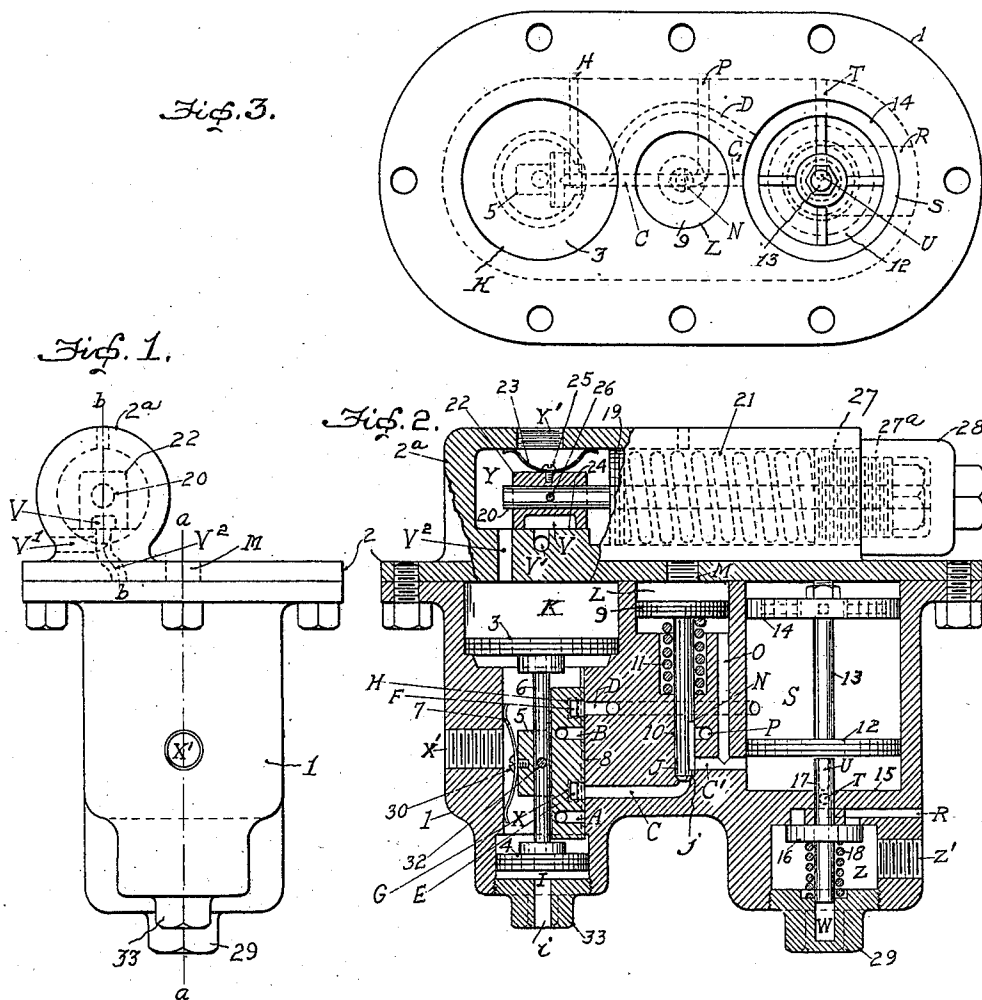


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 CONTROL DEVICE FOR AIR BRAKE MECHANISMS.
 APPLICATION FILED OCT. 6, 1909.

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Patented July 12, 1910.



Witnesses.

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UNITED STATES PATENT OFFICE.

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CONTROL DEVICE FOR AIR-BRAKE MECHANISMS.

964,168.

Specification of Letters Patent. **Patented July 12, 1910.**

Application filed October 6, 1909. Serial No. 521,345.

To all whom it may concern:

Be it known that I, CAMILLE LANG, a citizen of the United States, residing at Wilmington, in the county of Newcastle and State of Delaware, have invented a Control Device for Air-Brake Mechanisms, of which the following is a specification.

