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W. J. DANKEL.

AUTOMATIC AIR BRAKE FOR CARS.

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Fig. 1

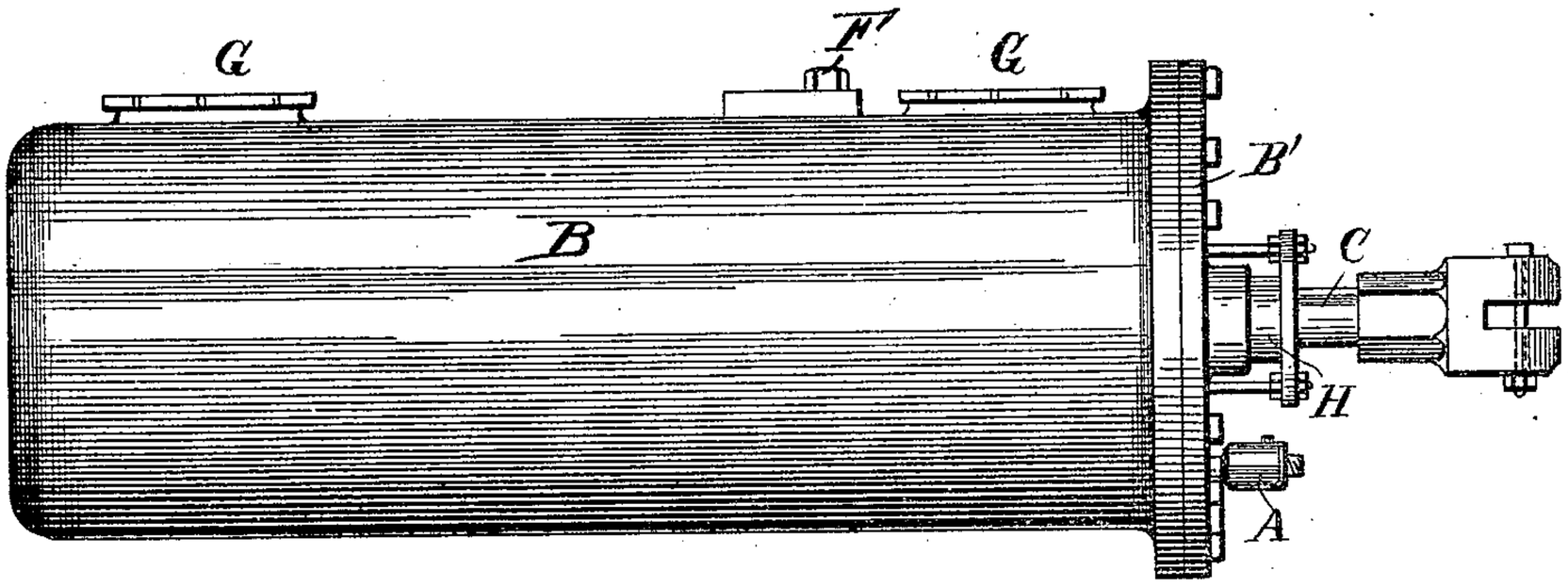


Fig. 2

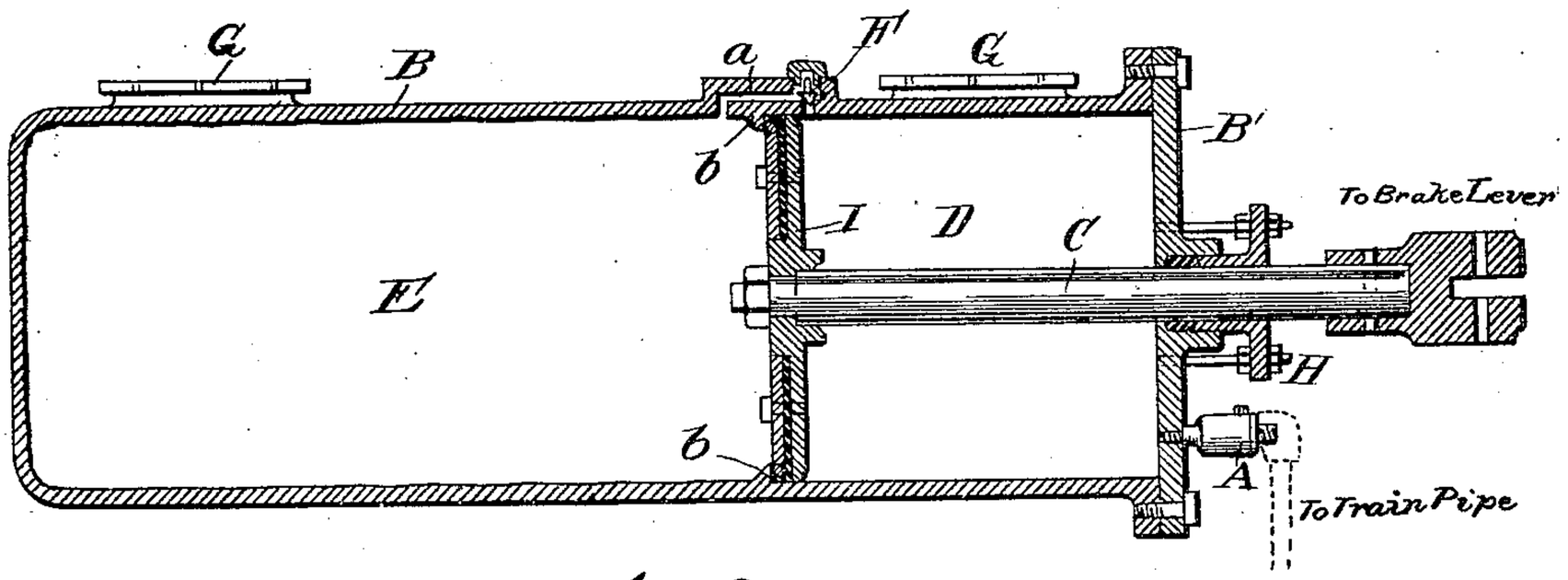
