No. 794,382. PATENTED JULY 11, 1905.

J. UNSER.

AUTOMOBILE BRAKE.

APPLICATION FILED SEPT. 22, 1904.

2 SHEETS—SHEET 1.

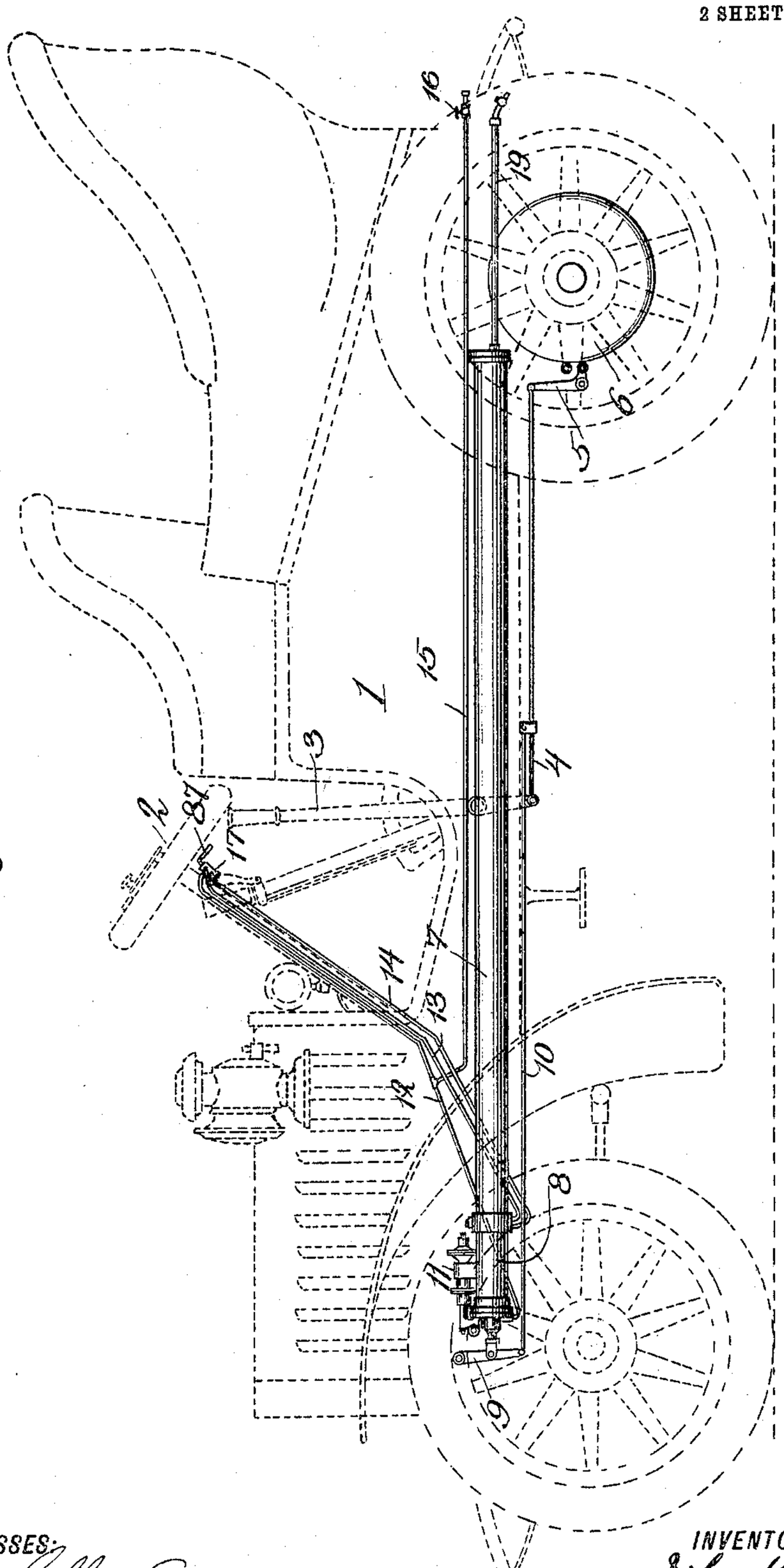

Fig. 1

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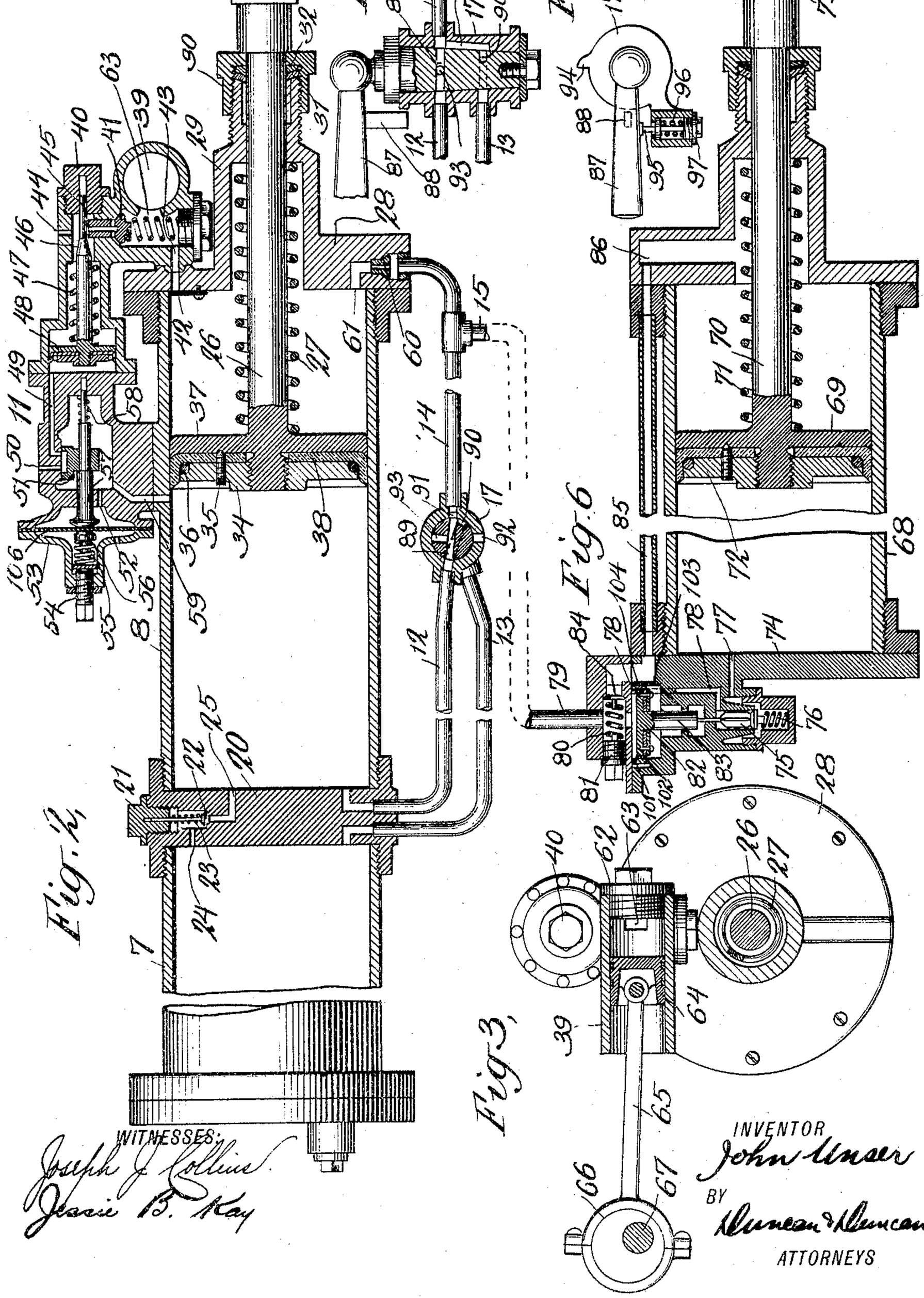

Fig. 2.

