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(71) Applicant: **MOTOROLA ISRAEL LIMITED**
16 Kremenetski Street
Tel Aviv 67899(IL)

(72) Inventor: **Prines, Alexander**
4 Aronson Ramat Gan
Israel 52293(IL)

(74) Representative: **Ibbotson, Harold**
Motorola Ltd Jays Close Viables Industrial Estate
Basingstoke Hants RG22 4PD(GB)

(54) Front activated fuze.

(57) The invention relates to a fuze, particularly an Inpact Delay fuze for a bomb.

The fuze has an activating mechanism which includes a striker which is retained against a spring bias. When released by a pulled lanyard the striker is forced, by the bias spring, to activate the fuze. In order that a fuze having a rear activating mechanism may be released by a pull from the front, the activating mechanism includes a motion reversing coupling to reverse the direction of the pull.

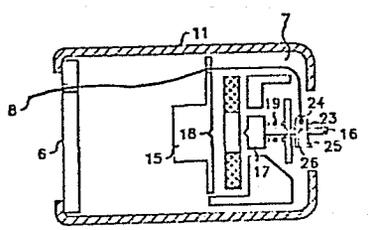

Fig. 4

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TITLE

FRONT ACTIVATED FUZE

This invention relates to a fuze for a bomb and particularly although not exclusively to an I/D (Impact Delay) fuze. A bomb usually incorporates two fuzes, one being located in the nose of the bomb whilst the other is in the tail. The bomb also has a fin portion which extends beyond the tail and is usually empty.

A known fuze is activated from its rear side (facing, in operation, towards the centre of the bomb) by a striker device striking a battery terminal within the fuze. The striker is spring biased towards the battery terminal but is normally retained against the spring bias.

A lanyard extends from the striker at the rear of the fuze and is fed through an internal piping to an exit hole, often located centrally in the body of the bomb, and thence to the bomb rack of the aircraft carrying the bomb.

When the bomb is released the lanyard is pulled and the striker is released from its retained position to activate the fuze.

A problem with this known fuze is that because the lanyard extends forward from the fuze i.e. towards the interior of the bomb, the fuze is only useable in bombs provided with the internal piping. Unfortunately many countries manufacture bombs without such piping.
This invention seeks to provide a fuze which may be activated by means of a pull from the front of the fuze without the need for relocation of the striker mechanism and without involving any substantial change in the operating characteristics of the striker.

According to this invention there is provided a fuze suitable for use in a bomb, the fuze having an activating mechanism which includes a striker retained against a bias force operative to urge the striker, when released, to activate the fuze; biasing means for providing the bias force and wherein the activating mechanism further includes a motion reversing coupling for reversing the direction of an applied force to effect release of the striker from its retained position whereby an activating mechanism located at a rear portion of a fuze may be operated by means of a force applied at a front portion of the fuze.

The biasing means may comprise a spring retained between the striker and a relatively fixed member.

The motion reversing coupling may comprise a pivotable member having a pivot located between first and second portions of the member, a reversed force being applied by the second portion by rotation of the member in a first rotational sense in response to application of a force to the first portion of the member.

In an embodiment of the invention the second portion of the pivotable member may be arranged to engage a portion of the striker, the pivotable member being provided with a portion adapted to engage a stop to prevent rotation of the pivotable member, under the action of the bias force, in a second rotational sense opposite to the first sense, whereby the striker is retained against the bias force.

The pivotable member may be arranged to extend into a recessed portion of the striker and to engage a portion of the striker which forms an edge of the recessed portion.

The pivotable member may be arranged to disengage from the striker to release the striker, on reaching a predetermined angle of rotation in the first sense in response to the applied force.

The pivotable member may have a double acting pivot, means being provided for changing the pivot point of the pivotable member is response to the predetermined angle of rotation of the member in the first sense, the change to a second pivot point being operative to disengage the pivotable member from the striker.

