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[54] **TOGGLE SWITCH WITH PIVOTAL SHORTING BAR BRIDGING STATIONARY CONTACT PINS, AND SLIDABLE CAM BLOCK DETENT MEANS**
5 Claims, 8 Drawing Figs.

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H01h 1/20, H01h 23/30
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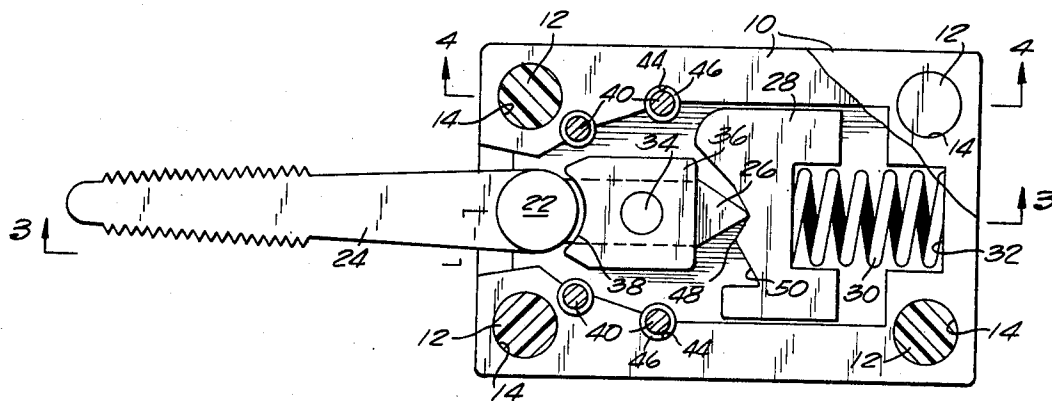
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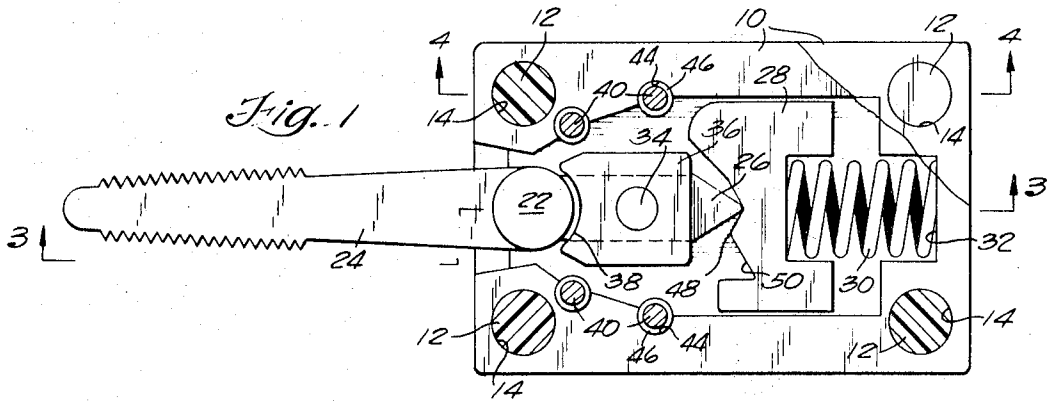
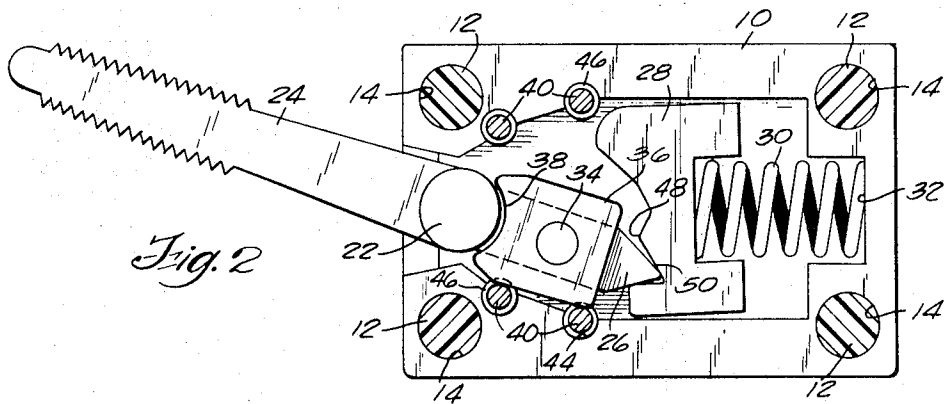
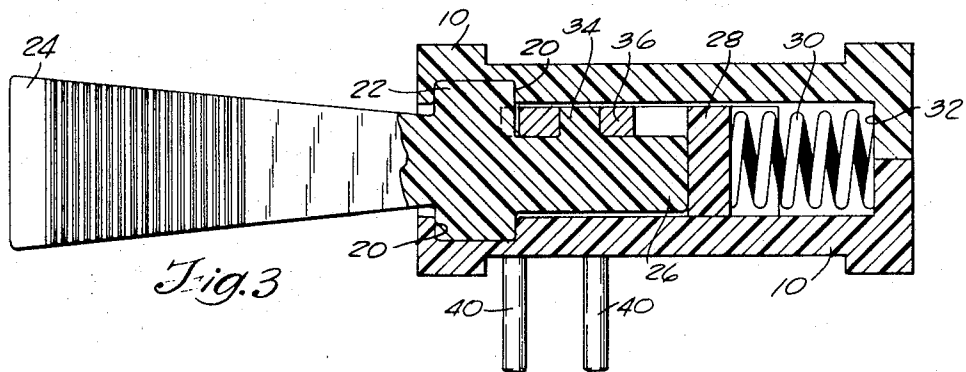
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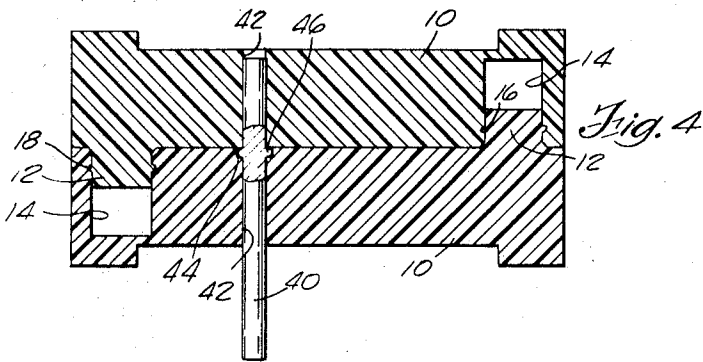
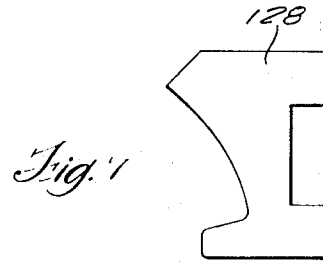
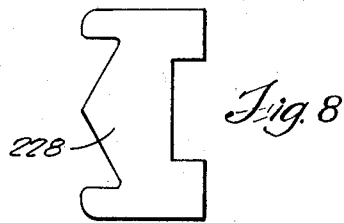
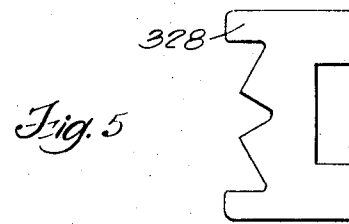
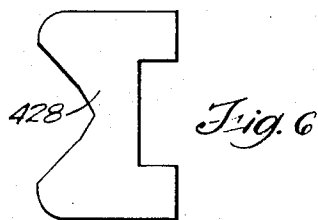
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ABSTRACT: The point of the pivoted toggle lever acts on the cam surfaces of the spring biased slidable cam to obtain the desired action depending upon the cam configuration. The shorting bar is mounted on the toggle lever for limited pivoting action to insure equal pressure against the contact pins at the extremes of motion. The pins are brought out of the case for simple connection to printed circuit boards. All parts are mounted in and retained by the case halves which are identical and snap together.