Fig. 6

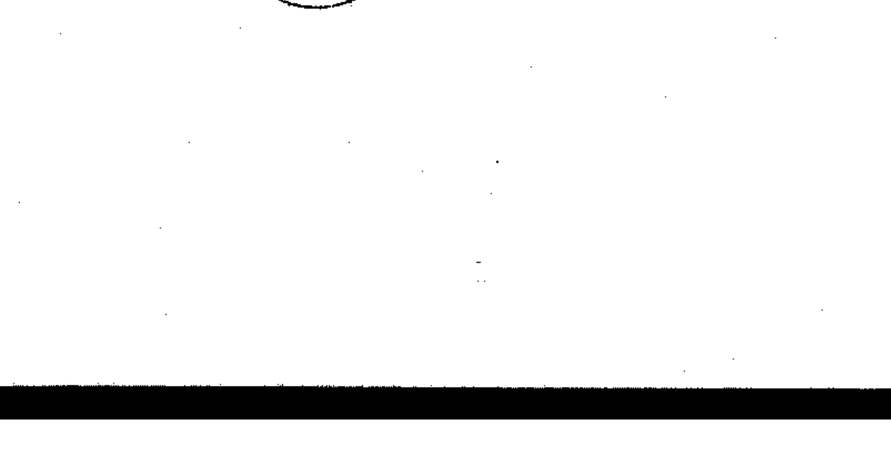

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN UNSER, OF CARTHAGE, NEW YORK.

AUTOMOBILE-BRAKE.

SPECIFICATION forming part of Letters Patent No. 794,382, dated July 11, 1905.

Application filed September 22, 1904. Serial No. 225,420.

To all whom it may concern:

Be it known that I, JOHN UNSER, a citizen of the United States, and a resident of Carthage, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Automobile-Brakes, of which the following is a specification, taken in connection with the accompanying drawings, which form a part of the same.

This invention relates to automobile-brakes, and relates especially to brakes operated by the pressure of air or similar fluid and used on motor-vehicles.

In the accompanying drawings, in which the same reference-numerals refer to similar parts in the several figures, Figure 1 is a side view of an embodiment of this apparatus as applied to an automobile, the vehicle being indicated diagrammatically. Fig. 2 is an enlarged vertical section. Fig. 3 is a transverse section. Figs. 4 and 5 are sectional detail views of the operating-valve. Fig. 6 is a sectional view of a secondary braking-cylinder.

In the illustrated embodiment of this invention the brake is operated by air-pressure, the air being supplied by a suitable pump driven from the eccentric 66 on the engine-shaft 67. The eccentric-rod 65 reciprocates the piston 64 within the supply-pump cylinder 39, which, as indicated in Figs. 2 and 3, is secured to the working cylinder 8 at one end of the same. The end of this pump-cylinder is closed by the head 62, and the lateral port 63 allows the cylinder to receive air through the port 44 and the intake-valve 41, which, as indicated, is a check-valve normally held against its seat by a light spring. When the supply-pump is operating regularly, air is drawn at each stroke past the intake-valve, and on the return stroke of the pump-piston this intake-valve is closed and the air forced through the supply-port 43, a suitable valve 42 preventing its return and holding the air under pressure within the release-chamber of the working cylinder.

As is seen in Figs. 1 and 2, the working cylinder 8 is preferably secured to the storage-tank 8, which, as illustrated, forms a continuation of the working cylinder, from which it is divided by the partition 20, these parts being preferably mounted under the body 1 of the automobile. The working cylinder carries the working piston 37, which is preferably formed with a valve, which may take the form of the cup-leather packing 38. As shown in Fig. 2, this packing is firmly held in position by the plate 34, screwed to the piston-head and held in position by the locking-screw 35. The packing-spring 36 serves to expand this packing-ring so as to make a joint sufficiently tight for proper operation, while this form of packing allows the air to escape past the piston in one direction, so that the air moves slowly from the release-chamber to the working chamber at the left. The piston-rod 26 passes through a suitable stuffing-box 29, which is preferably packed with a cup-leather 31, upon which the metal washer 32 bears, all being screwed together by the cap 30 in a well-known manner. The release-spring 27 is arranged around the piston-rod and normally forces the piston into the release position. (Indicated in Fig. 2.) The yoke 33 is connected to the brake, and the connection may take the form indicated in Fig. 1, in which the brake-lever 9 is shown as pivoted to the yoke and connected at its outer end with the brake-rod 10. The other end of this rod is pivoted to the connector 4, which operates the end of the bell-crank strap-lever 5. The other end of the brake, which may be of strap form, is connected to this lever and operates in a well-known manner upon a suitable drum 6 on the axle of the rear wheels of the vehicle.

