April 13, 1954 P. G. FRERER 2,675,436

SWITCH FOR ELECTRIC FANS

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Fig. 1

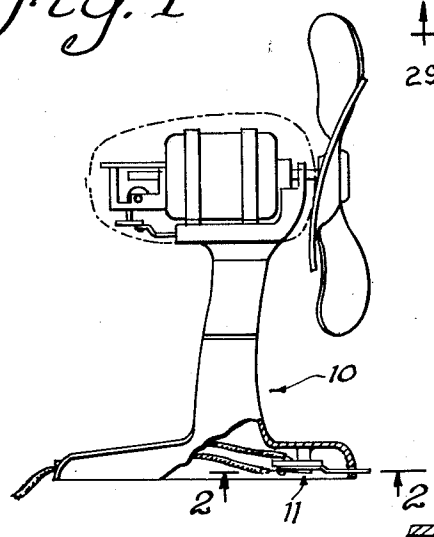


Fig. 6

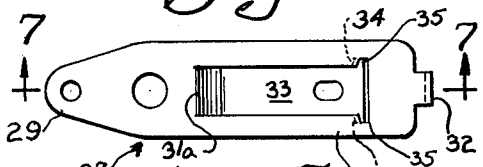
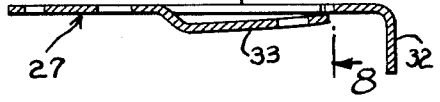


Fig. 7



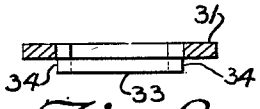
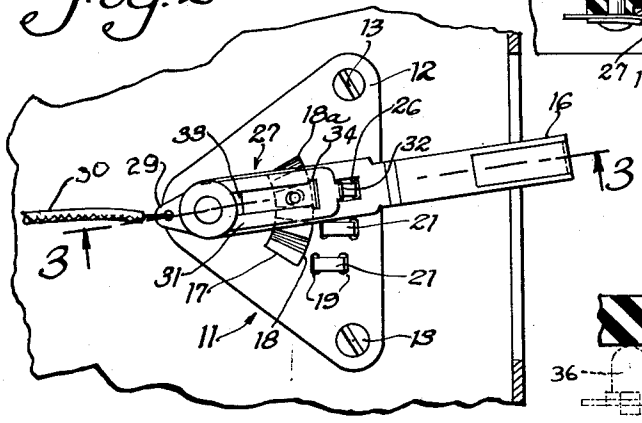


Fig. 8

Fig. 2



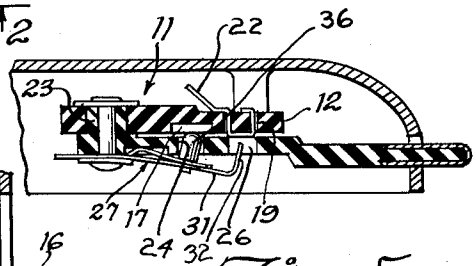


Fig. 5

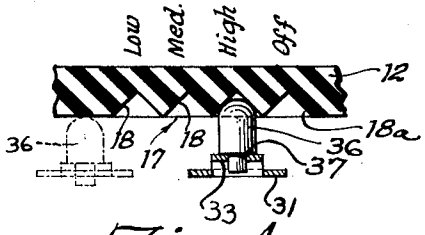


Fig. 4

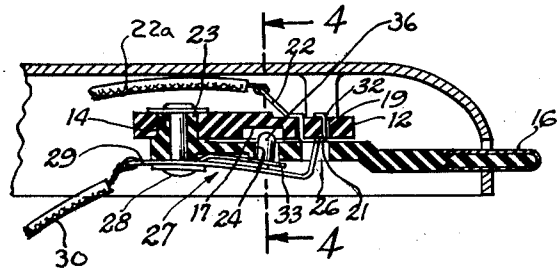


Fig. 3

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SWITCH FOR ELECTRIC FANS

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4 Claims. (Cl. 200—11)

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My invention relates to electric switch means and more particularly to a multiple contact switch means of the type such as used for varying the speed of an electric motor.

One of the objects of my invention is the provision of a switch means embodying a contact blade adapted to undergo sharp, engaging and separating movements at it meets with a series of contact terminals so as to minimize the effects of arcing and wear which are present in conventional switches wherein the movable contact arm or blade slides over contact terminals in edge to surface engagement.

A further object of my invention is the provision of a switch means of the foregoing character in which the switch blade upon making or breaking contact with a contact terminal is caused to be lifted toward or away from the said terminal, thereby minimizing arcing and wear between the switch blade and the terminal.

Another object of my invention is the provision of a switch means which is simple in construction, economical to manufacture and durable and efficient in service.

Other and further objects and advantages of my invention will become apparent from the following description when considered in connection with the drawings in which

Fig. 1 is an elevational view of an electric fan with a portion broken away to illustrate my invention incorporated in the base thereof.

