J. F. WARE.

VARIABLE TIME OPERATING OIL CONTROLLED VALVE.

APPLICATION FILED MAR. 29, 1909.

961,274. **Patented June 14, 1910.**

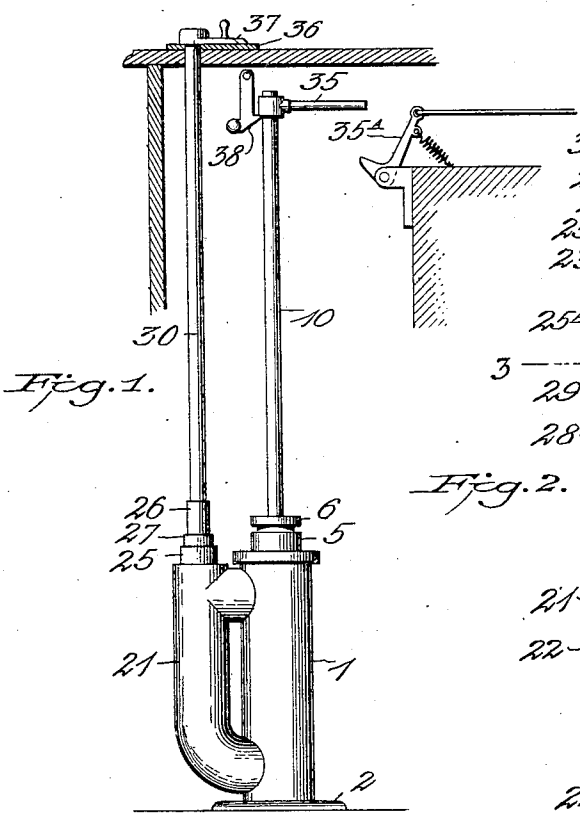


Fig. 1.

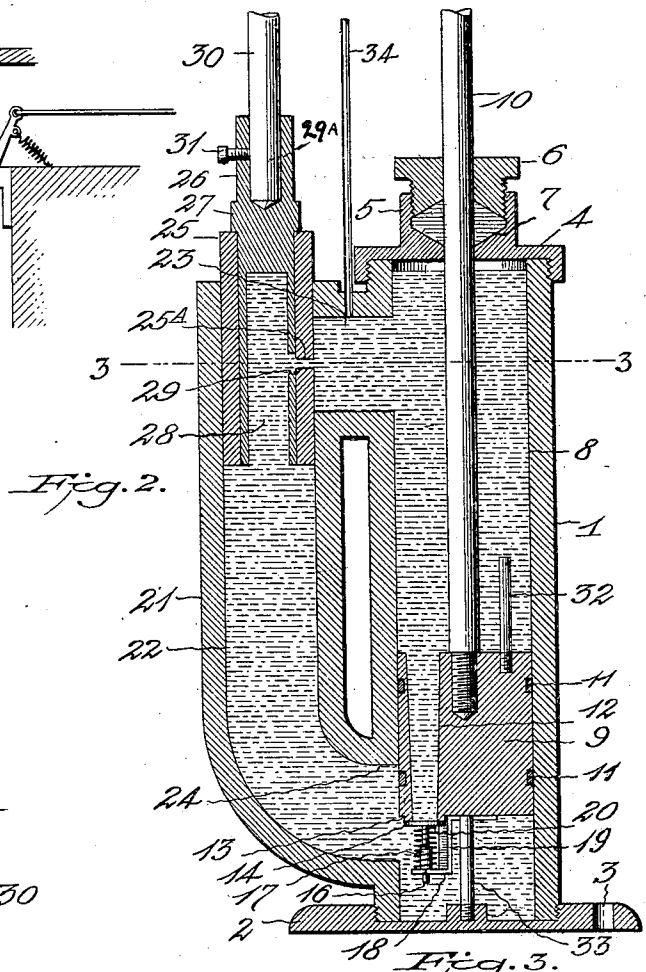


Fig. 2.

Fig. 3.

