Jan. 4, 1955 L. D. STATHAM ET AL 2,698,886

SEISMIC SWITCH

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Fig. 1.

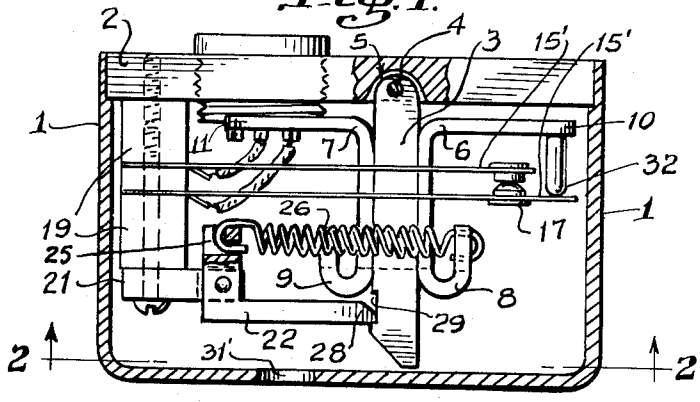


Fig. 2.

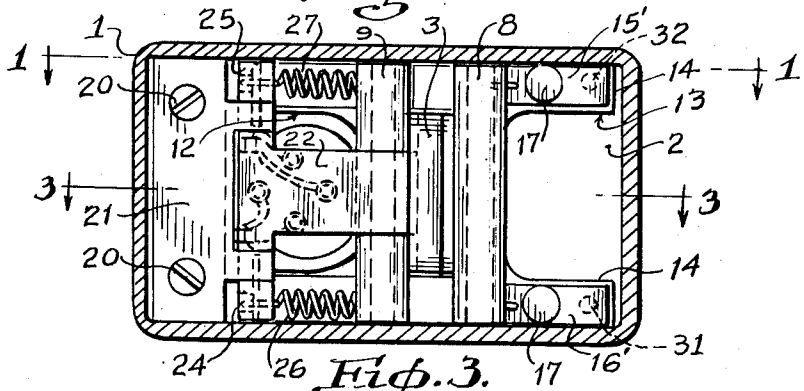


Fig. 3.

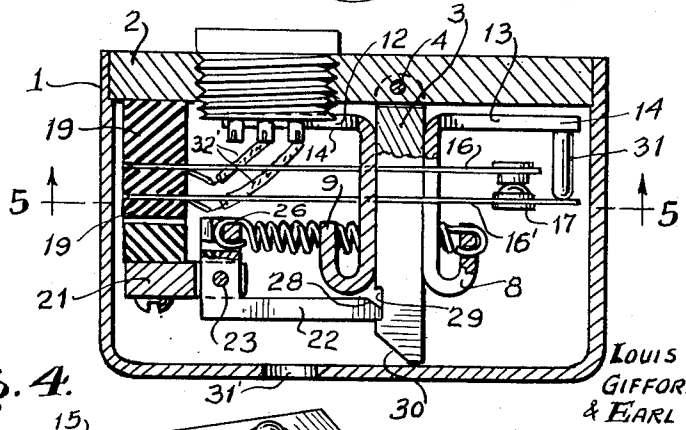
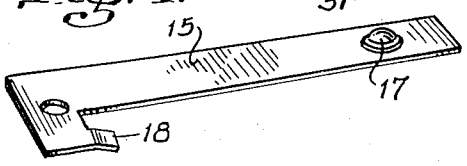


Fig. 4.



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Fig. 5.

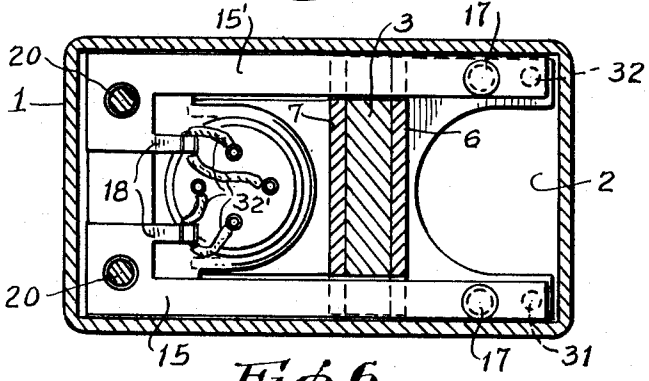


Fig. 6.

