(No Model.) 2 Sheets—Sheet 1.

# W. H. MASTERMAN.

## AIR BRAKE.

No. 504,227. Patented Aug. 29, 1893.

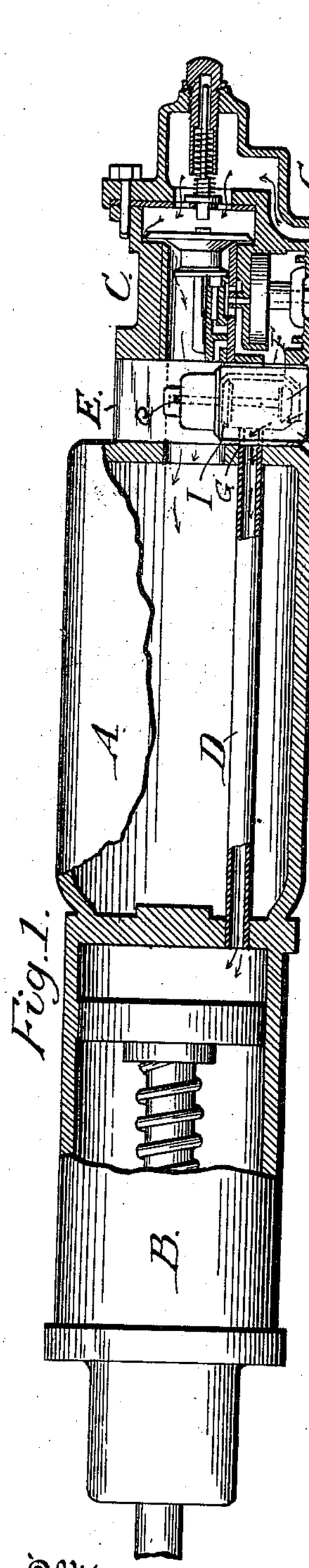


Fig. 1.

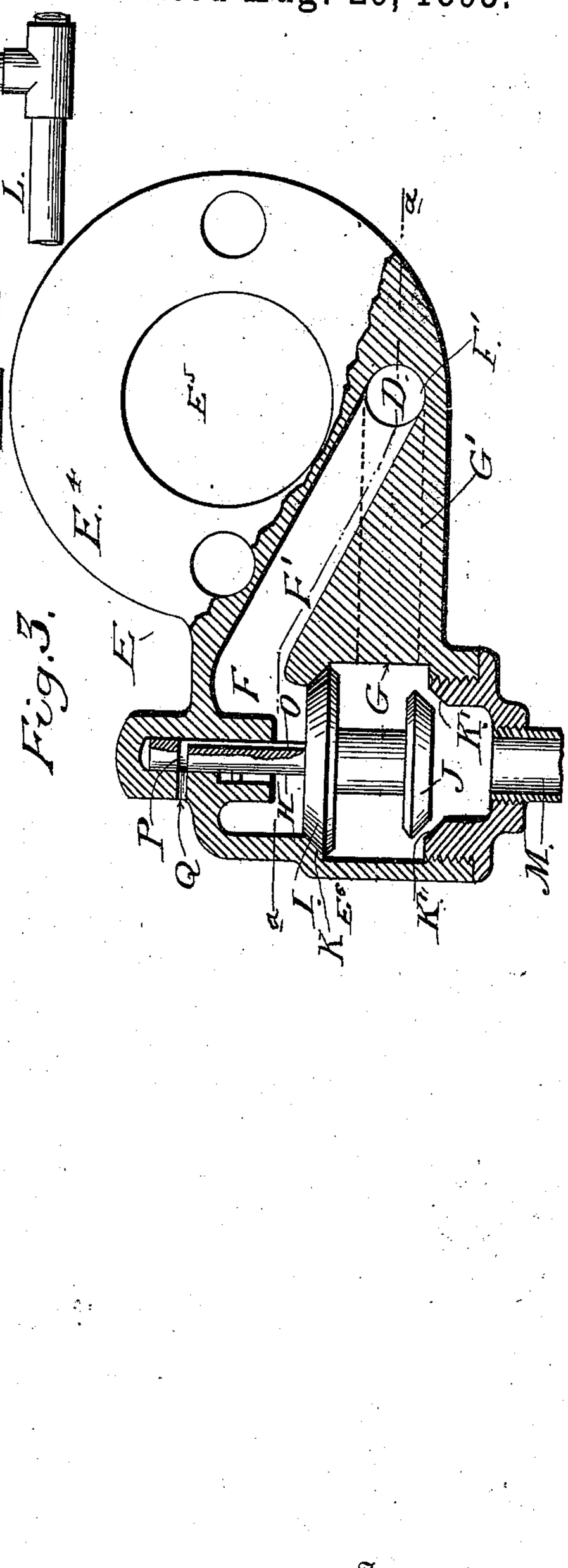


Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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## AIR BRAKE.