The primary object of my invention is to provide a control device for use in connection with the ordinary form of triple-valve of a railway brake mechanism, whereby when the air pressure in the auxiliary reservoir is reduced to a certain point, from leakage or any other cause, said control device will operate automatically to exhaust the air pressure in the train-line pipe thereby effecting an operation of the triple valves to apply the brakes.

Other objects and advantages of the invention will hereinafter appear, and what I claim as new in the art, and desire to protect by Letters-Patent, will be specifically set forth in the appended claims.

In the accompanying drawing, which forms a part of this specification: Figure 1 is an end elevation of my improved control device for air-brake mechanism. Fig. 2 is a sectional view on the line *a-a* of Fig. 1, with part of the governor broken away on the line *b-b* of said Fig. 1. Fig. 3 is a plan view, with the top-plate and governor removed.

Like letters and numerals of reference indicate like parts in all the figures of the drawings.

In carrying out my invention the body portion 1 of the device is in the form of a casting, in one end of which is formed a large piston-chamber K, at the upper part of the casting, a small piston-chamber I at the lower part of said casting, and a slide-valve chamber X extending between the chambers K and I, the piston-chamber I being smaller in diameter than chamber K but slightly larger in diameter than the slide-valve chamber X, for the purpose hereinafter explained. At the other end of the casting is formed a large piston-chamber S, separated from a smaller piston-chamber Z by a horizontal wall 15, while intermediate the chambers K and S the casting is provided with a piston-chamber L, below and communicating with which is a recess or cavity J, in which works the stem 10 of a

piston 9 located in chamber L. The upper end of cavity J is enlarged to receive a compression spring 11, and the lower end of said cavity is contracted to form a valve-seat *j* for the lower end of said valve-stem 10, whereby the latter may close an air-passage C C' extending from slide-valve chamber X to piston-chamber S, entering the lower part of the latter. There is also an air-passage D, extending from the upper part of the slide-valve chamber X to an intermediate portion of piston-chamber S, while the air-passage C' which extends from the cavity J to the lower part of said piston-chamber is connected by an air-passage O to the piston-chamber L, and the piston-stem 10 is provided at one side with a cavity N which when said stem is seated on *j* connects the air-passage C' to an exhaust-port P extending out at one side of the casting, communication between air-passages C' and C being then cut off by the lower end of the piston-stem, as shown in the drawings.

In the chamber K operates a piston 3 connected by a stem 6 to a piston 4 working in the chamber I, and secured to the stem by a pin 32 is a slide-valve 5 having two sets of ports, A, B, and E, F, which are adapted to alternately register with the air-passages C and D, hereinbefore referred to, the ports A and B opening out at opposite sides of the slide-valve into the chamber X, while the ports E and F are adapted to register with exhaust ports G and H when opposite the aforesaid air-passages C and D, and are closed when ports E and F are opposite said air passages on the operation of the slide-valve, as will be understood. The slide-valve is held against its seat by a bow-spring 7 attached by screw 30.

In the piston-chamber S there is a piston 12, which I term the application-piston, connected by a stem 13 to a guiding-piston 14, said application-piston being normally located between the air passages C' and D, and rests upon the upper end of a stem 17 which extends through the wall 15 and carries a valve 16 located in the chamber Z, said piston-valve being held upward against its seat by means of a compression-spring 18, the lower end of which latter is seated in the enlarged upper end of a recess W in which the lower end of the piston-stem is guided. In order to exhaust the lower end

of chamber S when piston 12 is forced downward in the operation of the device the upper end of the piston-stem 17 is provided in one side with a short groove U, which
 5 opens out at the upper end of said stem and is adapted to register with an exhaust port T extending out through the wall 15, said cavity being out of communication with the port when the piston-valve is against its
 10 seat, as shown in the drawings. Piston-valve 16 is adapted to open and close an air-passage R, which opens out to the atmosphere at one end of the body portion of the device; said valve connecting with the
 15 usual train-line pipe to the triple-valves by way of the opening Z' leading thereto.