The supply-pump operating continuously as long as the engine of the automobile is moving pumps air under pressure into the release-chamber, this air getting past the working piston, as stated, and filling the working chamber, and also passing through the ports 24 25 and past the check-valve 22, raising the spring 23, which normally seats this valve. It will be seen that this valve may be readily inspected and repaired by unscrewing the plug 21, in which its spindle operates. In this way the storage-tank and both chambers of the working cylinder are normally under the same air-pressure, and this air passing through the port 59 and the port 52 acts upon the dia-

phragm 106 of the supply-regulator 11, this diaphragm being engaged by the plunger 56 with adjustable spring-pressure, the spring 55 being arranged so that it can be compressed to the extent desired by the adjusting-screw 54. The valve-stem 57 is operated by a spring 58, which normally presses it against the diaphragm 106, mounted in the diaphragm-chamber 53, and upon this stem the valve 51 is arranged, which may be a slide-valve, as indicated, and which governs the ports 49 50. This regulator 11 comprises the cut-off piston 48, operating in a suitable chamber and being normally pressed back into the position indicated by the spring 47. The reduced end 45 of the piston-rod connected to this piston slides in a suitable bearing in the plug 40, and the conical cut-off spindle 46 is thus guided in the path of the end of the intake-valve 41. When in the position indicated, this intake-valve is free to operate and is normally held closed under the action of its spring. If, however, the air-pressure in the working chamber rises to the upper limit desired, the diaphragm is pressed outward, thus moving the valve 51, so that the connection between the ports 49 and 50 is closed, and finally the port 49 is put in connection with the high-pressure air from the working chamber. This air enters through the port 59 and drives the cut-off piston outward, and the conical spindle wedges the intake-valve off its seat and keeps it unseated as long as this high air-pressure continues. Under these conditions the air-pump continues to reciprocate; but the air drawn into the cylinder 39 past the intake-valve merely escapes past this same valve when the pump-piston moves backward and is not forced into the working cylinder. The supply-pump therefore runs idle as long as the air in the working chamber is up to the normal working pressure desired. As soon as this air-pressure falls, however, the regulator-diaphragm moves back toward the position indicated in Fig. 2, the ports 49 and 50 are connected, and the spring 47 forces the cut-off piston 48 into the illustrated position, in which the supply-pump once more operates to feed the working cylinder and storage-tank.

As is seen in Fig. 2, the working pipe 12 leads from the working chamber to the operating-valve casing 17. The storage-pipe 13 connects the storage-tank with this casing, and the release-pipe 14 similarly connects the release-chamber with the valve-casing. As is indicated in Fig. 4, the operating-valve 87 is formed with a tapering plug engaging the casing, and this plug has the through-port 89 and the communicating cross-port 93, which cöoperate with the working and release pipes 12 and 14 and also with the vent-port 92 in the valve-casing. The release-port 90 is on a different level and communicates with the storage-pipe 13 and with the port 91 in the casing communicating with the release-pipe 15.

As indicated in Figs. 2, 4, and 5, the mechanism is in the release position, the operating-valve being turned so that the through-port 89 connects the working pipe and release-pipe, thus allowing the pressure in the working chamber and release-chamber to equalize and allowing the release-spring to force the working piston back into the illustrated position. To set the brake, the operating-valve is turned in a right-handed direction through a quarter of a revolution, thus closing the connection to the working pipe 12 and allowing the air in the release-chamber to escape through the port 61, the release-pipe 14, the cross-port 93, and the through-port, so as to issue from the vent-port 92 in the casing. The air-pressure in the working chamber then drives the piston outward by its expansion and sets the brake to the extent desired, the working piston operating the brake through the connections previously described. Normal release is effected by moving the operating-valve into the position illustrated in Fig. 2, under which condition the pressure on both sides of the working piston becomes the same, and the release-spring moves the piston and brake mechanism back into the release position indicated. The emergency release of the brake is effected by moving the operating-valve through a small angle in a left-handed direction from the illustrated position. This puts the storage-pipe into connection with the release-chamber through the release-port 90, the port 91, and the release-pipe 15, (see Figs. 2 and 3,) and in this way the high-pressure air in the storage-tank quickly drives the working piston back into release position. The spring-stop 95 is preferably arranged on the valve-casing, so as to engage a suitable lug on the handle of the operating-valve. This spring-stop is normally pressed outward into the position shown in Fig. 5 by the spring 96, held in position by the plug 97. The stop 94 on the valve-casing comes into engagement with the lug 88 on the valve-handle and alines the valve when rotated into working position.

