(No Model.) 3 Sheets—Sheet 1

E. J. LEWIS.

AUTOMATIC AIR BRAKE.

No. 383,819. Patented May 29, 1888.

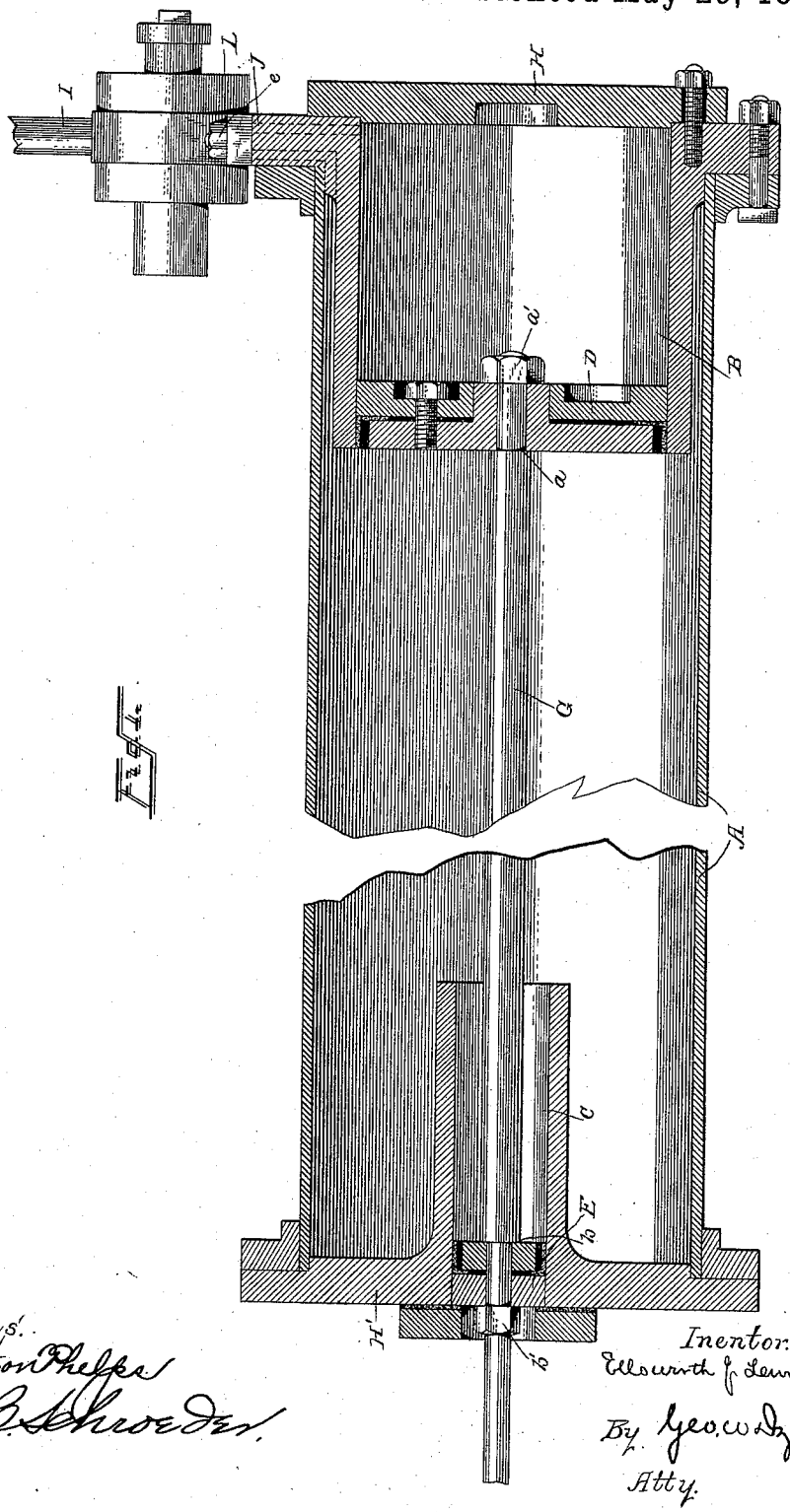

Fig. 1.

