3 Sheets—Sheet 1.

(No Model.)

J. E. LOUGHRIDGE.

POWER ACTUATED BRAKING MECHANISM FOR RAILROAD CARS.

No. 422,237. Patented Feb. 25, 1890.

FIG. 2.

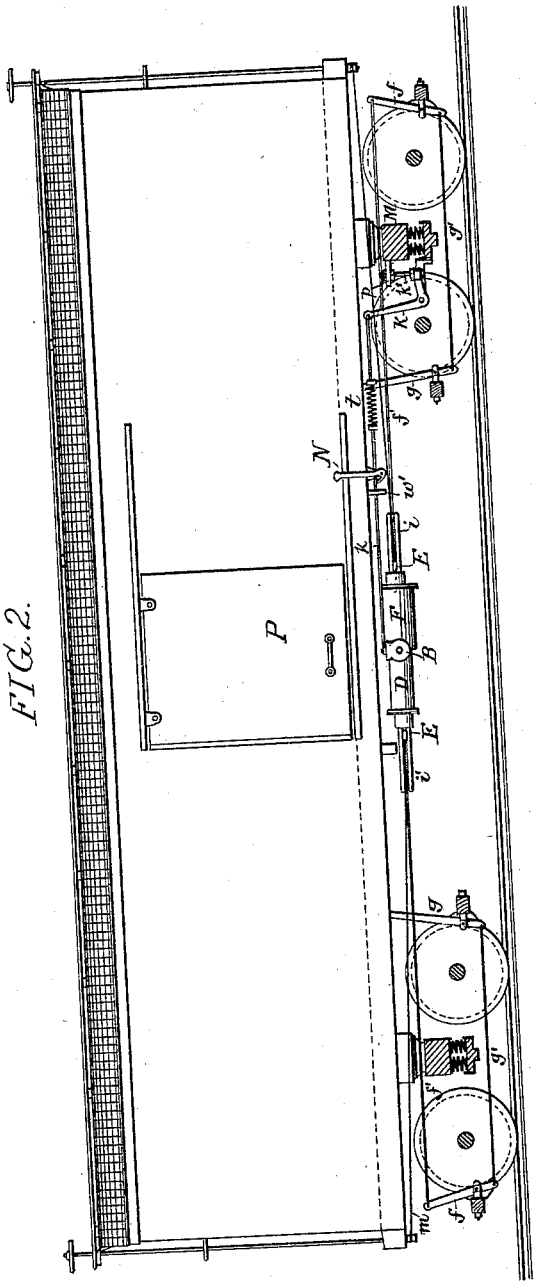
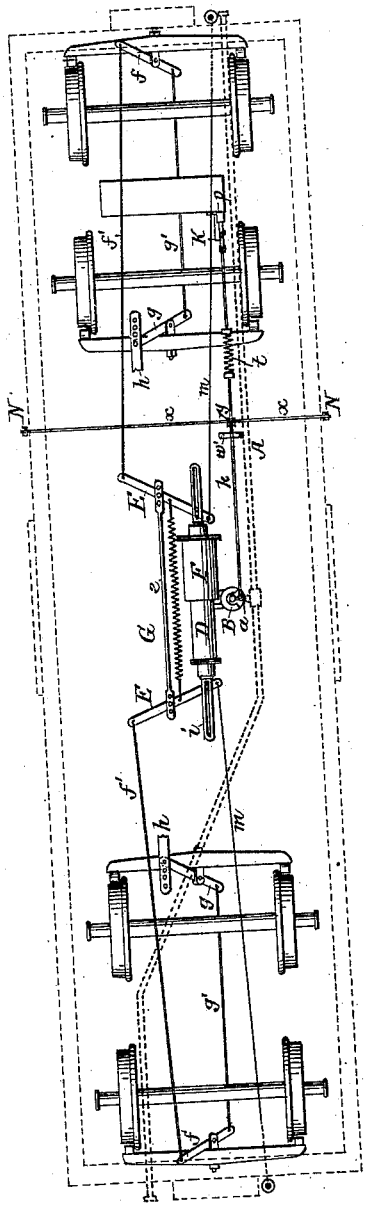


FIG. 1.



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William D. Bowser.

Inventor:
Jacob E. Loughridge
by his Attorneys
Howson & Howson

(No Model.) 3 Sheets—Sheet 2.

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FIG. 4.

