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2,062,006

MOUNTING MEANS FOR ELECTRIC SNAP SWITCHES

Filed April 22, 1935

Fig. 1

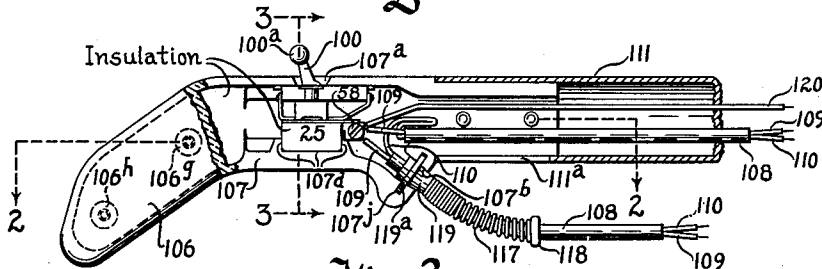


Fig. 2

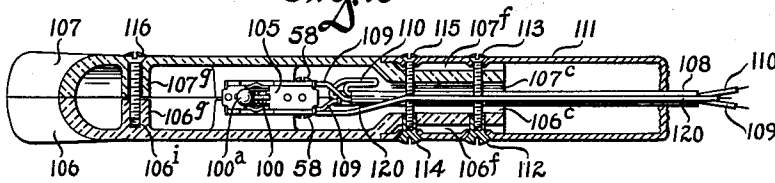
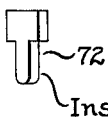


Fig. 8



Insulation

Fig. 3

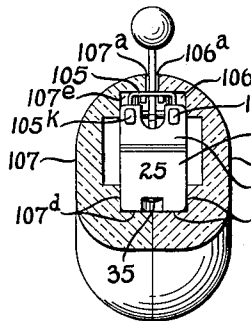


Fig. 4

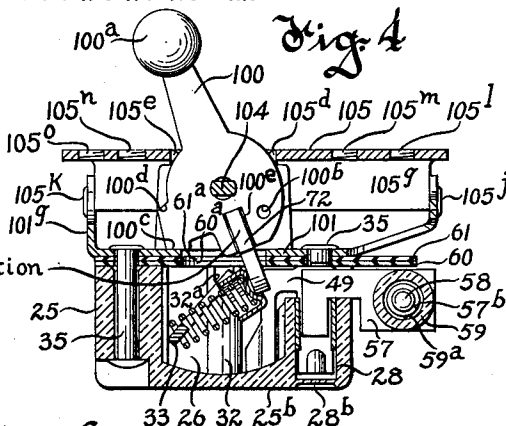
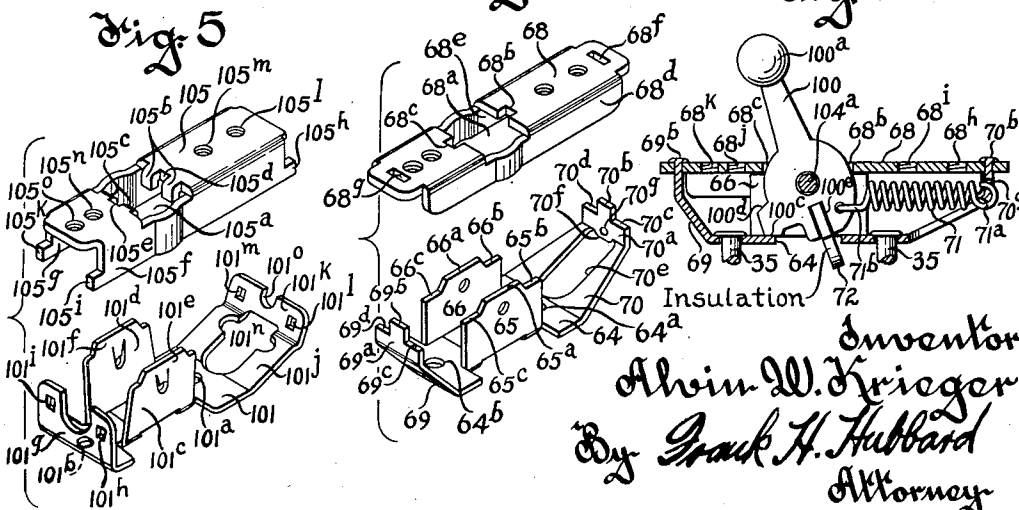


