Jan. 17, 1939. B. W. WALLACE ET AL 2,144,002

SIGN MECHANISM

Filed May 13, 1938

Fig. 1.

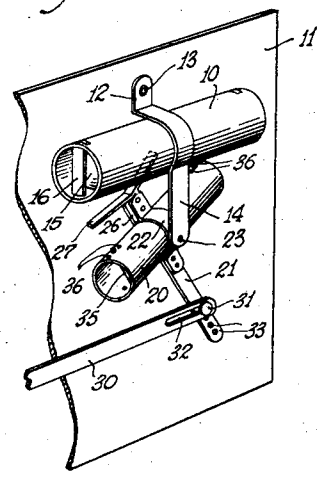


Fig. 2.

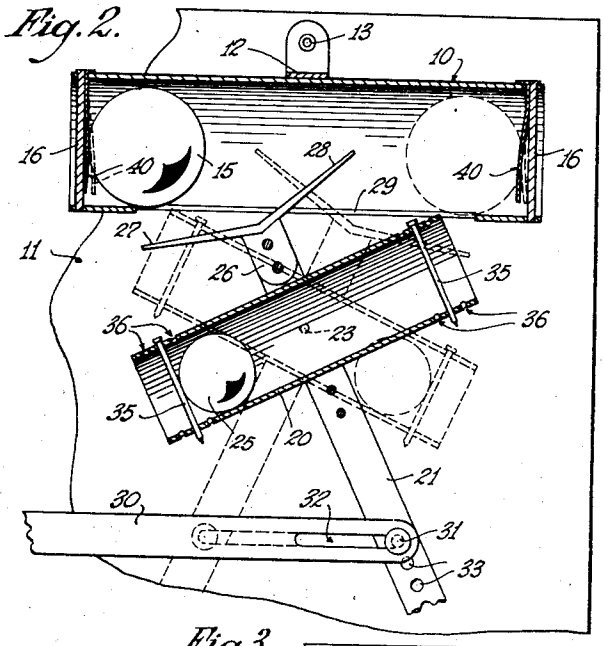


Fig. 3.

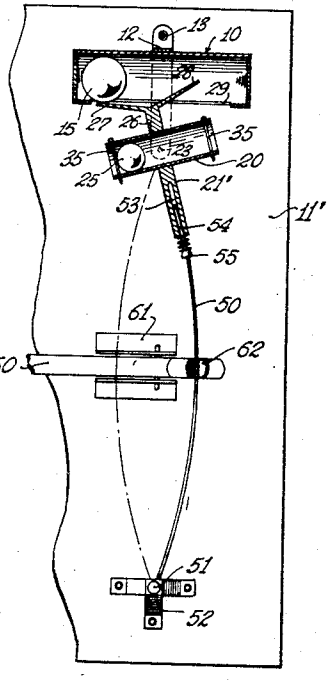


Fig. 4

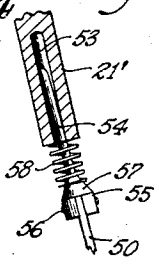
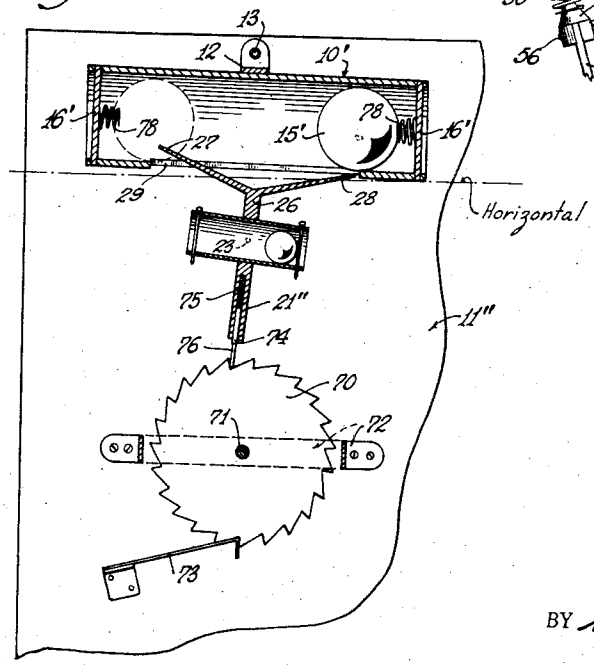


Fig. 5.



