W. B. MANN.

HIGH SPEED BRAKE.

APPLICATION FILED MAR. 12, 1903. RENEWED JAN. 10, 1906.

912,392. Patented Feb. 16, 1909.

FIG. 1.

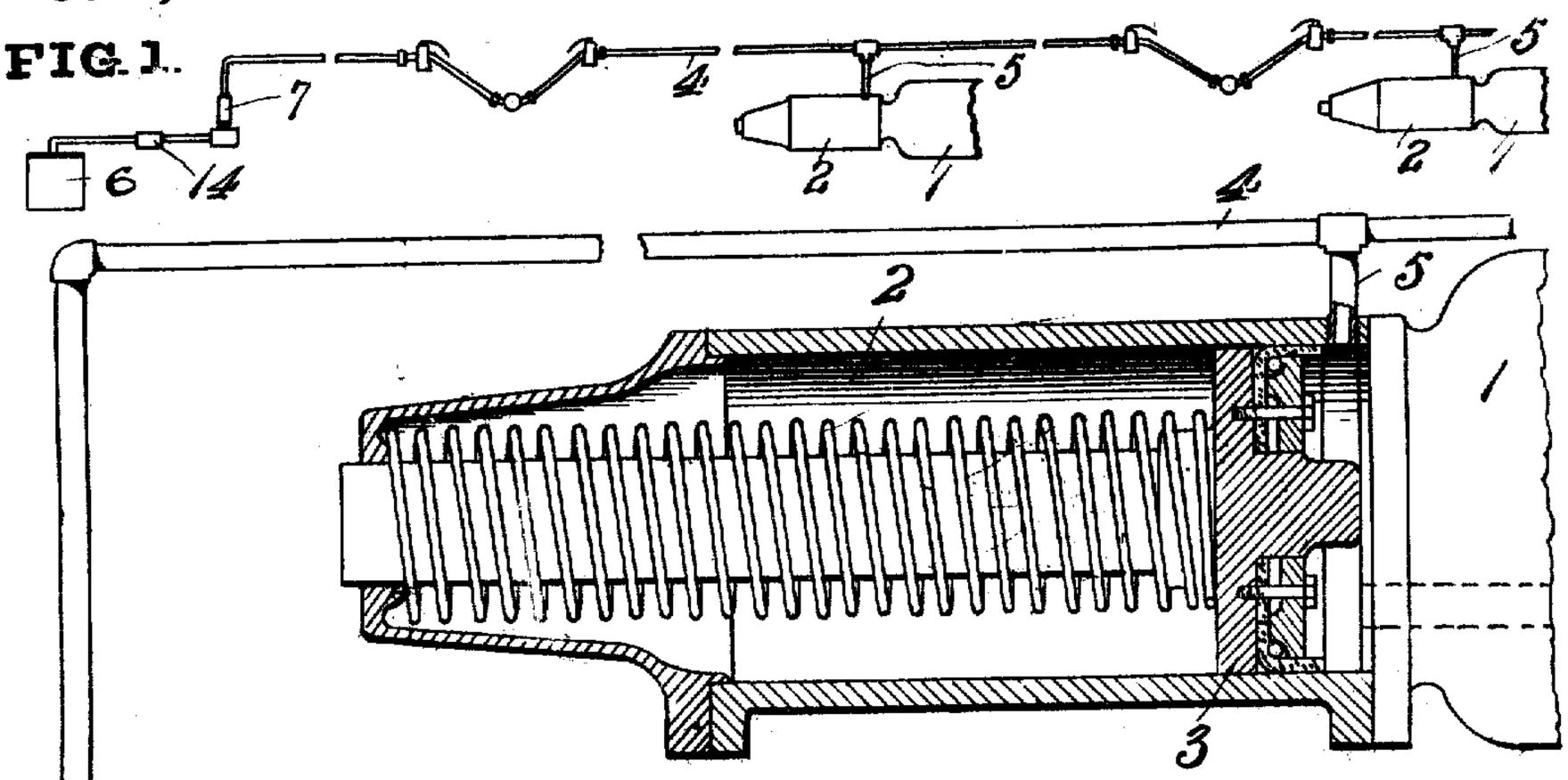
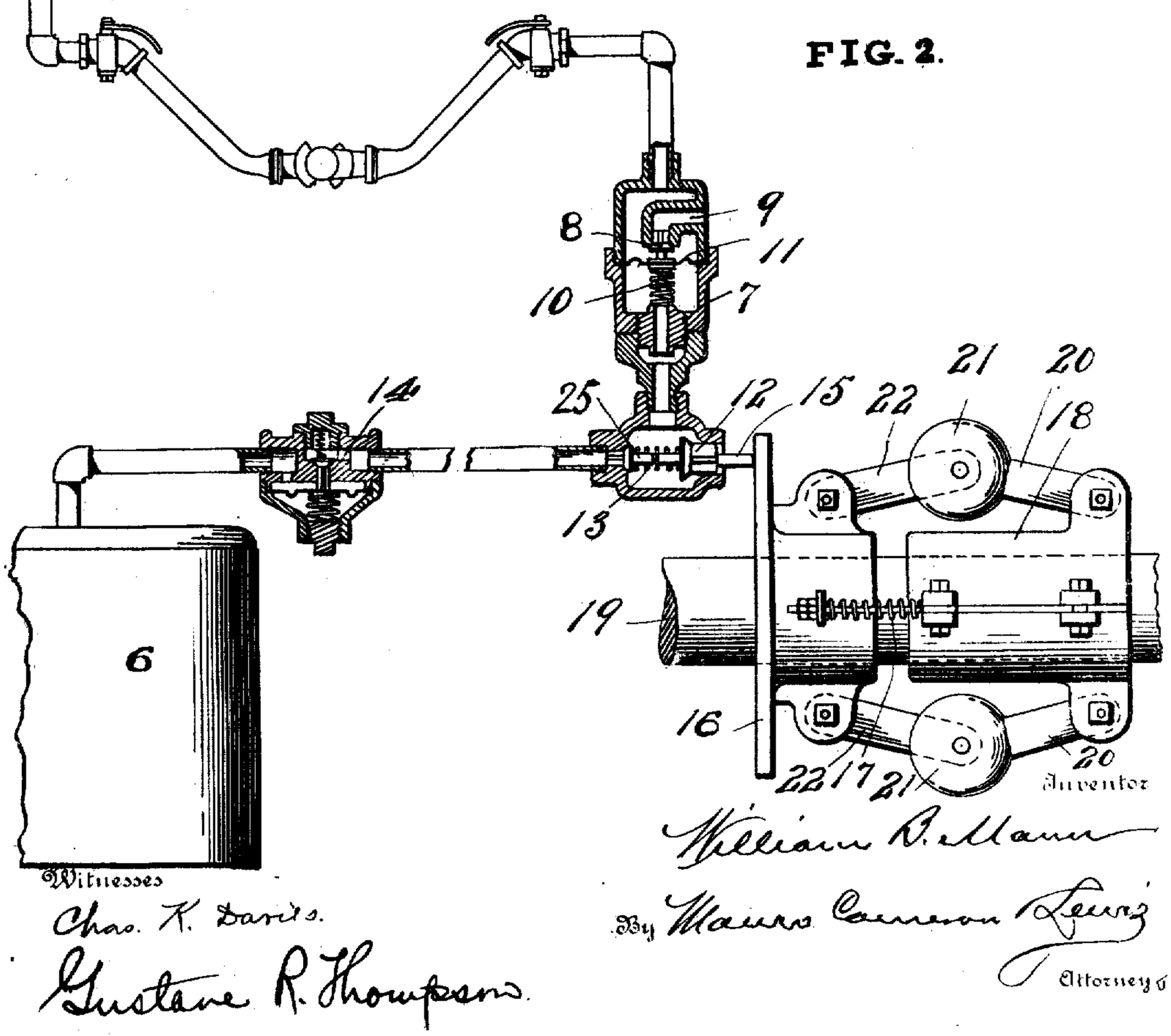