Fig. 6

Fig. 7

Fig. 5



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MOUNTING MEANS FOR ELECTRIC SNAP SWITCHES

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Application April 22, 1935, Serial No. 17,605

6 Claims. (Cl. 200—67)

This invention relates to improvements in mounting means for electric snap switches.

This application is a continuation in part of my Patent No. 1,998,962, dated April 23, 1935, for improvements in Electric snap switches.

An object of the invention is to provide novel mounting means for electric snap switches of the tool-handle type.

Another object is to provide novel forms of supporting means for electric snap switches to adapt the same for concealed mounting in different types of tool-handles or the like.

Another object is to provide novel means for mounting an electric snap switch in the pistol grip handle of an electric motor operated vacuum cleaner or the like.

Another and more specific object is to provide an improved form of insulating pistol grip or handle for vacuum cleaners or the like.

Another object is to provide a longitudinally divided molded insulating pistol grip handle having novel means for retaining the switch and the coiled wire conductor guard in assembled relationship thereto.

Another object is to provide a molded insulating pistol grip handle of the character aforementioned whereby wiring of the switch is facilitated, and whereby assembly of the wired switch with respect to the handle is likewise facilitated.

Another object is to provide novel means affording a rigid mechanical connection between the molded insulating pistol grip and the tubular metal handle or shaft of a vacuum cleaner or the like.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates certain embodiments of the invention which will now be described, it being understood that the embodiments illustrated are susceptible of modification in respect of certain details of construction thereof without departing from the scope of the appended claims.

In the drawing, Figure 1 is a sectional view of the tubular handle of a vacuum cleaner or the like, showing my improved insulating pistol grip and snap switch combination applied thereto,—a portion of one of the molded sections of insulation being broken away.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, but showing in top plan the snap switch in its assembled position.

Fig. 3 is a sectional view on the line 3—3 of Fig.

1, but embodying an end elevational view of the snap switch.

Fig. 4 is a side elevational view of an electric snap switch of the character illustrated in the combination of Figs. 1 to 3.

Fig. 5 is a perspective view of certain of the switch parts shown in Fig. 4.

Fig. 6 is a perspective view similar to Fig. 5, but showing a modified form of metal parts to provide the switch superstructure.

Fig. 7 is a fragmentary view in side elevation, showing the elements of Fig. 6 in assembled relation, and

Fig. 8 is a detail perspective view of the insulating actuator of the switch.

Referring first to Fig. 4, wherein I have shown an electric snap switch generally similar to that disclosed in my Patent No. 1,998,962, aforementioned. The numeral 25 designates a base molded from a suitable insulating material. I prefer to employ material of the phenol-formaldehyde condensation type, such as that sold under the trade name of "bakelite." Base 25 is provided with a relatively large substantially rectangular recess 26 and a pair of relatively smaller substantially rectangular recesses, one of which is shown at 28. Said relatively smaller recesses have portions of different depths whereby intermediate shoulders are provided,—the relatively deeper portions of said recesses having bottom walls located closely adjacent to the bottom surface 25^b of base 25, whereby relatively thin insulating diaphragms are formed integrally with the base, as shown at 28^b. These diaphragms may be readily removed by broaching to accommodate bottom wiring terminal elements of the character illustrated in said prior Patent No. 1,998,962. However, the switch in Fig. 4 is arranged for end wiring, and accordingly said diaphragms are left intact.

