

July 8, 1958

E. F. SWANSON
SNAP ACTING MECHANISM

2,841,999

Filed June 13, 1955

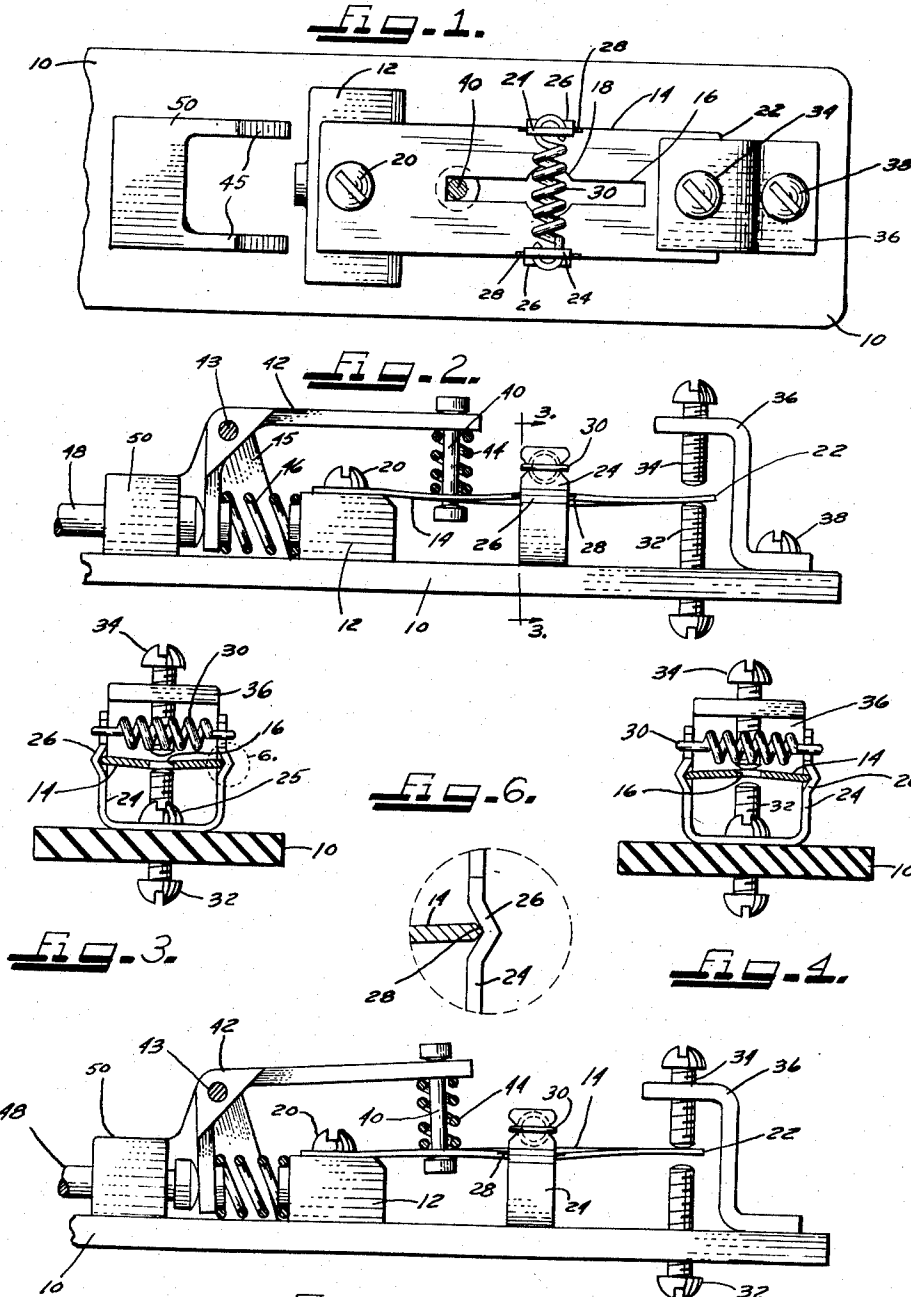


Fig. 5.

