No. 665,866.

Patented Jan. 15, 1901.

D. BEEMER.

CAR BRAKE.

(Application filed Mar. 23, 1900.)

(No Model.)

2 Sheets—Sheet 1.

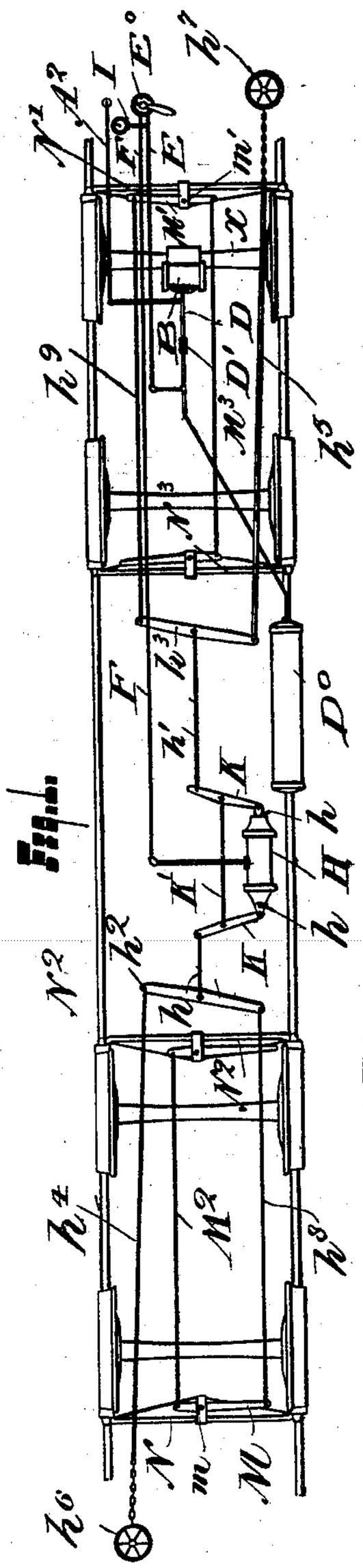

Fig. 3.

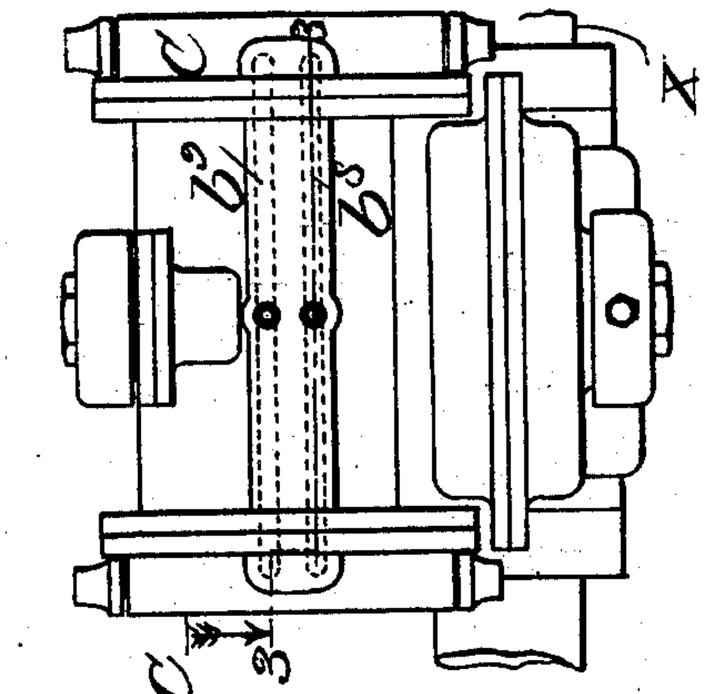

Fig. 4.