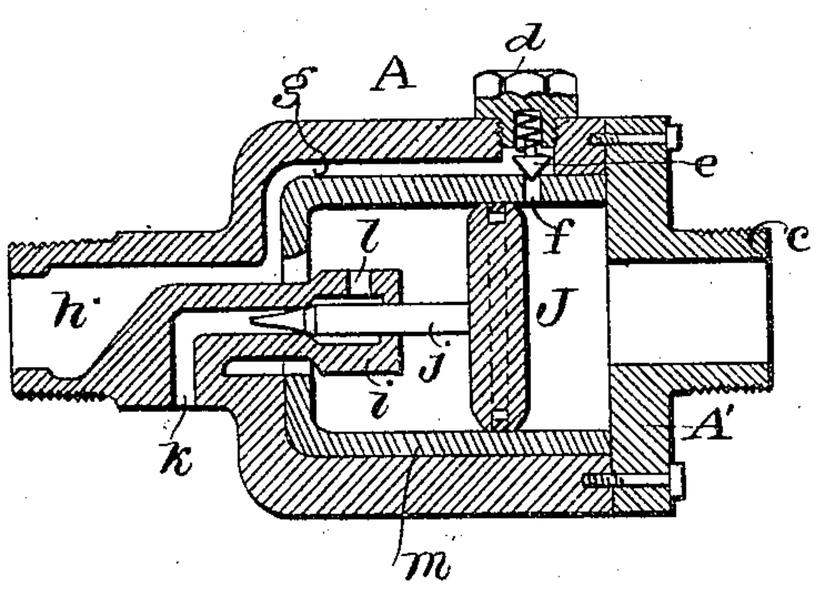


Fig. 3



WITNESSES

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AUTOMATIC AIR-BRAKE FOR CARS.

No. 841,636. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed March 24, 1906. Serial No. 307,812.