Witnesses.
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Jno. A. Schroeder.

Inventor.
Ellsworth J. Lewis.
By Geo. W. Dyer.
Atty.

(No Model.) 3 Sheets—Sheet 2.

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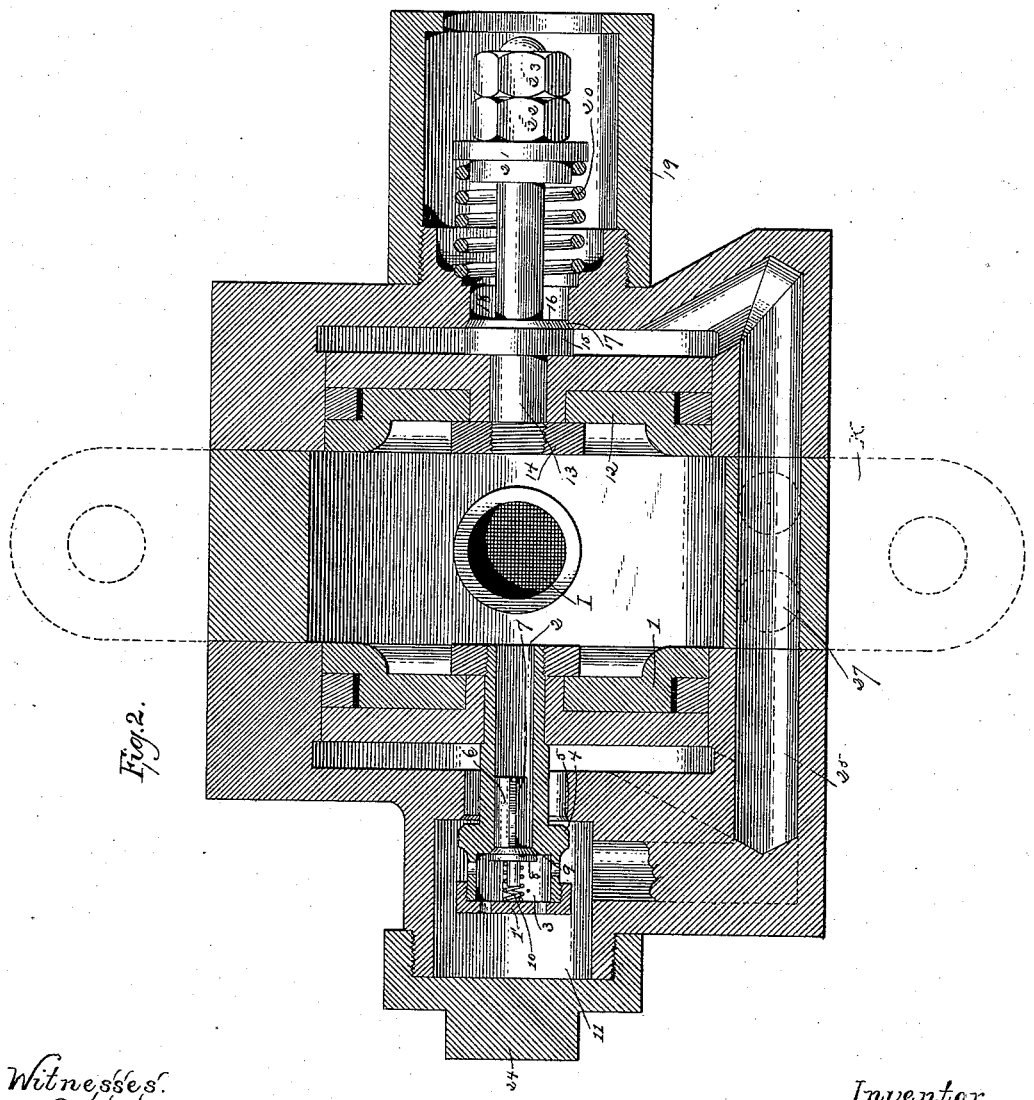

Fig. 2.