The double acting pivot may comprise an elongate slot provided in the pivotable member and a pin located in the slot, a first pivot point being provided by the pin at one extremity of the slot whilst the second pivot point is provided by relative movement of the pin and pivotable member to locate the pin an an opposite extremity of the slot.

The relative movement of the pin and the pivotable member may be effected by engagement of a portion of the pivotable member with a further stop on reaching said predetermined angle of rotation of the member in response to the applied force.

An exemplary embodiment of the invention will now be described with reference to the drawings in which Figure 1 illustrates a view of a bomb incorporating a known fuze with part of the bomb being broken away to show the fuze;

Figure 2 shows a schematic sectional view of the known fuze shown in the bomb in Figure 1;

Figure 3 shows a bomb incorporating a fuze in accordance with the present invention;

Figure 4 is a sectional schematic view of a fuze in accordance with the present invention and Figure 5 illustrates the fuze of the present invention in more detail.

Referring now to Figure 1 there is shown a bomb generally referenced 1 having a nose portion 2 and a tail portion 3 with a hollow fin 4 extending rearwards from the tail portion 3. Located in the tail of the bomb is a fuze

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which has a front end 6 facing the fin 4 of the bomb and a rear end 7 extending into the body of the bomb.

A lanyard 8 extends from the rear of the fuze and passes through an internal tube 9 emerging through a hole 10 in the body of the bomb and this lanyard is then subsequently connected to the bomb rack in which the bomb is located.

When the bomb is released the lanyard 8 is pulled and this pull releases a spring loaded striker within the fuze 5 which striker strikes a battery terminal to activate the fuze. The fuze illustrated in Figure 1 will now be described in more detail with reference to Figure 2. In

Figure 2 where only those parts of the fuze relevant to the present application are illustrated the fuze 5 has a casing 11 a front end 6 and a rear end 7. Within the casing 11 of the fuze, lies an activating mechanism generally referenced 14 located at the rear end 7 of the fuze. The activating mechanism includes a battery 15 which is activated when a striker 16 having a striking head 17 moves to strike a terminal 18 of the battery 15. The striker 16 is biased by means of a spring 19 located between the head 17 and a fixed member 12 towards the battery terminal 18. The striker 16 extends through a guide tube 20 and at its end has a cup-shaped recess 21 into which sits a ball head 22 of the lanyard 8. The ball head 22 is retained in the recess 21 by a resilient spring finger 42.

By means of the lanyard 8 the striker 16 is held away from the battery 15 against the bias of the spring 19. When the bomb is released the pull of the lanyard 8 causes the striker 16 to be pulled rearwards through the tube until the cupped recess 21 lies outside of the guide tube 20 at which point the retaining force of the spring finger 42 is overcome and the ball end 22 of the lanyard 8 is freed from the cupped recess 21. The striker 16 is urged forward under the bias of

the spring 19 so that the striker head 17 strikes the battery terminal 18 and activates the fuze. A typical fuze of this known type is the Motorola I/D-260.

As described above it is not possible to use the fuze in a bomb which does not have the internal piping. This problem is overcome by use of the fuze in accordance with the present invention.

Referring now to Figure 3 the fuze in accordance with the present invention is once again located at the rear end 7 of the bomb and as with the known fuze has a casing 11 and a front end 6. The activating mechanism is as with the known fuze located in the rear end 7 of the fuze and includes a striker and battery of substantially identical operating characteristics as those of the known fuze. The lanyard 8 however, now enters the fuze through the front end 6 after being fed through a hole 13 in the fin 4 and passes along the length of the fuze and is coupled to the striker by means of a motion reversing coupling. When the lanyard is pulled on release of the bomb this front pull is translated into an opposite pull by the motion reversing coupling. This coupling withdraws the striker against the spring bias until the coupling itself is disengaged from the striker which then strikes the battery as before. This striking mechanism is illustrated in more detail in Figure 4 which shows a fuze in accordance with the present invention.

