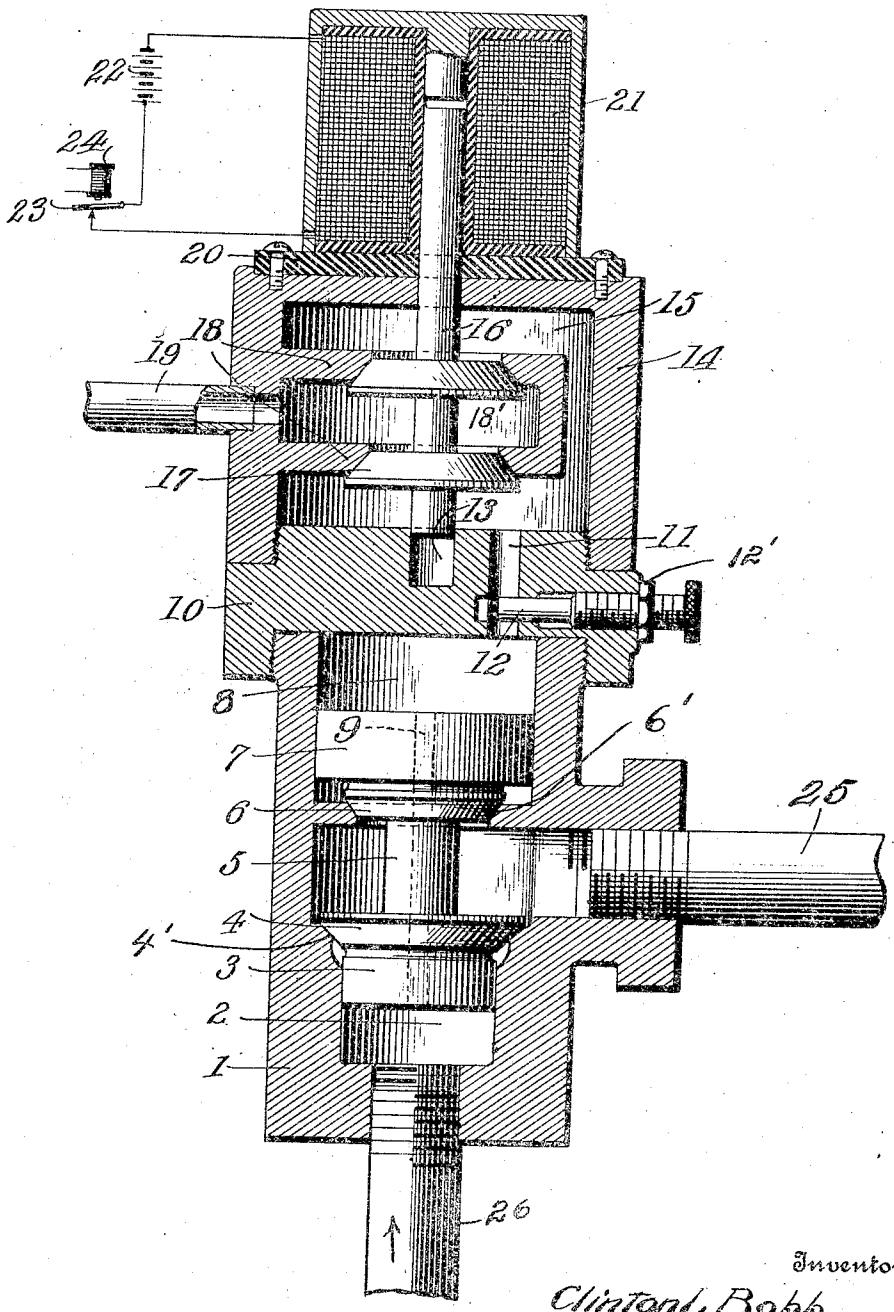
C. L. BOPP.

PNEUMATICALLY TIMED AIR VALVE.

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1,114,431.

