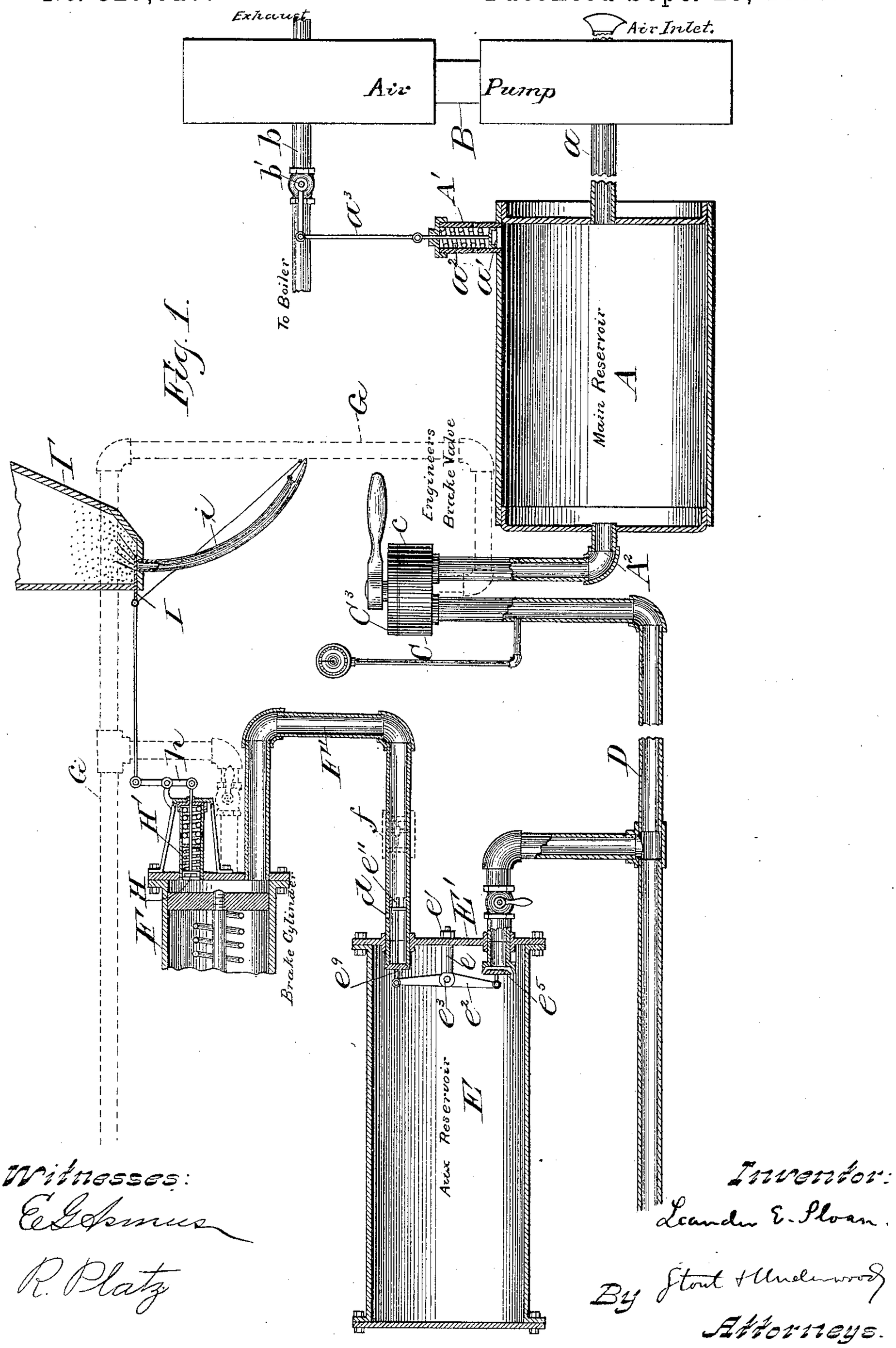
(No Model.) 2 Sheets—Sheet 1.

L. E. SLOAN.

AIR BRAKE FOR RAILROAD CARS.

