Jan. 18, 1938. L. J. GRIFFEY ET AL 2,106,094

TIME CONTROL MECHANISM

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Fig. 1.

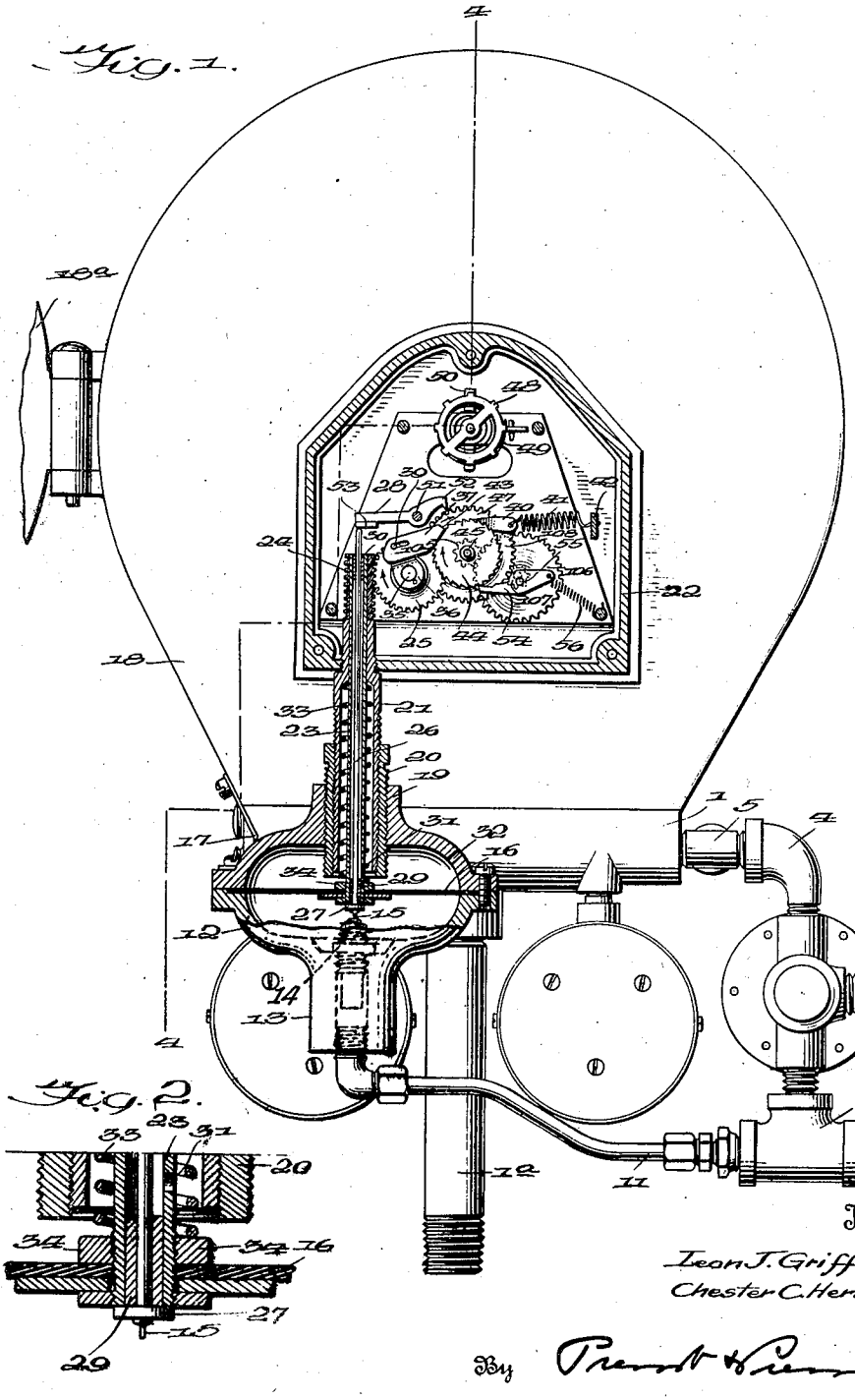


Fig. 2.

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TIME CONTROL MECHANISM

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Fig. 3.

