

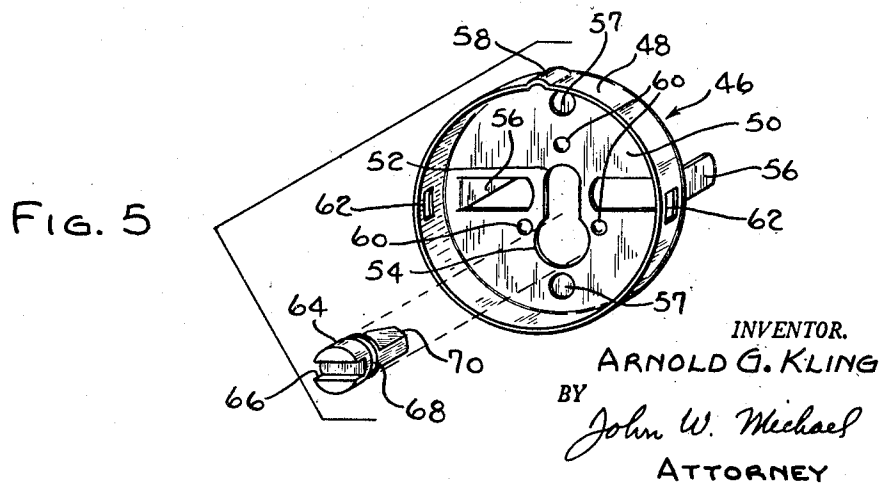
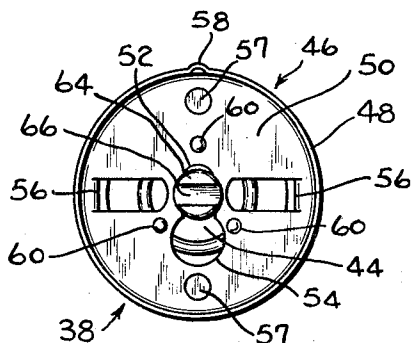
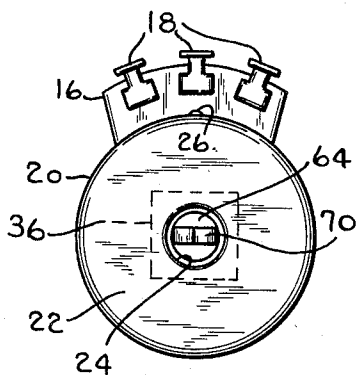
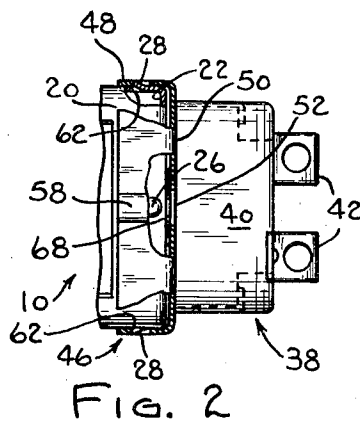
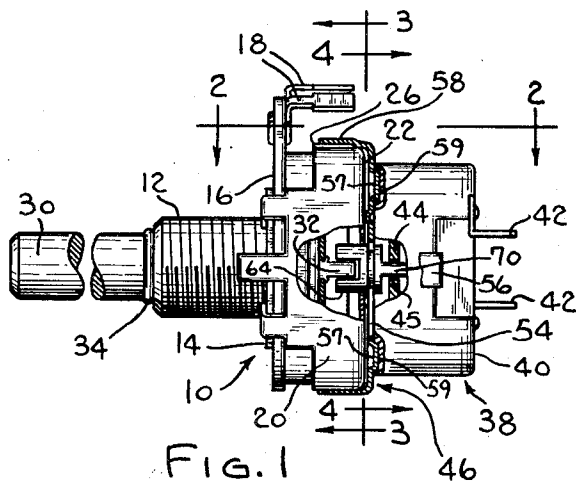
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A. G. KLING

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VARIABLE CONTROL UNIT AND ATTACHABLE LINE SWITCH

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## VARIABLE CONTROL UNIT AND ATTACHABLE LINE SWITCH

Arnold G. Kling, Milwaukee, Wis., assignor to Globe-Union Inc., Milwaukee, Wis., a corporation of Delaware

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7 Claims. (Cl. 201—55)

This invention relates to variable electrical controls and attachable line switches.

