

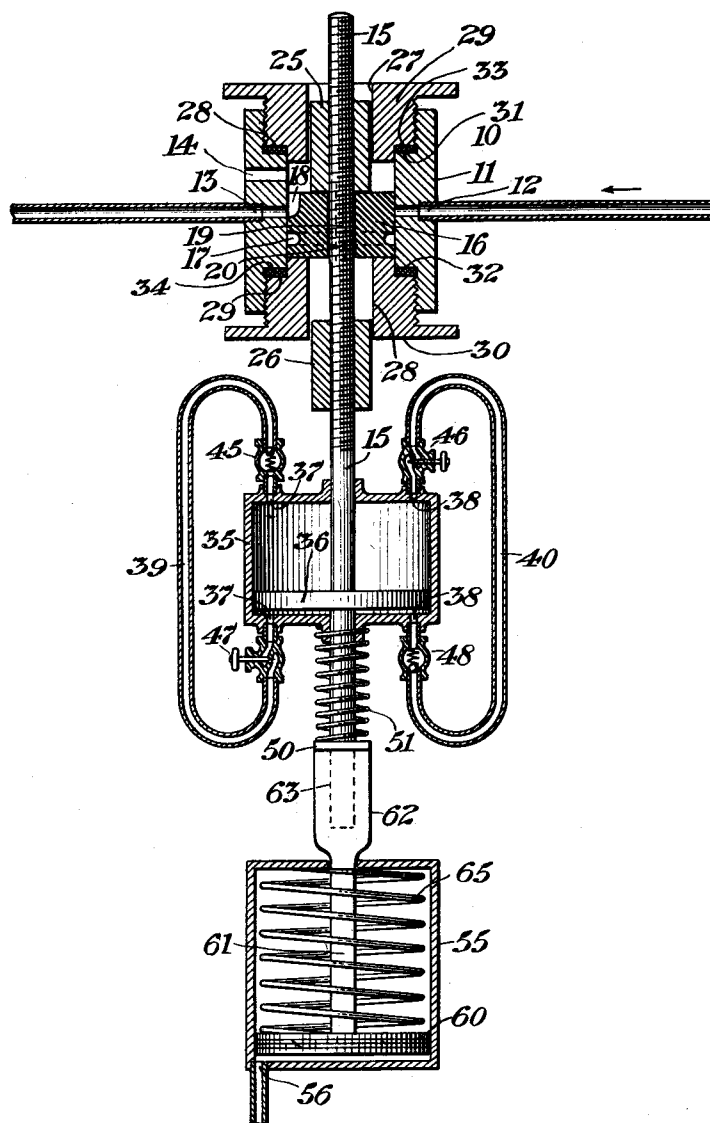
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A. D. TRENOR

RETARDING DEVICE

Original Filed Nov. 1, 1917



WITNESS:

Chas. J. Clagett

INVENTOR

Albert D. Trenor

BY

A. J. Gardner
HIS ATTORNEY

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UNITED STATES PATENT OFFICE.

ALBERT D. TRENOR, OF NEW YORK, N. Y., ASSIGNOR TO JOHN HAYS HAMMOND, JR.,
OF GLOUCESTER, MASSACHUSETTS.

RETARDING DEVICE.

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To all whom it may concern:

Be it known that I, ALBERT D. TRENOR, a citizen of the United States, and a resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Retarding Devices, of which the following is a specification.

Some of the objects of this invention are to provide an improved retarding device whereby an impulse of fluid under pressure when continued for a predetermined period of time will cause the operation of a valve to permit a fluid to pass through a pipe and to continue to pass through the pipe for a predetermined period after the impulse of compressed fluid has been terminated; and to provide other improvements as will hereinafter appear.

The accompanying drawing is a longitudinal central section of a delaying device constructed in accordance with this invention.