Thus I provide a pair of right-hand and left-hand one-piece combined contact and wiring terminal members, the right-hand member being designated by the numeral 49; and said members have attached to the terminal portions thereof, as by spot-welding, brazing or soldering, a pair of right-hand and left-hand punched and stamped sheet metal members,—the right-hand member being shown at 57. Said last mentioned members are tapped to accommodate the shanks of wiring terminal screws 58, and each member has a flange, such as 57^b, surrounding its tapped opening. Interposed between said members is an insulating member 59 of cylindrical form, said insulating member having aligned recesses (one of

which is shown at 58^a) formed in opposite ends thereof to provide clearance for the shanks of screws 58 and to receive the flanges aforementioned to provide for support of said member by said flanges. Member 59 is provided intermediate the length thereof with an integral inner diaphragm, as described in my Patent No. 1,998,962.

Recess 26 is provided in its opposed walls with a pair of vertical ribs, one of which is shown at 32,—the upper ends of said ribs being respectively provided with open bearings, one of which is shown at 32^a, to accommodate the integral pivot lugs of a substantially U-shaped flat punched sheet metal contactor 33. Said contactor may be of the form illustrated in detail in my Patent No. 1,905,914, dated April 25, 1933. The switch assembly likewise preferably comprises a pair of relatively thin, flat punched plates 60 and 61 of insulating material,—said plates having aligned openings to accommodate the rivets 35, and aligned relatively narrow straight-sided slots 60^a, 61^a to provide clearance for and to act as a guide for the insulating actuating element 72, the form of which is best illustrated in Fig. 8, and in my Patent No. 1,998,962.

I have shown a novel form of actuating lever 100 and a novel form of supporting means therefor. Thus in the device of Figs. 4 and 5 I provide a metal member having a flat portion 101 provided with openings 101^a and 101^b to receive the shanks of rivets 35 which may be upset thereover (Fig. 4) to clamp the insulating plates 60, 61 in position. Member 101 is provided with intermediate upstanding parallel arms 101^c and 101^d between which the lever is positioned,—said arms and said lever having registering openings to receive the pivot pin 104,—an intermediate portion of said pin being swaged or otherwise enlarged (Fig. 4) to afford a drive fit thereof within the lever opening. The punched and stamped sheet metal top plate 105 has an opening 105^a to afford assembling clearance for the knob portion 100^a of lever 100. Extending inwardly and bent downwardly with respect to opening 105^a are aligned pairs of lugs 105^b and 105^c, forming aligned notches 105^d and 105^e the side walls of which are adapted to straddle lever 100 to prevent sideways displacement of the latter. Top plate 105 is preferably provided with integral downwardly extending parallel flanges or projections 105^f, 105^g,—said flanges being adapted to overlap the arms 101^c, 101^d of member 101 and the opposite ends of pin 104 to insure against endwise displacement of the latter, and to thereby further assist in preventing sideways displacement of lever 100. As shown the arms 101^c, 101^d are provided with reduced upper ends 101^e and 101^f which extend upwardly into opening 105^a in top plate 105, and are retained in parallelism by the flanges 105^f and 105^g and the aligned lugs 105^b, 105^c adjacent to the respective flanges.

Member 101 is provided at one end with an arm 101^h bent upwardly at substantially a right angle with respect thereto, and provided with a pair of openings 101^h and 101ⁱ. Member 101 is provided at its other end with a relatively longer upwardly angled arm 101^j, the upper end portion 101^k of which initially extends upwardly and outwardly at a slight angle to the vertical, and said portion 101^k is provided with a pair of openings 101^j, 101^m. Arm 101^j is punched out to provide an opening 101ⁿ which affords clearance for a coiled tension spring when a switch of the momentary contact type is desired. The portion 101^k is notched at 101^o to facilitate attachment of one

hooked end of the spring,—the other hooked end of which spring would be engaged with the wall of opening 100^b in lever 100.