In Figure 4 where like parts to those in Figure 2 bear like reference numerals, the lanyard 8 can be seen to pass through the front end 6 of the fuze and extend through the length of the fuze to the rear portion 7. The lanyard 8 is coupled to the striker 16 by means of a motion reversing coupling in the form of a pivotable member 23. The lanyard is coupled to one extremity 24 of the pivotable member 23 whilst an opposite end 25 engages the striker 16, the

pivotable member 23 having a pivot point 26 which is located between its extremities 24 and 25.

As explained above when the lanyard 8 is pulled the pull exerted on the extremity 24 of the member 23 causes the member to pivot about the pivot point 26 and eventually to disengage from the striker 16 which is then urged by means of the bias spring 19 to strike the battery terminal 18. The operation of this activating mechanism will now be described in more detail with reference to Figure 5.

In Figure 5 the striker head 17 is provided in the form of a cylindrical member having a cut away recessed portion 27 located at its opposite end to that which strikes the battery terminal 18. The cut away recess 27 is bounded by a rear face 28 of the striker head.

The pivotable member 23 is a plate like member and its extremity 25 engages within the recess 27 against the end face 28. Opposite end 24 of the member 23 has a hole 29 through which passes the lanyard 8 extending from the front end of the fuze. The lanyard 8 is retained as before by means of the ball end 22. Between the extremities 24 and 25 the member 23 is provided with an elongate slot 30 having opposite ends 31 and 32. A pivot pin 26 passes through the slot 30 and is normally located in the end 31 of the slot. The engagement between the end 25 of the pivotable member 23 and the end face 28 would, by virtue of the bias of the spring 19, urge the pivotable member 23 to rotate about the pivot 26 in an anti-clockwise direction as viewed. This is prevented by means of a projecting leg 33 of the pivotable member 23 engaging against a stop 34. The striker 16 is therefore retained against the spring 19 from striking the battery terminal 18.

On release of the bomb the lanyard 8 is pulled in the direction of the arrow 35 and this causes the pivotable

member 23 to pivot as illustrated in Figure 5B. The member 23 pivots about the pivot pin 26 with the pin 26 still engaging with the end 31 of the elongate slot 30. This pivoting continues until the projecting leg 33 engages a second stop 36.

On engagement of the leg 33 with the stop 36 the continued pull on the lanyard 8 causes the pivotable member 23 to be further pivoted about a secondary axis formed at the contact point 37 between the leg 33 and the stop 36. This pivoting about the secondary axis 37 causes relative movement between the member 23 and the pivot pin 26 along the slot 30 so that the pivot pin 26 effectively moves to the extremity 32 of the elongate slot. This movement causes the end 25 of the member 23 to be withdrawn from contact with the end face 28 of the striker 16 and from the cut away recess 27. The striker is now freed to move under the bias of the spring 19 and moves in the direction of the arrow 38 to strike the battery terminal 18.

By use of this motion reversing coupling in which a pull of the lanyard 8 from the front end of the fuze is reversed to move the striker in the opposite direction against its spring bias until it is free from its retainment enables a fuze to be designed for use in pipeless bombs the fuze retaining its essential characteristcs such as striking energy, striker-battery interface, and pull force as in the known fuze. This avoids the necessity for complex redesigning and extensive type approval.

CLAIMS

1. A fuze suitable for use in a bomb, the fuze having an activating mechanism which includes a striker retained against a bias force operative to urge the striker, when released, to activate the fuze; biasing means for providing the bias force and wherein the activating mechanism further includes a motion reversing coupling for reversing the direction of an applied force to effect release of the striker from its retained position whereby an activating mechanism located at a rear portion of the fuze may be operated by means of force applied at a front portion of the fuze.

2. A fuze as claimed in claim 1 wherein the biasing means comprises a spring retained between the striker and a relatively fixed member.

3. A fuze as claimed in claim 1 or 2 wherein the motion reversing coupling comprises a pivotable member having a pivot located between first and second portions of the member, a reversed force being applied by the second portion by rotation of the member in a first rotational sense in response to application of a force to the first portion of the member.