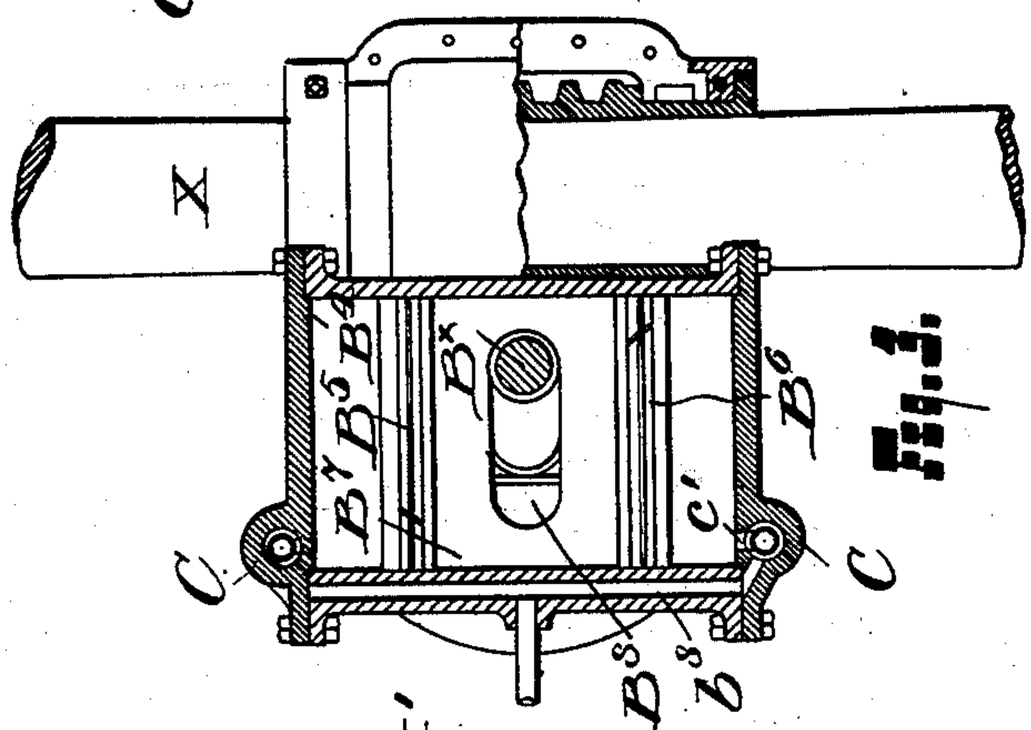

Fig. 1.

Fig. 2.

WITNESSES

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(Application filed Mar. 23, 1900.)

(No Model.) 2 Sheets—Sheet 2.