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(No Model.)

3 Sheets—Sheet 3.

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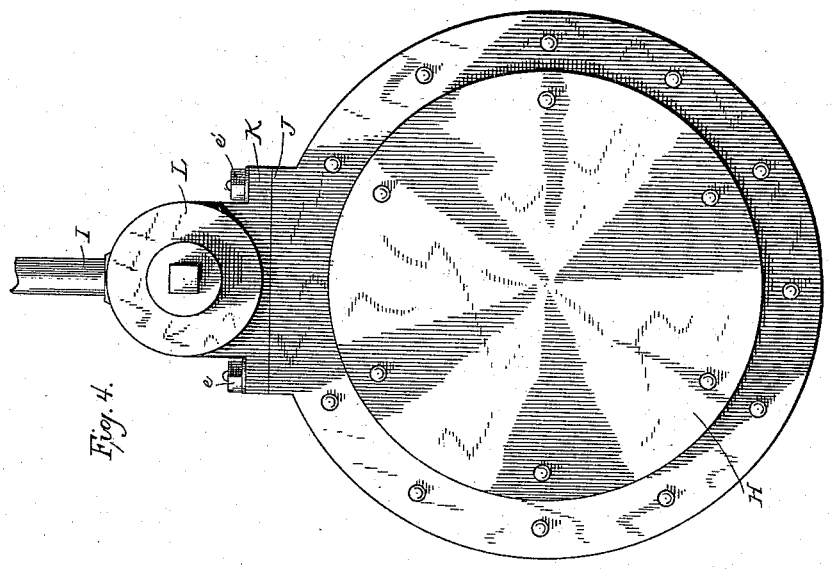

Fig. 4.

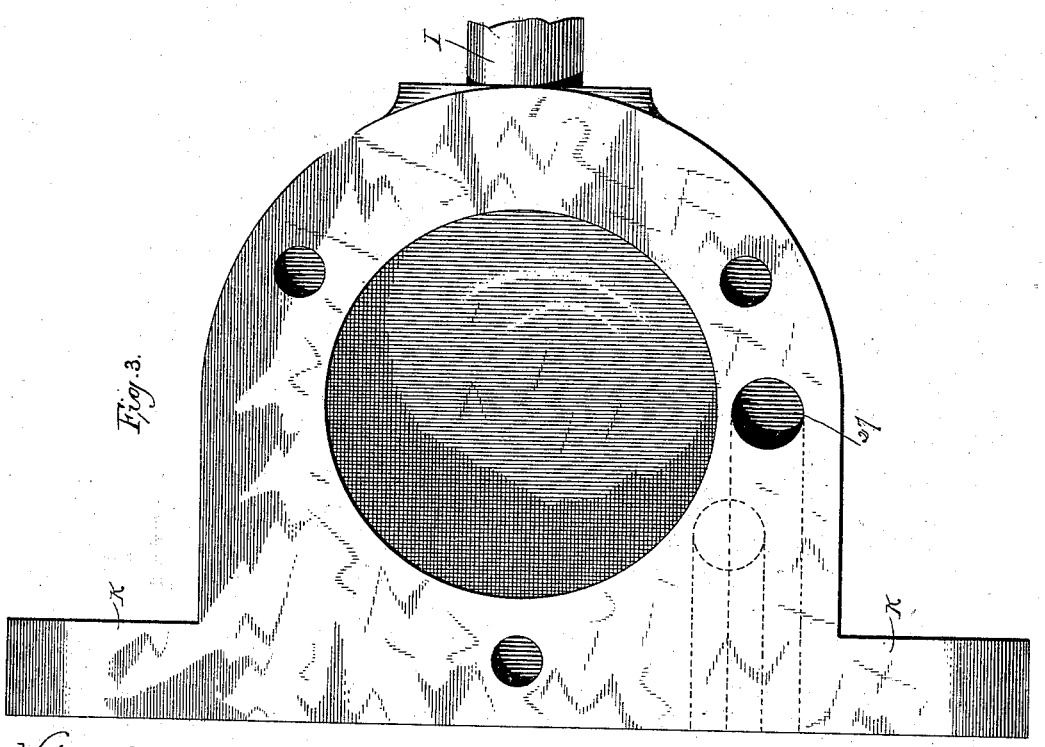

Fig. 3.