Fig. 2 is a cross sectional view of an enlarged scale taken substantially from line 2—2 of Fig. 1 and looking in the direction of the arrows.

Fig. 3 is a cross sectional view taken substantially on line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view taken substantially on line 4—4 of Fig. 3.

Fig. 5 is a cross-sectional view similar to Fig. 3 but showing the parts in a different operative position.

Fig. 6 is a plan view of the switch blade.

Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 6, and

Fig. 8 is a cross sectional view taken on line 8—8 of Fig. 7.

Referring to the drawings, the numeral 10 indicates generally an electric fan in the base of which is disposed the switch means of my invention the base being indicated generally by 11. It will be understood, however, that the particular application is merely illustrative of one use for the switch means and that my invention is not to be limited specifically to the application illustrated. The switch means 11 of my invention

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comprises a mount plate 12 molded of suitable electrically non-conductive material and provided with a pair of openings for receiving screws 13 by which the plate may be mounted in the base of an electric fan or at any other desired place. The mount plate 12 may be of any suitable form, that illustrated in the drawings being triangular. The mount plate 12 is provided with an aperture 14 at a point corresponding substantially to the apex of the triangular form, the said aperture being adapted to receive one end of the switch lever 16 hereinafter to be described. The plate 12 is preferably molded with a toothed bed 17 on one surface thereof, the toothed bed having radial serrations 18, as illustrated in Figs. 2 and 4. Additionally, the mount plate 12 is provided with a plurality of pairs of slots 19 in concentric relation to the serrations with each pair of slots arranged in substantial alinement with a trough of a serration 18, as illustrated in Fig. 2. It will be noted that while four serrations or teeth 18 are illustrated only three pairs of slots 19 are provided in the mount plate. Interlocked in each pair of slots 19 in the manner illustrated in Figs. 3 and 5, is a contact terminal 21 formed of relatively thin gage electrical conducting material. Each of the contact terminals is provided with a solder lug 22 for connection to a suitable electrical conductor wire 22a. Each contact terminal 21 is related to one position of speed adjustment, as for example, high, medium or low for the fan motor. The end tooth or serration 18a is not provided with an alined contact terminal 21 and thus constitutes the "Off" position for the fan motor.

The lever 16 is formed substantially in longitudinal cross section as illustrated in Figs. 3 and 5 and includes a boss 23 at one end thereof, the said boss being received in the aperture 14 of the mount plate 12 so that the lever is pivotable about the axes of the said aperture in a plane substantially parallel to that of the mount plate. The lever 16 is provided with a circular aperture 24 which is alined with the toothed bed 17 of the mount plate and is also provided with a substantially rectangular aperture 26 which is alined with the contact terminals 21. A resilient arm or blade 27, hereinafter to be described is secured to the lever 16 by a pin 28 which also secures the lever to the mount plate. The end of the resilient arm is provided with a solder lug 29 to which an electrical conductor 30 is attached.

The resilient arm 27 is formed of resilient electrically conductive material and includes body portion 31 and a contact element 32 at a right angle to the plane of the body, the said contact

element entering into the aperture 26 of the lever and being adapted to engage the contact terminal 21 on the mount plate. As will be seen more clearly by reference to Fig. 7 the body portion 31 has a finger portion 33 struck out from the plane thereof, the said finger portion being connected to the body as at 31a. It will be apparent that the finger portion 33 is hinged relative to the body portion 31 and may move relative thereto as a result of the finger portion being offset from the plane of the body portion. At the extreme end of the finger portion 33 are laterally directed ears or lugs 34 corresponding to similarly located cutouts 35 in the body portion 31. As a result of the offsetting of the finger portion 33 the lugs 34 are moved out of registration with corresponding cutouts 35 in the body portion as clearly illustrated in Figs. 6 and 7 and, accordingly, the said lugs engage with the underside of the body portion and effect an elevation thereof when the finger portion 33 is raised in a manner, as will be presently described. The aperture 24 in the lever 16 is adapted to receive a pin 36 having a round or blunt nose with the nose being adapted to engage in the serrations 18 of the toothed bed. The opposite end of the said pin is preferably reduced in size to provide a shoulder 37, the reduced end passing through an aperture in the finger portion 33 and the shoulder 37 engaging the topside of the said finger portion.

