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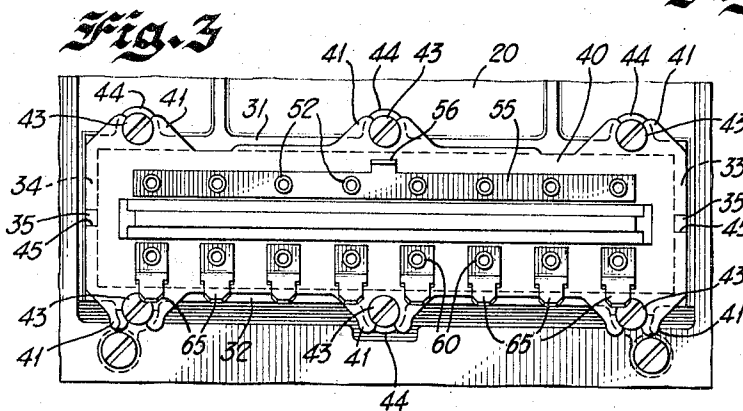
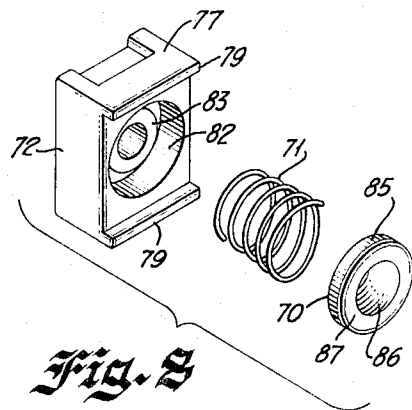
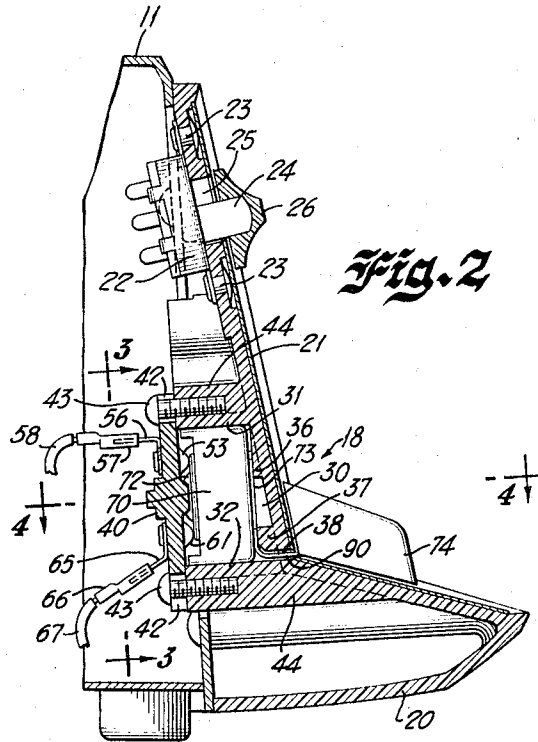
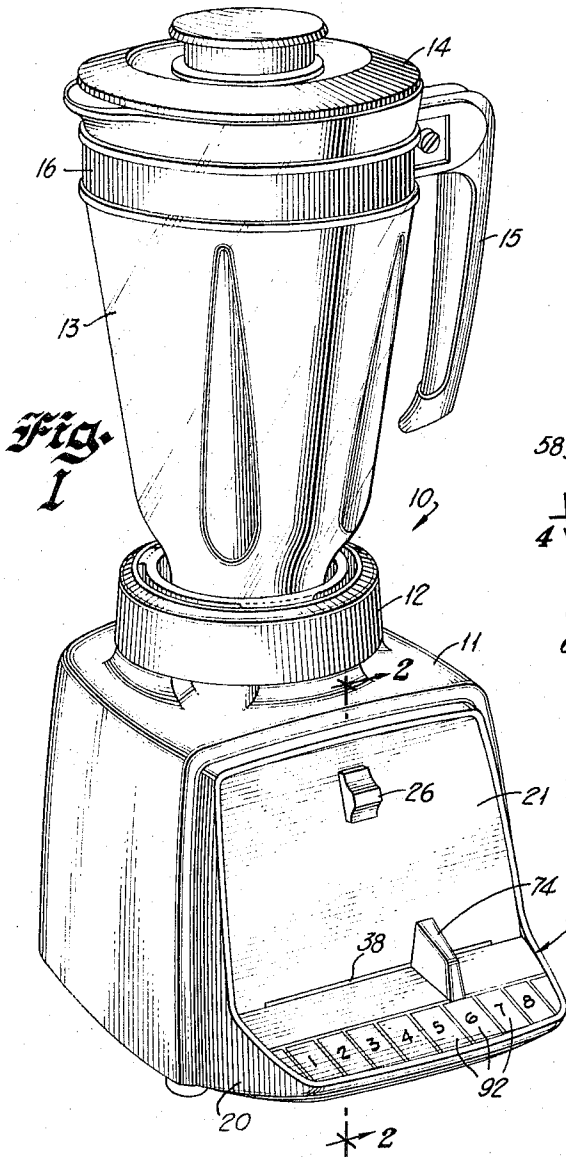
M. M. EDWARDS