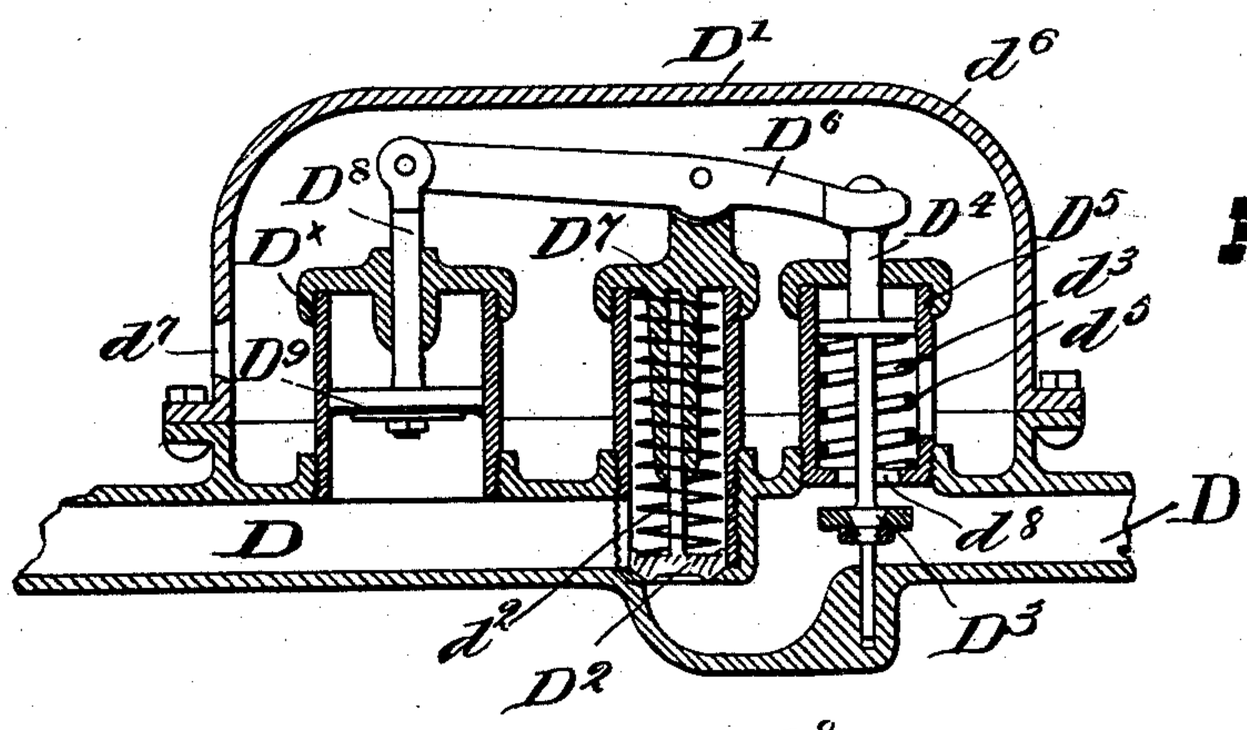

Fig. 5.

