United States Patent

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[33] **Spain**
[31] **359529**

[54] **INERTIA SWITCH**
18 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **200/61.45**
[51] **Int. Cl.** **H01h 35/14**
[50] **Field of Search** ..... 200/61.45, 61.48—61.53, 146, (Inquired; 340/262

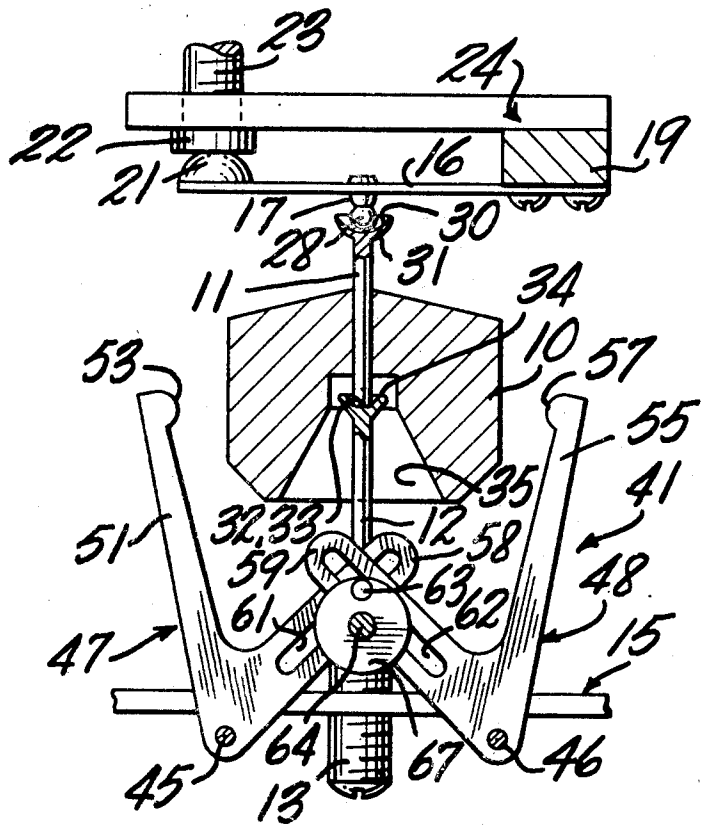
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ABSTRACT: An inertia switch including a massive inertia element movable through an articulated connection collapsible from an extended condition in response to abrupt changes in velocity to actuate the switch. A pair of pivotal arms of the articulated connection extend, in a stable position, in end-to-end relationship between a mounting point and a resilient conductive member. The pivotable arms abut at planar end surfaces thereof, propping the resilient member in its uppermost position. The inertia element is supported on the uppermost arm and forces applied to the pivotable arms in their stable position by the bias of the resilient member and the weight of the inertia element extend along the arms to the mounting point. Abrupt velocity changes pivot the arms from their stable alignment under the influence of the inertia element, allowing movement of the resilient member for switch actuation. Resetting levers are engageable with the inertia element and pivotable arms to their central stable position and current bypass provisions protect the resilient member from excessive currents.