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ELECTRICAL SWITCH FOR FOOD BLENDER WITH IMPROVED
CONTACT DETENT STRUCTURE

Filed Oct. 22, 1965

2 Sheets-Sheet 1



INVENTOR
MARGARET M. EDWARDS

by George R. Clark.

ATTORNEY

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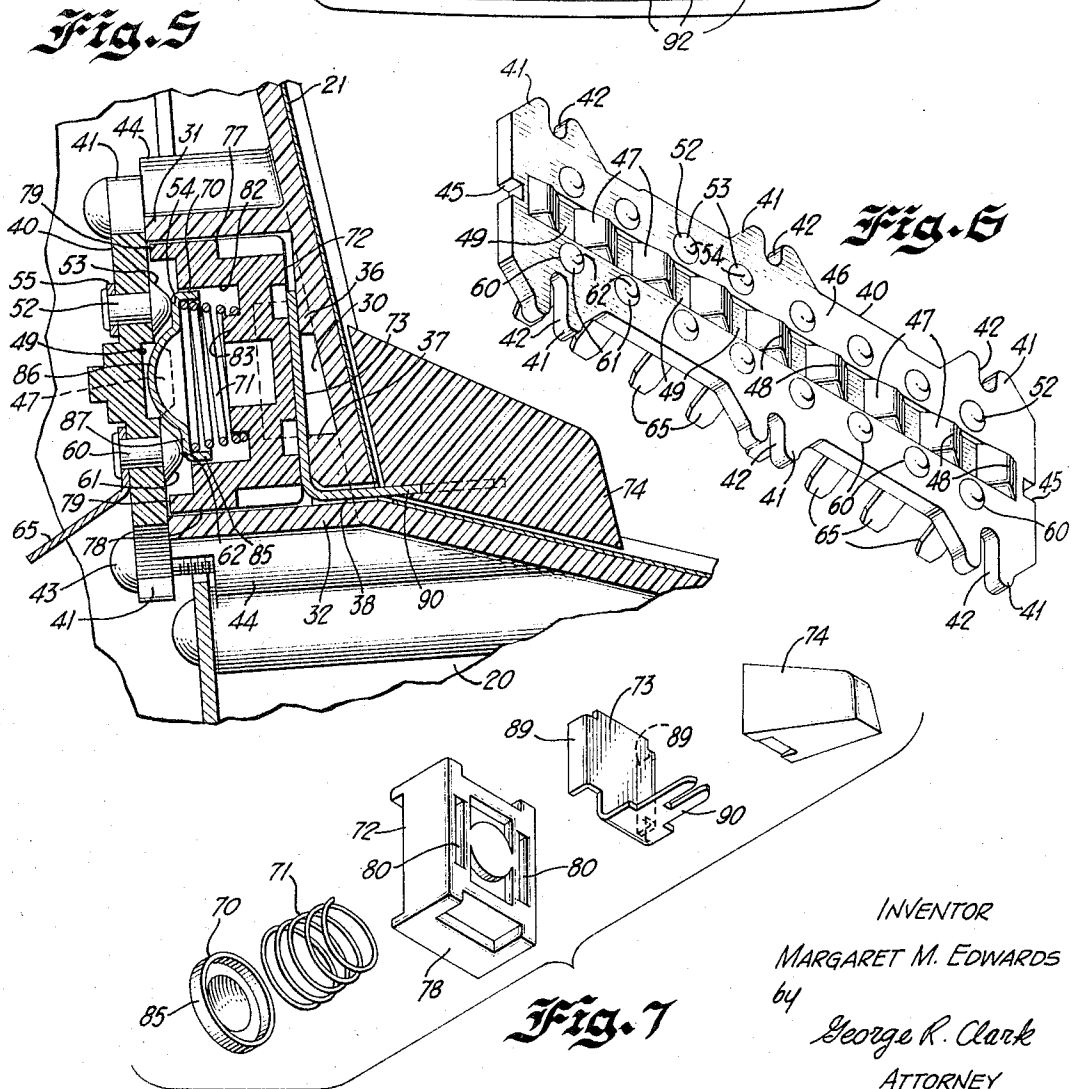
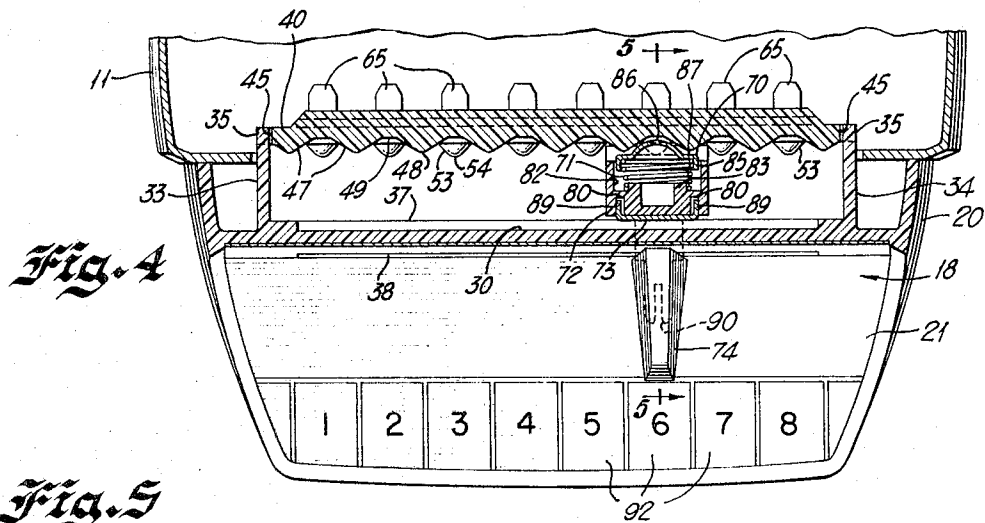
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INVENTOR
MARGARET M. EDWARDS
by George R. Clark
ATTORNEY