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SIGN MECHANISM

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Application May 13, 1938, Serial No. 207,804

15 Claims. (Cl. 40—138)

This invention pertains broadly to a novel inertia motor of general application and particularly adapted for use in animated sign mechanisms, one of the principal objects being the provision of an inertia motor for mounting on a moving object, such as a vehicle or the like, and adapted to drive a desired instrumentality, such as an animated sign, by successive changes in the speed or direction of the vehicle.

A more specific object is the provision of means providing a relatively stationary chamber in which there is an intertia element, such as a ball, arranged for movement back and forth in the general direction of the object or vehicle in which the chamber is mounted, there being a second chamber mounted for pivotal movement beneath the first or stationary chamber and having a gravitating element movable back and forth therein past center, and means connected with the movable chamber and extending into the stationary chamber for engagement by the inertia element in its back and forth movement to tilt the movable chamber so that the gravitating element therein will be moved past center to effect a quick additional tilting of the movable chamber to the limit of its movement, some driven instrumentality, such as an animated sign or the like, being operatively connected with the movable chamber.

Another object is the provision of an over-center snap-action mechanism arranged to be actuated by the back and forth tilting movement of the movable chamber.

Another object is the provision of a yieldable take-up connection between the snap-action means and the movable chamber for increasing the efficiency and reaction speed of the combined mechanisms.

Another object is the combination of a form of the aforesaid take-up means with a ratchet mechanism driven by the movable chamber.

Yet another object is the provision of inertia-energized means in the opposite ends of the stationary chamber for quickly starting the back and forth movement of the inertia ball responsive to changes in direction and speed of movement of the stationary chamber.

Other objects and novel aspects of the invention reside in certain details of construction, form, location, and operation of the parts hereinafter described in view of the annexed drawing, in which:

Fig. 1 is a fragmentary rear perspective of one form of the inertia motor;

Fig. 2 is an enlarged vertical section through the motor;

Fig. 3 is a vertical section through a modified form of motor including snap-action spring means cooperable therewith;

Fig. 4 is an enlarged detail, partly in section, of a take-up device for interconnecting the snap-action spring and motor; while

Fig. 5 is another modification including a ratchet mechanism driven by the inertia motor through the agency of a modified form of the take-up connection.

The present invention includes certain improvements over the type of sign mechanism described and claimed in United States Patent 2,113,415, and, in one of its preferred embodiments, as illustrated in Figs. 1 and 2 particularly, includes a stationary chamber 10, which may be in the form of a tube if desired, mounted on a member 11 adapted to be carried on a moving object such as a vehicle or the like, the object 11, for example, being part of a sign having animated sign elements driven by the novel inertia motor.

The stationary chamber 10 is mounted in a substantially horizontal position on the member 11 by means such as a strap bracket 12 secured to the member 11 by any suitable means 13 and secured to the tube 10 by means of soldering, welding, or the like, in those instances where the tube and strap are of metal, the strap having a depending arm 14 which provides a support for a movable chamber.

Within the stationary chamber 10 (Fig. 2) is an inertia element 15 preferably in the form of a steel ball and adapted to move back and forth from one end of the chamber to another responsive to movements of the member 11 in opposite directions substantially collateral with the axis of the chamber 10. Stops 16 are provided at the opposite ends of the stationary chamber to prevent escape of the element 15.

A movable chamber in the form of an elongated tubular member 20 is mounted below the stationary chamber for pivotal movement about an axis transverse to the long axis of the same, this mounting being accomplished preferably by the provision of an elongated transverse arm 21 arranged on one side of the movable tube and secured thereto by a strap 22 extending around the tube and riveted or otherwise secured to the arm, there being a pivot pin 23 extended from the strap 22 into supporting engagement with the arm 14 of the main mounting bracket. Thus, the movable chamber is supported for pivotal or tilt-

ing movement back and forth on opposite sides of a center coincident with the pivot 23.

Gravity-operated means for moving the movable chamber into tilted positions on opposite sides of the center includes a gravitating element, preferably in the form of a steel ball 25, arranged to roll back and forth within the movable tube in the same manner as the ball 15, with the difference, of course, that the gravitating ball 25 must first be moved past the dead-center position corresponding to the pivot 23 in order to effect a tilting of the movable chamber.

