(No Model.) 4 Sheets—Sheet 1.

G. F. STEEDMAN & J. H. BROOKMIRE, Jr.

CAR BRAKE.

No. 528,116. Patented Oct. 23, 1894.

Fig. I

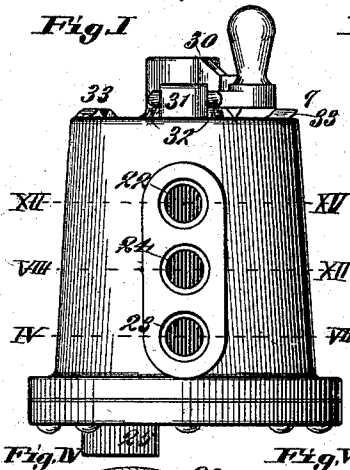

Fig. II.

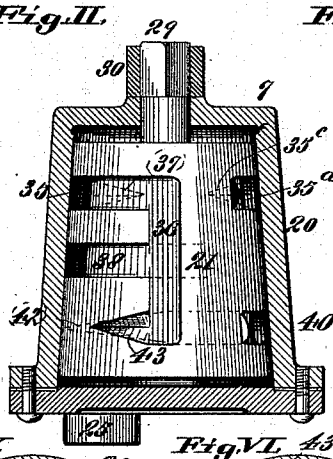

Fig. III.

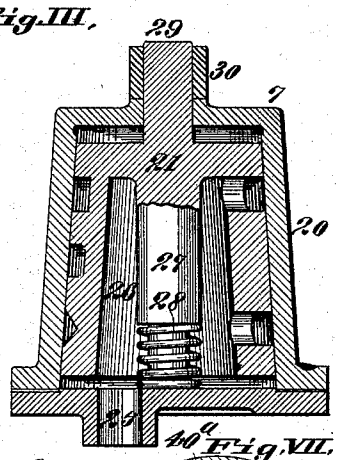

Fig. IV

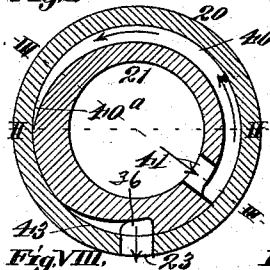

Fig. V.

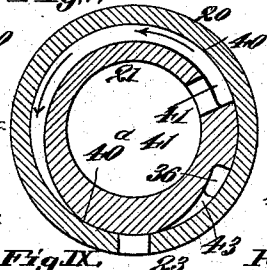

Fig. VI.

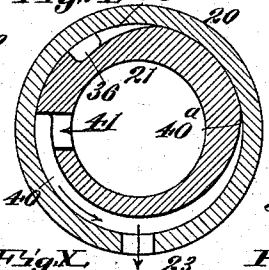

Fig. VII.

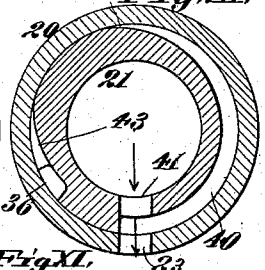

Fig. VIII.

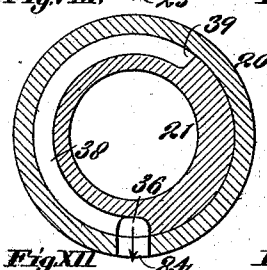

Fig. IX.

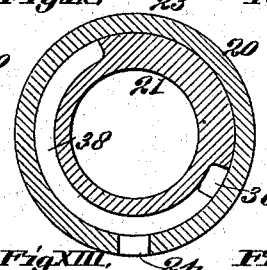

Fig. X.

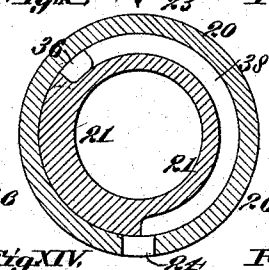

Fig. XI.

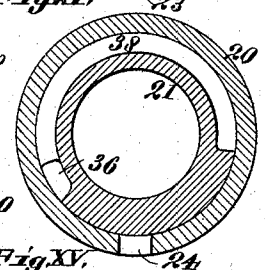

Fig. XII.

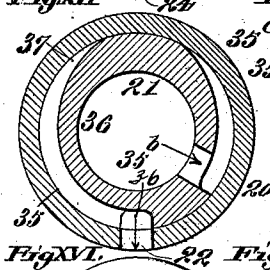

Fig. XIII.

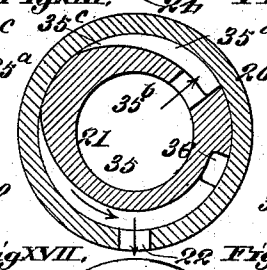

Fig. XIV.

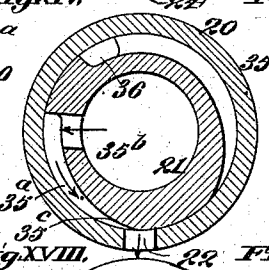

Fig. XV.