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ELECTRICAL SWITCH FOR FOOD BLENDER WITH IMPROVED CONTACT DETENT STRUCTURE

Margaret M. Edwards, Milwaukee, Wis., assignor to John Oster Manufacturing Co., Milwaukee, Wis., a corporation of Wisconsin

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This invention relates to electrical switches and more particularly to improvements in multiple pole slide switches.

In many motor operated appliances, it is desirable that a number of different operating speeds be provided in order to perform a particular function in the best manner. One example of such an appliance is an electrical food blender in which a great variety of substances are placed for whipping, blending, mixing, liquefying, chopping, grating, stirring, etc. These functions of the blender should be done at different motor speeds which vary from approximately 4,000 to 16,000 r.p.m. Normally, these speeds are obtained by tapping the motor field coil winding at various points and controlling the portion of the field coil used by means of an electrical selector switch.

Accordingly, it is an object of the present invention to provide a multiple pole selector switch which is economical to manufacture.

Another object of the present invention is to provide a multiple pole slide switch which consists of relatively few parts and which parts are easily and inexpensively manufactured.

Still another object of the present invention is to provide a multiple pole slide switch which is designed to permit a large number of pole contacts at a relatively low cost.

A further object of the present invention is to provide a multiple pole slide switch wherein the electrical contacts are made with a snapping action and the switch is economical to manufacture.