The operation of my improved switch means should be apparent from the foregoing but briefly stated it is as follows: When the switch is in "Off" position the lever 16 is alined with serration 18a and the pin 36 engages therewith. When the lever 16 is moved to "High" speed position immediately adjacent to the "Off" position, the pin 36 is caused to ride to the crest of the serration so as to act on the finger portion 33 and move the same in a direction away from the plane of the surface of the contact terminal. Movement of the finger portion 33 in a direction indicated causes the laterally directed lugs 34 thereof to engage against the body portion 31 and thereby effect a corresponding movement of the body portion and its associated contact member 32 in a direction away from the plane of the contact terminal. Thus, the contact member 32 is caused to describe a line of movement corresponding substantially to the contour of a serration 18. Accordingly, as the pin 36 is caused to follow the surface contour of the serrations 18 by manipulation of the switch lever 16 the contact element 32 is moved from engagement with a terminal 21 as illustrated in Fig. 3 to an intermediate out of contact position illustrated in Fig. 5, the latter position corresponding to one of maximum movement of the contact member in a direction away from the plane of a contact terminal. When the pin 36 reaches a point just beyond the crest of a serration, the resilience of the finger portion 33 urges the pin 36 to follow the contour of the serration in a direction to engage in the trough between two crests as illustrated in the solid lines in Fig. 4. Thus, the finger portion 33 serves to retain the lever 16 in a position of placement until it is manually dislodged therefrom thus effecting positive indexing of the said lever. The foregoing action takes place between adjacent contact terminals so that in moving the switch lever 16 from one contact terminal 21 to another the contact member 32 is caused to be sharply moved away from engagement with a contact terminal almost immediately upon initiation of movement of the switch lever. After traversing the gap between two adjacent contact terminals the contact member 32 is caused to be moved into sharp engagement with a succeeding contact terminal. Thus there is substantially no wiping action of the contact member 32 over the contact terminals with a consequent reduction in wear and a minimum of arcing. Further, because the finger portion 33 is normally spaced from the body portion 31 when the switch is in "On" position effective contact pressure of the contact member 32 on a contact terminal 21 is always maintained.

Various changes coming within the spirit of my invention may suggest themselves to those skilled in the art. Hence I do not wish to be limited to the specific embodiments described or uses mentioned, but intend the same to be merely exemplary, the scope of my invention being limited only by the appended claims.

I claim:

1. An electrical switch comprising a mounting plate, a lever pivotally attached to said plate, a plurality of contact terminals carried on said mounting plate, a resilient arm having a contact portion and movable with said lever, said arm having a resilient finger intermediate said arm and said lever and adapted to engage with said arm, camming surfaces on said plate each intermediate adjacent contact terminals and inwardly of said terminals, a detent pin movable with said lever and engageable with said camming surface and with said resilient arm, said pin when moved from a position of rest by said lever over said camming surface first moving said finger in a direction to engage said arm to cause the contact portion thereof to move in a direction away from the surface of contact of a contact terminal and then causing said finger to move said contact portion in a direction towards the surface of contact of a succeeding contact terminal.

2. An electrical switch comprising in combination a plate having a plurality of contact terminals mounted thereon, a lever pivotally mounted on said plate, camming surfaces on said plate each intermediate adjacent contact terminals and inwardly thereof between said terminals and the pivotal connection of said lever, a resilient conductor arm having a contact end and supported to move with said lever, said contact end being normally urged in a direction to engage with said contact terminals, a resilient finger connected to said conductor arm and disposed in a plane spaced from and intermediate said arm and said lever, said finger having a portion engageable with said arm, a protuberance on said finger arranged to wipe over said camming surfaces whereby said finger is caused to engage said arm to cause said contact end in passing to an adjacent terminal to move away sharply from engagement with a terminal and then to move towards an adjacent terminal.

3. An electrical switch comprising a mounting plate, a plurality of contact terminals mounted on said plate, a lever pivotally mounted on said plate, said plate having a toothed bed with the teeth thereof intermediate adjacent contact terminals and inwardly thereof between the terminals and the pivot connection of said lever, a resilient conductor arm supported to move with said lever, said arm having a contact end passing through an aperture in said lever and normally urged into engagement with a contact terminal, a resilient finger struck out of said arm but in-

tegrally connected thereto at one end and offset from said arm in a plane spaced from and intermediate said arm and said lever, said finger having a portion engageable with said arm, a protuberance on said finger projecting through an opening in said lever and arranged to wipe over said toothed bed whereby said finger is caused to engage said arm to cause said contact end in passing to an adjacent terminal to move away sharply from engagement with the terminal and then to move towards an adjacent terminal.

4. An electrical switch comprising a mounting plate, a plurality of contact terminals mounted on said plate, a lever pivotally mounted on said plate, said plate having a toothed bed with the teeth thereof intermediate adjacent contact terminals and inwardly thereof between the terminals and the pivot connection of said lever, a resilient conductor arm supported to move with said lever, said conductor arm formed with a finger struck out from said arm and offset therefrom intermediate said arm and said lever, said finger terminating short of said arm and having

integral lateral projections engageable with said arm, said arm having a contact end passing through an aperture in said lever and normally urged into engagement with said contact terminals, a protuberance on said finger projecting through an opening in said lever and arranged to wipe over said toothed bed whereby said finger is caused to engage said arm to cause said contact end in passing to an adjacent terminal to move sharply away from engagement with a terminal and then to move towards an adjacent terminal.

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