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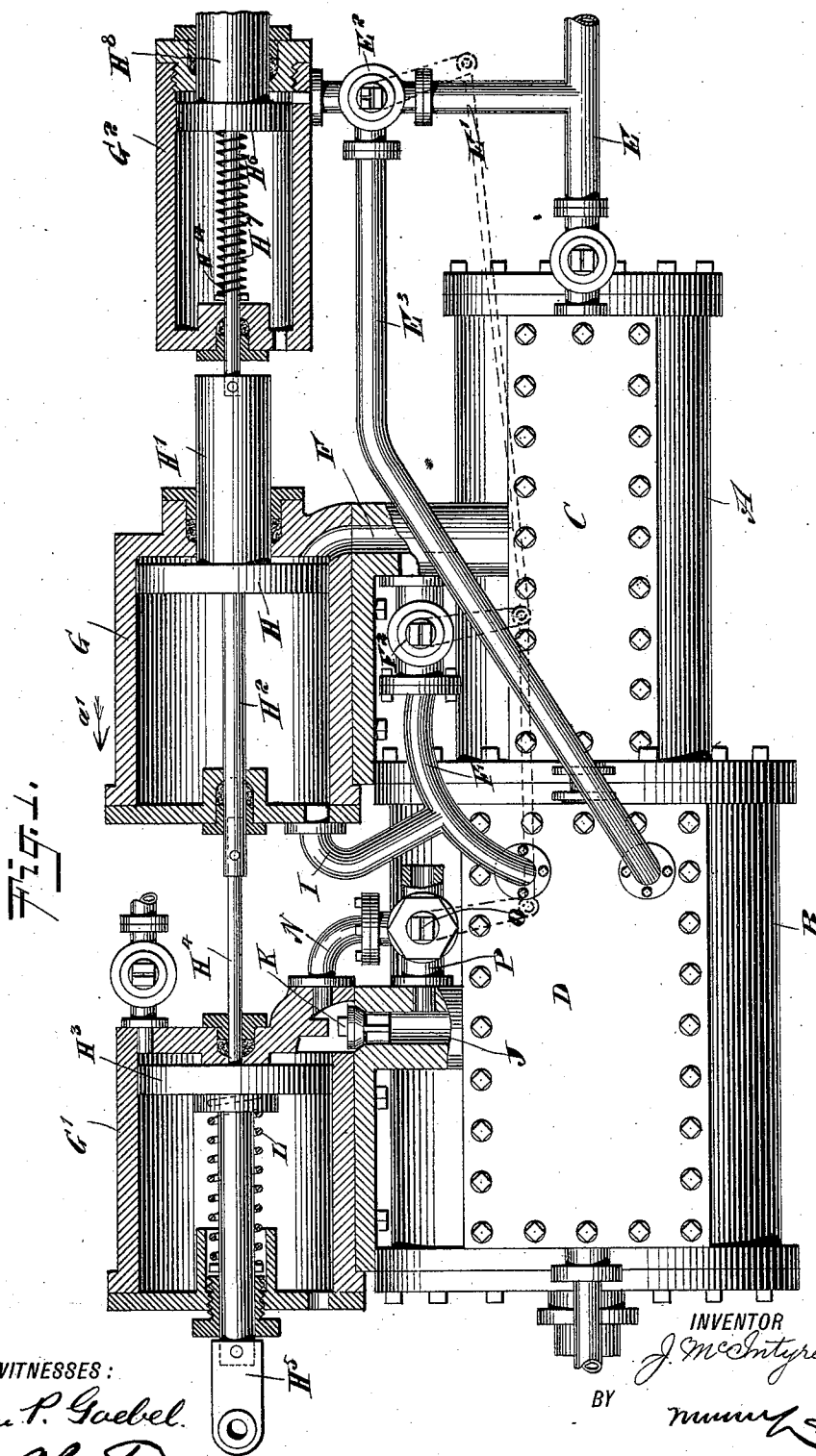
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J. McINTYRE.

FLUID PRESSURE COMPOUND MOTOR AND BRAKE.

No. 575,527.

Patented Jan. 19, 1897.



