No. 619,381. Patented Feb. 14, 1899.

R. E. WYNN.

AIR BRAKE FOR VEHICLES.

(Application filed Sept. 20, 1898.)

(No Model.) 5 Sheets—Sheet 1.

FIG. 1

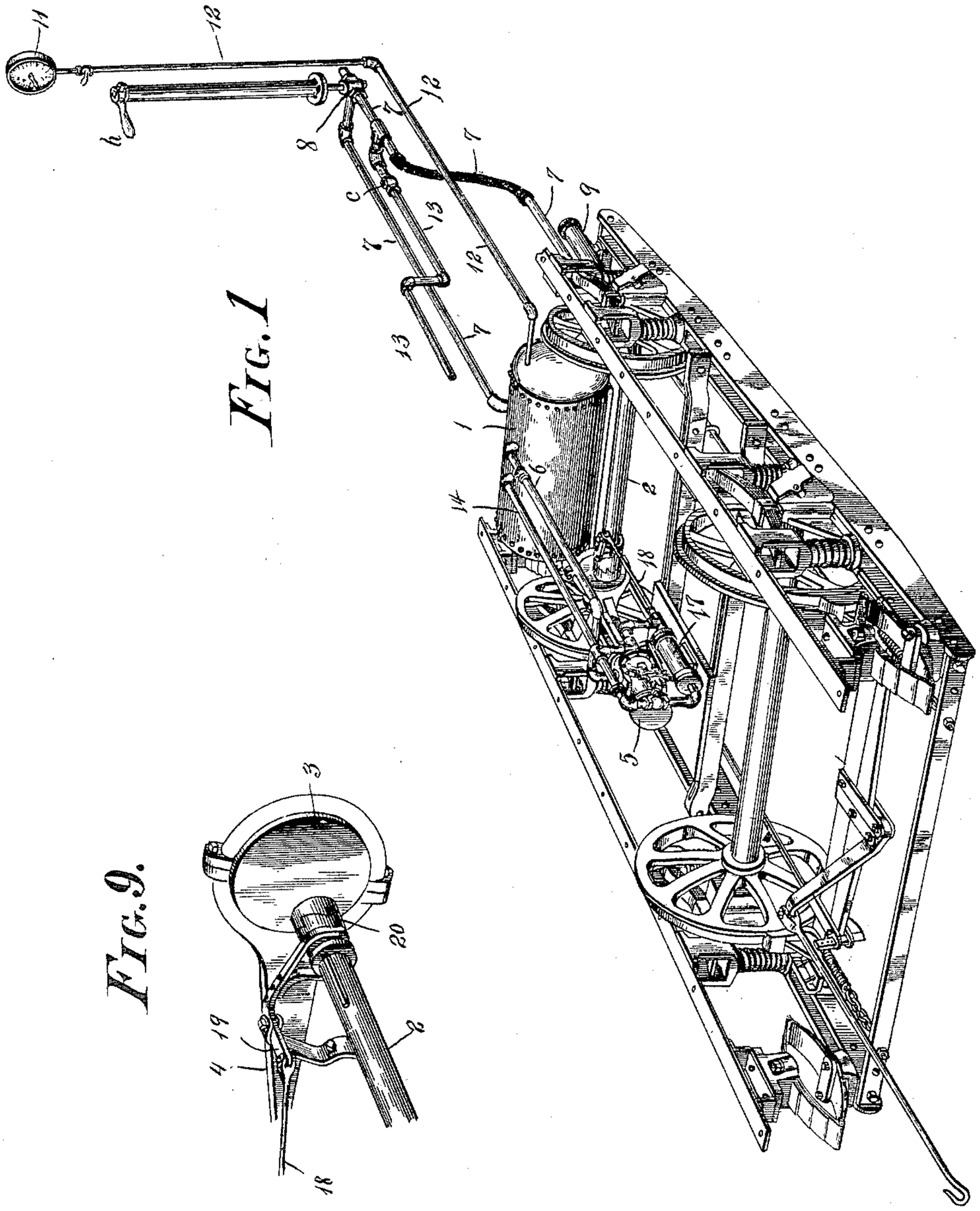

FIG. 9.

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(No Model.) 5 Sheets—Sheet 2.