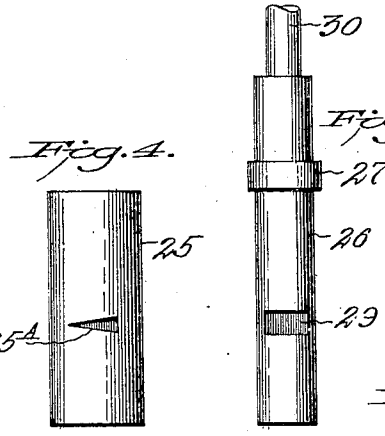


Fig. 4.

Fig. 5.

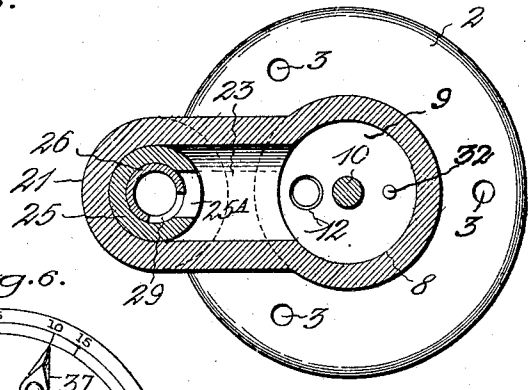
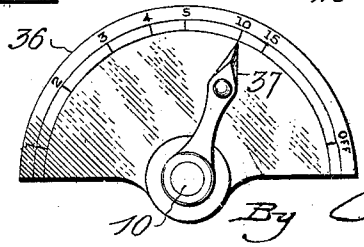


Fig. 6.



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UNITED STATES PATENT OFFICE.

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VARIABLE-TIME-OPERATING OIL-CONTROLLED VALVE.

961,274. Specification of Letters Patent. **Patented June 14, 1910.**

Application filed March 29, 1909. Serial No. 486,602.

To all whom it may concern:

Be it known that I, JAMES F. WARE, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Variable-Time-Operating Oil-Controlled Valve, of which the following is a specification.

My invention relates to improvements in oil controlled valves, and the object of my invention is to provide a variable time-controlling oil operating valve, that can be set to move through its operative movement in different predetermined periods of time, and that having been set to operate in any desired period of time within its capacity, will operate successively within that time. I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a side elevation of the improved valve showing one way in which the same may be arranged to effect a mechanical operation. Fig. 2, is a vertical, longitudinal sectional view through the same. Fig. 3, is a horizontal, sectional view thereof on the line 3—3 of Fig. 2. Fig. 4, is a side elevation of the outlet valve tube. Fig. 5, is a similar view of the cut-off which is mounted in the valve tube. And Fig. 6, is a plan view of the index plate and of the pointer which is attached to the upper end of the rod secured to the cut-off.

Similar characters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1, designates a cylindrical casing, to the bottom of which a base flange 2 is connected, which also forms the lower end and is provided with screw receiving apertures 3. A cylinder head 4 is also secured to the top of the cylinder, preferably by being screwed thereto. This cylinder head is provided with a stuffing box 5, in which a gland 6, is threaded. The chamber 7 of the stuffing box is filled with suitable packing material. The cylindrical casing is provided with a cylindrical bore 8, which extends through it from end to end. A piston head 9 is reciprocally mounted in the bore of the cylindrical casing, which is provided with a piston rod 10, that extends through the stuffing box and gland of the upper cylinder head. The piston head is provided with piston rings 11, to insure its fitting snugly in its bore. The cylinder and its piston head stand in a vertical position, and through the piston head from top to bottom I form an oil passage 12. I preferably make this aperture of tapering form, and taper it smaller from the top of the piston to the lower end of the piston, and at the lower end of the piston I form a valve seat lug portion 13, around the aperture passage 12, and against this valve seat 13 I place a valve, which comprises a disk portion 14 and a valve stem portion 16. The valve stem 16 projects slidably through a sleeve 17, that forms a part of one end 18 of a bracket 19, the other end of which is secured to the bottom of the piston head. The sleeve 17 extends to within a short distance from the disk portion 14 of the valve, and a coiled spring 20 is placed around the sleeve and bears with an expansive resilient pressure between the bracket and the disk of the valve, and holds the disk portion of the valve against its seat portion 13.

