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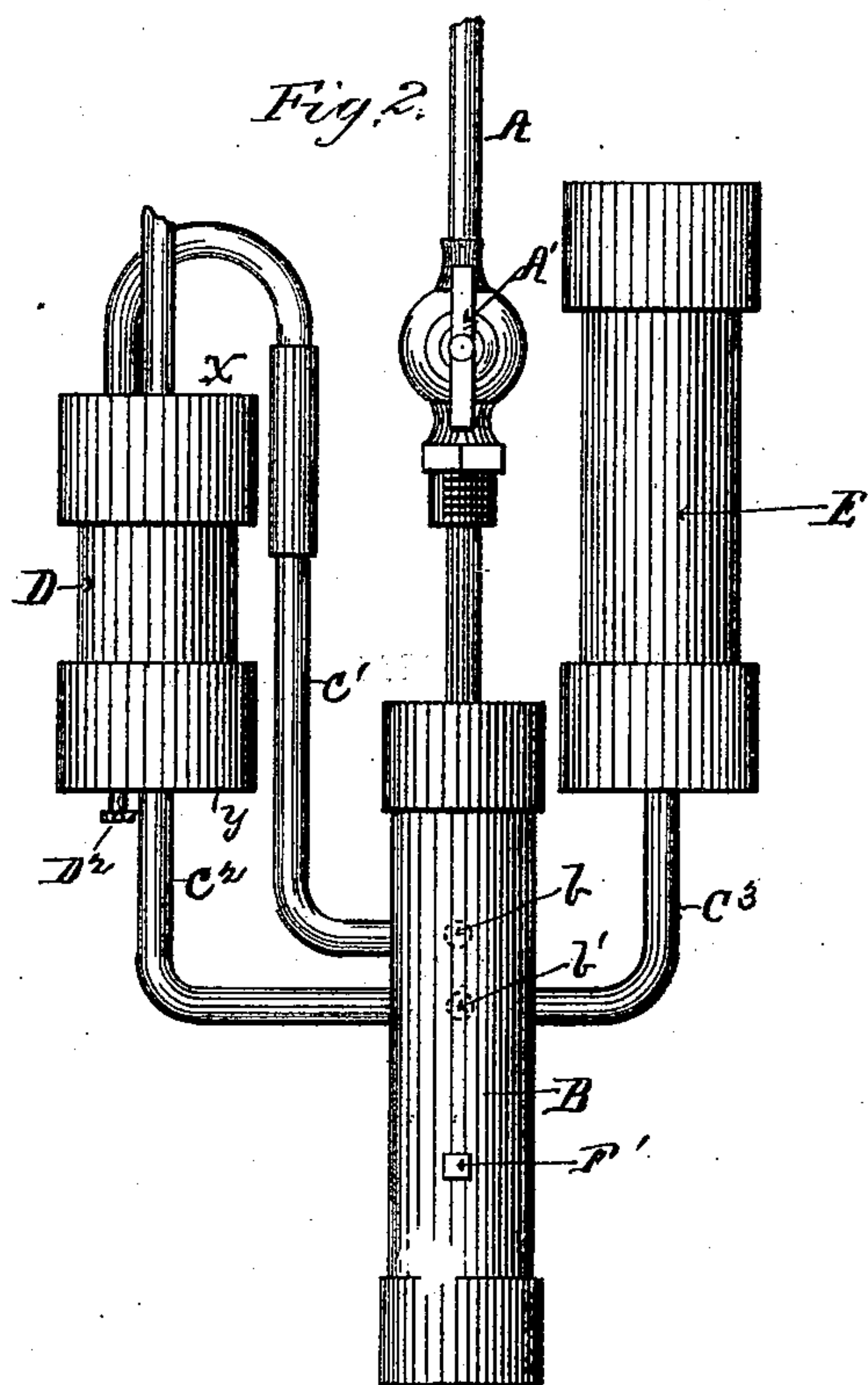
