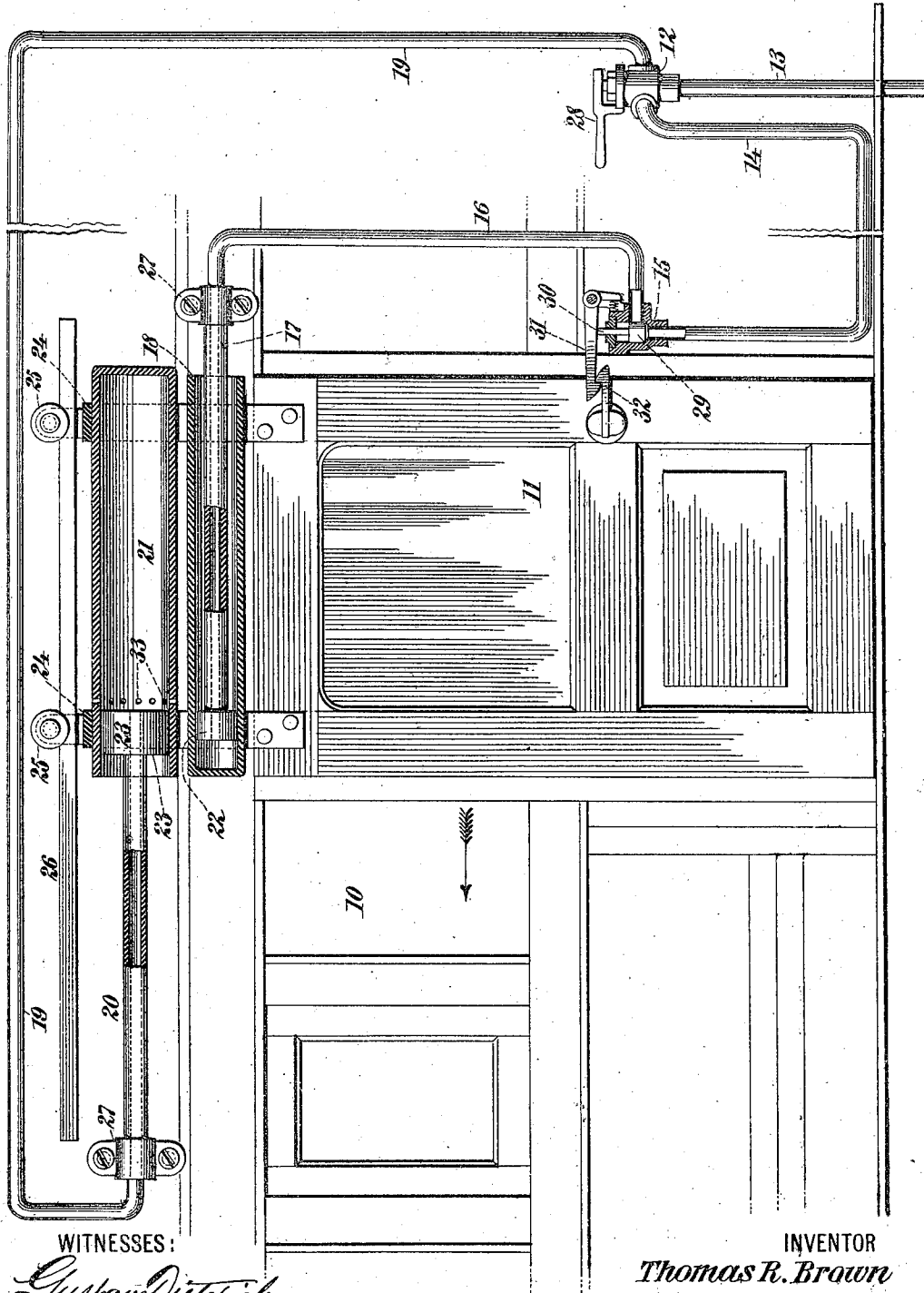


T. R. BROWN.
DOOR OPERATING MECHANISM.

APPLICATION FILED MAR. 17, 1906. RENEWED MAR. 12, 1909.

1,002,030.

Patented Aug. 29, 1911.



WITNESSES:

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THOMAS R. BROWN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
NATIONAL PNEUMATIC COMPANY, A CORPORATION OF WEST VIRGINIA.

DOOR-OPERATING MECHANISM.

1,002,030.

Specification of Letters Patent.

Patented Aug. 29, 1911.

Application filed March 17, 1906, Serial No. 306,489. Renewed March 12, 1909. Serial No. 483,062.

To all whom it may concern:

Be it known that I, THOMAS R. BROWN, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Door-Operating Mechanisms, of which the following is a specification.

The invention relates to improvements in door-operating mechanisms, and it consists in the novel features, arrangements and combinations of parts hereinafter described, and particularly pointed out in the claims.

I present my invention herein as applied to a car for opening and closing the door thereof, and in its preferred embodiment my invention comprises means whereby upon the movement of a control-handle to one position, compressed air or other motive fluid will be caused to effect the unlatching and opening of the door and upon the movement of said handle to another position, the same air, then acting against a surface of larger area, will be caused to effect the closing of the door, the latter becoming latched upon reaching its closed position. I thus utilize the air by which the door is opened for closing the same and avoid the waste of air which would result if one supply of air from the reservoir were employed in opening the door and another supply thereof used for closing the door.

