

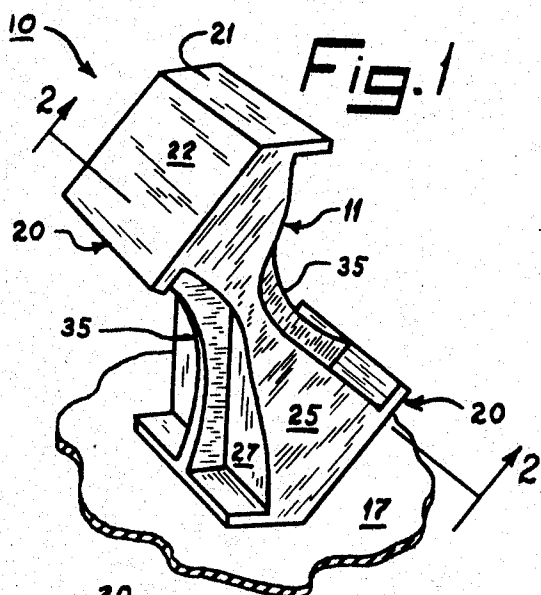
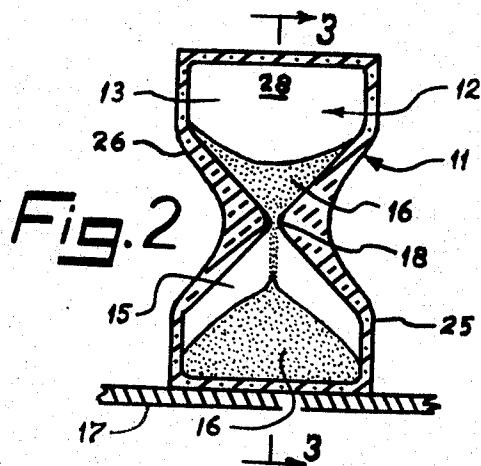
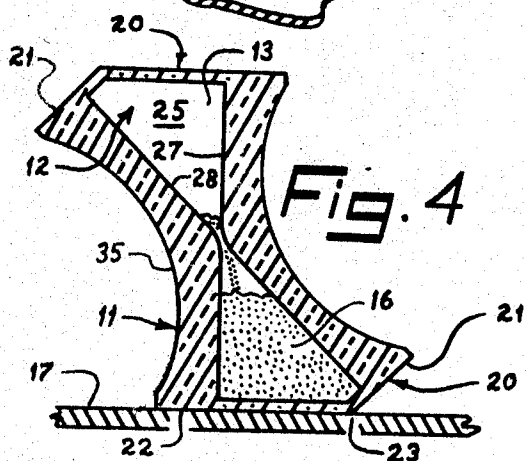
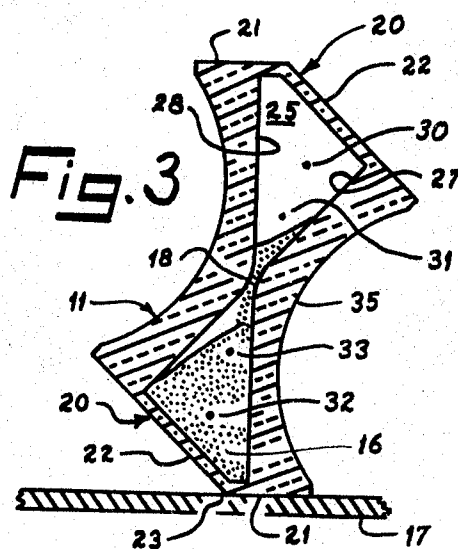
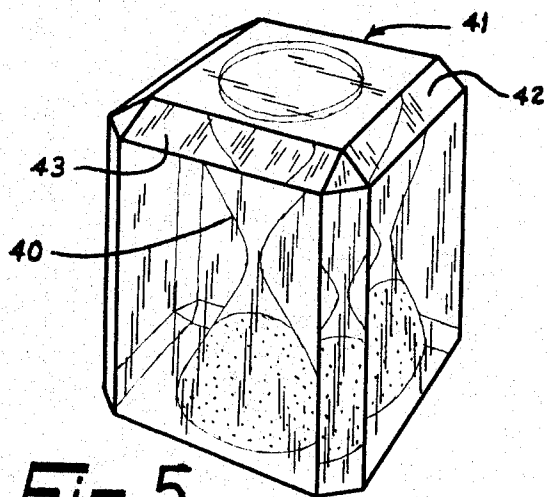
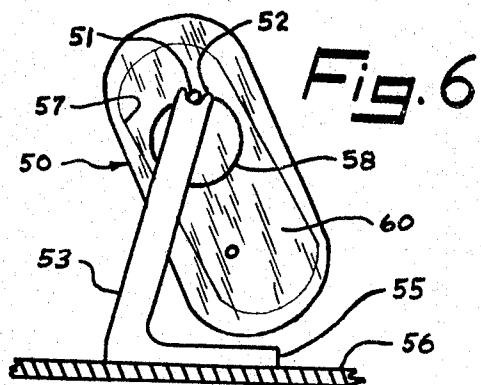
Feb. 28, 1967

