March 20, 1962 M. R. DOCK ETAL 3,025,665

TIMING DEVICE

Filed June 17, 1959

Fig.1.

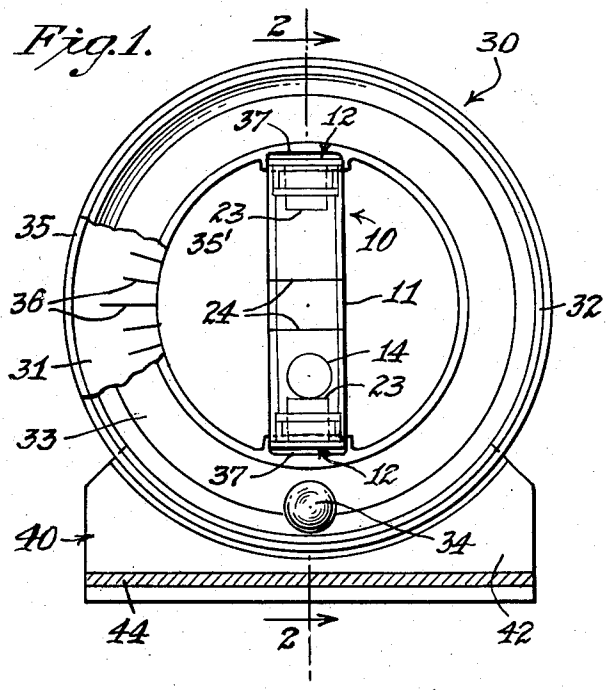


Fig.2.

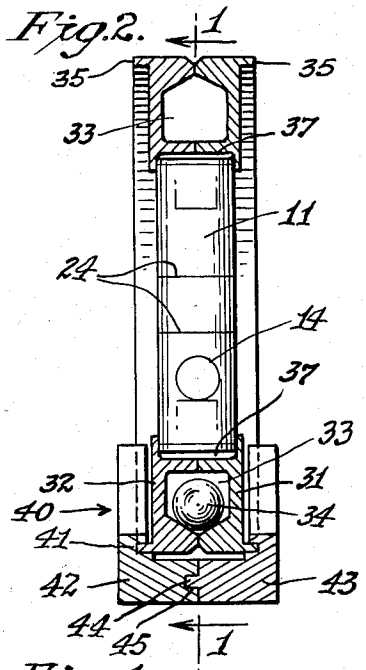


Fig.3.

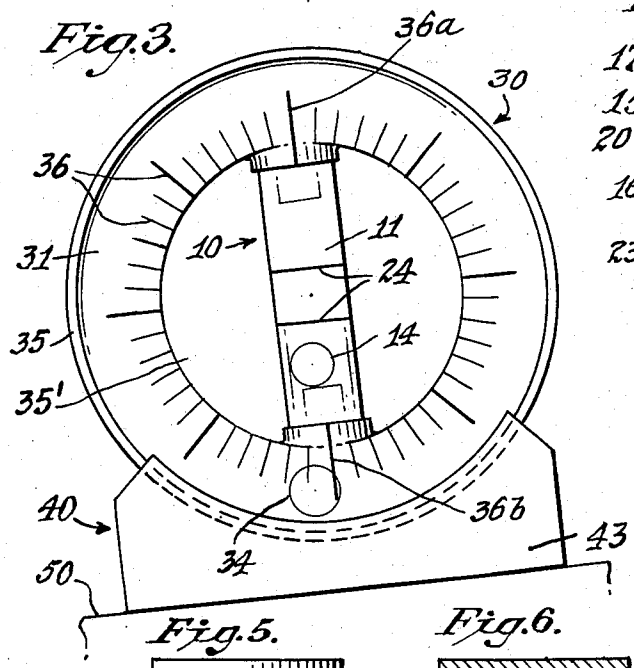


Fig.4.