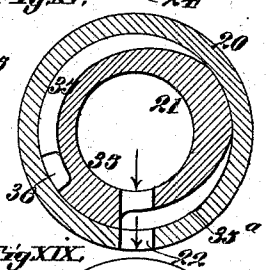

Fig. XVI.

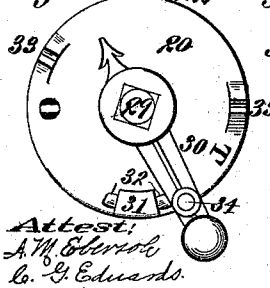

Fig. XVII.

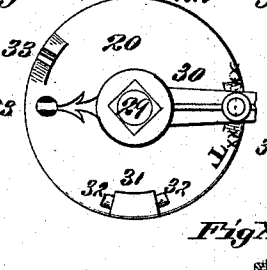

Fig. XVIII.

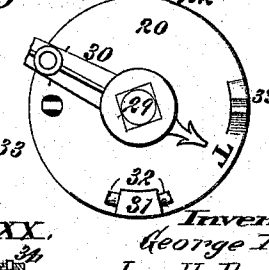

Fig. XIX.

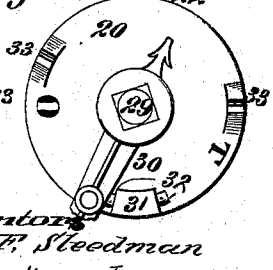

Fig. XX.

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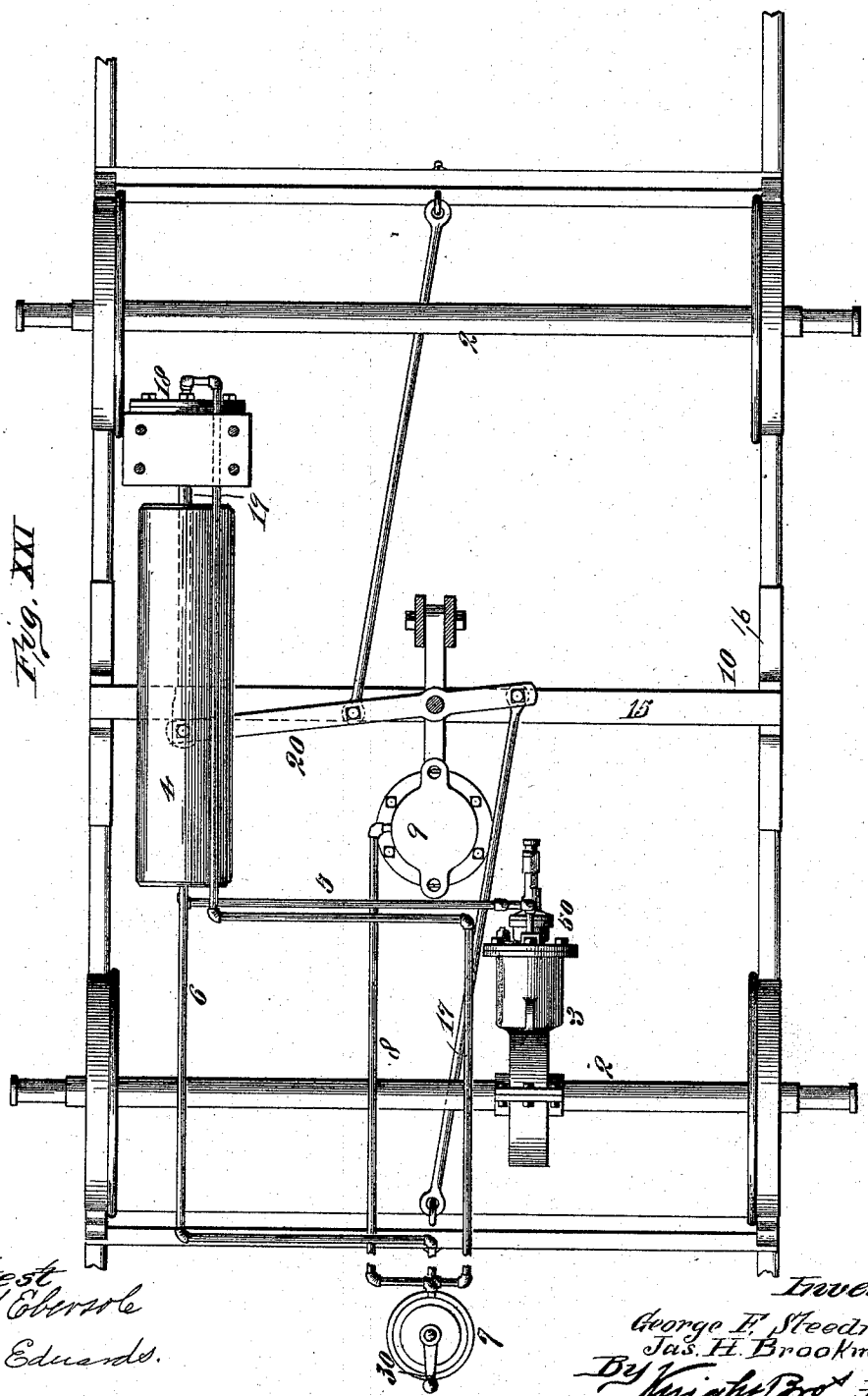
CAR BRAKE.