Means for tilting the movable chamber to effect movement of the gravitating element to dead-center includes a yoke-like arm 26 attached to the upper end of the bracket arm 21 and having opposite bifurcations or arms 27 and 28 adapted to extend alternately into the stationary chamber through a bottom longitudinal slot 29 therein, so as to dispose one or the other of the arms 27 or 28 alternately in the path of the inertia element 15, depending upon the position of the same in the stationary chamber and depending upon the position in which the movable chamber is disposed.

Referring to Fig. 2, for example, it will be apparent that a movement of the mounting member or sign 11 to the left will result in a movement of the inertia ball 15 toward the right, the ball encountering the arm 28 and moving the latter to pivot the movable chamber toward the right, so that the gravitating element or ball 25 will be moved toward dead-center position and slightly therebeyond, whereupon the ball 25 will continue to move in the same direction under the force of gravity, with the result that the movable chamber will be tilted quickly toward the right to the limit of its movement in that direction and into the dotted line position represented in Fig. 2, thus throwing the arm 21 toward the left.

Means for connecting the driven instrumentality or load with the motor includes a drive arm 30 connected in some manner with the load, for example an animated sign device (not shown) and having a pin and slot connection at its opposite end with the arm 21, the pin means 31 extending through an elongated slot 32 in the drive arm and being selectively positionable in openings 33 in the arm 21 to vary the stroke of the drive arm.

The throw or displacement of the gravitating element or ball 25 may be regulated through the agency of removable pins 35 positioned in openings 36 aligned in an axial direction on opposite sides of the tube and on opposite sides of the center 23, the pins being selectively positioned to alter the length of the path of movement of the ball in the movable chamber for the purpose aforesaid.

A novel means for effecting quick reaction of the inertia element includes in one embodiment, shown in Fig. 2, a pair of leaf springs 40 at opposite ends of the stationary tube 10 and disposed transversely across the latter and preferably attached to the end stops 16, the free end portions of the springs bowing toward the center of the tube and being engaged by the ball 15 in its positions at opposite ends of the tube, the inertia reaction of the ball tensioning the springs during movement of the vehicle or other moving object in one or the other direction, and the tensioned springs being effective to start or throw the ball toward the opposite end of the tube immediately upon change of speed or direction of the vehicle in that particular direction.

Thus, the operation of the motor is rendered more sensitive and more positive, it being obvious that the spring means may be tensioned variously to meet various operating conditions and to provide for suitable speeds of reaction response on the part of the ball. Another form of the quick-starting reaction means will be described in conjunction with Fig. 5.

In Fig. 3, an inertia motor of the type described in conjunction with Figs. 1 and 2 is arranged in combination with an over-center, snap-action spring driving mechanism of the type described, for example, in the aforesaid patent. In this embodiment, an elongated leaf spring 50 is pivotally connected at one of its ends 51 to a cleat or bracket 52 attached to the rear side of a mounting member or sign element 11'. The opposite end of the spring is connected through a novel take-up mechanism to the arm 21' of the inertia motor, the arm 21' in this instance being provided with a longitudinal bore or guiding formation 53 adapted to slidably receive a plunger 54 having an outer end portion provided with a tapered head 55 (see also Fig. 4). The upper end of the spring 50 is fitted into a transverse slot in the head 55 of the plunger and secured therein by pin means 56. Between the tapered or conical base 57 of the head 55 and the extremity of the arm 21', is a compression spring 58 normally urging the plunger 54 out of the arm 21' to a limit determined by the bowing of the spring 50 in its opposite positions (dotted line in Fig. 3).

A drive arm 60 is mounted for reciprocable movement in a bracket 61 and has a yoke-like arm 62 near its right-hand end and fitted over the mid portion of the spring 50. Thus, when the spring 50 is bowed past dead-center into opposite positions, the drive arm 60 is correspondingly reciprocated, the take-up means 54—55—58 permitting a relatively easy movement of the spring 50 into and past dead-center position due to the balanced reaction of the compression spring 58 against the upper end of the spring 50. As a result of the provision of the take-up device (Fig. 4), the spring 50 may be relatively strong and may be moved past dead-center without placing an excessive load on the inertia motor.

Another driving arrangement for the inertia motor is illustrated in Fig. 5, wherein the motor mechanism is substantially identical to that shown in Fig. 3 with the exception that the snap-action spring means 50—60 is replaced by a ratchet drive including a ratchet disc 70 pivotally mounted as at 71 on a strap means 72 secured to a sign panel 11'' and provided with a spring stopping pawl 73 normally engaging in the teeth of the disc to prevent retrograde movement of the same. The driving connection between the motor and the ratchet disc is effected through a plunger 74 arranged for reciprocation in the bore of the arm 21'', the plunger being normally urged outwardly of the bore by an internal compression spring 75 disposed therein and adapted to urge the outer end portion 76 of the plunger into driving engagement with the teeth of the ratchet disc. As the arm 21'' is rocked back and forth by operation of the motor, the disc 70 is advanced step by step in a particular direction.