WITNESSES:

William P. Gaebel.
Rev. G. Hostetler

INVENTOR

J. McIntyre

BY

Attorneys

ATTORNEYS.

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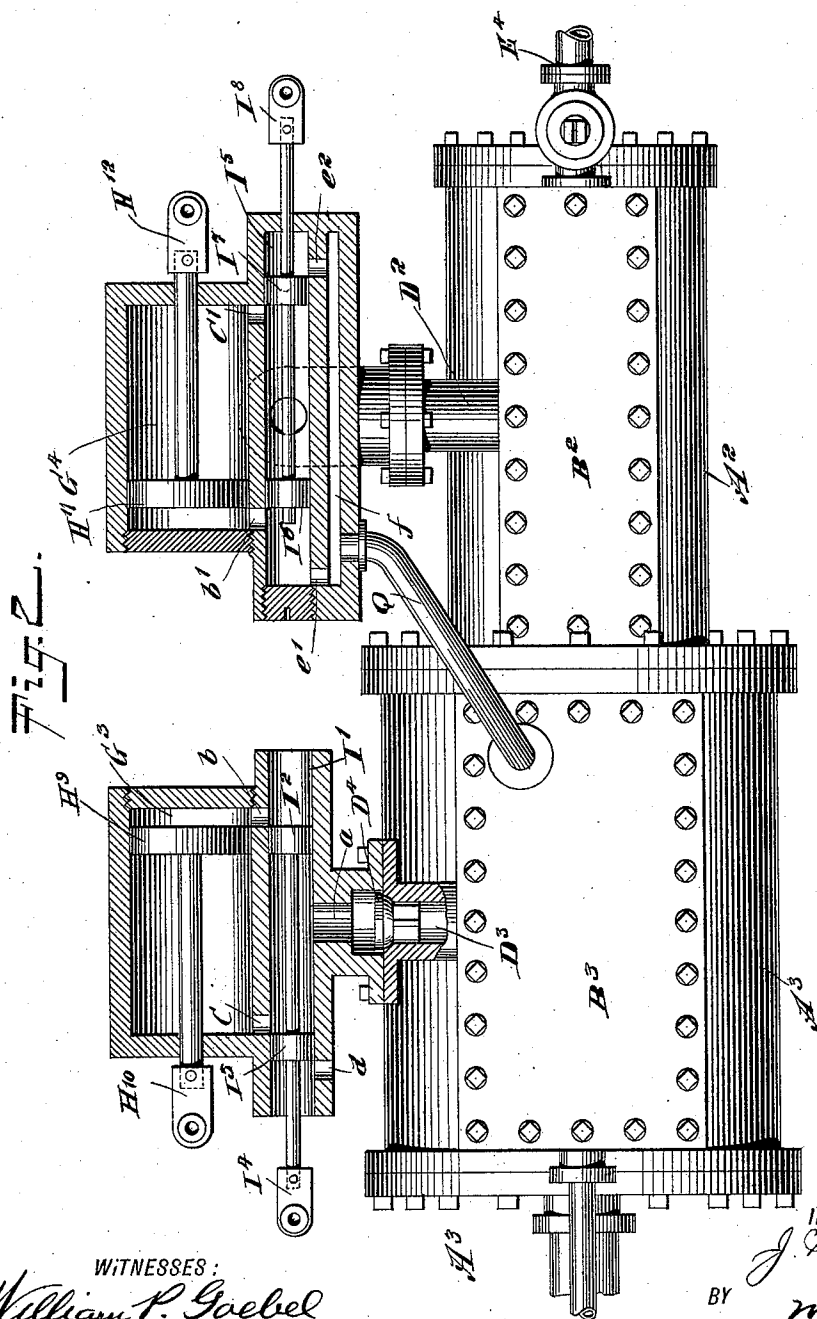
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UNITED STATES PATENT OFFICE.

JOHN MCINTYRE, OF JERSEY CITY, NEW JERSEY.

FLUID-PRESSURE COMPOUND MOTOR AND BRAKE.

SPECIFICATION forming part of Letters Patent No. 575,527, dated January 19, 1897.

Application filed October 9, 1896. Serial No. 608,378. (No model.)