Patented Oct. 20, 1914.



Witnesses

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UNITED STATES PATENT OFFICE.

CLINTON L. BOPP, OF HAWKEYE, IOWA.

PNEUMATICALLY-TIMED AIR-VALVE.

1,114,431. Specification of Letters Patent. Patented Oct. 20, 1914.

Application filed October 26, 1912. Serial No. 727,956.

To all whom it may concern:

Be it known that I, CLINTON L. BOPP, a citizen of the United States, residing at Hawkeye, in the county of Fayette and State of Iowa, have invented certain new and useful Improvements in Pneumatically-Timed Air-Valves; and I do hereby 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 appertains to make and use the same.

This invention relates to pneumatically timed air valves and the object of the invention is to provide such a valve with electro-magnetically controlled means for exhausting the air, said means being associated with another air valve, which is opened by the exhausting of the air.

Another object of the invention is to provide a valve with a cushioning chamber having associated therewith means for regulating the escapement of air therethrough.

With these and other objects in view, the invention comprises certain novel constructions, combinations, and arrangement of parts as will be hereinafter more fully described and claimed.

The drawings show a vertical central section through the valve, together with suitable air pipes and means for electrically energizing the electromagnet.

The general aim of this invention is to provide a valve casing having a two part slide valve having a bore communicating with two air chambers, a regulable air passage connecting one of said chambers to a puppet valve and an electro-magnetically controlled means for opening and closing the puppet valve, the slide valve being designed to be raised by the air pressure when the puppet valve is opened.

By referring to the drawings, it will be seen that the lower part of the valve casing 1 constitutes a chamber in the lower end of which is a small compartment 2 adapted to receive air or other fluid under pressure through an inlet pipe 26 from a suitable source. Reciprocating vertically within the chamber 2 is a piston 3 formed integral with a valve 4, which valve seats upon a valve seat 4′ formed within the casing 1. By means of a stem 5, the valve 4 is connected with a corresponding valve 6, which valve is also adapted to seat upon a seat 6′ within the casing 1. Formed integral with the valve 6 is a piston 7 of a diameter considerably greater than that of the piston 3, said piston 7 being adapted to reciprocate vertically in a larger compartment 8 in the upper part of the casing 1. By means of a small bore or air passage 9, which air passage passes through the mechanism just described, the compartment 2, and consequently the source of air pressure is connected with the compartment 8.

Threaded to the upper end of casing 1 is a partition 10, said partition being provided with a restricted air passage 11, the cross section of which is made regulable by means of a projecting screw 12, said projecting screw being threaded in the partition 10 and being provided with suitable means as nut 12′ for holding the same in any desired position. The partition 10 is also provided with an opening 13, in which is guided the lower end of the stem of a puppet valve. Threaded to the upper end of partition 10 is a casting 14, which when screwed to the partition 10 forms a suitable chamber 15, within which reciprocates a stem 16. The latter carries a double puppet valve 17, the two members of which engage with the valve seats 18 formed within the casing 14, the construction here shown being identical with ordinary puppet valves. Opening from the compartment 18′ between the two seats 18 of the valve 17 is a suitable pipe 19 leading to the air and serving as an exhaust. Mounted on the head of the casing 14 is a strip of insulation 20 to which is suitably secured a solenoid 21, said solenoid being energized by the battery 22, the circuit of the solenoid and battery 22 being closed by means of the armature 23 of an electromagnet 24 when the latter is de-energized. The bore of the solenoid 21 is adapted to receive the upper end of the stem 16 carrying the puppet valve 17 so that when the solenoid 21 is energized, the stem will be raised and the puppet valve closed, its closed position being illustrated in the drawing.