No. 327,027. Patented Sept. 29, 1885.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

L. E. SLOAN.

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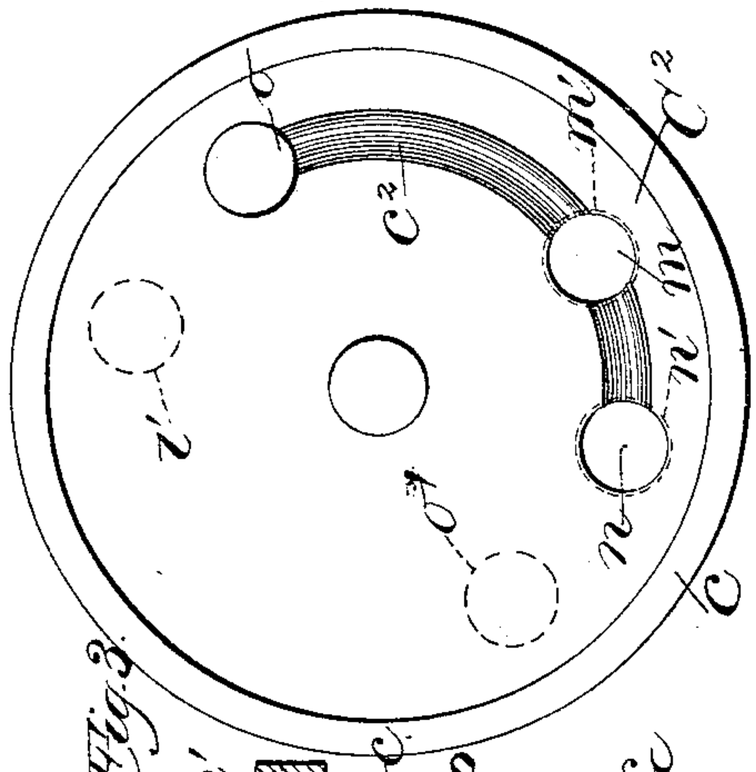

Fig. 3.

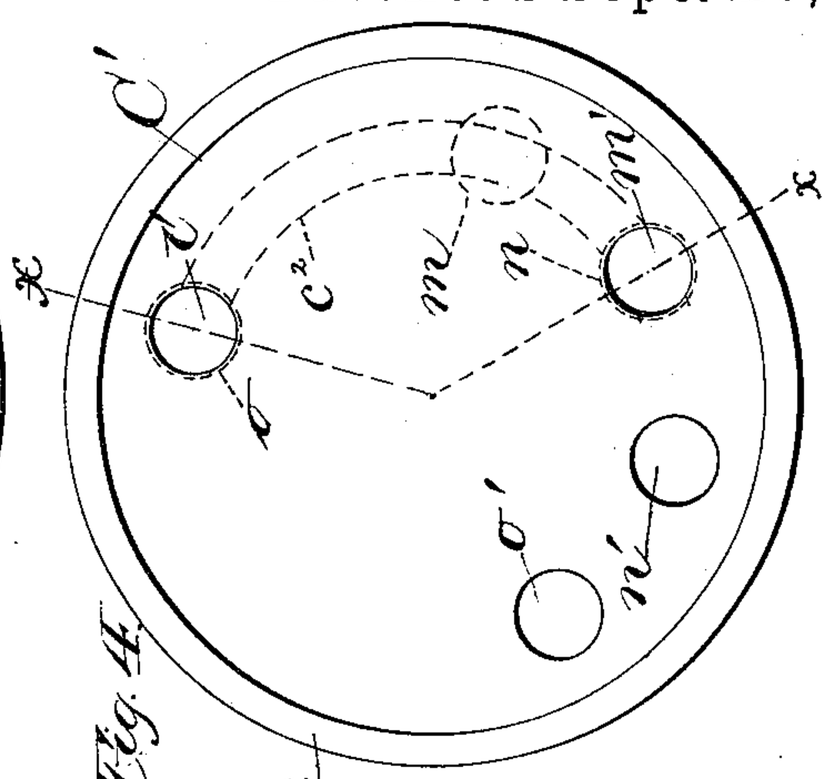

Fig. 4.