Slide-valve chamber X connects with the auxiliary reservoir by way of the opening X', and the lower end of piston-chamber I
 20 opens to the atmosphere through the opening i.

In the present instance the means for closing the lower ends of the piston-chambers Z and I consists of plugs 29 and 33,
 25 respectively, which are threaded into said cylinders, while the upper ends or walls of the piston-chambers K, L and S are formed by a cap-plate 2 bolted to the body portion or casting 1, and on this cap-plate is a governor which controls the air pressure in the
 30 upper part of the chamber or cylinder K by way of a port V², over which operates a slide, hereinafter referred to. This governor consists of a spring-pressure piston
 35 19, in a casing 2^a formed on the cap-plate, the stem 20 of said piston carrying a slide-valve 22 connected thereto by pin 26. The slide has a cavity V, which is adapted to establish communication between the port
 40 V² and an exhaust-port V' when the slide is moved to the left by the action of the spring, the port V' being connected in this instance preferably to the usual brake-cylinder (not shown). The slide-valve 22 is
 45 held upon its seat by a spring 23 secured thereto by screw 25. The governor casing is provided with an opening Y' which communicates with the auxiliary reservoir, the same as opening X' leading into slide-valve
 50 chamber X.

The piston 19 is moved to the right by the air pressure from the auxiliary reservoir, and to the left by means of a spring 21 interposed between the rear side of the piston
 55 and an adjusting-nut 27 threaded in the end of the governor-casing 2^a, said adjusting-nut having a reduced threaded end 27^a projecting beyond the casing and upon which is threaded a set-nut or cap 28. As will be
 60 noted the tension of the spring may be adjusted by simply removing the set-nut 28 and turning the adjusting-nut. The spring in the governor-casing may be adjusted so that the piston will be moved to the right,
 65 or in the position shown in the drawings

when the auxiliary reservoir pressure is say seventy pounds or more, and conversely, the spring will move said piston to the left when the auxiliary reservoir pressure falls below
 70 sixty-five pounds. Of course in case the standard air pressure of the air brake system is 110 pounds the spring will be adjusted so as to operate when the air-pressure of the auxiliary reservoir falls below 105
 75 pounds; that is to say, I purpose to adjust the spring so that it will operate when the air-pressure falls lower than five pounds below the standard air-pressure.

There is an opening M, which extends through the cap-plate into the chamber L
 80 which contains the piston 9, which latter I term the "block-piston", this opening M being connected to one of the ports of the triple-valve so as to control the admission of air-pressure to said chamber.
 85

The operation of the control-device is as follows: In the release position of the ordinary triple-valve air-pressure from the auxiliary reservoir flows into port or opening M,
 90 and as block spring 11 is adjusted at sixty pounds to the square inch piston 9 will be held in its upward position by said spring, and in this position the lower end of stem
 95 10 is unseated, opening communication between air passages C and C'. At the same time that air flows into port or opening M air also flows from the auxiliary reservoir into chamber X and into chamber Y of the governor, and as piston 3 of chamber X is
 100 of much greater area than piston 4 the air in chamber X will force piston 3 upward, the latter carrying with it piston 4 and slide-valve 5, thus positioning the slide-valve so that ports A and B register with ports C and D, respectively. Air now flows from
 105 chamber X through air-passages C and C' into piston-chamber S below the application-piston 12, and through port D into said chamber above the application-piston, the pressure being thereby equalized on both sides
 110 of the application piston so that there will be no movement thereof. As air-passage C' is always in communication with passage O leading to chamber L there is consequently also an equalization of pressure on opposite
 115 sides of the block-piston 9. Application valve 16 therefore remains closed. When the pressure in chamber Y of the governor exceeds sixty-five pounds, at which the spring is adjusted, piston 19 is forced to the right
 120 or rearward, and in this position slide valve 22 has uncovered port V², and air now flows from said chamber Y into chamber K above piston 3, and the pressure now becomes equalized in chambers K and X on both
 125 sides of said piston.

