No. 736,778. PATENTED AUG. 18, 1903.

W. M. REASON.

AIR PUMP.

APPLICATION FILED DEC. 14, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

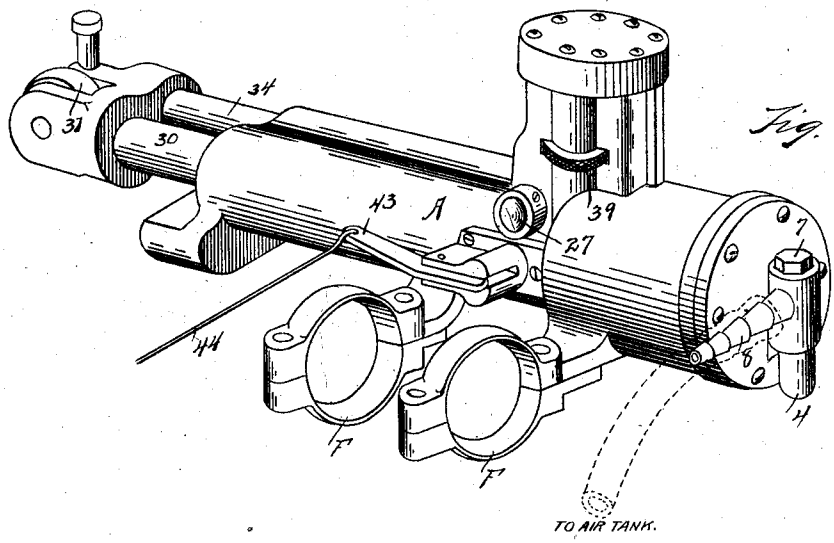


Fig. 1.

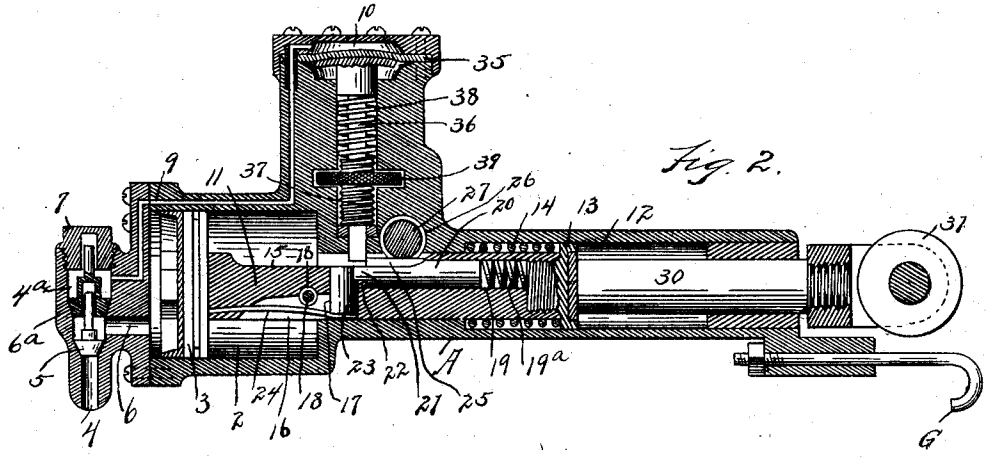


Fig. 2.

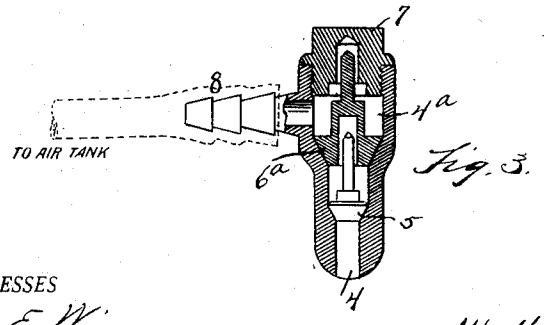


Fig. 3.

WITNESSES

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NO MODEL. 2 SHEETS—SHEET 2.