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3,306,029

INVERTIBLE TIMERS

Filed Aug. 6, 1965



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3,306,029

INVERTIBLE TIMERS

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Filed Aug. 6, 1965, Ser. No. 477,828

7 Claims. (Cl. 58—144)

This invention relates to timers, and more particularly to a mechanical timer utilizing a shift in its center of gravity to cause a pivoting of the timer and indicate lapse of time.

Limited duration timers of the type utilizing the movement of a mass under the influence of gravity are one of the oldest forms of clocks known to man. An example of this type of timer is the ordinary hourglass, currently in wide use for the timing of soft-boiled eggs and telephone calls. Although these timers are popular because they are simple and inexpensive, they have the inherent disadvantage of requiring the user thereof to pay close attention to the movement of the sand downwardly in order to be aware of completion of the timing function. Where the user is involved in doing other things during his timing operation, it frequently happens that the timer completes its timing operation outside of the view of its user. For example, this might occur when a person is using the device to time the cooking of eggs, and at the same time is attempting to prepare other portions of the meal.

It would, therefore, be desirable to have a timer of this simple and well-known variety which is capable of giving the user a more readily noticeable indication of the lapse of time, this indication not requiring strict visual attention to the timer at all times.

Although a timer of the hourglass variety normally increases in stability because of the downward movement of the sand and consequent downward shift of its center of gravity, it will be seen that in the timer to be described that the timer becomes less stable as the center of gravity moves downwardly until the timer reaches a point of total instability and tips over. Thus, the timer not only gives an easily noticed indication of the passage of time, but also stimulates curiosity by appearing to defy the laws of nature.

It is, therefore, a general object of this invention to provide a new and improved limited duration timer which pivots over a limited arc to indicate the passage of some predetermined length of time.

It is an advantage and a feature of the present invention to provide a limited duration timer which becomes unstable in its placed position after passage of a given amount of time so as to give a definite and obvious warning of the passage of some fixed amount of time.

Another advantage and feature of the invention is the provision of a simple gravity-operated timer utilizing the downward movement of a gravity-biased mass therein for the measurement of time, said timer becoming unstable and tilting to a more vertical position both to give an indication of the passage of some given period of time as well as permitting the downwardly moving mass to complete its travel to its lowermost position.

Other objects and advantages will become apparent upon reading the following description, to be taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of one form of the timer incorporating the broad principles of the invention;

FIG. 2 is a cross-sectional view of the timer shown in FIG. 1 taken substantially along the lines 2—2 of FIG. 1;

FIG. 3 is a cross-section of the timer shown in FIG. 1 and is taken substantially along the lines 3—3 of FIG. 2;

FIG. 4 is a view substantially the same as that shown in FIG. 3, but in a tilted position therefrom to assist in an understanding of the timer's action;

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FIG. 5 is a perspective view of a slight variation of the invention shown in FIGS. 1-4; and

FIG. 6 is a side view of another variation of the invention.