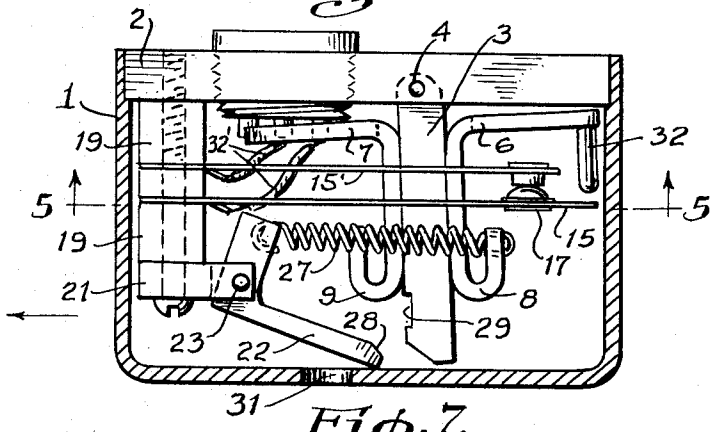
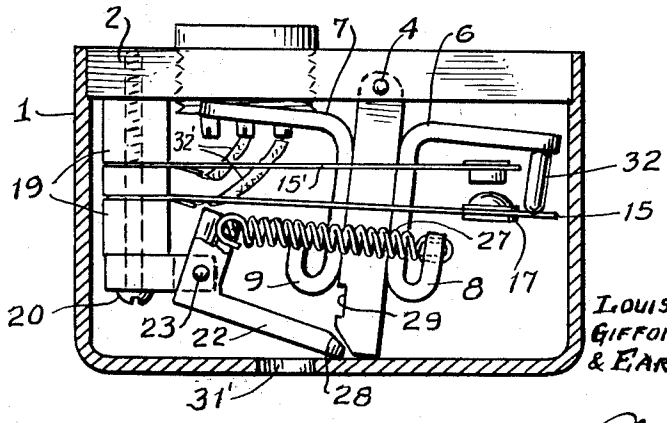


Fig. 7.



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2,698,886

SEISMIC SWITCH

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Application March 3, 1952, Serial No. 274,564

11 Claims. (Cl. 200—61.45)

This invention relates to "g" mechanisms, that is, mechanisms which are actuable when the mechanisms are accelerated (understanding this term in a vectorial sense) to a predetermined positive or, if desired, to a predetermined negative value.

It is another object of our invention to predetermine the algebraic sign which the acceleration must have as well as the value thereof in order for the mechanism to function.

Thus it is a specific object of our invention to preselect whether the mechanism is to operate upon deceleration or upon acceleration or to operate differently upon acceleration or deceleration of the mechanism. Thus one may hold the mechanism inactive during acceleration of the mechanism and cause the mechanism to become actuated when the acceleration decreases to a predetermined level.

Again, we may cause the mechanism to become actuated in one sense upon acceleration of the mechanism and operate in a different sense when the mechanism decelerates.

We have applied this mechanism to a switch as illustrated in the drawings. The switch becomes actuated upon deceleration but is not actuated upon acceleration.

Our invention will be further described by reference to the drawings, in which

Fig. 1 is a vertical section through the switch taken on line 1—1 of Fig. 2;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a section taken on line 3—3 of Fig. 2;

Fig. 4 is a perspective view of one of the switch leaves;

Fig. 5 is a section taken on line 5—5 of Fig. 3;

Fig. 6 is a view similar to Fig. 5 showing the switch on acceleration; and

Fig. 7 is a view similar to Fig. 6, showing the switch on deceleration.

The case 1 carries a cover 2 on which the pendulum plate 3 is hinged on pin 4 passing through the cover 2. The cover 2 is suitably recessed at 5 to permit swinging of the plate 3. On either side of the plate 3 are the brackets 6 and 7 which counterbalance each other. They are formed with U hooks 8 and 9 and flanges 10 and 11. The flanges are cut out at 12 and 13. This forms two arms 14, one on each side of the flanges 10 and 11. Spring leaf contacts 15 and 16 are positioned on one side of the cover and leaf contacts 15′ and 16′ on the other side of the cover. This form is illustrated in Fig. 4. The spring carries a contact button on one end and is formed with a tongue 18 in the other end. They are clamped between insulating blocks 19 which are screwed into the cover 2 by screws 20.