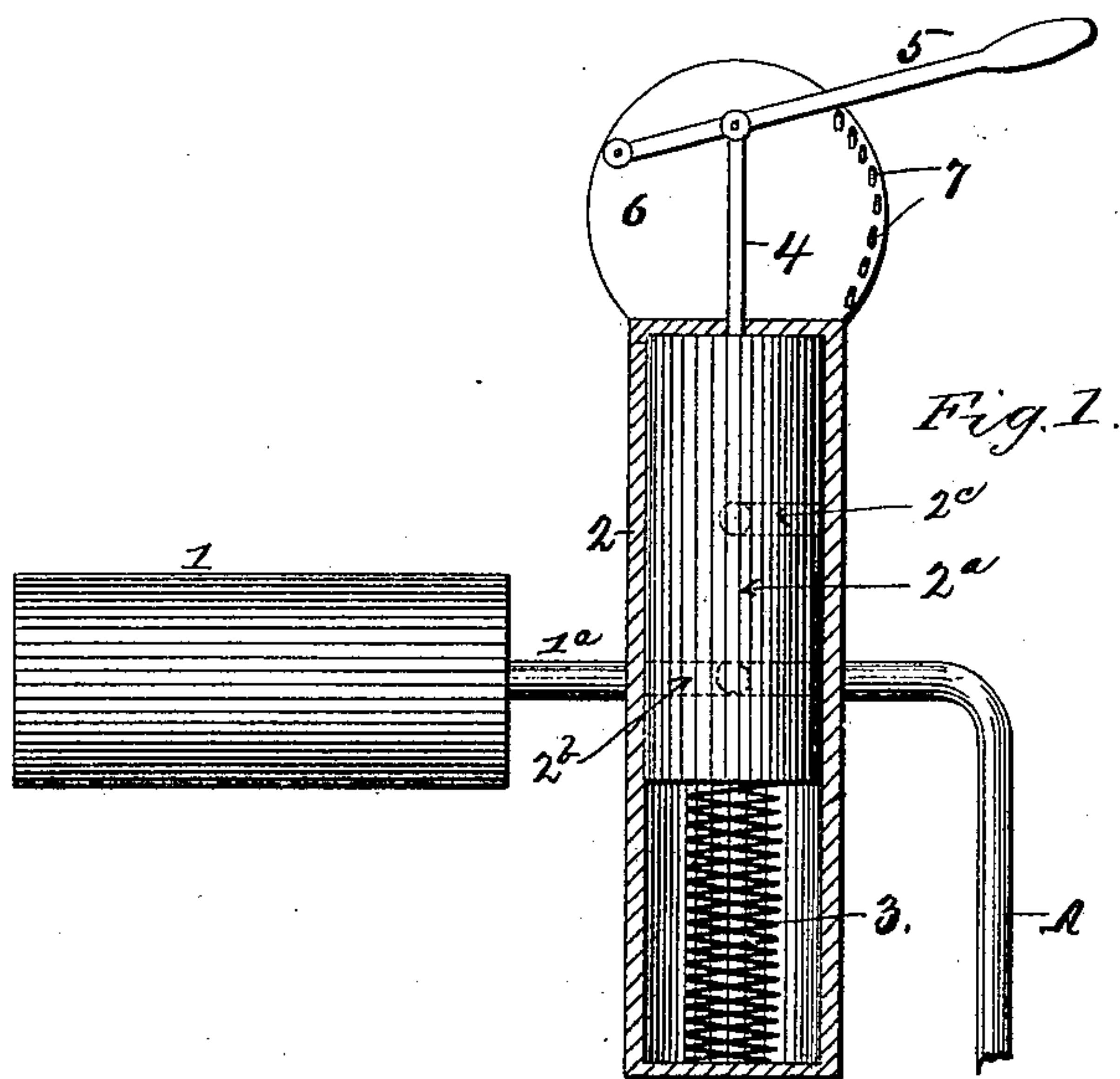
2 Sheets—Sheet 1.