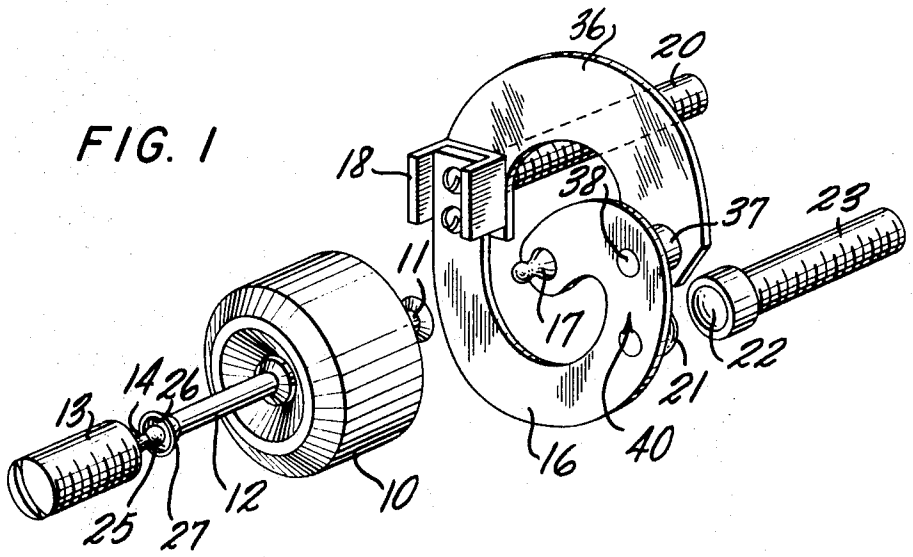


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SHEET 1 OF 2

FIG. 1



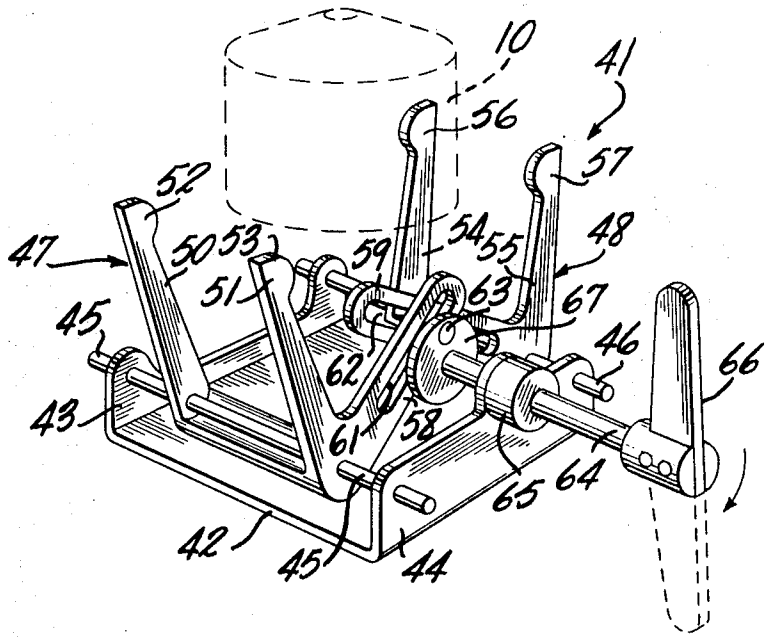


FIG. 6

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FIG. 2

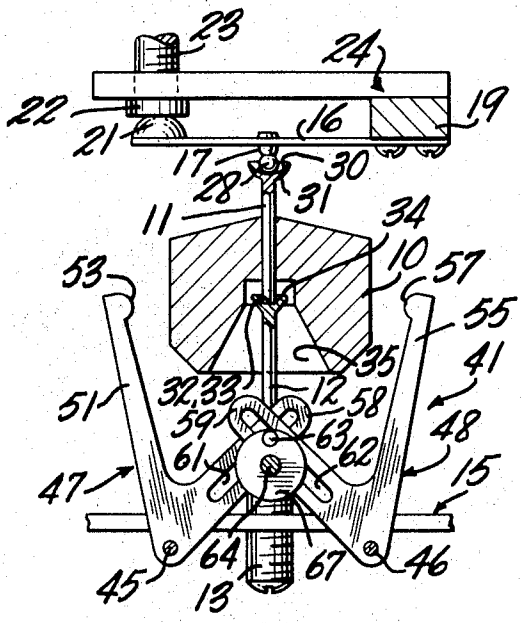


FIG. 4

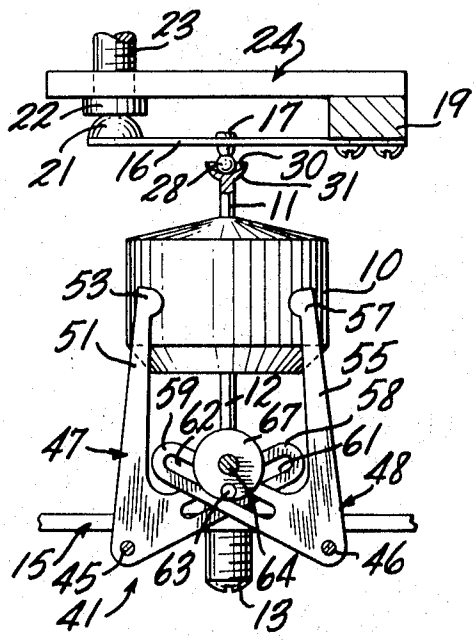


FIG. 3

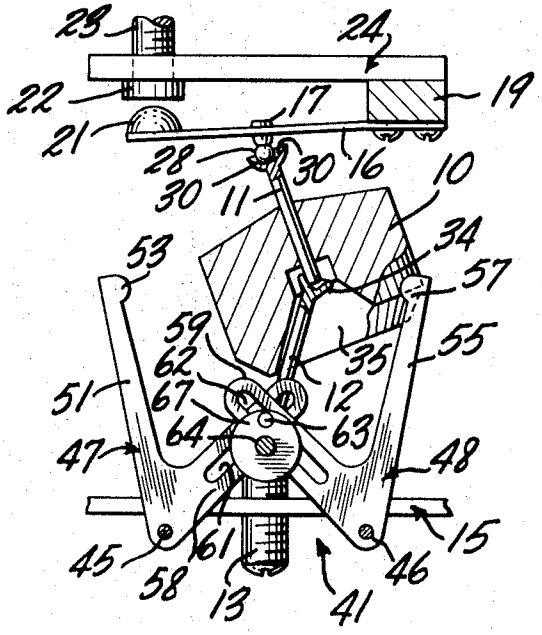
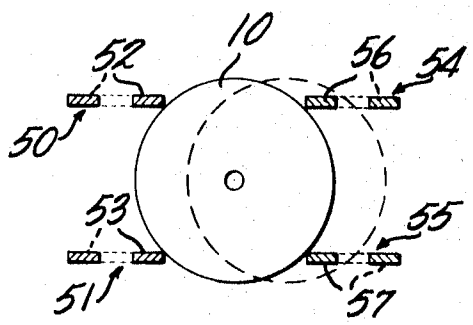


FIG. 5



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INERTIA SWITCH

BACKGROUND OF THE INVENTION

This invention relates generally to inertia switches responsive to abrupt changes in velocity and more particularly to inertia switches including relatively massive inertia members effective to provide switch actuation.

Previously, inertia switches have been provided wherein a relatively massive inertia element has been provided, movable with respect to remaining provisions of the switches for actuation of the switches upon abrupt changes in velocity or, in other words, abrupt acceleration or deceleration. It has often been the case, however, that in such previously known inertia switch arrangements, sudden actuation, causing either a sudden breakage or a sudden completion of an electrical circuit, has not been achieved. In this respect, the phrase "sudden actuation" is employed to describe full switch actuation without partial or intermittent connection and disconnection, once the desired switch actuating conditions have occurred. Sudden or complete switch actuation has been prevented in previously known switches by the tendency for partial movement of switch contacts to occur when a velocity change takes place which approaches the desired change in velocity at which switch actuation is to be effected. Similarly, the subjecting of such previously known switches to vibrations often results in intermittent switch actuation or contact chatter, despite the fact that the desired switch actuating acceleration or deceleration has not occurred.

SUMMARY OF THE INVENTION