Upon the bottom of the blocks are positioned the plate 21 upon which the dog 22 is pivoted on hinge pin 23 mounted on plate 21. The dog carries ears 24 and 25, one on each side. The ears and dog form a bell crank lever arm. Springs 26 and 27 are connected to the ears 24 and 25 and the U 8. The spring acts as a bias between the spring and frame to determine the force and therefore the acceleration necessary to actuate the pendulum to rotate about the hinge. The dog is beveled at 28 and the plate 3 carries a cooperating slot 29. The plate is beveled at 30. A suitable hole is provided at 31 in the bottom of the cover opposite the dog 22.

As shown, the plates 15 and 15′ are extended under insulating fingers 31 and 32 mounted on each arm 14. The springs are connected to electrical conductors 32 soldered to the lips 18 and connected to a conduit connector 33 mounted on the cover 2 opposite the dog 22.

As initially set, by lifting the dog 22 so that it rides over the bevel 30 into the slot 39, the plate 29, due to the tension of the springs 26 and 27, is locked in position. The plate 3 hangs vertically and the insulated finger 31 rests lightly on plates 15 and 15′ but does not disturb the contact of the contact buttons 15*a* and 15*b*.

However, when the case is accelerated to the left in the direction indicated by the arrows in Fig. 6, the plate 3 is subjected to a force, causing it to move in a counterclockwise direction, i. e., opposite to the arrow, provided the acceleration is such as will generate a force sufficient to overcome the spring tension. When this occurs (see Fig. 6) the movement of the plate 3 lifts the fingers 31 and 32 off the spring plates 15 and 15′ (see Fig. 6). The slot 29 is moved away from the dog 22 which then drops away, as shown in Fig. 6, relieving the tension of the springs 26 and 27. Thus, if the acceleration is constant or increases, the force causes a further movement of the plate in a counterclockwise direction until the arms 14 come against the cover 2 which then acts as a stop. It is evident, however, that in all this movement the position of the springs is unaltered. As illustrated the switch is in closed position.

If the case is now decelerated, the force holding the plate in the position of Fig. 6 decreases and when it reaches a value less than the tension of the springs, the springs will force the plate 3 to rotate clockwise (see Fig. 7) causing the fingers to descend and depress the spring 15 to open and separate the contact buttons.

To reset the switch it is merely necessary to insert a rod via hole 31 and lift the dog 22 which will ride over the bevel 30 and enter the notch 29.

It is obvious that the mechanical motion of the plate 29 in a clockwise or counterclockwise direction could be made to actuate any other type of mechanism. Furthermore, instead of mounting the pendulum and dog in the case and cover, they may be mounted on any other frame or structure.

For any given spring 26, the depth of the notch 29 determines the acceleration upon which the arm 3 will swing counter-clockwise sufficiently to release the dog 22. The deeper the notch, the greater the required acceleration for such release. For any given spring 26, the length of the ears 24 and 25, from the center of pivot 23, will determine the magnitude of the acceleration at which the arm 3 begins its clockwise rotation and therefore the acceleration at which the contacts 17 open. The longer the ears the smaller this acceleration and the later the period in time at which the contacts open.

While we have described a particular embodiment of our invention for the purpose of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention as set forth in the appended claims.

We claim:

1. A mechanism, responsive to acceleration, comprising a frame, a pendulum, a hinge for said pendulum, said hinge being mounted in said frame, a latch dog hingedly mounted in said frame, a recess in said pendulum, one end of said dog being positioned in said recess, a spring biasing said pendulum, and means operatively connected to said pendulum for actuation of said means on deflection of said pendulum upon acceleration of said frame, said means including also means for subsequently actuating said first-mentioned means upon a different acceleration of said frame.

2. A mechanism, responsive to acceleration, comprising a frame, a pendulum, a hinge for said pendulum, said hinge being mounted in said frame, a latch dog hingedly mounted in said frame, a recess in said pendulum, one end of said dog being positioned in said recess, a spring biasing said pendulum, an electrical switch mechanism, and an operative connection between said switch mechanism and said pendulum to actuate said switch mechanism upon deflection of said pendulum in one direction, said connection actuating said switch mechanism upon deflection of the pendulum in an opposite direction.