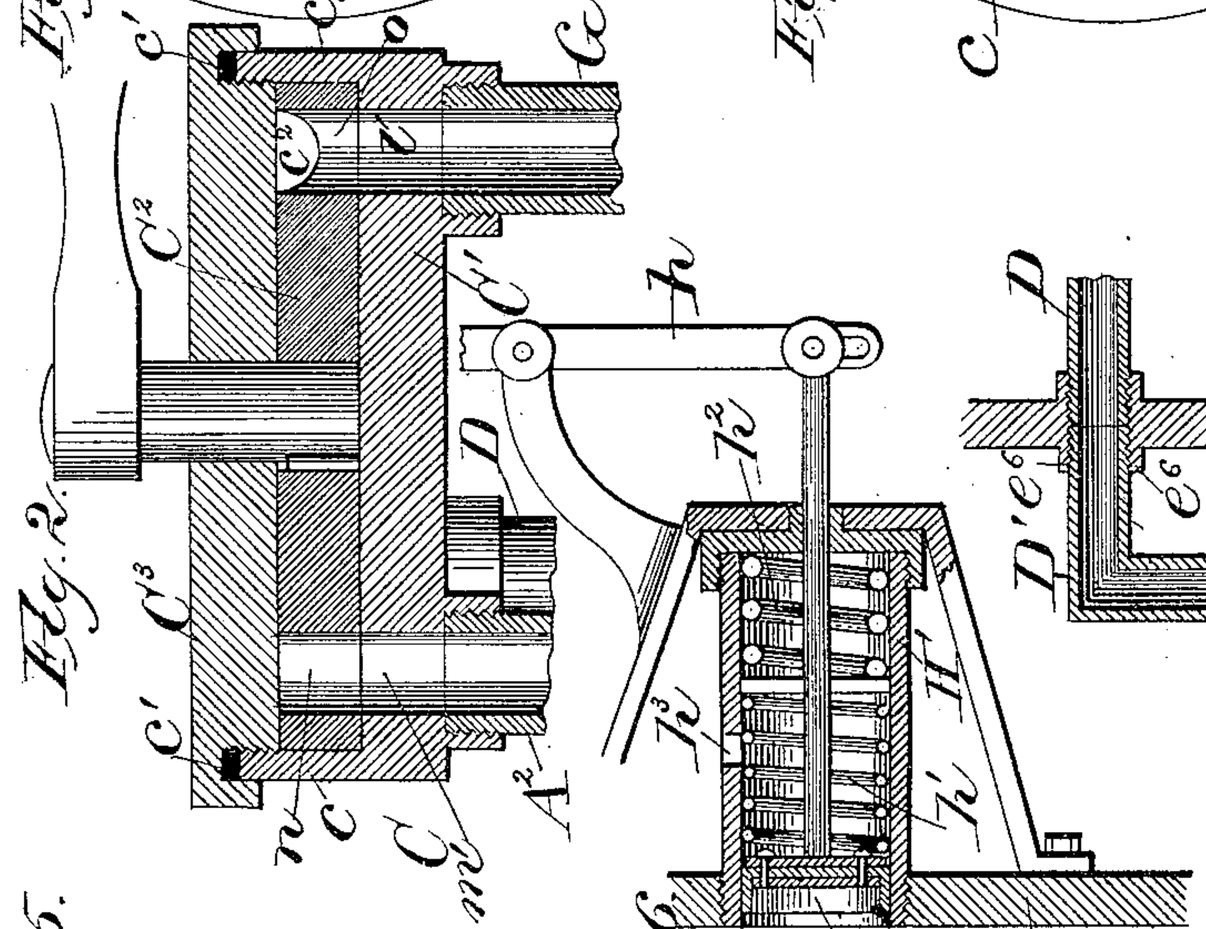

Fig. 2.

Fig. 6.