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Fig. 2.

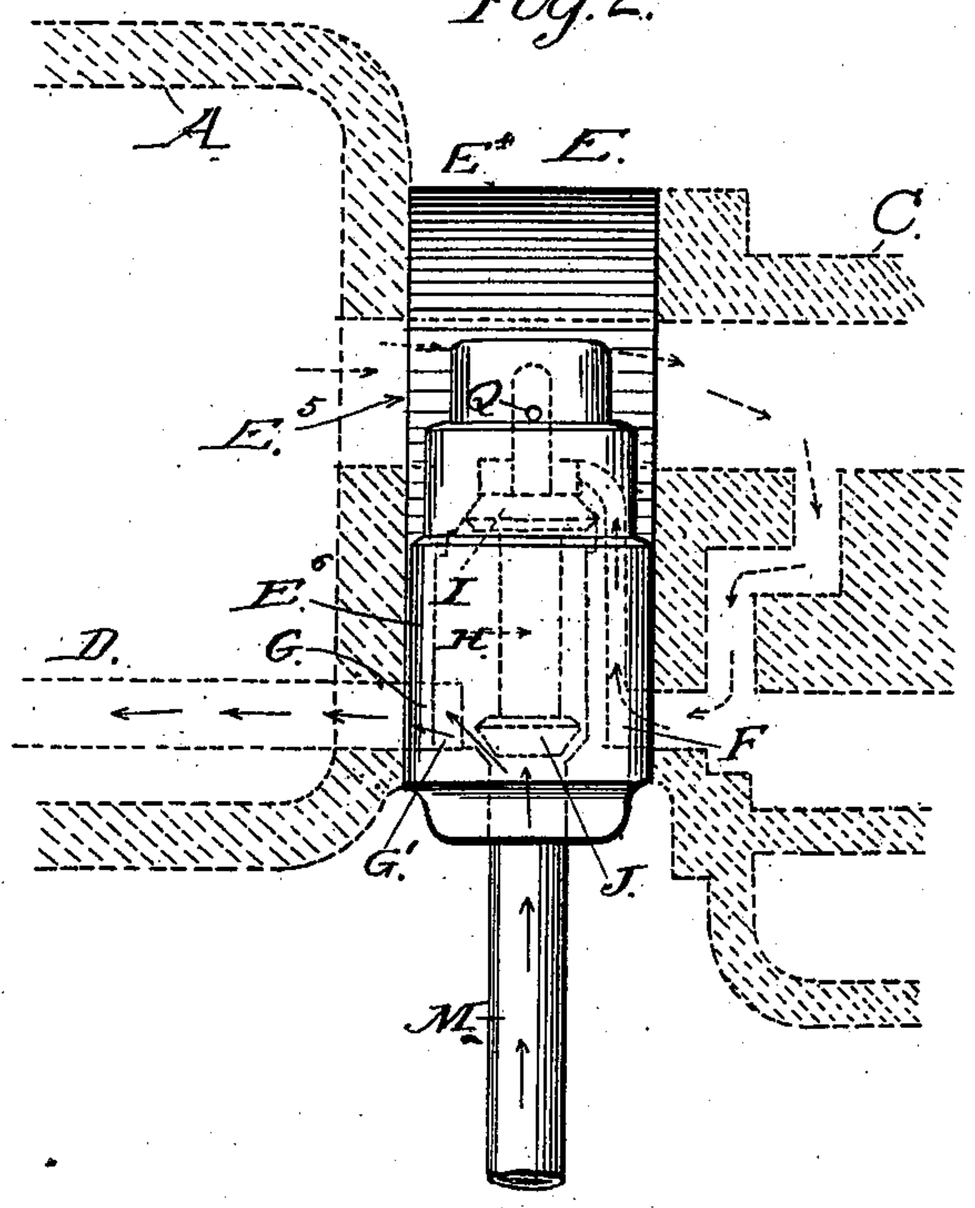
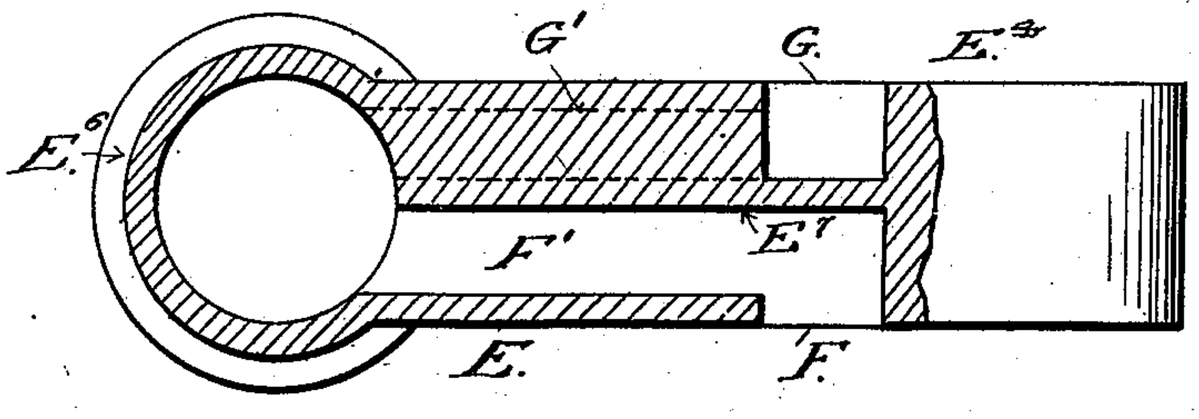



