

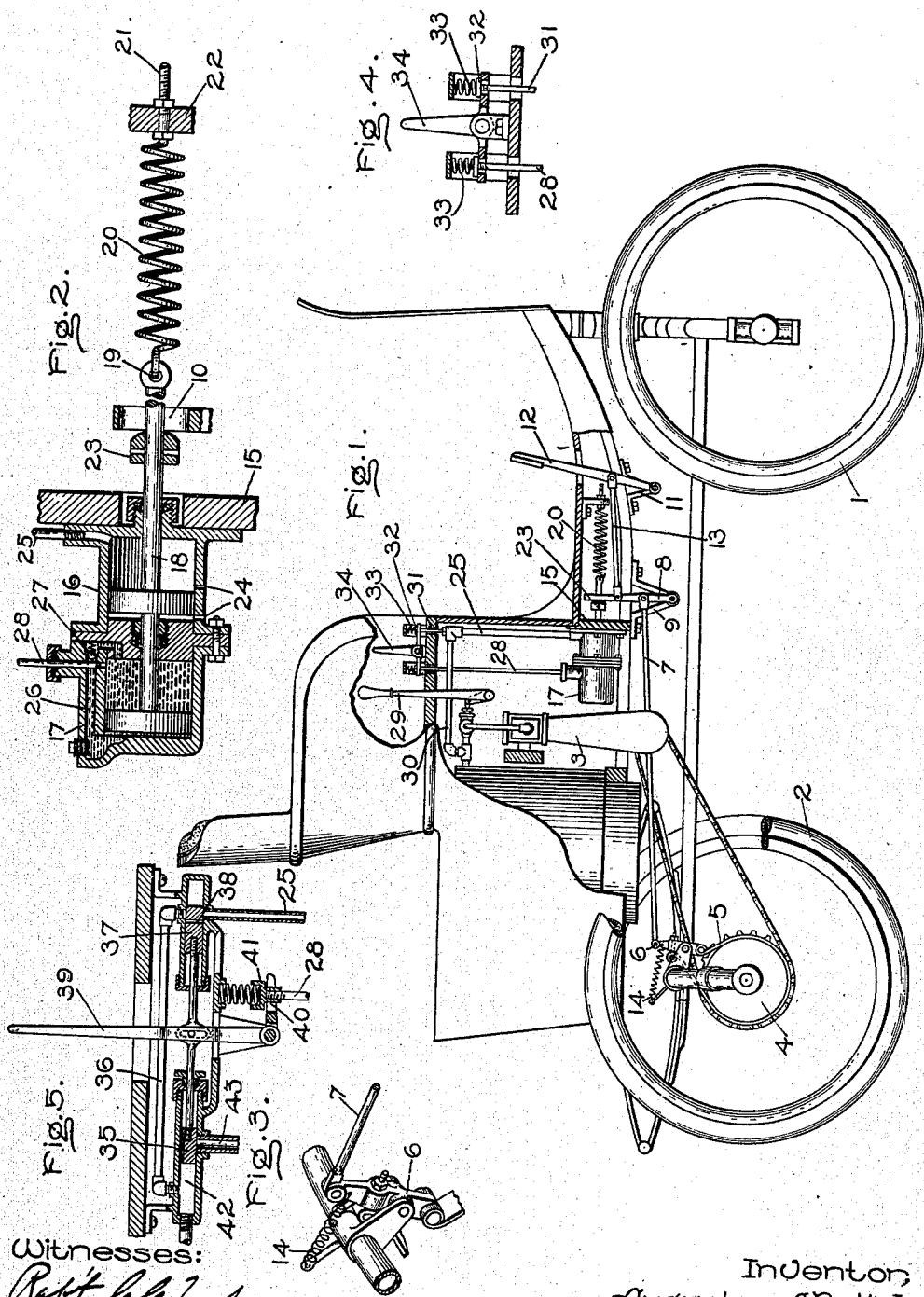
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A. A. BALL, JR.
VEHICLE BRAKE.

(Application filed Jan. 27, 1902.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

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VEHICLE-BRAKE.

SPECIFICATION forming part of Letters Patent No. 716,168, dated December 16, 1902.

Application filed January 27, 1902. Serial No. 91,299. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS A. BALL, Jr., a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Vehicle-Brakes, (Case No. 2,369,) of which the following is a specification.

The present invention relates to vehicle-brakes, and more particularly to those intended for use on self-propelled vehicles, and has for its object to improve their construction.