Brakes may be operated not only on the automobile, but in the case of traction-engines a series of secondary brakes may be operated on the trailers, which are sometimes drawn by the traction-engine itself. One or more secondary braking-cylinders 68 may be mounted in each of the trailers where a heavy traction-engine hauls a number of trailing vehicles, and, indeed, in some cases with heavy automobiles or traction-engines several of these secondary braking-cylinders may be mounted on the leading motor-vehicle itself, so as to give a greater retarding action. A series of these braking-cylinders 68 may be mounted one on each of the trailing vehicles, if desired, and all being connected by the line-pipe 15 with the release-pipe 14 of the leading automobile. This braking-cylinder is provided with the working piston 69, secured

to the piston-rod 70, and normally forced into the release position indicated by the release-spring 71. This piston is preferably provided with a valve, which may take the form of the cup-leather packing shown, which is held in position, as previously described, by the piston-plate 72. Suitable brakes on the trailing vehicles may be connected with the yoke 73 in a similar manner to what has been described. A controller-valve 82 is mounted in a suitable chamber in the cylinder-head 74, and this valve is preferably provided with a cup-leather or similar packing, the valve-stem 83 passing downward, as indicated, and being normally engaged by the end of the release-valve 75, which is pressed upward by the spring 76, as indicated. The release-chamber of this braking-cylinder communicates through the port 86 and the release-pipe 85 with the end 79 of the line-pipe 15. The setting-valve 84 is, however, interposed and normally pressed against its seat by the spring 80, held in place by the plug 81, thus acting as a check-valve. The controller-valve governs the feed-ports 101 and 102, which, as indicated, are connected by a passage, and also controls the feed-port 103 on the other side of the valve and the release-port 104. When this brake is used on a series of vehicles, a suitable retarding-valve is preferably employed between the release-pipe and the release-chamber of the leading and controlling vehicle. This retarding-valve may be in the form of a throttling check-valve 60 and may be lightly spring-pressed against its seat, if desired. When in the closed position indicated in Fig. 2, this check-valve only affords a restricted passage from the release-pipe to the release-chamber, but is readily forced off its seat and allows a free passage of air from the release-chamber to the release-pipe. In series operation when the operating-valve is moved to allow the escape of air from the release-chamber and thus set the brakes, the air from the line-pipe can also pass into the release-pipe and escape from the operating-valve. Under these conditions the air in the release-chambers of all the succeeding secondary braking-cylinders is allowed to pass through the release-pipes 85, past the setting-valves 84, and into the line-pipe, escaping through the operating-valve, as indicated. Under these conditions the air in the working chambers of the secondary braking-cylinders drives the working pistons forward, setting the brakes to the desired extent, and this operation takes place very quickly, so that practically simultaneous operation of the brakes is secured on any desired number of vehicles. When the operating-valve is moved into release position, air from the working chamber passes through the working pipe and the release-pipe into the release-chamber and also passes through the line-pipe and acts upon the upper surface of the controller-valve 82, quickly driving this valve downward to its full extent, thus opening the release-port 104 and also driving the release-valve 75 off its seat. The high-pressure air in the working chamber of the secondary braking-cylinder is thus allowed to issue from the port 77, past the open release-valve 75, and through the port 78, which communicates with the line-pipe and is also when the controller-valve is in its lower position in communication with the release-pipe 85 through the release-port 104. This air moves through the release-pipe 85 and the port 86 into the release-chamber. The pressure on both sides of the working piston in this secondary braking-cylinder becomes approximately equal, and the release-spring 71 forces the working piston and brake mechanism into release position. The sizes of the ports and the size of the passage through the retarding-valve are so proportioned that the release of the brakes takes place simultaneously throughout the whole system, and this is also true in the case of the emergency release of the brakes, which is brought about as has been described in the leading vehicle, and under these conditions the high-pressure air from the storage-tank enters the release-pipe 14 and also enters the line-pipe 15, effecting the release of the brakes more quickly in case of the leading and the trailing vehicles. When release has been effected in the trailing vehicles, the air-pressure on both sides of the controller-valve 82 is balanced, and this valve moves upward under the pressure of the spring 76, seating the release-valve and also closing the release-port 104. The air under the normal working pressure maintained by the supply-pump passes into the storage-tank and the working and release chambers of the primary working cylinder and also passes through the line-pipe and the feed-ports 101 102 103 into the release-chamber of the secondary braking-cylinder 68 and can then leak slowly past the working piston 69 into the working chamber. This air can also slightly raise the release-valve 75 from its seat and pass through the port 77 into the working chamber.