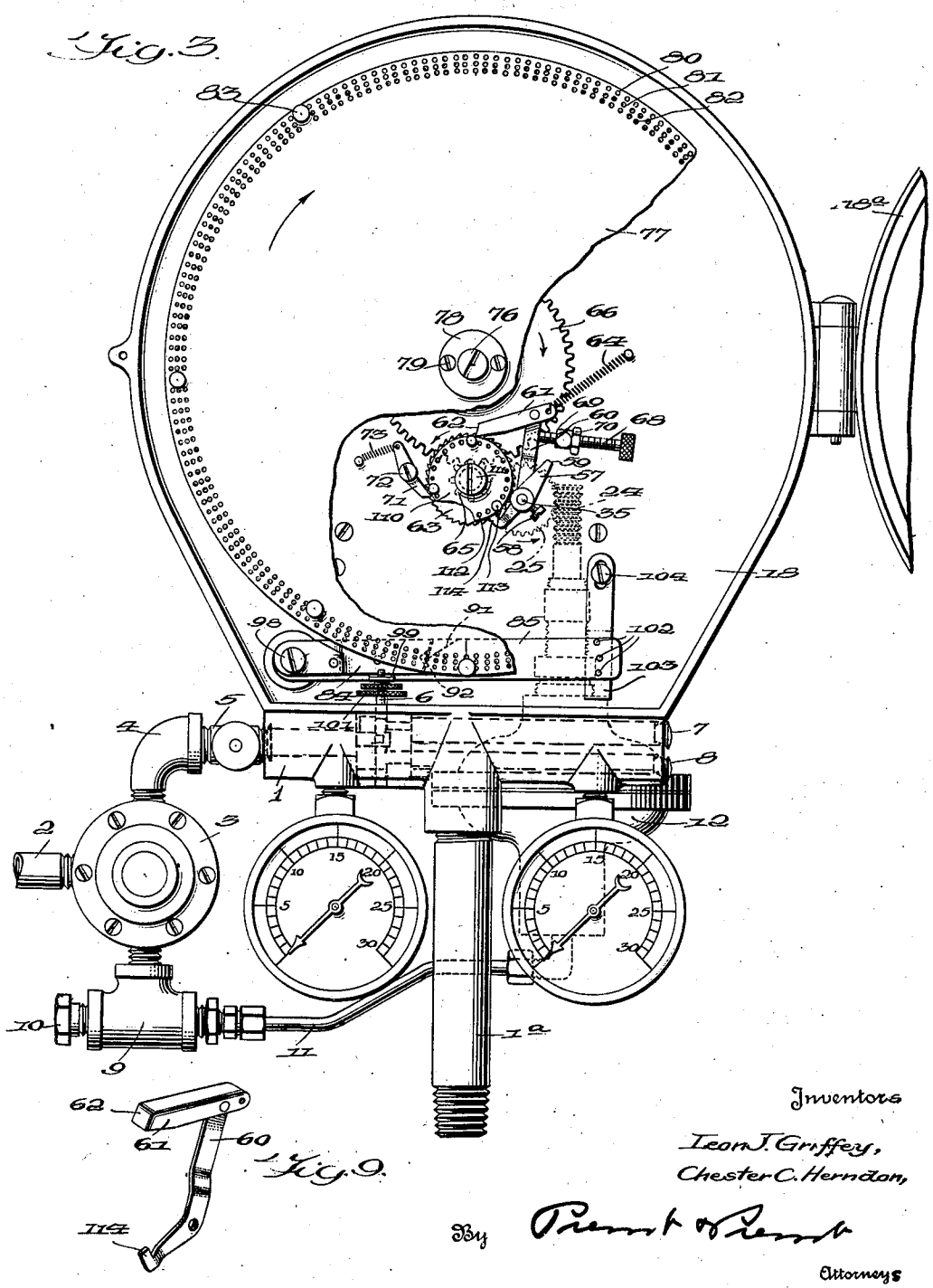


Fig. 9.

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TIME CONTROL MECHANISM

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Fig. 4.

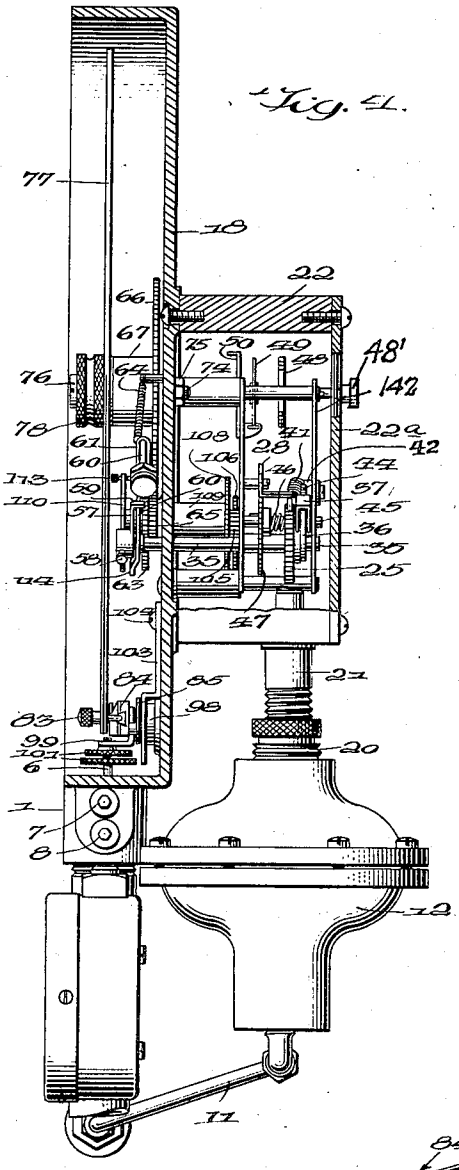


Fig. 5.