The scope of the invention will be more fully set forth in the description and in the claims appended thereto.

In the accompanying drawings, which illustrate an embodiment of my invention, Figure 1 is a side elevation of the vehicle with certain of the parts broken away. Fig. 2 is a sectional view of the means employed for operating the brake by power and for controlling its action. Fig. 3 is a perspective view illustrating the suspension of the brake-band. Fig. 4 is a detail of the means employed to control the action of the brake-actuating apparatus, and Fig. 5 is a slight modification wherein a single handle is arranged to control both the engine and brake.

Referring to the drawings, 1 represents the steering-wheels, which are mounted on short axles in the usual manner. For simplicity of illustration the steering-lever has been omitted. The driving-wheels 2 are connected to the engine 3 by sprockets and chain, together with the usual differential gearing, permitting one driving-wheel to make a greater angular movement than the other. The differential gearing is inclosed in a casing 4, the periphery of which is turned true and forms a brake-drum. Surrounding this drum is a flexible band 5, the ends of which are secured to the lever 6, as is illustrated in Fig. 3. The lever 6 is pivoted at a point about midway between the points of attachment of the band, so that the brake is effective either for forward or backward rotation of the driving-wheels. Extending forward from the lever 6 is a connecting-rod 7 of any suitable character. The opposite end of this connection or rod is pivotally secured to a vertically-extending lever 8, the latter being carried in a

hanger 9, that is fastened to the under side of the vehicle-body. The upper end of the lever 8 is provided with a slot 10, which permits it to move independent of the power-actuating mechanism, as will appear hereinafter.

Pivotally mounted in the hanger 11 is a foot-lever 12, which is connected to the lever 8 by a connection 13 and is adapted to be actuated by the foot of the person operating the vehicle. When pressure is applied to the lever 12, it moves the lever 8 forward, which in turn transmits motion to the rod 7 and to the brake-lever 6. This causes the brake-band to tighten around the drum and arrest the motion of the vehicle, and the action takes place whether the vehicle is moving forward or backward. Between the end of the brake-lever and a stationary part on the axle is a spring 14 for returning the brake parts to an inoperative position as soon as pressure is removed from the foot-lever 12.

A brake of the character described will meet most of the conditions of operation; but at times it is imperative to make a quick stop, and at such times it is necessary to apply the brake with great power, and this without loss of time. In order to provide for such emergencies, a power-actuated means is provided for the brake, which means includes a powerful spring for setting the brake, a power-piston for releasing the brake, and a cylinder containing a body of incompressible fluid for controlling the action of the spring, the movement of the piston within the cylinder being controlled by a by-pass valve, which is under the control of the operator.

Mounted on a transversely-extending support 15 are two cylinders 16 and 17, arranged in tandem. Each cylinder is provided with a piston, and the pistons are united by the piston-rod 18. The rod is provided with suitably-packed joints and at its outer end is provided with an eye 19 to receive one end of the adjustable tension-spring 20, employed to set the brake. The opposite end of the spring is secured to a screw-threaded stem 21, which is adjustably supported in the stationary support 22. Mounted on the piston-rod is a collar 23, having a rounded surface, which engages with the slotted end of the le-

ver 8. The relation between the lever 8 and the piston-rod is such that the lever can move forward and back within prescribed limits under the action of the foot-lever 12 and the releasing-spring 14 without affecting the operation of the power-actuating mechanism. On the other hand, when the pistons move to the right under the action of the spring 20 the collar 23 engages with the lever 8 and moves it in a direction to set the brake. The steam or actuating cylinder 16 is provided with small holes 24 on the under side to permit the escape of the water formed by the condensation of steam. The upper right-hand end of the cylinder is provided with a pipe 25 for admitting steam in a manner to move the piston and cause it to place the spring 20 under tension.

The controlling-cylinder 17 contains a body of non-compressible fluid, such as oil or glycerin, for regulating the action of the power-brake. I prefer to use oil or glycerin in this cylinder on account of their non-freezing properties; but where there is no danger from freezing water may be substituted therefor. In the cylinder, at some convenient point, is mounted a removable screw-threaded plug permitting the insertion of fluid. Formed in the upper side of the cylinder and extending from one end to the other is a passage 26. At some point in this passage is located a check-valve 27. In the present instance it consists of a small spring-pressed ball and is so arranged that fluid may be forced from the left-hand to the right-hand end of the cylinder, but not in the reverse direction. In order to control the passage of fluids, a manually-actuated valve 28 is provided, which valve is arranged to shunt the check-valve 27. When the valve 28 is open, the piston is free to move toward the right under the action of the spring 20, and the movement of the piston can be checked at any intermediate point. The rapidity with which the movement of the pistons takes place is controlled by the valve-opening.