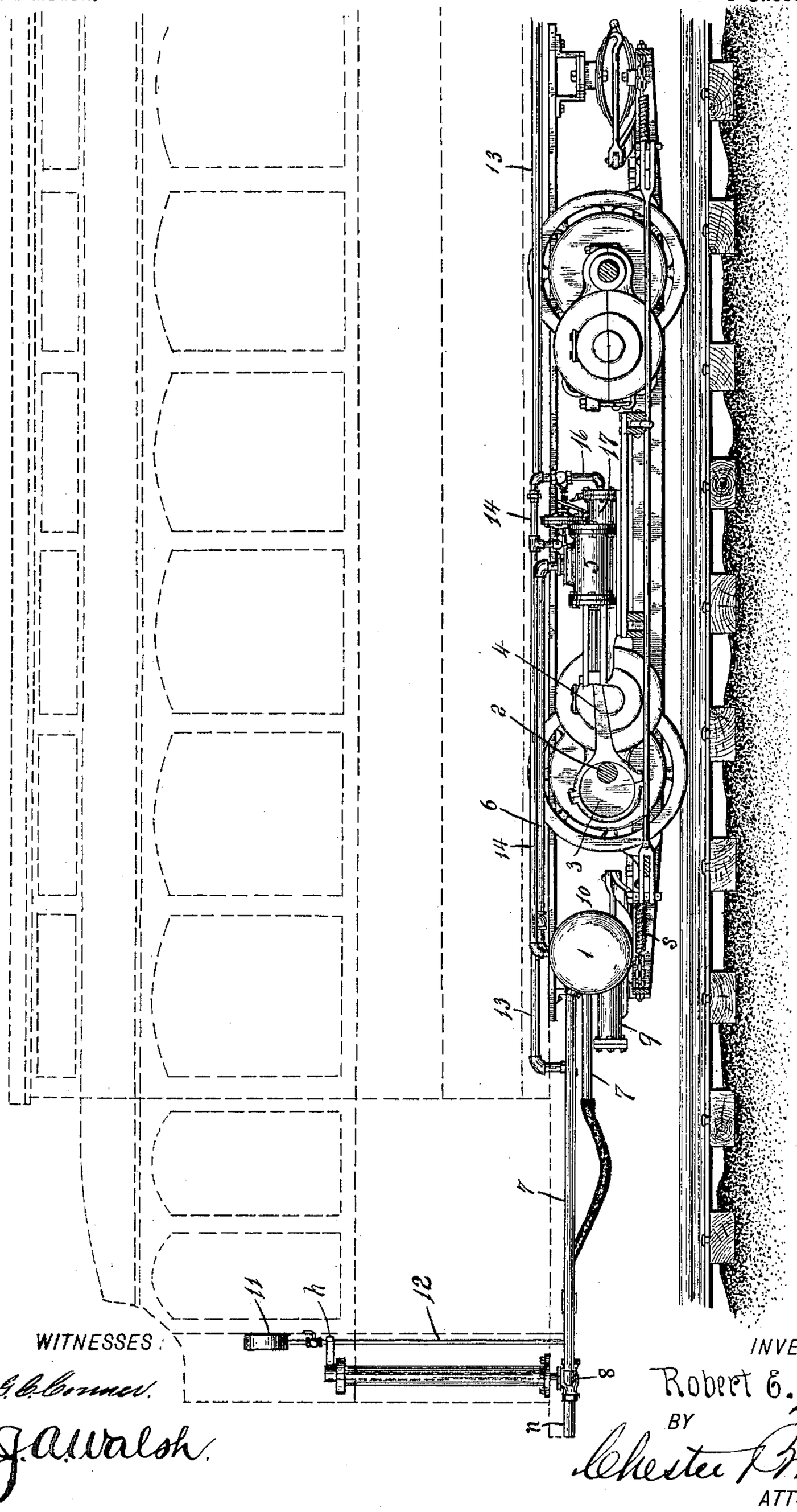

FIG. 2.

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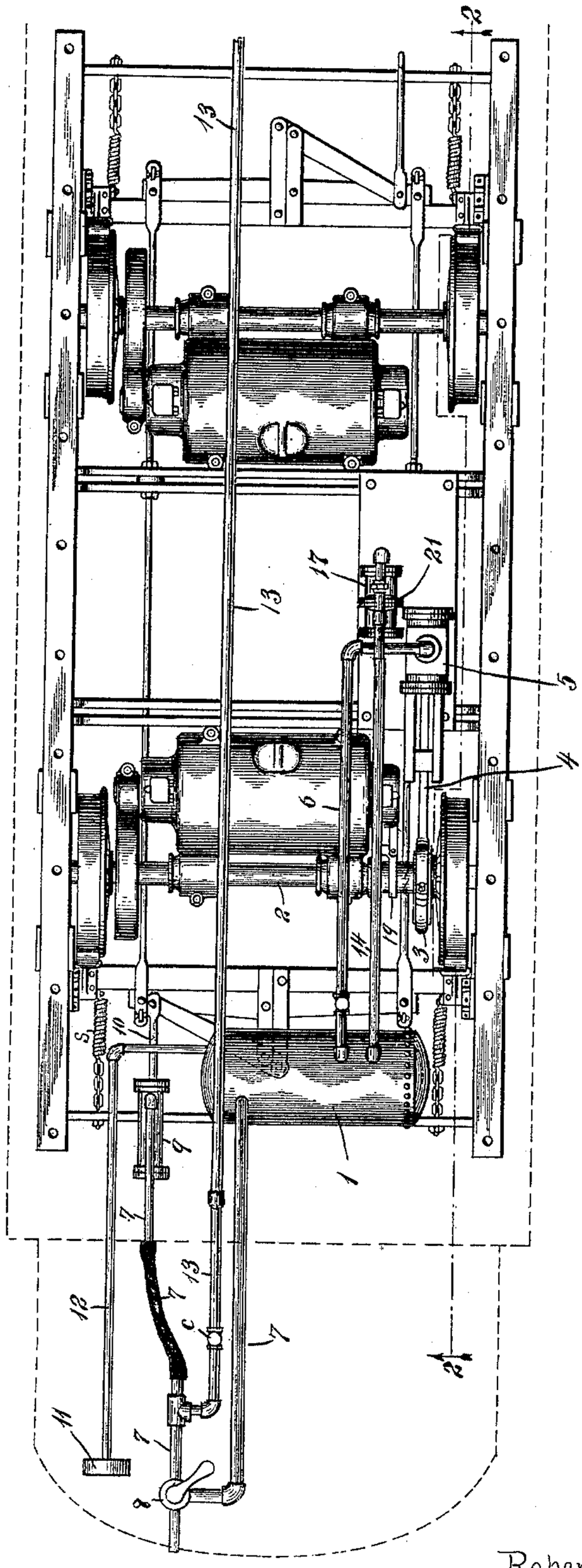
(No Model.) 5 Sheets—Sheet 3.