A modified form of the reaction spring means is also illustrated in Fig. 5 and includes a pair of conical coil springs 78 each secured to one of the end stops 16' substantially at the center line of the tube 10' so as to be engaged by the inertia element or ball 15' and tensioned by the latter in the manner of the reaction springs 40 heretofore described in conjunction with Fig. 2. As soon

as the direction or rate of movement of the chamber 10' is altered within certain predetermined limits, the spring member 18 theretofore tensioned will react to start the ball on its way toward the opposite end of the chamber.

Where the ratchet drive is employed, it is desirable for purposes of efficiency to tilt the stationary chamber 10' in the direction of driven movement of the ratchet, thus increasing the driving power of the ball, since the return movement of the ball is idle and does no useful work.

It will be understood that the motor means described herein is of general application and not limited to a combination with sign mechanism. Moreover, the objects and advantages of the invention may be accomplished by other forms of construction and operation than those specifically described herein for purposes of illustration, so that the invention is not to be limited by the illustrative description, but is to be broadly interpreted as defined in the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. An inertia motor including a horizontally extended chamber, a movable chamber pivotally mounted between its ends for movement into and out of tilted positions on opposite sides of its pivotal axis, said axis extending in a direction transversely of said horizontally extended chamber, an inertia element movable back and forth in said horizontally extended chamber responsive to changes in movement of the latter substantially in the direction of movement of the inertia member, a gravitating element movable back and forth in said movable chamber, and means operatively connected with said movable chamber and extending into said horizontally extended chamber for engagement and movement by said inertia member during back and forth movement of the latter, whereby to rock said movable chamber in one or the other opposite direction to move said gravitating element toward and past a predetermined position relative to said axis so that said gravitating element may move thereafter under attraction of gravity to rock said movable chamber into one or the other of its oppositely tilted positions, and means for connecting a driven load to said movable chamber.

2. In a device of the class described, rocking mechanism including a movable ball chamber pivotally mounted for rocking movement into and out of opposite positions relative to a horizontal axis between the ends of the chamber, a ball in the chamber movable back and forth in the direction of rocking movement thereof, a relatively stationary chamber and an inertia ball movable back and forth therein responsive to inertia forces imparted thereto, said stationary chamber being mounted in a substantially horizontal position at one side of said movable chamber, and means drivingly connected with said movable chamber and arranged to extend into said stationary chamber for engagement and movement back and forth by said inertia ball as the same moves back and forth as aforesaid, whereby to effect partial tilting of said movable chamber from one tilted position toward another to raise said ball therein into position for gravitating movement toward oppositely inclined position to drive said movable chamber into said oppositely inclined position, said movable chamber being adapted for connection with driven means actuatable by rocking movement thereof.

3. In a device of the class described, inertia drive means including a horizontally extensive chamber adapted for mounting on a moving object, an inertia member movable back and forth between opposite ends of said chamber, and reaction spring means at said opposite ends of the chamber and arranged for engagement and tensioning by inertia action of said ball thereagainst and effective to urge said ball away from corresponding ends of the chamber responsive to changes in motion of said object, and rocking mechanism arranged to be actuated by back and forth movement of said ball in said chamber.

4. In a device of the class described, gravity-driven rocking mechanism including an elongated chamber pivotally mounted between its ends for rocking movement about a horizontal axis, a ball movable back and forth between the ends of said chamber, and inertia-operated means cooperable with said chamber to partially rock the same from one tilted position toward another whereby to raise said ball into position to effect gravitating movement of the ball toward oppositely tilted position whereby to rock said chamber into said oppositely tilted position, and adjustably positionable end stops arranged at opposite ends of said chamber for changing the distance of movement of said ball therein.

5. In a device of the class described, an elongated chamber mounted for pivotal movement about a horizontal axis, a gravitating element arranged for movement back and forth in said chamber and effective, when moved past an over-center position relative to the pivotal axis of said chamber, to rock the latter into oppositely tilted positions on opposite sides of said pivotal axis under action of gravity, means providing a driving connection with said chamber for imparting movement to a driven member arranged for back and forth movement in the same plane as said gravitating element, and inertia-operated means for pivoting said chamber partially toward oppositely tilted positions to move said gravitating element past said over-center position to effect completion of the tilting movement of said chamber.