While several illustrative variations of one general form of the invention are shown in the drawings and will be described in detail hereafter, the description and drawings are to be taken merely as illustrative of the principles disclosed therein and are not intended to limit the invention to the variations shown and described, nor are these variations intended to define the scope of the invention. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings in detail, FIGS. 1-4 show one variation of the preferred form of the invention. The timer shown generally at 10 includes a main body 11 which contains an internal and entirely enclosed hollow or void 12. Internal void 12 includes upper and lower chambers 13 and 15, and carries therein a movable mass 16. Mass 16 may consist of any suitable material, such as a liquid or solid, and in this variation is shown as a finely-divided material, such as sand. It will be understood that the internal configuration of this variation of the timer operates in the same general manner as a conventional hourglass, the enclosed mass 16 being permitted to move between upper and lower chambers 13 and 15 under the influence of gravity when the timer 10 is properly positioned on a surface such as 17.

Means are provided for retarding or metering the downward movement of mass 16, and in this variation these means consist of a restricted area 18 which both separates and joins chambers 13 and 15. It will be understood, as in ordinary hourglass design, that the size of restriction 18, in conjunction with the type and quantity of sand used, are the principle factors which determine the amount of time it requires for the sand to move entirely from the upper hollow or chamber 13 to the lower chamber 15.

Although the above-described timing operation corresponds with the operation of an ordinary hourglass, means are herein provided for giving a user of the time a more readily noticeable indication of the passage of time than ordinary hourglasses permit. Although these means are shown as an integral part of main body 11, it will be understood that they could easily be attached to existing hourglass designs to perform the same function. These means consist of upper and lower composite supporting means 20. These supporting means 20 include a limited stability surface 21 which intersects a second supporting surface 22 at an obtuse angle, thus forming a common edge 23 about which the timer can pivot. Composite supporting walls 20 are joined by a plurality of side walls 25, 26, 27 and 28 which define internal void 12 and which are inclined at a sufficient angle to ensure that the sand can flow therealong under the influence of gravity when the timer is placed either on supporting surface 21 or 22. As can be seen in FIGS. 2, 3 and 4, the slope of all of these walls exceeds about 45 degrees when the timer rests on either of surfaces 21 or 22 to ensure that the sand will flow in either position of the timer. Furthermore, side walls 27 and 28 are shaped so as to cause the center of gravity of the sand to move laterally as well as downwardly as it flows through restricted area 18 into the lower chamber. The operation of the timer makes use of the interaction between the composite supporting means and the lateral shift of the center of gravity of the sand, and will be described next.

Referring now to FIG. 3, the center of gravity of the sand, immediately after inversion of the timer, is generally in the area designated 30. The center of gravity of the main body is, and remains, at the place of the restricted area 18. Assuming that the walls of the main body 11 are kept as thin as possible, to minimize the weight of the

main body, the composite center of gravity for both the sand and the main body would be generally at the position designated as 31. Inasmuch as this composite center of gravity lies directly above supporting surface 21, the timer is stable. As the sand flows downwardly through restricted area 18, the configuration of sides 27 and 28 causes the center of gravity of the sand to shift laterally to the left as well as downwardly. When the bulk of the sand has flowed into the lower chamber, such as actually shown in FIG. 3, its center of gravity will have shifted to the position designated 32, and the composite center of gravity for the sand and main body will be at 33. At this instant, the composite center of gravity is directly over pivotal edge 23. It will be understood that further sand flow shifts the composite center of gravity to the left of 33 in FIG. 3 which is beyond the last point of support that surface 21 can provide, thereby rendering the timer unstable and causing it to pivot into the position shown in FIG. 4. After tipping onto surface 22, the sides 27 and 28 permit the last remnants of sand to flow downwardly into the lower chamber. This movement, along with any accompanying noise such as the slap of surface 22 onto horizontal surface 17, gives an indication to the user of the lapse of some predetermined quantity of time as determined by the design of the specific timer used.