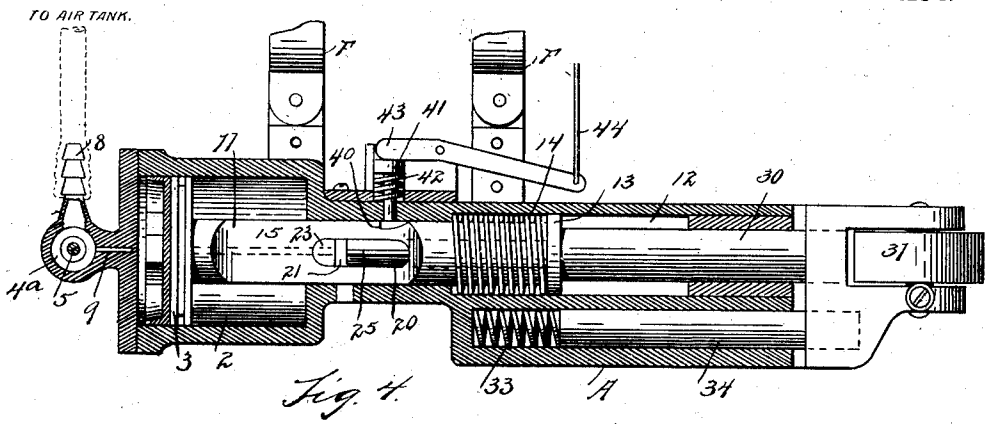


Fig. 4.

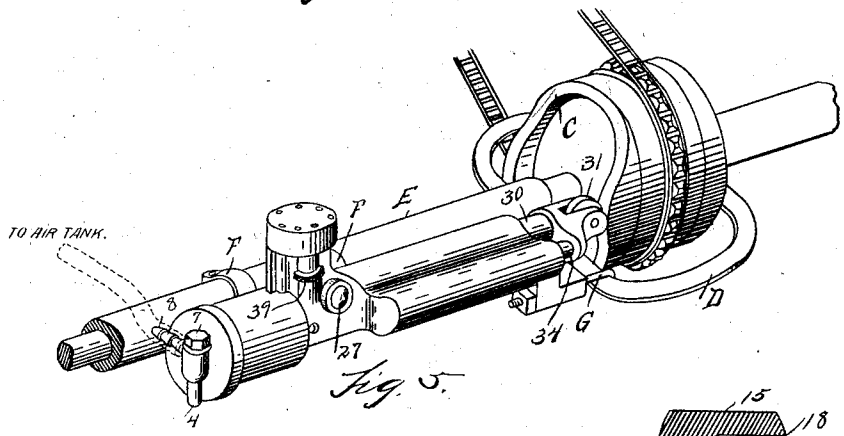


Fig. 5.

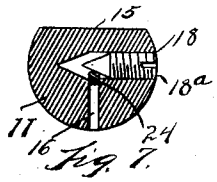


Fig. 7.

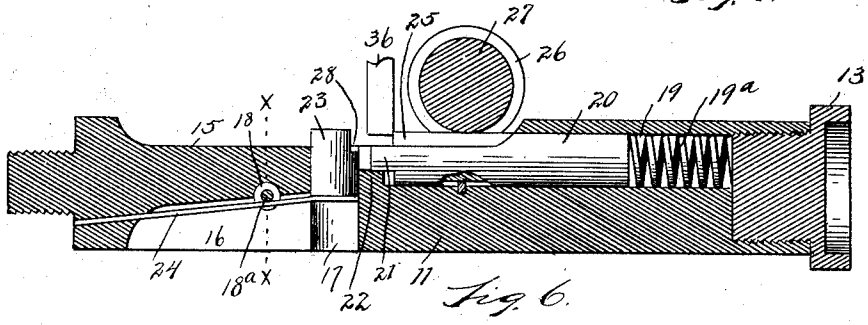


Fig. 6.

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No. 736,778. Patented August 18, 1903.

UNITED STATES PATENT OFFICE.

WALTER M. REASON, OF PONTIAC, MICHIGAN.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 736,778, dated August 18, 1903.

Application filed December 14, 1901. Serial No. 85,926. (No model.)