To all whom it may concern:

Be it known that I, WILLIAM JOHN DANKEL, a citizen of the United States, residing at Pittsburg, in the county of Crawford and State of Kansas, have invented a new and useful Improvement in Automatic Air-Brakes for Cars, of which the following is a specification.

My invention is in the nature of a novel construction of automatic air-brake for railway-cars which operates without the usual triple valve. It is an improvement upon that form of air-brake in which the piston-rod which actuates the brake-lever carries a piston, which piston is arranged to play between two air-chambers, the air-chamber on one side containing a body of compressed air, which in expanding applies the brake, and the air-chamber on the other side of the piston being connected through a special valve with the train-pipe, so that when the pressure within the latter is reduced by the engineer the pressure within the communicating air-chamber will be reduced and will allow the preponderating pressure in the air-chamber on the other side to expand and by advancing the piston apply the brakes.

My invention consists in a novel, simple, and practical construction operating upon the above-described principle, which I will now proceed to describe with reference to the drawings, in which—

Figure 1 is a side elevation of my complete apparatus. Fig. 2 is a longitudinal section through the same, and Fig. 3 is an enlarged sectional view of the inlet and discharge valve between the train-pipe and the communicating air-chamber in which the piston moves.

B is a cylinder cast in one piece with one closed end and with two projections G G, forming bolt connections for the attachment to the car.

B′ is a detachable head secured by bolts to the flanged and open end of cylinder B. The cylinder is formed interiorly with a rib, shoulder, or stop-lugs *b*, which mark the division of the cylinder into two chambers E and D. The chamber E is not turned or finished interiorly and is an air-chamber only. The chamber D is turned interiorly to form a smooth and accurate barrel, in which reciprocates a piston I. This piston is made in sections containing between them a packing that forms an air-tight fit against the inner walls of the barrel, and a piston-rod C connects centrally with the piston and also has an air-tight joint. The piston-rod C extends through a stuffing-box H in the cylinder-head with an air-tight joint and has a suitable coupling-head on its external end for connection with the brake-lever which applies the brakes.

At a point opposite the stop-lugs *b* of the cylinder there is cast on the cylinder an exterior projection in which is formed a by-pass *a*, which opens at one end into the chamber E and at the other end into the chamber D at a point behind the piston I when the latter is resting against the stop-lugs *b*. In this by-pass *a* is arranged a check-valve F, which opens from chamber D toward and into chamber E, but prevents the flow of air from the chamber E back into D.

A is a combined inlet and discharge valve, whose casing is preferably tapped into the removable cylinder-head B′. This valve connects at its outer end with the train-pipe leading to the engineer's cab and by a reduction of pressure in which pipe the valve A is influenced to vary the pressure within chamber D, and thus actuate the piston from the expansion of air in chamber E. The construction and operation of this valve are best seen in Fig. 3.

The outer casing is bottle-shaped, and its body portion has a brass lining *m*, which is retained in place by a detachable end A′, having a screw-threaded nipple *c*, adapted to connect with a branch of the train-pipe. The neck portion *h* of the casing is screw-threaded to connect with the head B′ of the cylinder, and within this neck is formed an inwardly-projecting core *i*, whose end enters the body of the casing in concentric relation thereto and is formed with a passage-way *k*, leading at one end to the outer air and with a lateral opening *l* near its inner end. This inner end is bored centrally to receive a valve-stem *j*, which is attached to and carried by a piston J, fitting the brass lining *m*. Between the brass lining *m* and the casing A there is formed a passage-way *g*, which opens at one end into the neck of the casing and at

