May 3, 1932. J. MARTIN 1,856,575

FIRE EXTINGUISHER

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Fig. 1.

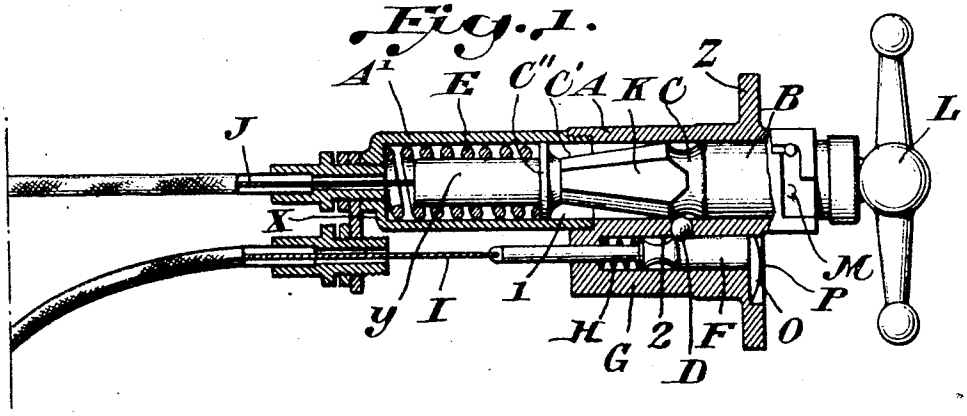


Fig. 5.

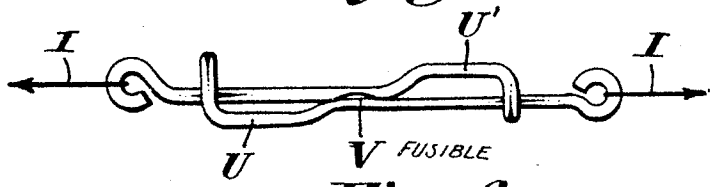
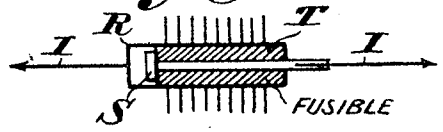


Fig. 6.



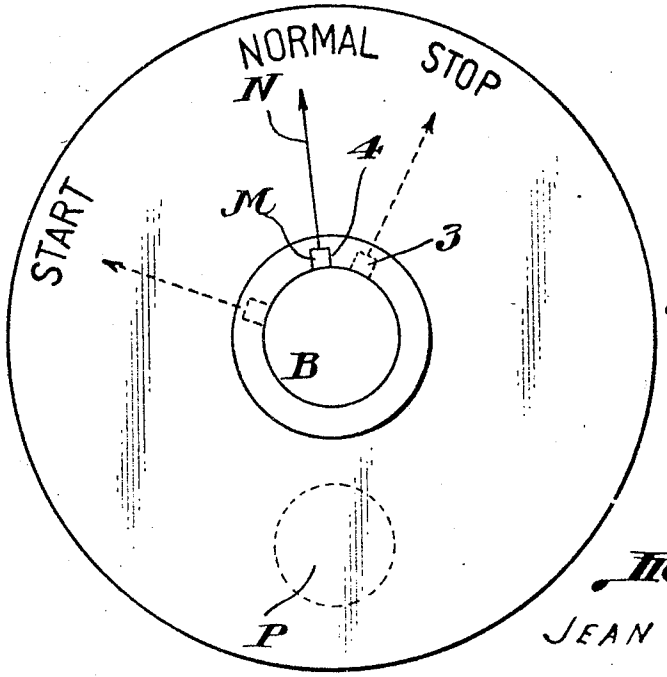


Fig. 4.

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Fig.2.