At the side of the main cylinder, I form a valve chest cylinder 21, which is connected to the main cylinder at its opposite ends. This valve chest cylinder is provided with a valve cylinder bore 22, which extends through it from end to end, and connects by an upper port 23 and a lower port 24 with the bore of the main cylinder. A tube 25, which I term the outlet valve, is secured to the top of the valve chest casing, and extends down into the bore of the casing, a short distance beyond the upper port 23 of the valve casing. This tube is preferably sweated or otherwise secured to the upper end of the cylinder, and preferably extends a short distance above it. This outlet valve is provided with a valve port 25^A, which comprises a V-shaped slot that is formed in the side of the tube facing the upper port 23 of the valve casing. This V-shaped valve port extends preferably about one-fourth of the way around the circumference of the tube. Within this tubular outlet valve I fit rotatably a plug 26, which I term a cut-off valve. This plug is provided with a shoulder 27, which rests on top of the top end of the outlet tube, and in its lower end it is provided with an aperture 28, which extends up into the plug above the port 25, and through the shell of the tube an aperture 29 is formed, which I term the cut-off port. This cut-off port registers opposite to the V-

shaped port 25A, in the outlet tube, and when this tube is turned in the outlet tube this port 29 cuts off the area of the outlet port 25A or closes it altogether.

An aperture 29A is formed in the top end of this cut-off, and a valve stem 30 is secured therein, preferably by a set screw 31. The reciprocal movement of the piston head is limited to a stroke that starts from the center of its upper port 23, to the center of its lower port 24, and its movement to these points is defined by a pin 32, which is secured to the top of the piston head, which strikes the top cylinder head and prevents the piston being raised above the central part of the upper port 23, and a pin 33, which is secured to the base flange and bottom cylinder head, and which extends up to the central part of the lower port 24. This lower pin 33 is placed preferably in the center of the cylinder, and the piston head on its downward stroke moves against and rests on it, the bracket that supports the piston's oil passage valve being placed at one side of the center of the bottom of the piston. At the top of the cylinder I form an atmospheric vent aperture, which I preferably place in the casing of the port 23, and preferably connect to this aperture a pipe 34, which is extended a short distance above the cylinder casing. The top of the piston rod is provided with a lever or latch engaging arm 35, which is arranged to engage a lever or latch or arm 35A, that is operatively connected to any machine to which the valve is applied, to secure a successive and predetermined number of variable time operative movements. This feature of my invention is controlled by a graduated dial plate 36, and a pointer finger 37, the pointer finger being secured to the top of the valve stem and the graduated plate being secured to the machine the valve is to operate, just below the pointer finger, and being graduated to any desired range of time for photographic printing work, from one second to fifteen seconds, but the valve and the oil passage in the piston head can be arranged to make the time vary from about one to several minutes, which would be the range of time necessary in some machines the valve could be applied to, such for instance as egg boiling machines.

The operation of my improved variable time operating valve is as follows: The cylinder and its valve chest bores are filled with oil, preferably a good quality of engine oil being used, and the piston is raised to the top of its stroke and held by a suitable latch 38. The pointer is attached to the valve stem in a position relative to the cut-off valve so that when the pointer is at the first line of the index, the cut-off valve 29 is wide open to the outlet valve 25A; consequently the pointer is turned to the graduated line of the index that will set the cut-off valve to a point where the piston will make its stroke in the time desired. I illustrate the pointer set at the tenth line of the index, which for example we will suppose stands for ten seconds, and this position of the pointer turns the cut-off valve to partially close the area of the outlet valve 25, which is so proportioned in area relative to the outlet valve port and the volume of oil in the cylinder and valve bores to allow sufficient oil to pass through it to permit the piston to be ten seconds in falling from the top of its stroke to and against the pin at the bottom of its stroke, and the instant the piston is raised and locked at the top of its stroke by the movement of the mechanism, it is then released, and the piston starts to move downward by its weight as the oil flows from below the piston through the lower port 24 and through the cut-off port 29 and outlet port 25A into and through the upper port 23 into the main cylinder on top of the piston, and the piston falls the full length of its stroke in ten seconds, and at the end of this operative time movement the oil displaced below the piston has flowed through the outlet valve to the top of the piston. Then when the piston is again raised, the oil flows down through the oil passage in the piston through its port 12 to below it.