In the operation of this valve, the puppet valve 17 is normally closed, as shown, and the pressure per unit of area in the compartment 8 will be equal to that in the compartment 2, but inasmuch as the piston 7 is of larger diameter than the piston 3 the pressure valve will be normally seated. As soon as the electro-magnet 24 is energized, the armature 23 is raised and the circuit on the solenoid 21 is broken, whereby the puppet valve 17 falls, the stem 16 seating in the opening 13 by gravity. This falling of the

puppet valve opens a communication between the compartment 8 and the exhaust pipe 19 through the regulable passage 11. As soon as this takes place, the pressure of the air within the compartment 8 is reduced, while the pressure upon the piston 3 in the compartment 2 is substantially the same as it was previously, and the result is that the normally-seated pressure valve will be raised. As soon as the valve 4 in the lower part of the casing has been raised, air pressure will be communicated from the inlet pipe 26 and compartment 2 to the outlet pipe 25, it being understood that the outlet pipe 25 leads to brakes or other suitable mechanism being operated by air. Inasmuch as the passage 11 is very much smaller than the compartment 8, an appreciable length of time will be required for the normally seated pressure valve to be raised, this time being regulated by means of the screw 12, which is adapted to obstruct the passage 11. As the valve 3 must move out of the compartment 2 before compressed air can escape from the outlet 25, it will be seen that the time required for setting the brakes can be regulated by means of the screw 12. From this construction, it will be seen that a simple energization of an electro-magnet will open a timed valve for setting air brakes or making connection between a source of compressed air and the point of application of such compressed air.

What is claimed as new is:

1. In a pneumatically timed air valve, the combination with an upright casing provided with an inlet and an outlet and having a transverse partition dividing it into two chambers connected by a restricted passage through the partition, the lower chamber comprising a large compartment at its upper end communicating with said passage and a small compartment at its lower end communicating with the inlet, two spaced valve seats between said compartments leaving a space between the seats communicating with the outlet, pistons slidably mounted in said compartments, a valve below the upper piston adapted to the upper seat, a valve above the lower piston adapted to the lower seat, a tubular stem connecting said pistons and valves and establishing constant communication between said compartments, and means for adjusting the size of said restricted passage; of an exhaust leading from the upper chamber, a puppet valve normally closing said exhaust, a solenoid mounted on the head of the casing and whereof the puppet valve stem constitutes the core, and means for energizing said solenoid.

2. In a pneumatically timed air valve, the combination with an upright casing provided with an inlet and an outlet and having a transverse partition dividing it into two chambers connected by a restricted passage through the partition, the lower chamber comprising a large compartment at its upper end communicating with said passage and a small compartment at its lower end communicating with the inlet, two spaced valve seats between said compartments leaving a space between the seats communicating with the outlet, pistons slidably mounted in said compartments, a valve below the upper piston adapted to the upper seat, a valve above the lower piston adapted to the lower seat, a tubular stem connecting said pistons and valves and establishing constant communication between said compartments, and means for adjusting the size of said restricted passage; of two valve seats in the upper chamber leaving a compartment between the seats communicating with an exhaust, a double puppet valve adapted to close upon said seats simultaneously, a stem passing through said seats and upon which said valves are fixed, said partition having an opening for the lower end of the stem and the upper end of the stem projecting above the head of the valve casing, and means for raising such projecting end at will.

3. In a pneumatically timed air valve, the combination with an upright casing forming a chamber having an inlet and an outlet, one end of the casing being provided with a restricted passage, the chamber at one end comprising a large compartment communicating with said restricted passage and at the other end comprising a smaller compartment communicating with the inlet, two spaced valve seats between said compartments, the intervening space between said valve seats communicating with the outlet, pistons slidably mounted in said compartments, valves rigid with the pistons and whereof one is adapted to close the large and the other the small compartment, and a tubular stem connecting said pistons and valves and affording constant communication between the compartments; of an exhaust communicating with said restricted passage, a normally closed valve between the passage and the exhaust, a solenoid rigid with the casing and having the stem of the last-named valve as a core, and means to energize the solenoid.

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

CLINTON L. BOPP.

Witnesses:
F. W. EKLUND
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