FIG. 3.



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(No Model.) 5 Sheets—Sheet 4.

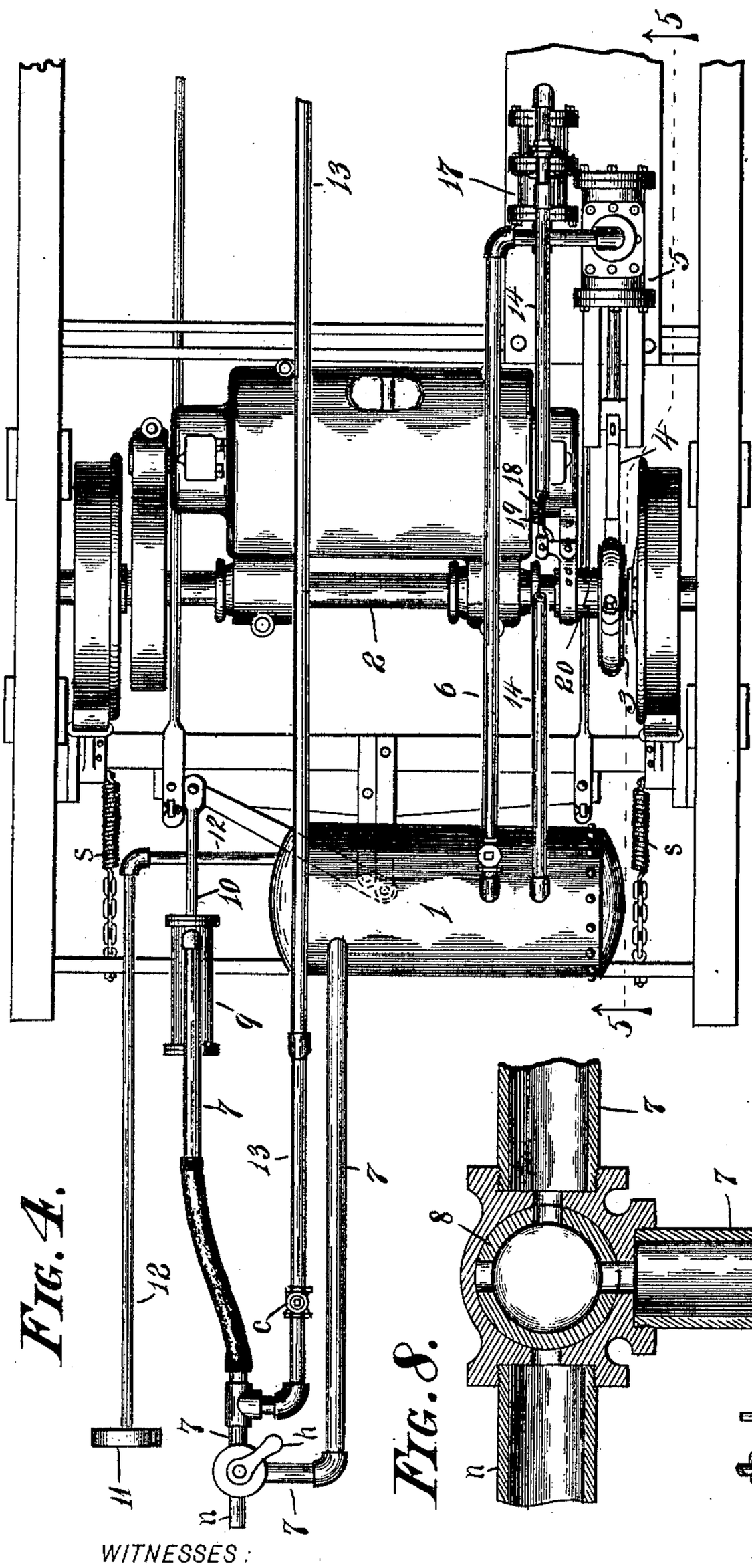

FIG. 4.

