

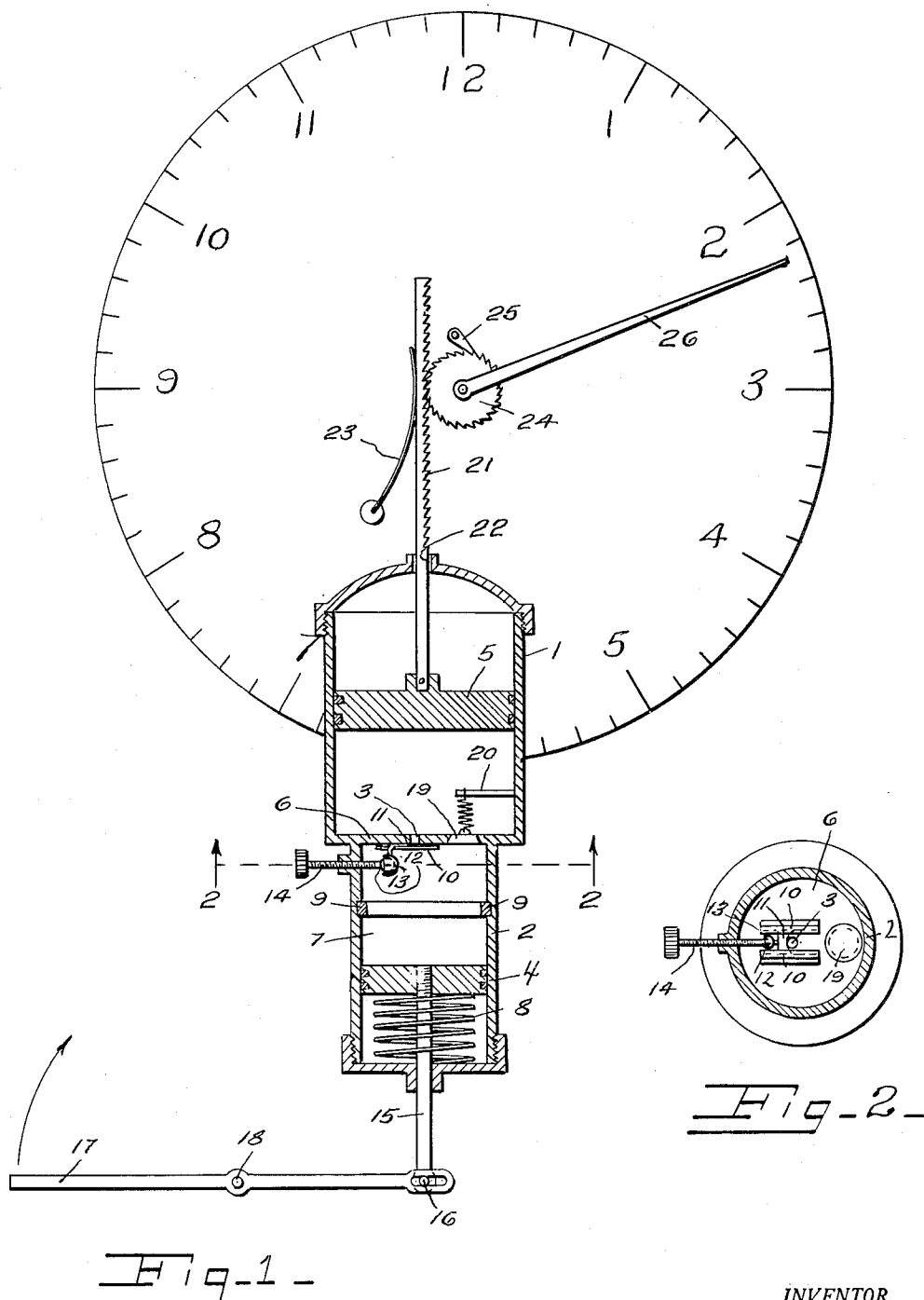
June 12, 1956

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2,749,700

HYDRAULIC CLOCK

Filed Nov. 4, 1953



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2,749,700

HYDRAULIC CLOCK

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Application November 4, 1953, Serial No. 390,221

3 Claims. (Cl. 58—42)

This invention relates to new and useful clocks.

The object of the present invention is to provide a fluid clock constructed in the simplest manner which provides precise time-keeping, ease of assembly and adjustment and means for easy "winding" without handling of the fluid in combination with a totally enclosed supply of fluid so that no liquid or vapor from the fluid may rust or otherwise damage the other working parts.

The object of the present invention has been attained and there is now discovered according to the present invention a clock comprising two adjacent cylinders separated by a wall containing an adjustable orifice, said cylinders each containing fluid-tight, slidable pistons retaining fluid between their faces, one of said pistons being attached to a compression spring on the side opposite the orifice and bearing a rod arranged so as to compress said spring with said piston, the other of said pistons bearing a rod attached to means for driving a clock hand in a clockwise direction only.

Other objects and advantages of the present invention will become apparent from the following description.

Fig. 1 is an elevation partly in section showing applicant's compression cylinders in cooperation with a clock mechanism as a winding mechanism.

Fig. 2 is a view taken on line 2—2 of Fig. 1 looking upward.