G. B. LEONARD & L. GLENN.

ATMOSPHERIC CAR BRAKE.

No. 303,527.

Patented Aug. 12, 1884.



Witnesses:

For R. Stuart.

C. E. Allen

Inventors:

Geo. B. Leonard,
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By J. M. Kalb,
Attorney.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

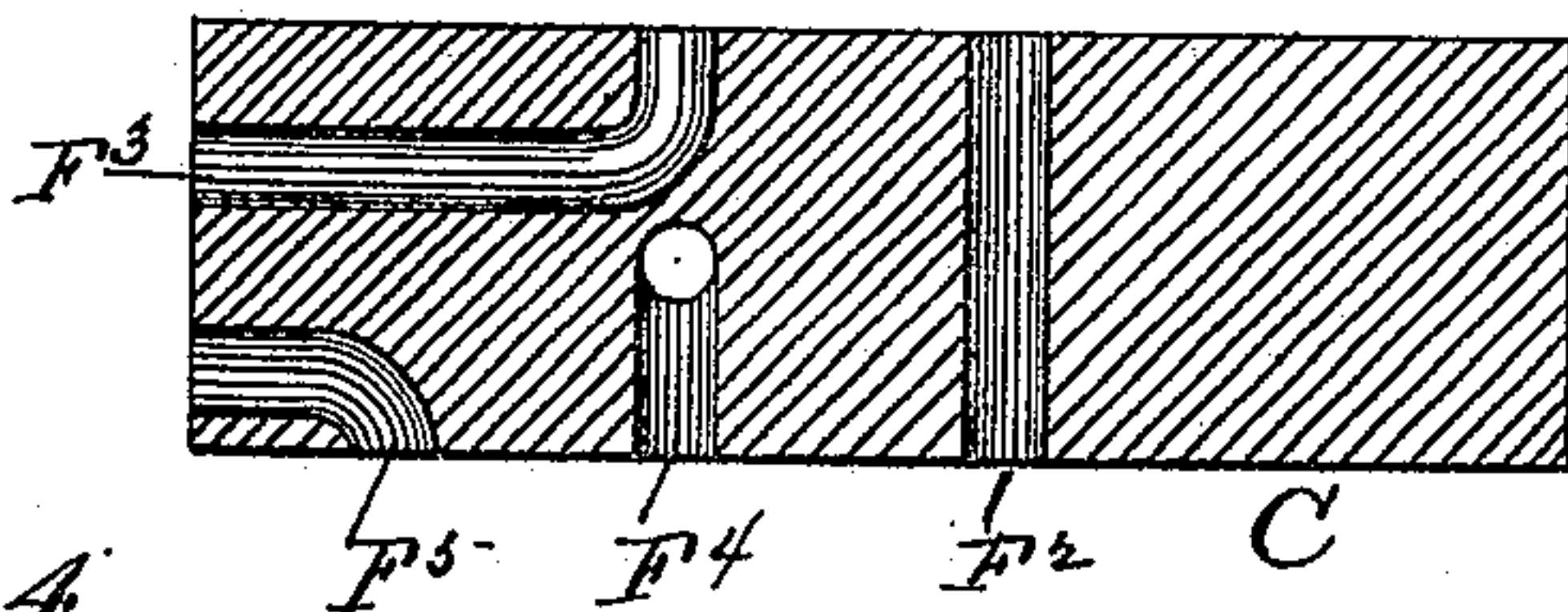


Fig. 4.