It will be noted that the upper half of one of the walls 27 and 28 is vertical and the other a fixed angle therefrom when the timer is placed on either of its two lower supporting surfaces, thereby ensuring that the rate of sand flow is identical regardless of which surface supports the timer. Also, the timer can be designed to tip at the end of a given period or at some short interval before the end of a given period as a warning. As an example of this latter design, a three-minute egg timer could be designed to tip at the end of two minutes and forty-five seconds, after which the remaining sand would take 15 seconds to vacate the upper chamber and complete the three-minute timing cycle. If it is desirable in a given application to have a more audible indication of time lapse than that resulting from the timer tipping onto surface 22, a simple impact bell could be attached to the side of the timer.

Preferably the entire main body is molded or cast of a light-conducting material, such as glass or plastic, and is kept at a minimum weight relative to the sand so as to get maximum sensitivity. When the walls are made very thin, additional structural support may be added in the form of webs 35.

FIG. 5 shows a slight variation of the timer and includes an hourglass-shaped void 40 formed as an integral part of an otherwise solid block 41 of clear material. This design gives a pleasing appearance to the timer making it suitable for use in an office as a combination phone call timer and paperweight. Block 41 includes a number of beveled edges as at 42 and 43, on which it can be supported during the timing operation. It will be understood that edges 42 and 43 perform the same function as supporting surface 21 performed in the previously described variation. However, edges 42 and 43 can be made slightly different in size and shape from one another so as to cause the timer to tip after the lapse of different amounts of time, depending on which of these two surfaces the block 41 is supported. For example, when inverted and supported on edge 42, the timer could be designed to tip up at the end of two minutes, whereas if it were supported on edge 43, it might be so designed as to tip up at the end of two and one-half minutes.

FIG. 6 shows a further variation of the timer wherein the main body 50 is pivotally supported about a pin 51 attached thereto. Pin 51 rests in the cradle portion 52 of a pair of supporting legs 53 which are rigidly affixed at their lower portions to a supporting base 55, said base being adapted to rest on any suitable surface such as the one shown at 56. Main body 50 includes an internal and elongate void 57 of cylindrical shape in which is movably

carried a solid spherical mass 58, although, the same action would be obtainable if mass 58 comprised a generally spherical void, to be described in detail later. Means are provided for retarding or impeding the free movement of mass 58 downwardly, and herein these means comprise a fluid 60 entrapped in the void 57 which entirely fills remaining portions of the void 57. The rate of movement downwardly of mass 58 under the influence of gravity can be controlled in the design of the timer by proper sizing of the respective diameter of the mass and cylindrical void as well as by a proper selection of the fluid used, the material of which the mass consists, and the length of the cylindrical void.

In operation, the main body is inverted and the upper pin 51 is placed in cradle 52 which supports the main body at an angle. As the mass moves downwardly, the shift in the timer's center of gravity causes the elongate dimension of the main body to slowly pivot toward the vertical. The same external effect can be achieved if the mass 58 is a large bubble or thin-walled hollow sphere of lesser specific gravity than the fluid used. In this case, the mass moves upwardly due to the buoyancy of the fluid to perform the timing function.

Although the variations of the invention shown and described each possess some individual advantages, it will be understood that certain of these are interchangeable among these variations. Furthermore, the teachings contained herein are not intended to limit the scope of the invention to the specific means used to illustrate its principles. Other means of support are contemplated as well as other means to cause a shift in the timer's center of gravity.

I claim:

1. A timer, comprising; a main body having an enclosed and elongate internal void defined at each end thereof by a pair of spaced apart wall areas; mass means having a center of gravity movably contained in said void for movement between said spaced apart wall areas under the influence of gravity; means between said end wall areas for retarding the free movement of said mass means between said spaced apart wall areas, thereby providing a metered movement of said mass means; and limited stability support means for supporting the lowermost portions of said main body in a stable position both with said elongate internal void tilted at an angle from the vertical and with said center of gravity located above and to the side of its lowermost position, said support means being of limited dimensions in the horizontal direction of movement of said mass means so as to lose its stable support of the timer as said center of gravity approaches its lowermost position thereby causing said timer to tilt and thus indicate the passage of some predetermined period of time.