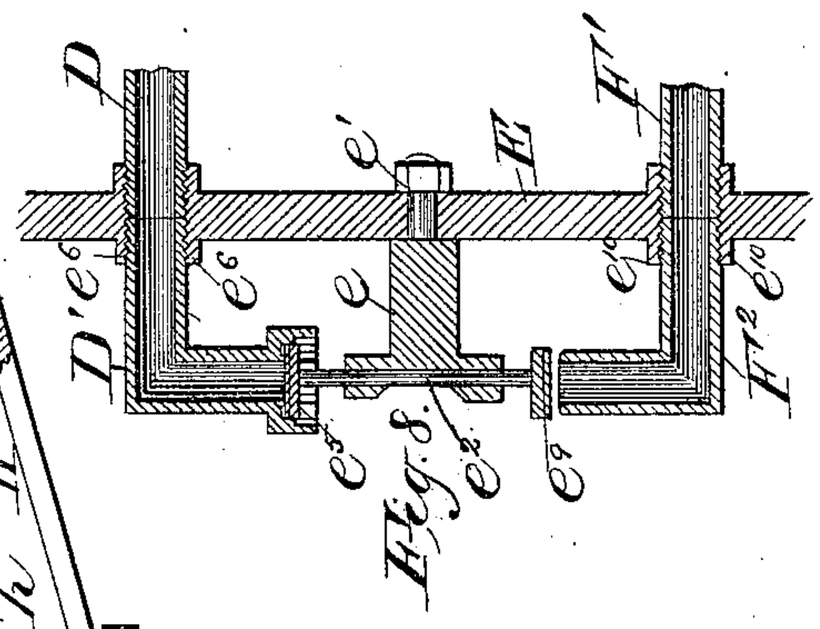

Fig. 8.

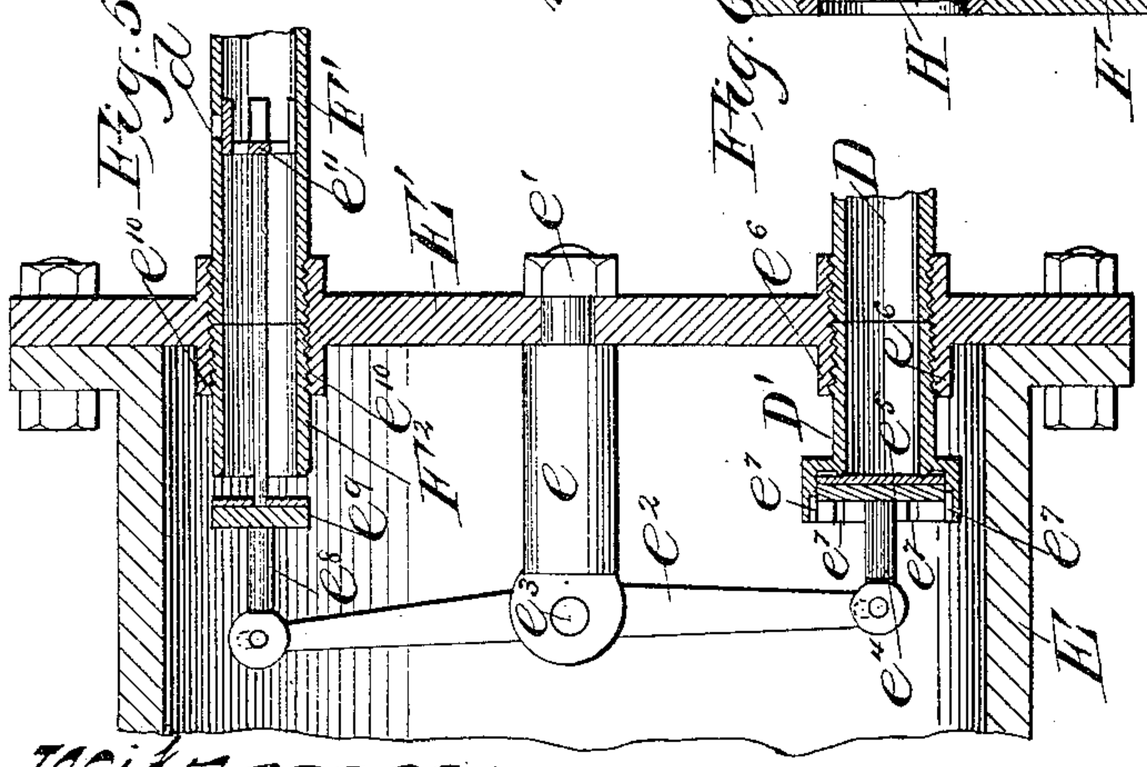

Fig. 5.