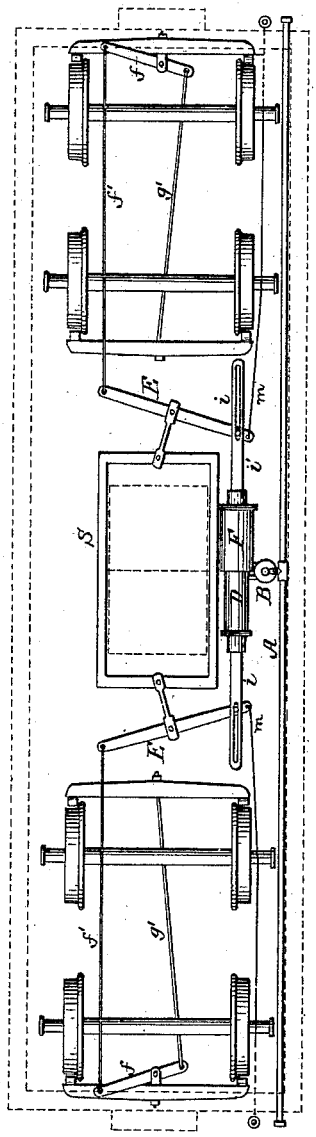

FIG. 14.

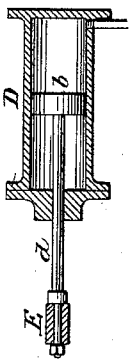

FIG. 3.

FIG. 10.

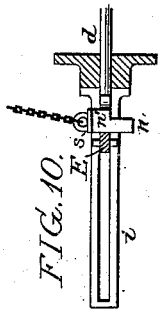

FIG. 9.

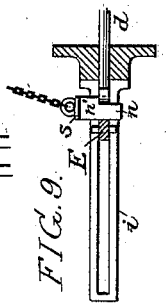

FIG. 8.

FIG. 11.

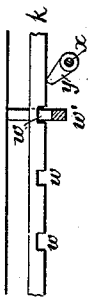

FIG. 12.

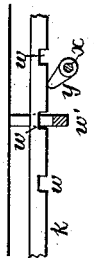

FIG. 13.

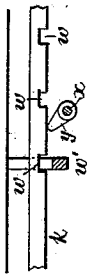

FIG. 5.

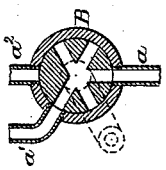

FIG. 6.

FIG. 7.

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FIG. 15.

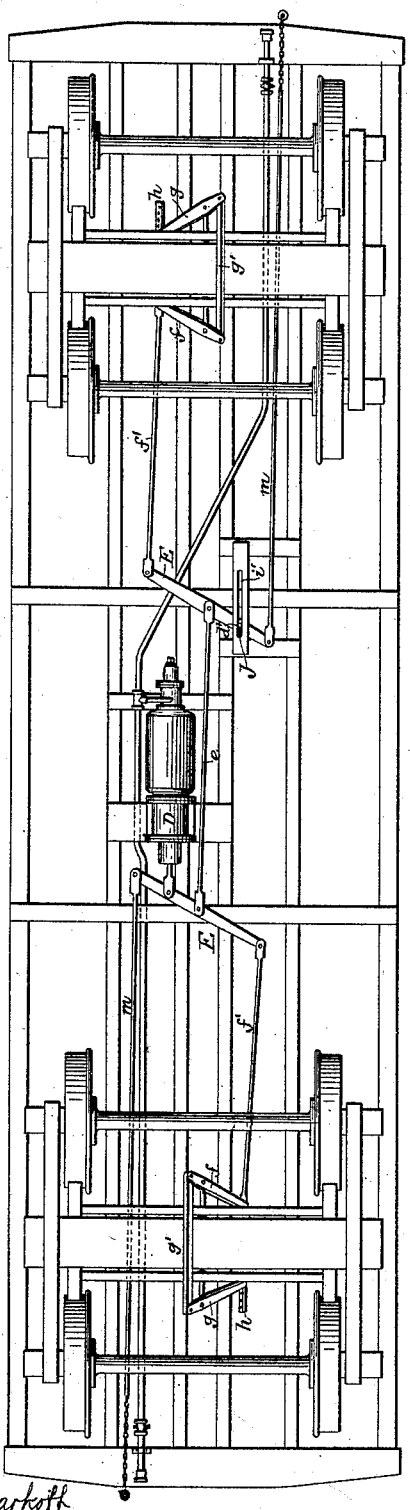


FIG. 17.