In units of this type it is desirable to have the electrical control such as a variable resistor separately salable and independently usable. The attachable line switch is designed to be carried as a separate item of a dealer's stock and can be quickly attached to a previously installed control or attached to such a control carried in stock and the combined unit sold as a single item. Heretofore the shafts of such controls had offset fingers engageable with a forked operating member projecting from the switch. The attachment of each switch was relatively easy. However, the demand for smaller physical dimensions and lower costs caused the elimination of the offset fingers and forked operating member. A switch operated by a revolving member coaxially aligned with the shaft of the control was then devised. However, this unit presented difficult assembly problems and hence the control was sold as a separate item or the control with factory mounted switch was sold as a unit.

It is an object of this invention therefore to provide a variable electrical control and attachable switch of the type employing coaxially aligned shafts which can be easily assembled and are relatively inexpensive to manufacture.

Another object is to provide such a unit in which a locking pressure established at the time of assembly of the switch to the control will remain and the unit kept tightly assembled.

In obtaining these objects the housing for the control is provided with an opening in alinement with the end of the shaft of the control and a mounting cap provided for the switch which carries a coupler normally coaxially aligned with the shaft of the control and connected with switch operating member. When the cap is seated on the housing of the control this coupler enters such opening and engages the end of the shaft of the control. A cylindrical wall on the mounting cap telescopes over a similar wall on the housing for the control and teeth on one wall snap into notches on the other wall to hold the two member locked. Both the control and mounting cap have opposing flat walls and one of such walls has projecting dimples which engage the other flat wall to inherently bias said walls in order for such teeth to reach and snap into such notches. This bias keeps a tight lock between the control and the switch, eliminating relative vibration therebetween.

One quick way of assembling the coupler in the mounting cap is to provide the cap with a keyhole opening having an enlarged portion offset slightly from a centrally located smaller portion and put a groove in the coupler which will overlap the edges of the smaller portion when the coupler is moved laterally into such portion from the enlarged offset portion to prevent longitudinal displacement of such coupler. With the coupler so centered, the cap is mounted on the switch and the coupler engaged with rotating switch operating member which holds the coupler in the small central opening and prevents loss thereof.

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The assembly of such switch to the control is simple and easy. The coupler is turned to switch "off" position and the control to one end of its travel. The cap and cover are angularly aligned by appropriate markings on each, and the switch pressed into place.

The novel features, which are considered characteristic of the invention, are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

Fig. 1 is a view in front elevation, with part broken away and shown in section, of an electrical control and attachable line switch embodying the present invention;

Fig. 2 is a fragmentary view in top elevation taken from the line 2—2 of Fig. 1 with part broken away and shown in section;

Fig. 3 is a view in right end elevation of the control with the line switch removed taken on the line 3—3 of Fig. 1;

Fig. 4 is a view in left end elevation of the line switch removed from the control taken from the line 4—4 of Fig. 1; and

Fig. 5 is an isometric exploded view of the mounting cap and coupler forming a part of this invention.

In the embodiment of the invention shown in the drawing the multiple unit device consists of a control 10 to which is attached a line switch 38 operated by such control. The control 10 is a variable resistor of well known design; however, other types of electrical controls may be used so long as they have an operating shaft. The line switch is fully disclosed and claimed in G. J. Meuer Patent No. 2,488,778, issued November 22, 1949, for "Electric Switch." It has an operating member 44 which rotates about a central axis substantially coaxial with the operating shaft of the control. The feature of this invention resides in the means used to attach the switch to the control and to operate the switch operating member by the control shaft.

The variable resistance control 10 illustrated in the drawings has a mounting bushing 12 to which is rigidly connected a ground plate 14. The bushing and ground plate provide the support by means of which the control is mounted on a panel or other base member. An insulating base 16 is supported against the ground plate 14 and holds terminals 18 by which proper connection is made with the resistance element and movable contact member. A steel cover having a cylindrical or annular side wall 20 and a flat rear wall 22 is secured to the ground plate 14 and provides an electrical shield for the resistor as well as support for the line switch. The rear wall 22 has a central opening 24 providing access to the shaft of the control. The side wall 20 is provided with an axially extending external bead 26 used for properly angularly locating the control and the switch. Such wall is also provided with diametrically opposed outwardly projecting teeth 28 (see Fig. 2) which are elements of an interlock between the switch and control. A shaft 30 is rotatably carried in the mounting bushing 12 and is connected in conventional manner with the rotary contactor of the resistor. It is provided with a flat inner end 32 within the control which is in alinement with the central opening 24 and spaced inwardly of the flat wall 22. The shaft 30 is held in place by a C ring 34. The control thus described may be used separately as a variable resistor and when so used the center opening 24 is closed by an adhesive member 36 (indicated by the broken lines 36) to prevent dust and grit from entering the control through such opening. This member may be easily re-

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moved from the flat wall 22 when a line switch is attached to the control.