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UNITED STATES PATENT OFFICE.

ELLSWORTH J. LEWIS, OF BELLAIRE, OHIO.

AUTOMATIC AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 383,819, dated May 29, 1888.

Application filed August 18, 1887. Serial No. 247,277. (No model.)

To all whom it may concern:

Be it known that I, ELLSWORTH J. LEWIS, a citizen of the United States, residing at Bellaire, in the county of Belmont and State of Ohio, have invented certain new and useful Improvements in Automatic Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has special relation to new and useful improvements in the construction of automatic air-pressure brakes, and also to new and improved automatic valves for the same, so that when the several parts are properly combined and arranged and put into practical use a more efficient, cheaper, simpler, and compact brake is obtained. In such a brake the valves are sufficiently protected to resist ordinary blows. All the mechanism is inclosed in one casing, and all the different parts are of easy access, so as to allow all necessary repairs to be made. The principal novelty of construction in this brake consists in a large reservoir to be placed under each car, and provided with a large cylinder within one end, and with a smaller cylinder within the other end, one being adapted to put the brake-shoes into effective action and the other adapted to withdraw them from such effective action, as well as in other details of construction, all as will be more fully hereinafter described and claimed. Air-brakes such as are now used are divided into two principal classes, both of which employ cylinders under each car, and which are connected together by suitable air-conducting pipes leading from the source of supply. The first class embraces those brakes which employ no auxiliary reservoir, and which, when about to be applied, necessitate the passage of the air along the train-pipe so as to fill each cylinder. The objection to this arrangement is, that it takes some time for the air to pass along the pipe, and consequently the brake is not instantaneous, and is not self-applied in the event of any accident which will break or injure the train-pipe. In brakes of the second class, such as are now used, a separate auxiliary reservoir under each car is employed, which is always kept filled with compressed air, so that when it is necessary to apply the brake the air is turned out of the train-pipe, and by suitable automatic valves the air is let out of the auxiliary reservoir into the brake-cylinder and the brakes are applied. Thus it will be seen that the movements of the compressed air and the application of the brakes are almost simultaneous, and are also automatic in the event of the train-pipe breaking. The principal objection to this kind of brake is, that the automatic valves employed are complicated, expensive, easily broken, and easily held from moving, so that the brakes will not be promptly released, thus causing unnecessary wear on the brake-shoes, and that the arrangement of the auxiliary reservoir and the brake-cylinder necessitates a great many superfluous joints, which can only with difficulty be kept air-tight.

This invention would properly come under the head of the second class, and it is my object to combine all of the advantages of the two classes with none of the defects. For a more thorough comprehension of the parts in detail, attention is invited to the accompanying drawings, wherein like letters of reference indicate corresponding parts in the several views, and in which—

Figure 1 is a sectional elevation showing the whole apparatus. Fig. 2 is a sectional view of the valves on an enlarged scale. Fig. 3 is a rear sectional view of the valve-chest without the valves. Fig. 4 is a rear view of the whole apparatus, showing the air-passages in dotted lines.

A represents the auxiliary reservoir, made of metal, and provided within one end with a large cylinder, B, termed the "brake-cylinder," and with a smaller cylinder, C, within the other end, termed the "releasing-cylinder." The two pistons D and E, both being provided with suitable air-tight packing, one, however, being of much larger diameter than the other, are adapted to reciprocate simultaneously inside of the cylinders B and C, respectively. This simultaneous reciprocation of the two pistons D and E is effected by both being rigidly connected by means of the piston-rod G, provided at one end with a shoulder, *a*, against which the piston D is firmly held by means of a nut, *a'*, and with another

shoulder, *b*, against which the smaller piston, E, rests, being held in position by means of a nut, *b'*.