Fig. 4.




WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM H. MASTERMAN, OF OAKLAND, CALIFORNIA, ASSIGNOR OF ONE-HALF TO FREDERICK H. MYERS, OF SAME PLACE.

## AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 504,227, dated August 29, 1893.

Application filed January 11, 1892. Serial No. 417,699. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. MASTERMAN, a citizen of the United States, residing at Oakland, Alameda county, State of California, have invented an Improvement in Air-Brakes; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to certain improvements in air brakes, and it consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1, is a part sectional view and part elevation showing my auxiliary valve between the triple valve and auxiliary reservoir. Fig. 2, is an enlarged sectional view of my auxiliary valve showing the abutting ends of the triple valve casing and auxiliary reservoir. Fig. 3, is an enlarged part section and part elevation of my auxiliary valve. Fig. 4, is a horizontal section on line *a a* of Fig. 3.

A is the auxiliary air reservoir which is situated beneath each car that is provided with automatic air brake mechanism.

B is the brake cylinder, and C is the casing containing what is known as the triple valve through which air is supplied to the auxiliary reservoir from the main reservoir upon the engine, and through which air passes from the auxiliary reservoir to the brake cylinder by means of the pipe D which in the present case is shown extending through the auxiliary reservoir, the brake cylinder being in line with this air reservoir in the construction here shown.

Difficulty is always experienced with the automatic brakes when running down long grades by reason of the necessity of replenishing the auxiliary air reservoirs upon the car from time to time, and with the usual construction of the valve mechanism, it is necessary to relieve the pressure upon the piston in the brake cylinder while the air reservoir is being pumped up. This is usually done by taking advantage of levels or up grades, if such occur, or by bringing the train nearly to a standstill and supplying air from the main reservoir, so as to partially replenish the auxiliary reservoir before the train has attained so high a speed as to become uncontrollable, when the brakes must again be applied.

In my invention I have shown a supplemental valve casing E located between the ends of the triple valve casing and auxiliary reservoir, the said casing having smooth flat sides at its head portion $E^4$ whereby it may be securely seated between the adjoining ends of the triple valve casing and auxiliary reservoir, and having an opening $E^5$ in communication with said triple valve casing and auxiliary reservoir. The supplemental casing E is extended at one side beyond the plane of the exterior of the triple valve casing and is formed with a hollow head $E^6$ into which a pipe M leads from a train pipe.

Within the head portion $E^6$ of the casing E seats K and K′ are formed for valves I and J hereinafter mentioned, and in the upper portion of this head a suitable guide is formed for the stem which carries said valves. The supplemental casing E is also formed with a web or partition $E^7$, see Fig. 4, upon one side of which a passage F′ is formed, and upon the opposite side another passage G′ is formed; the said passage F′ having a port F made through one of its flat sides and communicating with a passage in the triple valve casing, and thence extending upwardly and communicating with the hollow head $E^6$ at a point above the upper valve I, while the other passage G′ extends in an approximately horizontal line and enters the said head $E^6$ at a point below said valve I, and has port G extending through the opposite flat side of casing E, and is in communication with the pipe D which leads to the brake cylinder for supplying air thereto.

H is the valve stem guided to move vertically in the upper part of the head $E^6$ of this valve casing. I is the upwardly closing valve fixed to this stem and closing against the corresponding seat K as shown.

J is the downwardly closing valve of smaller area than valve I fixed to the same stem and closing upon the seat K′ in the lower part of the chamber. These valves are fixed upon the stem at such a distance apart that when one is open, the other will be closed.

L is the pipe conveying air from the main

train pipe upon the engine to the triple valve, and through it to the air reservoir A.

M is a supplementary train pipe extending throughout the train connecting with each of the valve casings E and having an independent controlling valve and supplied with air from the engine.