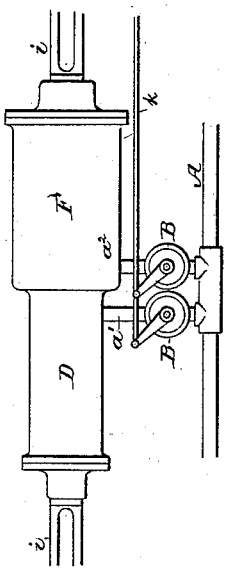
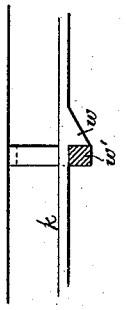


FIG. 16.



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UNITED STATES PATENT OFFICE.

JACOB E. LOUGHRIDGE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE LOUGHRIDGE BRAKE AND CAR COMPANY, OF NEW JERSEY.

POWER-ACTUATED BRAKING MECHANISM FOR RAILROAD-CARS.

SPECIFICATION forming part of Letters Patent No. 422,237, dated February 25, 1890.

Application filed August 8, 1889. Serial No. 320,121. (No model.)

To all whom it may concern:

Be it known that I, JACOB E. LOUGHRIDGE, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Power-Actuated Braking Mechanism for Railroad-Cars, of which the following is a specification.

My invention consists, mainly, of an improvement in or addition to the air-brake for railroad-cars for which Letters Patent No. 368,842 were granted to me on the 23d day of August, 1887, one object of my present improvement being to render said device more compact than before, a further object being to provide for automatically regulating the power of the brakes to accord with the light or loaded condition of the car, and still further objects being to prevent undue wear of the pistons, to readily take up the slack due to wear of the brake-shoes, and to so construct the brake mechanism that brakes may be applied to the wheels of both trucks or to wheels at both ends of that class of cars having central hoppers, depressions, or delivery-openings. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of sufficient of the running-gear and brake mechanism of a railroad-car to illustrate my invention. Fig. 2 is a side view of the car and braking mechanism, with the trucks in section. Fig. 3 is an enlarged section of the differential brake-cylinders and their attachments. Fig. 4 is a diagram illustrating the construction of the brake when applied to hopper-cars, and Figs. 5 to 17 are detached views illustrating certain details of construction or modifications of the invention.

A is the pressure-pipe, common to all of the cars of the train which are equipped with the brakes, this pipe being, by preference, one into which air under pressure is permitted to pass from a reservoir on the engine when the brakes are to be applied, as is usual in what are known as "straight-air" brakes, although the pipe may, if desired, be one in which, as in the "automatic air-brake" system, the pressure is reduced, so as to cause the operation of a valve, whereby air is permitted to flow into the brake-cylinder from a reservoir on the under side of each car through a pipe, which thus becomes the pressure-supply pipe for the power-cylinder; or the pipe A may be one in which a partial vacuum is produced for the purpose of causing the application of the brakes.

In the construction shown in the drawings the pipe A is a straight-air pipe and has a branch a, which communicates with the casing of a valve B, the latter also communicating through pipes a' and a^2 with two cylinders D and F, the former of less diameter than the latter, and the valve may be such as to direct the air to either of the cylinders, or to both of the same, if desired, one form of valve available for the purpose being shown in Figs. 5, 6, and 7, which represent the three positions of the valve. The cylinders are placed end to end, so as to insure compactness, and each cylinder contains a piston b, the rod d of which passes through an opening in the head of the cylinder and bears against one of the brake-levers E, these levers being connected by a rod e and each lever operating the brakes of one truck, the lever being connected by a rod f' to a lever f, hung to one brake-beam, and the lever f being connected by a rod g' to a lever g, hung to a bearing h on the under side of the car and carrying the other brake-beam. The details of the braking mechanism of each truck may, however, be modified as circumstances require without departing from my invention. It will be seen that the projection of either piston-rod will cause the operation of the brakes on both sets of wheels.

The piston-rods, by preference, simply bear upon the brake-levers, as shown in Fig. 3, the brake-levers being guided in their movements by slotted projections i, formed upon the heads of the cylinders, so that the operation of the brakes by one piston does not cause any movement of the other piston and its rod, nor is there any movement of either piston when the brakes are operated by hand through the medium of the chains or rods m, connected to the levers E and to the hand brake-rods at the ends of the car, unnecessary

wear of either piston being thus prevented and the operation of the brakes by hand rendered easier than if the brake-levers were connected to the piston-rods. A spring-connection G between the levers E E serves to keep said levers always in contact with the piston-rods and to retract the pistons when pressure upon the same is removed.

