No. 715,585. Patented Dec. 9, 1902.

L. KIRCHNER.

COMPRESSED AIR BRAKE FOR RAILWAYS.

(Application filed Oct. 7, 1902.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 2.

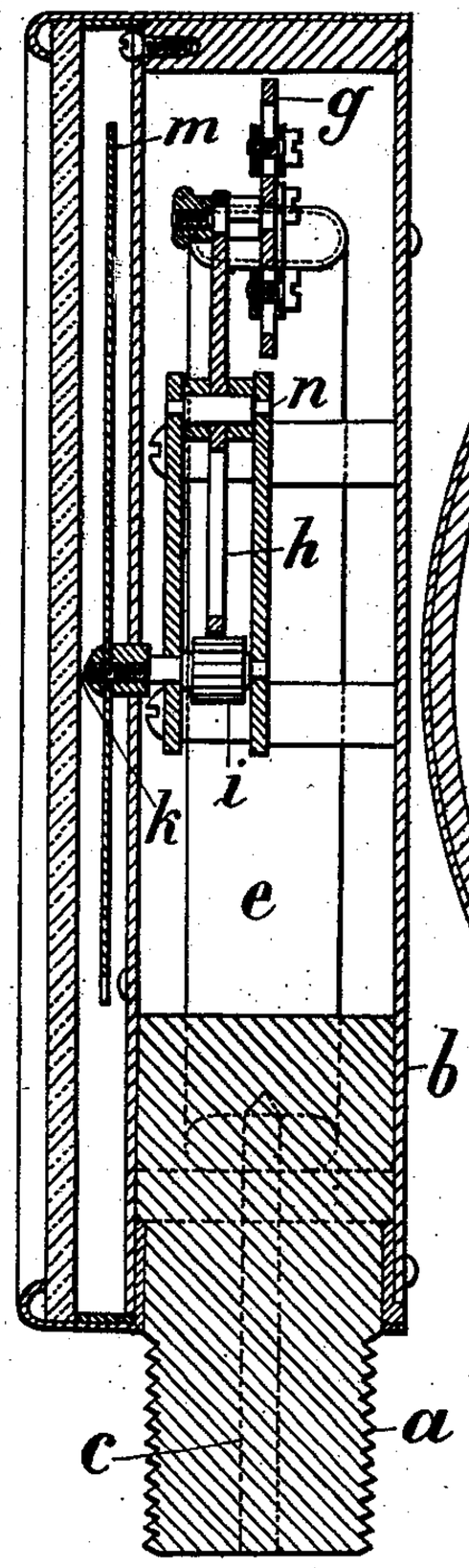

FIG. 1.