The flanges 105^f, 105^g, of top plate 105 are provided at opposite ends with lugs 105^h, 105ⁱ, 105^j and 105^k. The lugs 105^h, 105^k may be freely inserted into the aforementioned openings 101^h, 101ⁱ, and the lugs 105^h, 105^j are brought to a position to provide for cooperative engagement of the openings 101^j, and 101^m therewith upon bending of portion 101^k inwardly to a vertical plane (see Fig. 4). All of said lugs are then riveted or upset (as shown at 105^j, 105^k in Fig. 4) to rigidly secure top plate 105 to member 101. The lever 100 is provided with an edge portion 100^c which engages member 101 to limit counterclockwise movement of said lever, and the same is further provided with an edge portion 100^d which is engageable with top plate 105 to limit the degree of clockwise movement of said lever. Top plate 105 is preferably provided with four tapped openings 105^l, 105^m, 105ⁿ and 105^o which are spaced predetermined distances apart to provide for cooperative engagement of a pair of securing screws with any one of a number of selective pairs of said openings, when the switch is intended for concealed mounting within one of the various forms of metal tool handles now on the market. The spring and abutment member interposed between the lower end of actuator 72 and contactor 33 are of the character shown in my Patent No. 1,998,962.

In Figs. 1 to 3, however, I have shown the switch of Figs. 4 and 5 mounted within or carried by a two-part longitudinally divided insulating handle of the pistol grip type,—the two halves of said pistol grip being designated by the numerals 106 and 107 respectively. Said parts 106 and 107 are also preferably molded from insulating material of the phenol-formaldehyde condensation type, sold commercially under the trade name of "bakelite". Said halves are preferably in the form of complementary shells, the walls of which however, are of sufficient thickness to avoid fracture or breaking thereof even though subjected to comparatively rough usage. The surrounding walls of said halves 106, 107 have flat edges or surfaces which are notched or interrupted only at three points, namely; at 106^a 107^a to provide clearance for the flat sheet metal actuating lever 100; at the point represented by numeral 107^b (the part 106 being complementally formed with respect thereto) to provide for passage of the cord 108, comprising conductors 109, 110, from and to a suitable source of current supply; and at the point 106^c, 107^c through which the conductors pass to and from the motor (not shown) of a vacuum cleaner or the like.

The halves 106 and 107 are provided with complementary recesses 106^d, 107^d adapted to receive with a rather snug fit the lower end of the insulating base portion 25 of the switch; and said halves are further provided with complementary recesses to likewise receive with a fairly snug fit the superstructure of the switch comprising member 101 and top plate 105. When the switch is clamped between the halves 106, 107 the former will be restrained against movement in any direction relatively to the latter. Said complementary recesses are of course so arranged as to insure proper positioning of the switch actuating lever 100 with respect to the notches 106^e, 107^e aforementioned. With the arrangement illustrated the knob 100^a of the switch lever extends upwardly from that portion of the vacuum cleaner han-

dle which is alined with the usual tubular metal handle portion 111 of such a device.

The metal tube 111 is preferably of the seamless type, but is preferably provided with a single split or kerf in the lower side thereof (as indicated at 111^a in Fig. 1), which kerf extends throughout the major portion of the length of that end of the insulating handle which is telescoped into tube 111. Said tube is provided with two pairs of alined openings, as shown in Fig. 2,—the portions of the tube around said openings being bent inwardly to provide recesses or countersinks to accommodate the conical portions of the heads of the respective pairs of screw members 112, 113 and 114, 115. Members 113 and 115 have externally threaded shanks and members 112 and 114 have internally threaded recesses to accommodate said shanks to provide for telescopic engagement of said pairs of members with each other.

The insulating members 106 and 107 are provided with lateral grooves or depressions 106^f, 107^f to accommodate said inwardly bent portions of tube 111 (Fig. 2), and said insulating members are provided with alined pairs of openings to accommodate with a fairly close fit the shank portions of the respective screw members. By tightening the respective pairs of screw members the split end of tube 111 is brought into clamping engagement with the telescoped end of the insulating handle, and the two halves of insulation are clamped together at said end thereof. A rigid mechanical connection between the insulating handle and the metal tube is thus provided.