The piston and piston-rods can be turned in the cylinders so as to bring different parts of the piston to the bottom, and thus prevent excessive wear of any particular part of the piston due to the weight of the same pressing it against the bottom of the cylinder. The latter result might be attained by providing a swiveled connection between the piston-rod and brake-lever, as shown, for instance, in Fig. 14; but, for the reasons above given, the piston-rod free from all connection with the brake-lever is preferred.

The slotted projections on the cylinders provide horizontal guides for the piston-rod in its movements and prevent wear which might otherwise be due to the sagging of the outer or free end of the rod. As the brake-shoes wear more extended movement of the brake-lever is necessary before the brake-shoes touch the wheels; hence more of the movement of the piston is lost, and in time the full movement of the piston may not be sufficient to properly apply the brakes. To compensate for this wear and to prevent the lost motion occasioned thereby, I provide one or more filling-pieces J, Fig. 8, to be inserted between a brake-lever and a point against which it has a bearing, so as to effect a change in the normal or "off-brake" position of the lever, these filling-pieces being of differential width, so that the narrowest portion may be used to take up the first wear and a wider portion or portions to take up subsequent wear. The filling-piece shown in the drawings has a narrow portion n and a wider portion n', the shoulder formed between these two portions serving to support the filler when the narrow portion of the same is in use, and shoulders s at the top of the filler serving as supports when the wider portion is in use, the weight of the filler serving to prevent vertical displacement of the same. This will be understood on reference to Figs. 9 and 10, which show the filling-piece inserted between the brake-lever and the end of the power-actuated piston-rod.

The filler may be hung to any convenient portion of the car-frame or brake mechanism, and when two of them are used in connection with the piston-rods and brake-levers they provide for five different conditions of working of the brake mechanism to which they are applied, no filler being used in connection with either piston-rod when the brake-shoes are new and unworn, the narrow portion of one filler being inserted between one brake-lever and its piston-rod when the shoes are partially worn, the wide portion of said filler being inserted when the shoes are somewhat further worn, and the narrow and wide portions of the other filler being successively inserted between the other brake-lever and its piston-rod to compensate for further successive stages of wear of the shoes.

It is not necessary to the proper carrying out of this feature of my invention that the filling-pieces should always be inserted between the brake-lever and the piston-rod, as they can be used with like good effect between the lever and other primary bearing-points of the same. Thus in Fig. 15 is shown an instance of a single-cylinder brake, the piston-rod of the cylinder acting upon one of a pair of connected brake-levers and the other lever having a fulcrum-pin d', which is adapted to a slotted guide i' on the car-frame, the normal position of the pin being at the end of the slot. It will be evident that the insertion of the filling-piece J between the pin and its primary bearing at the end of the slot will in this construction have the same compensating effect as though it were inserted between the lever and piston-rod.

The valve B may be operated by hand, so as to render the small cylinder D operative, as in Fig. 5, for instance, and when the car is light and the braking force to be applied is correspondingly light, or so as to render the large cylinder F operative, as in Fig. 6, when the car is loaded and a heavy braking force is needed, or the valve may be made, as shown, so as to be adjusted to a third position, Fig. 7, in order to render both cylinders operative in case of exceptionally heavy loads.

It may be advisable in many cases to operate the valve automatically—that is to say, so as to throw the small cylinder into action when the load is light and the large cylinder when the load is heavy, or both cylinders under exceptional circumstances above alluded to. For this purpose I hang to some available point on one of the truck-frames of the car a lever K, one arm of which is connected to the operating-arm of the valve B by a rod k, the other arm of the lever being connected to a rod k', which is acted upon by a projection p on the spring-bolster M of the car. The rod k has a spring-section t and notches w for engagement with a retainer w' on the under side of the car.

When the car is light or empty, the rise of the spring-bolster causes the valve B to be so adjusted as to open communication with the small cylinder D; but when the car is loaded the depression of the bolster causes the operation of the valve through the medium of the connections described, so as to open communication with the large cylinder F, or exceptionally heavy loading may cause the opening of the communication with both cylinders. It is preferable to lock the valve in its adjusted position; hence the provision of the locking-notches w in the rod k and the spring-section t, which permits the ordinary

rise and fall of the spring-bolster due to the running of the car without causing any corresponding movement of the valve.