Referring to the drawings, which are for illustrative purposes only and are not to scale, some parts being exaggerated in size to increase the clarity of presentation, and wherein like numerals designate like parts, Figure 1 shows two metal compression cylinders, 1 and 2, cylinder 1 being the larger, connected by an adjustable orifice 3, in the bottom of cylinder 1 which also serves as the top of cylinder 2. Cylinder or compression chamber 2 contains the fluid-tight slidable piston 4, called the driving piston, and cylinder 1 contains the fluid-tight, slidable piston 5, called the driven piston. The space between the pistons is filled with fluid 7. Under the driving piston 4 is a compression spring 8 which pushes the driving piston upward at a steady rate controlled by orifice 3 as the driving piston displaces fluid from cylinder 2 into cylinder 1 and thus, in turn moves the driven piston 5 at the steady, controlled rate, thus providing the mechanical power to move the hands of a clock through further conventional gear arrangements.

The diameter of cylinder 2 is somewhat smaller than that of cylinder 1 so that the driven piston moves with greater force, but at a slower rate, in order to avoid inaccurate timing by small changes in resistance of the registering mechanism and thus increasing accuracy. The compression spring 8 powering the system is allowed by stops 9 to expand for a short distance only in relation to its length in order to obtain a slightly varying driving force for the driving piston 4.

Regulation of the speed of flow of fluid from cylinder 2 to cylinder 1 is accomplished by any suitable means for altering the size of orifice 3. A simple and very accurate method of doing this is illustrated in Figure 2, wherein the

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screw 14 is threaded through the wall of cylinder 2 and terminates in a socket 13 holding a ball 12 attached to a flat plate 11, shaped as shown and held in position and tight to wall 6 by grooves 10 or the like. Turning the screw 14 to advance plate 11 from its position as shown thus diminishes the size of orifice 3, and vice versa. It is further contemplated and found advantageous to make plate 11 of a metal whose coefficient of thermal expansion so differs from that of the other parts of the device as to compensate automatically for changes in temperature.

Piston 4 is fixed to a rod 15 which in turn is connected through a joint 16 to lever 17 turning on the fulcrum 18. Motion of lever 17 in the direction indicated by the arrow will thus "wind the clock" by pulling down piston 4, and compressing spring 8, thus starting the device on a new cycle. It is apparent that the position of the outer end of lever 17 serves as a simple, visual indicator of need for rewinding, which is an advantageous and unusual feature.

When restarting the mechanism by moving lever 17 in the direction of the arrow, means must be provided for easy and quick return of the fluid 7 from cylinder 1 to cylinder 2 as obviously the orifice 3 is too small for this purpose. Said means for expediting return of fluid is provided by a conventional one-way valve. Such a simple valve 19 is shown in Figure 1 and held under light tension by spring 20. Valve 19 opens on the downward motion of piston 4, allowing quick return of fluid from cylinder 1 to cylinder 2; atmospheric pressure forces piston 5 down on top of the fluid 7. The valve 19 closes automatically when upward pressure is exerted by piston 4.

The rod 21, loosely passing through chamber 1, is driven by piston 5 in an upward direction when the clock is "running" is connected by conventional means to a system for driving the hand 26 of the clock when rod 21 is moved upward and for not moving the hand 26 of the clock when rod 21 is moved downward during "winding." As one example, the teeth of rod 21 are shaped in such a manner that upward motion of the rod will drive the hour-pinion-gear 24, whereas downward motion during the period of compressing the driving spring will disengage the teeth of rod 21 from pinion gear 24 and then prevent turning hand 26 backward.

As used herein, the term "fluid" is intended to include both liquids and gases.

I claim:

1. A clock having an indicating hand, comprising two adjacent cylinders and a communicating wall therebetween, means providing an adjustable timing orifice in said wall, a fluid-tight slidable piston in each of said cylinders, a fluid in the space between the pistons, a compression spring having one of its ends resting on a stationary abutment and its other end bearing against one of the pistons at the side opposite the orifice, spring energizing means including a rod connected to said last-mentioned piston for moving said piston to compress said spring, a rod attached to the other of said pistons, and a one-way driving means for driving said clock hand from the last-mentioned rod.

2. A clock having an indicating hand, comprising two adjacent cylinders and a communicating wall therebetween, means providing an adjustable timing orifice in said wall, a one-way valve providing a large opening in said wall, a fluid-tight slidable piston in each of said cylinders, a fluid in the space between the pistons, a compression spring having one of its ends resting on a stationary abutment and its other end bearing against one of the pistons at the side opposite the orifice, spring energizing means including a rod connected to said last-mentioned piston for moving said piston to compress said spring, a rod attached to the other of said pistons, and a one-way driving means for driving said clock hand from the last-mentioned rod.

3. A clock having an indicating hand, comprising two adjacent cylinders having their long axes on a common line, and a communicating wall therebetween, means providing an adjustable timing orifice in said wall, a fluid-tight slidable piston in each of said cylinders, a fluid in the space between the pistons, a compression spring having one of its ends resting on a stationary abutment and its other end bearing against one of the pistons at the side opposite the orifice, spring energizing means including a rod connected to said last-mentioned piston for moving said piston to compress said spring, a rod attached to the

other of said pistons, and a one-way driving means for driving said clock hand from the last-mentioned rod.

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