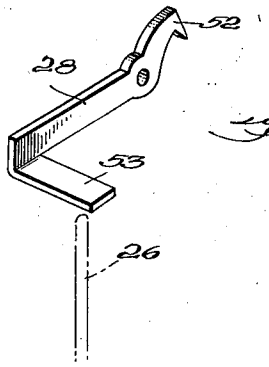


Fig. 6.

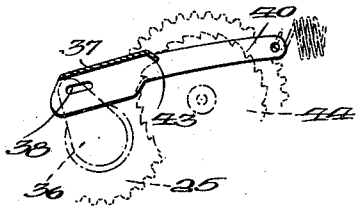


Fig. 7.

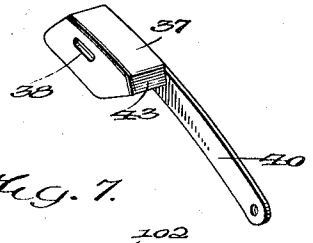
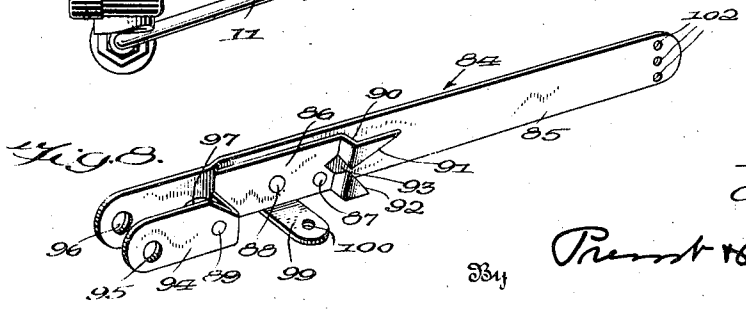


Fig. 8.



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Patented Jan. 18, 1938 2,106,094

UNITED STATES PATENT OFFICE

2,106,094

TIME CONTROL MECHANISM

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Application January 13, 1936, Serial No. 58,943

15 Claims. (Cl. 161—7)

Our invention consists in new and useful improvements in pneumatic time control mechanism and has for its object to provide a timing device for use in connection with the periodic operation of valves or the like, which is positive and powerful in action, flexible as to adjustment and relatively simple in principle and operation.

Although adaptable to many uses, as will be obvious from the following description, our invention is primarily designed for use in connection with a pilot valve mechanism for controlling one or more motor valves in an assembly such for example as that shown and described in the co-pending application of Leon J. Griffey, Serial No. 8,359, patented July 21, 1936, No. 2,048,607.

Heretofore, various forms of time control mechanism have been employed for periodically operating valves, switches or the like, wherein conventional spring clocks, electric clocks or turbines have been employed as the controlling mechanism. However, with manually wound clock mechanisms, constant supervision and periodic winding by the operator have been necessary, and in many instances, electric power for operating an electric clock has not been available at the points of installation. Furthermore, in mechanisms employing a turbine as the operating medium, a change in operating pressure changes the timing of the clock, whereas with the power unit designed by us, the timing device is capable of operation with no error in time and with a wide range of pressure change.

It is the primary object of our invention to overcome the disadvantages and inadequacies of devices heretofore employed and to this end we have provided a pressure actuated diaphragm power unit which serves as the driving means for the time controlled pilot valve operating mechanism and at the same time winds the main spring of the clock mechanism and maintains the same in constant operating condition.

A further object of our invention is to provide means for controlling and adjusting the operation of the pilot valve actuating mechanism for any combination of movement and idleness. That is, the device may be so adjusted as to be capable of constant movement, or to any fixed time of movement, once for example in every twenty-four hours, remaining idle for the remainder of said twenty-four hours.

With the above and other objects in view which will appear as the description proceeds, our invention consists in the novel features hereinafter set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings in which numerals of like character designate similar parts throughout the several views,

Fig. 1 is a view in rear elevation partly in section, showing the power unit and time control mechanism.

Fig. 2 is an enlarged sectional detail of a portion of Fig. 1.

Fig. 3 is a view in front elevation partly broken away to illustrate the stop adjustment and actuating means for the valve controlling disc.

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1 showing the power unit, time control mechanism and the disc stop adjustment.

Fig. 5 is an enlarged detail of the lever for periodically operating the diaphragm valve.

Fig. 6 is an enlarged sectional detail of the main spring winding yoke.