The rod *k* may be moved by hand so as to unlock it prior to loading or unloading the car and to lock it again after the car has been loaded or unloaded; but it is preferable to effect the movement of the rod automatically by the door of the car, so that the rod will be lifted to the unlocked position when the door is opened to load or unload the car, and will be held in this position during loading or unloading, but permitted to fall into locking position when the door is closed after loading or unloading of the car, the first notch being in position to lock the rod, as in Fig. 11, if the car is light, the second notch being in position, as in Fig. 12, if the car is loaded, or the third notch being in position, as in Fig. 13, if the load is exceptionally heavy.

The movement of the rod *k* is effected by levers N, hung to a rock-shaft *x*, which is adapted to suitable bearings on the under side of the car and has an arm *y* to bear upon and lift the rod *k*, one or other of the levers N being struck and moved by a door P as said door is opened.

Where it is not deemed necessary to provide for three positions of the valve B, a simple catch-lug on the rod *k* to hold the same in the position it assumes when the car is loaded may replace the three notches *w*, as shown in Fig. 16, for instance, and in some cases independent valves in the pipes *a a'* may replace the multiple-way valve B, if desired, an instance of this construction being shown in Fig. 17.

In applying my improved brake to hopper cars or other cars having a central outlet or depression at the bottom I hang the brake-levers E to a frame S, which surrounds the hopper, as shown in Fig. 4, and is suspended by chains or otherwise so hung from the bottom of the car that it is free to swing longitudinally to the extent required for the proper application of the brakes.

Some of the features of my invention may be adopted without the use of the differential cylinders. For instance, the cylinders may be of uniform diameter and the differential braking effect may be gained by using one or both of the cylinders to apply the brakes; or, as has before been shown, some of the features of my invention may be applied to braking apparatus having but a single cylinder, and, although I have shown the two cylinders as forming a single structure, the term "end to end" as used in the claims is not intended as a limitation of this special construction, or even to abutting cylinders, as it is apparent that the cylinders might be separated to some extent without impairing their functions or their proper relation to the other elements of the combinations claimed.

When the invention is applied to vacuum apparatus, the connections should be made with the ends of the cylinders opposite those which receive the connections in the apparatus shown in the drawings; otherwise a change in the lever mechanism of the brake will be necessary.

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

1. The combination of the two levers forming part of the single set of brake-operating devices on the car, two power-cylinders placed end to end and each having a piston and piston-rod, the rod of one cylinder projecting in one direction and acting on one brake-lever and that of the other cylinder projecting in the opposite direction and acting upon the other brake-lever, the air-pressure or vacuum pipe, and valved connections whereby one or both of the cylinders may be placed in communication with said pipe and the brakes thus applied by pressure in one or both of the cylinders, substantially as specified.

2. The combination of the two levers forming part of the single set of brake-operating devices on the car, two power-cylinders of differential diameter placed end to end and each having a piston and piston-rod, the rod of one cylinder projecting in one direction and acting on one brake-lever and that of the other cylinder projecting in the opposite direction and acting upon the other brake-lever, the air-pressure or vacuum pipe, and valved connections whereby either of the cylinders may be placed in communication with said pipe and the brakes applied by pressure in either of the cylinders, substantially as specified.

3. The combination of the two levers forming part of the single set of brake-operating devices on the car, two power-cylinders of differential diameter placed end to end and each having a piston and piston-rod, the rod of one cylinder projecting in one direction and acting on one brake-lever and that of the other cylinder projecting in the opposite direction and acting upon the other brake-lever, the air-pressure or vacuum pipe, and valved connections whereby either or both of the cylinders may be placed in communication with said pipe and the brakes applied by pressure in either or both of the cylinders, substantially as specified.

4. The combination of the two levers forming part of the brake-gear of the car, two power-cylinders placed end to end and each having a piston and piston-rod, the rod of one cylinder acting on one brake-lever and that of the other cylinder upon the other brake-lever, a spring-connection whereby the levers are drawn together and against the piston-rods, the air-pressure or vacuum pipe, and valved connections between said pipe and cylinders, substantially as specified.

5. The combination of the brake-lever, the brake-applying cylinder having a piston and piston-rod free to turn independently of the brake-lever, and means for providing communication between the brake-cylinder and an

air-pressure or vacuum pipe on the car, substantially as specified.

6. The combination of the brake-lever, the power-cylinder having a piston with rod free from connection with the brake-lever, an air-pressure or vacuum pipe on the car, and means for providing communication between said pipe and the cylinder, substantially as specified.

7. The combination of the brake-lever, the power-cylinder having a piston with rod bearing upon but free from connection with the brake-lever, an air-pressure or vacuum pipe on the car, a communication between said pipe and the cylinder, the hand brake-shaft, and a connection between the brake-lever and said hand brake-shaft, substantially as specified.