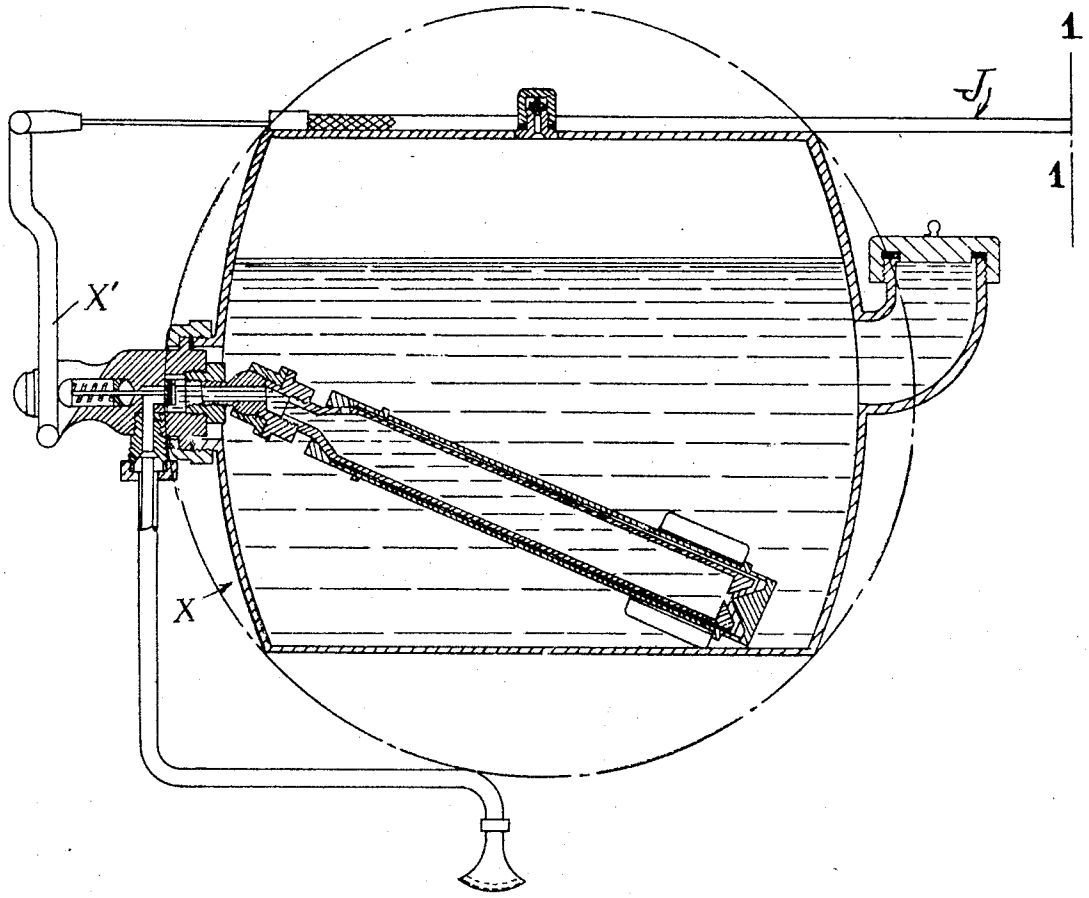
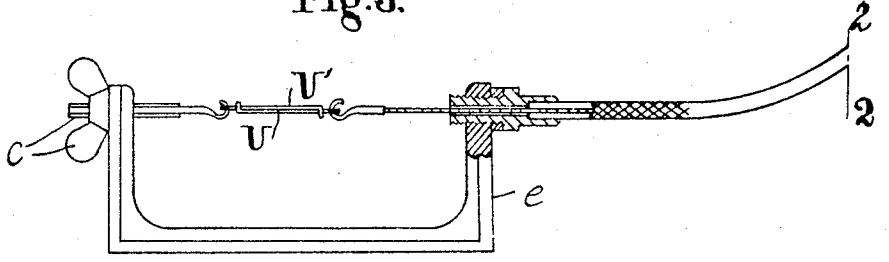


Fig.3.