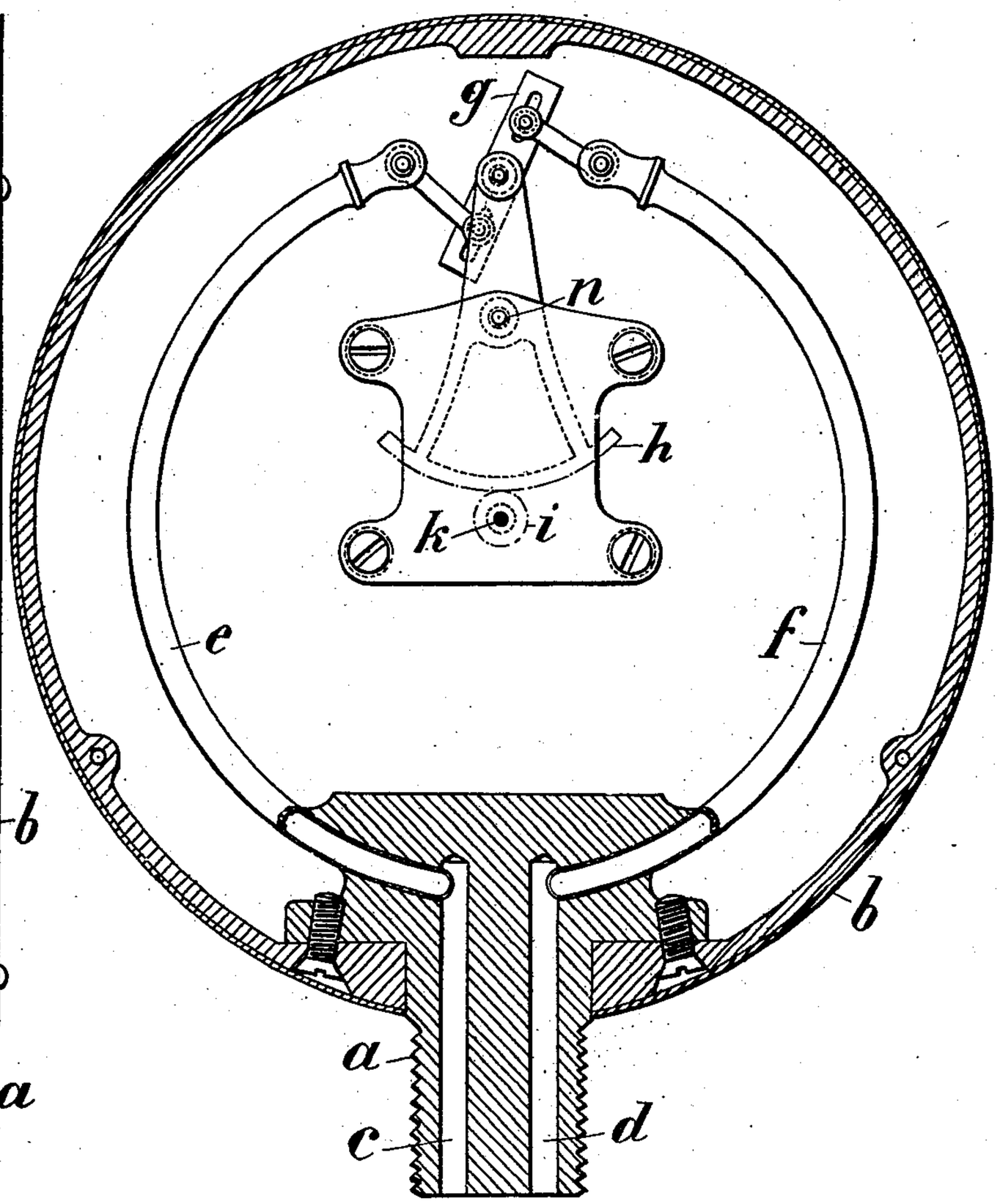

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FIG. 4.

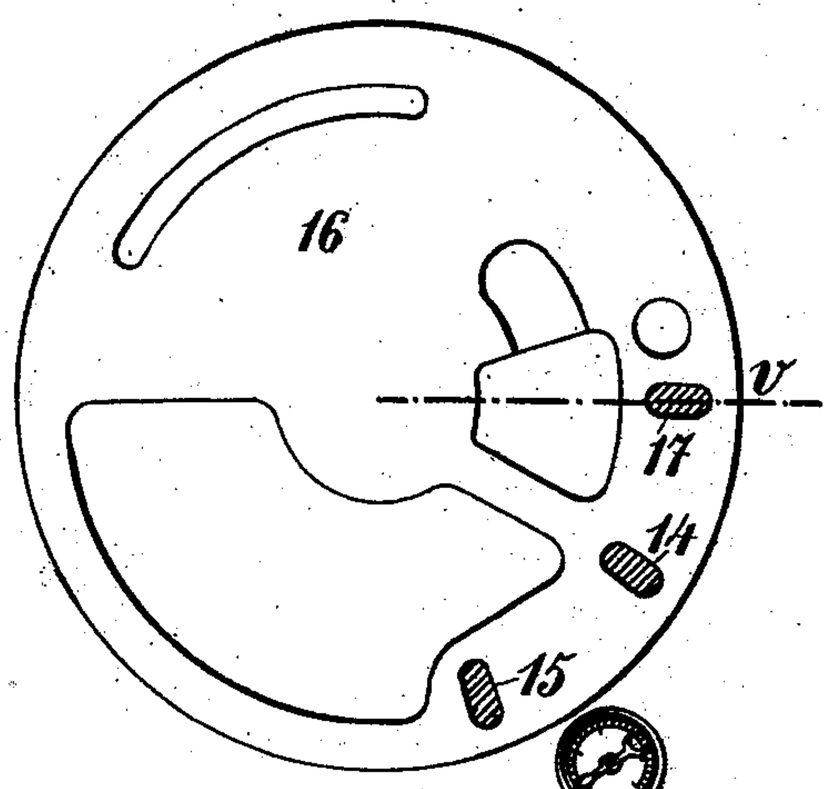


FIG. 5.