An additional object of this invention is to provide an articulate multiple pole slide switch which may be easily integrated with a molded front panel of an electrical device.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a front perspective view of a blender which employs an improved slide switch embodying features of the present invention;

FIG. 2 is an enlarged fragmentary sectional view taken substantially along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional plan view taken along line 4—4 of FIG. 2;

FIG. 5 is an enlarged fragmentary view taken along line 5—5 of FIG. 4;

FIG. 6 is a perspective view of the rivet block assembly;

FIG. 7 is an exploded assembly view of the contact carrier assembly; and

FIG. 8 is an exploded perspective view of a portion of the contact carrier assembly.

Briefly, the present invention relates to an improved multiple pole electric slide switch having a rivet block of electrically insulating material defining a series of

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spaced cams and supporting two rows, each of which is made up of a plurality of electrically conducting spaced rivets with one row positioned on each side of said cams so that the rivets are aligned opposite one another in pairs, each of which is positioned between said cams. A contact carrier is supported and guided by a switch block whereby the contact carrier may slide in a direction parallel to the rows of rivets. An electrical contact is positioned between the carrier and rivet block and has an integral detent portion which is adapted to cooperate with the cams to locate the contact in engagement with a selected pair of rivets. The contact is biased toward the rivet block by a spring which is disposed between the contact and the contact carrier.

Referring now to the drawings in which like numerals designate like parts throughout the several views, a blender which utilizes the subject invention is designated generally by the reference numeral 10. It should be understood that the invention may be employed in various electrical apparatus. As seen in FIG. 1, the blender 10 includes a base or motor housing 11 having a container holder 12 on the upper portion thereof to removably support a container 13 which has a cover 14. To facilitate the removal of the container from the container holder, there is provided a handle 15 which is secured to the container by a metallic strap 16. Within the base 11 but not shown in the drawings is an electric motor for rotating agitator blades positioned within the container 13. For the purpose of providing a number of different operating speeds, the motor has a field coil which is tapped at determined intervals in order that a given portion of the field coil may be energized by a multiple slide switch 18 to provide a specific speed.

The front portion of base 11 is enclosed by a removable switch block or closure plate 20, preferably molded from a non-conducting plastic material. Overlying the front section of the switch block 20 is an escutcheon 21 which may be fabricated from sheet aluminum. For the purpose of energizing the blender motor, a single pole double throw slide switch or an off-on switch 22 is secured to the back side of switch block 20 by means of a plurality of rivets 23. The off-on switch 22 is positioned so that its control lever 24 projects through an elongated slot 25 defined in both the switch block 20 and the escutcheon 21. As may be easily seen in FIG. 2, the escutcheon 21 covers the rivets 23 so that they may not be seen by the user, and it thus enhances the appearance of the blender. Preferably, an off-on switch knob 26 is secured to the control lever 24 so that the off-on switch may be easily actuated by the user and provide a better appearance. Terminals emanating from the back side of the off-on switch 22 are attached to the electrical circuit for the blender in such a manner that the off-on switch may, at any time, turn the blender motor on or off irrespective of the speed setting.

Extending from the inside surface of the switch block 20 is a cup-shaped portion 30 having an inwardly extending upper wall 31 and a lower wall 32 which lie generally in horizontal planes. Completing the cup-shaped portion 30 are vertical walls 33 and 34 which each has a centrally disposed tab 35 which projects toward the base 11 for a purpose to be disclosed hereinafter. On the bottom of cup-shaped portion 30 are upper and lower guiding ribs 36 and 37 which are generally disposed in the vertical plane and are relatively flat on their outer surface. Providing an operating access to the interior of portion 30 is a horizontally disposed slot 38 immediately below the lower guiding rib 37.