Suitable cylinder-heads, H H', are adapted to be fastened in any strong and durable manner over the outside end of the larger cylinder, B, and the forward end of the auxiliary reservoir, respectively, the head H' being provided with an opening for the passage of the piston-rod, and the head H being provided with a cavity, *c*, for the reception of the nut *a'* when the piston D rests against said cylinder-head H, which occurs when said piston has made the back-stroke to apply the brakes.

The piston D is made in the usual manner; but the construction of the smaller piston, E, departs radically from the brake-pistons now in use, being provided with the small cylinder C, made integral therewith.

On the rear end of the cylinder B, and made integral with the same, is a seat, J, to which the corresponding flat portion, K, of the valve-chest L is fastened. The preferable manner of fastening the two together is by bolting, as is clearly shown in Fig. 4, the bolts *e e'* being used to accomplish the desired result. The valve mechanism, which is inclosed in the valve-chest L, consists, essentially, of two differentially-reciprocating pistons, one of which being provided with auxiliary valves. For a better understanding of the details of construction of these valves, attention is especially invited to Fig. 2, which is a full-size view of the same.

1 represents the train-pipe leading from the source of supply along the bottom of each car, connecting all of the valve-chests of the different brakes, and through which the compressed air passes. A piston, 1, adapted to reciprocate easily inside of the valve-chest, is provided with suitable air-tight packing, being further provided with a hollow stem, 2, securely held in position by means of a nut or other equivalent means. This hollow stem is provided with an enlarged head, 3, having inclined shoulders 4, adapted to fit tightly against the seat 5 when the piston 1 is advanced, and with a perforated cap, 1', screwed thereon.

Inside of the hollow stem is a puppet or check valve, 6, provided with a triangular stem, 7, and a circular head, 8, normally held in position against the seat 9 by means of a coiled spring, 10. This arrangement prevents the puppet 6 from moving too far outwardly, but will not check the air from passing out of the train-pipe through the hollow stem 12 to the air-chamber 11, formed in the back wall of the valve-chest. The wall at this point is sufficiently enlarged to enable it to bear the strain the imperforated portions of the wall are capable of sustaining. This air-channel is continued along the back and the periphery of the valve-chest to the space formed between the outside of the larger cylinder, B, and the inside of the auxiliary reservoir. Another suitably-packed piston, 12, is adapted to move longitudinally inside of the valve-chest, and is provided with a stem, 13, held securely in position by means of a nut, 14. This stem is provided with an enlarged portion, 15, having shoulders 16, adapted to fit, when the apparatus is in its normal condition, against the seat 17, formed at the edges of the opening 18 in the front wall of the valve-chest. Extending out from this front wall and screwed thereon is a hollow projection, 19, into which the stem 13 extends.

On that portion of the stem 13 inside of the projection 19 is coiled a spring, 20, exerting a constant pressure outward, one end of which bears against the front wall of the valve-chest and the other against a washer, 21, held in place by means of two adjusting-nuts, 22 and 23.

It will be readily apparent that the use of two adjusting-nuts will greatly diminish the liability of the spring losing its tension by becoming loosened. The opening in the back wall of the valve-chest is closed by means of an imperforated screw-cap, 23, adapted to be readily removed in case of any necessary repairs.

It will be evident from the drawings that the spaces formed at the back of the two pistons 1 and 2 are connected by means of an air-passage, 26, and that a continuation, 27, of this passage extends through the walls of the valve-chest, through the flat portion J, and opening into the large cylinder B.

The whole device is to be suspended from the bottom of the car by means of suitable brackets or bands.

It should be understood before detailing the action of the device that a backward movement of the piston will, by means of suitable levers, apply the brakes, and vice versa. All the parts of the brake when at rest have free air communication with each other through the passage 11, 26, and 27, and are all under the same pressure of air.