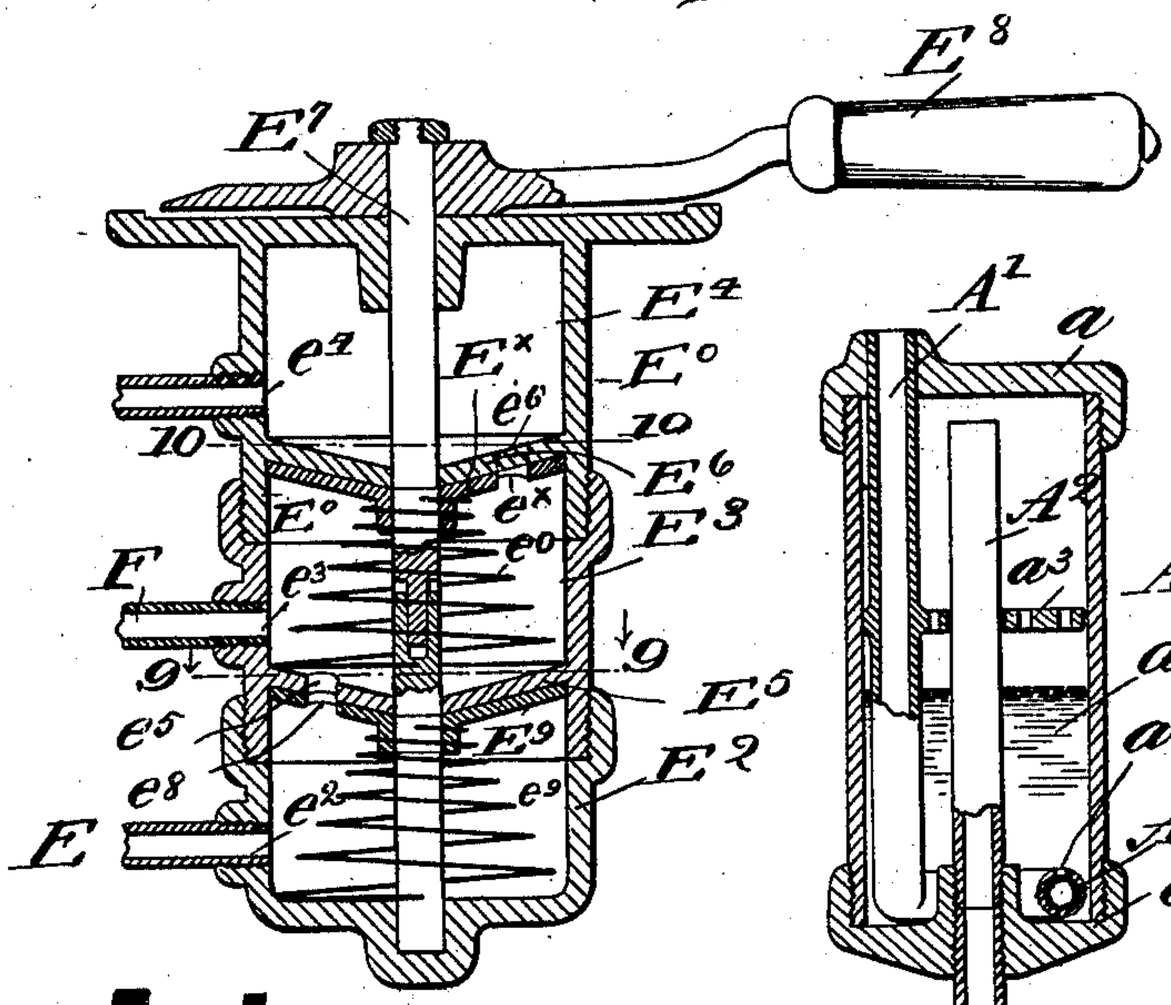

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

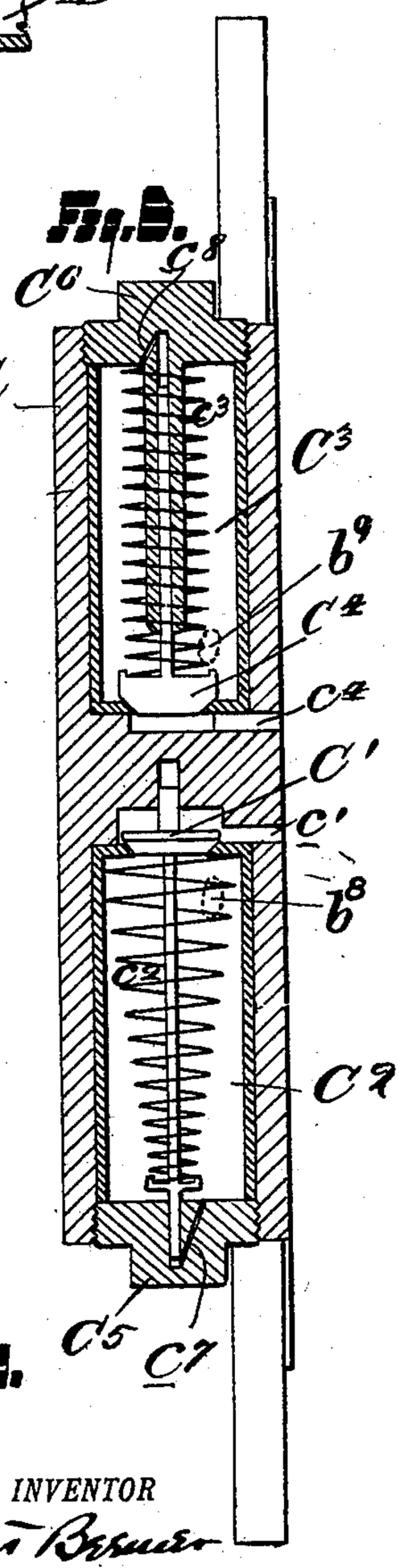

Fig. 10.

WITNESSES

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CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 665,866, dated January 15, 1901.

Application filed March 23, 1900. Serial No. 9,925. (No model.)

To all whom it may concern:

Be it known that I, DENNIS BEEMER, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in air-brakes for railway-cars; and it has for its object to provide a simple and effective brake operated by the motion of the vehicle and under the ready control of the brakeman or other attendant.

My invention consists in certain novel features hereinafter described and claimed.

The invention will be understood by reference to the accompanying drawings, wherein the same parts are indicated by the same letters throughout the several views.

Figure 1 is a diagrammatic view showing the arrangement of the different parts of the system of brakes and their operating devices and connections as applied to a railway-car. Fig. 2 is an enlarged vertical sectional view of the compressor, showing the connections between the piston therein and its operating-crank with the axle of the vehicle by the rotation of which the parts are operated. Fig. 3 is a section taken on line 3 3 of Fig. 4 and looking in the direction of the arrow, part of the casing of the worm on the axle being shown in elevation, however. Fig. 4 is a front elevation of the compressor. Fig. 5 is a vertical longitudinal sectional view of the automatic cut-off valve, which is located in the system between the compressor and the storage-tank and serves to limit the pressure within the said tank to a predetermined pressure. Fig. 6 is a vertical sectional view, very much enlarged, of one side of the air inlet and outlet valves used with the compressor for admitting air thereto and discharging it therefrom. Fig. 7 is a similar view, greatly enlarged, of the air cleansing or filtering device attached to the inlet-pipe, which admits air to the compressor. Fig. 8 is a similar view, also enlarged, of the controlling-valve by means of which the pressure is turned onto the brake-cylinder or released. Fig. 9 is a sectional view taken on the line 9 9 in Fig. 8 looking in the direction of the arrow, and Fig. 10 is a similar view taken on the line 10 10 in Fig. 8 and looking in the direction of the arrow.