No. 528,116. Patented Oct. 23, 1894.

Fig. XXI.



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(No Model.) 4 Sheets—Sheet 3.

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CAR BRAKE.

No. 528,116. Patented Oct. 23, 1894.

Fig. XXII.

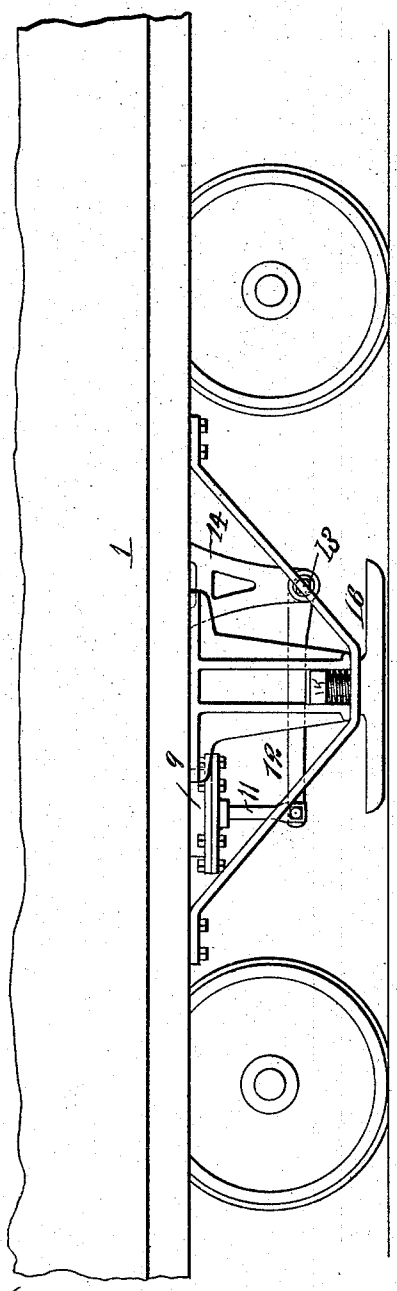
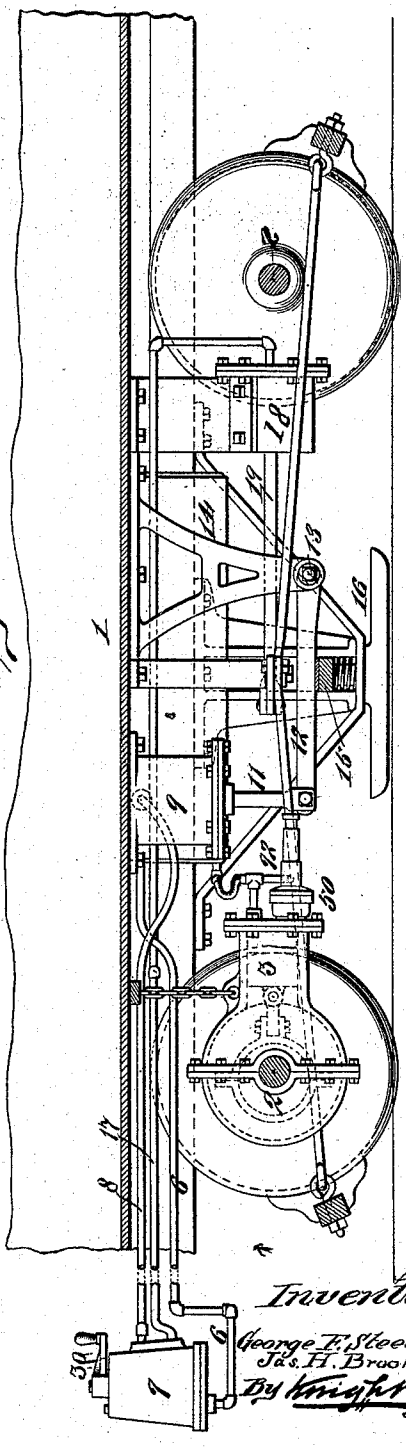


Fig. XXIII.