When it is desired to apply the brake, or should the train-pipe by any accident become broken or damaged, the pressure will be reduced therein. The first effect of the reduction of the air is to move the piston 1 in the direction of the exhaust, carrying the hollow stem with it and closing the passage 28, and thereby preventing free communication between the auxiliary reservoir and the back of the brake-cylinder. The escaping air from the auxiliary reservoir will close the puppet and will be confined within said reservoir, and is now in position to apply the brakes. When the first movement of the piston closes the communication between the auxiliary reservoir and the brake-cylinder, the compressed air from the latter will rush through the channel 28, and will force the piston 12 back against the tension of the spring 20, and will then escape, and when a sufficient quantity has escaped to lower the pressure of the air in the brake-cylinder to such a degree as to be ineffectual in opposing the tension of the spring 20 this spring will close the escape-outlet. The

confined air in the auxiliary reservoir in expanding will force the large piston D toward the rear of the brake-cylinder and the brakes will be applied.

It should be understood that the pressure in the auxiliary reservoir will begin to apply the brakes the instant the air from the brake-cylinder commences to escape.

When it is desired to release the brakes, the pressure is let into the train-pipe. This pressure will force the piston D back and the communication between the auxiliary reservoir and brake-cylinder will be established. This pressure will also open the puppet through which the air will pass.

It will be evident that the brakes will be released or the pistons forced to the front part of the cylinder by reason of the difference in area of the surfaces presented to the action of the compressed air.

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

1. In an air-brake apparatus, the combination, within a removable valve-chest, L, mounted on the seat J at the rear of the auxiliary reservoir, of the passage I from the main reservoir, the pistons 1 and 12 on each side of said passage, the hollow cylindrical stem 2, provided with the enlarged head 3, the solid cylindrical stem 13, secured to the piston 12, and the valve 15 on said stem 13, substantially as described, and for the purposes set forth.

2. In an air-brake apparatus, the combination, within a removable valve-chest, L, mounted on the seat J at the rear of the auxiliary reservoir, of the piston 1, hollow cylindrical removable stem 2, having enlarged head 3, puppet-valve 6, entirely within the head 3, piston 12, having the solid cylindrical stem 13, and valve 15 on said stem 13, substantially as set forth.

3. In an air-brake apparatus, the combination, within a removable valve-chest mounted on the seat J at the rear of the auxiliary reservoir, of the piston 1, having the hollow cylindrical stem 2, enlarged head 3, provided with the removable cap 1′, puppet 6, entirely within the enlarged head 3, piston 12, stem 13, and valve 15 on said stem 13, substantially as set forth.

4. In an air-brake apparatus, the combination, within a valve-chest, L, removably mounted on the seat J at the rear of the auxiliary reservoir, of the piston 1, hollow cylindrical stem 2, enlarged head 3, having the cap 1′, with perforations therein, the puppet 6, entirely within the head 3, piston 12, stem 13, and valve 15 on said stem 13, substantially as set forth.

5. In an air-brake apparatus, the combination, within a removable valve-chest, L, mounted on the seat J at the rear of the auxiliary reservoir, of the piston 1, having the cylindrical hollow stem 2, with enlarged head 3, removable perforated cap 1′, puppet 6, entirely within said enlarged head 3, coiled spring 10, bearing against said cap and said puppet and tending to hold the two apart, the piston 12, stem 13, and valve 15 on said stem 13, substantially as set forth.

6. In an air-brake apparatus, the combination, within a removable valve-chest, L, mounted on a seat, J, at the rear of the auxiliary reservoir, of the piston 1, cylindrical hollow stem 2, secured thereto, and having the enlarged head 3, puppet 6, entirely within said enlarged head 3, piston 12, solid cylindrical stem 13, valve 15 on said stem 13, coiled spring 20, encircling said stem 13, flanged washer 21, against which said spring 21 bears, and the double locking-nuts 22 and 23, screwed over said stem 13, substantially as set forth.

7. In an air-brake apparatus, and in combination within a separate valve-chest, the following elements, viz: a piston, 1, hollow stem 2, puppet 6, removable perforated cap 1′, the piston 12, stem 13, and valve 15, substantially as described and set forth.

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

ELLSWORTH J. LEWIS.

Witnesses:

JOHN MCGEORGE,

JAMES C. TALLMAN.