My oil valve can be adapted to operate machines of different characters, and is particularly adapted for photographic printing machines.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a variable time controlling oil operating valve, a vertical cylinder provided with a vertical valve chest, oil ports extending from said cylinder into said valve chest, a reciprocating piston in said cylinder provided with an oil passage through it to the opposite ends of said cylinder, a spring-controlled movable valve at the lower end of said piston's oil passage arranged and adapted to control the flow of oil from the opposite ends of said cylinder through said piston and through said valve chest and back into said cylinder, a rotary movement variable cut-out valve arranged to control the oil ports between said cylinder and valve chest, a valve stem on said valve, a pointer on said valve stem, an index in the path of said pointer for determining the amount of movement to be given said valve, a vent pipe in the oil passage at the top of said cylinder and valve, a piston rod connected to said piston, and means connected with said piston rod for raising and securing and releasing said piston.

2. In a variable time controlling oil operating valve, the combination of the vertical cylinder and valve chest, provided with

ports connecting the opposite ends of said cylinder and valve chest, a piston head and rod reciprocally mounted in said cylinder, means including a projection at the bottom of said cylinder in the path of said piston for limiting the reciprocal movement of the piston between said ports, with a fixed tube within said valve chest, closing the passage to the upper port of said cylinder, a V-shaped port through the shell of said tube registering with the upper port between the upper ends of said cylinder and valve chest, a rotating valve within said fixed tube comprising a stem provided with an open-ended oil entering recess registering with the valve chest and provided with a port registering with the V-shaped port in said fixed tube, a valve stem secured to said valve, a pointer on said valve stem registering with said rotary valve's port, a graduated index plate within the operative movement of said pointer, and means connected with said piston rod for raising and securing and for manually releasing said piston, and an atmospheric air vent pipe extending above said cylinder and connected with the passage between said cylinder and valve chest at the top port of said cylinder.

3. In a valve as specified, a vertically disposed main cylinder, a branch cylinder communicating with the main cylinder at its upper and lower ends, said cylinders being filled with a suitable liquid; a piston in the main cylinder, having a port extending through the same; a valve over the lower end of said port; a tube in the upper end of the branch cylinder having a port communicating with the main cylinder; a cut-off in said tube, having a port adapted to register with the port in said tube; a stem extending from the cut-off; a rod connected with the piston and extending through and beyond the upper end of the main cylinder; and means for limiting the movement of the piston in either direction.

4. In a variable time-controlling oil-operating valve, a vertical cylinder provided with a vertical valve-chest, oil ports extending from said cylinder into said valve-chest, a reciprocating piston in said cylinder provided with an oil passage through it to the opposite ends of said cylinder, a movable valve at the lower end of said piston's oil passage arranged and adapted to control the flow of oil from the opposite ends of said cylinder through said piston and through said valve-chest and back into said cylinder, a rotary movement variable cut-out valve arranged to control the oil ports between said cylinder and valve-chest, a valve stem on said valve, mechanism for indicating the position of the valve, a piston rod connected to said piston, and means connected with said piston rod for raising and securing and releasing said piston.

5. In a variable time-controlling oil-operating valve, the combination of the vertical cylinder and valve-chest, provided with ports connecting the opposite ends of said cylinder and valve-chest, a piston head and rod reciprocally mounted in said cylinder, means for limiting the reciprocal movement of the piston between said ports, with a fixed tube within said valve-chest, closing the passage to the upper port of said cylinder, a V-shaped port through the shell of said tube registering with the upper port between the upper ends of said cylinder and valve-chest, a rotating valve within said fixed tube comprising a stem provided with an open-ended oil entering recess registering with the valve chest and provided with a port registering with the V-shaped port in said fixed tube, a valve stem secured to said valve, mechanism for indicating the position of the valve, and means connected with said piston rod for raising and securing and for manually releasing said piston.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES F. WARE.

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