOR PUSHBUTTON TYPE ELECTRIC SWITCHES

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Application June 25, 1956, Serial No. 593,555

4 Claims. (Cl. 200—44)

This invention relates to improvements in attachable combined latching and locking means for pushbutton type electric switches.

A primary object of the invention is to provide an improved and simplified latching and locking device of the aforementioned character which is neat and attractive in appearance and trustworthy in operation.

Another object is to provide such latching and locking device having a small number of relatively simple parts which are not likely to get out of order.

Another object is to provide a device for positively latching and locking a pushbutton switch out of a given normally spring-biased position thereof, while providing for manual unlocking and/or unlatching of the pushbutton switch at will.

Another object is to provide a latching mechanism completely within the panel area required for the switch proper.

Another object is to provide a latching and locking device of the aforementioned character having a manually operable lever pivotally attached thereto, whereby said device may be operated to depress and latch a pushbutton out of its normal spring-biased position, said lever being formed to accommodate the hasp of a padlock, whereby the pushbutton may be locked in its depressed or partially depressed position.

Another object is to provide such a latching and locking device which is readily attachable to and removable from the open cylindrical upper end portions of pushbutton switches of known form having various functionally different electrical characteristics.

Another and more specific object is to provide novel, simple and inexpensive means for effecting attachment of said latching and locking device to a pushbutton supporting casting of a known form.

Another object is to provide novel and simple means for retaining said manually operable lever in either of its extreme positions.

Other objects and advantages of the invention will be pointed out hereinafter.

The accompanying drawings illustrate a preferred embodiment of the invention which will now be described, it being understood that the invention is susceptible of embodiment in other forms without departing from the scope of the appended claims.

In the drawings, Figure 1 is an enlarged top plan view of a pushbutton and the supporting metal casting therefor of known form, having my improved latching and/or locking device attached thereto, but with parts of the mounting means and of the switch mechanism omitted, for clarity of illustration; it being understood that the pushbutton is then in its upper extreme position to which it is normally spring-biased.

Fig. 2 is a view similar to Fig. 1, but showing the manually operable lever pivotally moved to a position thereof which causes a predetermined degree of depression of the pushbutton, with resultant latching of said pushbutton in

its depressed position; the hasp of a padlock being shown after attachment and locking thereof to the manually operable lever, whereby the pushbutton is positively restrained against movement to its normal outer extreme position; and further showing the latching mechanism covering only a small portion of the pushbutton in the depressed position thereof, thus permitting access for the finger to further depress said button to momentarily complete a normally open circuit at will.

Fig. 3 is a bottom plan view of the attachable latching and locking device shown in Figs. 1 and 2; and illustrating the parts thereof in the normal unlatching position thereof as shown in Fig. 1.

Fig. 4 is an irregular vertical sectional view of a completely assembled pushbutton switch unit mounted upon a perforated panel or similar support; certain parts of the complete device being shown in elevation; the latching and locking elements being shown in positions thereof for effecting depression of the pushbutton to interrupt a controlled circuit, and the manually operable lever being shown in a position to accommodate the padlock hasp, shown in dotted lines, whereby the switch may be locked in its aforementioned circuit interrupting position.

Fig. 5 is a fragmentary side elevational view of certain of the parts illustrated in Fig. 4, and in other figures, but showing, in full lines, the hand-operated lever in its opposite (or unlatching) position corresponding with that shown in Figs. 1, 3 and 6; the means for releasably holding said lever in its normal unlatching position being illustrated; and

Fig. 6 is a sectional view, on the line 6—6 of Fig. 5, illustrating the manner in which certain parts of the latching and locking attachment are assembled, and attached to each other to retain all of said parts in assembled relationship.