FIG. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM B. MANN, OF BALTIMORE, MARYLAND, ASSIGNOR TO AMERICAN AIR-BRAKE COMPANY, A CORPORATION OF NEW JERSEY.

HIGH-SPEED BRAKE.

No. 912,392. Specification of Letters Patent. Patented Feb. 16, 1909.

Application filed March 12, 1903, Serial No. 147,483. Renewed January 10, 1906. Serial No. 295,483.

To all whom it may concern:

Be it known that I, WILLIAM B. MANN, of Baltimore, Maryland, have invented a new and useful Improvement in High-Speed Brakes, which invention is fully set forth in the following specification.

This invention relates to high speed brakes for railway trains, and more particularly to that class of high speed brakes in which a high pressure is admitted to the brake cylinder upon the initial application of the brakes, and subsequently the pressure in the brake cylinder is permitted to decrease.

In my application Sr. No. 146,410, filed March 5, 1903, I have shown a high speed brake wherein the high pressure is retained in the brake cylinder until the speed of the train is decreased to a predetermined rate, after which the pressure in the brake cylinder is permitted to escape until a predetermined brake cylinder pressure has been attained, after which the pressure remains constant until the brakes are released.

The present invention is designed as an improvement upon, or an advance step over, the construction shown in my aforesaid application. By that construction a device was provided on each car, which was controlled by the speed of the car for maintaining the relief valve to the brake cylinder closed against the high pressure in the brake cylinder. This required a separate speed-controlling device for each brake cylinder.

The present invention, broadly stated, consists of the usual or any desired auxiliary reservoir and brake cylinder, connected up in the usual way with a train pipe and the triple valves, and in addition to the regular train-pipe I provide a supplemental train-pipe which is connected by a direct passage with the brake cylinder in front of its piston. This supplemental train-pipe leads forward to the main drum on the engine, and is provided with a relief valve which is normally closed by a load spring adjusted so as to always bring a predetermined amount of load upon the spring. A diaphragm or other movable abutment is interposed in the relief valve casing so as to effectually and at all times prevent the passage of air from one side to the other thereof, and the abutment is connected to the relief valve and causes said valve to move with it. One side of this diaphragm or abutment is exposed to pressure in the supplemental train-pipe on the main drum side thereof, which pressure is controlled by a reducing valve in the supplemental train-pipe interposed between the main drum and the relief valve casing, so that any desired pressure may be brought to bear upon the diaphragm or piston to aid the load spring in holding the relief valve to its seat; and on the other side the diaphragm is exposed to brake cylinder pressure. On the main drum side of this shiftable diaphragm or abutment, the supplemental train-pipe is provided with a valve controlling a port leading to the atmosphere, which valve is held closed whenever the speed of the train exceeds a predetermined rate, but which is opened by speed-controlled devices whenever the speed of the train is slackened below such predetermined rate; so that, whenever high speed pressure is introduced into the brake cylinders while the train is moving beyond the predetermined rate—say of 40 miles an hour—no air is allowed to escape from the brake cylinders; but when the high braking pressure has so far reduced the speed of the train as to render it possible that the high braking pressure might cause the wheels to slide, the atmospheric valve in the supplemental pipe is automatically opened and the pressure escapes from the brake cylinders via the relief valve, this being rendered possible by reason of the fact that the brake cylinder pressure exceeds the tension of the load spring on the relief valve, the power of which is now unaided by the pressure in the supplemental pipe on the main drum side of the diaphragm or other moving abutment.

One advantage of having the air escaping from the brake cylinders pass through the supplemental train-pipe to the engine before finally escaping to the atmosphere, lies in the fact that, for a long train having great momentum, the escape will be slower than with a single car or a short train having less momentum, thereby effecting a smoothness and evenness of braking action by avoiding a too sudden reduction of braking pressure on a train having great momentum.

The inventive idea is illustrated in the accompanying drawing, but such drawing is for the purpose of illustration only, and is not designed to be anything more than illustrative of one mechanical expression which may be given to the invention.

In said drawings, Figure 1 is a diagrammatic view; and Fig. 2 is a vertical section of the invention.

Referring to the drawings, 1 is the auxiliary reservoir, 2 is the brake cylinder, and 3 the brake cylinder piston.

4 is a supplemental train-pipe connected by branches 5 with each of the brake cylinders at a point in front of the piston 3. This supplemental train-pipe 4 leads to the main air drum 6 on the engine, and has interposed therein a relief valve casing 7, wherein is a relief valve 8 controlling a relief port 9 leading to the atmosphere, and provided with a load spring 10 tending to seat it so as to close the relief port 9. Interposed in the valve casing 7 so as to form an air-tight partition therein, is a movable abutment, here shown in the form of a diaphragm 11, which is connected to the valve 8. The casing 7 is provided on the main drum side of the diaphragm 11 with a vent valve 12 leading to the atmosphere, which valve is held closed by a spring 13 aided by the pressure proceeding from the drum 6 via the reducing valve 14. After the air passes the reducing valve 14 it enters the valve casing 7 past a valve 25 whose stem is in alinement with that of vent 12, the spring 13 operating to press the two valves in opposite directions. The valve 12 is provided with an outwardly projecting stem 15 adjacent to which is a disk 16 shiftable towards and away from the stem 15. This disk 16 is actuated by a spring or springs 17 which tend to force it against the valve stem 15 to open valve 12, the spring re-acting between an abutment on the disk 16 and some other fixed part, as collar 18 attached to and revolving with some revolving part of the engine, as the axle 19. On this collar are pivoted arms 20, provided with weights 21 at their extremities and connected by links 22 with the sliding disk 16. When the train is moving at a sufficient speed, the centrifugal action of the weights 21 withdraws the disk 16 from contact with the pin 15, overcoming the tension of the spring 17, thereby permitting the spring 13, aided by the pressure in the valve casing, to seat the valve 12, pressure flowing into the casing past valve 25. The relief valve 8 is therefore held closed by the combined energy of the load spring 10 and the air pressure on the diaphragm. If now the speed of the train slackens below a predetermined rate, the spring 17 overcomes the centrifugal force of the weights 21 and advances the disk 16 against the pin 15, thereby opening vent valve 12 and closing valve 25, to prevent waste from the main drum. The relief valve will then be held to its seat solely by the pressure due to its load spring 10.

