June 11, 1935. A. F. BENSON 2,004,909

CLOCK

Filed April 16, 1932

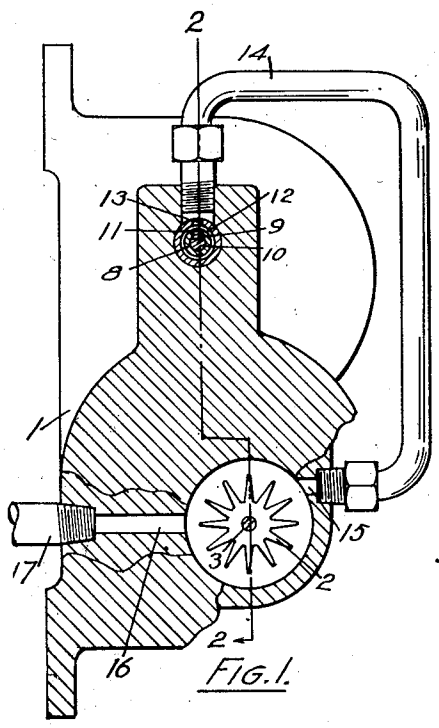


FIG. 1.

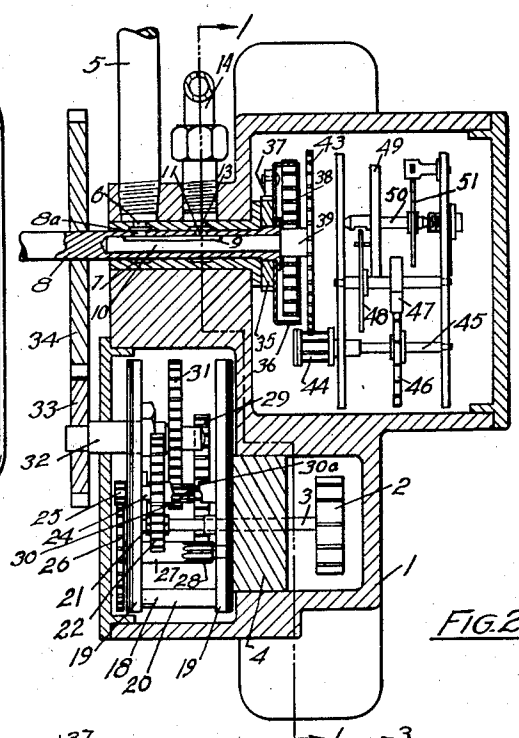


FIG. 2.

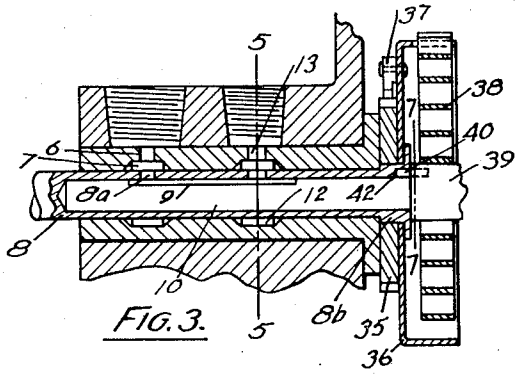


FIG. 3.

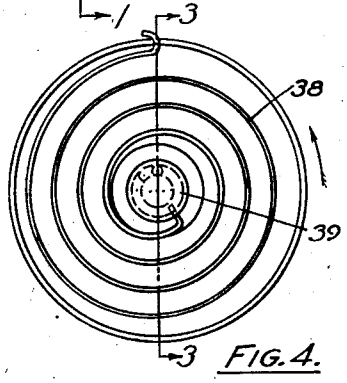


FIG. 4.

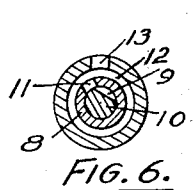


FIG. 6.

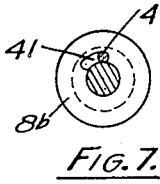


FIG. 7.

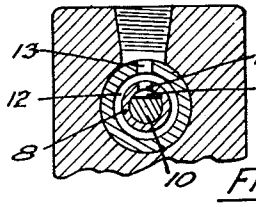


FIG. 5.

INVENTOR.

Arthur F. Benson

BY W. L. Lund

ATTORNEYS.

