

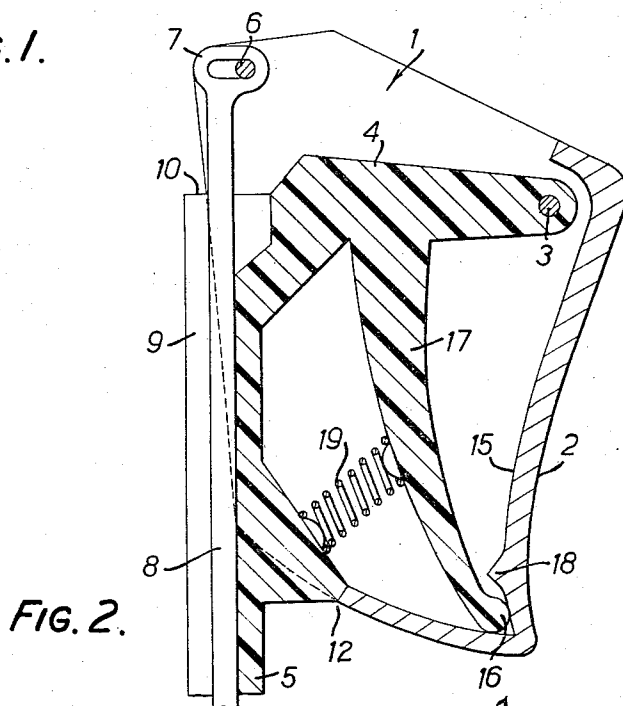
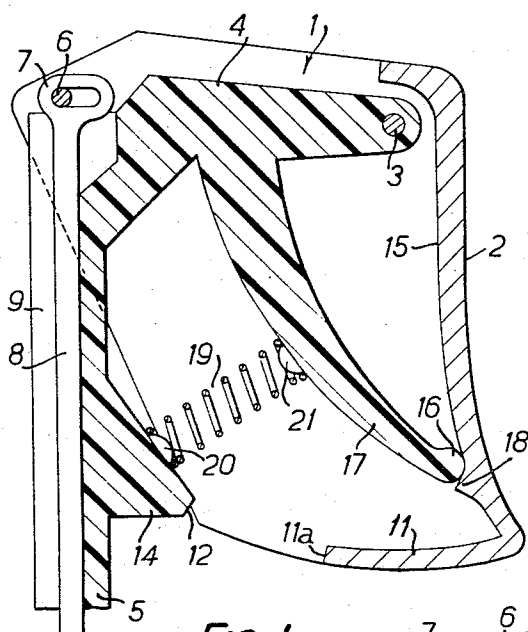
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TRIGGER ACTION CONTROL MECHANISM

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TRIGGER ACTION CONTROL MECHANISM
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ABSTRACT OF THE DISCLOSURE

A trigger action mechanism comprising: a trigger of channel shaped cross-section pivoted on a stationary member having a resilient arm portion slidably engaging a ramp surface formed on the inside of the closed side of the trigger. A high point or projection formed on the inner surface with opposite slopes provide a "snap action" type of movement during a portion of trigger travel. An extra conventional biasing spring can be optionally used to increase the bias exerted by the resilient arm.

This invention relates to a trigger action mechanism such as is used, for example to operate electric switches or pneumatic valves controlling hand-held power tools.

It is an object of the invention to provide an improved trigger mechanism having advantages in simplicity of construction and which by a simple modification will provide a form of snap-action very desirable in many applications of such mechanism.

It is another object of the present invention to provide an improved snap-action trigger control mechanism.

It is a further object of the present invention to provide an improved electric snap-action switch.

The features of the invention which are believed to be novel are recited with particularity in the appended claims. The invention, together with further features and advantages thereof, is best understood from the following description taken in conjunction with the accompanying drawings, in the two figures of which like elements are denoted by like reference numerals and in which:

FIGURE 1 shows a sectional elevation of one embodiment of trigger mechanism according to the invention with the trigger in the released position, and

FIGURE 2 shows a sectional elevation of the mechanism described in relation to FIGURE 1 but with the trigger member in the operated position.

The trigger member 1 of the mechanism shown in the drawings is a deep channel-section moulding, the outer surface of the base 2 of the channel presenting a working surface to the finger of the operator. Trigger member 1 is pivoted by means of a pin 3 to a protruding portion 4 of a switch frame 5 and is coupled by means of a pin 6 to the looped end 7 of a pull-rod 8 operating a control device, which may be electric or pneumatic, to be operated by the trigger. Pull-rod 8 works in a channel 9 formed in switch frame 5 and is retained therein by suitable means not shown for movement parallel to its length. Counter-clockwise rotation of trigger member 1 about pin 3 is limited by the engagement of pin 6 with the end surface 10 of channel 9 formed in switch frame 5, and clockwise rotation of the trigger is limited by engagement of an end face 11a of a web 11 joining the side members of the channel with a face 12 of an abutment 14 formed on switch frame 5, as shown at 14 in FIGURE 2.