If the train be running at a high speed—say 60 miles an hour—and the pressure in the auxiliary reservoirs be such that upon an emergency application of the brakes it will equalize in the brake cylinders at some high point—say 70 pounds, for example—the valve 12 will be held closed by its spring and the air pressure behind it, because the governor device in the form of the weights 21 withdraws the disk from the projecting valve stem 15. If now an emergency application of the brakes be made, a pressure of 70 pounds will be introduced into the brake cylinder and the supplemental train-pipe, which pressure will act against diaphragm 11 and tend to open the relief valve 8, but will be resisted and overcome by the load spring 10, aided by the air pressure on the same side of the diaphragm as the spring, and the relief valve will therefore remain seated. When the speed of the train has been slackened to a predetermined point (say 40 miles an hour), the spring or springs 17, if more than one is used, will advance the disk against the projecting pin 15 of the valve 12 and open it and close valve 25, thereby venting air from the relief valve casing and leaving the load spring 10 as the only resistance against the pressure of 70 pounds tending to open the relief valve, and the valve will therefore be opened and the pressure will escape from the brake cylinders until the pressure in these cylinders is decreased to any desired point, which will be determined by the power of the load spring 10. Assuming that, when the train has been slackened to a speed of 40 miles an hour, it is desirable to reduce the braking pressure in the brake cylinders to say 55 pounds, the load spring 10 will be so tensioned as to close against any pressure on the opposite side of the diaphragm of 55 pounds or less, so that when the brake cylinder pressure has been reduced to 55 pounds the relief valve 8 would automatically close and thereafter the pressure in the brake cylinders would remain constant until the brakes were relea ed.

In case but a single car is employed, it will be observed that the pressure passing from the brake cylinder to the relief valve would have but a short distance to travel, whereas with a long train of cars this pressure would have a much longer distance to travel than in a single car, the distance being equal to the length of the train and, generally speaking, proportional to the momentum of the train, so that the escape from a long train would be more gradual than from a short train. This would enable the action of the relief valve to be, in a degree at least, proportioned to the momentum of the train on which it was acting and would thereby avoid any sudden decrease of braking pressure and jerking action of the brakes.

It will be understood that the diaphragm 11 is shown merely as one form of shiftable partition, and that other forms, as a reciprocating piston, for example, might be em-

ployed. Moreover, it will be apparent that that portion of the casing 7 which contains the relief valve 8 and diaphragm 11, need not necessarily be located in the supplemental train-pipe, immediately adjacent to the vent valve 12. The relief valve and its diaphragm may be located at any convenient point in the supplemental pipe or its branches, it being only necessary that the relief port be on the brake cylinder side of the shiftable partition or diaphragm 11, and that the other side of said partition or diaphragm be ventable via valve 12 controlled by the speed of the train. If desired, a relief valve and diaphragm might be provided for each brake cylinder and located in the branch pipe 5, but I prefer the arrangement herein shown as being simpler, cheaper, and less liable to get out of order, and involving less labor of inspection and cleaning. Furthermore, while I have shown the air pressure for assisting the load spring 10 in holding the relief valve to its seat as being drawn from the main air drum on the engine, it is not to be understood that the invention is limited to this construction, since any suitable source of air pressure may be employed.

The term "relief valve" as herein used is not meant to include the ordinary exhaust valve found in connection with triple valve mechanism for exhausting the air pressure from the auxiliary reservoir to release the brakes. This term "relief valve" is rather used herein to indicate a valve whereby the high pressure in the brake cylinder may be relieved while still maintaining a pressure in the brake cylinder adequate to apply the brakes in proportion to the diminished speed of the train.