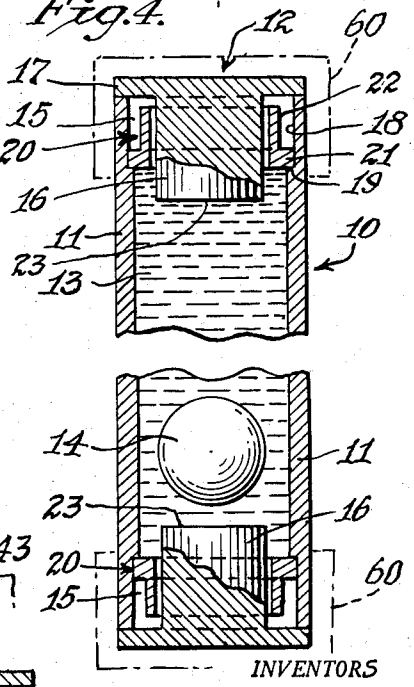


Fig.5.

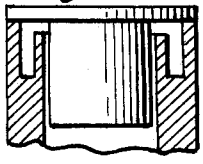
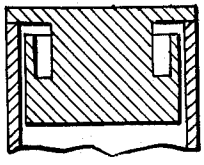


Fig.6.



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TIMING DEVICE

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7 Claims. (Cl. 58—144)

This invention relates to a timing device including a tubular element containing a fluid having a gravity-actuated time-indicating member submerged therein. The movement of said member as it settles to the bottom of the tube is adapted to indicate the passage of time. By inverting the tubular element the timing operation may be repeated.

It has been customary in devices of this character to allow for an air space at one end of said tube, to thereby provide for possible expansion of the liquid in the tube due to temperature changes. Thus, when the tube is inverted, an air bubble rises in the fluid and often interferes with the slowly descending indicating member, resulting in a lack of accuracy since such impeding has an irregular effect on the movement of said member through the fluid.

Although various expedients have been proposed, such as a float member with a central bore for the passage of the air bubble therethrough, results have been unsatisfactory, and would be inoperative when a slim tubular element is desired suitable for a clothing pocket or purse.

It is an object of this invention to provide a tubular member constructed, at least at one end, with means for trapping the air bubble so that its primary purpose may be retained without the heretofore objectionable results. Another object of the invention resides in the provision of means for determining a perpendicular position for the tubular member. A further object of the invention is characterized by means for predetermining angular positions of the tubular member with respect to the perpendicular, and their relation to various increments of time.

Other objects and advantages of the invention will be apparent from the following description, reference being had to the accompanying drawings in which—

FIG. 1 is a central vertical sectional view, partly in elevation showing an improved timing device in accordance with this invention, and taken on the line 1—1 of FIG. 2.

FIG. 2 is a sectional view, partly in elevation, taken on the line 2—2 of FIG. 1.

FIG. 3 is a side elevation of the timing device when resting upon an inclined surface.

FIG. 4 is an enlarged detail sectional view taken along the longitudinal axis of the tubular element of the device showing the air trap construction and having an intermediate portion broken away, and

FIGS. 5 and 6 are fragmentary sectional views showing modified forms of closing means for the tubular element.

Referring to the drawings, and particularly to FIG. 4, there is shown a timing unit 10 which may be used independently of other associated structure, since it can be made to resemble a pen or pencil and be carried on the person for use in timing telephone conversation, the

boiling of eggs, etc. It comprises a tubular element 11 provided with closing means 12, in this instance one for each end, a transparent silicone fluid which incompletely fills the element in order to leave room for a bubble of air at each end, and a time-indicating member 14 preferably in the form of a ball and which is completely submerged in the fluid between stops for that purpose presently to be described.

The ball may consist of a metallic shell sufficiently heavy to weigh slightly more than the fluid it displaces. The closing means 12 is constructed to define one wall of an air chamber 15 lying between the same and the adjacent inner wall of the element. Other forms of closing means incorporating an air chamber may suggest themselves to skilled persons without departing from the spirit of this invention, such as shown in FIGS. 5 and 6. One type practical to manufacture and assemble is shown herein. It consists of a cylindrical part 16 adapted to extend within and be spaced from the surrounding wall of the tubular element 11 so as to define one boundary of the air chamber 15. The cylindrical part 16 is formed with a circular flange 17 at its outer end for sealing engagement with the top of said tubular element. Between part 16 and the inner wall 18, which is cut away to form a shoulder 19, is an annulus 20 the base 21 of which rests upon shoulder 19 and fits snugly within the surrounding wall 18. Extending outwardly from base 21 is a tubular part 22 which closely surrounds cylindrical part 16, and is spaced from and parallel to wall 18. The top surface of part 22, when viewed at the top of element 11, is spaced from the flange 17, and when in an inverted position, as shown at the lower end of FIG. 4, constitutes a baffle since it then becomes a re-entrant part of air chamber 15 trapping the air bubble therein and preventing it from floating upwardly through the fluid which the bubble then has no direct way of reaching.