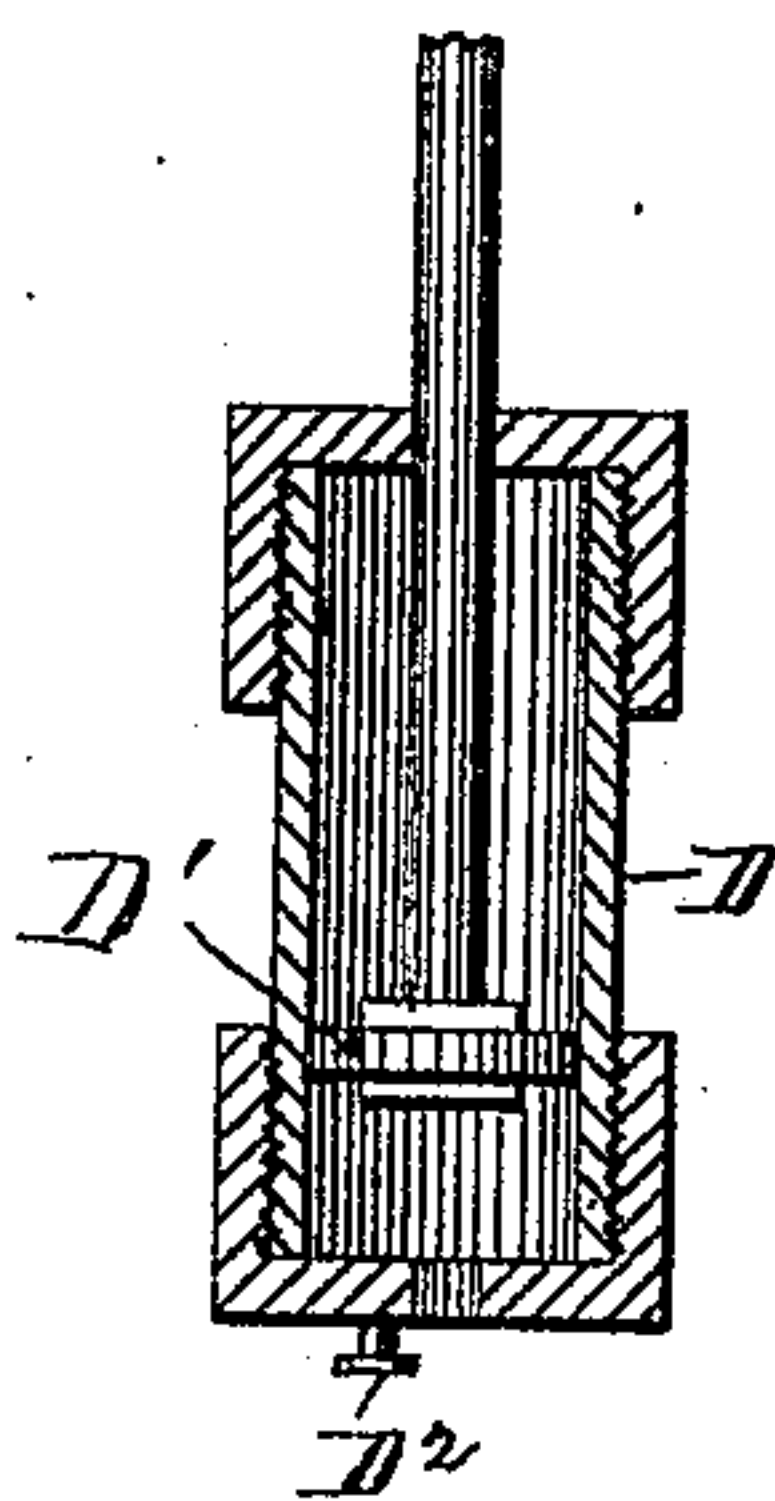


Fig. 5.