6. In a device of the class described, gravity-operated drive means including an elongated ball chamber arranged for pivotal movement about a horizontal axis disposed between the ends of said chamber, a ball movable back and forth between the ends of said chamber, said pivotal axis coinciding with the center of movements of said ball, and inertia means for pivoting said chamber from one tilted position toward another to move said ball toward and past a particular position relative to said axis whereby to position said ball for gravitating movement to tilt said chamber into opposite position, said inertia means including a horizontally extensive chamber adapted for mounting on a moving object, a ball movable back and forth in said chamber in the directions of movement of said object and responsive to changes in the movement thereof, and means operatively connected with said first-mentioned chamber and extending into said second-mentioned chamber for engagement and movement by said ball in the latter to tilt said first-mentioned chamber for the purpose aforesaid.

7. In a device of the class described, rocking mechanism including a movable ball chamber pivotally mounted for rocking movement into and out of opposite positions relative to a horizontal axis between the ends of the chamber, a ball movable back and forth in the direction of rocking movement thereof, a relatively stationary

chamber and an inertia ball movable back and forth therein responsive to inertia forces imparted thereto, said stationary chamber being mounted in a substantially horizontal position at one side of said movable chamber, and means drivingly connected with said movable chamber and arranged to extend into said stationary chamber for engagement and movement back and forth by said inertia ball as the same moves back and forth as aforesaid, whereby to effect partial tilting of said movable chamber from one tilted position toward another to raise said ball therein into position for gravitating movement toward oppositely inclined position to drive said movable chamber into said oppositely inclined position, said movable chamber being adapted for connection with driven means actuatable by rocking movement thereof, and quick-starting reaction means in the form of tensionable members arranged at opposite ends of said stationary chamber for engagement and tensioning by inertia effort of said ball therein, a tensioned one of said tensionable members reacting upon change of motion of said device to urge said ball toward an opposite end of the chamber.

8. In a device of the class described, rocking mechanism including a movable ball chamber pivotally mounted for rocking movement into and out of opposite positions relative to a horizontal axis between the ends of the chamber, a ball movable back and forth in the direction of rocking movement thereof, a relatively stationary chamber and an inertia ball movable back and forth therein responsive to inertia forces imparted thereto, said stationary chamber being mounted in a substantially horizontal position at one side of said movable chamber, and means drivingly connected with said movable chamber and arranged to extend into said stationary chamber for engagement and movement back and forth by said inertia ball as the same moves back and forth as aforesaid, whereby to effect partial tilting of said movable chamber from one tilted position toward another to raise said ball therein into position for gravitating movement toward oppositely inclined position to drive said movable chamber into said oppositely inclined position, said movable chamber being adapted for connection with driven means actuatable by rocking movement thereof, and selectively positionable stops at opposite ends of said movable chamber for varying the distance of movement of said ball therein.

9. In a device of the class described, gravity-operated rocking mechanism including an elongated ball chamber pivotally mounted between its ends for rocking movement into and out of oppositely tilted positions about a horizontal axis, a ball movable back and forth between the ends of said chamber, and inertia means including a second ball and means confining the same for movement back and forth in accordance with the principles of inertia, and means actuated by said second ball in its movement aforesaid and cooperable with said ball chamber to effect tilting movement of said ball chamber from one tilted position toward another whereby to move said ball toward a particular position between the ends of said chamber and energize said ball for movement past said particular position to gravitate thereafter into said oppositely tilted position and effect rocking movement of said chamber into said opposite position, said ball chamber being adapted for connection with means driven thereby.

10. In a device of the class described, gravity-operated rocking mechanism including an elongated ball chamber pivotally mounted between its ends for rocking movement into and out of oppositely tilted positions about a horizontal axis, a ball movable back and forth between the ends of said chamber, and inertia means cooperable with said ball chamber to effect tilting movement of said ball chamber from one tilted position toward another whereby to move said ball toward a raised position relative to the ends of said chamber and energize said ball for movement past said raised position to gravitate thereafter into said oppositely tilted position and effect rocking movement of said chamber into said opposite position, mechanism arranged to be driven by movement of said ball chamber and including a driven member, and means providing a driving connection between said ball chamber and said driven member, said means including an arm extended from said chamber, a plunger movable back and forth in said arm, and spring means normally urging said plunger in a direction away from said chamber, said plunger having operative connection with said driven member and being reciprocable relative to said arm responsive to movement thereof by rocking of said ball chamber whereby to transmit motion from the latter to said driven member.