In accordance with the present invention, an inertia switch is provided wherein actuation of the switch occurs suddenly through the provision of an inertia element and an associated switch actuation mechanism which, in response to predetermined abrupt changes in velocity, move from a first stable position at which time complete actuation of the switch immediately is achieved. A pair of pivotable members or arms extending between a support member and a movable switch actuating member are provided for alignment along an axis extending between the support member and the switch actuating member to maintain the switch actuating member in a first, unactuated position. The inertia element is supported upon one of the pivotable arms to provide pivoting of the arms out of their aligned, stable position, thereby reducing the distance between the distant ends of the pivotable arms to allow movement of the switch actuating member to an actuated position. Preferably, the pivotable arms are of an elongate configuration having abutting planar end portions which are in face-to-face relationship when the pivotable arms are aligned linearly along the axis extending between the support member and the switch actuating member. Forces applied to the pivotable arms by the switch actuating member and the inertia element extend linearly along the pivotable arms and, therefore, do not tend to move the pivotable arms out of their aligned, stable position. However, once the arms pivot under the influence of the inertia element, forces applied thereto aid in the pivoting thereof and sudden release of the switch actuating member is effected.

Resetting of the inertia switch is effected through the provision of movable members engageable with the inertia element for moving the inertia element and its associated switch actuating provisions to the stable position thereof. The members engageable with the inertia element for the resetting of the inertia switch may be provided by a plurality of levers having arms engageable with the inertia element and pivotally mounted for pivotal movement under the influence of a single manually operable means engageable with the plurality of levers for the pivoting thereof.

Additionally, the movable switch actuating member, responsive to a movement of the inertia element and pivotable arms, may constitute a resilient conductive spring element, in which case an alternate current path normally bypassing the spring element may be provided for the prevention of the passage of excessive current through the spring element and disconnection of the alternate current path may be provided upon movement of the spring element to its actuated disposition.