FIG. 8.

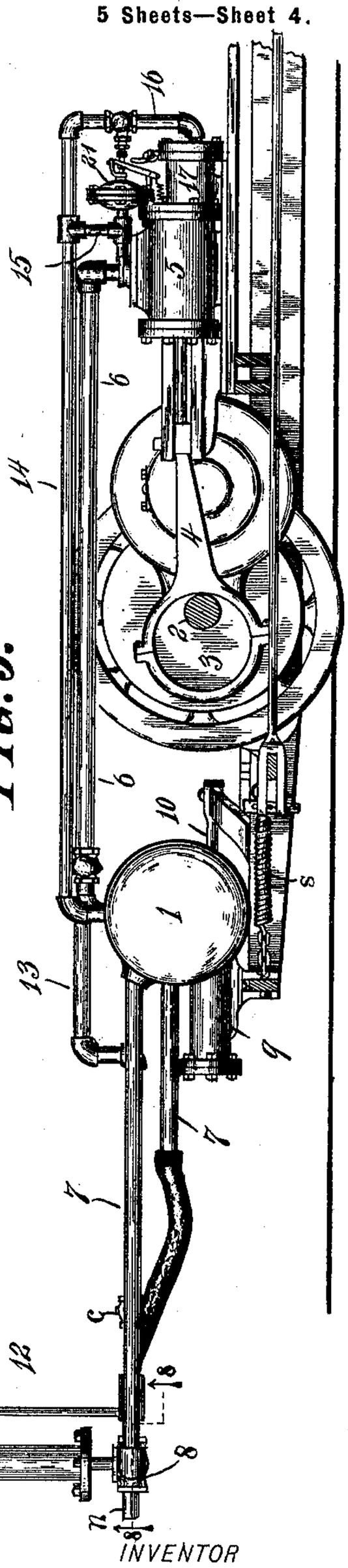

FIG. 5.

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AIR BRAKE FOR VEHICLES.

(Application filed Sept. 20, 1898.)

(No Model.) 5 Sheets—Sheet 5.

FIG. 6.