To all whom it may concern:

Be it known that I, WALTER M. REASON, a citizen of the United States, residing at Pontiac, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Air-Pumps; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to air-pumps, and has for its object an improved pump adapted to be used for producing an air-pressure in any fluid-containing chamber. The objects of the improvements are to produce a pump that shall be intermittently actuated from a constantly-moving source of power and in which the intermission or cessation of action shall occur when a predetermined pressure has been produced in the receptacle and the cessation shall be caused by the action of the pressure upon parts of the pump which are suitably arranged to cause such cessation of action of the pump proper, although the principal actuator still continues in uninterrupted action, and the cessation of action shall continue until the pressure falls a definite amount.

In the drawings, Figure 1 is a perspective of the pump. Fig. 2 is a vertical longitudinal section. Fig. 3 is a section on an enlarged scale, showing the arrangement of the valves. Fig. 4 is a horizontal longitudinal section. Fig. 5 is a perspective showing the location of the pump with respect to the principal motor. Fig. 6 is a longitudinal vertical section of a part of the main piston-rod. Fig. 7 is a cross-section at the line x x of Fig. 6. It shows a regulating device, the purpose of which is to regulate the action of the parts in disconnecting the two parts of the piston.

In this pump there are employed a piston-cylinder, a piston-rod cylinder, and a guide tube or cylinder, all in a main casing A. The piston-cylinder 2 contains a reciprocating piston 3 and is provided with an intake-passage 4, closed by a valve 5, that is seated in the intake-passage 4. Between the valve 5 and the piston a branch passage 6 leads from the intake-passage 4. The passage 4 is continued at 4^a, and in the continuation is seated a valve 6^a. The valves 5 and 6^a are both check-valves, arranged to close against a backflow of air that has once passed them. They are capable of independent operation and are independently actuated by the incoming and outgoing air, respectively. The stem of the valve 5 extends into a cavity in the valve 6^a, and the stem of the valve 6^a extends into a cavity in a plug 7, which closes the passage 4^a. Above the valve 6^a a branch passage 8 leads from the passage 4, and to the pipe through which this branch passage leads is connected a tubular conductor that leads to the air-tank. There also leads from the passage 4^a an air-passage 9, which leads to a chamber 10, which will be hereinafter referred to more at length.

The passage 9 is always in free communication with the storage-tank of compressed air.

From the piston 3 a piston-rod 11 extends toward the piston-rod cylinder 12, and the end of it projects into the piston-rod cylinder a distance and terminates with a collar 13, behind which there is inserted in the cylinder 12 a coiled spring 14. For structural reasons the collar 13 is the head of a screw that is run into a threaded cavity in the head of a rod 11. Between the piston 3 and a point about midway between the ends of the piston-rod 11 a portion of the side of the rod is slabbed off, and the rod at this part has a flat surface on that side which is normally on the upper side of the assembled structure. It also has underneath the slabbed surface a slot or saw-kerf 16, that extends upward from the under side, and it has a hole 17 cut through it vertically and a small tapped hole 18 cut into it. Through the rod beyond the slabbed-off portion there is a longitudinal bore 19, in which is inserted a plunger 20. The rear end of the plunger 20 is provided with a squared extension 21 or with an extension that is flat on its upper and under sides and has a shoulder on the upper side and another shoulder on another side at the base of the extension. At the terminal of the slabbed-off portion 15, where it approaches the bore 19, there is a step 22, that engages under the extension 21, and the upper surface of the extension 21 is level with the slabbed surface 15 except for a rib thereon hereinafter mentioned. The step 22 is at the edge of the hole 17, and in the hole 17 is inserted a stop