In accordance with the foregoing, then, it is an object of this invention to provide an inertia responsive mechanism which is suddenly actuable in response to abrupt changes in velocity.

Additionally, it is an object of this invention to provide an inertia switch including a switch actuating mechanism alignable in a first stable position and responsive to an inertia element for movement from the aligned stable position to effect movement of a switch actuating member.

Another object of this invention is to provide improved inertia switch resetting provisions including a plurality of members engageable with an inertia element and movable concurrently by manual actuation to return the inertia element to an initial position.

A further object of this invention is to provide an inertia switch including a conductive spring member movable in response to abrupt changes in velocity and current bypassing provisions, protecting the spring element from excessive currents and disconnectable upon movement of the spring element.

With the above and further objects in view that will hereinafter appear, the nature of the invention will more clearly be understood with reference to the several views included in the attached drawings and the following detailed description of a preferred embodiment of the invention.

IN THE DRAWINGS

FIG. 1 is a perspective view of current-carrying and actuating provisions of an inertia switch in accordance with this invention.

FIG. 2 is an elevational view illustrating inertia switch actuating and resetting provisions, parts being broken away or shown in section for clarity.

FIG. 3 is an elevational view of switch provisions of the type illustrated in FIG. 2, the switch actuating provisions thereof being shown in an actuated position.

FIG. 4 is an elevational view of switch provisions of the type illustrated in FIGS. 2 and 3, showing the resetting provisions in their resetting relationship with the switch actuating provisions.

FIG. 5 is a diagrammatic illustration of the engagement of a switch actuating inertia member by resetting provisions of the type illustrated in FIGS. 2 through 4.

FIG. 6 is a perspective view of inertia switch resetting provisions of the type illustrated in FIGS. 2 through 4.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings in detail, there is illustrated in FIG. 1 novel inertia switch provisions in accordance with this invention including a relatively massive inertia element 10 affixed to a first pivotable member or arm 11 which is shown in linearly aligned relationship with a further pivotable member or arm 12. A threaded member 13 bears, at one end thereof, a support projection 14 for engagement with an end of the second pivotable arm 12. The threaded member 13 is provided in threaded engagement with a base, generally designated by the numeral 15 in FIG. 2, which may form a part of or be supported within a housing (not shown) in which the switch provisions may be enclosed.

A movable resilient spring member 16 of conductive material bears at one end thereof a further projection 17 engageable with an end of the first pivotable arm 11. The conductive spring member 16 is supported at a further one of its ends by a support bracket 18 as shown in FIG. 1 or by other suitable chosen support means such as the mounting block 19 illustrated in FIGS. 2 through 4. The spring member 16 is maintained in electrical connection with a further conductive member such as, for example, an elongate threaded conductor

20 suitable for connecting the conductive spring member 16 into a circuit which is to be interrupted upon actuation of the inertia switch.

The conductive spring member 16, which may be of a spiral configuration as illustrated in FIG. 1, supports, intermediate the ends thereof, a contact 21 in alignment with a further contact 22 which may be, in turn, supported upon an additional elongate threaded conductor 23 suitable for connection into the circuit with which the inertia switch is to be associated. The conductive spring member 16 is of a resilient nature, being naturally biased away from the contact 22, thus providing a complete circuit from the threaded conductor 23 through the contacts 22 and 21 and the greater part of the length of the spring member 16 to the remaining threaded conductor 20 only when physically forced toward the contact 22 for engagement of the contacts 21 and 22.

The contact 22, its associated conductive member or conductor 23, and the secured end of the conductive spring member 16 are maintained a fixed distance from the base 15 as by the provision of a support member 24 supported within or forming a part of the housing enclosing the switch provisions. The pivotable arms 11 and 12, as best seen in FIG. 2, extend, when linearly aligned, between the projection 14 provided upon the threaded mounting member 13 and the projection 17 affixed to the conductive spring member 16. The threaded member 13 is initially adjusted to assure closure of the contacts 21 and 22 when the pivotable arms 11 and 12 are linearly aligned along an axis extending between the projections 14 and 17.