The mechanical devices for carrying my invention into effect may vary in many respects with the will of the manufacturer and the nature of the car or other body to be equipped with the same, but a very satisfactory embodiment of my invention will comprise, a manually operable control-valve to whose casing a pipe from a reservoir for compressed air will lead, a door-latching device to which a pipe from said casing will extend and pass thence to one end of a cylinder fastened to and movable with and utilized for opening the door, and a second pipe leading from said valve casing to a second cylinder also fastened to and movable with the door and utilized for closing the same. Upon the movement of the control valve to one position the compressed air will pass through its casing to the pipe leading to the door latching device and after freeing the latch from locking engagement with the door, travel thence to the door-opening cylinder, wherein the air will act to move the

cylinder and door to the open position of the latter. Thereafter upon the movement of the control-valve to another position, the air supply pipe from the reservoir will be cut off and the pipe leading from the valve casing to the door-closing cylinder will be placed in communication with the pipe system leading to the said door-opening cylinder, with the result that the air in said pipe system and in said opening-cylinder, will expand into the pipe leading to the door-closing cylinder and enter said cylinder, wherein (acting against a resisting surface of larger area than that against which the air exerted its force on opening the door), it will operate to reverse the movement of the cylinder and effect the closing of the door, the air in the then connected systems of pipes and cylinders exhausting through a suitable vent upon the door's reaching its closed position and the latch then automatically passing into locking engagement with the closed door.

I have illustrated, in this application, the cylinders within which the air acts to open and close the door as arranged at the upper edge of the latter, but said cylinders may be disposed at the lower edge of the door, if so desired, or one of said cylinders may be connected with the upper edge of the door and the other to the lower edge of the door.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which is represented a side elevation, partly broken away and partly in section, of a car equipped with door operating mechanism constructed in accordance with and embodying my invention.

In the drawings, 10 designates a portion of a common car, 11 the door thereof, 12 the control-valve casing, 13 the supply pipe leading thereto from a reservoir, not shown, for compressed air, 14 the pipe leading from said casing to the casing 15 for the door latching devices and extending thence by means of a branch pipe 16 to a fixed pipe 17 entering the opening-cylinder 18, and 19 a pipe leading from the control-valve casing 12 to a fixed pipe 20 entering the closing-cylinder 21, said fixed pipes 17, 20 having upon their ends within said cylinders suitable pistons numbered, respectively, 22, 23 through which the ends of the

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pipes 17, 20 extend for the purpose of conducting the air through said pistons and into the closed ends of said cylinders. The pistons 22, 23 may be of any suitable construction, but the ordinary cup-piston will be found to be entirely satisfactory. The cylinders 18, 21 are reversely arranged, since the cylinder 18 is to be used for moving the door to its open position and the cylinder 21 for effecting the closing of the door; and the said cylinders are secured together and to the door by means of brackets, 24 and said cylinders and door are suspended by rollers 25 from a rail 26, upon which said rollers may travel during the opening and closing of the door. The outer ends of the fixed pipes 17, 20 are secured in rigid brackets 27, while the inner ends of said pipes are secured to the pistons 22, 23 and hold the latter stationary.

The cylinder 18 is smaller in cross-section than the cylinder 21 and hence after the air has been used within the cylinder 18 for opening the door, it may be permitted to expand into the cylinder 21, wherein, acting against the greater area therein, it will effect the closing of the door.

The control-valve within the casing 12 is operable by means of a handle 28, and this valve is a two-way valve of any suitable character adapted when the handle 28 is in one position to place the supply pipe 13 in communication with the pipe 14 and the pipe 19 in communication with the atmosphere and when said handle is placed in another or closing position to cut off the pipe 13 and the exhaust to the atmosphere and place the pipes 14, 19 in communication with each other so that the air in the pipe 14 and its connections may expand into the pipe 19 and pass thence into the cylinder 21. I do not limit my invention to any special form of two-way valve within the casing 12, but one example of such valve is illustrated in detail in my application, Serial Number 483,053, filed March 15, 1906 for Letters Patent for improvements in door-operating mechanisms.

Within the casing 15 for the door latching devices is provided a vertical plunger-valve 29 from which projects a vertical stem 30 directly below the pivoted latch 31 adapted to engage a catch-arm 32 secured to the door 11. When the valve 29 is in its lower position the stem 30 permits the latch 31 to remain in engagement with the catch-arm 32, and said valve 29 when in its lower position cuts off communication from the pipe 14 to the pipe 16. When air is admitted to the pipe 14 for opening the door it will elevate the valve 29 and disengage the latch 31 from the catch-arm 32 and also open the port to the pipe 16, into which the air will pass on its way to the opening cylinder 18. The latch 31 will remain in its

elevated position so long as the air pressure remains in the pipe 14, but after the door 11 has been opened and then closed the air in the pipe system is permitted to exhaust and at such time the valve 29 will descend and the latch 31 automatically reengage the catch arm 32.