Referring to Fig. 7, A represents a hollow chamber having removable preferably screw-threaded upper and lower caps or closures a and a', respectively. A pipe A′ enters the upper end of the vessel A and extends downwardly to the bottom thereof, where it is provided with a coil A^0, having perforations a^0 therein. The pipe A′ is secured in an opening therefor in the cap a and does not necessarily extend beyond the outer wall of the said cap. Another pipe A^2 enters the bottom of the vessel through the cap a', wherein it is secured, and extends nearly to the top of the inside of the vessel A. This pipe A^2 leads to the air-inlet passage in the compressor B, as will hereinafter be more fully described. The vessel A contains a quantity of liquid, preferably oil, (shown at a^2.) The air entering through the pipe A′ passes up through this body of liquid a^2 before it may enter the pipe A^2, through which it is drawn to the compressor, and is thereby deprived of dust.

a^3 represents a perforated diaphragm, which is preferably fixed to the pipe A′ within the vessel A above the body of liquid for the purpose of restricting its movement upward, and thereby preventing its entering the pipe A^2.

The compressor B is shown in Figs. 2, 3, and 4. This comprises a casing composed of sections B′ and B^2, which inclose the axle X, which forms the principal support therefor. Upon the axle is keyed a worm X′, and this worm meshes with a worm-gear B^2, which is rigidly mounted upon the vertical rotary spindle or shaft B^3, having thereon the crank $B^\times$, which crank rotates within the compressor-cylinder B^4. The shaft or spindle B^3 is seated at its ends in adjustable cups b^2 and b^3, which form, with the tapered ends of the shaft, cone-bearings readily adjustable to take up wear. The bearing-cups b^2 and b^3 are protected against rotation by means of collars b^4 and b^5, fitted with set-screws b^6 and b^7, by means of which the said collars may be securely clamped to the exterior of the casing, as shown in Fig. 2. The shaft B^3 is preferably

formed in two sections, as shown, for the more ready application of the friction-collar $b^{\times}$ upon the portion of the crank B^4 subjected to friction and wear.

Within the compressor-cylinder B^4 is mounted a piston having two heads B^5 and B^6, connected by means of a plate or diaphragm B^7, as seen most clearly in Fig. 3. The connecting plate or diaphragm of B^7 is provided with a transverse opening or slot B^8, in which works a crank $B^{\times}$ on the shaft B^3, the rotation of the latter causing the swinging of the crank about its axis and the constant oscillation of the pistons and will be readily understood.

As hereinbefore stated, the worm X′ upon the axle X meshes with the worm-wheel B^2, fixed on the crank-shaft B^3, and hence it will be readily understood that the rotation of the axle causes the rotation of the crank-shaft.

The space between the piston-heads B^5 and B^6 in the compressor-cylinder B^4 is filled with oil, so as to render the parts self-lubricating.

At the opposite ends of the compressor-cylinder are mounted valve-casings C C, with which communicate the opposite ends of the air-inlet passage b^8 and also opposite ends of the air-discharge passage b^9, as shown in dotted lines in Fig. 4. One of these valve-casings C and the set of valves inclosed therein are shown in Fig. 6. As seen in this figure, the casing has two chambers, the lower chamber C^2 containing the air-inlet valve C′, controlling the passage c' to the interior of the cylinder B^4, and also having a passage (indicated by dotted lines) leading from the air-inlet passage b^8, hereinbefore referred to, through which air enters the chamber C^2 and is drawn past the valve C′ through the passage c' into one end of the cylinder. The valve C′ is under control of a coil-spring c^2, which acts to close the valve. The upper chamber C^3 of the valve-casing C contains the valve C^4, which controls the passage c^4, communicating with the interior of the cylinder, and this chamber C^3 has also a port or opening (indicated by dotted lines) which communicates with one end of the air-discharge passage b^9. This valve is also under the control of a coil-spring c^3, which causes the same to close against back pressure. The ends of the valve-casing C are fitted with screw-plugs C^5 and C^6, which close said ends and in which are seated the stems of the respective valves, as shown, there being relief-passages c^7 c^8 in said plugs, as shown.

The air-inlet pipe A^2 communicates with the air-inlet passage b^8, and there is connected with the air-outlet passage b^9 another pipe D. This pipe leads to the air-storage tank D^0, (shown in Fig. 1,) which is suitably mounted preferably midway of the length of the car, as is common. Connected with the pipe D is a pipe E, which leads to the operating-valve E^0, (shown in detail in Fig. 8,) hereinafter to be described.