23, capable of vertical motion in the hole 17, but normally held in elevated position by a spring 24, one end of which is fixed in the piston-rod and the other of which traverses a small hole or is inserted in a small hole in the stop 23. The spring 24 has a vertical vibratory motion in the slot 16. The distance of its upward movement can be regulated by means of a cone-pointed screw 18ª in the hole 18. That part of the upper surface of the plunger 20 which is next adjacent to the upper surface of the extension 21 is slabbed off, but provided with a central longitudinal rib 25, that engages in a groove 26 in a roller 27. The roller 27 is inserted in a bore in the casing. The upper end of the stop 23 is provided with a step 28, that engages under the under surface of the extension of the plunger 20, and when in such engagement the upper surface is held down with the top end flush with the surface 15 and with the continuation of that surface on the plunger 20, and when in this condition the piston-rod is free to reciprocate, carrying the piston 3 with it. In its reciprocations it travels under the roller 27 and is held by that roller from turning on its own axis. In its reciprocation it is urged in one direction by the spring 14 and forced in the opposite direction by the main actuating mechanism. The actuating mechanism consists of a cam C, mounted on a shaft and driven in any suitable way. For the purpose for which this pump is primarily intended to be employed the driving-shaft is the axle of the carriage or wagon having a rotary shaft, and the pump is connected to the sleeve E, through which that axle works, and to the ring D, which joins two sections of such sleeve. The attachment is made by means of any suitable clips—as, for instance, the ring-clips F F and the hook G.

When the device is in condition to pump, the stop 23 is arranged with its upper surface in the plane of the surface 15 and is held in this position by the plunger 20, the projection of which engages over the step on the stop 23, holding the stop down against the spring 24, and in this condition the piston and its rod are reciprocated, being driven in one direction by the rod 30 and in the opposite direction by the spring 14. The rod 30 is separate from the piston-rod 11 and is provided at its outer or free end with a friction-roller 31, that bears against a driving-cam C, and at the inner end abuts against the end of the piston-rod 11, within an annular projection from the collar 13 upon said piston-rod. The instroke is produced by the cam and the outstroke, as already described, by the spring 14, aided by a spring 33, that is located behind a guide-rod 34, and this action continues so long as the cam C continues to rotate and until a certain predetermined pressure has been accumulated in the air-tank. The action of the air in stopping the action of the piston is through the following-described mechanism.

The air-passage 9 already mentioned leads into a chamber 10, one wall of which is flexible, and the flexible diaphragm 35 bears against a pin 36, the stem of which passes through the stem of an adjusting-screw 37 and projects at its lower end into the little chamber formed by the removal of the slab from the upper side of the piston-rod. Under a low pressure or no pressure the pin is lifted by a spring 38, the upper end of which bears against the head of the pin and the lower end of which bears against the upper end of the hollow screw 37. The screw 37 is adjusted vertically by turning a runner-nut 39, that is held against longitudinal movement by the walls of a cavity in the frame in which it is seated. This act regulates the tension of the spring 38 and determines the pressure at which the air coming from the air-tank through the passage 9 into the chamber 10 will act on the pin 36. When the pressure in the tank reaches an amount sufficient to overcome the spring 38, it forces the pin 36 down, and the lower end of it engages against the end of the rib 25 and holds the plunger 20 against the tension of the spring 19ª while the piston and piston-rod complete their instroke. This takes place just before the end of the instroke, and the remaining part of the stroke is only sufficient to carry the stop 23 from under the plunger 20. The stop 23 immediately rises when released from under the plunger and presents an obstruction to the outstroke by engaging behind the pin 36, and the pin 36 remains in this obstructing position, preventing an outstroke of the piston until the pressure in the tank has been reduced to so great an extent that the spring 38 lifts the pin from its obstructing position. The reduction of pressure need not be to such an extent that the spring will entirely lift the pin; but by adjusting the screw 18ª and regulating the lift of the spring 24 the restarting of the pump may be brought about before the pressure in the tank has been reduced sufficient to enable the pin 36 to return entirely upward. This part of the device may be so regulated that the cessation of action will occur at a given pressure and that the pump will not again begin to act until the pressure has been reduced to a certain other lower pressure, and when the action begins a second time it will continue until the high pressure has been attained. Upon the outstroke the flanges of the roller 27 contact the stop 23 and press it downward into a position to be engaged by the plunger 20.

The inner rod or piston-rod proper is provided with a notch 40, and opposite the notch through the walls of the casing is a pin 41, normally held from projecting into the notch by a spring 42, but arranged to be forced into the notch by means of a hand-lever 43, that is pivotally mounted on the casing and is provided with a reach-rod 44 or other suitable means for hand manipulation.