The projection 14 engaging the lowermost end of the pivotable arm 12 is provided with a spherical terminal surface 25 which is accepted into a concave surface 26 formed by an enlarged lowermost end portion 27 of the pivotable arm 12 as illustrated in FIG. 1. Similarly, the projection 17 supported upon the resilient conductive spring member 16 terminates in a spherical surface 28 which is accepted within a concave surface 30 provided by an enlarged uppermost end portion 31 of the pivotable arm 11 as illustrated in FIGS. 2 through 4. Thus, the pivotable arms 11 and 12 are supported between the projections 14 and 17 and are pivotable in any direction away from the axis extending between the two projections. Of course, spherical surfaces such as those illustrated at 25 and 28 may be provided upon the distant ends of the arms 11 and 12, in which case the support member 13 and the movable spring member 16 may be provided with concave surfaces similar to the surfaces 26 and 30.

Intermediate the supporting provisions for the pivotable arms 11 and 12, the arms 11 and 12 abut at a pair of planar faces 32 and 33, respectively, the faces 32 and 33 being in face-to-face relationship when the arms 11 and 12 are linearly aligned as best illustrated in FIG. 2. The lowermost pivotable arm 12 is provided with a further enlarged end portion 34 adjacent the planar face 32 of the pivotable arm 11, the enlarged end portion 34 defining a recess encircling the planar face 33 of the pivotable arm 12 and receiving the lowermost end of the pivotable arm 11 therein. Upon pivoting of the pivotable arms 11 and 12 into a position such as that illustrated in FIG. 3, the enlarged end portion 34 maintains the lowermost end of the pivotable arm 11 in engagement with the pivotable arm 12, allowing the resetting of the inertia switch as will be discussed more fully hereinafter.

The inertia element 10 illustrated in FIGS. 1 through 4 is generally cylindrical in outline but may be provided with any suitable convenient shape such as, for example, a generally spherical configuration. The inertia element 10 is affixed centrally to the uppermost pivotable arm 11 and is symmetrical thereabout such that the weight of the inertia element 10, acting upon the pivotable arms 11 and 12 is normally applied to the mounting member 13 along the axis extending between the distant ends of the pivotable arms 11 and 12 when those arms are in their central stable position.

A downwardly opening conical recess 35 is provided within the inertia element 10 to allow pivoting of the lowermost pivotable arm 12 with respect to the uppermost arm 11 under the influence of the inertia element 10 as shown in FIG. 3.

Abrupt changes in velocity occurring through either sudden movement of the inertia switch or through sudden acceleration or deceleration of the inertia switch from a velocity at which it is initially moving will effect pivoting of the arms 11 and 12 under the influence of the inertia element 10. Once the pivotable arms 11 and 12 have been moved from the stable position thereof illustrated in FIG. 2, the forces applied to the arms 11 and 12 by the natural bias of the spring member 16 and the weight of the inertia element 10 will aid in the pivoting of the arms 11 and 12, reducing the distance between the distant ends thereof and allowing the spring member 16, by reason of its natural bias, to assume the position thereof illustrated in FIG. 3.

Changes in velocity approaching the changes in velocity necessary for actuation of the inertia switch will effect a slight rocking of the inertia element 10 and the pivotable arms 11 and 12. However, separation of the contacts 21 and 22 will not occur until the desired abrupt change in velocity has occurred inasmuch as slight movement of the terminal faces 32 and 33 out of their face-to-face relationship will be insufficient to reduce the distance between the distant ends of the pivotable arms 11 and 12 sufficiently to cause the required movement of the resilient spring member 16 necessary to separation of the contacts 21 and 22. Additionally, the forces applied along the pivotable arms 11 and 12 during relatively small movements thereof will still pass along these arms and through the abutting end portions of the pivotable arms 11 and 12 and, accordingly, further pivoting of the arms 11 and 12 does not occur under the influence of the forces applied thereto. In this respect, it should be noted that the contacting faces 32 and 33 of the arms 11 and 12, respectively, are preferably of a circular configuration whereby initial pivotal movement of the arms 11 and 12 in any direction causes a pressing together of the arms 11 and 12 at associated edge portions of the circular terminal faces 32 and 33. Thus, upon the occurrence of a change in velocity sufficient to actuate the inertia switch, the actuation, separating the contacts 21 and 22, is sudden, irreversible and free of contact chatter.

The complete and positive actuation of an inertia switch employing switch actuation provisions of the type described hereinabove renders such switches suitable for use in a wide variety of vehicles as, for example, circuit interruptors and safety provision actuating switches responsive, not only to collisions, but also to the upsetting of vehicles and sudden landings of aircraft.