The rear end portion of the insulating handle is angled downwardly into the form of a pistol grip. The major portion of said rear end is hollowed out, except for the provision of a pair of integral studs or projections within each of the complementary cavities. The studs carried by member 106 are shown in dotted lines at 106^e, 106^h in Fig. 1, and said studs are respectively provided with tapped recesses, one of which is shown at 106ⁱ in Fig. 2. The studs carried by member 107 are adapted to register with and abut against the studs of member 106,—and as shown at 107^e in Fig. 2 the former studs are respectively provided with through passages to freely accommodate the shanks of a pair of securing screws one of which is shown at 116,—the outer surface of member 107 being provided with countersinks to accommodate the tapered portions of the screw heads.

The cord 108 which preferably comprises the pair of rubber covered or otherwise individually insulated conductors 109, 110 is led to the insulating handle through a coiled wire guard member 117, one end of the coil being covered by a metal sleeve or ferrule 118 and the other end thereof being positioned within and attached to a metal member 119,—the latter having an intermediate flange or projection 119^a which fits snugly within a pair of complementary recesses formed in members 106 and 107; one of said recesses being shown at 107^j in Fig. 1.

A portion of the covering of cord 108 is removed and the wire 109, for instance, is severed to provide for attachment of one of the severed ends thereof to one of the switch terminals,—the other severed end of wire 109 being attached to the opposite terminal of the switch. The wire 109 then passes to the motor of the vacuum cleaner or the like,—the wire 110 as shown leading to the motor without interruption in the continuity

thereof. A grounding wire 120 is preferably connected between a portion of the motor frame and the first mentioned terminal of the switch, as best illustrated in Fig. 2.

From the foregoing description it will be apparent that it is only necessary to wire the switch, then position the latter and the cord guard 119 within one of the insulating sections of the pistol grip; whereupon the other insulating section may be placed in clamping position, and the forward end of the pistol grip telescoped into the split end of tube 111. Thereafter the pairs of screw members 112, 113, 114, 115 and the pair of screws (one of which is shown at 116) are inserted and tightened to afford a complete assembly of the insulating pistol grip and switch parts. Also it will be noted that the switch lever 100 is so located with respect to the pistol grip as to facilitate control of the supply of current to the motor by the thumb of that hand of the operator which is engaged with the pistol grip.

The switch superstructure illustrated in Figs. 6 and 7 is composed substantially entirely of parts like those shown in Figs. 11, 12 and 18 of my Patent No. 1,998,962. Thus in Figs. 6 and 7 I provide a metal member having a flat portion 64 provided with openings 64^a, 64^b to receive the shanks of rivets 35 which may be upset thereover (Fig. 7) to clamp the insulating plate or plates (not shown) in position. Member 64 is provided with intermediate upstanding parallel arms 65 and 66 between which the flat punched sheet metal actuating lever 100 is positioned,—said arms and said lever having registering openings to freely receive the pivot pin 104^a. A punched and stamped sheet metal top plate 68 is provided with an opening 68^a to afford assembling clearance for the knob or trigger portion 100^a of lever 100,—and communicating with opening 68^a are alined notches 68^b, 68^c the side walls of which are adapted to straddle lever 100 (Fig. 7) to prevent side-wise displacement thereof. Top plate 68 is provided with integral downwardly extending parallel flanges 68^d, 68^e,—said flanges being adapted to overlap the arms 65, 66 of member 64 and the opposite ends of pin 104^a to prevent endwise displacement of the latter. As shown the arms 65, 66 are provided with reduced upper ends 65^a, 66^a which extend upwardly into opening 68^a in top plate 68, whereby the latter is adapted to rest upon the horizontal shoulders 65^b, 65^c and 66^b, 66^c thus provided on arms 65, 66.

Member 64 is provided at one end with an upwardly angled arm 69 having a vertically extending portion 69^a the end of which is reduced, as at 69^b, whereby horizontal shoulders 69^c, 69^d are provided. Member 64 is provided at its other end with a relatively longer upwardly angled arm 70 having a vertically extending portion 70^a the end of which is reduced, as at 70^b, whereby horizontal shoulders 70^c, 70^d are provided.