The line switch 38 has a housing 40 which supports terminals 42. The operating disk 44 rotates about an axis substantially coaxial with the shaft 30 and has a center slot 45 for receiving the tongue of the coupler. In order to enable the switch 38 to be easily and quickly attached to the control 10 and coupled with the shaft 30, the switch has secured thereto a mounting cap 46. This cap has a cylindrical or annular wall 48 snugly overlapping the wall 20 and a flat wall 50 to the outer side of which the switch 38 is secured. This wall has a keyhole opening (best seen in Fig. 5) with a small opening 52 positioned centrally of said wall and a larger opening 54 offset from said small opening. Mounting arms 56 are struck out from the flat wall 50 and have ends inturned engaging the housing 40 to hold the switch and the cap together. It may be advisable to press portions of the flat wall 50 toward the housing 40 to form small projections 57 which seat in recesses 59 in such housing to prevent relative rotation between those parts. The wall 48 is provided with an outwardly formed channel 58 which slidably receives the bead 26 to properly angularly position the switch 38 with respect to the control 10 when assembled. Notches 62 cut in the wall 48 receive and engage the teeth 28 to lock the switch to the control.

It is desirable to keep such lock under constant tension and thereby eliminate any relative vibration between the switch and control. To accomplish this the flat wall 50 is provided with dimples 60 which are angularly spaced about and near the small opening 52 and project toward the flat wall 22. These dimples are dimensioned so that they engage the flat wall 22 before the teeth 28 aline with the edges of the notches 62. It is thus necessary to deflect and inherently bias the flat walls 22 and 50 in order to move the teeth 28 into alinement with such notches and make the interlock. This inherent biasing of the two walls will always keep a tight lock and eliminate any relative vibrational movement between the switch and control.

To operate the member 44 from the shaft 30 a coupler 64 is provided which has a keyway 66 engaging the flat end 32 of the shaft and a projecting tongue 70 which fits in the slot 45 of such operating member. While this coupler could be a separate part from the functional viewpoint, it would be an annoying item for dealers to stock and would make attachment of the switch more complicated. Consequently the coupler 64 is factory mounted in the switch 38. This is accomplished by providing an annular groove 68 in the coupling into which the marginal edges of the narrow opening 52 will slidably fit to restrain the coupler from longitudinal displacement while held in such narrow opening. The outer diameter of the coupler 64 is slightly smaller than the enlarged opening 54 and the coupler is assembled by inserting it axially into such large opening until the edges of the narrow opening are alined with the groove 68. The coupler is then moved laterally into the center of the mounting cap 46. It is held in this position until such cap is mounted against the switch housing 40. In so mounting the cap and coupler, the tongue 70 must be alined with and fitted into the slot 45. After such mounting the coupler will be held in the small central opening 52 by the disk 44 and can no longer be longitudinally displaced.

To attach the switch 38 to the control 10, the shaft 30 is moved to one extreme position (in this embodiment, the position of greatest resistance). The coupler 66 is rotated to the "off" position of the switch. The channel 58 is alined with the bead 26. With the parts thus alined the flat end 32 of the shaft will be in alinement with the keyway 66 of the coupler. The mounting cap is then telescoped over the steel cover until the teeth 28 snap into the notches 62.

Although only one embodiment of the invention is shown and described herein, it will be understood that this application is intended to cover such changes or modifica-

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tions as come within the spirit of the invention or scope of the following claims.

I claim:

1. In a multiple unit device, a control having a housing with a rear wall provided with an opening, an operating shaft for said control having an inner end provided with a coupler engaging portion positioned within said housing and spaced inwardly of said rear wall in alinement with said opening, a switch having a housing with a forward wall provided with a coupler receiving opening, an operating member within said switch housing rotatable about an axis alined with said shaft, said operating member having a coupler engaging portion within said switch housing spaced inwardly of said coupler receiving opening, means detachably interconnecting said housings with said shaft and the axis of rotation of said operating member alined, and a coupler rotatably carried in said coupler receiving opening, there being interfittng means between said coupler and said coupler receiving opening to retain said coupler in position when said housings are disconnected, said coupler having portions slidably engaging with the coupler engaging portions on said shaft and operating member.

