

(No Model.)

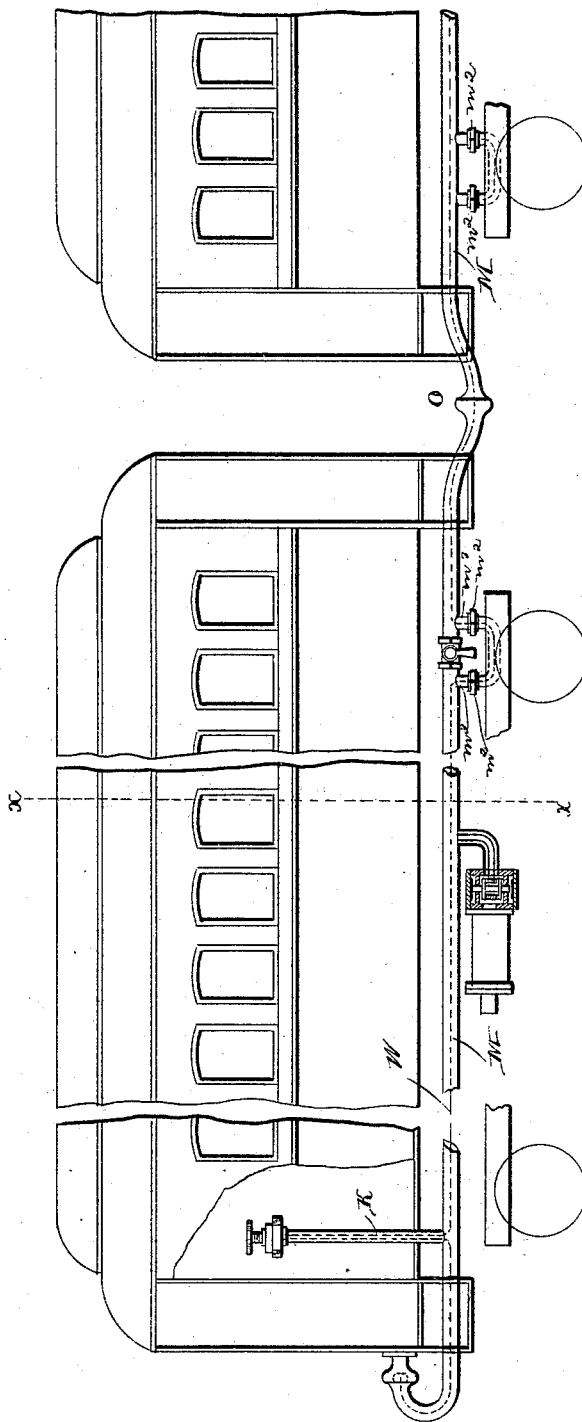
3 Sheets—Sheet 1.

H. FLAD.
RAILWAY AIR BRAKE.

No. 307,536.

Patented Nov. 4, 1884.

FIG. 1.