In the ordinary pleasure-automobile, such as is indicated in Fig. 1, the working cylinder 8 and the storage-tank 7 are preferably given the form indicated and are arranged under the vehicle, while the operating-valve casing 17 is mounted adjacent the steering-wheel 2, so that the operating-valve 87 is readily accessible. As indicated, the hand brake-lever 3 is also connected to the brake, so that either manual or power operation of the brake is possible. The line-pipe 15 is mounted under the body 1 of the vehicle, so as to be readily connected with other vehicles when the automobile is towing them, as in the ordinary operation with traction-engines. This line-pipe may be closed, and the line-valve 16 is provided for this purpose. It is

manifest that this system provides a considerable supply of compressed air on the vehicle, and a special pipe 19, provided with suitable valves, is connected to the storage-tank, so that this air can be conveniently used for inflating tires, blowing alarm-signals, for cleaning operations about the vehicle, or for any other purposes.

It is of course understood by those familiar with this art that many modifications in the form, size, proportion, and number of parts of this apparatus may be made, parts of the same may be employed without using the whole, and parts may be used in connection with other devices without departing from the spirit of this invention or losing the advantages of the same. This apparatus may also be operated by the use of other fluids than air without material change. I do not, therefore, desire to be limited to the details of the disclosure which has been made in this case; but

What I claim as new, and what I desire to secure by Letters Patent, is set forth in the appended claims:

1. In automobile-brakes, a working cylinder, a working piston provided with a cup-leather packing in said cylinder, brake mechanism connected with and operated by said working piston, a storage-tank connected to and forming a continuation of said working cylinder, a check-valve connection between said working cylinder and said storage-tank, means to normally force said working piston into release position, an air-pump communicating with the release-chamber of said working cylinder and supplying air to said chamber and to said working chamber and said storage-tank, a regulator governing the operation of said pump and maintaining desired working pressure in said working chamber, an operating-valve, pipes connecting said operating-valve with said storage-tank, said working chamber and said release-chamber, secondary braking-cylinders provided with valved working pistons normally pressed into release position, brakes connected to said pistons and operated thereby, controller-valves adjacent said secondary braking-cylinders and connected with the working chambers and release-chambers of said cylinders and a line-pipe connected to the release-chamber of said working cylinder through a retarding-valve and connected to said controller-valves, said operating-valve provided with ports to release the pressure in the release-chamber and said line-pipe to operate the brakes or to place the working chamber and release-chamber of said working cylinder in communication and in communication with said line-pipe to release the brakes operated from said working cylinder and to operate said controller-valves to release the brakes operated by said secondary braking-cylinders or to place said storage-tank in communication with said release-chamber and said line-pipe to effect the emergency release of said works.

2. In automobile-brakes, a working cylinder, a spring-pressed working piston in said cylinder and connected with brake mechanism, a valved connection through said piston between the working chamber and the release-chamber of said braking-cylinder, means to supply air under pressure to said release-chamber, an operating-valve, a pipe connecting said operating-valve with said working chamber, a release-pipe connecting said valve with said release-chamber, secondary braking-cylinders provided with valved working pistons normally pressed into release position and operating brakes, controller-valves adjacent said secondary braking-cylinders, spring-pressed release-valves engaging said controller-valves, spring-pressed setting-valves governing the exit of air from the release-chambers of said secondary braking-cylinders, a retarding-valve in said release-pipe and a line-pipe connecting said release-pipe with said controller-valves, said operating-valve being provided with ports to release the pressure in said release-pipe to operate the brakes and to place the working chamber and release-chamber in communication with the line-pipe to release the brakes.