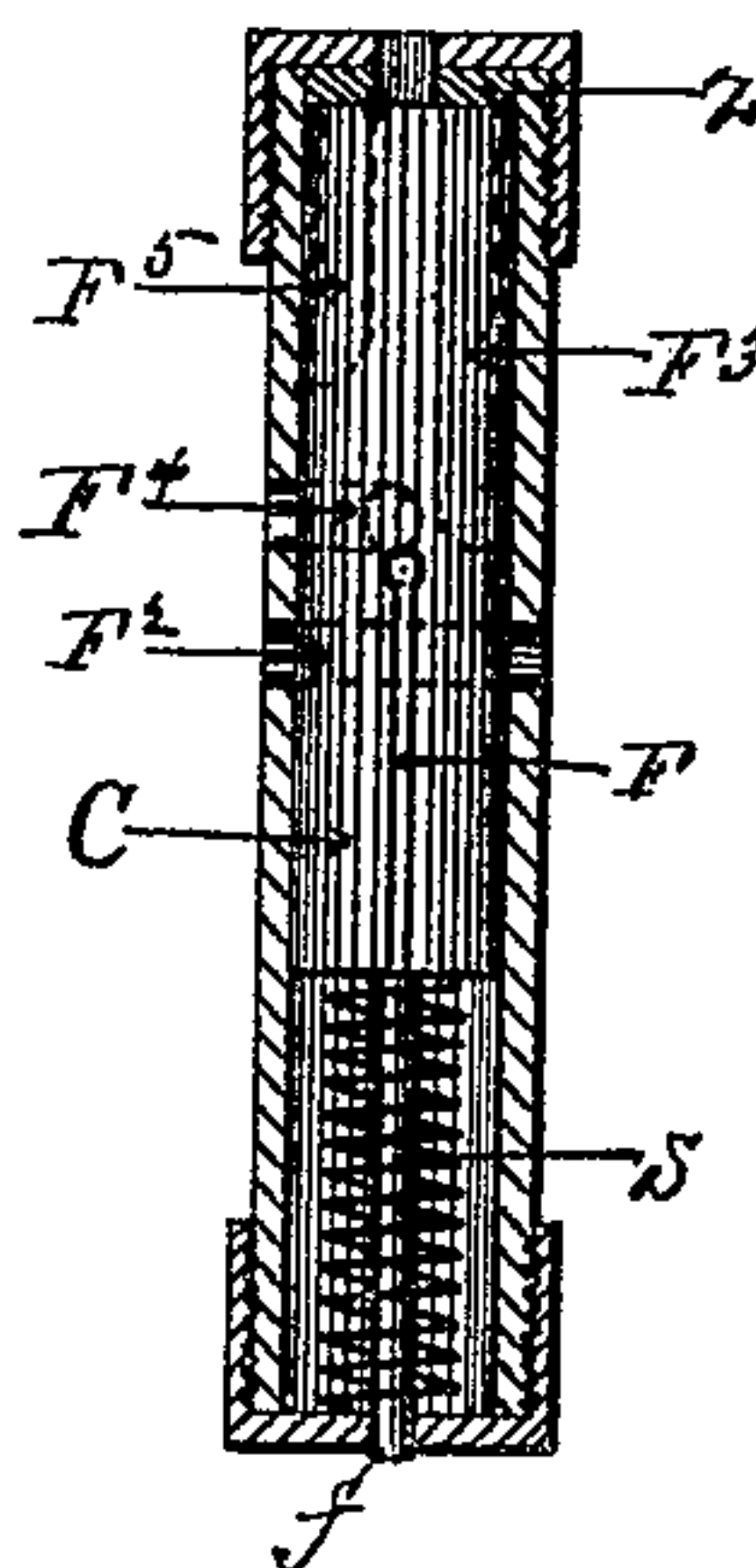
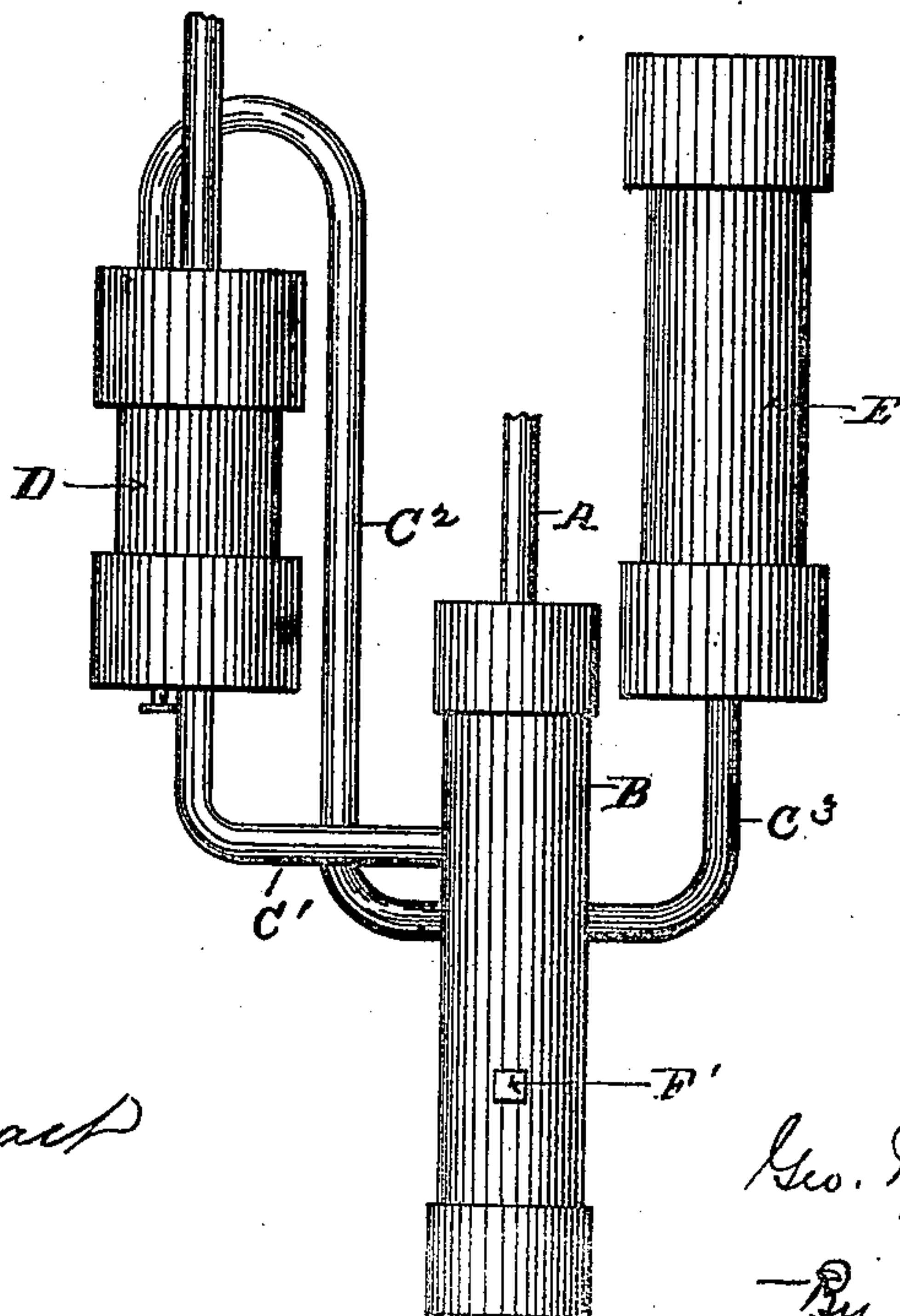