2. A device as claimed in claim 1 in which said coupler receiving opening has a smaller centrally located part and a larger part offset from said smaller part, and said coupler has an outer diameter smaller than said larger part and larger than said smaller part and an annular groove having a diameter smaller than said smaller part whereby the peripheral edges of said smaller part are engaged by said groove to restrain longitudinal displacement of said coupler when held in said smaller part.

3. A variable control and attachable line switch having a cover for said control provided with an annular side wall and a flat rear wall, said rear wall having a central opening, a shaft for said control having a flat inner end in said control alined with and spaced inwardly of said opening, said line switch having an operating member rotatable therein about an axis substantially alined with said shaft and having a central tongue receiving slot, a mounting cap for said switch having an annular side wall telescoped over the annular side wall of said cover and a flat inner wall in juxtaposition with the flat rear wall of said cover, the flat wall of said mounting member having a keyhole opening with a centrally located smaller portion in substantial alinement with said shaft and a larger portion offset from said smaller portion, and a coupler having an annular groove the edges of which engage the margins of said smaller portion to prevent axial displacement of said coupler while permitting rotation thereof relative to said cap, said coupler having a tongue fitted in said slot and a keyway engaging said flat end whereby rotative movement of said shaft is transmitted to said operating member and said shaft prevented from moving radially into said larger opening.

4. A variable control and attachable line switch having a cover for said control provided with an annular side wall and a flat rear wall, said rear wall having a central opening, a shaft for said control having a flat inner end in said control alined with and spaced inwardly of said opening, said line switch having an operating member rotatable therein about an axis substantially alined with said shaft and having a central tongue receiving slot, a mounting cap for said switch having an annular side wall telescoped over the annular side wall of said cover and a flat inner wall in juxtaposition with the flat rear wall of said cover, a tooth on one of said annular side walls, a notch on the other of said annular side walls into which said tooth fits to lock said cap on said cover, a projection on one of said flat walls engaging the other of said flat walls and biasing said flat walls apart with said tooth in said notch to maintain a tight engagement between said cap and said cover, and a coupler carried by said cap and having a keyway engaged by said flat inner end and a

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tongue fitted in said slot to transmit motion from said shaft to said operating member.

5. A variable control and attachable line switch having a cover for said control provided with an annular side wall and a flat rear wall, said rear wall having a central opening, a shaft for said control having a flat inner end in said control alined with and spaced inwardly of said opening, said line switch having an operating member rotatable therein about an axis substantially alined with said shaft and having a central tongue receiving slot, a mounting cap for said switch having an annular side wall telescoped over the annular side wall of said cover and a flat inner wall in juxtaposition with the flat rear wall of said cover, a tooth on one of said annular side walls, a notch on the other of said annular side walls into which said tooth fits to lock said cap on said cover, a projection on one of said flat walls engaging the other of said flat walls and biasing said flat walls apart with said tooth in said notch to maintain a tight engagement between said cap and said cover, the flat wall of said mounting member having a keyhole opening with a centrally located smaller portion in substantial alinement with said shaft and a larger portion offset from said smaller portion, and a coupler having an annular groove the edges of which engage the margins of said smaller portion to prevent axial displacement of said coupler while permitting rotation thereof relative to said cap, said coupler having a tongue fitted in said slot and a keyway engaging said flat end whereby rotative movement of said shaft is transmitted to said operating member and said shaft prevented from moving radially into said larger opening.

6. In a multiple unit device in which a second unit is

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snap-mounted onto a first unit, a cover for the first unit having an annular side wall and a flat rear wall, said side wall having outwardly projecting teeth, said side wall having an axially extending external bead, said second unit having a mounting cap provided with an annular wall snugly overlapping said side wall and a flat end wall, said annular wall having notches therein which receive and engage said teeth to lock said units together, said annular wall having an outwardly formed channel which slidably receives said bead to properly angularly position said units while permitting relative straight line axial movement therebetween and prevent relative rotational movement therebetween.

7. A multiple unit device of the type claimed in claim 6 in which there are dimples on one of said flat walls which project toward and engage the other of said flat walls before said teeth aline with and engage the edges of said notches to inherently bias said walls to maintain a tight lock and eliminate relative vibrational movement between said units.

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