By way of example, we have shown our pushbutton latching and/or locking device applied to a pushbutton switch, and supporting and actuating means for such switch, of the character disclosed and claimed in our application, Serial No. 574,828, filed March 29, 1956. As more fully described in said prior application, Serial No. 574,828, the switch mechanism shown in Fig. 1 comprises a main molded insulation body part 15 of a housing for a pair of switches to be controlled by the pushbutton 28; said housing including a molded insulation bottom cover member 16, which is preferably rigidly and permanently attached to member 15, after the various switch parts have been positioned therebetween, to provide two separated and substantially closed switching chambers. The switch mechanisms in said pair of switching chambers may both be of the normally open type, or both may be of the normally closed type; or one switch may be of the normally open type and the other may be of the normally closed type, depending upon the particular electrical circuit control functions desired or required. As will be understood, the single switch mechanism illustrated in Fig. 4 is of the normally closed type. Obviously if the other switch mechanism (not shown) is of the same type, it is possible to have a single circuit traversing, in series, both pairs of stationary contacts and the pair of either normally engaged or normally disengaged bridging contactors respectively associated thereby, by merely providing a suitable wire or bussing connection between the pair of wiring terminal screws 42 at either the right-hand or the left-hand side of the switching unit.

As aforesaid, the switch mechanism illustrated in Fig. 4 is of the normally closed type, and includes the molded insulating plunger member 18. The degree of spring-biased upward movement of plunger 18 is limited, by reason of the engagement of its associated bridging contactor 18<sup>c</sup> with the contact portions of a pair of right-hand and left-hand combined stationary contact and termi-



nal members 20 and 21, respectively. Contactor 18<sup>c</sup> is provided with a centrally located non-circular opening 18<sup>d</sup> having a close sliding fit around the centrally located downwardly projecting portion 18<sup>f</sup> on plunger 18. A molded insulating member 18<sup>e</sup> of substantially ring-shape likewise surrounds portion 18<sup>d</sup> and underlies said contactor 18<sup>c</sup>. Said member 18<sup>e</sup> has opposite downwardly projecting portions, one of which is shown at 18<sup>x</sup> in Fig. 4, to electrically isolate the biasing spring 18<sup>y</sup> and to assist in centering the upper end of the latter.

As further illustrated in Fig. 4, when at least one of the switching chambers is utilized to house the parts of a switch of the normally closed type, after the stationary contact and terminal parts 20 and 21 have been inserted into the recess, as shown, a pair of flat punched insulating plates 22, or the like, of rectangular contour are inserted into the respective pairs of opposed grooves or slots 15<sup>x</sup>, 15<sup>x</sup>, in a relation to overlie substantially all of the inner surfaces of the vertically extending intermediate portions of the combined stationary contact and terminal members 20 and 21. This arrangement insures against any likelihood of arcing between bridging contactor 18<sup>c</sup> and the members 20 and 21 upon separation of the contact making portions of the former from the latter.

Also as shown in Fig. 4, at least one switching unit, represented by the insulating housing members 15 and 16, is attached to the cast metal member 26, as by means of a pair of fillister-head screws (not shown) at diagonally opposed points on two opposite sides of the insulating housing; the threaded upper ends of which screws take into correspondingly located tapped openings in the substantially rectangular base portion 26<sup>c</sup> of casting 26; it being understood that the lower, or head, portion of each fillister-head screw is adapted to accommodate the threaded end of a like fillister-head screw, to provide for attachment of a second switch housing in tandem to the lower end of the housing first mentioned. A relatively large number of switch housings may thus be connected, one below the other, for operation by a single pushbutton housed within the metal casting 26.

Casting 26 is provided with an upper substantially cylindrical recess 26<sup>a</sup>, to accommodate the pushbutton 28 for reciprocating movement of the latter in opposite directions, respectively. Casting 26 is provided at its lower end with a substantially cylindrical recess 26<sup>y</sup> (Fig. 4); and an integral wall 26<sup>z</sup> is provided between recesses 26<sup>a</sup> and 26<sup>y</sup> by the casting operation; said wall having a circular opening 26<sup>w</sup> formed therein by the casting operation, to afford reciprocating clearance for the metal rod or plunger 29; to the roughened upper end portion of which plunger pushbutton 28 is rigidly and permanently attached as an incident to molding of the latter.