WITNESSES

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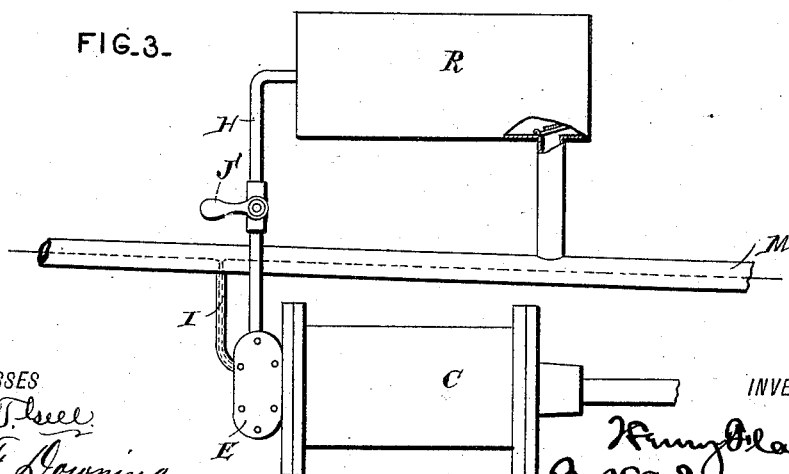
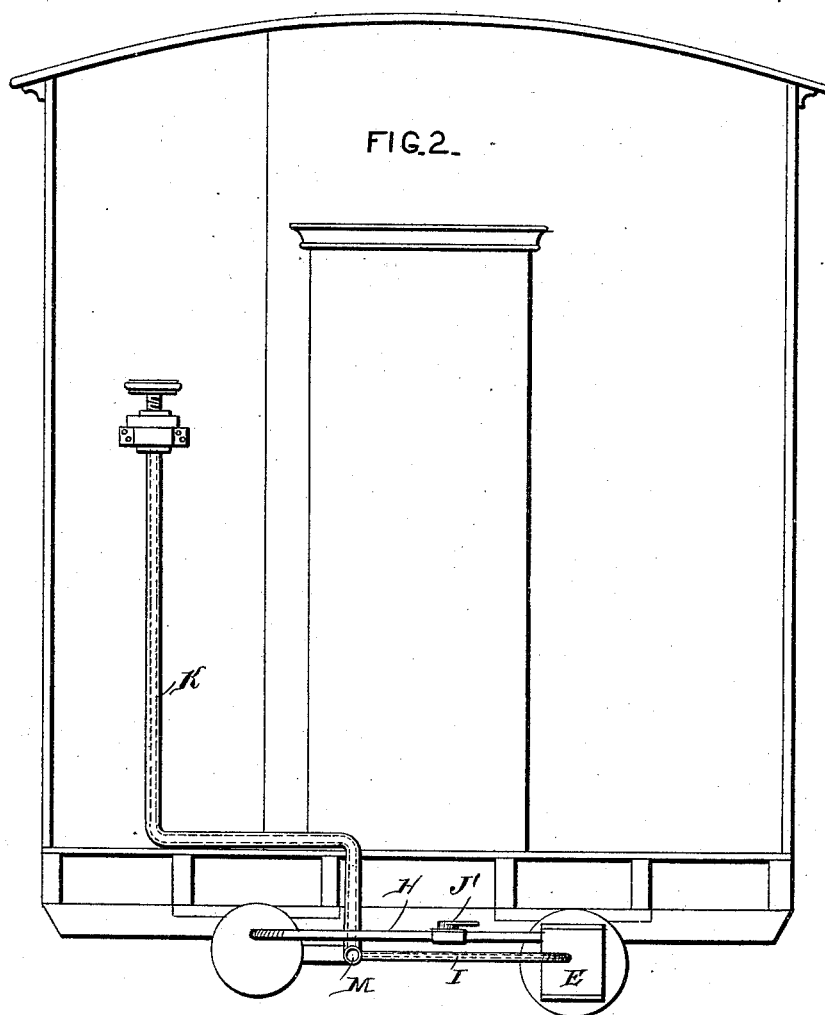
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3 Sheets—Sheet 2.

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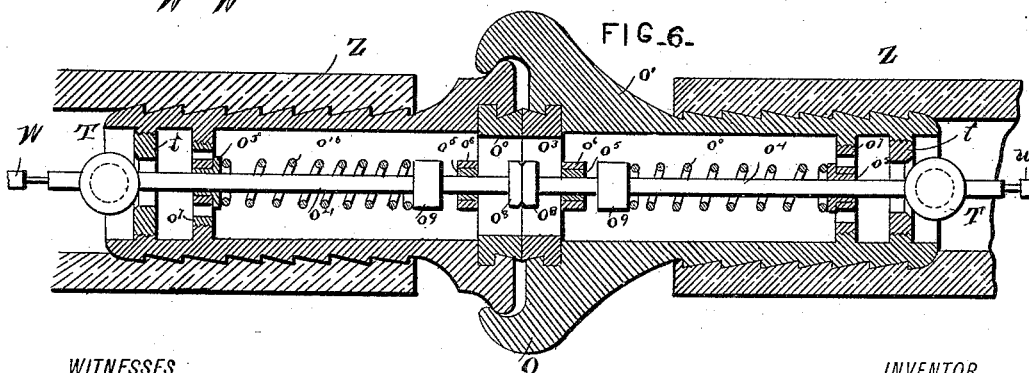
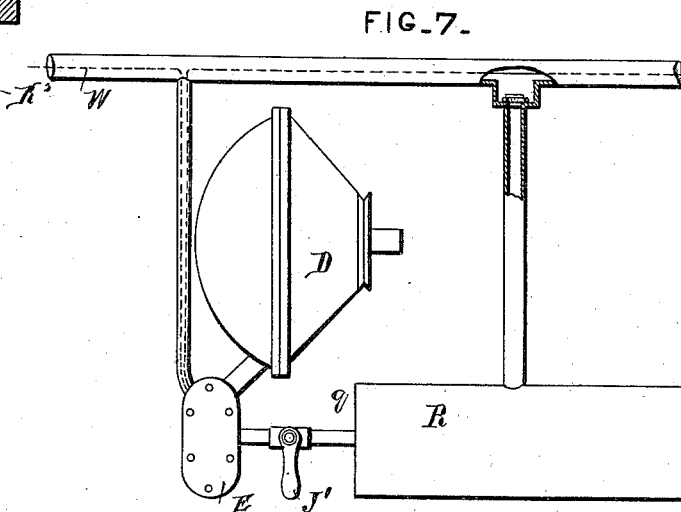
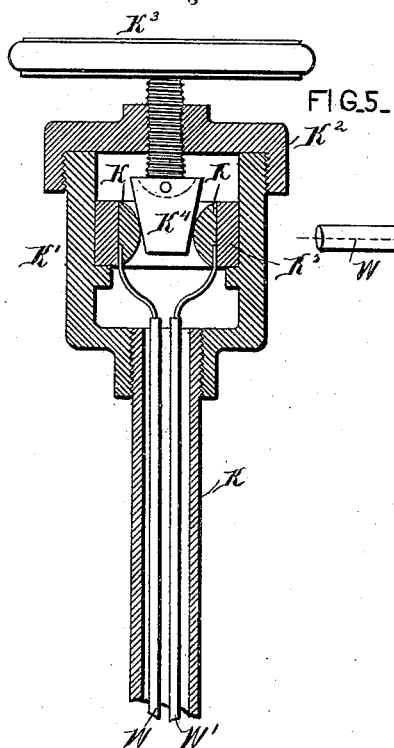
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3 Sheets—Sheet 3.