Steam is admitted to the engine from the boiler by a throttle-valve controlled by the lever 29, and between the throttle-valve and the boiler is a connection 30, which opens into the pipe 25. The opening between these two pipes is controlled by a spring-pressed valve 31.

The means employed for actuating the valve controlling the fluid-cylinder and that regulating the admission of steam to the cylinder will now be described.

The valve-stems are extended so that they pass through the seat or other support and are provided at their ends with heads 32. Situated between each head and a stationary abutment is a coiled compression-spring 33, which tends at all times to hold the valve closed. Pivottally supported between the valve-stems is a lever 34, having forked ends which engage with the enlarged heads on the valve-stems. When the lever 34 is moved

backward, the forward forked end raises the stem of valve 31, and steam is admitted from the boiler to the cylinder 16 through the pipes 30 and 25. On releasing the handle the spring 33 will close the valve and cut off the supply of steam to the cylinder 16. Only a very small amount of steam is required to move the piston within the cylinder, and as the former moves to the left it also moves the piston in the controlling-cylinder, the check-valve 27 automatically opening and permitting this action to take place. Any movement of the controlling-cylinder piston in the opposite direction is of course checked by said valve. Assuming that it is desired to set the brake by means of the spring or motive power device 20, the lever 34 is moved forward and the forked end engaging with the head on the stem of valve 28 raises it and permits the fluid in the cylinder 17 to circulate freely. When the handle is released, the compression-spring 33, situated above its head, causes the valve to close and prevent further movement of the power-brake mechanism. The fluid in the controlling-cylinder in passing through the valve-opening also acts to retard the action of the spring 20, so that the brake or brakes are gradually set, yet with sufficient rapidity to quickly arrest the movement of the vehicle. The valves 28 and 31 are entirely independent in their action, although a single lever is used to control them. Assuming that the pistons are in the extreme right hand ends of the cylinders, with the brake set by reason of the collar 23 engaging with the lever 8, and that it is desired to release the brake, the lever 34 is moved backward, thus opening the valve 31. Steam then enters the pipes 30 and 25 and passes into the cylinder 16. This will move the piston to the left, and the check-valve 27 will permit the fluid on the left hand end of the controlling piston to flow past it into the right hand end of the cylinder. The valve 31 is of course opened only momentarily, after which it is returned to the closed position. This last action may take place manually or by means of suitable springs, the latter being preferable. As shown, the spring 20, which constitutes the motive device for setting the brake, is in an operative position and subject to the action of the controlling-cylinder. Assuming the parts to be in the position shown and that it is desired to arrest the speed of the vehicle under ordinary running conditions, the foot-lever 12 is forced outwardly away from the operator, and motion is transmitted to the brake-lever through the rod 13, lever 8, and rod 7. The lever 8 being slotted at its upper end is free to move independent of the piston-rod 18 and the spring 20. Assuming that for any reason it is desired to utilize the power-brake for stopping the vehicle, the handle 34 is moved forward, which raises the valve 28. The fluid in the controlling-cylinder will then flow from the right to the left hand end, and in so doing will permit the piston to move to the right un-

der the action of the spring 20. As the pistons move to the right the collar 23 engages with the lever 8 and transmits motion to the brake-lever through the rod 7. The brake
5 can be set lightly or otherwise, depending upon the amount of fluid permitted to pass from the right to the left hand end of the controlling-cylinder. The brake may also be set under the action of the spring 20 when it is
10 desired for any reason to leave the vehicle, and the only way that the apparatus can be placed in operative condition is to admit steam to the power-cylinder 16 and move the piston to the left until the lever 8 assumes a
15 position substantially as shown in Fig. 1.

It will be seen that both the manually-actuated lever 12 and the power-piston and spring 20 act on the lever 8, and, furthermore, that the action of the power-actuated mechanism is independent in so far as its action is
20 concerned of the manually-actuated lever 12.

For simplicity of illustration the reversing-valve mechanism for the engine is omitted; but it is to be understood that such mechanism is provided.
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Referring to Fig. 5, means are shown whereby a single controlling-lever is utilized to admit steam to the engine and also to control the action of the power brake or brakes. The
30 advantage of such a construction over the other resides in the reduction of the number of control-handles, which is of course advantageous in self-propelled vehicles where the operator has many valves and levers to keep
35 in mind.