Inventor

EARNEST F. SWANSON

By *Bair, Freeman & Molinare*

Att's

1

2,841,999

SNAP ACTING MECHANISM

Earnest F. Swanson, Bristol, Ind., assignor to Penn Controls, Inc., Goshen, Ind., a corporation of Indiana

Application June 13, 1955, Serial No. 515,075

4 Claims. (Cl. 74—100)

This invention relates to snap acting mechanism which is interposed between an actuating device and an actuated device whereby the actuating device upon movement in one direction will tend to move the snap acting mechanism, and at a certain point will cause it to snap over center from one position to an opposite position and in so doing to actuate the actuated device.

One object of the invention is to provide snap acting mechanism in the form of a leaf spring blade anchored at one end and having its opposite end arranged to function as an actuator for an actuated device, the intermediate portion of the leaf spring blade being so stressed as to effect snap action thereof when an actuating device causes movement of the blade intermediate its anchored end and such intermediate portion.

Another object is to provide a means to stress the blade in the form of abutments engaging the side edges thereof intermediate the ends of the blade and resiliently urged toward each other, the blade having a longitudinal slot between its side edges.

Still another object is to provide an improved snap acting mechanism which may be used for actuating a switch or the like so that the switch is operated with a quick make-and-break action, the mechanism being extremely sensitive in its response to slight travel of its actuating device.

A further object is to provide a leaf spring blade arranged to maintain itself in a certain position when relaxed, but which when subjected to stress imposed by the resilient means of the last object will be moved in a manner by the actuating device such that distortion of the blade through and beyond a central position occurs, the movement of such distorted portion being translated and multiplied to impart wide and quick movement to the actuating end of the blade to sharply open or close contacts at a predetermined critical point in the travel of the actuating device when the mechanism is used as an electric switch.

Still a further object is to provide a snap acting mechanism which is very simple, inexpensive and compact in construction and reliable in operation, and which does not require critical deformations set into an actuating blade or "pre-formed" blades as in some types of snap acting mechanisms, which are found difficult to hold to desirable tolerances from piece to piece in mass production.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my snap acting mechanism, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawing, wherein:

Fig. 1 is a plan view of a snap acting mechanism embodying my present invention with portions of the actuating device omitted;

2

Fig. 2 is a side elevation thereof showing the actuating blade in the depressed position;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2 showing the snap acting blade in depressed position;

Fig. 4 is a similar view showing the blade in elevated position;

Fig. 5 is a side elevation similar to Fig. 2 showing the elevated position of the actuating blade; and

Fig. 6 is an enlarged view of that portion of Fig. 3 shown within the circle 6.

On the accompanying drawing I have used the reference numeral 10 to indicate a base on which the snap acting mechanism of my invention is mounted. A boss 12 on the base 10 serves as an anchoring base for an actuating blade 14, which blade is made of spring steel or the like and provided with a longitudinal slot 16 along its center and terminating short of its ends as shown in Fig. 1. The slot 16 may be enlarged at 18 for receiving the head of an actuating pin as will hereinafter appear.

The blade 14 is stamped or otherwise cut from sheet material and has the slot 16 formed therein, as by punching, and is perforated to receive a screw 20 for anchoring it to the boss 12 in an obvious manner. The actuating blade 14 when so mounted is substantially unstressed.

In order to make the blade 14 snap-acting in character, I stress it by a pair of elements resiliently urging the side edges thereof toward each other at points substantially opposite the central portion of the slot 16. These elements may comprise the arms of a U-shaped sheet metal bracket 24 anchored to the base 10 as by a screw 25 (see Fig. 3). The bracket 24 is provided with a pair of opposite seats 26 of somewhat V shape as shown in Fig. 6 and the adjacent side edges of the blade 14 are preferably sharpened as at 28 to provide knife edges to seat in the seats 26. The two arms of the bracket 24 are then biased toward each other by a spring 30. The length of the spring 30 and the tension exerted thereby may be selected during manufacture to give the desired snap action which in some instances may desirably be softer than in others as required for the particular job the actuating blade 14 is to do.

By way of example, I have illustrated the blade serving as a switch with stop screws 32 and 34 limiting its throw. The screw 34 is supported by a bracket 36 secured to the base 10 by means of a screw 38. Each of the stop screws 32 and 34 may serve as switch contacts, the base 10 being of insulating material so that a circuit to the screw 20 may be selectively controlled with respect to the screws 32 and 34. On the other hand, the actuating end 22 of the blade 14 may be attached to a valve or similar actuated device.