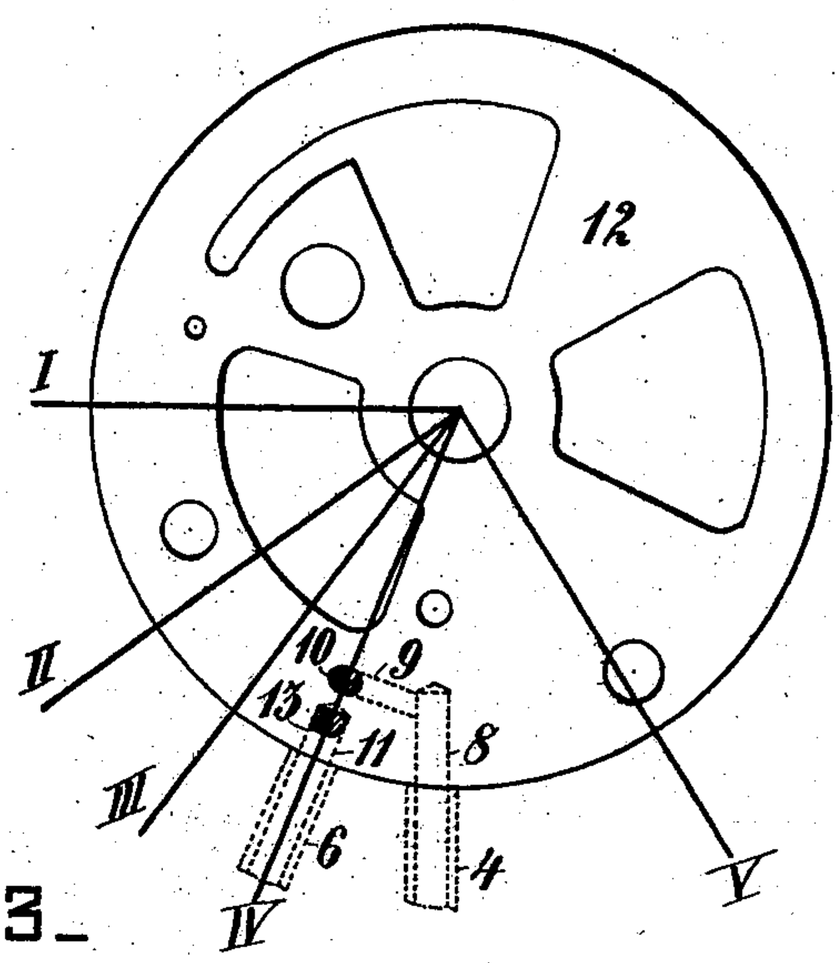
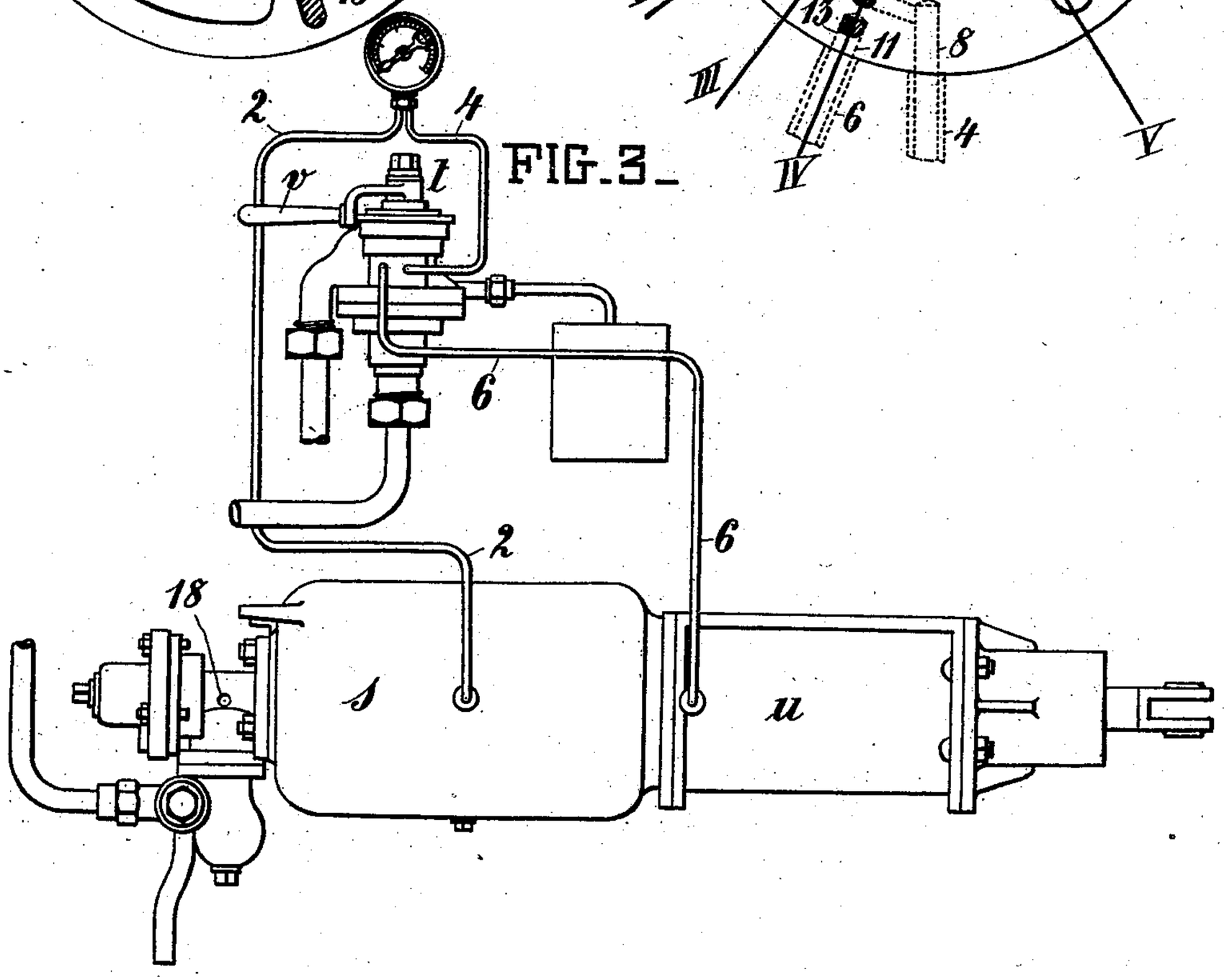