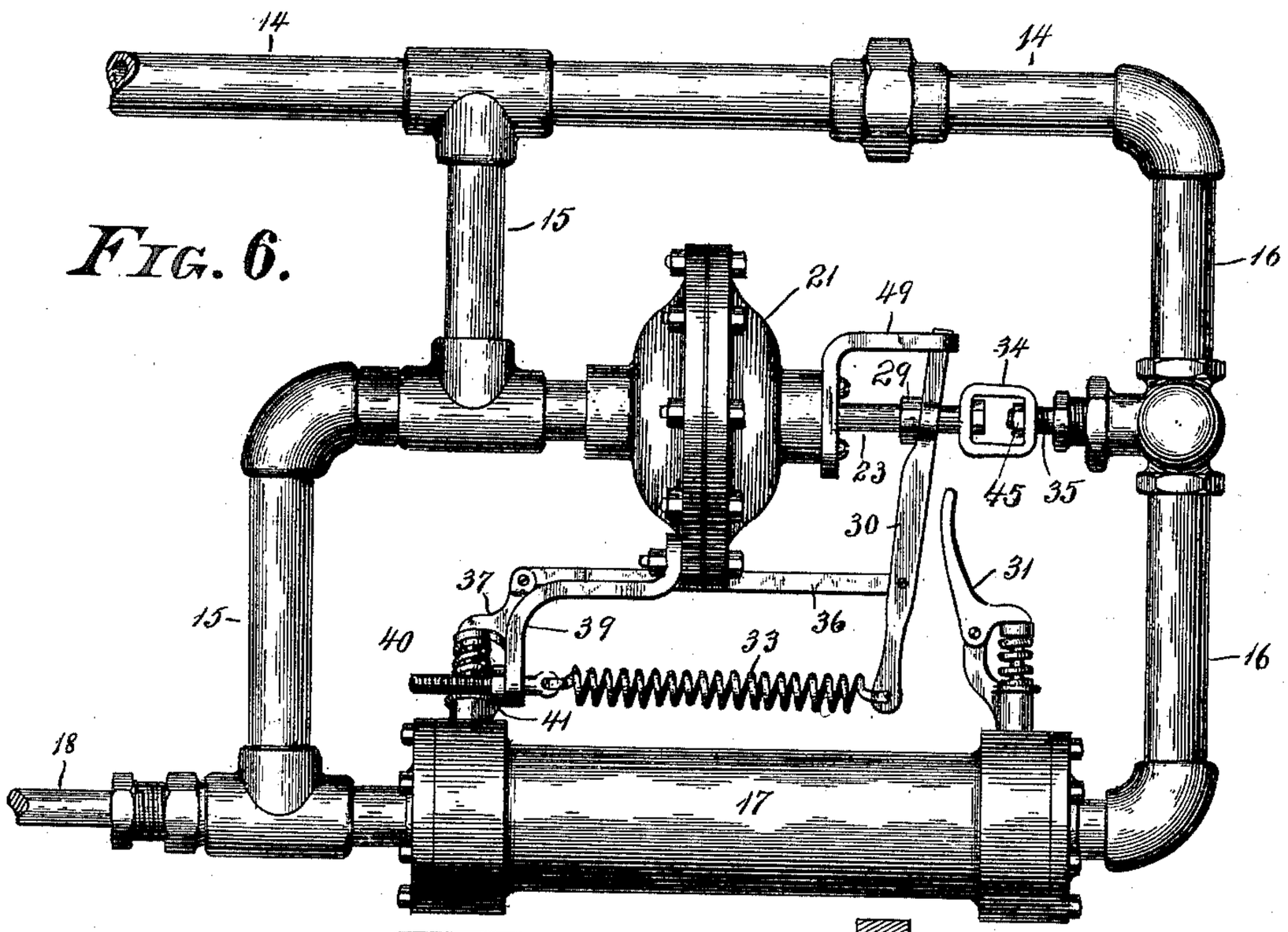
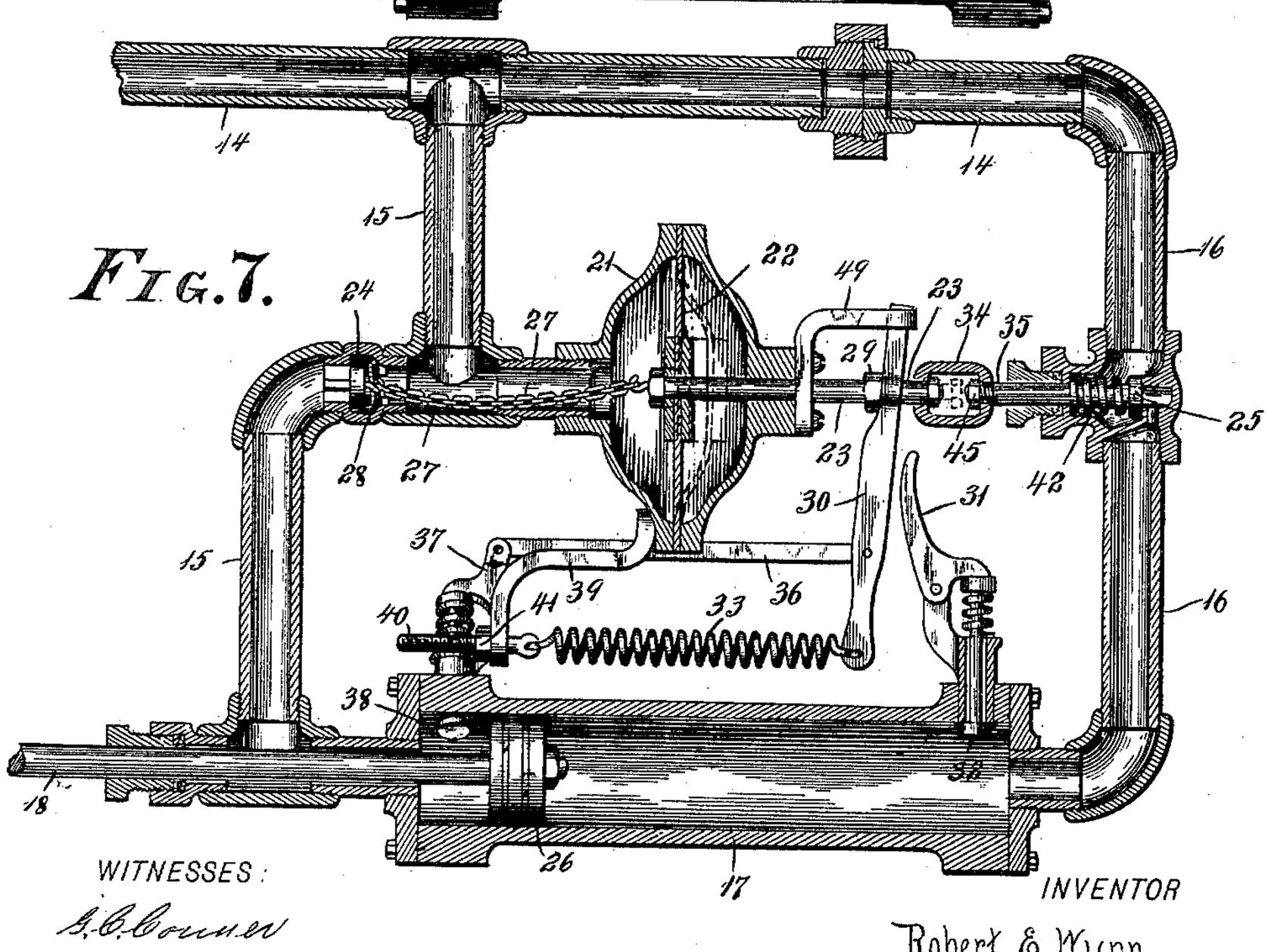


FIG. 7.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ROBERT E. WYNN, OF BARNARD, INDIANA, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO YANCEY N. NEW, OF SAME PLACE.