the other end through a hole *f* in the brass lining into the end of the casing next to the train-pipe. A check-valve *e* is housed within a detachable plug *d* and allows air to pass from the opening *f* to passage-way *g*, but will not allow it to pass in the opposite direction. The end of the valve-stem *j* is made tapered, and the adjacent end of the passage-way *k* is turned to form a valve-seat coöperating therewith. The function of this valve is as follows: The neck *h*, being in communication with the chamber D and the thimble *c* being in communication with the train-pipe and the train-pipe pressure being, say, seventy pounds, the pressure of the train-pipe entering nipple *c* of the valve passes through opening *f*, valve *e*, passage-way *g*, and into chamber D of the cylinder, and thence through valve F and by-pass *a* into air-chamber E. There will therefore be seventy pounds pressure on both sides of piston I and through the whole system. If now an application of brakes is to be made, the engineer's valve is manipulated in the usual way to reduce pressure in the train-pipe, say, five pounds. This causes piston J to move outwardly, since it has sixty-five pounds on the outside and seventy pounds on the inside, and this movement causes stem *j* to move back and open communication between port *l* and passage-way *k* to the outer air. This allows the air in chamber D to gradually pass out through port *l* and passage-way *k*. The air-pressure in chamber D being thus reduced and that in chamber E being still at seventy pounds, (since check-valve F prevents any movement of air from E to D,) the piston I moves outwardly with sufficient energy to apply the brakes.

To release the brakes, the engineer increases the air-pressure in the train-pipe, and this pressure moves valve-piston J inwardly, closing the discharge-outlet *l k* from chamber D and opening port *f* and allowing the freshly-introduced air from the train-pipe to force valve *e* open and pass through passage *g*, and thence into chamber D, wherein its gradual accumulation forces the piston I back again to the lugs *b* in a position ready to apply the brakes again.

It will be seen that the air in chamber E at no time escapes and the engineer has not the power to destroy its air-cushion. He may, however, increase its effective pressure, when required, by simply increasing the pressure in the train-pipe, and this allows the increased pressure to flow through check-valve F and by-pass *a* for increasing the power of the brake or for compensating for any leakage from the chamber E.

It will be seen that the valve end of stem *j* of the discharge-valve is made tapering. This enables me to make a slow-service application of brakes or a quick-emergency application of brakes. Thus for a slow application of brakes the reduction of air-pressure in the train-pipe is slight, which moves the piston J of the discharge-valve but a little distance and causes the tapering end of the valve-stem *j* to leave its seat only a little distance, and consequently opens only a small annular space around the tapering end. If, however, there is a sudden and considerable reduction of air-pressure in the train-pipe, the piston J of the discharge-valve will quickly move its full stroke and by pulling the tapering stem *j* farther away from its seat opens a larger annular space around the tapering end, and by thus giving a full discharge of air from chamber D makes a quick and full movement of piston I and an emergency application of brakes.

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

1. An automatic air-brake apparatus, comprising a single cylinder with an interior stop projection marking the division-line of two air-chambers and having a by-pass with check-valve connecting the two chambers on opposite sides of the stop projections, one of said air-chambers being constructed as a smooth piston-barrel and having a detachable head with stuffing-box, a piston fitting said barrel and having its rod extending through the stuffing-box and adapted to connect with a brake-lever, and an inlet and discharge valve comprising a casing with a piston, one end of the casing being in open communication with the piston-barrel and the other with the train-pipe, and a discharge and cut-off device controlled by the movement of this piston and arranged to open one end of the casing to the atmosphere in one movement of the valve-piston and close it in the other movement, said casing having also a passage-way with check-valve opening around the piston from the outer end of the casing to the inner end of the same.

2. An air inlet and discharge valve for air-brakes, comprising a casing having one end provided with a connection for the brake-cylinder and the other end provided with a connection for the train-pipe and a passage-way with check-valve opening into the opposite ends of the casing, a piston within the casing having a central stem forming a valve, a concentric projection from the casing having a valve-seat receiving the said stem and an outlet passage-way to the atmosphere formed in said concentric projection.

3. An air inlet and discharge valve for air-brakes, comprising a casing having one end provided with a connection for the brake-cylinder and the other end provided with a connection for the train-pipe and a passage-way

with check-valve opening into opposite ends of the casing, a piston within the casing having a central stem bearing a tapering valve end, a concentric projection from the casing having a valve-seat receiving the tapering valve and an outlet passage-way to the atmosphere arranged to have its discharge-opening increased by the progressive outward movement of the piston.

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