No. 307,536.

Patented Nov. 4, 1884.



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UNITED STATES PATENT OFFICE.

HENRY FLAD, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE ELECTRO MAGNETIC BRAKE COMPANY, OF EAST ST. LOUIS, ILLINOIS.

RAILWAY AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 307,536, dated November 4, 1884.

Application filed May 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY FLAD, of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Railway Air Brakes; and I 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.

My invention relates to railway air-brake systems in which the valves for controlling the direct brake-operating devices are themselves controlled by electro-magnets included in electric circuits the conducting-wires of which are arranged through the main air-pipes and suitable branches thereof.

I have heretofore, on the 9th day of April, 1884, filed an application for patent for improvement in electrically - controlled air-brakes, the invention in said application having in view to provide for the simultaneous application and simultaneous release of the brakes on all the cars of a train, and to furnish a simple and reliable attachment where- by either compressed-air or vacuum brakes may be rendered automatic in their action for applying the brakes to a train of cars in case of accident, resulting in the breakage of the main pipes or the rupture of the electric circuit, by means of which the valves are operated.

My present improvements are supplementary to the invention set forth in said heretofore-filed application, and have in view the following objects, namely: first, to render it practicable to include and operate in the main air-pipes cocks for retaining compressed air therein without interfering with the conducting-wires, of which the main pipes form conduits; second, to prevent the brakes from being applied or set on a car which is to be uncoupled and shifted from a train; third, to render it possible for a conductor or other person, in case of necessity, to operate the brakes of a train from any car in such train; fourth, to automatically close the ends of the main air-pipes of a car or cars uncoupled from a train using a system of pipe-couplings—such as the Mallinckrodt coupling. The devices for accomplishing these objects will be clearly

understood from the following particular description, in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of portions of two cars coupled in a train provided with a Westinghouse automatic air-brake system controlled by electro-magnetic valves and comprising my present improvements, the car walls and timbers being partly broken away to afford a view of the parts. Fig. 2 is a vertical cross-section of one of the cars on a plane just behind the front truck, as indicated by dotted line *xx* of Fig. 1. Fig. 3 is a detail bottom view of a portion of the brake system. Fig. 4 is a detail view, partly in section, illustrating the by-pass or loop pipes for carrying the conducting-wire clear of cocks in the main pipes. Fig. 5 is a detail vertical sectional view illustrating the devices which enable the electric circuit to be broken for operating the brakes from any car of a train. Fig. 6 is a detail longitudinal section through two of the hose-couplings provided with automatic circuit-closing devices, and automatic valves for closing the ends of the hose to prevent the escape of air when they are uncoupled. Fig. 7 is a detail bottom view of a portion of a vacuum-brake apparatus of the Eames type, controlled by electro-magnetic valves, and provided with a cock, according to my invention, for preventing the air from escaping from the diaphragm to the reservoir, and allowing the setting of the brakes when a car is uncoupled and the electric circuit broken.