What I claim is—

1. In combination with the piston-rod of an air-pump, a means for reciprocating said piston-rod separated therefrom but arranged to engage and actuate the same, a stop on said rod, a pin and means actuated by air-pressure for projecting the pin into the path of the stop, means for holding the stop normally out of position to engage the pin, said pin when in its extended position being adapted to engage said holding means to release the stop from its normally retracted position, substantially as described.

2. In an air-pump, the combination of a pump and its piston, a rod arranged to actuate the piston, a stop intermediate the ends of the piston-rod arranged to be projected from and retracted into the body of the piston-rod, means for holding the stop in retracted position, and means actuated by air-pressure adapted to disengage the stop and the holder, substantially as described.

3. In an air-pump, the combination of a pump and its piston and piston-rod, a stop intermediate the ends of the rod arranged to be projected from and retracted into the body of the rod, means for normally holding the stop in retracted position, a pressure-actuated pin arranged to disengage the means for holding the stop in its retracted position from the stop and to itself engage in front of the projected stop and a roller under which the piston-rod travels arranged to return the projected stop to its retracted position, substantially as described.

4. In combination with the piston and rod of an air-pump, a reciprocating rod separate from the piston and arranged to reciprocate axially in line with the piston-rod, a spring acting upon the piston-rod to press it in one direction, a second spring acting upon said reciprocating rod to press it in the same direction as the piston-rod, and means for forcing said reciprocating rod in a direction opposite to that in which said rod is pressed by said spring.

5. In a device of the kind described, the combination with the piston-rod of an air-pump, of a stop arranged to be projected from and retracted into the said rod, a pressure-actuated pin arranged to engage said stop, and means for adjusting the projection of said stop, substantially as described.

6. In a device of the kind described, the combination with the piston-rod of an air-pump, of a stop arranged to be projected from and retracted into the said rod, a pressure-actuated pin arranged to engage said stop and means for adjusting said pin, substantially as described.

7. In combination with the piston-rod of an air-pump, a stop arranged to be projected from and retracted into said rod, means for engaging and holding said stop when the same is in its retracted position, and means for contacting said stop and pressing it into its retracted position.

8. In combination with the piston and piston-rod of an air-pump, a reciprocating rod separate from the piston-rod and arranged to reciprocate axially in line with the piston-rod, a spring arranged to act upon the piston-rod to press the same in one direction, a second spring arranged to act upon said reciprocating rod to press it in the same direction as the first spring presses the piston-rod, means for forcing said reciprocating rod against the action of its spring, and a manually-actuated stop adapted to hold the piston-rod against the action of its spring.

9. In an air-pump, the combination of a piston with a stop, a pin arranged to be projected into the path of the stop, a diaphragm actuating said pin and arranged as the wall of an air-confining chamber, a spring arranged to press the pin against the diaphragm and means for regulating the tension of said spring, substantially as described.

10. In an air-pump, in combination with a piston provided with a stop, a pin arranged to be projected through the casing of the pump into the path of the stop, an air-actuated diaphragm arranged to project said pin, a screw-threaded sleeve on the stem of said pin, a spring between the sleeve and a collar on the stem arranged to press the stem against the diaphragm and a rotatable but longitudinally-fixed nut on said sleeve, substantially as described.

11. In an air-pump, the combination of a reciprocating part forming a part of said pump, a plunger adapted to reciprocate on said reciprocating part and a roller adapted to engage said plunger to prevent the same turning about its axis, said roller being adapted to rotate in the plane of movement of said reciprocating part.

12. In an air-pump, the combination of a reciprocating part forming a part of said pump, a stop adapted to move laterally to the motion of said reciprocating part, a spring-impelled plunger adapted to reciprocate upon said reciprocating part and to engage said stop to hold it in its retracted position, and a roller turning upon said plunger and having a portion of its periphery extending below the higher portion of the surface of said stop and adapted to engage said stop, to force it into a position to be engaged by said plunger.

In testimony whereof I sign this specification in the presence of two witnesses.

WALTER M. REASON.

Witnesses:
LOTTA L. HAYTON,
MAY E. KOTT.