Fig. 7 is a perspective view of the same.

Fig. 8 is a detail perspective of the pilot valve operating lever, and

Fig. 9 is a detail perspective of the combined stop and pawl member employed in connection with the disc operating mechanism shown in Fig. 3.

In the drawings, 1 represents a base member which is preferably composed of suitable cast metal and is provided with a plurality of longitudinally extending fluid passageways and a pilot valve shown in dotted lines in Fig. 3 and similar to the arrangement shown in said co-pending application now Patent No. 2,048,607. A pipe 2 leads from a source of operating pressure fluid and terminates in communication with a conventional pressure reducing valve 3, one outlet of which is connected by an L 4 and short pipe 5 to the inlet passageway in the body member 1. A pilot valve connected to stem 6 (see Figs. 3 and 4), controls the passage of fluid from the inlet passageway to a plurality of discharge passageways, the outlet ends of which are shown as closed by plugs 7 and 8 but which when assembled are connected into conduits leading to respective motor valve diaphragms. The foregoing is more fully described in said co-pending application but is briefly referred to herein to present a more complete picture of the entire assembly forming the subject matter of the present invention.

The opposite outlet of the pressure reducing valve 3 is connected into a T 9, one end of which is provided with a pop valve 10, its other end discharging through a line 11 into the inlet end of a diaphragm chamber 12. The inlet end of the dia-

phragm chamber forms a housing 13 for a suitable valve 14 having an upwardly projecting stem 15 (Fig. 1), said valve being normally held by spring means in closed position. A diaphragm 16 extends across the diaphragm chamber and is secured in place by any conventional means between the flanges of the chamber 12.

The upper end of the diaphragm chamber 12 is provided with an internally threaded boss 19 adapted to receive an adjustable diaphragm stop sleeve 20 which extends downwardly a predetermined distance in the upper half of the diaphragm chamber for the purpose hereinafter set forth. The sleeve 20 is internally threaded to receive the lower end of a tubular distance piece 21, the upper end of which terminates within a housing 22 for the time control mechanism as shown in Fig. 1. The weight of the diaphragm chamber is supported by this distance piece 21 and is prevented from turning on the latter after adjustment, by means of a suitable bracket 17 fastened to the main housing 18 carried by the base member 1.

At the central portion of the diaphragm 16 we secure the lower end of an upwardly extending sleeve 23 which projects through the bore of the distance piece 21 in sliding engagement with the upper end thereof. The upper end of the sleeve 23 terminates in a cylindrical rack 24 which is movable up and down with said sleeve in response to the movement of the diaphragm 16, the teeth of said rack meshing with the teeth of a gear 25 hereinafter referred to more in detail.

Extending through the center of sleeve 23 is a valve operating plunger 26, the lower end of which projects through the diaphragm 16 and terminates in an enlarged head 27 immediately in line with the valve stem 15, its upper end extending beyond the terminus of said sleeve a predetermined distance for engagement by a pivoted lever 28, the operation of which is effected by the time control mechanism as will hereinafter appear. A bushing 29 at the lower end of the sleeve 23 slidably engages the lower end of the plunger 26 (see Fig. 2), and a similar bushing 30 at the upper end of said sleeve slidably guides the corresponding end of said plunger. Sufficient clearance is provided between the lower bushing 29 and the plunger 26 to permit the escape of pressure fluid, and said sleeve is provided with a small port 31 above the bushing which discharges pressure fluid from the interior of the sleeve into the upper half of the diaphragm chamber 12 from whence it bleeds to atmosphere through a port 32 in the wall of the upper diaphragm casing. The sleeve 23 and diaphragm 16 are normally maintained in the position shown in Fig. 1 by the downward pressure of a coil spring 33 located in the enlarged lower portion of the distance piece 21, said spring abutting an adapter 34 on the upper face of the diaphragm 16.

Returning to the gear 25, it will be seen from Fig. 1 that when the sleeve 23 and the rack 24 carried thereby are moved upwardly by pressure under the diaphragm 16, said gear 25 is rotated in clockwise direction. This gear is fixed on a shaft 35 which also carries a crank arm 36, the outer end of which rides within a yoke 37. This yoke is preferably of an inverted U-shape in cross section, its side walls being provided with longitudinally extending slots 38 adapted to receive the projecting ends of a pin 39 extending transversely through the end of crank arm 36. Details of this yoke arrangement are shown in Figs. 6 and 7 of the drawings. One side wall of the yoke 37 is extended longitudinally to form an arm 40, the end of which is fastened to a coil spring 41 fixed as at 42 to a suitable point on the rear clock plate 102 (Fig. 4), said spring normally tending to draw the yoke 37 toward the right, looking at Fig. 1. The forward end of the top portion of the yoke 37 is bent downwardly at an angle as at 43 to form a pawl member for engagement with the teeth of a ratchet 44 mounted on a shaft 45 and freely rotatable thereon directly in front of the arm 40 and in line with the yoke 37.