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TOGGLE SWITCH WITH PIVOTAL SHORTING BAR BRIDGING STATIONARY CONTACT PINS, AND SLIDABLE CAM BLOCK DETENT MEANS

BACKGROUND OF THE INVENTION

With the advent of modular printed circuit boards there is a need for a very small toggle switch which can be mounted on the board by methods similar to those employed in mounting other components. The usual toggle switch design does not satisfy the need.

SUMMARY OF THE INVENTION

The present toggle switch employing the construction set forth in the abstract achieves a small, very versatile, simple design which can be mounted directly upon printed circuit boards. The switch is so constructed that good contact pressures are obtained and are assured without requiring adherence to close tolerances. The switch action can be varied to provide any of the usual toggle switch actions by simply changing one part which can take any of five configurations to obtain seven types of action. This one part is the sliding cam which acts against the pointed end of the toggle lever and has suitable cam surfaces to obtain the various functions. The lever carries a shorting bar which is pivoted on the lever for restricted motion whereby the bar is assured proper and substantially equal contact pressure on each of the two contact pins which it contacts in an operating position. These contact pins are mounted in and captured by the housing and project through the housing for connection to a printed circuit board or, if desired, the "pigtail" may be made longer for connection to more remote locations. The casing itself is interesting in that it is made up of identical halves which serve not only to position and retain the parts but additionally are designed to snap together to complete the assembly.