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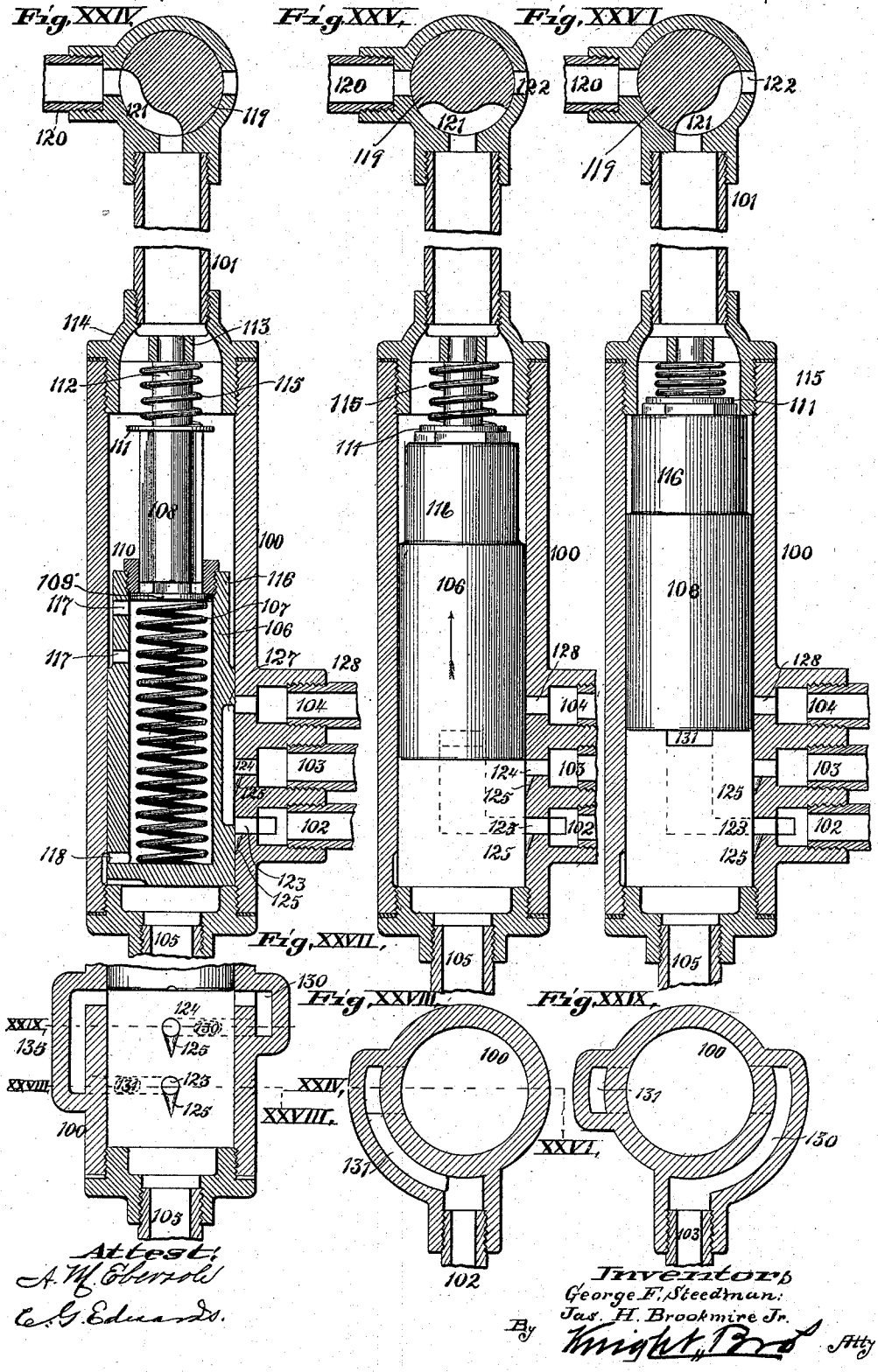
(No Model.) 4 Sheets—Sheet 4.

G. F. STEEDMAN & J. H. BROOKMIRE, Jr.

CAR BRAKE.

No. 528,116. Patented Oct. 23, 1894.



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UNITED STATES PATENT OFFICE.

GEORGE F. STEEDMAN AND JAMES H. BROOKMIRE, JR., OF ST. LOUIS, MISSOURI.

CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 528,116, dated October 23, 1894.

Application filed January 22, 1894. Serial No. 497,630. (No model.)

To all whom it may concern:

Be it known that we, GEORGE F. STEEDMAN and JAMES H. BROOKMIRE, Jr., both of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Car-Brakes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to a brake intended more particularly for use on the class of cars known as street railways, wherein electricity, cable or other motive power is used as the means of propulsion.

The invention relates to a combined wheel and track brake, the arrangement being such that the wheel brake can be applied without applying the track brake, and when the track brake is applied, it is always preceded by the application of the wheel brake, and the track brake is released before the wheel brake.

Our invention consists in features of novelty hereinafter fully described and pointed out in the claims.

Heretofore in air brakes for street cars wheel brakes only have been used. This system is disadvantageous, because if too much pressure is applied, the wheels are held from their rotation and they skid or slide upon the tracks, causing very rapid wear of the track and wheels. Moreover, in cases of emergency there is no means of stopping the car, or train, further than turning on power sufficient to skid the wheels.