As illustrated in FIG. 1 the conductive spring member 16 may be protected from the possible application thereto of excessive currents by the employment of current bypassing provisions including a conductive element 36 supported by the mounting bracket 18 in electrical connection with the elongate threaded conductive member 20. The conductive element 36 is preferably substantially thicker than the relatively thin spring member 16, providing less resistance to current passed therethrough. A first contact 37 is supported at one end of the conductive element 36 in alignment with a further contact 38 supported upon the spring member 16 for engagement with the contact 37. Upon closure of the contacts 21 and 22 the further contacts 37 and 38 are brought into engagement completing a current bypassing path between the threaded conductor 23, the contacts 21 and 22, an intermediate portion 40 of the spring member 16, the contacts 37 and 38, the conductive element 36 and the threaded conductor 20. Excessive currents occurring in the circuit into which the inertia switch is connected will, then, bypass the greater portion of the length of the conductive spring member 16, preventing deterioration of the spring member 16 and the current bypassing path will be opened in response to actuation of the spring member 16 by pivoting of the aligned arms 11 and 12.

Resetting of the inertia switch actuating provisions is effected through the resetting mechanism generally indicated by

the numeral 41 in FIG. 6. The resetting mechanism 41 includes a support plate 42 having generally upstanding support flanges 43 and 44 formed integrally at each end thereof. A pair of spaced-apart shafts 45 and 46 are supported between the flanges 43 and 44 adjacent the ends thereof, the shafts 45 and 46 having mounted thereon a pair of pivotable bellcrank levers generally designated by the numerals 47 and 48, respectively. The bellcrank lever 47 includes a pair of parallel arms 50 and 51 extending upwardly away from the supporting shaft 45 in spaced-apart relation, the arms 50 and 51 terminating in rounded end portions 52 and 53, respectively. Upon pivoting of the bellcrank lever arms 50 and 51, the end portions 52 and 53 are moved toward the central location of the inertia element 10, illustrated in broken lines in FIG. 6. The bellcrank lever 48 similarly includes a pair of upwardly extending and spaced-apart arms 54 and 55, each terminating in rounded end portions 56 and 57, respectively and the bellcrank lever 48 is pivotable for movement of the end portions 56 and 57 of the arms 54 and 55 thereof toward the central location of the inertia element 10. Thus, upon actuation of the inertia switch by movement of the inertia element 10 away from its central location, the bellcrank levers 47 and 48 may be pivoted, causing engagement of the inertia element 10 by one or more of the arm end portions 52, 53, 56 and 57 to effect movement of the inertia element 10 and the pivotable arms 11 and 12 toward their central, stable position.

The bellcrank levers 47 and 48 are provided with additional arms 58 and 59, respectively, the arms 58 and 59 having formed therein respective elongate slots 61 and 62 for the reception therein of a driving pin 63 to provide manual pivotal movement of the bellcrank levers 47 and 48 through engagement of the pin 63 with the interior slot surfaces provided upon the arms 58 and 59. Movement of the pin 63 within the slots 61 and 62 for manual resetting of the inertia switch actuating provisions is effected through the employment of a shaft 64 supported upon the flange 44 of the mounting plate 42 by a bearing member 65. The shaft 64 is mounted for manual rotation by the movement of a handle 66 supported thereon and carries the driving pin 63 in offset relation through the provision of a connecting member 67 supporting the pin 63 at a distance from the axis of rotation of the shaft 64. It will be seen that as the handle 66 is moved from the position thereof illustrated in full lines in FIG. 6 to the position illustrated in broken lines in FIG. 6, the driving pin 63 will be moved to its lowermost position as best seen in FIG. 4, causing the arms 50, 51, 54 and 55 of the bellcrank levers 47 and 48 to move inwardly toward the central position of the inertia element 10, again as illustrated in FIG. 4.

Assuming the inertia element 10 to have moved previously to the broken-line position illustrated in FIG. 5, upon manual actuation of the resetting provisions 41, the rounded end portions 52, 53, 56 and 57 which are provided upon the bellcrank levers 47 and 48 will move from their outermost positions as illustrated in FIG. 5 toward the illustrated innermost positions, the end portions 56 and 57 of the arms 54 and 55 engaging the inertia member and returning the switch actuating provisions to the stable position thereof best illustrated in FIG. 2. Thus, a full rotation of the handle 66 completes a resetting of the actuating a provisions of the inertia switch, initially moving the arms 50, 51, 54 and 55 inwardly to return the inertia element to its central location and returning those arms outwardly away from the inertia element for subsequent actuation of the switch in response to abrupt changes in velocity.