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE B. LEONARD AND LAWRENCE GLENN, OF OTTUMWA, IOWA.

ATMOSPHERIC CAR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 303,527, dated August 12, 1884.

Application filed February 26, 1884. (No model.)

To all whom it may concern:

Be it known that we, GEORGE B. LEONARD and LAWRENCE GLENN, citizens of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Atmospheric Car-Brakes; and we 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.

Our invention relates to improvements in the apparatus used for operating air-brakes, and has more particular reference to an automatic controlling-valve and connections to the air-cylinder, together with means for applying the brakes when the pressure from the engine is cut off.

The manner in which we construct and operate our device to fulfill these objects will be understood from the following description.

The accompanying drawings illustrate what we consider the best means for carrying our invention into practice.

Figure 1 is a section of the engineer's controlling-valve chamber and inclosed valve with connections. Fig. 2 is a plan view of the arrangement of valve, auxiliary cylinder, and brake-cylinder with connections. The main pipe is shown broken off in both these figures, in order to indicate the distance between the apparatus. In practice this pipe is of course connected. Fig. 3 is a horizontal section of the valve for use at the brake or on the coaches. Fig. 4 is a section of brake-cylinder; Fig. 5, a section of valve-chamber with inclosed valve. Fig. 6 is a modification, hereinafter more fully explained.

Similar letters and figures of reference indicate corresponding parts in all the views.

1 is the engine or main air-drum; 1^a, the pipe leading from it to the valve-chamber 2, in which the valve 2^a under control of the engineer works. The chamber 2 is connected to the main pipe A at a point opposite the entrance of the pipe 1^a from air-drum, and the valve 2^a is provided with the transverse port or passage 2^b, which normally registers with pipe 1^a and A. A coiled spring, 3, tends to keep the passage 2^b in line with the pipes 1^a and A by forcing the valve forward in its chamber.