Closing the rearwardly facing mouth of the cup-shaped portion 30 is an elongated rivet block 40 which has a plurality of ears 41 formed along the upper and lower edges

thereof. Each ear 41 has a centrally disposed slot 42 which is adapted to cooperate with retaining screws 43 to lock the rivet block 40 in its proper location with respect to the cup-shaped portion 30. As may be best seen in FIG. 3, the screws 43 are threadedly fastened to integral bosses 44 on the inside surface of switch block 20. When the screws 43 are tightened, the rivet block 40 is firmly held against walls 31, 32, 33 and 34. In order for the rivet block 40 to be accurately positioned with respect to the cup-shaped portion 30, each end of the block 40 is notched at 45, and the notches are located to cooperate with tabs 35 so that the rivet block 40 is prevented from shifting. On the surface 46 of the rivet block 40 facing the cup-shaped portion 30, there are provided a plurality of cams 47 which extend longitudinally and horizontally across the rivet block. Preferably, each cam 47 has a generally V-shaped cross section with an included angle of approximately 120 degrees. Each cam has a crest 48 projecting above the inside surface 46 of the rivet block 40. As seen in FIG. 6, the cams 47 are molded so that a valley 49 is formed between adjacent cam crests 48 and extends below the rivet block inside surface 46. A plurality of electrical contact rivets 52 are mounted on rivet block 40 in spaced relation in a row and are positioned above the row of cams 47 with the individual rivets 52 placed between the adjacent pairs of cam crests 48 and opposite the cam valley 49. Each of the rivets 52 has an enlarged head 53 which is conically shaped and has a rounded peak 54 pointing away from surface 46. Preferably, the rivets are fabricated from brass and are silver plated to provide low contact resistance. The rivet block 42 is made of a non-conducting plastic material. In order to secure the rivets rigidly to the rivet block 40 and electrically interconnect them, each rivet is fastened by riveting to a common terminal bar 55 which extends parallel to the row of rivets 52 on the opposite side of rivet block 40 from the cams 47. The bar 55 has an integral terminal 56 which is bent at a right angle with respect to the bar. Terminal 56 is adapted to receive a connector 57 which is crimped to lead wire 58 which is in series with off-on switch 26. The circuit for the blender is such that the off-on switch 26 may be used to energize or de-energize bar 55 which will, consequently, energize or de-energize the row of rivets 52. In the specific embodiment herein illustrated, the slide switch 18 permits eight different speed settings so that eight different electrical connections are required between the switch and motor field coil.

Positioned below the row of cams 47 is a row of rivets 60 which are similar to rivets 52 having heads 61 with rounded peaks 62. The row of rivets 60 is parallel to the row of cams 47 and the row of rivets 52 with the individual rivets 60 spaced opposite the cam valleys 49 so that the rows of rivets 52 and 60 form a plurality of pairs of rivets which are vertically aligned with one another. Each individual rivet 60 is riveted to a separate terminal 65 which extends away from the backside of the rivet block 40 at an acute angle. Each terminal 65 receives a connector 66 which is crimped to a lead wire 67. The lead wires 67 are in electrical connection with various taps of the motor field coil so that when pairs of rivets 52 and 60 are electrically connected, the blender motor will operate at a selected speed. It is desirable to have the lead wires 67 tap into the motor field coil in such a way that, as consecutive pairs of rivets 52 and 60 are closed, the speed of the blender may be either progressively increased or decreased in determined increments.

In order to connect selected pairs of rivets 52 and 60, there is provided in accordance with the present invention a contact carrier assembly which is illustrated in FIG. 7 and which includes a cup-shaped contact 70, coil spring 71, carrier 72, L-shaped lever 73 and switch knob 74. The carrier 72 is molded preferably from a non-conducting plastic material and has a flat upper surface 77 and a lower surface 78. Each surface 77 and 78 has a notched