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CLOCK

Arthur F. Benson, Erie, Pa., assignor to American Meter Company, New York, N. Y., a corporation of Delaware

Application April 16, 1932, Serial No. 605,539

6 Claims. (Cl. 58—46)

In some locations it is necessary to have a clock. As an example, it is necessary with orifice meters to drive the recording mechanism from a clock so that pressure differences may be recorded with relation to time. An example of such a use is indicated in the patent to Connet and Jackson #529,365, Nov. 20, 1894. Where the record is one that requires frequent renewals, or servicing the disadvantage is largely limited to the effort of re-winding the clock. But where recording devices which are capable of recording over considerable periods of time are available the necessary servicing of the clock adds materially to the expense. Many of these meters arranged in gas lines are, of necessity, located at inconvenient places. The effort has been made to connect these meter stations with a source of electric power with a definite time characteristic in the manner of ordinary electric clocks. There are two general objections to such a scheme. It involves considerable expense, is not always available and also increases the fire hazard. The present invention is designed to provide a timing device which may be driven by a fluid, such as gas in the line itself and the invention involves in its details the efficient control of such a clock. Features and details of the invention will appear from the specification and claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing as follows:—

Fig. 1 shows a section on the line 1—1 in Fig. 2.

Fig. 2 shows a section on the line 2—2 in Fig. 1.

Fig. 3 an enlarged section of the valve mechanism.

Fig. 4 an end view of the parts shown in Fig. 3.

Fig. 5 a section on the line 5—5 in Fig. 3.

Fig. 6 a section of the valve structure, the section being similar to that of Fig. 5, but with the valve in a different position.

Fig. 7 a section on the line 7—7 in Fig. 3.

1 marks the case. A motor chamber is arranged in the case and a fluid motor wheel 2 is arranged in this chamber. The wheel is mounted on a shaft 3 journaled in a closure plug 4, the plug closing the chamber.

Fluid, such as gas from the line is supplied through a pipe 5. It passes from the pipe 5 through a port 6 into an annular passage 7. A port 8a arranged in a driving sleeve 8 connects with the annular passage 7. The port 8a is adapted to be brought into register with a port, or passage 9, extending along a driving shaft 10. The passage 9 is connected by a port 11 with an annular passage 12. A port 13 extends from the passage 12 and leads to a pipe 14. The pipe 14 leads to an inlet, or nozzle opening 15 from which the gas is discharged against the motor wheel 2. The gas is discharged from the chamber by means of a passage 16 leading to an exhaust pipe, or discharge 17.

A reducing gear mechanism 18 is mounted between plates 19, these plates being connected by pins 20. A gear 21 is fixed on the shaft 3. It meshes with a gear 22 arranged on a shaft 24. A pinion 25 is fixed on the shaft 24 and meshes with a gear 26. The gear 26 is fixed on a shaft 27 and a pinion 28 is arranged on this shaft. The pinion meshes with a gear 29, the gear 29 being fixed on a shaft 30. A pinion 30a is formed in the shaft 30 and this pinion meshes with a gear 31. The gear 31 is mounted on a shaft 32. A gear 33 is fixed on the shaft 32 and meshes with a gear 34. The gear 34 is fixed on the sleeve 8. It will readily be seen from this that the movement of the fluid-actuated motor wheel is communicated through this gear reduction to the driving sleeve 8.

A ratchet wheel 35 is fixed on a head 8b of the sleeve 8. A spring barrel 36 is journaled on the head 8b and a ratchet pawl 37 is mounted on the barrel and engages the ratchet wheel 35. A spring 38 has one end secured to the barrel and the other end to a head 39 on the end of the shaft 10. A pin 40 projects into a slot 41 in the head 39 and into an opening 42 in the head 8b. The head 39 has a limited movement relatively to the sleeve, the movement being limited by a pin 40 and slot 41. This movement is sufficient to move the valve passage 9 from open position to closed position relatively to the ports 8a and 11.

The spring is put under initial tension by turning the barrel and it is locked under this tension by the ratchet pawl and this forms a yielding connection between the sleeve 8 and the shaft 10. A gear 43 meshes with a pinion 44. The pinion 44 is carried by a shaft 45. The shaft 45 carries an escapement wheel 46 on which an escapement anchor 47 acts. The anchor operates the balance pawl connection 48 and this drives the usual balance wheel 49 which is carried by a shaft 50 on which is tied the hair spring 51. Any timing element, or escapement may be used in connection with the device.