3. In automobile-brakes, a working cylinder, a spring-pressed working piston in said cylinder connected with brakes, an operating-valve, a working pipe connecting said valve with the working chamber of said cylinder, a release-pipe connecting said valve through a retarding-valve with the release-chamber of said cylinder, a secondary braking-cylinder, a spring-pressed working piston in said secondary cylinder, a controller-valve, a spring-pressed setting-valve adjacent said controller-valve, a release-port and feed-port governed by said controller-valve, a release-pipe connecting the release-chamber and said secondary braking-cylinder with said release-port and said setting-valve and a line-pipe communicating with said controller-valve and connecting with the release-pipe of said working cylinder, said operating-valve comprising ports to release air from said release-pipe and line-pipe and to place said working pipe and release-pipe in communication.

4. In automobile-brakes, a working cylinder, a spring-pressed working piston in said cylinder connected with brakes, an operating-valve, a working pipe connecting the working chamber of said cylinder with said valve and a release-pipe connecting said valve through a retarding-valve with the release-chamber of said cylinder, a secondary braking-cylinder, a spring-pressed working piston in said braking-cylinder, a controller-valve adjacent to said braking-cylinder and communicating with the working chamber and release-chamber of the same, said operating-

valve being provided with ports to release the pressure in said release-pipe and to place said working pipe and release-pipe in communication and said retarding-valve allowing the rapid release of air from said release-chamber into said release-pipe, but preventing the rapid admission of air from said release-pipe to said release-chamber.

5. In automobile-brakes, secondary braking-cylinders, spring-pressed working pistons provided with cup-leather packings in said cylinders, each of said cylinders being provided with a controller-valve, a spring-pressed release-valve engaging said controller-valve and acting as a check-valve to close a passage from the working chamber of the braking-cylinder, a release-pipe communicating with the release-chamber of said cylinder and with a release-port governed by said controller-valve and also with a spring-pressed setting-valve, feed-ports governed by said controller-valve and a line-pipe communicating with said controller-valve and said setting-valve.

6. In automobile-brakes, a working cylinder, a storage-tank forming a continuation of said braking-cylinder, a working piston provided with a cup-leather packing in said working cylinder and normally spring-pressed into release position, a brake connected with said piston, a check-valve between said storage-tank and the working chamber of said cylinder, an air-pump to supply air under pressure to said release-chamber so that said air passes into said working chamber and said storage-tank, a supply-regulator connected to said pump to control its operation and maintain the desired working air-pressure, an operating-valve connected to said working chamber, said release-chamber and said storage-tank and provided with ports to discharge the air from said release-chamber to operate the brake or to put the release-chamber and working chamber in communication to release the brake or to allow air to pass from the storage-tank to the release-chamber to effect the emergency release of the brake.

7. In automobile-brakes, a working cylinder, a spring-pressed working piston in said cylinder connected with brakes, a storage-tank adjacent to and forming a continuation of said working cylinder, an operating-valve to operate said brakes by air-pressure in said working cylinder, a check-valve connection between said working cylinder and said storage-tank and a check-valve connection between the working chamber and release-chamber of said working cylinder and a supply-pump to supply compressed air to said release-chamber and thence through the check-valve connections into said working chamber and said storage-tank.

8. In automobile-brakes, a working cylinder, a spring-pressed working piston in said working cylinder having a valved connection therethrough and forming a working chamber and a release-chamber in said cylinder, a storage-tank adjacent to and having a check-valve connection with said release-chamber, an operating-valve to operate said brakes by air-pressure in said working cylinder and a supply-pump to supply compressed air to said working chamber and thence through said check-valve connection to said storage-tank.

9. In automobile-brakes, a working cylinder, a spring-pressed working piston provided with cup-leather packing in said cylinder, said cylinder being provided with a controller-valve, a spring-pressed release-valve to engage said controller-valve and also acting as a check-valve to close the passage from the working chamber of said working cylinder, a release-pipe communicating with the release-chamber of said cylinder and with a release-port governed by said controller-valve and feed-ports governed by said controller-valve.

10. In automobile-brakes, a working cylinder, a spring-pressed piston in said cylinder and forming a working chamber and a release-chamber, said piston having a valved connection therethrough, a release-valve governing a passage from said working chamber, the release-pipe and a controller-valve connected with an air-pipe operated by pressure therefrom and governing the admission and release of air in said working chamber and said release-chamber.

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