In the operation of my invention, the door being in its closed position, the control-handle 28 will be moved to place the supply pipe 13 in communication with the door-opening pipe 14 and the pipe 19 in communication with the atmosphere, and thereupon the compressed air will flow through the pipe 14 to the casing 15, unlatching the door, and then through the pipe 16, fixed pipe 17 and piston 22 into the closed end of the cylinder 18, wherein the air acting against the end of said cylinder will force the cylinder to carry the door 11 to its open position, the closed end of the cylinder 21 reaching a position adjacent to the piston 23 when the door attains its open position. During the opening of the door with the use of the cylinder 18 the air does not become trapped within the closed end of the cylinder 21 because of the fact that when the control-handle 28 is moved to place the pipes 13, 14 into communication with each other, the pipe 19 exhausts to the atmosphere at the casing 12. The door will be held open so long as the air pressure is permitted to exert its force through the pipe 14 and against the end of the cylinder 18. When it is desired to close the door, the control-handle 28 will be moved to its closed position and thereby cut off the supply pipe 13 and the exhaust from the pipe 19 and place the pipes 14, 19 into communication with each other, whereupon the air within the pipes 14, 16, 17 and cylinder 18 will expand into the pipe 19 and fixed pipe 20 and pass thence through the piston 23 into the closed end of the cylinder 21, wherein said air will act to move the cylinder and door back to their initial position, closing the door. Upon the door's reaching its closed position the vent apertures 33 in the cylinder 21 become uncovered and permit the air within the cylinder 21 and connected pipe systems to exhaust into the atmosphere, whereupon the air pressure being relieved the valve 29 in the latch casing 15 will descend to its initial position and permit the latch 31 to pass into reengagement with the catch arm 29, locking the door in its closed position.

The area upon which the air acts within the cylinder 18 to effect the opening of the door is less than the surface area against which it acts within the cylinder 21 for the purpose of closing the door, and thus I am enabled to use the same air which effected the opening of the door, for closing the same.

The construction hereinbefore described is very efficient and durable and also simple in its details and inexpensive of manufacture.

What I claim as my invention and desire to secure by Letters-Patent, is:—

1. In combination, in a mechanism for moving doors or other devices, an element to be moved, two cylinders of unequal area connected to the movable element for moving the same, one of the cylinders being employed to move said member in one direction, and the other for moving it in the opposite direction, stationary pistons in said cylinders, said pistons having passages here-
15 through, pipes respectively extending into said cylinders and connected to the pistons, and in communication with the passages therethrough, means for directing compressed air to one of said pipes and thence
20 to one cylinder, and means for thereafter permitting the compressed air to expand into the other of said pipes and thence into the other cylinder, the effective area upon which the air operates in one cylinder being
25 greater than that against which it operates in the other cylinder, substantially as set forth.

2. In combination, in a mechanism for moving doors or other devices, an element to be moved, two cylinders of unequal area, connected to the movable element to move the same, one of the cylinders being employed to move the movable element in one direction and the other for moving it in the opposite direction, pistons in said cylinders, means for directing air under pressure into one of said cylinders, and means for thereafter permitting the air to expand into the other cylinder whereby the air is
40 utilized for moving the movable element in one direction and thereafter moving said element in the opposite direction, the area against which the air acts to initially move the movable element being less than that
45 against which it acts to move said element in the opposite direction, substantially as set forth.

3. In combination, in a mechanism for moving doors or other devices, an element to be moved, two reversely arranged cylinders connected with the movable element for

moving the same, one of said cylinders being of greater diameter than the other; pistons in said cylinders and arranged on about a transverse line with each other, fixed
55 means connected with said pistons for holding the same stationary and extending in opposite directions from the respective cylinders, means connected with a source of supply of compressed air and leading to the
60 smaller of said cylinders to move the movable element in one direction; means for cutting off the air supply and placing the cylinders into communication with each other to move said element in the opposite
65 direction, whereby the air used in the smaller cylinder to move the movable element in one direction is permitted to expand into the larger cylinder to move said element in the opposite direction. 70

4. In combination, in a mechanism for moving doors or other devices, an element to be moved, two cylinders of unequal area connected to said element, a stationary piston arranged in each cylinder, supply pipe
75 connections to said cylinders, a valve mechanism for controlling the supply of pressure medium to one of said pipe connections, said valve mechanism operating, when actuated, to place said pipe connections into
80 communication with each other.

5. In combination, in a mechanism for moving doors or other devices, an element to be moved, two cylinders of unequal area connected to said element, a stationary piston
85 in each cylinder, supply pipe connections to said cylinders, a valve mechanism for controlling the supply of pressure medium to one of said pipe connections and operating, when actuated, to place said
90 connections into communication with each other, one of said cylinders having exhaust openings arranged to be uncovered, when the movable element attains the limit of its movement toward initial position. 95

Signed at New York city, in the county of New York and State of New York this 15th day of March A. D. 1906.

THOMAS R. BROWN.

Witnesses:

CHAS. C. GILL,
ARTHUR MARION.