Referring to the drawing, one embodiment of this invention comprises a valve 10 including a stationary cylindrical valve casing 11 which is provided with two diametrically opposed ports, an inlet port 12 and an outlet port 13, and with an exhaust port 14 arranged in longitudinal alinement with the outlet port 13. Extending axially through the casing 11 is a valve-stem 15 and loosely surrounding the valve-stem 15 and fitting snugly but slidably in the valve casing 11 is a piston valve 16 which is provided adjacent one end with an annular recess 17, and adjacent its other end with a longitudinally extending recess 18 which is arranged to communicate with the corresponding port 13 when the valve 16 is in its innermost position as shown in the drawing. The valve 16 is held against rotation with respect to the valve casing 11 in any suitable manner, as for instance by means of a rectangular lug or key 19 projecting inwardly from and rigidly secured to the casing 11 and engaging snugly but slidably in a key-way 20 provided therefor in the valve 16 and extending longitudinally thereof. Threaded upon the valve-stem 15 and arranged upon opposite sides of the valve 16 respectively are two cylindrical sleeves 25 and 26 which engage snugly but slidably in two cylindrical apertures 27 and 28 provided therefor respectively in two caps 29

and 30 which are threaded into the opposite ends respectively of the valve casing 11. Between the inner ends of the two caps 29 and 30 and corresponding annular internal shoulders 31 and 32 provided therefor in the valve casing 11 are two packing rings 33 and 34.

Spaced from the valve-casing 11 and arranged coaxially therewith is a fixed delaying cylinder 35 through which the valve-stem 15 extends snugly but slidably. Surrounding and rigidly secured to the valve-stem 15 is a delaying piston 36 which fits snugly but slidably in the delaying cylinder 35. The delaying cylinder 35 is provided at each end with two ports 37, 38. The two ports 37, 38 of one end of the cylinder are arranged to communicate respectively through two pipes 39 and 40 with the corresponding ports 37 and 38 of the other end of the cylinder. These two pipes 39 and 40 are controlled at one end of the cylinder 35 by an outwardly closing check-valve 45 and by a needle valve 46 respectively, and at the other end of the cylinder 35 these two pipes 39 and 40 are controlled by a needle valve 47 and by an outwardly closing check-valve 48 respectively. Spaced outside of the delaying cylinder 35 and surrounding and rigid with the valve-stem 15 is a collar 50, and surrounding the valve-stem 15 between the collar 50 and the corresponding end of the delaying cylinder 35 is a normally compressed spiral spring 51 which normally acts to hold the valve-stem 15 in such a position that the valve 16 carried thereby will be in the position shown in the drawing in which the inlet port 12 will be closed and the outlet port 13 will be in communication through the recess 18 with the exhaust port 14.

For moving the valve-stem 15 inwardly to ultimately move the valve 16 into such a position that the inlet port 12 will be in communication with the outlet port 13 through the annular recess 17 of the valve 16, an actuating cylinder 55 is spaced beyond the outer end of the valve-stem 15 and held in a fixed position coaxial therewith in any suitable manner. This actuating cylinder 55 is provided at its outer end with a port 56 through which compressed air or other fluid under pressure may be admitted from any suitable source or may be exhausted to the surrounding atmosphere.