To all whom it may concern:

Be it known that I, JOHN MCINTYRE, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Fluid-Pressure Compound Motors and Brakes, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in fluid-pressure compound motors and brakes whereby the motive agent is utilized to the fullest advantage both in working the motor and actuating the brakes.

The invention consists principally of a compound fluid-pressure motor and a fluid-pressure brake discharging into the low-pressure cylinder of the said motor.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional plan view of the improvement, and Fig. 2 is a similar view of a modified form of the improvement.

The compound fluid-pressure motor shown in Fig. 1 is provided with a high-pressure cylinder A, a low-pressure cylinder B, and chests or receivers C and D for the said cylinders, the chest C being connected with a fluid-pressure-supply pipe E, connected with a storage-tank or other vessel containing the fluid under pressure.

The exhaust-pipe F of the high-pressure cylinder A is connected by a branch pipe F' with the chest of the low-pressure cylinder B, and the said pipe contains a valve F² for connecting or disconnecting the pipes F and F'. When the valve F² is open, the exhaust from the high-pressure cylinder A can pass by the pipes F and F' to the low-pressure cylinder B, so that the force of the exhaust motive agent is further utilized in the low-pressure cylinder. The exhaust-pipe F is also connected with one end of a brake-cylinder G, containing a piston H, connected at one end with a piston-rod H' and at its other end with a piston-rod H². The motive agent passing

into the cylinder G from the pipe F acts on the face of the piston H having a reduced area, to force the said piston outwardly in the direction of the arrow *a'* to apply the brakes. 55

The forward end of the cylinder G is connected by a pipe I with the branch pipe F', previously described, so that when the valve F² is open the exhaust passing through the pipe F' can pass through the pipe I into the forward end of the cylinder G to act on the face of the piston H having the large area, so as to return the piston H to its forward position and thereby release the brakes. 60

The exhaust-pipe J from the low-pressure cylinder B contains a check-valve K and connects with one end of a brake-cylinder G', containing a piston H³, connected by a piston-rod H⁴ with the piston-rod H² of the piston H, previously mentioned. The piston H³ is also provided with a forwardly-extending piston-rod H⁵, connected in the usual manner with the brake-levers of the brake mechanism. A spring L is coiled on the piston-rod H⁵ and presses on the piston H³ to hold the latter normally in release position, as shown in Fig. 1. A pipe N leads from the exhaust-pipe J above the valve K to a three-way valve O, held in a pipe opening to the atmosphere and connected with the exhaust-pipe J between the valve K and the chest D. 65 70 75 80

Now it is evident that the exhaust from the low-pressure cylinder B passes through the pipe J into the cylinder G' to push the piston H³ therein outward and apply the brakes when the valve O is closed to the atmosphere. When the valve O is opened, then the spring L returns the piston H³ to its former or release position, and the exhaust from the high-pressure cylinder passes through the pipes J and P to the outer air. 85 90

The supply-pipe E is provided with a branch pipe E', connected with one end of a working cylinder G², containing a piston H⁶, connected by a piston-rod H⁷ with the piston-rod H' previously mentioned. The outer face of the piston H⁶ is connected with a piston-rod H⁸ of larger diameter than the piston-rod H⁷, so as to reduce the area of the piston H⁶ at this end of the cylinder. A spring H¹⁴ is coiled on the piston-rod H⁷ and presses on the piston H⁶. 95 100

In the pipe E' is arranged a valve E² for admitting the motive agent to the said cylinder G² to force the piston H⁶ outward and apply the brakes, and the said valve E², when
 5 turned, serves to close the lower end of the pipe E' and to connect the cylinder G² with a pipe e³, leading to the chest D of the low-pressure cylinder B. Thus when the valve E² is in this position the motive agent used in ap-
 10 plying the brakes and contained in the cylinder G² can pass from the latter through the pipe E² to the low-pressure cylinder B, to be utilized therein in the usual manner, the same as the exhaust from the high-pressure cylinder A. Thus it will be seen that the motive
 15 agent can be directly used in the brake-cylinder to apply the brakes, and the exhaust of the motive agent from the said cylinder is passed to the low-pressure cylinder, to be further
 20 utilized and assist in actuating the compound motor. It is evident that the three brake-cylinders may be independently connected with brake-levers of brake mechanisms, if desired, but when connected with each
 25 other, as shown in Fig. 1, then the valves O, F², and E² are also connected with each other, to be simultaneously actuated by the operator in charge.