The purpose of our invention is to furnish a system wherein the wear to the track and wheels is reduced to a minimum, and a more positive means provided for stopping the train. To carry out these aims we have devised the combinations and mechanisms herein set forth.

We do not limit ourselves to the specific device here shown, but to the underlying principles which we wish to patent, and which the specific devices herein shown illustrate. Primarily, we provide a pump with suitable connection to a reservoir to store up the air compressed by said pump, with a proper connection between said reservoir and a valve device hereinafter fully described and called "the motorman's valve," which is operated by the person managing the motive power. The wheel brakes are so arranged as not to skid under average conditions of load and track when thrown on to their fullest extent, further braking power, when needed, being applied through the agency of track brakes.

Figure I is an elevation of the motorman's, gripman's or engineer's valve device, of our improved brake, in its preferred form. Fig. II is a vertical section of the housing of the valve, taken on line II—II, Fig. IV, the barrel of the valve being shown in elevation. Fig. III is a section taken on line III—III, Fig. IV, part in elevation. Figs. IV to VII inclusive are diagram sections, taken on line IV—VII, Fig. I, and showing different positions of the said valve. Figs. VIII to XI inclusive are similar views taken on line VIII—XI, Fig. I. Figs. XII to XV inclusive are similar views, taken on line XII—XV, Fig. I. Figs. XVI to XIX inclusive, are top views of the valve, showing the valve lever in different positions, the position of the lever in the different figures corresponding with the position of the barrel of the valve in the sections immediately above. Fig. XX is a detail section, taken on line XX—XX, Fig. XVII. Fig. XXI is a top view, showing part of a car, with our improvement applied. Fig. XXII is a side elevation, showing part of a track brake mechanism. Fig. XXIII is a vertical, longitudinal section of part of a car truck, and illustrative of our invention. Figs. XXIV to XXIX inclusive, show a modification of the valve device, with which automatic air may be used to apply the brakes, Figs. XXIV to XXVI being a longitudinal section, taken on line XXIV—XXVI, Fig. XXVIII; Fig. XXVII being a detail, longitudinal section; Fig. XXVIII being a transverse section taken on line XXVIII—XXVIII, Fig. XXVII; and Fig. XXIX being a similar view on line XXIX—XXIX, Fig. XXVII.

We will first describe the general arrangement and construction of the brake, and will then describe the arrangement of the particular form of motorman's valves, which we have illustrated to carry out the operation of the brake.

Referring to the drawings, 1 represents part of a car body and truck or running gear.

Mounted on one of the axles 2 of the car is an air pump 3. No invention is claimed by us in the construction of this pump, and any suitable form of pump, with any suitable means of working it from the axles, or car axle of the car, may be employed.

4 is a receiving tank, suitably supported from the car body or truck, and into which the air is forced by the pump through a pipe 5.

6 is a pipe forming a communication between the tank 4 and a valve 7, which valve may be of the construction shown in Figs. I to XX inclusive. The valve would be arranged in convenient position to be operated by the motorneer or gripman of the car.

8 is a pipe leading from the valve 7 to the cylinder 9 of the track brake 10. The piston-rod 11 of the cylinder 9 is connected to the free end of a lever 12, pivoted at its other end, at 13, to a bracket 14 secured to the car body or other support. The lever 12 bears upon the cross beam 15, which carries the shoes 16 of the track brake.

We make no claim to the special construction of the track brake, or the manner of imparting movement to the shoes from the piston-rod of the cylinder 9, and any desired form of track brake may be employed.

17 represents a pipe forming a communication between the valve 7 and the cylinder 18 of the wheel brake; the piston rod 19 of the cylinder 18 being connected to the lever 20 of the wheel brake mechanism. There is no invention claimed by us in the form of the wheel brake mechanism, and it may be of any ordinary and well known construction.

We will now describe the construction of the valve device 7, by which the air is allowed to pass from the tank 4 to the cylinder 18 of the wheel brake, through the pipe 17, and then if it is desired to apply the track brakes, is allowed to pass to the cylinder 9 of the track brake, the construction of the valve device being such that the wheel brakes are always applied before the track brakes, and the track brakes are always released before the wheel brakes.

The track brakes and wheel brakes can be applied and released more or less gradually at the will of the operator, the proper sequence being maintained. We do not limit outselves to the forms of valves herein shown and described.

A valve device is shown in Figs. I to XX inclusive, and consists of an outer shell or housing 20, within which is located a barrel 21, the housing having an opening 22 with which the track brake pipe 8 connects, an opening 23 with which the wheel brake pipe 17 connects, and an exhaust opening 24. The housing has also an opening 25, with which the pressure tank pipe 6 connects. The barrel 21 is made with a central opening 26 into which the air enters from the pipe 6. The barrel tapers slightly from its lower end upwardly, (being the smallest at its upper end,) and the interior of the housing tapers in the same manner, and the barrel has a central stem 27, between which and the bottom of the housing is a spring 28, the function of which is to keep the barrel forced upwardly, when the air pressure is turned off, so that there is always a close fit between the barrel and the housing, and contact between the barrel and the housing is thus always insured. The barrel has a stem 29 projecting through the top of the housing, and upon which is placed the crank or lever 30 by which the barrel is turned in the operation of the valve to manipulate the brakes.