While a preferred form of the invention has been described hereinabove, many variations in the apparatus illustrated and described will be apparent to those skilled in the art within the spirit and scope of the invention. For example, completion of a circuit upon actuation by the inertia switch actuating provision could simply be accomplished as by the provision of an additional contact or pair of contacts opposite the contacts 21 and 22 and engageable together upon movement of the spring member 16 into the position thereof illustrated in FIG. 3. Such provisions could, for example, be employed in the short-circuiting of vehicle electrical provisions by the connection of a circuit across the normally provided electrical generating means or for the actuation of additional safety devices upon abrupt velocity changes sufficient to effect switch actuation.

I claim:

1. In an inertia switch of the type responsive to abrupt changes in velocity, the combination comprising movable means for altering the condition of an electrical circuit upon movement thereof, first pivotable means having a portion thereof contacting said movable means for controlling movement thereof, second pivotable means pivotably joining said first pivotable means at a location removed from said movable means, both pivotable means having portions in contact at said location, support means for supporting said second pivotable means at a point removed from said first pivotable means, and inertia means for effecting pivotal movement of said first and second pivotable means in response to abrupt velocity changes to reduce the distance between said support means and said portion of said first pivotable means contacting said movable means, whereby movement of said movable means is effected sufficient for the altering of a circuit condition, the first and second pivotable means and their portions in contact being alignable in a stable position, forming a restraining interconnection, and being free of further restraining interconnection between the first and second pivotable means when in their stable position.

2. The combination according to claim 1 wherein said first and second pivotable means comprise first and second elongate arms in abutting end-to-end relationship between said movable means and said support means, said arms each having planar end surfaces in contact and said arms being positionable linearly between said support means and said movable means with said planar surfaces in face-to-face relationship to define a first stable position out of which said arms are movable by said inertia means for switch actuation.

3. The combination according to claim 1 wherein said first and second pivotable means comprise first and second alignable members, respectively, movable into a stable position along an axis between said movable means and said support means, said movable means comprising means biased into engagement with said first pivotable means for applying a force through said alignable members to said support means when said alignable members are in said stable position.

4. The combination according to claim 3 further comprising first and second conductor means for connection into an electrical circuit, said means biased into engagement with said first pivotable means comprising a conductive spring member electrically connected with said first conductor means and movable into and out of electrical connection with said second conductor means, and protective current carrier means electrically connected with said first conductor means, said movable means including means movable therewith into electrical connection between said protective current carrier means and said second conductor means for providing a current path between said first and second conductor means in addition to said spring member, whereby said spring member is protected from excessive current.

5. The combination according to claim 1 further including first rounded projection means on one of said first pivotable means and movable means, first concave surface defining means on the remaining one of said first pivotable means and movable means for accepting said first rounded projection means therein to maintain said first pivotable means in pivotal relation with said movable means, second rounded projection means on one of said second pivotable means and support means, and second concave surface defining means on the remaining one of said second pivotable means and support means for accepting said second rounded projection means therein to maintain said second pivotable means in pivotal relation with said support means.

6. The combination according to claim 1 wherein said first and second pivotable means includes first and second abutting extremities, one of said first and second abutting extremities

including thereon recess defining means opening toward and receiving therein the remaining abutting extremity to allow relative pivotal movement between said first and second pivotable means without disengagement thereof.

7. The combination according to claim 1 including reset means for moving said inertia means and said first and second pivotable means to a stable position, said reset means including a plurality of movable members spaced about said inertia means and movably supported for engaging said inertia means, and means for driving each of said movable members toward said stable position, whereby at least one of said movable members will engage said inertia means for return to said stable position.

8. In an inertia switch of the type responsive to abrupt changes in velocity, the combination comprising movable means for altering the condition of an electrical circuit upon movement thereof, first pivotable means having a portion thereof contacting said movable means for controlling movement thereof, second pivotable means pivotably joining said first pivotable means at a point removed from said movable means, support means for supporting said second pivotable means at a point removed from said first pivotable means, and inertia means for effecting pivotal movement of said first and second pivotable means in response to abrupt velocity changes to reduce the distance between said support means and said portion of said first pivotable means contacting said movable means, whereby movement of said movable means is effected sufficient for the altering of a circuit condition, said first and second pivotable means including first and second extremities, respectively, pivotably associated at a point intermediate said movable means and said support means, said inertia means comprising a relatively massive member having a recess therein, said recess receiving both said first and second extremities, whereby at least a portion of one of said first and second pivotable means is free to pivot a limited extent within said recess upon relative movement of said inertia means.