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FIRE EXTINGUISHER

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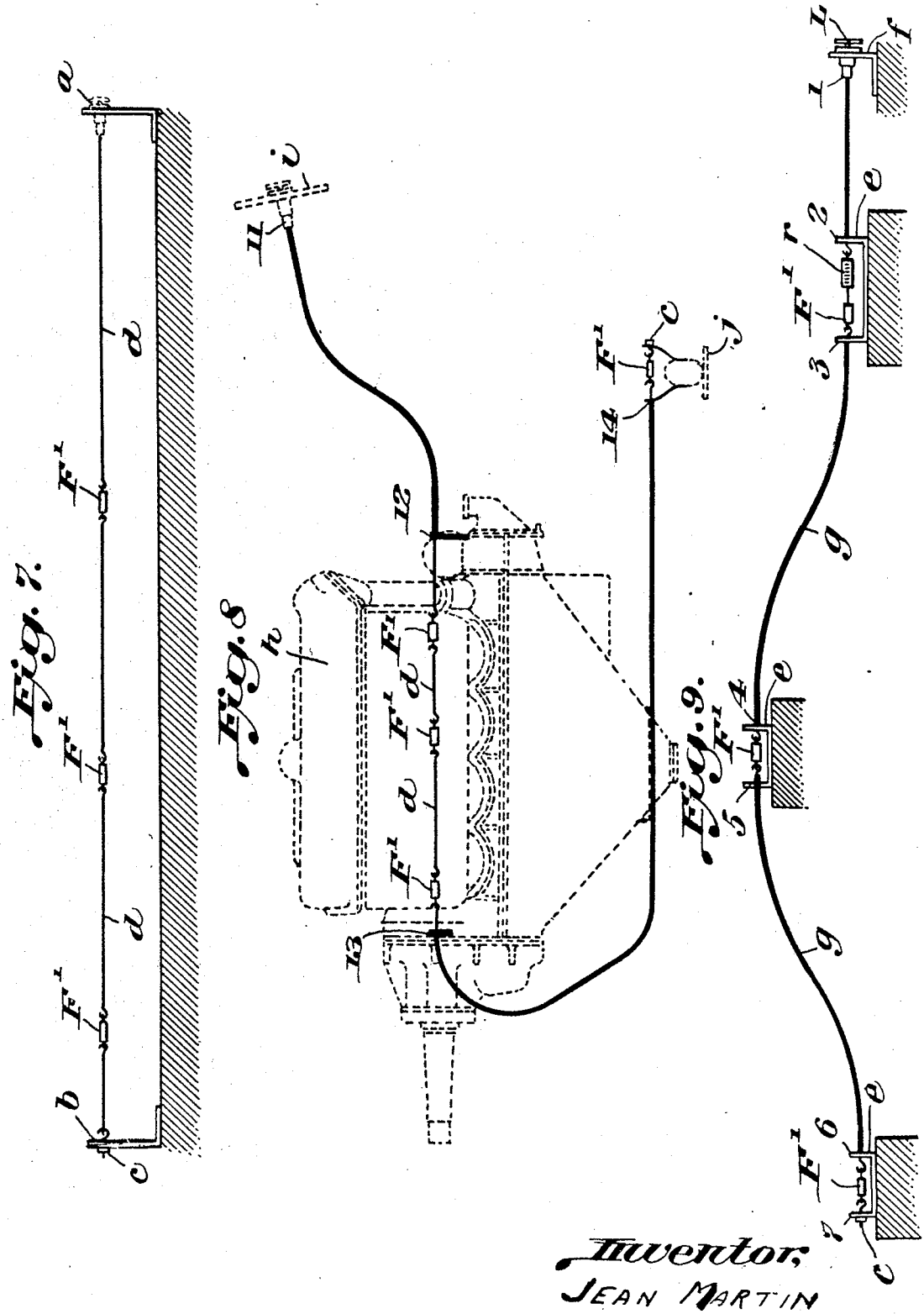

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FIRE EXTINGUISHER

Application filed December 13, 1928, Serial No. 325,873, and in France December 16, 1927.