Arm 70 is punched out to provide an opening 70^e and a lug 70^f, the latter being provided with an opening 70^g to accommodate the hooked end 71^a of a coiled tension spring 71,—the other hooked end 71^b of said spring being attached to lever 100, as shown in Fig. 7. Lever 100 is thus biased to a position to effect opening of the switch contacts (not shown). It is to be understood, however, that the spring 71 may be omitted where a switch of the momentary contact type is not required.

Top plate 68 is provided with openings 68^f, 68^g to accommodate the reduced ends 70^b, 69^b, respectively, aforementioned, whereby said top

plate is also adapted to rest upon the horizontal shoulders 70^a, 70^b, and 60^a, 60^b. Said ends 70^a, 60^a are then upset or riveted over the upper surface of top plate 68, as shown in Fig. 7, to rigidly and permanently secure said parts in assembled position. Lever 100 is provided with a projection the lower edge 100^a of which is engageable with member 64 and the upper edge 100^b of which is engageable with top plate 68, whereby movement of said lever in opposite directions is limited.

Lever 100 is provided in its lower edge with a rectangular notch 100^c to accommodate the upper end of the T-shaped insulating actuator 72 aforementioned,—the relatively wide upper end of actuator 72 being movable between the inner faces of arms 65, 66 of member 64 to prevent side-wise displacement of said actuator with respect to lever 100. Top plate 68 is provided with a plurality of suitably spaced tapped openings 68^a, 68^b, 68^c and 68^d, said openings being adapted for utilization in pairs to register with variously spaced openings provided in tool handles now on the market. As will be apparent, the switch superstructure illustrated in Figs. 6 and 7, having the aforescribed insulating base 25 and the other parts of the complete switch attached thereto, may be employed in the insulating pistol grip handle illustrated in Figs. 1, 2 and 3,—the return spring 71 of Fig. 7 being either included or omitted, as desired.

What I claim as new and desire to secure by Letters Patent is:

1. In an electric snap switch, in combination, a punched and stamped sheet metal member, said member having a pair of intermediate upstanding parallel arms, a flat punched sheet metal actuating lever positioned between said arms, said arms and said lever having aligned pivot openings, a pivot pin insertable within said openings, a top plate secured to said metal member, said top plate having an opening to permit passage of the enlarged upper end of said lever, said top plate also having notches communicating with said opening to receive the opposed edges of said lever whereby the same is restrained against relative lateral displacement, said lever having a substantially rectangular notch in the lower edge thereof, and an insulating member of substantially T-shape having the upper end thereof positioned within said notch and engageable flat-wise by the opposed walls of the latter, said upper end of said insulating member being positioned between said first mentioned arms and restrained thereby against relative lateral displacement, the lower end of said insulating member being formed to provide an abutment.

2. In an electric snap switch, in combination, a molded insulating base having a main recess and a pair of auxiliary recesses, stationary and movable contact elements positioned within said main recess and wiring terminal elements positioned within said auxiliary recesses, an insulating plate overlying said contact and terminal elements to retain the same within the respective recesses, a punched and stamped sheet metal member secured to said base in clamping engagement with said insulating plate, said member having intermediate upstanding parallel arms, an actuating lever positioned between said arms, said lever and said arms having aligned pivot openings, a pivot pin insertable into said openings, a metal top plate having an opening to accommodate said lever, said member having integral parallel end portions, said top plate having opposite end portions adapted for interfitting

engagement with said parallel end portions of said member, and certain of said end portions being upset over other of the same respectively to thereby rigidly secure said parts in assembled relationship to each other.