As shown in Fig. 2, a compound motor having high and low pressure cylinders A² and A³ is employed, the cylinders having chests B² and B³, respectively, of which the chest B² is
 30 connected with the fluid-pressure-supply pipe E¹. The exhaust-pipe D³ of the low-pressure cylinder A³ contains a check-valve D⁴, and is connected with a fluid-pressure brake similar to that shown in Fig. 1 of the application
 35 for Letters Patent for fluid-pressure motors and brakes, filed October 9, 1896, Serial No. 608,377.

The exhaust-pipe D³ supports a brake-cylinder G³, containing a piston H⁹, having its piston-rod H¹⁰ connected with the brake-levers
 45 in the usual manner. Between the brake-cylinder G³ and the exhaust-pipe D³ is arranged a valve mechanism provided with a cylinder I', containing the piston-valves I² I³,
 50 secured on the stem I⁴, connected with a lever under the control of the operator. The cylinder I' is connected by a port a with the exhaust-pipe D³ above the valve D⁴, and the said
 55 cylinder I' is also connected by ports b c with the ends of the brake-cylinder G³. A port d is formed in the cylinder I' to connect the interior thereof, near one end of the cylinder,
 60 with the atmosphere when the valve I³ moves to the left beyond the said port d.

When the several parts are in the position shown in Fig. 2, the exhaust fluid from the
 65 low-pressure cylinder A³ passes through the pipe D³ and the port a into the cylinder I', and from the latter by the port c into the brake-cylinder G³ to act on the piston H⁹ and force the same into the release position shown.
 When this has been done, then the operator moves the piston-valves I² I³ to the left, to

bring the piston-valve I³ in front of the port d, so that the exhaust fluid passes through the cylinder I' and port d to the atmosphere, part
 70 of the exhaust fluid keeping sufficient pressure on the piston H⁹ to hold the brakes released.

When it is desired to apply the brakes, the operator moves the piston-valves I² I³ to the right to open the port c to the atmosphere and
 75 to connect the ports a and b with each other by the cylinder I', so that the exhaust from the pipe D³ can pass into the right-hand end of the cylinder G³ to exert its pressure against
 80 the piston H⁹ and force the latter outward to apply the brakes, the air in front of the piston H⁹ being forced out through the port c and the cylinder I' to the atmosphere.

The fluid-pressure brake connected with the exhaust-pipe D² is provided with a cyl-
 85 nder G⁴, containing a piston H¹¹, the rod H¹² of which is connected with the brake-levers. The cylinder G⁴ is connected by ports b' c' with the cylinder I⁵ of the valve mechanism, having the valves I⁶ I⁷ secured on a
 90 stem I⁸, attached to a lever under the control of the operator. The cylinder G⁴ is also connected by ports e' e² with a channel f, into which opens the exhaust-pipe D², and the said
 95 channel is connected by a pipe Q with the low-pressure chest B³. The brakes may be applied by the exhaust from the low-pressure chest B³ by passing the said exhaust into the
 100 cylinder G³ upon shifting the piston-valves I² I³. The brakes may also be applied by shifting the valves I⁶ I⁷ in the cylinder I⁵ to cause the exhaust passing up the pipe D² to enter the cylinder G⁴ and force the piston H¹¹
 105 outward, so as to apply the brakes.

In order to release the brakes controlled
 110 from the cylinder G⁴, the valves I⁶ and I⁷ are shifted so as to let the fluid exhaust through the ports e² and e' into the outer end of the cylinder G⁴ to return the piston H¹¹, that is, move it back into a release position. It is
 115 evident that by the arrangement described the exhaust from the cylinder G⁴ passes with the exhaust from the pipe D² through the pipe Q into the low-pressure chest B³ to utilize the exhaust from the cylinder G⁴ without
 120 any waste whatever.