In the operation of the device, the tension of the spring 38 holds the valve passage 9 in register with the ports 8a and 11. In other words, the control valve is wide open and the pin 40 is located to accomplish this result. With gas turned into the pipe 5, it passes through the valve and into the fluid motor chamber and acts on the

wheel 2 giving it a rotary motion. The wheel operating through the reducing gear mechanism and gear train drives the sleeve 8 and the sleeve acting through the spring drives the gear 43 and with it the clock escapement. The fluid actuated wheel is arranged to have an excess speed with a full open valve. The escapement prevents the movement of the gear 43 in full response to the speed of the fluid-actuated motor. As a result the sleeve 8 advances slightly, or rotates relatively to the shaft 10, the spring 38 permitting this relative movement. This movement of the sleeve 8 on the shaft 10 gradually closes the valve so as to reduce the speed of the fluid actuated motor and bring it into step with the clock escapement mechanism. With any lag of the motor the valve is opened so as to increase its speed and in any excess speed of the motor the valve is closed so as to reduce its speed. So that there is a perfect control of the motor in step with the escapement mechanism.

Should the pressure in the line fail, the motor would stop. The spring 38 would continue to move the escapement until the pin 40 reached the end of the slot. At this point the effect of the spring would be neutralized. This brings the valve to wide open position. When the pressure comes on again the motor will start and the response will be as above described. Should the escapement fail, the retarding at this point will complete the closure of the valve and shut off the motor.

I have designated this invention as a clock. This is the term usually used for the instrument for driving registering devices in which instrument the clock does not indicate to the ordinary observer any definite time. While this device may be used and have merely driving hands through which time may be read, it will be understood that ordinarily it is used to drive some instrument which is to be time-controlled by the escapement, the use of the fluid motor easily permitting sufficient power to drive many types of instrument which from an ordinary spring-wound clock, for instance, would be impractical.

What I claim as new is:—

1. In a clock, the combination of a time controlling escapement; means driving the escapement comprising a fluid-actuated motor; and devices controlled by the action of the escapement relatively to the motor controlling the rate of flow of fluid to the motor to maintain the speed of the motor in conformity with the speed of the escapement.

2. In a clock, the combination of a time controlling escapement; means driving the escapement comprising a fluid-actuated motor; means delivering fluid under pressure to the motor; a control valve for the means; and devices responsive to the action of the escapement relatively to the motor controlling the valve to control the rate of flow to the motor to maintain the speed of the motor in conformity with the speed of the escapement.

3. In a clock, the combination of a time controlling escapement; means driving the escapement comprising a fluid-actuated motor; a yielding driving connection between the motor and the escapement; means supplying fluid under pressure to the motor; and a valve responding to the action of the yielding connection and controlling the supply means to vary the rate of flow to the motor to maintain the speed of the motor in conformity with the speed of the escapement.

4. In a clock, the combination of a time controlling escapement; a fluid-actuated motor; a driving connection between the motor and the escapement comprising a sleeve and shaft, one of them being connected to the escapement and the other to the motor, said sleeve and shaft having valve ports opened and closed by relative rotative movement of the sleeve and shaft; a yielding connection between the sleeve and shaft; and means supplying fluid under pressure to the motor controlled by said valve.

5. In a clock, the combination of a time controlling escapement; a fluid-actuated motor; a driving connection between the motor and the escapement comprising a sleeve and shaft, one of them being connected to the escapement and the other to the motor, said sleeve and shaft having valve ports opened and closed by relative rotative movement of the sleeve and shaft; a yielding connection between the sleeve and shaft; means limiting the relative rotative movement of the sleeve and shaft; and means supplying fluid under pressure to the motor controlled by said valve.

6. In a clock, the combination of a time controlled escapement; a motor; a reduction gear mechanism on which the motor operates; a sleeve and shaft connection between the gear reduction mechanism and the escapement, said sleeve and shaft having valve ports opened and closed by the relative movement of said sleeve and shaft; a supply connection including ports leading to the motor; a spring connection between the shaft and sleeve; means for holding the spring under tension; means for limiting the relative movement of the shaft and sleeve; and means operating the escapement through the yielding connection afforded by the spring.

ARTHUR F. BENSON.