42 represents a cylinder which is in communication with the steam-carrying connection leading from the boiler, and mounted therein is a piston 35, which constitutes a
40 valve. The piston is provided with a very small orifice to enable the pressures on opposite sides to equalize. Communicating with the cylinder 42 is a connection 43, leading to the engine, and the opening between the cylinder and the connection is controlled by the
45 piston-valve 35. In order to control the admission of steam to the actuating-cylinder 16, a second piston-valve 37 is provided, having a small vertical orifice 38, arranged to
50 connect the steam-pipe 36 from the boiler with the pipe 25, leading to the cylinder 16. The pistons are mechanically united, and the orifice 38 is so arranged that it admits steam to the pipe 25 before steam is admitted to the
55 engine. In other words, steam for a very brief interval is admitted to the actuating-cylinder 16 each time the throttle-valve is moved from a closed position.

Situated midway between the pistons and
60 pivotally connected to the rod is a lever 39, which is provided at its lower end with a cam 40, that strikes the head 41 on the valve-stem 28 and raises it against the spring-pressure each time the lever is moved back of a central position. Forward movement of the lever

regulates the speed of the engine and backward movement regulates the application of the brake or brakes.

What I claim as new, and desire to secure by Letters Patent of the United States, is— 70

1. In combination, a revolving element, a brake therefor, a motor which is separate from the said element for applying the brake, a body of non-compressible fluid which is independent of the motor for regulating the setting of the brake, and a manually-actuated device by means of which the fluid is controlled. 75

2. In combination, a revolving element, a brake therefor, a motor which is separate from said element for applying the brake, a pressure cylinder and piston for setting the motor in operative condition, a body of non-compressible fluid which is independent of the motor for regulating the setting of the brake, and a manually-actuated valve which controls the action of the fluid. 80

3. In combination, a revolving element, a brake therefor, a motor for applying the brake, a steam cylinder and piston for setting the motor into operative condition, a second cylinder containing a piston, a connection between the piston and the motor, a body of non-compressible fluid in the second cylinder, and a valve for regulating the fluid circulation. 85

4. In combination, a revolving element, a brake therefor, a spring for applying the brake, a power piston and cylinder for releasing the brake, and a controlling piston and cylinder acting on a body of non-compressible fluid to regulate the application of the brake. 90

5. In combination, a revolving element, a brake therefor, a motor for setting the brake, a power piston and cylinder for releasing the brake, a controlling piston and cylinder, the latter containing a body of non-compressible fluid, and an automatic valve arranged to permit the piston to move freely in one direction, and a second valve arranged to control the movements of the piston in the opposite direction. 95

6. In combination, a revolving member, a brake therefor, a motor for applying the brake, a second motor for releasing the brake, a lever which is connected to the brake and is acted upon by the first motor and is capable of moving independent thereof, a manually-actuated lever, and a connection between the two levers whereby the brake can be applied either by the motor or by the manually-actuated lever. 100

7. In combination, a revolving element, a brake therefor, a motor for applying the brake, a motor for releasing the brake, a lever which is connected to the two motors by a lost-motion connection, a second lever connected to the first for applying the brake manually, and a body of non-compressible fluid to regulate the application of the brake. 105

110 120 125 130

fluid for controlling the action of the motor which sets the brake.

8. In combination, a revolving element, a brake therefor, a spring for setting the brake, 5 a power piston and cylinder for placing the spring under stress, a piston, a cylinder, a body of non-compressible fluid confined in the cylinder and arranged to act on the piston, a valve for admitting steam to the power- 10 cylinder, a valve for controlling the fluid circulation; and a lever arranged to operate first one valve and then the other.

9. In combination, a revolving element, a brake therefor, a motor for setting the brake, 15 a motor for releasing the brake, a controller for the brake containing a body of non-compressible fluid, an engine, and a single lever for controlling the application and release of

the brakes and the admission of steam to the engine.

10. In a vehicle, the combination of a rotating element, a brake therefor, a motor for setting the brake in an operative position, a means for holding the brake in said position 25 irrespective of the movements of the vehicle or rotating element, a second motor independent of the rotating element for applying the brake, and a device which is under the control of the operator for regulating the ac- 30 tion of the second motor.

In witness whereof I have hereunto set my hand this 23d day of January, 1902.

AUGUSTUS A. BALL, JR.

Witnesses:

DUGALD MCK. MCKILLOP,
HENRY O. WESTENDARP.