4. A fuze as claimed in claim 3 wherein the second portion of the pivotable member is arranged to engage a portion of the striker, the pivotable member being provided with a portion adapted to engage a stop to prevent rotation of the pivotable member, under the action of the bias force, in a second rotational sense opposite to the first sense, whereby the striker is retained against the bias force.

5. A fuze as claimed in claim 4 wherein the pivotable member is arranged to extend into a recessed portion of the striker and to engage a portion of the striker which forms an edge of the recessed portion.

6. A fuze as claimed in claim 4 or 5 wherein the pivotable member is arranged to disengage from the striker to release the striker on reaching a predetermined angle of rotation in the first sense in response to the applied force.

7. A fuze as claimed in claim 6 wherein the pivotable member has a double acting pivot and means is provided for changing the pivot point of the pivotable member in response to the predetermined angle of rotation of the pivotable member in the first sense, the change to the second pivot point being operative to disengage the pivotable member from the striker.

8. A fuze as claimed in claim 7 wherein the double acting pivot comprises an elongate slot provided in the pivotable member and a pin located in the slot, a first pivot point being provided by the pin at one extremity of the slot whilst the second pivot point is provided by relative movement of the pin and pivotable member to locate the pin at an opposite extremity of the slot.

9. A fuze as claimed in claim 8 wherein the relative movement of the pin and the pivotable member is effected by engagement of a portion of the pivotable member with a further stop on reaching said predetermined angle of rotation of the member in response to the applied force.