Plunger 29 is provided with a relatively narrow peripheral groove (not shown) to accommodate, with a grip fit the wall of an opening provided in the dome-shaped elastic sealing member 32, the flat lower flange portion of which is shown at 32<sup>b</sup>. A flat, annular sheet metal member 33 (Fig. 4) is preferably interposed between flange portion 32<sup>b</sup> and the lower end portion of a coiled compression spring 31, the upper end portion of which spring seats against the suitably formed inner surface portion of pushbutton 28. The reduced lower end portion 29<sup>b</sup> of plunger 29 is accommodated within, and passes through, a centrally located opening provided in the punched and stamped sheet metal plate 30; and the projecting end of portion 29<sup>b</sup> is upset or riveted over the lower surface of plate 30, as shown at 29<sup>c</sup>, to permanently secure said parts to each other. As indicated in Fig. 4, plate 30 is provided at diametrically opposite edge portions thereof with substantially rectangular notches 30<sup>a</sup> and 30<sup>b</sup>, to accommodate the integral inwardly projecting portions 26<sup>x</sup> and 26<sup>l</sup>, formed on casting 26, to restrain plate 30 against rotary displacement during reciprocatory movement thereof.

Plate 30 is provided at diametrically opposite sides thereof, at points spaced ninety degrees from the respective notches 30<sup>a</sup> and 30<sup>b</sup>, with flat portions located in a common plane, which are respectively adapted to overlie the reduced upper ends of the two insulating plungers (one for each switch mechanism); the plunger 18 for a switch of the normally closed type being illustrated in Fig. 4, and the bridging contactor 18<sup>c</sup> thereof being shown in circuit-interrupting position. As aforesaid, the other switch unit within the other switching chamber provided by the molded insulating members 15 and 16 of Fig. 4 may likewise be of the normally closed type, or, alternatively, one of the switch units may be of the normally open type; or both of the switch units may be of the normally open type.

Prior to attachment of the latching and locking device herein disclosed, it will be apparent that a switch mechanism like that shown in Fig. 4 will normally have its pushbutton 28 biased by spring 31 to its outer extreme position, which will result in its outer end being substantially flush with the upper edge 26<sup>x</sup> of the upper cylindrical portion of the cast metal member 26.

The latching and locking device disclosed herein comprises a substantially annular cast metal member 45, having a flat, horizontal lower surface 45<sup>a</sup>; a flat upper surface portion 45<sup>b</sup>, with an integral, flat-surfaced enlargement extending upwardly therefrom throughout a portion of its circumference, as indicated at 45<sup>c</sup> in Figs. 1, 2, 4, 5 and 6, and also laterally at one portion of its circumference, as indicated at 45<sup>d</sup> in Figs. 1, 2, 3 and 5. Also formed integrally with casting 45 is an upwardly projecting portion 45<sup>e</sup>, in the form of a segment of a cylinder.