Snugly but slidably arranged in the actuating cylinder 55 is an actuating piston 60 which is rigidly secured to the inner end of a piston rod 61 which is arranged to reciprocate through the inner end of the cylinder 55. The outer end of this piston rod 61 is enlarged as at 62 and is provided with a cylindrical recess or socket 63 arranged to slidably receive the corresponding end of the valve-stem 15 and to permit the outer end of the enlarged portion 62 of the piston rod 61 to engage against the outer annular surface of the collar 50 which is rigid with the valve-stem 15. The actuating piston 60 is normally held in its innermost position by means of a normally compressed spiral spring 65 arranged within the actuating piston 55 and surrounding the piston rod 61. In the operation of this improved delaying device, the parts are normally arranged as shown in the drawing, and when an impulse of compressed air is permitted to pass inwardly through the port 56 of the actuating cylinder 55, the piston 60 will be gradually moved outwardly towards the valve casing against the action of the normally compressed spiral spring 65 and against the action of the spiral spring 51 which surrounds the valve-stem 15, and also against the retarding action of the retarding piston 36. If this impulse of compressed air is continued inwardly through the port 56 for a predetermined period, which may be varied by varying the pressure of the air or by varying the adjustment of the needle valve 46, the sleeve 26 carried by the stem 15 will be brought into engagement with the corresponding end of the piston valve 16, and if the impulse of compressed air is further continued for a sufficient predetermined period the piston valve 16 will be moved into its outermost or operative position in which the piston valve will be arranged so that its annular recess 17 is in alignment with and permits communication between the inlet port 12 and the outlet port 13. If now after the piston valve 16 has been moved into its outermost position as just described, the impulse of compressed air inwardly through the port 56 is discontinued and the air is permitted to pass outwardly from the actuating cylinder 55 through the port 56, the piston 60 together with the piston rod 61 will be immediately returned to their initial position under the action of the spring 65 and the valve-stem 15 will be permitted to be returned towards the normal position under the action of the spiral spring 51 by the retarding piston 36. And after the valve-stem 15 has been thus moved through a predetermined distance or period towards its initial position, the time of which can be regulated by the needle valve 47, the sleeve 25 will be brought into

engagement with the outer end of the piston-valve 16, whereupon a continuous movement of the valve-stem 15 for a predetermined period will return the piston-valve 16 into its initial position as shown, in which communication will be closed between the inlet port 12 and the outlet port 13, and the latter will be opened to the exhaust port 14 through the recess 18, as shown in the drawing.

Although only a single form has been shown in which this invention may be embodied, it is to be understood that the invention is not limited in its application to any particular construction but might be embodied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described this invention, I claim:

1. A control mechanism comprising a fixed valve casing provided with an inlet port and with an outlet port, a valve arranged to reciprocate in said casing to control said ports, a valve stem having a lost motion connection with said valve, means including a fluid actuated device having a lost motion connection with said valve stem for moving said valve stem in one direction, and means to retard the movement of said valve stem in either direction.

2. A control mechanism comprising a fixed valve casing provided with an inlet port and with an outlet port, a valve arranged to reciprocate in said casing to control said ports, a valve stem having a lost motion connection with said valve, means including a fluid actuated device having a lost motion connection with said valve stem for moving said valve stem in one direction, and retarding means variable at will to control the movement of said valve stem in either direction.

3. A control mechanism comprising a valve casing provided with an inlet port and with an outlet port, a valve arranged to reciprocate in such casing to control said ports, a valve stem having a lost motion connection with said valve for reciprocating said valve and means including a fluid actuated device having a lost motion connection with said valve stem for moving said valve stem in one direction.

4. A control mechanism comprising a fixed valve casing provided with an inlet port and with an outlet port, a valve arranged to reciprocate in said casing to control said ports, a valve stem having a lost motion connection with said valve for reciprocating said valve, and means including a cylinder and a piston slidable in said cylinder, said piston having a lost motion connection with said valve stem for moving said valve stem in one direction.

5. A control mechanism comprising a

valve casing provided with an inlet port and with an outlet port, a valve movable in said casing to control said ports, means having a lost motion connection with said valve for actuating said valve in either of two directions, and means including a fluid actuated device having a lost motion connection with said first mentioned means for moving said first mentioned means in one of said directions.

6. A control mechanism comprising a valve casing provided with an inlet port and with an outlet port, a valve arranged to reciprocate in said casing for controlling said ports, a reciprocatory valve stem having a lost motion connection with said valve for reciprocating said valve and means including a fluid actuated device having a lost motion connection with said valve stem for moving said valve stem in one direction.

7. A control mechanism comprising a valve casing provided with an inlet port and an outlet port, a valve cooperating with both of said ports and arranged to reciprocate in said casing to control said ports, a reciprocatory valve stem having a lost motion connection with said valve for reciprocating same, means whereby said valve stem may be moved in one direction said means having a lost motion connection with said valve stem, and means fixed upon said valve stem for retarding the movement of the same.