out portion which faces toward the switch block 20 to reduce the surface area of 77 and 78. The carrier 72 is positioned in the cup-shaped portion 30 so that the upper surface 77 slides against the upper wall 31 and the lower surface 78 slides against and is guided by wall 32. With this construction, the carrier 72 is accurately guided between walls 31 and 32 in a direction parallel to the rows of rivets 52, cams 47 and rivets 60 with the center of the carrier 72 being disposed over the row of cams 47. For controlling the movement of carrier 72 with respect to the inside surface 46 of the rivet block, the carrier is provided with integral spaced projections 79 which are adapted to engage rivet block surface 46 outside of the rows of rivets 52 and 60. On the surface of carrier 72 which faces upper and lower guiding ribs 36 and 37, there is defined two spaced parallel slots 80 which extend in a vertical direction toward walls 31 and 32. These slots are widely spaced and, consequently, each slot is relatively close to an outside edge of the carrier 72. On the side of the carrier 72 facing towards the rivet block surface 46, there is defined a cavity 82 which contains a central hollow boss 83. As can be easily seen in FIGS. 5 and 8, cavity 82 is adapted to receive spring 71 so that one end of the spring wraps around boss 83. The other end of spring 71 engages the inside of the cup-shaped contact 70 and biases it towards the rivet block 40. The contact 70 has a rim 85, spherical detent portion 86 and an annular contact surface 87 which forms a ring around detent portion 86. Since rim 85 has a slightly smaller diameter than carrier cavity 82, the contact 70 is guided by the carrier 72 for proper alignment with the rivet block 40. Thus, the spherical detent portion 86 of contact 70 is aligned to engage with the row of cam surfaces 47 thereby tending to force the contact spherical detent portion 86 toward one of the cam valleys 49 due to the V-shaped configuration of the cams and the biasing force of spring 71. When the contact 70 is positioned so the spherical detent portion 86 overlies a cam valley 49, the contact surface 87 engages a pair of rivets 52 and 60 whereby completing the electrical circuit therebetween. The engagement between contact surface 87 and a pair of rivets occurs before the detent 86 is permitted to reach the valley 49 so that detent portion never touches the valleys 49 or inside surface 46 but merely engages the upper portion of the cams 47.

When a different speed is desired, the carrier 72 is slid within the cup-shaped portion 30 causing the contact 70 to move lengthwise with respect to the row of cams 47 and causing the spherical detent 86 to ride upwardly along the cam surface. As this happens, the contact is forced within cavity 82 and, consequently, compresses spring 71. When the contact 70 is forced toward the carrier 72, the contact surface 87 is disengaged from a pair of electrical rivets. Once the spherical detent has passed over the crest 48 of a cam, the spring 71 quickly biases the contact 70 towards the rivet block 40 so that the contact surface 87 engages with the next pair of rivets with a snapping action. Due to the rapid movement of the contact 70, very little arcing occurs between the for the contact to rotate during the switch movement so that rivets engage at different points along annular contact surface 87.

To provide a connection between carrier 72 and lever contact surface 87 and the rivets. There is a tendency 73, lever 73 has integral flanges 89 which are adapted to engage in slots 80. Thus, as lever 73 is slid, the carrier 72 will correspondingly move. To maintain the carrier 72 at the proper distance from the rivet block, the upper guide rib 36 and lower rib 37 are disposed parallel to the rivet block 40. Lever 73 has a bifurcated leg 90 which is formed to extend through slot 38 in the switch block 20. Switch knob 74 defines a twin passageway which is adapted to receive and lock with the leg 90 so that the knob 74 on the outside of switch block 20 is secured to the lever 73. When it is desired to slide the carrier 72, the switch knob

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74 is moved horizontally. Indicia 92 is located on the escutcheon 21 so that the operator may move the switch knob 74 to a location which will electrically contact the pair of rivets causing the proper amount of the field coil to be energized to produce the desired speed. It is found that a slight amount of grease having a non-conducting characteristic is beneficial between the upper surface 79 of carrier 72 and wall 31, between surface 78 and wall 32 and between the lever 73 and ribs 36 and 37.

As hereinbefore explained, electric food blender 10 has a slide switch 18 which is connected electrically in series with a motor having a tapped field coil in order selectively to afford a number of operating speeds. In addition, an off-on switch 22 is provided in series with the slide switch so that the slide switch does not have to be actuated in order to turn the blender motor off or on. Thus, the slide switch may remain at a desired speed setting and the blender may be started or stopped by the off-on switch. In this manner, it is not necessary to move the slide switch through a full range of speeds to actuate the motor.

In the embodiment herein described, the switch block or closure plate 20 for the motor housing is used to support both the off-on switch and the slide switch as well as define a portion of the slide switch. With this arrangement, the switches are easily assembled to the closure plate to reduce assembly costs as well as facilitate repairs. Furthermore, the closure plate reduces the cost of the slide switch by reducing the number of required parts.