3. A mechanism, responsive to acceleration, comprising a frame, a pendulum, a hinge for said pendulum

mounted in said frame, a latch for said pendulum, means responsive to acceleration of said frame in a predetermined direction for unlatching said pendulum, and a spring connected to said frame and said pendulum for biasing said pendulum against rotation about said hinge, said pendulum rotating about said hinge upon acceleration of said frame and means responsive to this said rotation of said pendulum and actuated thereby, said means also including means for actuation by said pendulum upon a reverse rotation of said pendulum upon a different acceleration of said frame.

4. A switch mechanism, responsive to acceleration, comprising a frame, a pendulum, a hinge for said pendulum mounted in said frame, a latch for said pendulum, means responsive to acceleration of said frame in a predetermined direction for unlatching said pendulum, a spring connected to said frame and said pendulum for biasing said pendulum against rotation about said hinge, an electrical switch connected to said pendulum for actuation of said switch on rotation of said pendulum, said means including also means for subsequently actuating said first-mentioned means upon a different acceleration of said frame.

5. A switch, responsive to acceleration, comprising a frame, a pendulum mounted on said frame, a bracket mounted on said pendulum, a pair of electrical contacts mounted on said frame, a bell crank hingedly mounted on said frame, a notch in said pendulum, one end of said bell crank being positioned in said notch, a spring connecting the other end of said bell crank and to said pendulum, means mounted on said pendulum and operatively connected to said contacts for actuation of said switch on rotation of said pendulum about its hinge.

6. A switch, responsive to acceleration, comprising a frame, a pendulum mounted on said frame, a bracket mounted on said pendulum, a pair of electrical spring contacts mounted on said frame at one side of said pendulum and also to one side of said bracket, a bell crank hingedly mounted in said frame, a notch in said pendulum, one end of said bell crank being positioned in said notch, a spring connecting the other end of said bell crank and to said pendulum, said bracket contacting one of said spring electrical contacts when the pendulum is in locked position with the bell crank end positioned in said notch.

7. A mechanism, responsive to acceleration, comprising a frame, a pendulum hingedly mounted on said frame, a latch for said pendulum to hold said pendulum in a fixed position, means responsive to acceleration in one direction to release said pendulum from said latch and to permit said pendulum to swing freely on said hinge in one direction upon acceleration of said mechanism, and means connected to said pendulum for actuation by said pendulum when said pendulum swings in an opposite direction at a predetermined lesser magnitude of acceleration of said mechanism.

8. A mechanism, responsive to acceleration, comprising a frame, a pendulum hingedly mounted on said

frame, a latch for said pendulum to hold said pendulum in a fixed position, means responsive to acceleration in one direction to release said pendulum from said latch and to permit said pendulum to swing freely on said hinge upon acceleration of said mechanism, and means connected to said pendulum for actuation by said pendulum upon a predetermined magnitude of deceleration of said mechanism when said pendulum swings in a direction opposite to the direction of swing of said pendulum on said acceleration of said mechanism.

9. A mechanism, responsive to acceleration, comprising a frame, a pendulum hingedly mounted on said frame, a latch for said pendulum to hold said pendulum in a fixed position, means responsive to acceleration in one direction to release said pendulum from said latch and to permit said pendulum to swing freely on said hinge in one direction upon acceleration of said mechanism, and means connected to said pendulum for actuation by said pendulum when said pendulum swings in an opposite direction at a predetermined deceleration of said mechanism.

10. A mechanism, responsive to acceleration, comprising a frame, a mass, a mount for said mass on said frame, said mass being movably mounted on said mount on acceleration of said frame, releasable means mounted in said frame to restrain said mass from motion on acceleration of said frame, said releasable means being actuable upon a predetermined acceleration of said frame to release said mass, said mass moving on said mount upon said acceleration of said frame in one direction after said release, said mechanism including means for moving said mass on said mount upon a predetermined acceleration of said frame different from said first mentioned acceleration, a motion responsive device responsive to the motion of said mass, said motion responsive device including means responsive to the motion of said mass upon a lesser acceleration of said frame.

11. A mechanism, responsive to acceleration, comprising a frame, a mass, a mount for said mass on said frame, said mass being movably mounted on said mount, releasable means mounted in said frame to restrain said mass from motion on acceleration of said frame, said releasable means being actuable upon a predetermined acceleration of said frame to release said mass, said mass moving on said mount upon said acceleration in one direction after said release, said mechanism including means for moving said mass on said mount upon a predetermined deceleration of said frame, and a motion responsive device responsive to the motion of said mass, said motion responsive device including means responsive to the reverse motion of said mass upon a predetermined deceleration of said mechanism.

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