A downward pressure on the actuating blade 14 intermediate the boss 12 and the bracket 24 will spring the blade to the depressed position shown in Fig. 2 against the stop screw 32. When so sprung the blade will stay in that position.

Reversely, upward pressure at the same point will spring the blade to the position shown in Fig. 5 against the stop screw 34, at which position it will stay, providing of course the screws 32 and 34 are properly adjusted. They can be adjusted to symmetrical positions with respect to the anchored end of the blade 14 and the seats 26 for equal snap action in both directions, or to non-symmetrical positions in relation thereto for greater snap action in one direction than the other if desired.

From the foregoing description it will be obvious that actuating means for the blade 14 must be in the form of a device capable of depressing or elevating the portion of the blade intermediate the boss 12 and the bracket 24, and this may be accomplished, for instance, by a

headed pin 40, the lower head of which is entered through the enlargement 13 of the slot 16 and the pin then moved to the position shown in Fig. 1, the upper head being above a horizontal arm of a bell crank 42 after passing through an opening in the arm, the arm being pivoted on a pin 43 supported by a pair of ears 45 extending upwardly from the base 10. The bell crank 42 has its short vertical arm biased in one direction by a spring 46. A spring 44 tends to hold the horizontal arm of the bell crank 42 and the blade 14 spread apart so that the spring 46 can act. For moving it in the opposite direction an actuating rod 48 is shown which is slidable through a boss 50 so that in the position shown in Fig. 2 the spring 46 has depressed the blade 14.

When the actuating rod 48 is slid toward the right as in Fig. 5, either manually or by some mechanical means, then the headed pin 40 pulls upwardly on the blade 14 for snapping it from the position of Fig. 2 to the position of Fig. 5.

From the foregoing specification it will be obvious that I have provided means for stressing a normally unstressed actuating blade so that when pressure is exerted on it at one point, snap action will be imparted to it so that another point thereof will move quickly from one position to another and through a greater range of movement than the movement of the device that imparted the snap action to the blade. The latter portion can then be utilized to actuate an actuated device such as a switch, a valve or the like.

Some changes may be made in the construction and arrangement of the parts of my snap acting mechanism without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

I claim:

1. Snap acting mechanism comprising a leaf spring blade provided with a longitudinal slot terminating short of the ends thereof, means for anchoring one end of said blade whereby the other end may serve as an actuating means, a pair of elements pivotally engaging the side

edges of said blade in the vicinity of the central portion of said slot, resilient means biasing said elements toward each other, and means for imparting movement to said blade in opposite directions at a point intermediate its anchored end and said pair of elements to cause the unanchored end thereof to move with snap action in opposite directions.

2. Mechanism of the character disclosed comprising a leaf spring blade provided with a longitudinal slot between its side edges, means for anchoring one end of said blade whereby the other end may serve as an actuating means, a pair of elements pivotally engaging said side edges of said blade, and resilient means biasing said elements toward each other for stressing said blade for snap action.

3. Snap acting mechanism comprising a leaf spring blade provided with a longitudinal slot, means for anchoring one end of said blade whereby the other end may serve as an actuating means, a pair of elements pivotally engaging the side edges of said blade in the vicinity of the central portion of said slot, resilient means biasing said elements toward each other, and means for imparting movement to said blade in opposite directions at a point intermediate its anchored end and said pair of elements to cause the unanchored end thereof to move with snap action in opposite directions.

4. Snap acting mechanism comprising a leaf spring blade provided with a longitudinal slot, means for anchoring one end of said blade whereby the other end may serve as an actuating means, a pair of elements pivotally engaging the side edges of said blade in the vicinity of the central portion of said slot, resilient means biasing said elements toward each other, and means for imparting movement to said blade at a point intermediate its anchored end and said pair of elements to cause the unanchored end thereof to move with snap action.

References Cited in the file of this patent

UNITED STATES PATENTS

2,359,075	Arnold	Sept. 26, 1944
2,369,616	Spahn	Feb. 13, 1945
2,452,425	Berkholder	Oct. 26, 1948