As there is nothing but atmospheric pressure in chamber I below the smaller piston 4 the air-pressure in chamber X will force
 130 piston 4 downward, which carries with it

piston 3 and slide-valve 5, and in this position of the slide-valve the exhaust cavities E and F thereof will register with the air-passages C and D, exhausting the pressure in chamber S at opposite sides of the application-piston 12 therein. As air-passage O is in communication with air-passage C' the pressure in the lower part of chamber L is also exhausted, but as the pressure in the port or opening M has not been reduced, and when it is sufficient to overcome tension of spring 11 and reducing pressure in the lower part of said chamber, piston 9 is forced downward until the piston-stem 10 is seated on *j*, and in this position the lower part of chamber S, below piston 12, is exhausted through port P, by way of passage C' and cavity N, instead of through port G by way of air-passage C, the pressure below piston 9 being likewise exhausted through said port P by way of passage O, which communicates with air-passage C'. It will be seen that in this operation also, the application-valve 16 is not unseated. Furthermore, when the air-brakes are applied in the usual manner by the triple-valve the pressure is relieved in the port or opening M and spring 11 moves the piston 9 upward unseating the stem, so that communication is established between air-passages C and C', and when pressure in governor-chamber Y becomes weaker than the regulating-spring piston 19 moves forward, and the slide cuts off communication between chambers Y and K and connects K with port V' which leads to the brake-cylinder. As probably only a ten or fifteen pound reduction of train-line pressure has been made, this reduction would not give us as much pressure in the brake-cylinder and chamber K, which is now open to the brake-cylinder, as we have in the auxiliary reservoir or chamber X connected therewith; so that pistons 3 and 4, with slide-valve 5 would have a tendency to move upward, but as piston-stem 10 is unseated from *j* the pressure will be equalized above and below application-piston 12 so that application-valve 16 is not operated. On the other hand, in case an angle cock in the train line should work itself shut while a train is in motion, or an air-pump should stop on the locomotive and the engineer fail to notice the air-gage pointers falling, or any other obstruction in the passageway of a train line and its connections after a train has been charged, should the air in the train line be leaking to the atmosphere just slow enough to allow the pressure in the auxiliary reservoirs to leak back through the feed grooves in the triple-valve fast enough to make up for the leak in the train line and not overcome the friction of the operating parts of the triple-valve, the pressure would in a short time leak away and not apply the brakes, and

when a stop became necessary the engineer would probably have air only in one or two cars, or none at all, to apply the brakes. In this case, when the air-pressure in the auxiliary reservoir and governor-chamber Y of the control-device has leaked away to sixty-five pounds the spring of the governor, which has been regulated to operate at sixty-five pounds, will force piston 19 to the left, the slide operated by said piston thereby closing communication between chambers Y and K, and connecting chamber K to port V', so that the air from said chamber K will now pass to the brake-cylinder. As the brake-cylinder piston is in release position this small volume of pressure in chamber K will pass out the leakage grooves in the brake cylinder, and as the pressure in said chamber K becomes exhausted the differential pistons 3 and 4, with slide-valve 5 will be raised by the air-pressure in chamber X, the slide-valve then connecting said chamber X with the air-passages C and D by way of the ports A and B. The triple-valve being still in release position there is air-pressure in port or opening M holding piston 9 down and stem 10 on its seat *j*, closing air-passages C and C', the area of said piston 9 being so much larger than the lower end of the stem as to counteract the pressure in air-passage C and the pressure of spring 11. Air-pressure now flows from chamber X through air-passage D into chamber S above application-piston 12, and there being no pressure below said piston the latter is depressed and moves the piston-valve 16 away from its seat, uncovering the exhaust port R, so that the air pressure in the train line which connects with chamber Z is reduced sufficiently to apply the triple-valves to which the train line is also connected. This operation is effected inasmuch as the area of application-piston 12 is considerably greater than the area of piston-valve 16, or sufficient to overcome the air-pressure in chamber Z and the pressure of spring 18. Piston 12 in its movement to unseat piston-valve 16 passes air-passage C', and the exhaust below said piston is then through the exhaust-groove U and port T. Air-passage C' is now open to the chamber S above the piston 12 allowing the air-pressure that flows through said passage when stem 10 is unseated to pass into chamber S above the piston, and is released in the same course as on entering. Should every governor-spring have the same tension every triple-valve would operate at the same time, thereby allowing every control device to operate its own triple-valve and set each brake alike; but should one or more governor-springs have a higher tension than sixty pounds such device or devices would operate individually and the train line reduction would be great enough to apply all triple-valves