46 represents the main spring of the time control mechanism which surrounds the shaft 45 as shown in Fig. 4, being secured at one end to the ratchet 44 and at its other end to a timing gear 47 fixed to the shaft 45. The shaft 45 is geared to a balance wheel 48 in the conventional manner (not shown) which regulates the speed of rotation of said shaft at exactly one revolution per hour by means of a hair spring 49 and hair spring adjustment lever 50. A stem and knob 48' project through the rear of the clock housing, said stem being operatively connected to the balance wheel 48 for starting purposes as will hereinafter appear.

The timing gear 47 is provided with sixty teeth, and as it is fixed to the shaft 45, rotates at a speed of one revolution per hour or a distance of one tooth per minute. The lever 28 heretofore referred to is pivotally mounted on a shaft 51 (Fig. 1) and is provided adjacent the periphery of the gear 47 with an abutment 52, and at its other end with a right angular horizontal projection 53, shown in detail in Fig. 5, which lies immediately above the upper extremity of the valve plunger 26 and is normally engaged thereby, with the abutment 52 riding in the notches of the respective teeth of the timing gear 47. Thus, the operation of the main spring and clock mechanism rotates the timing gear 47 at the rate of one revolution per hour as before stated, which causes one tooth per minute to engage the inclined face of the abutment 52 and rocks the lever 28 on the shaft 51 in counterclockwise direction, looking at Fig. 1. This movement depresses the plunger 26 by means of the projection 53 and in turn causes the valve stem 15 of valve 14 to be depressed, opening the valve and permitting pressure fluid from line 11 to enter the pressure chamber under the diaphragm 16. The pressure under the diaphragm forces the same upwardly and with it the sleeve 23 which, through the medium of the cylindrical rack 24, rotates the gear 25 and shaft 35 in clockwise direction. The upward movement of the diaphragm 16 and parts connected thereto is controlled by the adjustable stop sleeve 20. The crank arm 36 fixed to the shaft 35 is correspondingly rotated in clockwise direction together with the pin 38, thus relieving the tension on the spring 41 attached to the yoke 37 and permitting said spring through arm 40 to pull the yoke to the right in Fig. 1.

During this movement of the yoke, the pawl member 43 at the forward end of the yoke engages an adjacent tooth on ratchet 44 and rotates the same in clockwise direction. This ratchet 44 being freely rotatable on shaft 45 and fixed to the main spring 46, winds said main spring until such movement is stopped by the arm 36 reaching the end of its travel. This winding will take place upon each movement of

the crank arm 36 by the rack 24 and sleeve 23 until the resistance of the main spring 46 is equal to the tension of spring 41, after which the pin 39 will move freely in slot 38 with no further winding of the main spring 46. A snap pawl 54 pivotally mounted as at 55 is normally held in engagement with the teeth on the ratchet 44 by means of a spring 56 and maintains the wind of the main spring 46 by preventing the ratchet 44 from rotating in a reverse direction.

Turning to Figs. 3 and 4, it will be seen that the shaft 35 which carries the pinion 25 is elongated and extends forwardly through the wall of the main housing 18 and terminates in the front thereof where it carries a crank 57 held in place by a set screw 58, the upper end of said crank being bent at right angles to form an abutment 59 (see Fig. 4). On the same shaft 35 adjacent the crank arm 57, an upwardly projecting lever 60 is freely mounted, the upper end of said lever carrying a pivoted actuating channel 61 (see Figs. 3 and 9). The forward end of the channel 61 is closed as at 62 to form a pawl which is normally held in engagement with the teeth of a ratchet 63 by means of a spring 64. The ratchet 63 is fixed to a co-axial gear 65 which in turn meshes with a large gear 66 fixed on a hub 67 hereinafter referred to more in detail.

A rating screw 68 suitably mounted in a tapped post 69 provided with a lock nut 70 limits the pick-up of ratchet teeth on ratchet 63 by the actuating channel 61. In other words, by adjusting the position of the rating screw 68 in the post 69 so as to move its inner end either to the right or to the left, varies the position of the actuating channel 61 with respect to the ratchet 63. The spring 64 serves the dual purpose of maintaining the pawl end of the actuating channel 61 in engagement with the periphery of the ratchet 63 and normally tends to pull the actuating channel and lever 60 in a clockwise direction into engagement with the end of the rating screw 68 to pick up a predetermined number of teeth on the ratchet 63. Thus, by varying the position of the rating screw 68, the number of teeth picked up may be correspondingly varied from one to six teeth.