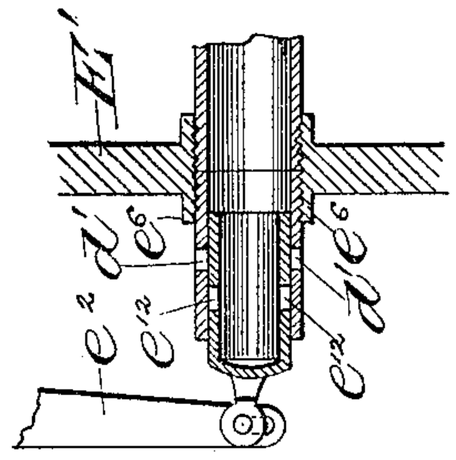

Fig. 7.

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UNITED STATES PATENT OFFICE.

LEANDER E. SLOAN, OF MILWAUKEE, WISCONSIN, ASSIGNOR OF ONE-HALF TO WALLACE G. COLLINS, OF SAME PLACE.

AIR-BRAKE FOR RAILROAD-CARS.

SPECIFICATION forming part of Letters Patent No. 327,027, dated September 29, 1885.

Application filed October 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, LEANDER E. SLOAN, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Air-Brakes for Railroad-Cars; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to improvements in railway air-brakes, and will be fully described hereinafter.

In the drawings, Figure 1 is a vertical longitudinal section through an air-brake gear embodying my invention. Fig. 2 is a vertical section through the center of the engineer's brake-valve on the line *x x* of Fig. 4. Figs. 3 and 4 are details of the said valve, illustrating different movements. Fig. 5 is an enlarged vertical section of the front end of the auxiliary reservoir, showing the construction of my automatic operating-valve. Fig. 6 is a like view of the front portion of the brake-cylinder, showing the connection of the brake-gear with a wheel-sanding device; and Figs. 7 and 8 show in vertical section various forms of the auxiliary-reservoir operating-valve.

The chief object of my present invention is to so construct and locate the operating-valve of the auxiliary air-reservoir that this very important portion of the air-brake gear will practically be proof against the accidents to which the forms of valve generally in use now are liable. This improvement is effected partly by the simplification of the working parts of the valve, and especially by its being mounted entirely inside of the auxiliary reservoir. The operating-valve is in this manner completely protected against dust, moisture, and frost, and its bearing-points being materially reduced the liability to sticking, which is of frequent occurence in ordinary brake-operating valves, will be absolutely avoided in my improved gear.

Another feature of my improvement consists in providing for the automatic action of the air-pump used in the locomotive, whereby the air-tension may be maintained at the point desired in the main air-reservoir independently of the engine-driver. I have also designed an improved form of valve, by means of which the said driver is enabled to operate from one and the same point the double brake-pipe system described in my application for a patent for "improvements in railway air-brakes," filed December 12, 1883, Serial No. 114,312.

A further object of my invention is to provide a connection of the brake-gear with a rail-sanding device, such as shown in my patent No. 301,762, dated July 8, 1884, whereby the action of the brakes is rendered more effective.

A is the main air-reservoir, which is connected, as usual, with the air-pump B through the pipe *a*, and is, moreover, provided with a check-valve, *a'*, inclosed with its spring a^2 within the air-tight chamber A' opening into the main reservoir, and fastened thereon in any suitable manner. The stem of this valve is freely connected through the link a^3 to the handle of the stop-cock *b'*, working in the steam-pipe *b*, through which the air-pump is operated from the boiler. By this arrangement the moment the desired air-pressure has been attained in the main reservoir A the valve *a'* will be raised against its spring, which is given a corresponding resiliency, and the steam from the boiler being shut off by the consequent closing of the stop-cock the air-pump will cease working until a decrease of the air-pressure in the said main reservoir will cause the valve *a'* to return to its seat, and thus re-open the stop-cock *b'*, thereby admitting steam to the air-pump.