This invention has for its object a device for the remote control of fire extinguishers, particularly on board of airplanes or other flying machines and, generally, on board of vehicles or in plants where a fire is likely to break out.

The improved device is arranged in such manner that the release of the extinguisher may take place:

(*a*) Either automatically, through the melting of one or more fuses, under the action of a rise in temperature; or

(*b*) Directly by hand, without, however, releasing the above automatic operating mechanism. A spring release device allows, alternatively, to stop the fire extinguisher, and to set it again in operation, whether the release thereof occurred automatically or by hand.

Moreover, the invention covers an embodiment of a particular method of mounting the fuses.

The appended drawings show, by way of example, an embodiment of the control device, the general features of which have just been given.

Figure 1 is a longitudinal sectional view of said control device;

Fig. 2 a vertical section of a fire extinguisher of known type actuated by the said device;

Fig. 3 is a side view of a fuse used in connection with the device in question;

Fig. 4 is a face view of an indicator plate forming part of the controller;

Fig. 5 is an enlarged plan view of the above-mentioned fuse;

Fig. 6 is a diagrammatic view of another form of fuse, and

Figs. 7, 8 and 9 show various ways of mounting the fuses.

It is to be understood at the outset that the controller illustrated in Fig. 1 operates automatically in connection with the fuse mechanism or device represented in Fig. 3, and itself operates to actuate the fire extinguisher shown in Fig. 2; it being assumed that the Bowden connection of Fig. 2 forms part of the connection J of Fig. 1 and, in like manner, the Bowden connection I also forms part of the connection shown in Fig. 3. The connections in question are assumed to be of indefinite length, the control portions thereof being broken away; but in practice the two parts indicated in Figs. 1 and 2 will be bridged or united, and the same with respect of the two parts indicated in Figs. 1 and 3.

As to the fire extinguisher, which is generally designated X, this element or device, as already stated, is of known type and operates in known manner, and it forms, in itself, no part of the actual invention, so that its structural details are immaterial and need not be described. It is believed to be sufficient for all present purposes, that when the controller is actuated either automatically or by hand, in the manner hereinafter explained, the action thereby exerted upon the aforesaid Bowden connection J (Fig. 1), will be transmitted to the controlling lever X′ of the extinguisher X and will actuate the same.

It must be understood, moreover, that while the improved controller is designed primarily for application to a fire extinguisher of suitable type, that is not its only use. In place of being applied to a fire extinguisher, it can be connected with other apparatus or devices to be operated consequent upon an abnormal temperature-rise.

The control device comprises a tubular, e. g. cylindrical body A (Fig. 1) in which is movably housed a piston provided with a frusto-conical portion C′, having a reduced portion Y forming a shoulder C″, against which rests one end of a helical spring E, the other end of which rests against the bottom of a tubular part A′ screwed to member A. This spring surrounds the cylindrical part Y above mentioned. The portion C′ is also formed with a flattened surface or part K which may be brought into registering relation with ball D by turning piston B about its axis.

Into groove C projects a ball D which prevents spring E from expanding when piston B is cocked—that is, is subjected to the action of said spring. This ball is maintained in its position in groove C by the action of an auxiliary piston F working in an additional

hollow cylinder G at the side of and communicating with cylinder A. Said piston F, which is under the action of a spring H, is provided with a groove 2 which permits the ball to move from groove C into groove 2 when piston F is driven backwards under the released action of spring H, as will be set forth hereinafter. Said spring H is maintained under compression by the tension of a cord I by which all the fuses causing the release of the fire extinguishers arranged at suitable places are connected to one another; and piston B is connected by the Bowden power transmission means J to the fire extinguishers just mentioned.