AIR-BRAKE FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 619,381, dated February 14, 1899.

Application filed September 20, 1898. Serial No. 691,455. (No model.)

To all whom it may concern:

Be it known that I, ROBERT E. WYNN, a citizen of the United States, residing at Barnard, in the county of Putnam and State of Indiana, have invented certain new and useful Improvements in Air-Brakes for Vehicles, of which the following is a specification.

The object of my present invention is to provide a simple and inexpensive air-brake for vehicles, especially such as railway and street cars and the like.

A leading feature of said invention is the means whereby a continuous substantially uniform air-pressure is maintained at all times without attention on the part of the operator.

It further consists in various features of construction and arrangements of parts, as will be hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof and on which similar letters and figures of reference indicate similar parts, Figure 1 is a perspective view of a street-car truck, omitting the electric motors, and upon which my invention is placed; Fig. 2, a longitudinal vertical sectional view of such a truck as seen from the dotted line 2 2 in Fig. 3, said view being substantially a side elevation with the framework and wheels removed at one side; Fig. 3, a top or plan view of such a truck; Fig. 4, a view similar to a portion of Fig. 3, on an enlarged scale, showing the parts more plainly; Fig. 5, a longitudinal vertical sectional view on the dotted line 5 5 in Fig. 4; Fig. 6, a side elevation of that particular portion of the apparatus by which the air-pressure is automatically maintained; Fig 7, a detail sectional view of the same; Fig. 8, a sectional view of the three-way cock for controlling the air, as seen from the dotted line 8 8 in Fig. 5; and Fig. 9, a detail perspective view illustrating the eccentric and clutch.

I have purposely illustrated my invention upon a street-car truck of a common and well-known construction and arrangement, in which the truck-frame, axles, wheels, motors, and most of the brake mechanism is such as is commonly employed.

Upon the truck-frame or car at some suitable point I mount the air-reservoir 1. Upon one of the axles 2 I place an eccentric 3, which through a suitable pitman 4 drives the piston of an air-pump 5, and this pump is connected by means of a pipe 6 to the air-reservoir 1. It is obvious that so long as the car is in motion and the eccentric 3 is caused to rotate with the axle 2 air will be pumped into the reservoir 1. I have therefore provided a clutch by which the eccentric 3 can be thrown into and out of operation, and this and the means of operating it will be presently described.

Leading from the reservoir 1 is a pipe 7, which preferably extends to a point convenient to the motorman or driver, where it contains a three-way cock 8, and thence to a cylinder 9, containing a suitable piston, the rod 10 whereof is connected to one of the levers of the brake mechanism. This brake mechanism, being of a usual and well-known construction, need not be particularly described. Suffice it to say that it is arranged to be operated when the air is caused to operate the piston on the rod 10 and is released when the air is shut off, leaving said piston free from its force.

The brake-beams, shoes, levers, and retracting-springs, as above stated, are of an ordinary and well-known construction, and obviously any form or construction of these devices which may be desired may be employed by making suitable mechanical changes, such as any person skilled in the art is usually capable of making without particular direction.

In order that the motorman may at all times be advised of the pressure in the reservoir 1, I have provided a pressure-gage 11 at a suitable point, which is connected to said reservoir by a suitable pipe 12.

In order that a single apparatus may be arranged to operate upon any desired number of cars, branch pipes may be employed, leading off from the pipe 7. I have shown such a pipe 13 leading rearwardly toward the position of another car, as is best shown in Figs. 1, 3, and 4. When not in use, this pipe should be shut off by a cock *c* close to where it branches from the pipe 7, so as to prevent waste of air.

As heretofore stated, a leading feature con-

sists in a means whereby a substantially uniform air-pressure is automatically maintained at all times. In order to accomplish this, I lead off from the reservoir 1 a suitable pipe 14, having two branches 15 and 16, leading to two ends of a cylinder 17, which cylinder contains a piston, the piston-rod 18 whereof is connected to and operates a bell-crank lever 19, by which a clutch 20, mounted on the axle 2, is controlled, and which is adapted to be thrown into or out of engagement with the hub of the eccentric 3, and thus cause said eccentric to rotate with said shaft or permit it to run loosely thereon. Obviously when said clutch is thus thrown into engagement the effect is to set the air-pump in motion and pump air into the reservoir 1, while when said clutch is thrown out of engagement the air-pump is permitted to remain idle, so that no air is forced into the reservoir thereby. The bell-crank lever 19, as shown especially in Figs. 4 and 9, is mounted upon a suitable bracket extending out from an adjacent portion suitable to support the same, as the framework or motor-casing.

Interposed between the branches 15 and 16 and suitably connected to said branch 15 is a suitable drum 21, containing a diaphragm 22. This diaphragm is connected to a rod 23 and a chain 27, which, as will be presently described, operate certain valves by which the admission of air to the cylinder 17 is controlled. When the air in the reservoir 1 reaches a predetermined pressure, the operation is (through the diaphragm 22) to so shift the valves that the piston in the cylinder 17 will be operated to throw the clutch out of engagement with the hub of the eccentric 3.