Trigger member 1 is urged in the anti-clockwise direction by the engagement with the inner surface 15 of its base of the rounded end 16 of a resilient arm 17 protruding from portion 4 of switch frame 5.

In some applications of the trigger mechanism, as where

it is employed to control a snap-action switch, surface 15 may be uninterrupted. Where it is desired to obtain a snap-action in the trigger mechanism itself, however, the construction illustrated is employed. In the released position of the trigger shown in FIGURE 1, end 16 of arm 17 engages trigger surface 15 on one side of a triangular projection 18 extending inwardly from surface 15. In the operated position of the trigger, end 16 of arm 17 engages surface 15 on the other side of projection 18. Thus as trigger 1 is operated, end 16 of resilient arm 17 must pass over projection 18. This action results in an initial resistance to the motion of the trigger, followed by an abrupt yielding to increased pressure, thus providing a valuable "snap" action to the control. A similar snap action is present when the trigger is released.

In other applications of a trigger mechanism according to the invention more than one projection may be formed on surface 15. Such an arrangement will provide a plurality of detent-located positions for trigger member 1, which is convenient when the control means controlled by the trigger member provides a like plurality of distinct operating conditions for the controlled device. An example of this is an electric switch having a plurality of different switching conditions. The arrangement may also be used with a continuously variable controlling device to provide a number of discrete speeds for a controlled apparatus.

The force exerted by resilient arm 17 on trigger 1 may be supplemented, if required, by additional resilient means, such as a helical compression spring 19 pressing against abutment 14 of switch frame 5 and against the arm 17. The spring may be located by small protrusions 20, 21 arising from abutment 14 and from arm 17 respectively. Alternatively, it may be found convenient to provide a spring-steel leaf moulded within or applied to a surface of resilient arm 17 to increase the force which it exerts on trigger 1, though it is preferred to avoid the use of supplementary metal springs by appropriate design of the resilient arm.

It is also possible for resilient arm 17 to be a separate element of the construction, attached by suitable means to the switch framework, though an integral construction will usually be preferred.

It is also possible to add to the trigger mechanism shown in the drawings a known form of locking mechanism by which the trigger may be locked in the operated position until released by repeated pressure on the trigger. Such mechanisms are well known in the art and it is not thought that any further description is required.

It will be appreciated that the construction above described may be modified by forming the resilient arm as an integral part of the trigger member and the surface on which the arm bears as a part of the switch frame.

It will be appreciated that an advantage of the trigger mechanism described is that the conventional steel trigger spring may usually be dispensed with, and even if a metal spring is still used it may be less highly stressed than in conventional trigger mechanisms and will thus be less liable to failure.

While particular embodiments of the invention have been shown and described, it is apparent that changes and modifications may be made without departing from the invention in its broader aspects. The aim of the appended claims, therefore, is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

We claim:

1. In a trigger action control mechanism, in combination, a member having an integral resilient arm, a trigger having a ramp portion, means mounting said trigger on the first mentioned member and affording pivotal movement of said trigger between extreme limiting posi-

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tions, said resilient arm slidably engaging said ramp portion on said trigger to provide a resilient bias opposing movement of said trigger toward one limiting position.

2. A trigger action control mechanism in accordance with claim 1 wherein said ramp portion includes a single surface engaged by said arm, said surface having a form such that the pressure exerted thereon by said arm changes progressively during relative movement of said members.

3. A trigger action control mechanism in accordance with claim 1 wherein said ramp portion includes a projection bounded by slant surfaces of opposite slope, said surfaces being engaged by said arm thereby to increase the force exerted by said arm between said members at a predetermined relative position of said members.

4. A trigger action control mechanism in accordance with claim 1 wherein said ramp portion is formed by two intersecting surfaces of opposite slope, each said surface extending to an individual one of the points engaged by said arm at a limiting position of said members, thereby to provide a snap action between said limiting positions of said members.

5. A trigger action control mechanism in accordance with claim 1 and including spring means for increasing the resilient bias beyond that provided by said resilient arm.

6. The trigger action control mechanism of claim 5 including a protrusion on said resilient arm, a further protrusion on said first member and a helical spring posi-

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tioned about said protrusions to provide said increased bias.

7. The trigger action control mechanism of claim 1 wherein said trigger member is of channel sectional form and said ramp portion is formed by the interior surface of a base portion of said channel section.

8. A trigger action control mechanism, comprising, a frame member having an integral projection, a trigger member of channel sectional form embracing said projection, an inner face of said channel forming a ramp member having intersecting faces of opposite slope bounding another inward projection, pivot means connecting said frame member and trigger member for pivotal movement of said trigger member with respect to said frame member, and a resilient arm extending from said frame projection within said channel section trigger member to slidably engage said ramp portion thereby providing snap action resilient bias for said trigger member.

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