While there has been shown and described a particular embodiment of the present invention, it will be apparent to those skilled in the art that various modifications may be made without departing from the invention in its broader aspects and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A multiple pole electric slide switch comprising a rivet block carrying a plurality of spaced contact rivets aligned in a first straight row with said rivets in electric contact with a common terminal bar, a plurality of spaced contact rivets attached to said block in a second straight row positioned parallel to said first row with the rivets in each row in alignment with one another to form pairs, said block defining a plurality of spaced integral cams which are located in a third straight row positioned between said first and second rows with each cam longitudinally spaced between adjacent pairs of rivets, a contact carrier, means supporting and guiding said carrier so that it is slidable in a direction parallel to said three rows, a contact positioned between said carrier and block and having an integral detent portion which is adapted to cooperate with said cams to locate said contact in engagement with a selected pair of rivets, a spring positioned between said carrier and contact bar biasing said contact toward said block.

2. The electric slide switch of claim 1 wherein said carrier has a flat upper and lower surface, said means includes a switch block having integral walls for receiving said carrier and engaging said surfaces, said walls extending parallel to said rows and positioned to permit said carrier to slide in a direction parallel to said rows so that said contact may engage a selected pair of rivets and said contact detent portion cooperates with said spaced cams.

3. The electric slide switch of claim 2 wherein said carrier defines integral projections which extend from said carrier toward said rivet block and are spaced outside said three rows whereby said rivets and cams are not permitted to engage said carrier.

4. The electric slide switch of claim 2 wherein said switch block defines an elongated opening between said walls and extending parallel thereto, said switch block

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forming a pair of integral ribs which are disposed between said walls and extend parallel to said switch block opening, an L-shaped lever secured to said carrier and positioned between said carrier and switch block ribs with a leg thereof extending through said opening whereby said leg is manually operatable to selectively position said contact.

5. The electric slide switch of claim 4 wherein said carrier defines a pair of slots which extend normal to said three rows, said lever having a pair of flanges at opposite sides thereof which are adapted to enter said slots for securing said lever and carrier together.

6. The electric slide switch of claim 4 wherein said one lever leg has a locking means at the end thereof, a switch knob having integral means for securing said knob to said lever leg locking means.

7. In a multiple pole electric slide switch comprising a rivet block of electrical insulating material defining a plurality of spaced cams, an electrically conducting means secured to said block and positioned on one side of said cams, a plurality of electrically conducting rivets secured to said block disposed on the other side of said cams, an electrically conducting contact having a portion adapted to engage said conducting means and only one rivet at a time and having a detent portion adapted to engage said spaced cams, and means guiding and supporting said contact so that it may be slid to engage selectively any of said plurality of rivets forming an electrically conducting bridge between said conducting means and said selected rivet.

8. In a multiple pole electric slide switch comprising a block of electrically insulating material defining a plurality of spaced cams each of which has a crest, two rows each of which includes a plurality of electrically conducted spaced rivets secured to said block with one row positioned on each side of said cams and said rivets aligned opposite one another in pairs, said pairs positioned between said cam crests, said rivets each having a peak which is the furthestmost point thereof from said block, a contact having a detent portion adapted to engage said cams and a second portion adapted to engage a pair of said rivets, means guiding and supporting said contact so that it may be slid parallel to said cams and rivets, said cam crests extending sufficiently from said block so that said second contact portion is completely disengaged from said rivets when said detent contact portion engages said cam crests, said detent contact portion formed so that it does not effectively engage said block when said second contact portions are in electrical connection with a pair of said rivets.

9. In a multiple pole slide switch for electrical apparatus having a casing defining an opening comprising a switch block formed to cover the casing opening; said block defining an integral cup-shaped portion formed on the side of the block facing the casing; said portion including a pair of parallel spaced walls; a second block secured to said walls including cam means extending parallel to said walls and facing said portion, a plurality of contacts positioned adjacent said cam means; a conductor disposed within said portion provided with means for cooperating with said cam means to position said conductor for electrically bridging at least two said contacts; said switch block defining an access from outside the casing to within said portion; and slide means secured to said conductor and projecting through said access whereby said conductor is slideable by the user to selectively position it in engagement with determined contacts.

10. The switch of claim 9 wherein said portion defines integral means for locating said second block with respect to said walls.