2. A timer, comprising: a main body structure having an internal and enclosed void of generally hourglass shape including upper and lower chambers separated by a centrally located restricted area; and a moveable mass of finely divided material in said void and moveable from said upper chamber to said lower chamber under the bias of gravity; said main body structure having composite supporting means including a limited stability supporting surface for supporting said main body with said upper chamber above and to the side of the lower chamber, said composite supporting means also including a second supporting surface which intersects said limited stability supporting surface at an obtuse angle, the intersection of said surfaces forming an axis about which said timer can pivot, said axis being horizontally located between the horizontal limits of movement of the center of gravity of said timer when said timer is supported on said limited stability supporting surface so as to cause said timer to become unstable after a portion of said mass moves from said upper chamber to said lower chamber, thereby causing said timer to tilt and indicate the passage of some predetermined amount of time.

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3. A timer comprising: a main body having an enclosed and elongate internal void defined at each end thereof by a pair of spaced apart wall areas; mass means having a center of gravity movably contained in said void for movement between said spaced apart wall areas under the influence of gravity; means between said end wall areas for retarding the free movement of said mass means between the said spaced apart wall areas; thereby providing a metered movement of said mass means; and limited stability support means for supporting the lowermost portions of said main body in a stable position both with said elongate internal void tilted at an angle from the vertical to permit downward and horizontal movement of said mass means and when said center of gravity is located above and to the side of its lowermost position, said support means being an integral part of said main body and defining a plane of support for resting said timer on a horizontal surface, said plane of support being of limited dimensions in the horizontal direction of movement of said mass means so as to lose its stable support of the timer as said center of gravity approaches its lowermost position, thereby causing said timer to tilt and thus indicate the passage of some predetermined period of time.

4. A timer, comprising: a main body having an enclosed and elongate internal void defined at each end thereof by a pair of spaced apart wall areas; mass means having a center of gravity movably contained in said void for movement between said spaced apart wall areas under the influence of gravity; means between said end wall areas for retarding the free movement of said mass means between said spaced apart wall areas, thereby providing a metered movement of said mass means; and limited stability support means for supporting said main body in a stable position both with said elongate internal void tilted at an angle from the vertical to permit downward and horizontal of said mass means and when said center of gravity is located above and to the side of its lowermost position, said support means comprising a first supporting plane for resting said timer on a horizontal surface, said support means being of limited dimensions in the horizontal direction of movement of said mass means so as to lose its stable support of the timer as said center of gravity approaches its lowermost position, thereby causing said timer to tilt and thus indicate the passage of some predetermined period of time; and other support means in the form of a second supporting plane onto which said timer tilts after passage of said predetermined amount of time, said plane being oriented to support said timer in a position with said elongate internal void being

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generally vertically oriented to permit said mass means to complete its movement to its lowermost position in said void.

5. In a limited duration timer incorporating a laterally movable mass which is carried thereby to effect a change in the location of the timer's composite center of gravity, and wherein said change in location renders the timer unstable so as to cause the timer to move and thereby indicate the lapse of some predetermined period of time, the improvement comprising: an integral supporting structure for said mass, said supporting structure including an upper end and a lower end rigidly forming a part thereof, means between said upper end and said lower end for restricting the movement of the mass in an elongated path generally therebetween, and limited stability supporting means rigidly forming a part of said lower end and movable therewith for supporting said timer in a stable condition on a generally horizontal surface with said path having a horizontal component and for relinquishing said stable support after a predetermined lateral movement of said composite center of gravity.

6. The improvement as set forth in claim 5, wherein said integral supporting structure includes second limited stability supporting means rigidly forming a part of its upper end and of a configuration similar to the first mentioned limited stability supporting means for providing limited support for said timer upon an inversion thereof to thereby permit a timing function when supported thereon.

7. The improvement as set forth in claim 5, wherein said limited stability supporting means defines a lower plane of support on which said timer rests, said lower plane of support covering a limited area directly underlying said composite center of gravity over only the first portion of its change in location whereupon a predetermined lateral displacement of said movable mass causes said composite center of gravity to move laterally beyond said limited area and thus render the timer unstable.

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