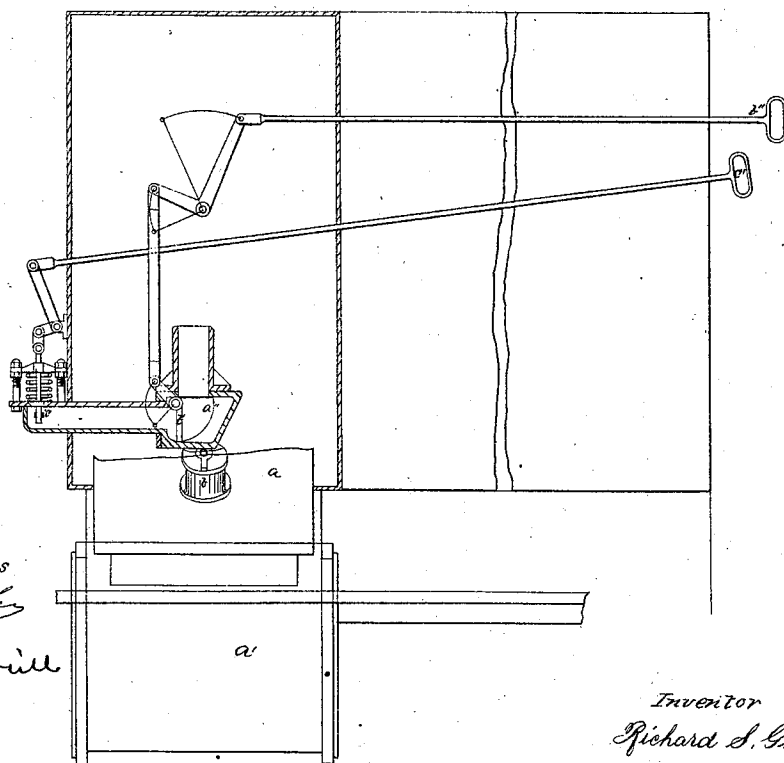
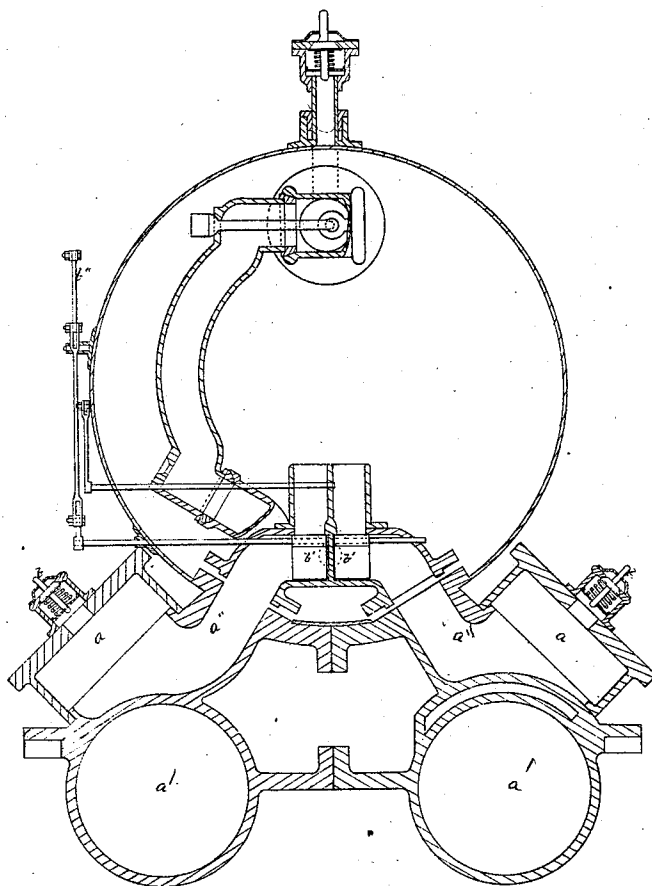


*Richard S. Gillespie's new form of Air Brake
to control the motion of Steam Engines*

No. 121,283.

Patented Nov. 28, 1871.



Witnesses

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UNITED STATES PATENT OFFICE.

RICHARD S. GILLESPIE, OF NEW YORK, N. Y.

IMPROVEMENT IN LOCOMOTIVES.

Specification forming part of Letters Patent No. 121,283, dated November 28, 1871.

To all whom it may concern:

Be it known that I, RICHARD S. GILLESPIE, of the city, county, and State of New York, have invented a certain new and useful form of air-brake to control the motion of steam-engines; and that the following, taken in connection with the drawings, is a full, clear, and exact description of the same.