It is understood that the air used for operating the piston H¹¹ to apply the brakes is not exhausted to the atmosphere, as is the case with the air passed into the cylinder G³,
 125 as previously mentioned, but the air is utilized in the low-pressure cylinder to do further work, that is, assist in actuating the motor for propelling the car.

It is evident that by the arrangement described no motive agent whatever is wasted,
 130 as the motive agent is utilized for applying the brakes and the exhaust from the brake-cylinders is utilized in the low-pressure cylinders to do further work.

It is understood that the exhaust from the brake-cylinder can be passed into a receiver

or reheater instead of directly into the low-pressure cylinder.

Having thus described my invention, I claim as new and desire to secure by Letters

5 Patent—

1. A compound fluid-pressure motor and a fluid-pressure brake, arranged to discharge its motive agent into the said motor to do further work, substantially as shown and described.

2. A compound fluid-pressure motor, and a fluid-pressure brake actuated by fluid-pressure and having its exhaust forming part of the motive agent for the low-pressure cylinder of the said motor, substantially as shown and described.

3. A compound fluid-pressure motor, and a fluid-pressure brake connected with the exhaust of the high-pressure cylinder, to apply the brakes and discharge into the low-pressure cylinder of the said motor, substantially as shown and described.

4. A compound fluid-pressure motor, and a fluid-pressure brake interposed in the connection between the high and low pressure cylinders of the said motor, substantially as shown and described.

5. A compound fluid-pressure motor, a fluid-pressure brake, and a valved connection between the said brake and the said motor, for utilizing the exhaust of the brake as part of the motive agent for the said motor, substantially as shown and described.

6. A compound fluid-pressure motor, a fluid-pressure brake, and a valved connection between the said brake and the high-pressure cylinder of the said motor, for actuating the said brake, to apply and release the brakes, substantially as shown and described.

7. A compound fluid-pressure motor, a fluid-pressure brake, a valved connection between the said brake and the high-pressure cylinder of the said motor, for actuating the said brake, to apply and release the brakes, and a connection between the said valved connection and the low-pressure cylinder, for passing the exhaust from the brake-cylinder into the said connection and to the low-pressure cylinder, substantially as shown and described.

8. A compound fluid-pressure motor, a fluid-pressure brake, a live-fluid supply for the said brake and the high-pressure cylinder of the said motor, and a connection between the said brake and the low-pressure cylinder of the said motor, to pass the exhaust of the brake

into the said low-pressure cylinder, substantially as shown and described.

9. A compound fluid-pressure motor, a fluid-pressure brake, a live-fluid supply for the said motor and brake, an exhaust connection between the said fluid-pressure brake and the low-pressure cylinder of the said motor, to pass the exhaust of the brake into the said low-pressure cylinder, and a second fluid-pressure brake interposed in the connection between the high and the low pressure cylinders, substantially as shown and described.

10. A compound fluid-pressure motor, a fluid-pressure brake, a live-fluid supply for the said motor and brake, an exhaust connection between the said fluid-pressure brake and the low-pressure cylinder of the said motor, to pass the exhaust of the brake into the said low-pressure cylinder, a second fluid-pressure brake interposed in the connection between the high and the low pressure cylinders, and means for connecting the said brakes with each other to operate the same in unison, as set forth.

11. A compound fluid-pressure motor, a fluid-pressure brake, a live-fluid supply for the said motor and brake, an exhaust connection between the said fluid-pressure brake and the low-pressure cylinder of the said motor, to pass the exhaust of the brake into the said low-pressure cylinder, a second fluid-pressure brake interposed in the connection between the high and the low pressure cylinders, and a third fluid-pressure brake in the exhaust of the low-pressure cylinder of the motor, substantially as shown and described.

12. A compound fluid-pressure motor, a fluid-pressure brake, a live-fluid supply for the said motor and brake, an exhaust connection between the said fluid-pressure brake and the low-pressure cylinder of the said motor, to pass the exhaust of the brake into the said low-pressure cylinder, a second fluid-pressure brake interposed in the connection between the high and the low pressure cylinders, a third fluid-pressure brake in the exhaust of the low-pressure cylinder of the motor, and means for connecting the said brakes with each other, to operate the same in unison, as set forth.

JOHN MCINTYRE.

Witnesses:

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