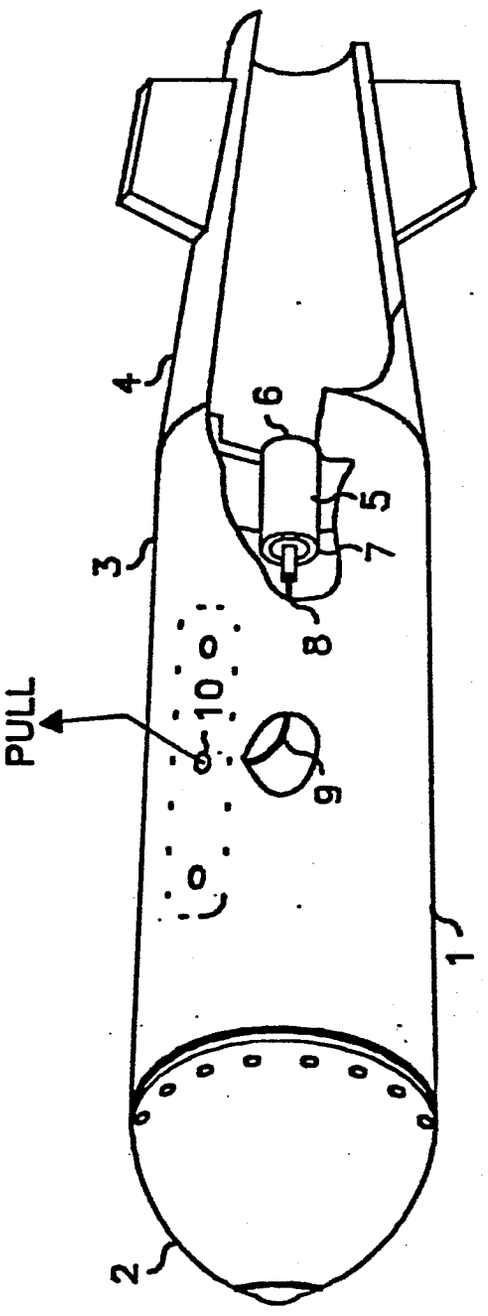

Fig. 1

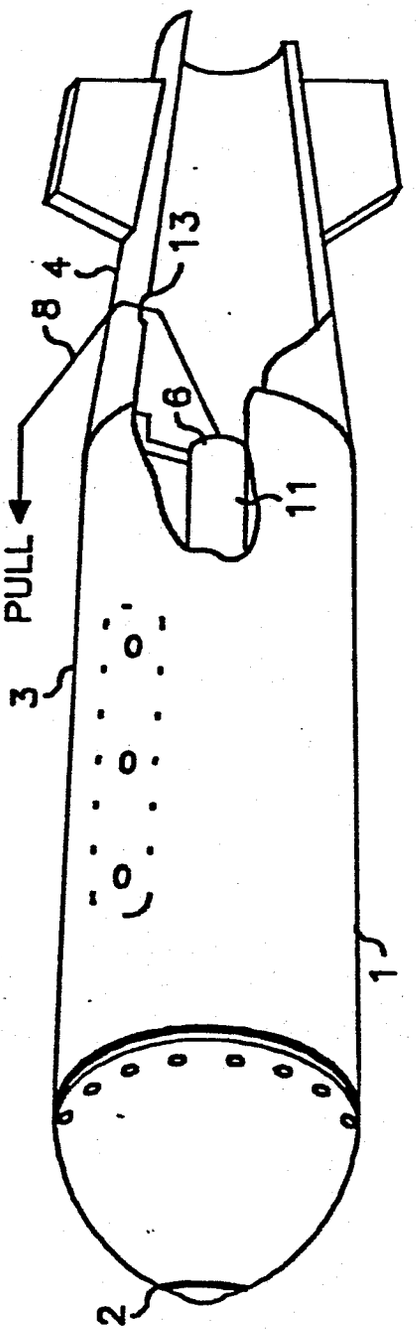

Fig. 3

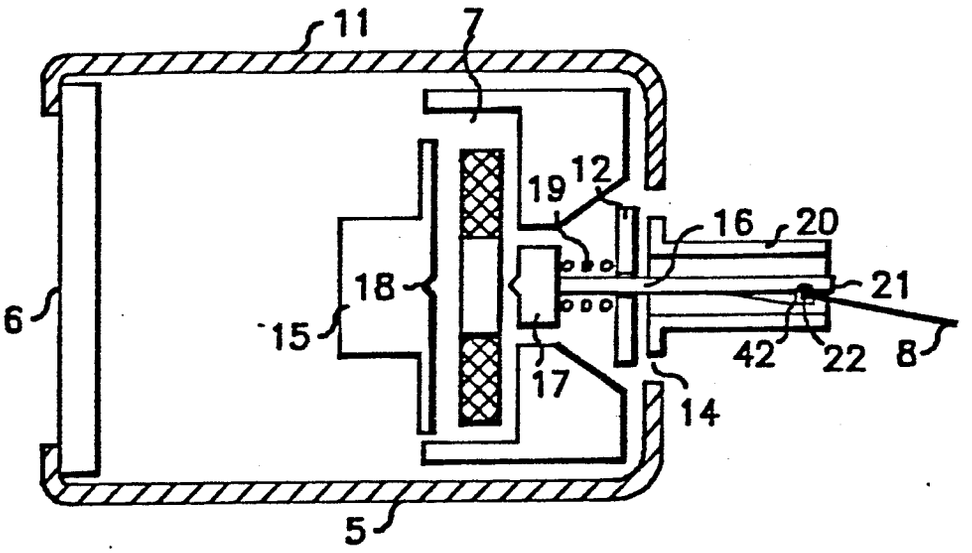
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Fig. 2

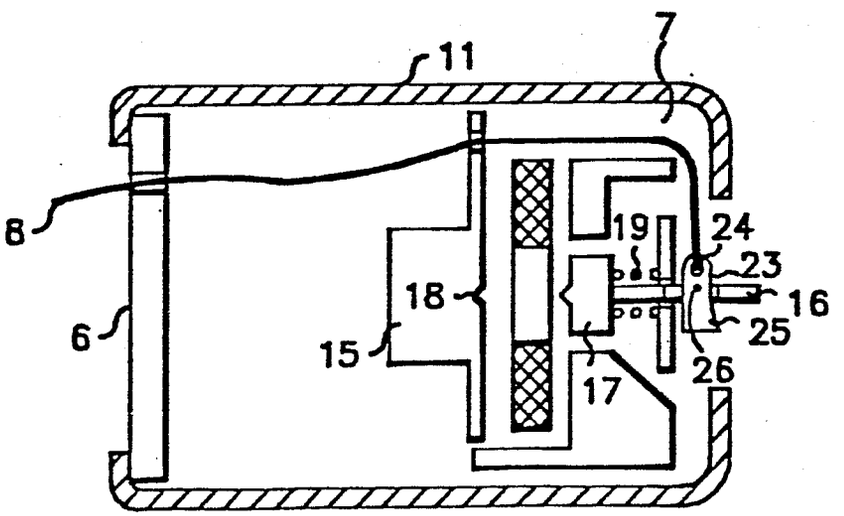
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Fig. 4