DESCRIPTION OF DRAWINGS

FIG. 1 is a plan view of the switch with one-half of the housing removed. The switch provides ON-OFF-MOMENTARY ON action (or the reverse if the cam is turned over);

FIG. 2 is similar to FIG. 1 but shows the switch actuated (ON);

FIG. 3 is a sectional view along line 3-3 in FIG. 1;

FIG. 4 is a sectional view along line 4-4 in FIG. 1;

FIG. 5 is a cam giving ON-OFF-ON action;

FIG. 6 is a cam giving MOMENTARY ON-OFF-MOMENTARY ON action;

FIG. 7 is a cam giving ON-NONE-MOMENTARY ON action; and

FIG. 8 is a cam giving ON-NONE-ON action.

DESCRIPTION OF PREFERRED EMBODIMENT

The switch housing is made of two identical halves 10 having posts 12 and holes 14 in the corners so as to match when the halves are mated. The post has a circumferential ridge 16 which snaps into the groove 18 in the hole to hold the housing together. Each half has a recess 20 which receives a boss 22 on toggle lever 24 to journal the lever with the pointed end 26 engaging the cam surface of cam 28. The cam is slidable in the elongated opening in the housing and biased toward the tip of the lever by spring 30 compressed between the cam and seat 32. Lever 24 is provided with a boss 34 which serves as a pivot for shorting plate 36 which is held thereon by the proximity of the adjacent surface of the housing (see FIG. 3). Since the curved surface 38 of the plate 36 is generally complementary to but spaced from boss 22 the plate has limited freedom of movement relative to the toggle lever. This allows the plate to equalize the contact pressure between it and the contact pins 40. Each pin 40 is mounted in aligned through holes 42 in the

housing to project from either side of the housing. It will be noted that the interface portion of each housing half is recessed at 44 to receive the shoulder 46 on each pin 40 to thereby retain the pins when the assembly is completed.

With the cam 28 shown in FIG. 1 and the lever as shown in the FIG. the switch is held in "off" position. If the lever end is moved up the cam is pushed back until the lever tip 26 passes over hill 48 whereupon the spring 30 pushes the cam forward and the tip slides into valley 50 as shown in FIG. 2. The spring force is now off center relative to the lever pivot and tip and the lever is held in this position, "on" and the shorting plate 36 contacts the adjacent pins 40 with the plate having adequate freedom to adjust the contact pressures on the pins. If the lever is moved down it first returns to "off" and continued movement will short the other pair of pins 40, but the lever must be held in this position since, upon release, the spring acting on the cam will force the lever back to "off." The action is described as ON-OFF-MOMENTARY ON and cam 28 can be turned over to reverse the sequence.

Cam 228 of FIG. 8 gives ON-NONE-ON sequence. Cam 328 of FIG. 5 gives ON-OFF-ON and cam 428 of FIG. 6 gives MOMENTARY ON-OFF-MOMENTARY ON.

FIG. 7 cam 128 gives ON-NONE-MOMENTARY ON action and can be turned over to reverse the action.

From this it can be seen many sequences are available by changing or reversing the cam. The pins can be brought out either or both sides to further add to the versatility of the design. Since the housing and lever are plastic they can be color coded easily to aid in distinguishing them. The pins are normally brought out far enough to mount easily and directly on printed circuit boards but can be made any desired length to aid more remote hookups.

I claim:

1. A toggle switch comprising:

- a. a housing;
- b. a lever including a pivot post on opposed faces thereof journaled in recesses in the housing to permit movement of the lever to an active position on either side of a medial position;
- c. a cam block slidably mounted in and guided by a cavity in the housing;
- d. a spring biasing the block into contact with the end of the lever;
- e. said cam block having a cam surface against which the lever end acts and contoured to retain the lever in or return the lever from its various positions;
- f. a pair of stationary contact pins parallel to the pivot post and mounted in the housing on both sides of the lever and having ends projecting through the housing; and
- g. a shorting bar carried by the lever and operative to bridge either of said pairs of contacts when the lever is in either of said active positions.

2. A toggle switch according to claim 1 in which said shorting bar is mounted on the lever for limited rotation relative thereto to assure proper contact with both contact pins of each of said pairs when the lever is in either of said active positions.

3. A toggle switch according to claim 2 in which the housing serves to retain all the switch parts in assembled position.

4. A toggle switch according to claim 3 in which the housing is comprised of two halves which snap together, said pins being mounted in cooperating holes in the housing and having a shoulder at the interface of the halves for retaining the pins.

5. A toggle switch according to claim 1 in which the lever has a raised boss thereon upon which the shorting bar is mounted, said bar having an arcuate notch generally loosely conforming to the adjacent pivot post while allowing restricted motion to seat the bar on the contact pins.