just the same as if a reduction was made by the engineer's brake valve.

It will be seen that as the pressure in chamber K passes through port V², cavity V, and port V' to the brake cylinder and out to the atmosphere by way of the brake cylinder leakage grooves, after the brake-cylinder piston moves far enough to close the leakage grooves in the brake cylinder the pressure equalizing between the auxiliary reservoir and brake cylinder has free access to chamber K in the same course that it entered the brake cylinder from chamber K. When we obtain equalization in brake cylinder and auxiliary reservoir we have the same pressure in chambers K and X on both sides of piston 3, whereby the pressure against piston 4 moves the differential pistons and slides downward. When the air-pressure in chamber S above the piston 12 becomes weaker than the air-pressure and tension of spring 18 in chamber Z piston-valve 16 closes and application-piston 12 is moved to its normal position.

Having thus described my invention, I claim:—

1. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, a valve for admitting pressure to both sides of said piston, respectively, and a valve adapted to cut off admission of pressure to one side of the piston, substantially as shown and described.

2. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, a slide-valve having separate ports for admitting air-pressure to both sides of the piston, and a valve operating independently of the slide-valve for cutting off air-pressure to one side of the piston.

3. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a slide-valve for controlling the admission of air to said passages, means for operating said slide-valve, and a valve adapted to cut off one of the air passages.

4. A control device for air-brake systems, comprising a valve connected to the train line for reducing the air-pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston respectively, a slide-valve controlling the admission of air-pressure to said passages, differential pistons operating said slide-valve, and means for admitting air-pressure to the differential pistons; together with a valve adapted to cut off one of said air-passages.

5. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a slide-valve controlling the admission of air-pressure to said passages, differential pistons for operating said slide-valve and receiving air-pressure between them, and a governor for controlling the admission of air to the outer side of one of the differential pistons, together with a valve adapted to cut off one of the aforesaid air-passages, substantially as shown and described.

6. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston respectively, a slide-valve for controlling the admission of air-pressure to said passages, differential pistons operating said slide-valve and receiving air-pressure between them, and a spring-pressure piston for controlling the admission of air-pressure to the outer side of one of the differential pistons; together with a valve adapted to close one of the aforesaid air-passages leading to the chamber of the piston first mentioned, substantially as shown and described.

7. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a slide-valve for controlling the admission of air-pressure to said passages, differential pistons operating said slide-valve and receiving air-pressure between them, a spring-pressure piston for controlling the admission of air to the outer side of one of the differential pistons, and means for adjusting the spring; together with a valve adapted to close one of the air-passages leading to the chamber of the first mentioned piston, substantially as shown and described.

8. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a slide-valve for controlling the admission of air-pressure to said passages, differential pistons operating said slide-valve and receiving air-pressure between them, a slide-valve controlling the admission of air-pressure to the outer side of one of the differential pistons, and a spring-pressure piston operating the last mentioned slide valve in one direction; together with a valve adapted to close one of the aforesaid air-passages

leading to the chamber of the first mentioned piston, substantially as shown and described.

9. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the admission of air-pressure to said passages, differential pistons operating said valve, and receiving air-pressure between them, a valve controlling the admission of air to the outer side of one of the differential pistons, a spring-pressure device connected to the last mentioned valve and operated in one direction by air-pressure and in the other by the spring, together with a valve adapted to close one of the aforesaid air-passages leading to the chamber of the first mentioned piston, substantially as shown and described.

10. A control device for air brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the admission of air-pressure to said passages, differential pistons operating said valve and receiving air-pressure between them, a slide-valve controlling the air-pressure at the outer side of one of the differential pistons, a piston connected to the slide-valve and operated in one direction by air-pressure, and a spring operating the slide-valve in the other direction when the air-pressure is reduced to a certain point; together with a valve adapted to close one of the air-passages leading to the chamber of the first mentioned piston, substantially as shown and described.

11. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the admission of air-pressure to said passages, differential pistons operating said valve and receiving air-pressure between them, a slide-valve controlling the admission of air-pressure to the outer side of one of the differential pistons and exhaust into the brake-cylinder, a piston connected to the slide-valve and operated in one direction by air-pressure, a spring operating the slide-valve in the other direction when the air-pressure is reduced to a certain point, and means for adjusting said spring; together with a valve adapted to close one of the air-passages leading to the chamber of the piston first mentioned, substantially as shown and described.

12. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the admission of air-pressure to said passages, differential pistons operating said valve and receiving air-pressure between them, a slide-valve for controlling the admission of air to the outer side of one of the differential pistons, a piston connected to the slide-valve and operated in one direction by air-pressure, a spring operating the slide-valve in the other direction when the air-pressure on the piston is reduced to a certain point, a nut for adjusting the tension of the spring, and a set-nut engaging the adjusting-nut; together with a valve adapted to close one of the air-passages leading to the chamber of the first mentioned piston, substantially as shown and described.

13. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, the stem of the valve having an exhaust-groove adapted to register with an exhaust-port when the valve is unseated, a piston for operating said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the admission of air-pressure to said passages, differential pistons operating said valve and receiving air-pressure between them, a valve and spring-pressure piston for controlling the admission of air-pressure to the outer side of one of the differential pistons; together with a valve for closing one of the aforesaid air-passages, substantially as shown and described.

14. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, the stem of the valve having an exhaust-groove adapted to register with an exhaust-port when the valve is unseated, a spring for normally closing said valve, a piston for operating said valve, a guiding piston connected to the piston, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the air-pressure to said passages, differential pistons operating said valve and receiving air-pressure between them, a valve and spring-pressure piston for controlling the admission of air-pressure to the outer side of one of the differential pistons; together with a piston working in a chamber and having a stem which is adapted to close one of the aforesaid air-passages, substantially as shown and described.

15. A control device for air-brake systems, comprising a valve connected to the train line for reducing the pressure therein, the

stem of the valve having an exhaust-groove adapted to register with an exhaust-port when the valve is unseated, a spring for normally closing said valve, a piston for
5 opening said valve, air-passages leading into the piston-chamber at opposite sides of the piston, respectively, a valve for controlling the air-pressure to said passages, differential pistons operating said valve and receiving
10 air-pressure between them, a valve and spring-pressure piston for controlling the admission of air-pressure to the outer side of one of the differential pistons; together with a piston operated in one direction by
15 air-pressure and having a stem adapted to

close one of the aforesaid air-passages, the stem having a cavity for connecting one part of the air-passage with an exhaust-port, said part of the air-passage being also connected to the chamber of the last mentioned piston 20 on the side of the piston opposite that receiving the air-pressure, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of 25 two subscribing witnesses.

CAMILLE LANG.

Witnesses:

NELSON P. McCLEES,
HORACE S. BEALL.