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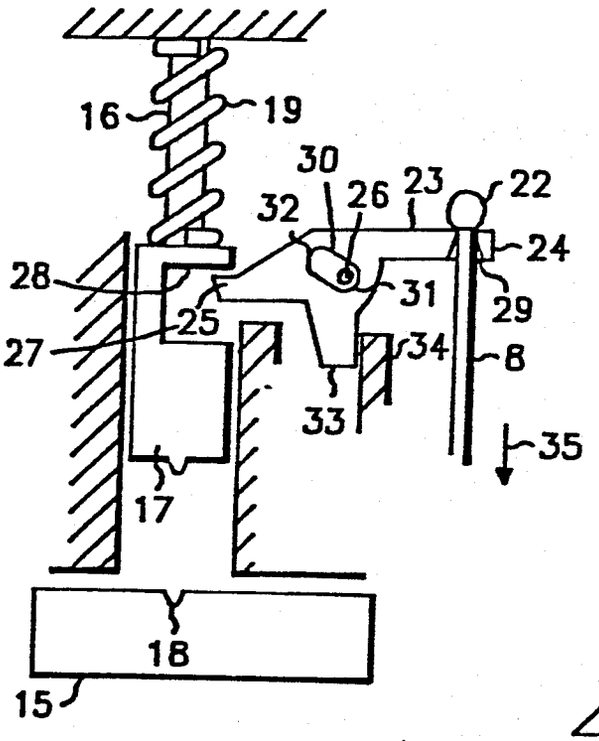
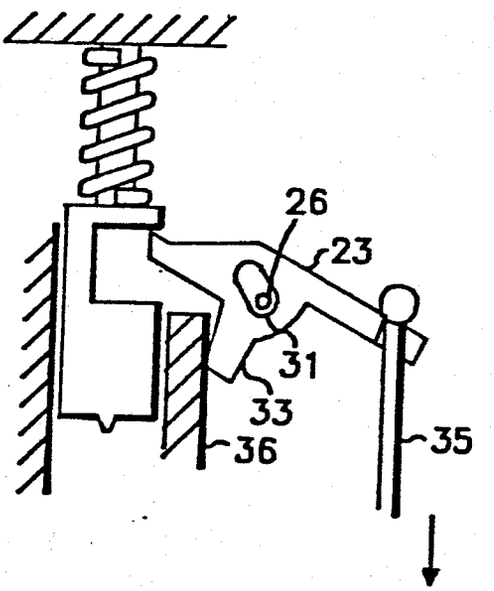


Fig. 5a

Fig. 5b



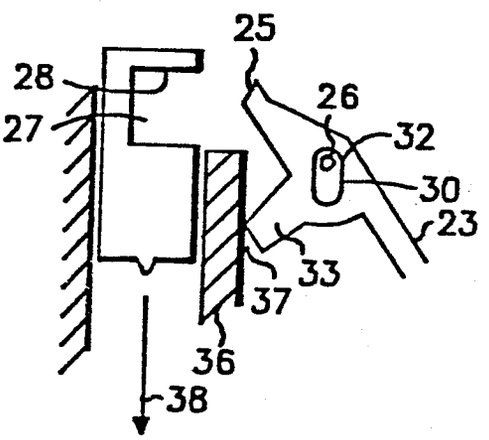


Fig. 5c