The initial position of operation (automatic, manual or stop) is controlled by a handle L and a bayonet joint, the slot of which is located in the fixed body A, while the pin M is secured to the piston B. The said pin M carries a pointer N which moves in front of an indicating plate formed by the rim Z of body A and bearing the words "Start", "Stop" and "Normal". Moreover, in a seat or opening provided in plate Z is a disk O which is normally kept concealed by a movable member P that is dislodged by the piston F when the fuse melts. The shutter P is hinged to the body A and is kept closed in normal position by means of a spring or wedge member. In the active position, when the fuses melt, the piston dislodges the shutter P against the force of the spring or the wedge member and brings the disk O into view. When the members are replaced into rest position, the fuses are replaced and the piston F goes back to its original position. The shutter P is then returned either by the spring or manually by hand and kept in place by means of the wedge member.

It will be assumed that the apparatus is in its inactive or unset position. The springs E and H are expanded and piston B is in projected position, point 1 of said piston lying to one side of ball D while point 2 of piston F lies to the other side of said ball. In order to set said apparatus, the handle L is pushed right in, then turned until finger N stands in front of the word "Stop", on the rim or plate Z. At that time, spring E is compressed and held in its position; and pin M is at position 3 (Fig. 4) in the locking slot. Spring H is then compressed by fitting the fuses on cord I, and the device is then set in the position shown in Fig. 1. The handle L is then turned so as to bring finger N in front of the word "Normal" and the locking pin is then at 4 (Fig. 4), the apparatus being then ready for operation. The fuses used may be of different kinds and arranged at suitable points and connected to a cord I which maintains spring H under compression; the operation of each fuse being based on the relative displacement of two members. In the form represented in Figs. 3 and 5, these members consist of slidably connected links U and U' to which cord I is attached, which are normally fastened together by a drop of solder V (Fig. 5); while in Fig. 6, they comprise a cylinder R and a piston S connected to the cord I. The cylinder R contains a body of solder T which prevents the outward movement of piston S, while the solder retains its solid state, at normal temperature, and resists the compression strain to which it is subjected by the tension of cord I through reaction upon the cylinder and piston. As a result of a rise in temperature, the body T melts and flows away through the clearances provided in the apartus, which allows of a relative displacement of the constituent parts R and S. The operation of both devices is substantially the same, as will be understood, and involves only very weak tensions on the traction cords. Moreover, by varying the composition of the body T it is possible to obtain a comparatively wide range of operation points. On the other hand, the very nature of such compound renders the fire extinguisher extremely sensitive to rises of temperature and insures a high degree of safety in operation.

Automatic operation

If, under the action of a rise in temperature resulting from a fire breaking out, the fuses are melted, the cord I to which the same are attached slackens and spring H is released, thus pushing piston F rearwards. This piston allows the disk O, which formerly was hidden by the movable member P, to be moved into a position in which it is visible from without. The point 2 lies to one side of ball D which, being released, is thrown out of groove C by the release of spring E. This movement involves that of piston B which exerts on the cord a pull by which the fire extinguisher is made to operate.

Direct hand control

The apparatus being in the position shown in Fig. 1, the pin M which stood in front of the word "Normal" merely has to be brought in front of the word "Start". The result of such displacement of piston B is to bring the flat portion K thereof in registering relation to ball D, so that said piston is free to move backwards under the action of spring E without involving the displacement of ball D.

In the above considerations it has been shown that the melting point of the fuses depends on:

(1) The composition,

(2) The temperature,

(3) The strain to which they are submitted.

This strain is itself dependent on the make-up of the fuse line.

Fig. 7 shows, by way of example, one of such fuse lines, which comprises three fusible

elements F'. At *a* is the control device, and *b* is another fixed point of the arrangement where the line terminates in a tightener *c*.

If, by construction, points *a* and *b* are invariable in their positions, it is merely necessary to give proper tension to cord *d*; as the points of reaction *a* and *b* are fixed, the tension of the cord will remain constant.

If the position of these points happens to vary, the result will be a tightening or a slackening of the cord, and the melting point of the fuse will be varied accordingly within wide limits.

In practice, and particularly in arrangements on board flying machines, or in connection with any other power system provided with a propelling member, it is not possible to obtain a constant tension of the cord on account of the deformation of the whole system resulting from external reactions.