The upward movement of the rack 24 which causes the rotation of the pinion 25 in a counter-clockwise direction, looking at Fig. 3, correspondingly rotates the crank 57 which, by means of the angular abutment 59, engages the adjacent edge of lever 60. This pulls the actuating channel 61 away from the end of the rating screw 68 against the tension of the spring 64, its pawl end 62 engaging the teeth of the ratchet 63 and rotating the latter in a counter-clockwise direction. Gear 65 fixed to the ratchet 63 and rotated thereby causes the clockwise rotation of the large gear 66 a predetermined extent dependent upon the setting of the rating screw. The ratchet 63 is prevented from rotating in a reverse direction by a snap pawl 71 pivotally mounted at 72 and normally held in engagement with the periphery of the ratchet by a spring 73.

The hub 67 carrying the gear 66 rotates on a shaft 74 fastened to the clockcase 18 by a nut 75 and is held in place on this shaft by a shoulder screw 76. On this same hub 67, we provide a time controlled disc 77 which is secured in place by a knurled nut 78, the latter being locked to the disc by set screws 79 as shown in Fig. 3. Thus, the hub 67, gear 66 and disc 77 are held as a unit and the time controlled disc 77 rotates at a speed proportionate to the speed of rotation of the ratchet gear 63.

Referring to Fig. 3, the disc 77 is provided with three co-axial annular rows of apertures 80, 81 and 82 adapted to receive screw threaded pins 83 which, as in the similar disc in the aforementioned co-pending application, are provided with knurled heads at their outer ends and project laterally through the inner face of the disc as shown in Fig. 4, to engage the operating lever 84 of the pilot valve 6.

This operating lever 84, as shown in detail in Fig. 8 and assembled in Fig. 3, comprises a substantially straight horizontally extending arm 85 carrying a pin-engaging arm 86 which is secured thereto in spaced relation by suitable rivets 87, 88 and 89, the pin-engaging end of arm 86 is off-set as at 90 and provided with an abutment having opposed cam surfaces 91 and 92 which terminate in a common slot 93 for the purpose hereinafter set forth. The opposite end of the pin-engaging arm 86 is off-set to a greater extent as at 94 to form a pivotal bearing 95 which cooperates with a corresponding bearing 96 formed in the adjacent end of the arm 85. The off-set portion 94 is retained in spaced relation from the adjacent end of the arm 85 by a spacer 97 which is held in place by the rivet 89.

This mechanism just described is pivotally mounted as at 98 on a suitable fulcrum secured to the wall of the casing 18 as shown in Fig. 3, with the pin-engaging abutments 91 and 92 lying immediately behind but slightly spaced from the disc 77 and in line for engagement with the inner projecting ends of pins 83 in the apertures in said disc.

At an intermediate point, the pin-engaging arm 86 carries a valve engaging L 99 which is pivotally supported by the rivet 88, its foot extending forwardly and being provided with a threaded aperture 100. The upper end of the pilot valve 6 is threaded as shown in Figs. 3 and 4 to engage the aperture in the foot of the L 99, suitable adjusting nuts 101 being provided to vary the operating position of the valve.

The opposite end of the horizontal lever 85 is provided with a series of vertically spaced apertures 102 adapted to co-operate with a raised button of conventional design on the arm 103 adjustably mounted at 104 on the wall of the casing 18. The arm 85 being resilient, its varying positions are retained until positively changed by means of this button and aperture arrangement.

Thus, as the disc 77 is rotated in clockwise direction by the mechanism hereinbefore described, the projecting inner ends of the pins 83 arranged at predetermined positions in the apertures 80, 81 and 82 successively engage the respective cam surfaces 91 and 92 to positively move the arm 84 up or down. This movement is transmitted by means of the L 99 to the pilot valve 6 in a manner similar to that described in connection with the aforesaid co-pending application Serial No. 8,359. As the engaging pin reaches the end of the cam surface, it passes freely through the slot 93 and continues in its path, the arm assembly 84 being retained in its assumed position until positively changed by the engagement of a subsequent pin 83 with the abutment of the pin-engaging arm 86.

In some instances it is desirable and necessary to provide for a control which will operate the disc 77 through any desired span of time and then entirely stop the operation of said disc for a desired period before resuming its rotation. In

other words, it is desirable to have a control adjustment for the rotation of the disc 77 for any combination of movement and idleness from constant movement to any fixed time of movement, one every twenty-four hours.

To this end we provide a pinion 105 which is keyed to and rotates with the main spring shaft 45 at a constant speed of one revolution per hour. This pinion meshes with a gear 106 on a shaft which carries a second pinion 107 (see Fig. 1), which latter pinion rotates at the same speed with gear 106 and meshes with a gear 108 on an enlarged shaft 109 as shown in Fig. 4. The reduction of speed through this train of gears gives a resultant rotation to shaft 109 of one revolution per day.