FIG. 3.



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UNITED STATES PATENT OFFICE.

LÉON KIRCHNER, OF MULHOUSE, GERMANY, ASSIGNOR OF ONE-HALF TO JOHANNES HANDSCHIN, OF BASLE, SWITZERLAND.

COMPRESSED-AIR BRAKE FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 715,585, dated December 9, 1902.

Application filed October 7, 1902. Serial No. 126,307. (No model.)

To all whom it may concern:

Be it known that I, LÉON KIRCHNER, a subject of the Emperor of Germany, and a resident of Mulhouse, Alsace, Germany, have invented new and useful Improvements in Compressed-Air Brakes for Railways, of which the following is a full, clear, and exact specification.

As is well known, compressed-air brakes allow the pressure in the brake-cylinders to be gradually raised by means of a gradual service braking until the pressure stored up in the auxiliary air-reservoirs is exhausted—that is to say, until the pressure in these latter and in the brake-cylinders become equal. Now it is of considerable importance for the engine-driver to know the degree of exhaustion of this pressure store, and especially when the pressure in the auxiliary air-reservoirs and in the brake-cylinders becomes equal—that is to say, when the brakes are applied with full force—so as not to let escape further compressed air out of the train-pipe uselessly, and to be able, if necessary, to cause the stopping of the train by strewing sand and reversing steam. To give notice of this to the engine-driver is the object of the present invention. According to it a differential elastic-tube manometer is permanently connected to an auxiliary air-reservoir by one of its elastic tubes connected to the indicator mechanism and by the other elastic tube to the corresponding brake-cylinder with interposition of the brake-operating valve, and this valve is so arranged that on ordinary service braking it allows the air to pass from the brake-cylinder to the manometer in order to indicate the difference of pressure between the auxiliary air-reservoir and the brake-cylinder. Should this difference of pressure become zero, which, as already mentioned, happens when the full service application of the brakes is effected, the indicator mechanism points to zero, thereby showing the engine-driver that the pressure store in the auxiliary air-reservoirs intended for the service braking is entirely used up.