Attached to the valve-rod 4 is a lever, 5, pivoted on the arc 6, and adapted to engage with the stops or teeth 7 on one side thereof. By taking hold of this lever and pressing it in the proper direction the force of the spring 3 is overcome and the valve 2^a forced back to close the mouths of pipes 1^a and A, and thereby shut off the pressure from air-drum 1. In the valve 2^a is provided a leak-passage, 2^c, which can be made to register with the mouth of pipe A and a leak-hole on the under side of chamber 2, whereby the air in the pipe A is allowed to escape; but the drum 1 will remain closed.

We do not lay any claim to this engineer's valve in this application, having made it the subject-matter of a separate application for patent filed July 22, 1884, Serial No. 138,432. The main pipe A leads from the engineer's valve to the valves under the coaches. It is provided with a stop-cock, A', in front of the valve at the brake on the coach, to regulate or cut off the flow of air thereto. B is the valve-chamber for the brake-valve C. The pipe A connects with this chamber B. The valve C will be more particularly described further on. The valve-chamber B is connected by pipes C' C² to the front and rear of the air-cylinder, D, respectively, and by the pipe C³ to the storage or auxiliary air chamber or cylinder E. The air-cylinder D, in which the piston D' moves, whose action controls the condition of the brakes, is tight at both ends, and is provided at the rear end with a cock, D², to allow discharge of condensations.

The construction and operation of the valve C and the connection of the air-pipes is such as to deliver air in front of the piston D' in the cylinder D, when the pressure is applied from the engine, and at the same time to store a quantity of air in a highly-compressed condition in the auxiliary chamber E, and when the pressure from the engine is cut off to automatically reverse the brake-piston by calling into requisition the air stored in the auxiliary chamber E, and on reversing the motion of the piston, at either end of the stroke, to provide a leak to permit the escape of waste air from the opposite side of the piston. This valve C is moved in one direction by the pressure of air from the engine and in the other by a spring, S. The valve C is made in the form

of an elongated piston or plunger, and works snugly in the chamber B. It may be made of a single length of metal without packing, or it may be formed of several sections, and, if desired, may be packed in any suitable or convenient manner. It is provided with a groove, F, into which projects a plug or stop, F', which is attached to or passed through the walls of the chamber B, and serves, by coming in contact with the end of the groove, to limit the forward throw of the valve. The valve is provided with a transverse passage, F², which registers on one side with the mouth of the pipe C², leading to the rear end of the cylinder, and on the other side with the pipe C³, leading to the auxiliary chamber, when the valve is forced back upon its seat Z by the expansion of the spring S. The valve is also provided with the passage F³, leading from the end of the valve next to the main pipe-connection to the side and opening at a point which will register with the pipe C³, leading to the storage-tank E, when the pressure in the main pipe is on and the valve is driven away from the seat Z. At the same time that air is being delivered to the storage-tank E it is also delivered to the forward end of the air-cylinder through the passage or port F⁵, which extends from end of valve to a point which registers with the mouth of pipe C', when the pressure is on in pipe A. The valve is also provided with a port or passage, F⁴, having openings on side and bottom of the valve for the passage of the leak or waste air. The chamber B is provided with leak-holes b b', underneath, which are in line with the bottom opening of passage F⁴, and the mouths of pipes c' c² are in line with the side openings thereof, so that when the piston is reversed in the air-cylinder the passage F⁴ will register with one or the other of the pipes C' or C², and with one or the other of the leak-holes b or b', according to the end of the air-cylinder receiving air. The spring S is coiled around the valve-rod f, and bears against the valve at one end and the chamber-head at the other, and is of proper power to reverse the valve when the pressure is removed, but will not interfere with the proper action thereof when the pressure of air is on. The heads of both the working air-cylinder and the auxiliary or storage air-cylinder and the valve-chamber are made removable by being screw-caps, or of other convenient form for ready removal. The end of the chamber B, next to the main pipe-connection, is provided with a seat or cushion Z for the valve C; but this may be dispensed with, if desired.