Cylindrical parts 16 at each end of the element project inwardly toward each other and into the fluid 13, thereby providing stop surfaces 23 for member 14 to settle against. The graduations 24, shown on the tubular element 13, designate units of time, such as one minute, two minutes, etc. These time intervals may be lengthened by inclining the tubular element at various angles to the perpendicular which causes the indicating member 14 to move through the fluid at a reduced rate of speed since the pull of gravity is then indirect with respect to the axis of element 11, causing the said member to impinge and drag along the low side of said element. The greater the inclination toward the horizontal, the more slowly member 14 will sink in the fluid.

It is sometimes desirable to have an air chamber at each end of the tube for various reasons, such as (1) to double the volume of air for possible compression; (2) the tubular unit is rendered more symmetrical and better balanced; (3) the pressure potential is divided into two separate and widely spaced zones; (4) in the assembly operations no time need be lost in deciding which end of the tube should be uppermost inasmuch as they are identical, and (5) when combined with the definite stops 23 at each end of the tube which are always submerged in the liquid, a constantly uniform distance can be maintained for the travel of the ball which is of course important in a calibrated timing device.

For the purpose of aligning the timing unit 10 with

such angular positions, the construction shown in FIGS. 1, 2 and 3 will now be described.

Referring to the same, a holder **30** for the unit **10** consists of a ring molded in matched half sections **31** and **32**, which are hollow and adapted to be cemented together. When so joined they form an annular ball race **33** within which is a relatively heavy ball **34** free to roll in said race. The holder **30** is provided with circular rails **35** formed respectively along its outer edge on either side, and extending laterally in opposite directions. On one or both sides of the holder **30**, around its central opening **35'**, there are radial graduations **36** which may correspond to a definite angular scale, and/or various time intervals to be read conjointly with the graduations **24**. Two of such graduations **36**, viz. **36***a* and **36***b*, are aligned with the longitudinal axis of the time unit **10**, as clearly shown in FIG. 3.

The holder **30** may also be provided with any suitable means for mounting the timing unit **10** so that it may extend radially across the opening **35'**. Such means may be of a detachable nature so that the time unit may be utilized separately if desired. The means shown herein consists of pockets **37** diametrically opposite each other and adapted to fit snugly over corresponding ends of unit **10**. Since the ring is made from flexible plastic material, such as polyethylene, it may be deformed sufficiently to apply or remove the said unit as will be understood.

A base **40** is provided for rotatably supporting the holder **30**, and it may also be molded in half sections **42** and **43** from plastic material such as transparent polystyrene. It is internally formed with arcuate grooves **41** adapted to receive rails **35**. When these half sections are cemented together, as along the aligned tongue **44** and groove **45** after the positioning therein of holder **30**, the latter may be rotated in base **40**, and because the ball **34** naturally tends to seek a lowermost position, as shown in FIG. 1, any of the graduations may be brought into an aligned position with the center of the ball, causing the unit **10** to lie at a corresponding angle to the vertical since the ball, being responsive to gravity, will always indicate the perpendicular. As an example, should base **40** be placed on an inclined surface **50** indicated in FIG. 3, holder **30** may be rotated clockwise until graduation **36***b* is aligned with the center of ball **34**, thus correcting the out-of-plumb position of the unit **10** for obtaining an accurate reading in that position.

In addition to the useful purposes described, it will be obvious that the closing means shown herein could be made of insulating material and could have electric terminals passing through to the interior of the tubular element adapted to be engaged and bridged by the member **14** to close a circuit connected to ring a bell, light a bulb, or actuate a relay operative to automatically invert the unit **10** for a repetition of the operations outlined.