The connection of the main reservoir A is directly effected with the brake-cylinder F through the "straight" air-pipe G, (shown in dotted lines,) the flow of the air to and from the said brake-cylinder through the said pipe G and to and from the auxiliary reservoir E through the automatic pipe D being controlled by means of the valve C in reach of the locomotive-driver, and shown on an enlarged scale in Figs. 2, 3, and 4. This valve has a bottom disk, C', that is provided with a vertical annular flange, *c*, projecting from and around its upper face, the upper rim of the said flange being threaded, as shown. Within the flange *c* loosely fits the central disk, C^2, in the center of which is keyed the stem of the valve that

passes through the top disk, C^3. This latter is provided in its under face with an annular groove for a packing-ring, c', and is screw-threaded to correspond with the upper threaded end of the annular flange c, over which it is tightly screwed. The central disk, C^2, has three port-holes, m n o, either one of which may be brought in opposition to the perforations l' m' n' o' made in the bottom disk, C', the perforation o' being an exhaust-port, while the three former are the orifices of the pipes G, A^2, and D, respectively, each one of which has its upper end screwed in a sleeve formed in the under side of the disk around each of the said perforations. By means of a groove, c^2, formed in the upper face of the central disk, C^2, communication may be variously established between the main reservoir and the pipes D and G, so as to apply the brakes through either the automatic or direct service, as well as for the release of the same, as follows: By swinging the middle disk, C^2, so that its port m covers the orifice m' the port n will then be opposite the orifice n', and communication will be opened between the main reservoir and the automatic pipe D, as in Fig. 3, and thus the auxiliary reservoir E on each car of the train will be charged. By bringing the said disk with its port n between the pipe-orifices m' and n' the air will be shut off to and from the train.

When it is desired to apply the brakes through the automatic pipe D, the port m is brought opposite n'. This movement of the disk C^2, bringing its port n over the exhaust-orifice o', lets the air off the automatic pipe D, to apply the brakes. When the automatic pipe is alone in use on the train, the brakes are released by bringing the port m opposite m'. The ports n and n' being also in opposition, the air is admitted from the main to the auxiliary reservoir, to recharge the same.

When the direct or straight air-pipe G is used, the releasing of the brakes will be effected by bringing the port o opposite the orifice o', while to apply the said brakes through the same pipe the port o is swung opposite the orifice l', as shown in Figs. 2 and 4. I do not claim this special construction of engineer's valve in this application, but reserve it as the subject of a separate application for patent filed August 31, 1885, Serial No. 175,735.

When the two pipes D and G are used on the train, I provide in the pipe F', that connects the auxiliary reservoir E with the brake-cylinder F, a skeleton valve, f, (shown in dotted line,) which closes the said pipe when the straight air-pipe is used to set the brakes. In that case the releasing of the brakes is always accomplished through the said pipe G, whether the brakes have been applied by this latter or through the automatic pipe D.

In Fig. 5 I have shown on an enlarged scale the front portion of the auxiliary reservoir E, the head E' of which is firmly bolted or otherwise fastened onto the flanged front end of the said reservoir. The center of the said head is perforated to receive the reduced end of the horizontal arm e projecting inside the reservoir, and held in position therein by means of the nut e' working on its threaded end against the outer face of the head E'. The opposite end of the arm e is bifurcated to receive the central part of the balance-lever e^2, which is adapted to swing freely therein on the fulcrum-pin e^3. One end of this lever is freely jointed to the stem e^4 of the valve-disk e^5, which works in the enlarged end of the pipe-section D' screwed in the annular flange e^6 formed on the inside face of the head E', and opposite which the automatic pipe D is screwed in a similar flange formed on the outside face of the said head. The enlarged end of the pipe-section D', that serves as a seat for the valve-disk e^5, is provided in the outer part of its inner periphery with the ports e^7 e^7 e^7, and through which the auxiliary reservoir may be charged from the main reservoir. The opposite end of the swinging lever e^2 is freely connected to the stem e^8 of the valve-disk e^9. This valve-disk is made somewhat smaller than the valve-disk e^5, and its stem is of such a length relatively to the stem e^4 that whenever the valve e^5 occupies the bottom of its seat the valve e^9 will be kept at a slight distance off its own seat—that is, off the inner end of the pipe-section F^2, which is screwed in the flange e^{10} on the inner face of the head F' opposite, the brake-pipe F' screwing in a similar flange formed on the outer face of the said head.

It will be readily understood that as long as the air-tension is kept up in the automatic pipe D the valve-disk e^5 will be held away from its seat, thus forcing the smaller disk e^9 against the orifice of the pipe-section F^2 leading to the brake-cylinder. Obviously, also, when that tension is decreased the latter valve-disk will in turn leave its seat to let the air into the brake-pipe and apply the brakes.