31 is a projection on the top of the housing, which limits the movement of the crank or lever 30, in either direction, the projection being preferably provided with rubber, or other bumpers 32, as shown. The top of the housing is also provided with notched projections 33, to receive a conically pointed and spring-pressed pin 34, secured in the lever 30, (see Fig. XX;) the object of the pin 34 and the notched projection 33 being to hold the lever against accidental movement at important points, hereinafter described.

35 is a horizontal groove in the upper part of the barrel 21. (See Fig. II and Figs. XII to XV inclusive.) One end of this groove terminates at a vertical groove 36 in the barrel, and the other end of the groove 35 terminates about half way around the barrel in a gradually tapering and V-shaped end 37, as shown by full lines in Figs. XII to XV inclusive, and by dotted lines in Fig. II. Approximately on a horizontal line with the groove 35, and on the other side of the barrel, is a groove 35^a, which communicates with the interior of the barrel somewhere in its length, or at one end, through an opening 35^b, and at the other end it gradually tapers in V-form, as shown at 35^c, Figs. XII to XV inclusive, and by dotted lines in Fig. II. The horizontal distance between 37 and 35^c, is something more than the horizontal width of port 22.

38 represents a horizontal groove located about midway of the length of the barrel 21, and one end of which terminates at the vertical groove 36, while the other end terminates rather more than half way around the barrel, though it might encircle it, as shown at 39. (See Figs. II and VIII to XI inclusive.)

40 represents a horizontal groove in the barrel, near the lower end of the latter, which communicates through an opening 41 with the interior of the barrel. (See Figs. II, III, and IV to VII inclusive.) The groove extends from the opening 41, preferably rather more than half way around the barrel, where it terminates in a tapered and V-shaped end 40^a. (See full lines Figs. IV to VII inclusive, and dotted lines Fig. II.) Approximately on line with the groove 40 is a groove 43, preferably V-shaped, which extends a short distance from the vertical groove 36, and in the direction of the groove 38. The space between the tapered termini of the grooves 40

and 43, is something more than the horizontal width of the port 23.

The operation of this valve device is as follows:—When the brakes are to be released, the lever 30 is moved to the position shown in Fig. XVI, which brings the barrel 21, (with relation to the housing,) into the position shown in Figs. II, IV, VIII and XII, when the pipes 8 and 17 will be open to the exhaust through the grooves 35, 43, 36, 38 and the opening 24. The operator now moves the lever 30 to the position shown in Fig. XVII, which we choose to call the neutral position, designated by 0, where it is held by the spring actuated pin 34, ready for the next time that the brakes are to be applied. When the lever is in this position, the relation of the position of the barrel to the housing is that shown in Figs. V, IX and XIII, the points of the grooves 40 and 43 not quite registering with the opening 23, as shown in Fig. V. When the brakes are to be applied, the operator gradually moves the lever 30 from the position shown in Fig. XVII toward the position shown in Fig. XVIII, and as he does so the groove 40 is caused to register with the opening 23, and the fluid passes from the interior of the barrel through the opening 41 into the groove 40, and through the pipe 17 to the wheel brake cylinder 18, and the wheel brakes are thus applied. By making the point of the groove 40 tapering and V-shaped, as shown at 40^a, the fluid passes gradually from the valve to the brake cylinder, thus causing the brakes to be applied gradually and without serious shock to the brake mechanism, or to the car. If the track brakes are to be applied, as well as the wheel brakes, the operator turns the lever 30 still farther around, and opens communication between the groove 35^a and the opening 22 of the pipe 8, which leads to the cylinder 9 of the track brake, and by making the end of the groove 35^a tapering and V-shaped, as shown and as explained, the track brake will be applied gradually, as well as the wheel brake.

Fig. XIV shows the barrel turned sufficiently far to bring the extreme point of the groove 35^a opposite the opening 22, and if the track brake is to be applied with full force, the barrel is turned still farther around to bring it, (with relation to the housing,) to the position shown in Figs. VII, XI and XV, with the lever to the position shown in Fig. XIX. This opens a full communication between the interior of the barrel and the pipe 8 of the track brake, and it will be noticed that the communication is still maintained between the interior of the barrel and the pipe 17 of the wheel brake, as shown in Fig. VII. While the brakes are thus applied, the exhaust opening 24 is shut off, as shown in Fig. XI.

