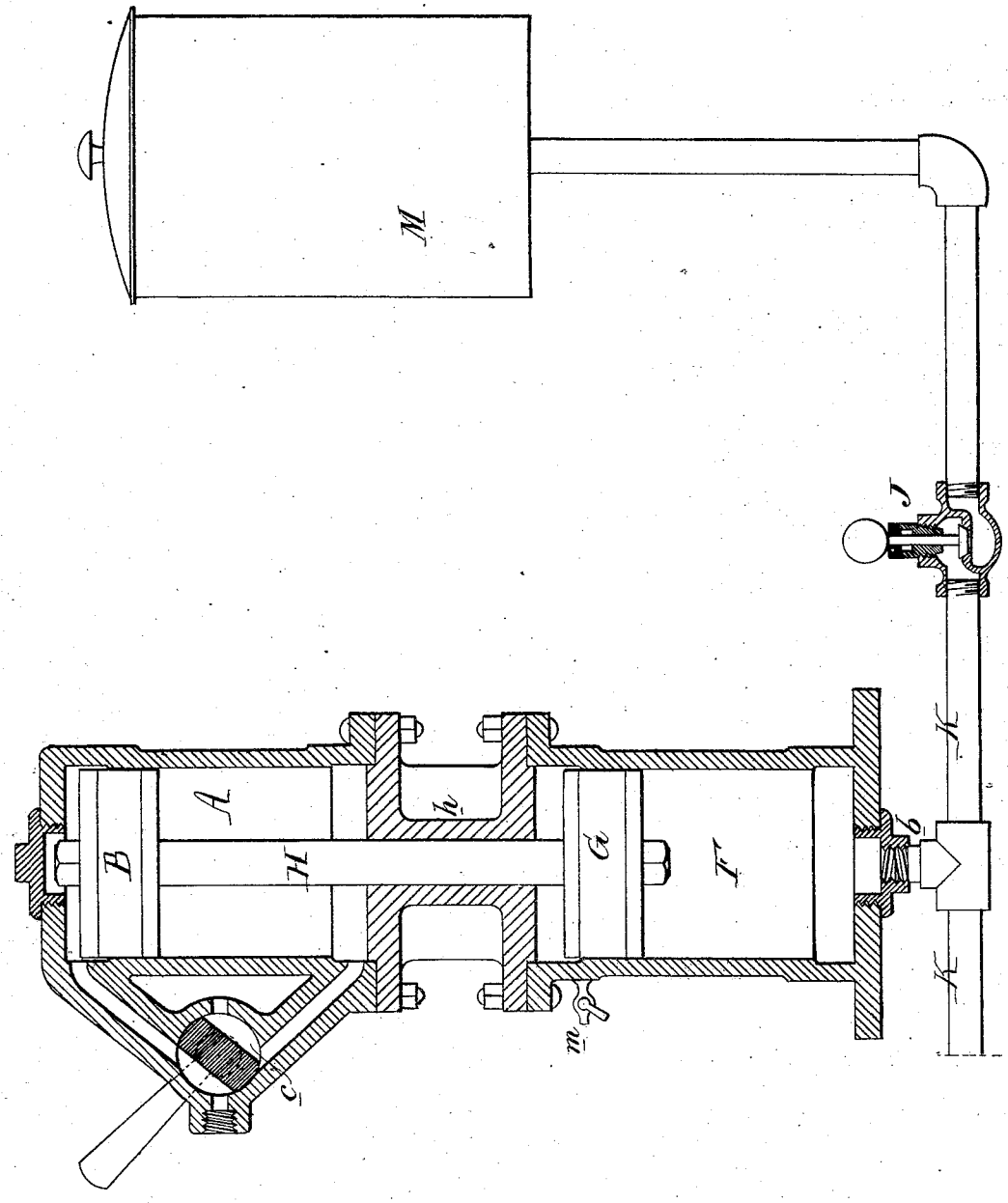
W. M. HENDERSON.

Hydraulic-Mechanisms for Operating Car-Brakes.

No. 157,175. Patented Nov. 24, 1874.



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UNITED STATES PATENT OFFICE.

WILLIAM M. HENDERSON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDRAULIC MECHANISMS FOR OPERATING CAR-BRAKES.

Specification forming part of Letters Patent No. **157,175**, dated November 24, 1874; application filed November 22, 1873.

To all whom it may concern:

Be it known that I, WILLIAM M. HENDERSON, of Philadelphia, Pennsylvania, have invented certain Improvements in Hydraulic Mechanism for Operating Car-Brakes, of which the following is a specification:

My invention relates to an improvement in the construction of mechanism for applying car-brakes through the medium of liquid under pressure, an early example of such mechanism being exhibited in the English patent, No. 2,875, granted to Henry Bessemer in 1853. No new principle is involved in my improvement, which is directed to such a construction and arrangement of parts as will afford a perfect control of the mechanism by which the desired pressure is imparted to the liquid for operating the brakes.