Casting 45 is provided with recesses extending upwardly from the lower surface 45<sup>a</sup>, thereof, as best illustrated in Figs. 3 and 6. Thus a circular recess 45<sup>f</sup> extends upwardly a suitable distance from said lower surface 45<sup>a</sup> to accommodate, with a snug fit, the peripheral surface of the upper cylindrical end portion 26<sup>x</sup> (Fig. 1) of the aforementioned casting 26; said recess including a laterally offset portion 45<sup>g</sup>, Figs. 3 and 6, to permit insertion of a screwdriver or the like to facilitate removal of casting 45 from portion 26<sup>x</sup> of casting 26, when desired or required. Casting 45 is further provided with a pair of axially aligned recesses 45<sup>h</sup> and 45<sup>i</sup>; the smaller recess 45<sup>h</sup> being adapted to afford a bearing permitting pivotal movement of the straight end portion 46<sup>a</sup> of a bent wire latch rod or bail member 46, the bent intermediate portion of which is utilized to effect latching or locking of pushbutton 28 in its inward or partially depressed position, as hereinafter more fully described. As shown in Figs. 3 and 6, the substantially longer straight end portion 46<sup>b</sup> of wire member 46 is inserted, with a close fit, through an opening 47<sup>a</sup> (Fig. 6) provided in a steel spacer member 47. Spacer 47 is provided with a relatively large circular inner end or flange portion 47<sup>b</sup> which is adapted to bear against a shoulder formed in recess 45<sup>i</sup> to restrain said spacer against outward displacement laterally of casting 45. The intermediate portion 47<sup>c</sup>, of circular cross section, is adapted to bear against the outer portion of said recess 45<sup>i</sup>; and said portion 47<sup>c</sup> projects to a slight degree beyond the flat surface 45<sup>j</sup> formed at one side of member 45. The further reduced outer end portion 47<sup>d</sup> of spacer 47 has a rather close fit within an opening 48<sup>a</sup> (Fig. 6) in a flat, punched metal lever 48, of the form best illustrated in Fig. 5. Both said outer end portion 47<sup>d</sup> of spacer 47 and the end portion 46<sup>b</sup> of bail member 46 project slightly beyond the outer surface of lever 48; and said projecting portions are fused and welded or otherwise rigidly attached to each other and to lever 48, as illustrated at X in Fig. 6; and in the other figures.

Prior to thus attaching lever 48, as just described, a relatively short pin 49 has its end portion of reduced size inserted outwardly through an opening of proper size in lever 48, at the point shown; and said reduced outer



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end portion is upset or riveted as shown at 49<sup>a</sup> in the drawings, to rigidly attach the same to lever 48.

Lever 48 is formed, as best illustrated in Fig. 5, to provide a manually operable means for effecting movement of the latch rod or bail member 46 from each extreme position thereof to the other. As shown in full lines in Figs. 1, 3, 5 and 6 lever 48 is in its normal, or inactive, position; it being noted that lever 48 at one side thereof, substantially opposite to the location of pin 49, is provided with a substantially rectangular cut-out or notch 48<sup>b</sup>. Also as shown, partly in dotted lines, in Fig. 1, the portion 45<sup>d</sup> of casting 45 is provided with a suitable outwardly opening recess 45<sup>k</sup>, to accommodate a small coiled compression spring 50 and a small metal ball or sphere 51 which is normally projected outwardly by said spring. When notch 48<sup>b</sup> is alined with ball 51, as shown in Fig. 5, lever 48 will be releasably held in its normal, or unlatching, position. When lever 48 is manually moved to its opposite extreme position, and pin 49 engages the outer surface of portion 45<sup>d</sup>, ball 51 will bear against a smooth inner surface portion of lever 48, as shown in Fig. 1, and will be frictionally held in such position. Also bail 46 travels slightly beyond the dead center position, permitting the biasing force of the pushbutton to provide a restraining force against unlatching in the latched position. A second notch for the ball could also be provided to further insure against unlatching, if desired.

Upon manual movement of portion 48<sup>c</sup> to the dotted line position thereof shown in Fig. 5 the portion 48<sup>d</sup> thereof will be positioned as shown in dotted lines in said figure; and the curved intermediate portion of wire bail member 46 will then be positioned as shown in Fig. 4 to latch pushbutton 28 in its depressed position against the action of coiled compression spring 31. As shown in Figs. 4 and 5, portion 48<sup>d</sup> of lever 48 is provided with an opening 48<sup>e</sup> of suitable size to accommodate the hasp 52<sup>a</sup> of a padlock 52, to which said hasp may be locked; whereby pushbutton 28 may be locked in depressed position pending unlocking of the padlock hasp and removal thereof to permit lever 48 to be manually moved to the unlatching and unlocking position thereof shown in Fig. 5.