When the brakes are to be released, the lever 30 is turned in the reverse direction, and the groove 35^a is thus removed from communication with its opening 22, and by further movement of the lever the pressure to the track brake cylinder is released gradually by the tapering V-shaped end of the groove 35, and as the point of the groove 35^a leaves the opening 22, the groove 38 registers with the exhaust opening 24, see Fig. X, and then as the point of the groove 35 registers with the opening 22, the fluid gradually exhausts from the cylinder 9 of the track brake, back through the pipe 8, through the opening 22, through the groove 35, into the groove 36, and out through the groove 38, and the opening 24, the communication between chamber 26 and inside of barrel being still maintained with wheel brake port 23.

At the time of the exhaust of the fluid from the track brake cylinder, which released the track brakes, the wheel brakes are yet applied, but a further movement of the barrel carries the point 40^a of the groove 40 away from the opening 23, thus shutting off the supply of fluid to the wheel brake cylinder 18, and a still further movement of the barrel, (from the position shown in Fig. XVII,) brings the point of the groove 43 opposite the opening 22, and the fluid will exhaust from the track brake cylinder back through the pipe 17, through the grooves 43 and 36, and out through the groove 38 to the opening 24.

It will thus be seen that the wheel brake is always applied before the track brake, so that it can be used, if desired, without the track brakes, and which would usually be the case; and when it is desired, the track brake can be applied without releasing the wheel brake; and it will likewise be observed that the track brake is always released before the wheel brake, which is a desirable object on the operation of this compound system of brakes; and it will also be observed that the brakes are applied and released by the manipulation of a single valve device, and by the simple operation or movement of a single lever, which is moved in but one direction to apply both of the brakes, and in but one direction to release both of the brakes.

In Figs. XXIV to XXIX inclusive, we have shown a valve device arranged for use on what is known as the automatic system of air braking, wherein each car is fitted with its separate auxiliary reservoir for receiving compressed air from the pump, which reservoir is connected to the brake mechanisms, and air is permitted to pass from the auxiliary reservoir to the brake cylinders when desired, by means of a reduction of air in the train pipe, through means of the motorman's valve device.

For convenience of illustration, we have represented the cock of the motorman's valve device as of a simple three-way type, which makes communication either between the pump pipe and the train pipe, or between the train pipe and the atmosphere. With this system, one or more cars may be employed, each equipped with a separate auxiliary reservoir, brake cylinders and brake appliances.

The valve device we have shown whereby automatic air may be used, consists of a cylinder 100, with which the train pipe 101 connects, and with which connects the pipe 102 of the wheel brake cylinder, the pipe 103 of the track brake cylinder and the exhaust pipe 104. Connecting with this cylinder is also a pipe 105, leading to the auxiliary reservoir. Not shown. Within the cylinder is a valve piston 106, which is hollowed out to receive a spring 107.

108 is a stem of a size to fit loosely within the valve piston 106, and guided therein by a nut 110. Beneath the stem is a head or washer 109 bearing against one end of the spring 107, while the other end of the spring rests against the inner end or bottom of the piston valve, as shown in Fig. XXIV. The nut 110 is arranged to slide on the stem 108, and at the upper end of the stem is a loose washer 111.

112 is the upper end of the stem 108, which has bearing in a bridge 113 of the head 114 of the cylinder 100. Between the washer 111 and the bridge 113, is a spring 115 surrounding the end 112 of the stem.

The end 116 of the piston valve 106 is made somewhat smaller than the interior of the cylinder 100, so as to permit the passage of air, and ports 117 are formed in the piston valve to permit the air to pass into the interior of the valve, from where it passes out through a port 118 into the pipe 105 leading to the auxiliary reservoir.

119 represents an ordinary form of a three-way cock, which forms part of the motorman's valve device. This cock is placed between the pipe 101 and the pipe 120 leading from the pump 3, or from the tank 4. The cock has a passage-way 121 adapted to form a communication between the pipe 120 and the pipe 101, as shown in Fig. XXIV, or to close off this communication, as shown in Fig. XXV, or to open a communication between the pipe 101 and an exhaust opening 122 in the housing of the cock.