Figure 1 of the accompanying drawing represents a vertical section of my invention.

A is a steam-cylinder, having a piston, B, and piston-rod H, and having a cock, *c*, or any suitable valve, by manipulating which the engineer of a train can admit steam to, or permit it to escape from, the cylinder, at either end of the same, through appropriate passages. The steam-cylinder, its piston, piston-rod, valves, and passages, in fact, constitute a double-acting reciprocating steam-engine. Below the cylinder is the pump-barrel F, containing a piston, G, which is connected to that of the engine by the said piston-rod H, the latter passing through a connection, *h*, between the steam-cylinder and pump-barrel, and fitting so snugly in this connection, or the latter being so packed, that there can be no communication between the pump-barrel and cylinder. The lower end of the pump-barrel communicates, through a pipe, *b*, with the tube K, which communicates in one direction with a reservoir, M, containing water, glycerine, or other appropriate liquid, and in the other direction with an apparatus placed under each car of a train for simultaneously applying all the brakes.

I prefer as a medium through which the liquid under pressure is caused to act on the brakes the device for which Letters Patent were granted to me on the 28th day of October, 1873, No. 143,980.

A check-valve, J, is placed in the pipe K, between the pump and the reservoir, to prevent the liquid, while it is acted on by the piston of the pump, from returning to the said reservoir. In the pump-barrel, near the upper end of the same, is a cock, *m*, or simple opening, for the admission of air—a feature to which, when viewed in connection with a piston-pump in contradistinction to a plunger-pump, the practical success of my invention is due, as will appear hereafter.

The above-described mechanism is situated in such a position on the tender or locomotive that the handle of the cock or valve of the engine is within easy reach of the engineer.

On manipulating this cock the piston of the pump may be raised or depressed at pleasure. When elevated the check-valve J will open and permit the liquid from the reservoir to pass into the pipe, which is in direct communication with the pump-barrel, thus supplying any deficiency of liquid which may have been caused by leakage, &c. When the pump-piston is depressed the check-valve J will be instantly closed, and the liquid will be forced to the braking apparatus beneath the bodies of the cars.

It will be seen from the foregoing description that the mechanism consists of the combination of a double-acting steam-engine with a single-acting piston-pump, and that it differs materially from the device of Bessemer, in which the steam-cylinder and pump-barrel are one and the same, the piston being all that separates the actuating-steam from the liquid to be forced.

The engineer can in this case have no such control of the downward movement of the piston as will enable him to retract the brakes, for such retraction is facilitated by the action of the steam in my improvement. On the other hand, the combination of a double-acting engine with a single-acting plunger-pump, while it may be used to facilitate the retraction of the brakes, has this defect, that the engineer can have but an imperfect control of the upward stroke of the plunger, for even a delicate manipulation of the steam-valve will not always prevent the piston from striking the cylinder-cover, the result of which must be the rapid destruction of the engine.

By combining a piston-pump with a double-acting engine, however, and by making an air

opening in the pump-barrel, as described, I am enabled to obtain an air-cushion above the pump-piston for gradually arresting the upward movement of the piston of the engine, and thereby preventing the above-mentioned destructive shocks. In other words, when the pumping-engine is in operation, the pump-piston must always be acting either in one direction against the liquid, or in the other direction against an air-cushion, and must, therefore, work smoothly and easily, whatever may be the manipulation of the steam-valve.

It should be understood that I have no desire to claim the air-cushion, *per se*, as it has been used, in connection with valves for steam-engines, for the special purpose of preventing destructive shocks; but as the practical success of my invention, as demonstrated by its daily use on the Westchester railroad, depends upon the facilities afforded by the combination of a double-acting engine with a single-acting pump, for facilitating the retraction of the brakes, and as the proper operation of this combination depends upon this air-cushion, the means by which the cushion is obtained enters into the combination with the double-acting engine and single-acting piston-pump.

I make no claim to the use of a steam-pressure pump for operating car-brakes through the medium of liquid under pressure, as such a claim is precluded by the English patent of Bessemer. Nor do I claim the combination of a double-acting engine with a plunger-pump for the same purpose, as this is not within the scope of my invention; but

I restrict myself to and desire to secure Letters Patent for—

The within-described double-acting steam-engine, single-acting piston-pump, and air-opening *m* in the barrel of the pump, in combination with the pipe K for receiving the liquid from a reservoir and conducting it under pressure to the brakes, all as set forth, for the purpose specified.

WILLIAM M. HENDERSON.

Witnesses:

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