The pipe D is provided with a pressure-regulating device D′. (Shown in detail in Fig. 5.) This pressure-regulating device is intended to limit the pressure of air within the storage-tank D^0 and the pipe D to a predetermined pressure and to allow of the escape of air from the compressor when this pressure exceeds the limit. This pressure-regulating device consists as follows: Referring to Fig. 5, D^2 represents the valve past which the air is forced through the pipe D from the compressor, said valve being controlled by means of a coil-spring d^2, which tends to seat the same against back pressure. Upon the compressor side of the valve D^2 the pipe D is fitted with the valve D^3, which is under the control of a spring d^3, tending to seat the valve against the passage of air from the compressor. The valve D^3 has an extension D^4 upon its stem and to which is connected one arm of a lever D^6, pivoted to a fixed portion of the valve-casing D^7 or any other convenient portion of the device. The other arm of the pivoted lever D^6 is pivotally connected to the stem D^8 of a piston D^9, mounted in the cylinder $D^{\times}$, which cylinder opens at one end into the pipe D upon the opposite side of the check-valve D^2 from that on which the valve D^3 is located. The valve-casing D^5 is provided with an opening d^5 for the escape of the air, as hereinafter described, and the shell d^6 surrounds the various valve-casings for protecting the same from dust and moisture, and the shell is provided with an opening d^7 for the outlet of air escaping from the passage d^5 in the valve-casing D^5. By reason of this pressure-regulating device air from the compressor may pass through the pipe D by the valve D^2 into the storage-tank D^0 until the pressure in the said tank and said pipe D becomes sufficiently great to move the piston D^9 outwardly in the cylinder $D^{\times}$ against the action of the spring d^3 in the valve-chamber D^5, which movement of the said piston D^9 displaces the valve D^3 from its seat and allows the air from the compressor to escape by way of the passages d^8 and d^5 in the valve-chamber D^5 and thence out through the escape-opening d^7 in the shell d^6, as will be readily understood. In this way the pressure in the storage-tank may be maintained uniformly as long as the compressor is working and yet will not become sufficiently great to cause any injury.

The pipe E enters the lower portion of the casing of the controlling-valve E^0, as seen in Fig. 8. This valve E^0 is formed with three chambers E^2, E^3, and E^4, respectively, and these three chambers are separated by two diaphragms E^5 and E^6. The said three chambers are provided with ports e^2, e^3, and e^4, respectively, into which are fitted pipes, and the diaphragms E^5 E^6 are provided with ports e^5 and e^6, respectively. A common valve-stem E^7 passes axially through the said chambers and the diaphragm separating the same and is operated by means of a handle E^8.

Within the valve-chamber E^2 is mounted a disk E^9, through which passes centrally the valve-stem E^7, the whole being preferably provided with a squared portion upon which the said disk fits. A coil-spring e^9 within the valve-chamber E^2 serves to hold the valve firmly upward against the diaphragm E^5, to the contour of which the disk E^9 corresponds and against which it fits closely. The disk E^9 is provided with a port e^8, which is preferably in the form of a curved and tapered slot, as shown in dotted lines in Fig. 9, so that when the disk E^9 is turned the compressed air is admitted gradually to the port e^5 in the diaphragm E^5 and is also shut off gradually as the said disk is turned in the reverse direction.

Within the valve-chamber E^3 is mounted a disk $E^\times$ similarly to the disk E^9 in the valve-chamber E^2 and held closely upon the under side of the diaphragm E^6 by means of the coil-spring e^0. This disk $E^\times$ is provided with a port $e^\times$, arranged to be turned into communication with the port e^6 in the diaphragm E^6. Communicating with the port e^3 in the valve-chamber E^3 is a pipe F, which leads to the brake-cylinder H, (shown in Fig. 1,) through which the compressed air is admitted for operating the brake-levers. By turning the handle E^8 the port e^8 in the lower disk E^9 may be caused to register with the port e^5 in the diaphragm E^5, allowing the passage of air into the chamber E^3, from which by way of the port e^3 air passes to the supply-pipe F and thence to the brake-cylinder H. This manipulation of the valve turns on the air to the cylinder H and applies the brake. In releasing the brakes the handle E^8 is turned in the reverse direction until the port $e^\times$ in the upper disk $E^\times$ registers with the port e^6 in the upper diaphragm E^6, at the same time closing the ports e^5 and e^6. This allows the air to escape from the brake-cylinder backward through the pipe F into the chamber E^3 and by way of the ports $e^\times$ and e^6 to the relief-chamber $E^\times$ and thence by way of the port e^4 to the open air.