8. A control mechanism comprising a valve casing provided with an inlet port and an outlet port, a valve cooperating with both of said ports and arranged to reciprocate in said casing to control said ports, a reciprocatory valve stem having a lost motion connection with said valve for reciprocating same, means whereby said valve stem may be moved in one direction said means having a lost motion connection with said valve stem, and means fixed upon said valve stem for retarding the movement of the same in either direction.

9. A control mechanism comprising a valve casing, provided with an inlet port, an outlet port, and an exhaust port, a valve arranged to reciprocate in said casing to control said ports, said valve being so constructed that when it is in one position it will cause said inlet port to communicate with said outlet port and so that when in another position it will prevent communication between said inlet port and said outlet port and will cause said outlet port to communicate with said exhaust port, and means to retard the movement of said valve in either direction.

10. A control mechanism comprising a valve casing, provided with an inlet port, an outlet port and an exhaust port, and a valve arranged to reciprocate in said casing to control said ports, said valve being

so constructed that when it is in one position it will cause said inlet port to communicate with said outlet port and so that when in another position it will prevent communication between said inlet port and said outlet port and will cause said outlet port to communicate with said exhaust port, a valve stem having a lost motion connection with said valve for reciprocating said valve, means having a lost motion connection with said valve stem for moving said valve stem in one direction, and means to retard the movement of said valve stem in either direction.

11. A control mechanism comprising a valve casing provided with an inlet port, an outlet port, and an exhaust port, a valve arranged to reciprocate in said casing to control said ports, said valve being provided with passages whereby when said valve is in one position said inlet port will be in communication with said outlet port, and there will be no communication through said valve between said exhaust port and said outlet port, or said inlet port, but when said valve is in another position communication will be closed between said inlet port and said outlet port but will be established through said valve between said outlet port and said exhaust port, a valve stem extending loosely through said valve, two stops arranged upon said valve stem upon opposite sides respectively of said valve and arranged to permit of a limited longitudinal movement of said valve stem with respect to said valve, means having limited movement with respect to said valve stem for moving said valve stem in one direction, and means to retard the movement of said valve stem in either direction.

12. A control mechanism comprising a valve casing provided with an inlet port, an outlet port and an exhaust port, a valve arranged to reciprocate in said casing to control said ports, said valve being provided with passages whereby when said valve is in one position said inlet port will be in communication with said outlet port, and there will be no communication through said valve between said exhaust port and said outlet port, or said inlet port, but when said valve is in another position communication will be closed between said inlet port and said outlet port but will be established through said valve between said outlet port and said exhaust port, a valve stem extending loosely through said valve, two stops arranged upon said valve stem upon opposite sides respectively of said valve and arranged to permit of a limited longitudinal movement of said valve stem with respect to said valve, means including an element carried by said valve stem for retarding the movement of said valve stem, and means having limited movement with respect to said valve stem for moving said valve stem in one di-

rection, and yielding means operatively connected with said valve stems for moving the same in an opposite direction.

13. A control mechanism comprising a
5 valve casing, a valve arranged to reciprocate in said casing, a valve stem extending loosely through said valve, two stops carried by said stem upon opposite sides of said valve respectively, and arranged to permit
10 of a limited longitudinal movement of said stem with respect to said valve, a piston carried by said stem, a fixed cylinder through which said stem is arranged to reciprocate, a pair of pipes providing communication between the opposite ends of said
15 cylinder, said pipes being provided with suitable valves, some of which are adjustable so as to cause the retardation of said piston in either direction, means operative-
20 ly connected to said stem and having a limited

movement with respect thereto for moving said stem in one direction, and yielding means operatively connected to said stem for moving the same in an opposite direction.

14. A control mechanism comprising a
25 valve casing, a valve arranged to reciprocate in said casing, a valve stem having a lost motion connection with said valve for reciprocating the same, power means for
30 moving said valve stem in one direction said means having a lost motion connection with said stem, yielding means for moving said stem in an opposite direction and means for
35 retarding the movement of said stem in said opposite direction.

Signed at New York, in the county of New York and State of New York this 29th day of October A. D. 1917.

ALBERT D. TRENOR.