Within the branch pipe 15 is a valve 24, and within the branch pipe 16 is a valve 25. There is of course a continuous air-pressure, after the apparatus has once been put in working order, in the pipe 14 and in those parts of the branch pipes 15 and 16 between said pipe 14 and the valves. Assuming now that the clutch has been thrown into engagement and that the air-pump is therefore in operation, the air-pressure of course increases in the reservoir and in the pipe 14 and in the described portions of the branch pipes 15 and 16 so long as the air-pump continues to work. The increase of pressure in the branch pipe 16 has no effect; but the increase in the branch pipe 15 between the valve 24 and the diaphragm 22 has the effect to force said diaphragm, which is elastic, to the position shown by the dotted lines in Fig. 7, thus opening the valve 24 and allowing the air to flow into the portion of the branch pipe 15 below the valve, and thence against the piston-head 26 in the cylinder 17, thus forcing said piston-head toward that end of said cylinder with which the branch pipe 16 connects, which in turn operates through the piston-rod 18 to throw the clutch out of engagement and stop the pumping operation. The connection between the diaphragm 22 and the valve 24 I prefer to make flexible, and I have shown a small chain 27 as constituting such connection. A small spring 28 serves to keep the valve 24 seated, except when forced from its seat by the action of the diaphragm 22 through the chain 27. As the diaphragm 22 begins to move in performing the above-described operation a nut or collar 29 on the rod 23 presses against the lever 30, which in turn presses the lever 31 and opens the escape-valve 32, permitting the air in the cylinder behind the piston-head 26 to freely escape. When the air-pressure in the reservoir is reduced by the use of air therefrom for operating the brakes and the pressure upon the diaphragm 22 becomes thus decreased to the predetermined limit, the spring 33, connected to the lower end of the lever 30, overcomes the remaining pressure upon said diaphragm and returns said diaphragm to its normal position, permitting the valve 24 to seat itself. The movement being continued, (this being permitted by the continuation of the decrease of air-pressure,) said lever 30 through the rod 23 and a link 34 pulls upon the stem 35 of the valve 25, compressing the spring 42 and opening said valve and permitting air to flow through the branch pipe 16 to against the opposite side of the piston-head 26, forcing said piston-head toward that end of the cylinder 17 to which the branch pipe 15 is connected. At the same time said lever 30 through the link 36 operates the lever 37 and opens the escape-valve 38 in a manner corresponding to that in which the escape-valve 32 is opened by the movement in the opposite direction, as above described. The stem 35 is screw-threaded and carries a nut 45, by means of which the operation of the valve 25 can be adjustably controlled.

The lever 30 is pivoted at one end to a rigid bracket 49, and the spring 33 is connected to a rigid bracket 39 through the medium of a screw-rod 40, upon which is an adjusting-nut 41. It is obvious that by turning this adjusting-nut upon this rod the tension of the spring 33 can be increased or diminished, so that the relative stiffness of the two springs may be varied and the limit of variation of pressure thus adjustably controlled. These parts are so adjusted that this apparatus will shift automatically as the pressure reaches the predetermined limit in either direction. Assuming, therefore, that the maximum pressure required is eighty pounds and the minimum pressure for efficient operation is seventy pounds, the diaphragm would be adjusted to move by the air-pressure entering the branch pipe 15 when the pressure of eighty pounds was reached, with the result of throwing the clutch out of engagement, as above described, and the spring 33 would be adjusted to operate the apparatus in the opposite direction, so as to again throw the clutch into operation, when the minimum of seventy pounds was reached, and so on continuously. By means of my apparatus, therefore, I am enabled to

secure a continuous pressure as nearly uniform as may be desired without attention upon the part of the operator.

While I have in my illustration mentioned a change of ten pounds in the pressure, it will be understood that that is simply for purposes of illustration and that the apparatus can be adjusted to be operated by a much smaller change in pressure.

As indicated by the dotted lines in Fig. 7, the rod 23 passes loosely into the link 34, so that its head may move freely for a certain distance within said link, and thus said rod 23 is enabled to travel for said distance independently of the rod 35, and consequently the valve 25 is not unseated simultaneously with the seating of the valve 24, but instead remains seated until the air-pressure against the diaphragm 22 has been additionally decreased sufficiently to permit the additional movement of the diaphragm, which is caused by the action of the spring 33, which operates, through the lever 30, the rod 23 and the link 34 to compress the spring 43 and unseat the valve 25, as will be clearly understood by an inspection of the drawings. In other words, the resistance of the air-pressure against the diaphragm 22 is sufficiently different between the times when the rod 23 occupies the position indicated by the dotted lines in Fig. 7 and the times when it occupies the position indicated by full lines to permit the above-described changes in air-pressure in the tank and system of pipes before the valves are caused to reverse.