The pipe E is preferably fitted near the controlling-valve E^0 with a pressure-indicator I (shown in diagram in Fig. 1) in order to indicate to the attendant the amount of pressure and to show whether or not the compressor is working properly.

The brake-cylinder H is fitted with opposite pistons having rods h h working through opposite ends of said cylinder, as seen in Fig. 1, to the ends of which rods are connected a pair of levers K K, through which the system of brakes is operated. These levers K K are pivotally connected by means of a rod K', which constitutes a common fulcrum for the said levers, and to the ends of said levers are connected rods or chains h h', leading in opposite directions and connected to cross-arms h^2 and h^3, respectively. These cross-arms h^2 and h^3 may be connected to any preferred system of rods or chains and levers for operating the brake-bars, and the system herein shown in Fig. 1 is merely an example. In Fig. 1 one end of the cross-arms h^2 and h^3 is shown as having rod-and-chain connections h^4 and h^5 with a hand-operated device, (shown diagrammatically at h^6 and h^7.) The opposite ends of the said cross-arms h^2 and h^3 are shown as connected, by means of rods h^8 and h^9, respectively, to levers M and M', fulcrumed at m m' to the brake-beams N N' at opposite ends of the car, and the said levers M and M' are shown as connected, by means of the rods M^2 and M^3, to the brake-beams N^2 and N^3 on opposite sides of the two car-trucks.

I do not wish to be understood as limiting myself to the precise arrangement of brake-levers and connections herein shown and described, as these may be varied at will without departing from the spirit of my invention, which relates, primarily, to the apparatus for compressing and controlling the air-supply used in operating this brake system.

It will be obvious that many modifications might be made in the devices herein shown and described which may be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an air-brake system for vehicles, the combination with a gear fixed to rotate with the wheels of the vehicle; a casing and supports therefor; a compressor-cylinder provided with valve-controlled inlet and outlet ports, located in said casing; and a piston in said cylinder; of a crank-shaft journaled within said casing and passing diametrically through said cylinder and having its crank engaging said piston; adjustable cone-bearing cups for the ends of said crank-shafts secured in the said casing; and a gear fixed on said crank-shaft meshing with the gear on the vehicle, substantially as described.

2. In an air-brake system for vehicles, the combination with a gear fixed to rotate with the wheels of the vehicle; a casing and supports therefor; a compressor-cylinder provided with valve-controlled inlet and outlet ports, located in said casing; and a piston in said cylinder; of a crank-shaft journaled within said casing and passing diametrically through said cylinder and having its crank engaging said piston; adjustable cone-bearing cups for the ends of said crank-shafts secured in the said casing; a detachable collar engaging said bearing-cups for securing the same when adjusted; and a gear fixed on said crank-shaft meshing with the gear on the vehicle, substantially as described.

3. In a pressure-controlling valve for air-brake systems, the combination with a casing comprising a series of chambers or compartments separated by diaphragms provided with ports, and each of said chambers having a distinct outwardly-communicating port; of a spindle passing axially through said chambers; a handle for turning said spindle; disks

mounted on said spindle to rotate therewith in contact with said diaphragms, respectively, and said disks having openings arranged to register with the openings in the respective diaphragms at different points in the rotation of said disks, substantially as described.

4. In a pressure-controlling valve for air-brake systems, the combination with a casing comprising a series of chambers or compartments; concavo-convex diaphragms separating the two extreme compartments from the intermediate compartment each of said diaphragms being provided with an opening therethrough, and each of said chambers having a distinct outwardly-communicating port; of a spindle passing axially through said diaphragms; a handle for turning said spindle; concavo-convex disks conforming to the convexity of the respective diaphragms, mounted upon said spindle to rotate therewith, in contact with said diaphragms, respectively, said disks having openings arranged to register with the openings in the respective diaphragms at different points in the rotation of said disks; and springs acting to press the said disks against the said diaphragms, substantially as described.