In FIG. 4, terminal caps **60** are indicated in dot and dash lines at each end of unit **10**. These add to the appearance of unit **10** when used or sold separately, and provide a firmer support for it in an upright position.

While specific forms of the invention have been shown and described, it will be understood that other modifications may be made within the scope of the appended claims.

What is claimed is:

1. A timing device comprising a tube which is at least in part transparent, a body of fluid incompletely filling said tube, whereby air is adapted to be trapped in opposite end portions of the tube, closure elements having fluid tight sealing engagement with opposite ends of the tube and including centrally disposed axial projections spaced from the side wall of the tube and extending inwardly from the ends of the tube and into said body of fluid, said closure elements, projections and end side wall portions of the tube defining trap chambers for air at

the opposite ends of the tube and outwardly of the body of fluid, annular baffle means associated with the closure elements and tube and closely surrounding said projections and spaced inwardly of the ends of the tube and inwardly of said end side wall portions of the tube and projecting into said air trap chambers, whereby the air trapped therein cannot pass into or through said body of fluid, and a movable time indicating element submerged bodily within said body of fluid and free to move in any direction therein and having a density somewhat greater than the density of the fluid and engageable with the inner ends of said projections when the tube is upright for limiting the movement of the time indicating element axially through said tube in either direction.

2. A timing device comprising a tube which is at least in part transparent and having opposite ends, disc elements spanning the opposite ends of the tube and having fluid tight engagement therewith, axial projections formed upon the disc elements and projecting axially into opposite end portions of the tube and spaced from the side wall of the tube, annular baffle means closely surrounding said projections in the end portions of the tube and spaced from the side wall of the tube and inwardly of the ends of the tube, the inner ends of said projections extending axially inwardly of said baffle elements, a body of fluid incompletely filling said tube and receiving inner end portions of said projections axially inwardly of the baffle elements, and a time indicating element entirely submerged in said body of fluid within said tube and between said projections and freely movable axially through said tube and having a density greater than the density of said fluid, there being air trap chambers at opposite end portions of the tube beyond the ends of said body of liquid and bounded by said projections, disc elements and the side walls of the tube, said annular baffle elements disposed within said air trap chambers and forming a reverse flow passage therein through which it is impossible for the air in said chambers to escape into said body of fluid.

3. A timing device according to claim 2, and wherein said annular baffle elements are rigid with the side wall of said tube.

4. A timing device according to claim 2, and wherein said annular baffle elements are rigid with said projections.

5. A timing device according to claim 2, and a vertically disposed annular supporting means for said timing device engaging opposite ends thereof so as to extend diametrically across the supporting means to facilitate positioning the device in a selected vertical position.

6. A timing device according to claim 2, and a vertically disposed annular supporting means for said timing device engaging opposite ends thereof so as to extend diametrically across the annular supporting means to facilitate positioning the device in a selected vertical position, said annular support including an annular ball race and a ball freely rotatable therein, and a base rotatably supporting the annular supporting means, whereby in cooperation with said ball the timing element may be vertically aligned with the ball, or inclined at various angles with respect to the perpendicular.

7. A timing device comprising a tubular element which is at least partly transparent, a body of fluid incompletely filling said element whereby air is adapted to be trapped in an end portion thereof when the element is supported in a substantially vertical position, closure means completely sealing the same, said closure means including a centrally disposed axial projection spaced from the side walls of the tubular element and extending inwardly into said body of fluid, said closure means, projection and adjacent side walls of the tubular element defining a trap chamber for air, annular baffle means associated with the closure means and tubular element and closely surrounding said projection and spaced inwardly of the side walls of the tubular element and projecting into said air trap

chamber, whereby air trapped therein cannot pass into or through said body of fluid, and a movable time-indicating element submerged bodily within said fluid and free to move in any direction therein and having a density somewhat greater than the density of the fluid and engageable with the inner end of the projection when the tube is upright for limiting the movement of the time-indicating element axially through the tubular element.

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