3. In an electric snap switch, in combination, a molded insulating base having a main recess and a pair of auxiliary recesses, stationary and movable contact elements positioned within said main recess and wiring terminal elements positioned within said auxiliary recesses, an insulating plate overlying said contact and terminal elements to retain the same within the respective recesses, a punched and stamped sheet metal member secured to said base in clamping engagement with said insulating plate, said member having intermediate upstanding parallel arms, an actuating lever positioned between said arms, said lever and said arms having aligned pivot openings, a pivot pin insertable into said openings, a metal top plate having an opening to accommodate said lever, said top plate having downwardly extending flanges engageable with said pivot pin to prevent endwise displacement of the latter, said member having integral parallel end portions of reduced width providing a plurality of spaced shoulders located in a common plane, said top plate being adapted to seat against said shoulders and having openings to accommodate said end portions of reduced width, and said end portions being upset over said top plate to secure said parts in assembled relationship to each other.

4. In an electric snap switch, in combination, a recessed molded insulating base, a punched and stamped sheet metal member secured to the upper surface thereof, said member having intermediate upstanding parallel arms, an actuating lever positioned between said arms, said lever and said arms having aligned pivot openings, a pivot pin freely insertable into said openings, a metal top plate having an opening to accommodate said lever, said top plate having downwardly extending flanges overlying the ends of said pin to prevent displacement of the latter, said member also having end arms bent upwardly at an angle to the main body thereof, said last mentioned arms being additionally bent to provide end portions of equal height arranged in parallel relationship to each other, said end portions being of reduced width whereby horizontal shoulders are provided, said top plate being adapted to seat upon said shoulders and having openings to accommodate said reduced end portions, the latter being upset over said top plate to rigidly and permanently secure said parts in assembled relation, one of said arms being cut away to provide a lug, said lug and said lever having openings formed therein, and a coiled tension spring having hooked ends to respectively engage the walls of said openings, whereby said lever is normally biased to a given extreme position, the cutaway portion of said end arm also providing clearance for said spring.

5. In combination, an electric snap switch comprising a molded insulating base of substantially rectangular contour, a metallic superstructure rigidly attached to said base at the upper surface thereof, a flat punched sheet metal actuating lever pivotally supported by said superstructure and extending upwardly therefrom, a pistol grip comprising a pair of longitudinally mated sections formed of molded insulating material, the adjacent faces of said sections being complementally recessed to accommodate said switch base and

superstructure therebetween, the walls of the complementary recesses forming the sole means for restraining the switch against dislocation relatively to the pistol grip when said sections are in assembled relation, said sections having complementary grooves formed therein to provide operating clearance for the lever, means for removably retaining said sections in assembled relation, said means comprising a split tubular shaft end into which the forward portion of said pistol grip is adapted to telescope, a pair of screw threaded members penetrating said split shaft end and said sections to provide a frictional connection and a positive connection therebetween, and a pair of screw threaded members penetrating one of said sections and engaging integral threaded portions of the other section at the rear portion of the pistol grip to assist in retaining the parts in assembled relation.

6. A pistol grip for vacuum cleaner handles and the like, said pistol grip comprising two longitudinally extending complementary molded parts of insulating material, said parts being complementally recessed throughout the major portion of the area thereof to minimize the weight thereof, said parts being adapted to receive therebetween and to enclose a unitary electric snap switch of

suitable form, the actuating lever of said switch extending upwardly from the straight forward portion of said pistol grip to provide for operation of said lever by the thumb of a hand engaging said pistol grip, the walls of the complementary recesses within said parts forming the sole means for restraining said switch against displacement relatively thereto when said parts are in assembled relation, portions formed integrally with said insulating parts and extending downwardly from the straight forward portion of the pistol grip, said integral portions being recessed to provide a forwardly and downwardly extending passage, the walls of said passage being formed to provide for interlocking engagement thereof with a coiled wire cord guard of suitable form, means for rigidly but removably retaining said insulating parts in assembled relation, said means including a split tubular handle member into which the forward portion of said pistol grip is adapted to extend to a predetermined degree, and a plurality of sets of externally and internally threaded members penetrating said split handle member and said forward portion of the pistol grip to frictionally and positively interlock said parts with each other.

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