11. In a multiple pole slide switch including a first block of non-conducting material defining a row of cams, a plurality of contacts secured to said block and positioned adjacent said cams, a second block secured to said first block, a conductor positioned between said blocks and permitted to slide over said cams, said conductor provided

with detent means adapted to cooperate with said cams to position said conductor in electrical contact with selected contacts, and means biasing said conductor toward said cams and contacts, said conductor being completely disengageable from all of said contacts while sliding in engagement with said cams whereby the conductor engages said contacts with a snapping action.

12. In a multispeed electrical device comprising a motor including a tapped field coil, an off-on switch connected electrically in series with said motor where the contacts in each pair are electrically insulated from each other, a slide switch provided with a plurality of pairs of contacts wherein the contacts in each pair are electrically insulated from each other, one contact of each of said pairs of contacts electrically connected to a common conductor and the other contact of each of said pairs of contacts electrically connected to said tapped field coil so that said pairs of contacts determine the portion of said coil energized, means manually movable for selectively connecting one pair of said pairs of contacts in electrical conducting relationship with each other so that only one pair of contacts are electrically closed at a time, said common conductor and off-on switch being electrically connected in series whereby the device is started and stopped by said off-on switch without requiring movement of said means.

13. In a multispeed electric food blender comprising a motor having a field coil which is tapped at intervals for producing different motor speeds, a slide switch provided with a plurality of pairs of contacts with the contacts of the pair being electrically insulated from each other, one contact of each said pairs of contacts being wired for connection with a remote electrical power source and the other contact of each of said pairs electrically connected to said tapped field coil so that said pairs of contacts determines the portion of said coil energized, contact means for said slide switch which is manually operable to selectively engage one of said pair of contacts for electrically connecting therewith, said contact means permitting only one pair of contacts to be closed at a time, an off-on switch connected in series with said motor and slide switch whereby the blender is started and stopped without requiring the actuation of said slide switch.

14. The food blender of claim 13 wherein the blender includes a motor housing having a removable wall, said switches being secured to said removable wall.

15. A multiple speed motor operated device comprising a motor housing defining an opening, a removable closure plate adapted to closing said housing opening, a motor having a tapped field coil disposed within said housing, a slide switch secured to said closure plate, said slide switch provided with a plurality of pairs of contacts, one contact of said pairs of contacts being wired for connection with a remote electrical power source and the other contact of said pairs of contacts electrically connected to said tapped field coil so that said pairs of con-

tacts determine the speed of said motor, contact means with in said slide switch for selectively engaging one of said pairs of contacts, lever means disposed outside said plate and secured to said contact means so that the contact means may be manually actuated, and an off-on switch secured to said closure plate and connected electrically in series with said slide switch.

16. A multiple speed motor operated device comprising a motor housing defining an opening, a closure plate secured to said housing closing said housing opening, said closure plate forming an integral cup-shaped portion with the mouth facing toward said housing, a slide switch secured to said cup-shaped portion, said slide switch including slidable contact means, said plate defining integral means for guiding and positioning said contact means, a motor disposed within said motor housing, means electrically connecting said motor and slide switch whereby said motor may operate at multiple speeds, and an off-on switch carried by said closure plate and connected electrically in series with said slide switch.

17. In a multispeed electrical appliance comprising a housing formed with an opening, a motor having a tapped field coil disposed within said housing, a removable closure plate adapted to close said housing opening and defining an integral cup-shaped portion facing inwardly toward said housing, a block secured to said plate cup-shaped portion and including cam means linearly arranged and facing said portion, a plurality of pairs of contacts positioned on said block adjacent said cam means, one contact of each of said pairs of contacts electrically connected to a common conductor and the other contact of each of said pairs of contacts electrically connected to said tapped field coil so that said pairs of contacts determine the portion of said coil energized, a slidable conductor disposed within said portion provided with means for cooperating with said cam means to linearly position said slidable conductor for electrically bridging said pairs of contacts, said cup-shaped portion defining a slot extending parallel to said cam means, slide means secured to said slidable conductor and projecting through said slot whereby said conductor is slidable to selectively engage said pairs of contacts, and an off-on switch secured to said housing and connected electrically in series with said motor and common conductor so that the appliance can be started and stopped by said off-on switch without requiring movement of said slide means.

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ROBERT K. SCHAEFER, *Primary Examiner.*

J. R. SCOTT, *Assistant Examiner.*