As shown in Fig. 3, a stop disc 110 on the front side of the housing 18 and behind the timing disc 77 is held in place on the forward end of the shaft 109 by means of a suitable lock screw 111, said disc 110 being drilled with twenty-four tapped holes 112 arranged in an annular row near the periphery and adapted to receive stop pins 113. As in the case of the timing disc, these pins are provided with knurled heads and are screw-threaded for engagement with the holes 112, their inner ends projecting through the disc as shown in Fig. 4.

The lower end of the lever 60 with operates the actuating channel 61 is extended downwardly and suitably off-set to form a foot 114 (see Fig. 9), which lies in a plane between the disc 110 and the ratchet 63, in line for engagement with any one of a series of pins inserted in said disc. This foot is so designed that when it contacts one of the pins 113 in the twenty-four hour disc 110, the entire pick-up mechanism including the gear actuating assembly lever 60 will be held in its extreme counter-clockwise position out of contact with the actuating crank 57 on the shaft 35. Thus, as long as the foot 114 at the lower end of the actuating lever 60 is in contact with a pin 113 in the twenty-four hour disc 110, all rotation of the timing disc 77 will cease. The power unit on the opposite side of the casing 18 will continue to operate but its only function will be to keep the clock mechanism wound and maintain the timing of the entire unit.

The front face of the casing 18 may be closed by any suitable means such as by the hinged door 18a, and the rear face of the clock housing 22 may be closed by a plate 22a secured in place by suitable screws or the like. The entire assembly may be supported upon a vertical standard 1a or any other suitable means.

In operation, there is a constant source of gas pressure available through line 11 from the gas line 2, and in order to start the mechanism, the operator depresses the extension 53 on the lever 28 which in turn forces the plunger 26 downwardly to open the valve 15, permitting pressure to enter under the diaphragm 16. At the same time, he starts the balance wheel 48 into motion by turning the knob 48'. The pressure under the diaphragm forces the same upwardly and with it the sleeve 23 and rack 24 to rotate the gear 25 as hereinbefore described. The valve 15 then closes and the pressure fluid under the diaphragm escapes through the clearance between the plunger 26 and the bushing 29 in the sleeve 23 and is discharged through ports 31 and 32 to atmosphere.

The rotation of gear 25 in this manner has a two-fold function. It winds the main spring of the clock through the medium of the channel assembly 37 and spring 41, and at the same time operates the timing disc 77 through the medium of the lever 60, channel 61 and gearing assembly connected with the ratchet 63.

Thus, through the mechanism timed in operation by the clock structure, the plunger 26 is depressed once every minute which in turn winds the clock main spring and rotates the timing disc 77 to an extent dependent upon the adjustment of the rating screw 69. In other words, if this rating screw is set so that the channel 61 engages only one tooth on the ratchet 63, the extent of rotation of the disc 77 through the train of gearing hereinbefore described will be a minimum, while if said rating screw is adjusted to permit a pick up of six teeth on the ratchet 63, the extent of rotation of the disc 77 will be proportionately increased. The gearing between the ratchet 63 and the timing disc 77 is such that with a one-tooth pick up per minute on the ratchet, the timing disc will rotate at the rate of one revolution every six hours. On the other hand, with the maximum pick up of six teeth per minute, the timing disc will rotate at the rate of one revolution per hour. As the disc 77 is actuated only at one minute intervals, the minimum selectivity of valve action remains at one minute intervals regardless of the speed of disc rotation. The object of the variable speeds of rotation of the disc is of course to change the time sequences of valve action to more efficiently determine the time cycles desired.

When it is desired to so control the mechanism that during certain predetermined periods the timing disc 77 will remain completely idle without effecting any operation of the pilot valve 6, the pins 113 are so arranged in the apertures in the twenty-four hour disc 110 that at the desired time, one of the pins will come in line for engagement by the foot 114 at the end of the lever 60. As before described, as long as a pin lies in the path of this foot 114, the timing disc operating mechanism remains idle as the channel assembly 61 is maintained in its extreme counter-clockwise position and is prevented from operatively engaging the teeth on the ratchet 63. These pins 113 may be arranged in any series to provide for any desired combination of movement and idleness throughout the twenty-four-hour period.

From the foregoing it is believed that our invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed without departing from the spirit of the invention as set forth in the following claims.

What we claim and desire to secure by Letters Patent is:—

1. The combination with a fluid controlling valve, a valve control member, a train of gears for actuating said member, diaphragm actuated means for operating said train of gears, fluid means for actuating said diaphragm, a spring clock mechanism, means associated therewith for timing the admission of fluid to said diaphragm, and means actuated by said diaphragm for winding said clock mechanism.