In order to provide for the release of the brakes from the locomotive through the automatic pipe D when the said pipe is the only one used, I propose to extend the stem of the valve-disk e^9 out in the brake-pipe F', and to attach in any suitable manner to the outer end of this stem a skeleton valve, e^{11}, which, as it travels in the said pipe, is adapted to close or open a port, d, cut on its line of travel in the pipe F'. The said skeleton valve closes the port d when the disk e^9 is raised from its seat to apply the brakes, and opens it, releasing the brakes, when the said disk is forced against the orifice of the pipe-section F^2 by the reopening of the communication between the auxiliary and the main reservoir by the proper manipulation of the engine-driver's valve C, as above stated.

Though the form of operating-valve just described is the form I propose to use preferably, I have shown in Figs. 7 and 8 two modifications of the same, so that it may well be understood that I can variously arrange the different parts of the valve without in the

least departing from the spirit of my invention. Thus, instead of using a swinging or balancing lever, e^2, I may attach the valve-disks e^5 and e^9 on ends of a sliding rod, e^2, the pipe-sections D′ and F² being in this case bent at right angles toward each other, so as to conform to the altered position of the valve-disks. Again, the said valves may be made in the form of a sleeve, with ports e^{12} to correspond with similar ports, d' d', cut in the inner ends of their respective pipes, as shown in Fig. 7. These sleeves, again, instead of being made to slide in and out of the said pipes, may be mounted so as to be turned, their ports being cut in such a case in the same vertical plane with the ports of their respective pipes.

The connection of my device for sanding the rails in front of the car-wheels is designed to further assist in operating the brakes, and may be made so that the said device can be automatically worked at any particular moment during the application of the brakes. I provide therefor a check-valve, H, which is mounted in a suitable air-chamber, H′, connected to the front end of the brake-cylinder F. The stem of the valve H is freely jointed to the rod h, that is in turn similarly connected to the sliding valve I working in the bottom of the sand-box I′ in front of the car-wheels. The said valve H works against the springs h' and h^2, which are of unequal strength, and as the motion necessary to open the valve I of the sand-box is much shorter than that of the brake-cylinder piston I provide a port, h^3, in the shell of the air-chamber H′, so that as soon as the sand-valve has been sufficiently opened for the sand to flow out as desired through the pipe i the valve H will be prevented from being pressed out farther than the said port by reason of the escape of air through the port h^3.

Similar check-valves to the one described to operate the sanding device may be located also to regulate the pressure in the auxiliary reservoir or at any other point of the service-pipe. This arrangement will permit of keeping the air at such points at a different pressure from that maintained in the main reservoir, which may be very convenient at times, as will readily be understood without further explanation by any one conversant with the requirements of the case.

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

1. In an automatic air-brake, a balance-lever fulcrumed inside of the auxiliary reservoir and provided with two valve-disks, in combination with the automatic and brake-cylinder pipes, whereby the said valve-disks are adapted to close or open as the tension in the automatic pipe is increased or decreased, substantially as set forth.

2. In an automatic air-brake, an operating-valve mounted inside of the auxiliary reservoir on a swinging or sliding bar that carries valve-disks of unequal size, the larger of which has its seat in the suitably-shaped inner end of the automatic pipe, while the other is located opposite the orifice of the brake-cylinder pipe, substantially as and for the purpose set forth.

3. In an automatic air-brake, in combination with a sliding or swinging valve mounted inside of the auxiliary reservoir and adapted to operate so as to let the air into the brake-cylinder, a skeleton valve located in the brake-cylinder pipe and connected to the swinging or sliding valve, the said brake-pipe having a port-hole, opposite which the said skeleton valve stands when the brakes are being applied, and which is left open when the same are being released, substantially as set forth.

4. In a combined automatic and straight air-pipe service, in combination with the brake-cylinder pipe F′, the skeleton valve f, adapted to close the said pipe when the straight or direct air-pipe is used to apply the brakes, substantially as and for the purpose set forth.

5. In an automatic brake-gear, in combination with the brake-cylinder F, the air-chamber H′, inclosing the check-valve H, with springs h' h^2, and having the port-hole h^3, the stem of the said valve being connected through the link or rod h to the sliding valve I of the said box I′, substantially as shown and described, and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

LEANDER E. SLOAN.

Witnesses:
S. S. STOUT,
H. G. UNDERWOOD.