As shown in Figs. 3 and 4, casting 45 is provided with two vertical openings 53 and 54, of approximately rectangular form in transverse cross section; said openings being initially of a size, in cross section, to provide slight engagement with the reduced lower ends of a pair of like self-tapping screws 55, 55, for retaining said screws when partially driven. The arrangement is such that upon downward assembly of casting 45 into telescopic relationship with the cylindrical upper end portion of casting 26, and into seating engagement with the end surface 26<sup>x</sup> thereof, and in the desired rotary relationship thereto, the respective screws 55, 55 may be forcibly driven, by means of a screwdriver or the like, to the positions thereof shown in Fig. 4, thus rigidly, but removably, attaching said castings to each other; it being understood that said screws 55, 55 will not only cut the desired thread within the openings 53 and 54, but also upon the adjacent portions of the peripheral surface of said cylindrical upper end portion of casting 26, as shown. Of course, if desired the screws 55, 55 may be partially or entirely removed in a well known manner, to provide for attachment of casting 45 in a different rotary relationship to said upper end of casting 26, or for attachment of casting 45 to another casting like casting 26.

As will be apparent to those skilled in the art, the padlock attachment herein disclosed may be attached to any flush pushbutton operator of standard form; and as

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best illustrated in Figs. 2 and 4, one of said screws is at least partially covered by the padlock hasp, thus making the device substantially tamper-proof when the padlock has been attached thereto.

When the padlock has been applied, as shown in Figs. 2 and 4, all normally closed contacts in the switches controlled by the pushbutton 28 are maintained in open position; but as will be clear from the showing of Fig. 2 the normally open contacts of the switch or switches may still be manually closed by manually depressing said pushbutton 28.

We claim:

1. As an article of manufacture, an attachable combined latching and locking means for pushbutton type electric switches comprising an approximately annular cast metal member the inner peripheral wall of which is adapted to slidably fit onto the outer end portion of a pushbutton housing member, said cast metal member having a plurality of spaced openings formed therein and extending inwardly from the outer end thereof in a direction substantially parallel with the inner surface of said peripheral wall, a plurality of self-tapping screws respectively freely insertable into the outer end of each of said openings, each of said screws when forcibly rotated in one direction acting automatically to form a screw-thread within the wall of its respectively associated opening and to effect attachment thereof to the pushbutton mechanism associated therewith, whereby said cast metal member is retained in assembled relationship to said pushbutton switch mechanism, means including a manually operable lever and a bent wire member rigidly and permanently attached thereto, said last mentioned means being pivotally supported by said cast metal member for effecting movement of an associated spring-biased pushbutton to and for latching the same in a depressed position thereof for control of one or more electric circuits associated therewith.

2. A device of the character defined by claim 1, including a padlock, the hasp of which is engageable with said manually operable lever to provide for positively locking said pushbutton in said depressed position thereof.

3. A device of the character defined by claim 1, wherein said plurality of self-tapping screws when partially screwed into said annular cast metal member are retained thereby pending attachment of said annular member to an associated pushbutton housing.

4. An article of manufacture, a combined latching and locking attachment for a pushbutton operated type of switch, comprising a substantially annular cast metal member the inner end portion of the peripheral wall of which is adapted to slidably fit telescopically onto and to seat against the hollow cylindrical outer end portion of a pushbutton housing member, a manually operable punched sheet metal lever and a bent wire member rigidly attached thereto and pivotally supported by said cast metal member, said cast metal member having a pair of substantially diametrically oppositely positioned openings formed therein and extending between the outer and inner ends thereof, and a pair of self-tapping screws adapted to be forcibly driven partly into said openings for initial support thereof by said cast metal member prior to attachment of the latter to a pushbutton housing.

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