2. In a time controlled valve actuating mechanism, a valve actuating lever, a rotary disc, means carried by said disc selectively engageable by said lever, a fluid actuated diaphragm, a reciprocating rack operated by said diaphragm, a gear in mesh with said rack, a pawl and ratchet mechanism operatively connected to said gear and means operatively connecting said ratchet mechanism and

said disc to rotate the latter upon the movement of said rack, and a clock mechanism for timing the operation of said diaphragm.

3. Apparatus as claimed in claim 2 including means controlled by said diaphragm for winding said clock mechanism.

4. Apparatus as claimed in claim 2 including means operatively associated with said pawl and ratchet mechanism for selectively controlling the rotation of said disc.

5. In a time controlled valve actuating mechanism, a valve actuating lever, a rotary disc, means carried by said disc selectively engageable by said lever for periodically actuating said valve lever, a fluid actuated power unit for operating said disc, a spring clock mechanism, means operated thereby for timing the admission of fluid to said power unit, means actuated by said power unit for winding said clock mechanism, and means controlled by said clock mechanism for selectively controlling the rotation of said disc.

6. Apparatus as claimed in claim 5 wherein said last named means comprises a second disc interposed between said power unit and said first disc and provided with selective means for controlling the periodic rotation of said first named disc.

7. In a time controlled valve actuating mechanism, a valve actuating member, a fluid operated driving unit, means operatively connecting said unit with said valve actuating member, a control valve for admitting fluid to said driving unit, a spring clock, means actuated thereby for periodically opening and closing said control valve, means controlled by said unit for winding said clock, and means for periodically preventing operation of said valve actuating member.

8. In a time controlled valve actuating mechanism, a valve actuating member, a fluid operated driving unit, means operatively connecting said unit with said valve actuating member, a control valve for admitting fluid to said driving unit, a spring clock, means actuated thereby for periodically opening and closing said control valve, means controlled by said unit for winding said clock, and means controlled by said clock for periodically preventing operation of said valve actuating member.

9. In a time control mechanism, a rotary control member, a pawl and ratchet mechanism for operating said member, a power unit for operating said pawl, a clock mechanism, means associated therewith for timing the operation of said power unit, means for regulating the pick-up of said pawl with respect to said ratchet, means actuated by said power unit for winding said clock mechanism, and means for periodically rendering said pawl mechanism inoperative without affecting the continued operation of said power unit and clock mechanism.

10. The combination with a fluid controlling valve, of a valve actuating member, a fluid operated power unit, means operatively connecting said power unit with said valve actuating member, a spring clock, means actuated by said clock for controlling the operation of said power unit, means controlled by said power unit for winding said clock, comprising a freely rotatable ratchet operatively secured to one end of the main spring of said clock, a timing gear fixed to the other end of said main spring, a pawl member operatively associated with said ratchet, spring means for moving said pawl member in one direction for winding said main spring, means normally tending to force said pawl member in the opposite direction against the tension of said spring means, and means actuated by said power unit for releasing said last named means, whereby said pawl and spring means cause the rotation of said ratchet to wind said main spring.

11. In mechanism of the class described, a driven element, a fluid operated driving unit therefor, a valve for controlling the admission of fluid to said driving unit, a spring clock, means actuated thereby for periodically opening and closing said valve, means controlled by said driving unit for winding said clock, a rotary disc driven by said clock, and means on said disc for selectively controlling the operation of said driven element.

12. In a time control mechanism, a rotary control member, a pawl and ratchet mechanism for operating said member, a spring normally tending to retract said pawl, a power unit, means operated by said power unit for forcing said pawl in the opposite direction against the tension of said spring, a clock mechanism, means associated therewith for timing the operation of said power unit, means actuated by said power unit for winding said clock mechanism, and means for regulating the pick-up of said pawl with respect to said ratchet.

13. Mechanism as claimed in claim 12 wherein said last named means comprises a rating screw adjustable to vary the retraction of said pawl, whereby the number of teeth on said ratchet picked up by said pawl is determined.

14. In a time control mechanism, a rotary control member, a pawl and ratchet mechanism for operating said member, a spring normally tending to retract said pawl, a power unit, a lever actuated by said power unit for forcing said pawl in the opposite direction against the tension of said spring, a clock mechanism, means associated therewith for timing the operation of said power unit, a disc driven by said clock, selective projections on said disc, and an extension on said lever adapted to engage said selective projections, whereby the retraction of said pawl by said spring is periodically prevented.

15. In a time controlled valve actuating mechanism, a valve actuating lever, a rotary disc, means carried by said disc selectively engageable by said lever, a fluid actuated diaphragm, a reciprocating post operated by said diaphragm, a pawl and ratchet mechanism, means operatively connecting said ratchet to said disc, means operatively connecting said pawl to said post, a valve for controlling the admission of fluid to said power unit, a valve actuating stem carried by said post, a clock mechanism, and means actuated by said clock mechanism for periodically operating said valve stem.

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