The operation of my invention is as follows:—The auxiliary reservoirs A are supplied with air under pressure from the engine through the triple valve, in the usual manner, and this pressure is always ready for the instant application of the brakes, when necessary, in the usual manner. As soon as the brake has been applied, and the brake cylinder B is filled with air from the auxiliary reservoir A, the engineer's valve which controls the supply of air to the pipe M is opened, and air is led directly from the main reservoir upon the engine through the pipe M and into the lower part of the head $E^6$ of valve chamber E. A pressure is thus produced greater than the pressure in the brake cylinder A and the valve J is lifted from its seat. At the same time, the valve I will be closed against its seat, thus cutting off communication between the auxiliary reservoir and the pipe D which usually takes place through the passages of the triple valve. The air which passes in beneath the valve J will pass directly to the pipe D through the passage G′ and thence into the brake cylinder, thus keeping up as great a pressure as may be desired. Within this cylinder, and as long as the train is running, this direct pressure is kept up independent of the automatic apparatus. Meanwhile the pump may be at work, and the air reservoirs kept constantly full. The brakes are always applied in the first instance by the use of the triple valve, and the auxiliary air reservoirs, and this supplemental device is only used to keep up the pressure in the brake cylinder after the brake has been applied. Whenever the valve controlling the air which passes direct through the pipe M is shut, the train pipe pressure reduced, and the triple valve brought into position to allow a free passage of air from the auxiliary reservoir to the valve I, the pressure in the auxiliary reservoir overcomes that within the pipe M, and the valve I by reason of its greater area will be forced open and the valve J closed. This leaves the ports F and G again in communication through the air passages F′ and G′, and the brake cylinder and brake mechanism are again under the control of the automatic brake mechanism. It will thus be seen that by reason of this supplemental valve and independent direct air supply mechanism in conjunction with the automatic brake mechanism, I am enabled to apply the brakes independently by the use of the automatic mechanism, then to cut this off and keep up or increase the pressure within the brake cylinders as long as may be desired by the independent air supply from the engine. In order to prevent such a pressure upon the valve I as would open it against the pressure upon the valve J by reason of leakage through the triple valve, I have made a small groove or channel O in one side of the valve stem H, where it extends up into the guide channel in the upper part of the head $E^6$ of the valve casing E. At its upper end this channel connects with a groove P which is cut around the upper part of the stem and through this groove communication is made with a small opening Q leading to the open air. These openings are exceedingly small and will not allow any considerable quantity of air to escape, but will prevent any accumulation or pressure above the valve I when the latter is closed. When the valve I is open, and the valve J is closed, it will be seen that the groove P will be below the line of the opening Q, and will thus prevent the escape of air through the opening Q when air is being used from the reservoir through the ports F and G. As the groove O upon the side of the stem H is upon the opposite side from the opening Q, it will be manifest that the pressure upon that side will force the stem closely against the opposite side of the opening in which it moves, and will practically keep the opening therein closed against any leakage around the stem while the valve I is open.

A vertical slot may be made in the stem H, and a pin or key project into it through the side of the valve casing to prevent the valves and valve stem from turning around during its movements.

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

1. The combination with the brake cylinder, air reservoir, and triple valve of a brake mechanism, of a supplemental casing adapted to be interposed between the adjoining faces of the triple valve casing and the reservoir, and having an extended portion terminating in a hollow head, said supplemental casing having independent passages formed in it leading into said head at points near its upper and lower ends and having ports leading through its sides, one of said ports communicating with the triple valve casing and the other with a pipe leading to the brake cylinder, a valve stem guided in the extended head portion of the supplemental casing having valves of different areas adapted to close against the seats in said head portion, one of said valves closing upwardly and the other downwardly, and a straight air supplemental pipe entering the extended head portion of the supplemental casing below the lower valve, whereby the lower valve may be lifted from its seat to open communication with one of the passages in the supplemental casing, and with the pipe leading to the brake cylinder, substantially as herein described.

2. The combination with the brake cylinder, air reservoir, and triple valve of a brake mechanism, of a supplemental casing adapted to be interposed between the adjoining faces

of the triple valve casing and the reservoir, said supplemental casing being extended at one side and formed with a hollow head in said extended portion, and provided with independent passages entering said head at points near its upper and lower end, with ports at the opposite ends of the passages, opening through opposite sides of the supplemental casing, communicating respectively with the triple valve casing, and with a pipe leading to the brake cylinder, upwardly and downwardly closing valves fixed to a single valve stem, and having different areas, a straight air supplemental pipe entering the head below the lower valve whereby the valves may be raised to close communication with the passage leading to the triple valve casing and to open communication between the straight air pipe and the passage leading to the brake cylinder, a channel in the upper part of the head in which the upper end of the valve stem is guided, an opening from the upper part of said channel to the open air, and a groove made upon the side of the valve stem connecting the upper part of the valve chamber with the opening, substantially as herein described.

In witness whereof I have hereunto set my hand.

WILLIAM H. MASTERMAN.

Witnesses:
GEO. H. STRONG,
S. H. NOURSE.