The operation of this invention may be briefly recapitulated as follows: The reservoir 1 being suitably charged with air and it being desired to apply the brake, the operator by means of a suitable handle *h* turns the three-way cock 8 to the position shown in Fig. 8. The supply of air thereupon enters the cylinder 9, behind the piston-head therein, and draws upon the rod 10, thus operating the brake mechanism, which, as heretofore stated, is of a usual and well-known variety, and the brake-shoes are thus applied to the wheels. When it is desired to release the brake mechanism, then the three-way cock 8 is given a quarter-turn, shutting off the air from the reservoir 1 and permitting the free escape of the air from the cylinder 9 to the outside of the apparatus, generally through a short piece of pipe or nozzle *n*, although such pipe or nozzle may be dispensed with. The brake-springs *s* then perform their usual functions and draw the brake-shoes back away from the wheels, as will be readily understood. When the pressure in the reservoir decreases to the predetermined limit, then the force of the spring 33 overcomes the air-pressure upon the diaphragm 22 and opens the valve 25, which through the piston-rod 18 and bell-crank lever 19 throws the clutch 20 into engagement with the hub of the eccentric 3. The pumping is then set up in the air-pump 5, which continues until the predetermined maximum pressure is reached, when the pressure upon the diaphragm 22 overcomes the resistance of the spring 33, opening the valve 24 and permitting the spring 42 to close the valve 25, and at the same time through the connection 27 opening the valve 24. This throws the clutch out of engagement, as has already been described, and stops the pumping operation.

The pressure-gage 11 is provided simply that the operator may observe that the apparatus is in order and doing its work properly.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in an air-brake apparatus for vehicles, of an air-reservoir, an air-pump, its piston, a connection from said piston to a crank or eccentric on an axle, said crank or eccentric, devices for throwing said crank or eccentric into or out of operation, means including a diaphragm for operating valves and thus shifting said devices automatically as the air-pressure in the reservoir reaches predetermined limits, said valves being positioned on opposite sides of said diaphragm, a brake-operating cylinder, a pipe leading from the reservoir to the brake-cylinder, and a three-way cock interposed in said pipe, all substantially as set forth.

2. The combination, in an air-brake apparatus for vehicles, of a reservoir, an air-pump for supplying said reservoir, a device for operating said pump, a clutch whereby said device may be thrown into or out of engagement, and an apparatus for automatically shifting said clutch; said apparatus consisting of an air-cylinder the piston whereof is connected to said clutch, branch pipes leading from both ends of said cylinder, valves in said pipes, a diaphragm situated between said valves and adapted to be operated in one direction by the air-pressure as the same increases, a rod connected to said diaphragm, and a spring connected to said rod whereby said diaphragm is operated in the other direction as the air-pressure decreases.

3. The combination, in an automatic shifting device for air-brake apparatus, of the pipes 14, 15 and 16, the air-cylinder 17 containing a piston-head, an operating-rod 18 driven by said piston-head, valves 24 and 25 in said pipes 15 and 16, a diaphragm 22 situated between and connected to said valves, and a spring 33 also connected to said diaphragm, said several parts being arranged as described whereby the air-pressure will operate said diaphragm in one direction as it reaches its maximum limit, and whereby said spring will operate said diaphragm in the other direction as the pressure reaches its minimum limit, substantially as set forth.

4. The combination, in an automatic shifting device for an air-brake apparatus, with the shifting-piston, its pipes and valves, of a diaphragm 22 having a rod 23 connected thereto, valves 24 and 25, springs 28 and 42

whereby said valves are normally held seated, connections between said valves and said diaphragm, the air-pressure being adapted to operate said diaphragm in one direction, and a spring which is adapted to operate said diaphragm in the other direction.

5. The combination, in an automatic shifting device for an air-brake apparatus, with the main valves, an operating-diaphragm, and a clutch-shifting piston, of escape-valves 32 and 38, and connections between said escape-valves and the main-valve-operating mechanism whereby as the main valve of one set of valves is closed the escape-valve of the other set is opened, substantially as and for the purposes set forth.

6. The combination in an automatic-shifting device for an air-brake apparatus, with the shifting-piston its pipes and valves, of a diaphragm 22, valves 24 and 25 adapted to be operated by said diaphragm, a stem 35 to said valve 25, a loose connection to the diaphragm therefrom, and an adjusting-nut 45 whereby the relation of said valve to said diaphragm can be adjustably controlled.

7. The combination, in an automatic shifting device for an air-brake apparatus, of branched pipes, a diaphragm between said pipes, valves in said pipes, connections from said diaphragm to said valves, an air connection to one side of said diaphragm whereby it may be operated in one direction, a spring connected to said diaphragm whereby it may be operated in the other direction, and an adjusting screw attachment to said spring whereby its tension can be adjusted, and the change of pressure required to shift the apparatus thus adjustably controlled.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 16th day of September, A. D. 1898.

ROBERT E. WYNN. [L. S.]

Witnesses:
CHESTER BRADFORD,
JAMES A. WALSH.