Referring to Figs. 1, 2, and 3, the letter M indicates the main air-pipe, which serves the purpose of conveying air to operate the brakes, on the general principle of the well-known Westinghouse air-brake system. In this pipe is arranged a conducting-wire, W, which is led laterally in a loop through a small branch pipe, I, to include the coils of the electro-magnet which operates the tubular valve, which is arranged in the chamber E, the same as in my heretofore referred to and previously filed application.

I have found that it may often be desirable to close the main pipe to the passage of air, and in order to do this without interfering with the conducting-wire I connect with the

main pipe a small loop or by-pass pipe, M' , the arched portion m' of which is connected by union-couplings m^2 with short branches m^3 , projecting from the main pipe. The conducting-wire W is led through this by-pass pipe, as shown in dotted lines, and after the said wire is placed in position the arched portion m' of the loop is filled around the wire with paraffine or some similar sealing substance—such as asphalt or plaster-of-paris—as shown at s , before the said portion is coupled to the branches. In the main pipe, between the points of intersection of the branches m^3 , I interpose a cut-off cock, J , in the usual manner; and it will now be obvious that the cut-off cock may be turned to prevent the passage of air through the main-pipe without interfering with the conducting-wire, and the sealing substance in the by-pass pipe will also prevent flow of air either to or from the main pipe. As the main pipe will be provided with by-pass pipe at both ends of a car, it may at any time be closed to preserve therein either a vacuum or compression of air when the car is detached from a train. Such closing of the main pipe will, however, not prevent the flow of air from the reservoir to the brake-cylinder in a Westinghouse automatic brake, or from the diaphragm to the reservoir in an Eames or other automatic vacuum-brake, and therefore the brakes in either of such systems will be operated when the main pipe is closed and the electric circuit broken; but in the systems in which the brakes are set by charging the main pipes they may be kept set as long as desired after a car is detached from a train, provided the ends of the main pipe are closed by means of the cocks J before the car is detached.

In order to prevent the brakes on a car which is to be taken out of a train from being set when the electric circuit is broken, and the valves thereby operated so as to allow of compressed air entering the brake-cylinder, (as in the case of Westinghouse and similar brakes,) or to allow the air from a diaphragm-chamber or a cylinder to escape into a reservoir, (as in the case of vacuum-brakes,) I interpose a valve, J' , in the pipe H , which leads from the reservoir R to the valve-chamber E . Before uncoupling the hose this cock in the car or cars to be separated from the train is closed, so that, although the valve opens the port which ordinarily prevents communication between the brake-cylinder and reservoir, the cock J' prevents the flow of air, and therefore the brakes will not be set. The uncoupling of the hose and consequent breaking of the circuit will cause the brakes to be set on those cars which remain connected with the engine; but as soon as the circuit is restored by connecting the hose-coupling at the rear end of the last car of the train with the false coupling provided for it, as in my Patent No. 296,546, granted April 8, 1884, the valves will immediately be operated to allow the com-

pressed air from the brake-cylinders to escape (if a Westinghouse brake) or the air to be exhausted from the diaphragm, (if a vacuum-brake,) and the brakes will be taken off.

In Figs. 2 and 3, which illustrate a portion of a Westinghouse compressed-air brake apparatus, the cock J' is in the pipe H , which connects the reservoir R with the upper compartment of the valve-chamber, as in my application of April 9, 1884, and in Fig. 7 the cock J' is in the pipe g , which connects the reservoir with the upper compartment of the valve-chamber, as also shown in my said application.

The letter K , Figs. 1, 2, and 5, indicates a branch pipe brought up into a car from the main air-pipe, and has connected to its top a chamber, K' , having a screw-cap, K^2 , formed of hard rubber or other non-conducting material, through which plays a hand-screw, K^3 , having a metallic cone, K^4 , secured to its lower end.

Resting upon a ledge within the chamber K' is a ring, K^5 , of non-conducting material, and having secured to its inner periphery two convex metal plates, K K , diametrically opposite each other, so that both will be pressed, and thus electrically connected by the metallic cone K^4 when the screw is run down a sufficient distance. The insulated conducting-wire W is drawn up through pipe K in the form of a loop, which is cut at its top, and has its terminals connected electrically to the plates k k , respectively. The pipe K is filled around the wire strands with paraffine or similar sealing substance to prevent the passage of air. When the metallic cone is screwed down to connect the plates k k , it will be seen that the electric circuit will be maintained at this point; but if, in case of accident or for any other reason, it should be desirable for a conductor or other person to operate the brakes from the car, the operation can be readily accomplished by screwing up the hand-screw, so as to raise the metallic cone R out of contact with the plates k k , as the electric circuit will be thus broken and the magnets allowed to release the valves, so that the brakes will be operated as described in my application of April 9, 1884.