5. In an air-brake system for vehicles, the combination with a gear fixed to rotate with the wheels of the vehicle; a casing mounted upon the axle and a compressor-cylinder provided with valve-controlled inlet and outlet ports, located in said casing; and a piston in said cylinder; of a crank-shaft journaled within said casing and passing diametrically through said cylinder and having its crank engaging said piston; adjustable cone-bearing cups for the ends of said crank-shafts secured in the said casing; and a gear fixed on said crank-shaft meshing with the gear on the vehicle, substantially as described.

6. In an air-brake system for vehicles, the combination with a gear fixed to rotate with the wheels of the vehicle; a casing mounted upon the axle and a compressor-cylinder provided with valve-controlled inlet and outlet ports, located in said casing; and a piston in said cylinder; of a crank-shaft journaled within said casing and passing diametrically through said cylinder and having its crank engaging said piston; adjustable cone-bearing cups for the ends of said crank-shafts secured in the said casing; a detachable collar engaging said bearing-cups for securing the same when adjusted; and a gear fixed on said crank-shaft meshing with the gear on the vehicle, substantially as described.

7. In a pressure-controlling valve for air-brake systems, the combination with a casing comprising three chambers or compartments separated by diaphragms provided with ports, and each of said chambers having a distinct outwardly-communicating port; of a spindle passing axially through said chambers; a handle for turning said spindle; disks mounted on said spindle to rotate therewith in contact with said diaphragms, respectively, and said disks having openings arranged to register with the openings in the respective diaphragms at different points in the rotation of said disks, substantially as described.

8. In a pressure-controlling valve for air-brake systems, the combination with a casing comprising three chambers or compartments; concavo-convex diaphragms separating the two extreme compartments from the intermediate compartment each of said diaphragms being provided with an opening therethrough, and each of said chambers having a distinct outwardly-communicating port; of a spindle passing axially through said diaphragms; a handle for turning said spindle; concavo-convex disks conforming to the convexity of the respective diaphragms, mounted upon said spindle to rotate therewith, in contact with said diaphragms, respectively, said disks having openings arranged to register with the openings in the respective diaphragms at different points in the rotation of said disks; and springs acting to press the said disks against the said diaphragms, substantially as described.

9. In an air-brake system for vehicles, the combination with a check-valve located in the pressure-pipe; of a chamber containing a piston, located on one side of the said check-valve; a spring-controlled valve located in the pressure-pipe upon the opposite side of the check-valve and opening against the pressure in said pipe; a lever-arm having a stationary fulcrum pivotally connected at one end to said piston, and at its opposite end to the said spring-controlled valve, the area of the said piston being greater than that of the valve and said piston being adapted to unseat said valve when the pressure thereon exceeds the pressure of the spring on the valve, substantially as described.

10. In an air-brake system for vehicles, the combination with a check-valve located in the pressure-pipe; of a chamber containing a piston, located on one side of the said check-valve; a spring-controlled valve located in the pressure-pipe upon the opposite side of the check-valve and opening against the pressure in said pipe; a lever-arm having a stationary fulcrum pivotally connected at one end to said piston, and at its opposite end to the said spring-controlled valve, the area of the said piston being greater than that of the valve and said piston being adapted to unseat said valve when the pressure thereon exceeds the pressure of the spring on the valve, a casing provided with an opening, inclosing the stem of said valve; and a removable shell or casing inclosing the said piston-chamber, valve-casing and lever-arm, substantially as described.

11. In an air-brake system for vehicles, the combination of an air-compression cylinder; piston-heads therein; a crank-shaft passing therethrough and engaging the piston; a gear on the said crank-shaft; a worm on the axle of the vehicle meshing with said gear on the

crank-shaft driving the latter; an air-inlet pipe entering the said compression-cylinder, an air-outlet pipe also connected with the said compression-cylinder; and valves controlling the admission and discharge of air through said pipes to and from the compressor; of an air-filtering device connected with the inlet-pipe; an accumulator-tank connected with the outlet-pipe, a pressure-controlled valve in said outlet-pipe; a brake-cylinder; a pipe leading from said tank and a pipe leading from the said brake-cylinder; a controlling-valve connected with said pipes; brake-beams; pistons in said brake-cylinder, and connections between said cylinder and said brake-beams, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DENNIS BEEMER.

Witnesses:
H. H. HAGER,
H. O. WALES.