According to this invention, a remote controlling means connecting all the fuses together has thus been provided which maintains a constant pull on the latter.

Fig. 9 shows, by way of example, an embodiment of one such means. It comprises a number of rigid brackets *e* adapted to receive fuses F'. One of these brackets is located at the end of the fuse line and is provided with a tightener *c*.

At the other end the line leads to a bracket *f* which receives the control device L. The connection between the various fuses is provided by means of a cord leading from *a* to *c* and slidable between the brackets within a sheath formed by a flexible and incompressible tube *g*.

In the construction shown in Fig. 7, the pull of cord *d* is applied to points *a* and *b* which are assumed to be invariable by construction. This method of connection thus provides for the reaction. The result is a constant tension of the cord.

In the construction shown in Fig. 8, which is designed for use on board an airplane, the points *a* and *b* may be moved with respect to each other without varying the tension of the cord within the sheath. The pull of the cord is applied to points *a* and *b* whereof the interconnection providing for the reaction of the system is obtained in the following manner (see Fig. 9):

From 1 to 2 through the outer sheath; from 2 to 3 through the bracket; from 3 to 4 through the outer sheath; from 4 to 5 through the bracket; from 5 to 6 through the outer sheath; from 6 to 7 through the bracket.

It follows that the brackets may be displaced with respect to one another without thereby altering the tension of the cord.

In Fig. 8, *h* is the engine, *i* the dash-board, *j* another device to be protected, for example, a gasoline pump. Between 11 and 12 the connection is provided by the cord within its sheath, from 12 to 13 through two ears secured upon the engine. Between those points is a line of fuses composed of elements F' attached to one another by means of cord *d*. From 13 to 14 the cord is once more found in its sheath and at *j* the arrangement likewise comprises a fuse F' and the tightener *c*. As a result of that arrangement the position of such devices as *i*, *h*, *j* may vary under the influence of external reaction without bringing about any disturbance in the satisfactory operation of the warning means.

Where the tension of the cord must be regulated very closely, the arrangement comprises a dynamometer *r*, shown in Fig. 9 in the first bracket.

I claim as my invention:

1. A device for controlling the operation of fire extinguishers or other objects to be operated, comprising a housing embodying juxtaposed main and auxiliary compartments having an opening connecting them; a ball movable in either direction through said opening; a member slidable in the main compartment and formed with a circumferential groove to normally receive the ball and be locked thereby against endwise movement, said member adapted to be operatively connected to the object to be operated; an operating spring acting axially on one end of said member to operate said object; a member slidable in the auxiliary compartment and formed with a depression to receive the ball when the latter moves thereinto through said opening; a spring tending to move said member into a position whereby the depression receives the ball; a fuse; a flexible connection between the fuse and the second-named sliding member to hold that member against the action of its spring, said second-named member being released by the melting of the fuse permitting the consequent movement of the ball into said depression, thereby to release the first-named member and operate the object connected to the same; and means for indicating the melting of the fuse.

2. A device according to claim 1, in which the means for indicating the melting of the fuse comprises a normally-concealed member which is brought automatically into visible position by the movement of the member slidable in the auxiliary compartment consequent upon the melting of the fuse.

3. A device for controlling the operation of fire extinguishers or other objects to be operated, comprising a housing embodying juxtaposed main and auxiliary compartments having an opening connecting them; a ball movable in either direction through said opening; a member slidable in the main compartment and formed with a circumferential groove to normally receive the ball and be locked thereby against endwise movement, said member adapted to be operatively connected to the object to be operated; an

operating spring acting on said member; a spring-actuated member slidable in the auxiliary compartment and formed with a depression to receive the ball when the latter moves thereinto through said opening; a flexible fuse line connected with the second-named sliding member and having a plurality of separate fuses included therein at points which are displaceable with respect to one another, the second named member being released by the melting of a fuse permitting the consequent movement of the ball into said depression, thereby to release the first-named member and operate the object connected to the same.

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