11. An inertia motor including a mounting member adapted for installation in a moving object such as a vehicle, a stationary chamber providing a horizontal runway and supported on said mounting member, an inertia member arranged for movement back and forth in said runway in the stationary chamber responsive to changes in movement of said mounting member in the directions of movement of said inertia member, a movable chamber and means supporting the same beneath said stationary chamber for pivotal movement into tilted positions on opposite sides of a pivotal axis transverse to the direction of movement of said inertia member, a gravitating element in said movable chamber and arranged for movement by the latter in opposite directions toward and past a raised intermediate position so as to be moved thereafter under attraction of gravity to effect further tilting of said movable chamber in the same direction, and means operatively connected with said movable chamber and extending into said stationary chamber for engagement and movement by said inertia member in opposite directions to pivot said movable chamber and move said gravitating element past said intermediate position, and means for connecting a driven instrumentality with said movable chamber.

12. An inertia motor including an elongated stationary chamber, said chamber being mounted in a substantially horizontal position in a moving object such as a vehicle or the like, an inertia element movable back and forth between the ends of said stationary chamber responsive to changes in the movement of said movable object or vehicle, a movable elongated chamber and means pivotally mounting the same beneath said stationary chamber for movement into oppositely tilted positions about an axis transverse to the long axis of said stationary chamber, a gravitating element movable back and forth between the ends of said movable chamber, means extended from said movable chamber into said stationary chamber and into the path of movement of said inertia element for engagement and movement by the latter in opposite directions to rock said movable

chamber partially from one tilted position toward another whereby to move said gravitating element past a predetermined position such that said element may thereafter move under force of gravity to complete the tilting of said movable chamber, and means for connecting a driven load to said movable chamber.

13. An inertia motor including an elongated stationary chamber, said chamber being mounted in a substantially horizontal position in a moving object such as a vehicle or the like, an inertia element movable back and forth between the ends of said stationary chamber responsive to changes in the movement of said movable object or vehicle, a movable elongated chamber and means pivotally mounting the same beneath said stationary chamber for movement into oppositely tilted positions about an axis transverse to the long axis of said stationary chamber, a gravitating element movable back and forth between the ends of said movable chamber, means extended from said movable chamber into said stationary chamber and into the path of movement of said inertia element for engagement and movement by the latter in opposite directions to rock said movable chamber partially from one tilted position toward another whereby to move said gravitating element past a predetermined position such that said element may thereafter move under force of gravity to complete the tilting of said movable chamber, and means for connecting a driven load to said movable chamber, and reaction means in the form of tensionable members positioned at opposite ends of said stationary chamber and tensioned by inertia action thereagainst of said inertia element when said moving object or vehicle is in motion, said tensionable members reacting when said motion is altered to move said inertia element toward an opposite end of the stationary chamber.

14. An inertia motor including an elongated stationary chamber, said chamber being mounted in a substantially horizontal position in a moving object such as a vehicle or the like, an inertia element movable back and forth between the ends of said stationary chamber responsive to changes in the movement of said movable object or vehicle, a movable elongated chamber and means pivotally mounting the same beneath said stationary chamber for movement into oppositely tilted positions about an axis transverse to the long axis of said stationary chamber, a gravitating element movable back and forth between the ends of said movable chamber, means extended from said movable chamber into said stationary chamber and into the path of movement of said inertia element for engagement and movement by the latter in opposite directions to rock said movable chamber partially from one tilted position toward another whereby to move said gravitating element past a predetermined position such that said element may thereafter move under force of gravity to complete the tilting of said movable chamber, means for connecting a driven load to said movable chamber, and selectively positionable stop means at opposite ends of said movable chamber for varying the limits of movement of said gravitating element.

15. Inertia controlled mechanism including, in combination, an inertia member and means mounting the same for back and forth travel responsive to predetermined motion changes of said mounting means, together with gravity-operated mechanism including a gravitating member and movable means mounting the same for back and forth motion past an intermediate raised point to effect gravitating movement of said movable means into opposite positions, and means actuated by said inertia member for moving the aforesaid movable means to raise said gravitating member toward and past said intermediate position for the purpose aforesaid.

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