Figure 1 is a longitudinal section through the smoke-box and exhaust-passages of a locomotive. Fig. 2 is a cross-section of the same through the center of smoke-box, cylinders, and exhaust-passages, in which—

a a are the steam-chests; *a' a'*, steam-cylinders; *a'' a''*, exhaust-passages. *b b* are poppet-valves, provided with springs to keep them seated when steam is shut off. These valves open a communication with the outer air. *b' b'* are valves closing exhaust-nozzle to prevent the escape of compressed air, and are closed by the handle *b'' b''*, which is placed within reach of the engine-driver. *c* is the relief or safety-valve communicating with the exhaust-passages to prevent excessive strain on pistons and connections. This valve is worked by the handle *c'*.

The action of the brake may be described as follows: Suppose the locomotive to be at a speed which it is necessary to check or control; the first operation is to shut throttle, cutting off steam from the cylinders, then to close the valves *b' b'* in the exhaust-passages. By the shutting off the steam the cylinders are converted into air-pumps; a vacuum is produced in the steam-chests and cylinders. This vacuum causes the air-valves *b b* to open to supply air to the steam-chests and cylinders, which is discharged on the exhaust side, and, by the closing of the valves *b' b'*, is compressed in the exhaust-passages, forming an increasing back pressure to the motion of the pistons. That this back pressure may not be increased to an extent dangerous to either the pipes or working connections the safety-valve *c* is provided loaded to a determinate pressure. This valve is also operated by the handle *c'*, which is under the control of the engineer, by which he can modify as he pleases the back pressure, and, consequently, the retarding force, thus at all times having his train well in hand. When the train is brought to a stop the engine-driver relieves the back pressure by raising momentarily the safety or relief-valve *c*, opening

the exhaust-valves *b' b'*, and the engine is then in its normal condition.

In applying and making this form of brake practical—that it may act effectually and without shock to train or working parts of the locomotive—that it may not only be a brake to be applied in the contingency of imminent danger, but also for constant use, even to the doing away with the necessity of brakemen—many mechanical details form a part of this apparatus—all simple in themselves, yet many new and very important, for the purposes above set forth.

The resistance for the most part to the motion will depend on the amount of back pressure. This pressure will accumulate with more or less rapidity, dependent on the relative openings of air-valves, capacities of the cylinders and exhaust-passages; but some resistance will be obtained from the vacuum on the opposite side of the pistons.

The retarding force exerted by brakes depends on the weight of the train compared with the weight on the wheels to which brakes are applied, and there is less shock to the train the more uniformly the brakes are applied throughout the train; and when trains are long, the brake as above applied to the locomotive alone might not be sufficient, without brakemen on the cars, for the complete control of the train; and should it be thought advisable to do away with brakemen, the compressed air from the locomotive can be readily carried back through the whole or part of the train by fixed iron pipes beneath the cars and a flexible coupling connecting them. Were the pipe-connections to be made with cylinders or expansible vessels and motion communicated to the common brake-levers by the motion of the pistons or expansion of the vessels, springs or weights maintain pistons or vessels in such position that the brake-shoes are not in contact with the wheels when there is no pressure of air in the pipes, but are brought in contact as the compressed air flows from the receptacle of the locomotive. The relief-valve, under the hands of the engine-driver, relieves simultaneously car-brakes and locomotive.

In the drawings all the motions, except that of the air-valves, are shown as positive; but I propose also to make this brake entirely automatic. It will be readily seen that, if the valves *b b* on the steam-chests and valves *b' b'* in the exhaust

Not shown on drawing

passages are connected by levers or their equivalents, directly the steam is shut off from the cylinders and expiration ceases or nearly so through the exhaust-passages, the vacuum in the steam-chests and cylinders opens the valves *b b* and closes the valves *b' b'*. Now it is evident that with each motion of the pistons air is sucked through the steam-chests and packed or compressed into the exhaust-passages, thereby quickly retarding the motion of the locomotive and train; but should the engine-driver only wish to slow down and not use the brake, he opens the relief-valve *c*, which allows the air to escape without being compressed into the exhaust-passages, and the motion of the train is not retarded; but should he see imminent danger, he merely closes the relief-valve, and then instantly the air is compressed into the exhaust-passages, quickly retarding the motion of the locomotive and train and bringing it to rest without shock or strain to any of its parts.

My brake is more particularly devised for locomotives; but is applicable to other steam-engines, as hoisting-engines, in which the velocity at times requires to be regulated.

I do not broadly claim the use of valves for closing the exhaust-apertures or passages in steam-engines, and wish to confine my claim to invention to the construction and combination as herein described and shown.

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

1. The poppet-valve *b* and its spring, in combination with the steam-chest of a steam-engine, constructed to operate in the manner and for the purpose described.

2. The valves *b'* that close the exhaust-nozzles and safety-valves *c*, in combination with the steam-cylinder of a steam-engine, in the manner and for the purpose described.

3. The combination of the poppet-valve *b*, valve *b'*, and safety-valve *c* with the steam-cylinder of a steam-engine, constructed and arranged to operate in the manner and for the purpose described.

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Witnesses:

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