As thus constructed and arranged the operation of the device is as follows: When it is desired to get a pressure of air from the main air-drum 1 into main pipe A, the spring 3 is allowed free action, and keeps the passage 2^b in line with the mouths of the pipes 1^a and A. While thus conditioned a constant pressure is maintained in pipe A. When the pipe A and

all the chambers and cylinders at the brake are filled with air, the same pressure may be maintained by forcing the valve 2^a back, so as to cut off the connection between the drum 1 and pipe A, but to keep both sealed. Then, if it be desired to allow the air in pipe A to escape, the valve is forced on back until the passage 2^c causes the pipe A and a leak-hole in bottom of cylinder 2 to register. This will still keep the drum 1 sealed. Now, when the appliances in the engine are conditioned to throw pressure through pipe A, and the cock A' is open, the valve C will be forced up until stopped by the plug F'. The passage F⁵ in the valve is thereby brought into line with the mouth of pipe C' in the valve-chamber and air admitted to forward end, X, of cylinder D, thereby forcing the piston toward the rear end, Y. This action releases the brakes. At the same time the passage F⁴ in the valve C is made to bring the mouth of pipe C² and leak-hole b' into communication, thereby allowing waste air to escape from end Y of cylinder and preventing all possibility of counter-pressure upon piston D'. While the pressure continues in main pipe, the passage F³ is caused to register with pipe C³, leading to auxiliary storage-cylinder E, which is thereby filled with air. As long as pressure is continued through main pipe A, either by having it communicate with air-drum 1 or by sealing its mouth, as already explained, at valve 2^a, the brakes will be loose or released. Now, if it be desired to draw or apply the brakes, the pressure through pipe A is cut off at the engine in the manner already explained, or by cock A', and the force stored in the compressed spring S will be given out and cause the valve to be driven back upon the end of the chamber or seat Z, which will bring about the following condition of passages and consequent action of parts: The passage F² will register with pipes C² and C³ and allow the air stored in chamber E to flow into the cylinder at the rear end, Y, and reverse the piston D'. At the same time passage F⁴ is caused to connect pipe c' and leak-hole b, which will allow the air to exhaust from the forward end, X, of cylinder D. The force of the air stored in chamber E, when thus released, will be amply sufficient to reverse the piston and apply the brakes. Thus it will be seen that the application of the brakes does not depend on the integrity or continuance of the pressure from the engine, nor upon the manipulation of levers or springs, but that the force which applies the brakes is derived from the air stored in the auxiliary chamber, which is upon the same car with the brake-cylinder D.

The modification shown in Fig. 6 enables us to apply the brakes by direct pressure and release them by the force of the air stored in the auxiliary chamber E. It will be noticed that pipe C' here communicates with rear end of the cylinder and pipe C² with forward end of the same. The same passages through the

valve, leak-holes in the valve-chamber, &c., are provided in this case, as before, and their action is the same, the only change being the manner of running the pipes C' and C², in order to bring about the application of the brake by direct pressure and its release by pressure from storage-cylinder.

Having thus described our invention, what we desire to claim and secure by Letters Patent is—

1. In an air-brake, the combination, with the valve-chamber and piston-valve therein having a leak-passage through it, of a power-cylinder having connections from both its ends to the valve-chamber, so located and arranged as to bring one or the other into communication with the leak-passage as the valve is at the extremities of its movement.

2. In an air-brake, the combination, with a power-cylinder and auxiliary storage-cylinder, of an interposed valve-chamber and piston-valve having a passage through it to communicate with the storage-cylinder when the

pressure is on from the engine, and a transverse passage directly through it to produce communication between the storage and power cylinders when the pressure from the engine is cut off.

3. The valve described, having the passage F⁵, for connecting pipes A and C', the passage F², for connecting the pipes C² and C³, the passage F³, for connecting main pipe A and pipe C³, and the passage F⁴, for connecting either of the pipes C' or C² with a leak-hole.

4. In an air-brake apparatus, the stop-cock A, located in the main pipe in front of the valve or air-cylinder for controlling or shutting off the flow of air, as herein set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

GEO. B. LEONARD.
LAWRENCE GLENN.

Witnesses:

JAMES R. RUSSELL,
WILLIAM J. ALLEN.