In Figs. 1 and 6 the letter O designates the coupling of the flexible hose which connect the main air-pipes from car to car, the hose being indicated by ZZ . The two parts o' and o'' are formed with clutches, to engage each other in the usual manner, and each has let into its mouth a rubber gasket, o^3 o^3 , the two of which coming together form an air-tight joint when the two parts of the coupling are engaged. Through the center of each part of the coupling is arranged a metallic rod, o^4 , arranged to slide in bearings o^5 o^5 , supported, respectively, by a cross-bar, o^6 , near the mouth, and a perforated disk, o^7 , near the rear end, of the coupling part. The rods o^4 o^4 have at their free ends heads o^8 o^8 , and each rod has behind its front bearing a shoulder, o^9 , against which bears one end of a helical spring, o^{10} , sur-

rounding the rod, and having its other end bearing against the perforated disk o' , so that normally the springs will force the rods outward and cause their heads to come together in elastic contact when the two parts of the coupling are engaged.

To the rear or inner end of each rod o' is connected the conducting-wire W, which is arranged through the main pipe of the car, the rods serving as automatic circuit connections of the wires from car to car when the hose are coupled.

Into the rear end of each part of the coupling is screwed a metal disk, t , having at its center an aperture of preferably about three times the diameter of the rod o' , which passes through it. Around this aperture, on the rear side of the disk, is formed a seat to receive a ball-valve, T, secured upon the rod o' , which passes centrally through it. The valves T T are preferably formed of india-rubber, and when the parts of the coupling are engaged and the heads of the rods o' butted against each other these rods will be forced inward to carry the valves off their seats and leave free passage for air through the main pipes, hose, and couplings. When, however, the hose are uncoupled, either by accident or purposely, the rods are forced outward and press the valves snugly upon their seats, thus automatically closing the main pipes, so that compressed air cannot escape, or air enter to destroy a vacuum, as the case may be. Either part of the coupling may be connected with a blind or false coupling on its car (as shown in my Patent No. 296,546, granted April 8, 1884,) to re-establish the electric circuit temporarily broken by the uncoupling of the hose.

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

1. The combination, with an air-brake pipe having a cut-off cock arranged therein, of the by-pass or loop pipe having its ends connected with the main pipe on opposite sides of the cock, and the electric conducting-wire arranged through the main pipe and the by-pass pipe and sealed in the latter, substantially as and for the purpose set forth.

2. In an air-brake operated by electricity, an air-brake pipe provided with one or more by-pass pipes or loops adapted to carry the elec-

tric conducting-wire around points between the junctions of each loop with the main pipe, substantially as set forth.

3. The combination, with the main pipe, the reservoir, the brake cylinder or chamber, the valve-chamber and valve, the electric conducting-wire arranged in the main pipe and connected to the valve, and the pipe connecting the reservoir with the valve chamber, of the cut-off cock J', arranged in said pipe, substantially as set forth.

4. The combination, with an air-brake pipe of a railway-car and an electrical conducting-wire arranged through said pipe, of the branch pipe extending up into the car and having a loop of the wire sealed in it, and a circuit-breaker arranged in said loop, substantially as set forth.

5. The combination, with the main air-pipe, of the branch-pipe K, extending up into the car, the conducting-wire looped into said branch pipe and provided with terminal plates near the top of the same, and the adjustable metallic cone or wedge arranged to make or break electrical connection between said terminal plates, as desired, substantially as described.

6. The combination, with the hose-coupling and spring-actuated circuit-connecting rod arranged therein, of the disk t , having an air-passage, and a valve secured upon said circuit-connecting rod, and adapted to open or close said air-passage, according to the position of the rod, substantially as described.

7. The combination, with the two pipe-connecting hose and the two coupling parts connected to the same, of the spring-actuated circuit-connecting rods arranged in said parts, air-passages arranged in said parts, respectively, and the valves carried by said rods, respectively, and adapted to open said air-passages when the coupling parts are engaged, and to automatically close said passages when the parts are uncoupled, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

HENRY FLAD.

Witnesses:

E. F. FINNEY,
J. S. McLEOD.