8. The combination of the two levers of the brake mechanism, two power-cylinders, each having a piston and piston-rod, that of one cylinder acting upon one brake-lever and that of the other upon the other brake-lever, and both rods being disconnected from their respective levers, an air-pressure or vacuum pipe, and a valved communication between said pipe and the cylinder, substantially as specified.

9. The combination of the two levers of the braking mechanism, the two power-cylinders, each having a piston and piston-rod, one rod acting upon one brake-lever and the other upon the opposite brake-lever, but both disconnected from said levers, an air-pressure or vacuum pipe on the car, a valved communication between the same and the cylinders, the hand brake-shaft, and a connection between each brake-lever and said hand brake-shaft, substantially as specified.

10. The combination of the brake-lever, the power-cylinder having a piston-rod bearing upon said brake-lever, but disconnected therefrom, a projection on the cylinder serving as a guide for the lever, an air-pressure or vacuum pipe on the car, and a valved communication between said pipe and the cylinder, substantially as specified.

11. The combination of a braking-cylinder having power-actuated piston and piston-rod with braking mechanism acted on by said piston-rod, one of the levers of said mechanism being movable away from one of its primary bearings, and a filling-piece inserted between the lever and said primary bearing, so as to take up slack without movement of the piston-rod, substantially as specified.

12. The combination of a braking-cylinder having power-actuated piston and piston-rod with braking mechanism acted on by said piston-rod, one of the levers of said mechanism being movable away from one of its primary bearings to take up slack without moving the piston-rod, and a filling-block inserted between said lever and said primary bearing, said block having portions of different width, substantially as specified.

13. The combination of the power-cylinder and its piston and piston-rod with the brake-lever acted upon by said rod, but movable away from the same, and a filling-block inserted between said lever and the piston-rod to take up slack without movement of said piston-rod, substantially as specified.

14. The combination of the power-cylinder and its piston and piston-rod, with the brake-lever acted upon by said rod but movable away from the same to take up slack without movement of the rod, and a filling-piece inserted between the rod and lever and having portions of different width, substantially as specified.

15. The combination of the two power-cylinders, each having a piston and piston-rod, with the two brake-levers, one acted upon by one piston-rod and the other by the other piston-rod, but each movable away from its piston-rod, so as to permit of the insertion of a filler to take up slack without movement of the piston-rod, substantially as specified.

16. The combination of the two cylinders, each having a brake-operating piston and piston-rod, the air-pressure or vacuum pipe, a valved communication between said pipe and the two cylinders, and a connection between said valve and a spring-supported portion of the car, whereby the valve will be automatically moved to different positions, depending upon whether the car is loaded or light, substantially as specified.

17. The combination of the two cylinders, each having a brake-operating piston and piston-rod, the air-pressure or vacuum pipe, a valved communication between said pipe and the two cylinders, a connection between said valve and a spring-supported portion of the car, and a catch whereby said connection, when moved to the position corresponding with the loaded car, is held and prevented from moving backward, substantially as specified.

18. The combination of the two cylinders, each having a brake-operating piston and piston-rod, the air-pressure or vacuum pipe, a valved communication between said pipe and the two cylinders, a connection between said valve and a spring-supported portion of the car, a catch for retaining said connection in the position it assumes when the car is loaded, and means whereby the door of the car is caused to control the operation of said catch, substantially as specified.

19. The combination of the two cylinders, each having a brake-operating piston and piston-rod, the air-pressure or vacuum pipe, a valved communication between the same and the two cylinders, a connection between said valve and a spring-supported portion of the car, said connection having an elastic section, and a catch whereby the connection is retained in the position it assumes when the car is loaded, substantially as specified.

20. The combination, in braking mechanism for railroad-cars, of a power-cylinder with piston and piston-rod, the brake-beams, lever

mechanism acted on by said piston-rod and connected to the brake-beams, and a swinging yoke or frame carrying said lever mechanism, substantially as specified.

21. The combination of the brake-beams, the brake-levers connected thereto, a swinging frame carrying said brake-levers, two cylinders, each having a piston and piston-rod, the rod of one cylinder acting upon one brake-lever and that of the other cylinder upon the other brake-lever, an air-pressure or vacuum pipe on the car, and a valved communication between said pipe and the cylinders, substantially as specified.

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

JACOB E. LOUGHRIDGE.

Witnesses:
WILLIAM D. CONNER,
HARRY SMITH.