What is claimed is:

1. In an air brake, the combination of a brake cylinder, a relief valve therefor, an air reservoir and means subject to pressure from the reservoir to hold said valve closed

2. In an air brake, the combination of a brake cylinder, a relief valve therefor, the main air drum on the engine, and means subject to pressure from the main drum to hold said valve closed.

3. In an air brake, the combination of a brake cylinder, a relief valve therefor, a power device tending to close said valve, an air reservoir, and a shiftable member connected to said valve and exposed to pressure from the reservoir on one side and to brake-cylinder pressure on the other.

4. In an air brake, the combination of a brake cylinder, a relief valve therefor, a power device tending to close said valve, an air reservoir, a shiftable member exposed to pressure from the reservoir on one side and brake-cylinder pressure on the other side, and means venting the reservoir pressure therefrom when the speed of the train is below a predetermined rate.

5. In an air brake, the combination of a brake cylinder, a relief valve therefor, a power device tending to close said valve, an air reservoir, a diaphragm connected to said valve and exposed to pressure from the reservoir on one side and brake-cylinder pressure on the other.

6. In an air brake, the combination of a brake cylinder, a relief valve therefor, a power device tending to close said valve, an air reservoir, a diaphragm connected to said valve, and exposed to pressure from the reservoir on one side and brake-cylinder pressure on the other, and speed controlled means for venting the reservoir pressure from the diaphragm.

7. In an air brake, the combination of a brake cylinder, and a relief valve therefor, with the main air drum on the engine, a conduit leading from said drum to the relief valve casing, and a shiftable member closing said conduit and connected to the relief valve.

8. In an air brake, the combination of a brake cylinder, and a relief valve therefor, with the main air drum on the engine, a conduit leading from said drum to the relief valve casing, a shiftable member closing said conduit and connected to the relief valve, and automatically operated means venting said conduit.

9. In an air brake, the combination of a brake cylinder, and a relief valve therefor, with the main air drum on the engine, a conduit leading from said drum to the relief valve casing, a shiftable member closing said conduit and connected to the relief valve, and speed controlled means venting said conduit.

10. In an air brake, a plurality of brake cylinders, a supplemental train pipe, connections between said train pipe and each brake cylinder, a relief valve in said pipe, a power device normally holding said relief valve closed against pressure in the brake cylinders, and speed controlled means reducing the force of said power device below brake cylinder pressure.

11. In an air brake, the combination of a plurality of brake cylinders, a relief valve common to said cylinders, and means normally holding said valve closed against brake cylinder pressure.

12. In an air brake, the combination of a plurality of brake cylinders, a relief valve common to said cylinders, and speed controlled means normally holding said valve closed against brake-cylinder pressure.

13. In an air brake, the combination of a plurality of brake-cylinders, a relief valve common to said cylinders, means holding the relief valve closed against high speed pressure in the brake cylinders, and devices operating to relieve said valve and permitting it to open under brake-cylinder pressure

when the speed of the train has decreased to a predetermined rate.

14. In an air brake, the combination of a plurality of brake cylinders, a relief valve common to said cylinders, a shiftable member connected to said valve, a source of fluid pressure, and a conduit leading therefrom to said shiftable member, whereby the latter is acted upon to hold the relief valve to its seat against brake-cylinder pressure.

15. In an air brake, the combination of a plurality of brake cylinders, a relief valve, a relief valve chamber, a conduit vented through said relief valve chamber and connected to each of the brake cylinders, a movable partition in said chamber operatively connected to said relief valve on one side, a conduit leading to a source of fluid pressure on the other side, and speed controlled means venting said last mentioned conduit.

16. In an air brake, the combination of a relief valve chamber having a relief port, a movable partition in said chamber, a relief valve operatively connected thereto, means acting to close said valve against a predetermined low braking pressure in the brake cylinders, a conduit connecting said cylinders with the valve chamber on the relief port side of said partition, a source of fluid pressure leading to the opposite side of the partition, and speed controlled means venting the pressure from said last mentioned side of said partition.

17. In an air brake, a brake cylinder, a relief valve, a shiftable member operatively connected to said valve and exposed on one side to brake cylinder pressure, and on the other side to reservoir pressure, a check valve in the conduit leading to the reservoir, and speed controlled means closing the check valve and venting the reservoir pressure from said shiftable member.

18. In an air brake, a plurality of brake cylinders a relief valve, a relief conduit leading from one side of said valve to the brake cylinders, a pressure conduit leading from the other side of the valve to a pressure reservoir, and means venting said pressure conduit when the speed of the train is less than a predetermined rate.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM B. MANN.

Witnesses:
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S. T. CAMERON.