9. The combination according to claim 8, wherein the first and second extremities of the first and second pivotable means include surfaces contactable in face-to-face relation within the recess in the massive member.

10. In an inertia switch of the type responsive to abrupt changes in velocity, the combination comprising movable means for altering the condition of an electrical circuit upon movement thereof, pivotably connected members collapsible from a stable, extended condition holding the movable means against movement, inertia means supported by at least one of the pivotably connected members and movable relative to said movable means from a first stable position in any of a number of directions for providing movement of said movable means upon abrupt changes in velocity, and reset means including a plurality of movable members spaced about said inertia means, and manually actuable means connected with each of said movable members for moving said movable members towards said first stable position of said inertia means, whereby at least one of said members will engage said inertia means during movement of said members and return said inertia means to said first stable position independently of the direction in which the inertia means is removed from the first stable position.

11. In an inertia switch of the type responsive to abrupt changes in velocity, the combination comprising movable means for altering the condition of an electrical circuit upon movement thereof, inertia means movable relative to said movable means from a first stable position in any of a number of directions for providing movement of said movable means upon abrupt changes in velocity, and reset means including a plurality of movable members spaced about said inertia means, and manually actuable means connected with each of said movable members for moving said movable members toward said first stable position of said inertia means, whereby at least one of said members will engage said inertia means during movement of said members and return said inertia means to said first stable position independently of the direction in which the inertia means is removed from the first stable position, each of said movable members comprising a lever mounted for pivotal movement of one portion thereof toward and away from said first stable position of said inertia means, said manually actuable means comprising means for engaging said levers for effecting concurrent pivoting thereof upon movement of said manually actuable means.

12. The combination according to claim 11 wherein said manually actuable means comprises rotatable means mounted for rotation about an axis of rotation, said means for engaging said levers comprising means in driven relation with said rotatable means and spaced from said axis for movement thereabout while engaging said levers.

13. The combination according to claim 12 wherein said levers comprise bellcrank levers each having a slot defined in an arm thereof, said means in driven relation with said rotatable means including means projecting into said slots for moving said bellcrank levers upon movement of said means projecting into said slots about said axis of rotation.

14. The combination according to claim 13 wherein each of said bellcrank levers comprises two additional spaced-apart arms extending generally in parallel relation and engageable with said inertia means, and means fixedly connecting said two additional arms, each of said bellcrank levers being pivotably mounted for pivotal movement about an axis passing intermediate the arm thereof in which said slots are defined and one of said additional arms thereof, whereby pivoting of each of said bellcrank levers effects movement of each of said additional arms toward said first stable position.

15. In an acceleration responsive actuating mechanism responsive to sudden velocity changes for providing movement to an associated movable member, the combination comprising support means located a predetermined distance from said movable member, a first pivotable member supported upon said support means and extending toward and terminating short of said movable member, a second pivotable member supported upon said first pivotable member and extending toward and contacting said movable member, said first and second pivotable members having a stable position extending along an axis between said support means and said movable member to support said movable member against movement thereof toward said support means, and massive means responsive to abrupt velocity changes for forcing said first and second pivotable members pivotally out of said stable position to reduce the extent thereof and provide movement of said movable member, the first and second pivotable members having portions in contact defining the stable position of the first and second pivotable members and defining means at their pivotal contact resisting movement of the first and second pivotable members from said stable position.

16. The mechanism according to claim 15 wherein said movable member comprises an element biased toward said support means and wherein said means responsive to abrupt velocity changes comprises a relatively massive element supported upon one of said pivotable members and recessed to accept the portions in contact, forces applied to said pivotable members by said biased element and massive element being generally along said axis when said pivotable members are in said stable position prior to abrupt velocity changes.

17. An inertia switch actuatable in response to abrupt changes in velocity and constituting switch elements comprising a movable switch actuating member normally biased to one position, a support spaced apart from the movable switch actuating member, an articulated connection collapsible from an extended condition interposed between said support and the movable switch actuating member for holding said actuating member in an alternative position when the articulated connection is in the extended condition, and a mass carried by said articulated connection, said switch elements cooperating with one another to maintain said mass in a given position, said mass being responsive to an abrupt change in velocity to collapse said articulated connection without damage to any switch element and to permit said biased switch actuating member to return to its biased position.

18. An inertia switch as set forth in claim 17 including means for resetting the movable switch actuating member by restoring the articulated connection from the collapsed to the extended condition.