The operation is as follows:—When the cock is in the position shown in Fig. XXIV, (which is when the brakes are not applied,) air passes from the pipe 120, through the valve device, and through the pipe 105, to the auxiliary cylinder or tank; the passage being through the ports 117, through the hollow piston valve 106, and through the port or passage 118. When the brakes are to be applied, the cock 119 is turned so as to open a communication between the pipe 101 and the exhaust opening 122. As the air pressure in the pipe 101 diminishes, the piston valve 106 will be forced in the direction of the arrow, Fig. XXV, and will open a communication between the pipe 105 and the wheel brake pipe 102, through means of a port or passage 123 in the cylinder 100. The wheel brakes will now be applied. If it is desired to hold the wheel brakes, without applying the track brake, the cock 119 is turned back slightly, to shut off the exhaust; and then, if it is desired to apply the track brake also, the cock 119 is again turned to open communication between the pipe 101 and the exhaust opening 122, thereby further reducing the pressure in the pipe 101 and the piston valve 116 will now be forced still farther in the direction of the arrow, Fig. XXV, and a communication will be opened between the pipe 105 and the pipe 103, of the track brake, through means of a port or passage 124 in the cylinder 100. (See Fig. XXV.) If it is desired to apply both the wheel brakes and the track brake in quick succession, the cock 119 is not turned back after the wheel brakes are applied, but is allowed to remain open, and the track brake will be applied quickly after the wheel brakes are applied. The wheel brakes are thus first applied, and if it is then desired to apply the track brakes, it may be done, and to produce a gradual application of the brakes, we form V-shaped grooves 125, extending from the passages 123 and 124 in a direction toward the pipe 105. If it is desired to hold the brakes applied without further pressure or force, the cock 119 is turned to the position shown in Fig. XXV, and when it is desired to release the brakes, the cock is turned back still farther, so as to again open communication between the pipe 120 and the pipe 101, when the pressure from the pipe 120, being in excess of the pressure in the pipe 105, (which has been reduced by the application of the brakes,) causes the piston valve 106 to move back to the position shown in Fig. XXIV, and as it does so, the air is first allowed to exhaust from the pipe 103, through a passage-way 127, in the side of the piston valve 106, and out through a port or passage-way 128 in the cylinder 100 to the exhaust pipe 104, and as the piston valve 106 moves still farther back to its normal position, a communication is made through the passage-way 127 between the pipe 102 and the exhaust pipe 104, and thus the brakes are released, the track brake being removed before the wheel brake.

In cases of emergency stops, where it is desired to get a very severe and quick application of both brakes, the cock 119 is thrown around to open full communication between the pipe 101 and the exhaust opening 122, and at such times the piston valve 106 moves not only as far as is shown in Fig. XXV, (wherein it compresses the spring 107,) but moves still farther in the direction of the arrow, Fig. XXV, to the position shown in Fig. XXVI, the nut 110 coming against the washer 111 and compressing the spring 115. This opens communication between the pipe 105, and the pipes 102 and 103, not only through the passages 123 and 124, but also through passages or ports 130 and 131, the port 130 forming a communication between the interior of the cylinder and the passage 124 of the track brake pipe, and the port 131 forming a communication between the interior of the cylinder and the passage 123 of the wheel brake pipe, as shown in Fig. XXV, so that

a large amount of air is quickly admitted to the wheel brake pipe 102 and the track brake pipe 103, when it is desired to obtain a quick application of the brakes.

50 represents a governor device for regulating the pressure in the air tank 4, but which forms no part of our joint invention.

We claim as our invention—

1. In a car brake, in combination with a wheel brake mechanism, a track brake mechanism, and a pump mechanism; a single valve device by which both the wheel brake and the track brake may be applied; substantially as shown and described.

2. In a car brake, in combination with a wheel brake mechanism, a track brake mechanism, a pump, and a pressure tank; a valve device, a connection between the valve device and the pressure tank, a connection between the valve device and the wheel brake cylinder, and a connection between the valve device and the track brake cylinder; said valve device being constructed to apply both the wheel brake and the track brake; substantially as set forth.

3. In a car brake, in combination with a wheel brake mechanism, a track brake mechanism, a pump and a pressure tank; a valve device, a connection between the valve device and the pressure tank, and connections between the valve device and the cylinders of the wheel and track brakes; said valve device being constructed to apply the wheel brake and the track brake, and being constructed so that the wheel brake is first applied and the track brake first released; substantially as and for the purpose set forth.

4. In a car brake, in combination with a wheel brake mechanism, a track brake mechanism, a pump, and a pressure tank; a valve device, a pipe connection between the valve device and said tank, a pipe connection between the valve device and the cylinder of the wheel brakes, and a pipe connection between the valve device and the cylinder of the track brakes; said valve device being constructed to first apply the wheel brakes, and then the track brake without releasing the wheel brake, and being constructed to release the track brake before releasing the wheel brake; substantially as set forth.

5. In a car brake, in combination with the wheel brake mechanism and track brake mechanism and a pump, a single valve device by which both the wheel brakes and track brakes are applied; a pipe connection between the valve device and the cylinder of the wheel brake mechanism; and a pipe connection between the valve device and the track brake mechanism; said valve device being so constructed as to admit the compressed air gradually into the wheel brake cylinder, then gradually into the track brake cylinder, and then gradually release the air from the track brake cylinder, and then gradually from the wheel brake cylinder.

6. In a car brake, in combination with a pump, reservoir, a valve device and a track brake device; a wheel brake device which shall always be applied before the track brake device, by means of the same valve, and so regulated as not to allow the wheel brake device to prevent the car wheels from rotation.

7. In a car brake, in combination with a wheel brake mechanism, a track brake mechanism, and a pump mechanism; a single motorman's valve device in combination with automatic valve device by which both the wheel brakes and track brakes may be applied; substantially as shown and described.

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JAMES H. BROOKMIRE, JR.

In presence of—
A. M. EBERSOLE,
C. G. EDUARDS.