The accompanying drawings represent an embodiment of the object of this invention in connection with an air-brake of the Westinghouse type in as far as it is necessary for the comprehension of this invention.

Figures 1 and 2 show the differential elastic-tube manometer. Fig. 3 shows this manometer in connection with an auxiliary air-reservoir, the corresponding brake-cylinder, and the brake-operating valve. Figs. 4 and 5 illustrate the brake-operating valve, Fig. 4 being an under side view of its rotary valve and Fig. 5 a top view of the guide-face of this latter.

Referring first to Figs. 1 and 2, the screw-plug *a* carries the frame or casing *b* of the manometer and is also formed with two separate passages *c d*, to which are connected, respectively, the elastic tubes *e f* of the pressure-gage. These tubes are secured at their upper ends by means of links to a two-armed lever *g*, which is in connection, by means of the toothed sector *h*, pivoted at *n*, and the toothed wheel *i*, with the indicator-spindle *k*. The spindle *k* carries the pointer *m*, which is movable over a dial.

As will be seen in Fig. 3, the passage *c* of the pressure-gage is permanently in connection by the tube 2 with the auxiliary air-reservoir *s*, and the passage *d*, by means of the tube 4, with the brake-operating valve *t*, which is itself in connection, by a tube 6, with the brake-cylinder *u* on the auxiliary air-reservoir *s*. The connection of the tubes 4 6 to the brake-operating valve is best shown by Fig. 5. The tube 4 is connected to a passage 8 of the body of the brake-operating valve, and this passage to a channel 9, which opens at 10 to the guide-face 12 of the rotary valve of the brake-operating valve. On the other hand, the tube 6 is joined to a passage 11, which opens at 13 also to the said guide-face 12. The rotary valve 16, Fig. 4, is provided on its under side with three notches 17 14 15, intended to allow the communication between the apertures 10 and 13 in three principal positions of said rotary valve. Apart from these notches, openings, and passages the rotary valve and its guide-face have the usual construction. In order to show more clearly which are the notches and openings that

have been added in the invention to the usual passages of the brake-operating valve, they have been pointed out by hatching. Fig. 5 shows also the five principal positions well known of the brake-operating valve—that is to say, of its operating-lever *v*—viz., the positions for filling, (I,) for running, (II,) for closing, (III,) for ordinary service braking, (IV,) and for emergency braking, (V.)

The described apparatus of the invention operates as follows: In the filling position of the brake-operating valve (position I, Fig. 5) the apertures 10 13 communicate with each other by means of the notch 15, and in the running position II through the notch 14. Therefore in these two positions the tube 4—that is to say, the channel *d* of the manometer—is put into communication with the tube 6, itself connected with the back end of the brake-cylinder, and thus with the air-outlet 18, Fig. 3, of the triple valve of the auxiliary air-reservoir *s*, and the pipe 4 is under atmospheric pressure. The degree of the pressure store in the auxiliary air-reservoir can thus be seen on the manometer. By closing the brake-operating valve (position III) the aforesaid communication is cut off. In the position IV—that is to say, when an ordinary service braking is being effected—the same communication takes place between the apertures 10 and 13 of the guide-face 12 through the notch 17 of the rotary valve, while the communication of the brake-cylinder with the air-outlet or escape-opening 18 is now cut off. Therefore some of the compressed air in the brake-cylinder flows also into the channel *d* of the manometer, and this latter shows thus the difference of pressure in the auxiliary air-reservoir and in the brake-cylinder and informs in this manner the engine-driver as to the degree of pressure store still left in the auxiliary air-reservoir. If after a first ordinary service braking has taken place there will be let still more compressed air out of the train-pipe to effect a stronger application of the brakes, the pressure in the auxiliary air-reservoir is decreased and the pressure in the brake-cylinder rises, so that the difference of pressure between these two capacities becomes smaller until at last the pressures become equal, when full service braking is reached and the pointer of the pressure-gage moves to zero. Since the engine-driver has always to observe the manometer during the braking operation, he will immediately perceive when the pressures are equalized and know thereby that the pressure store in the auxiliary air-reservoir is exhausted and any further escape of compressed air out of the train-pipe useless. He can then move the brake-valve lever *v* to its closing position. On an emergency braking (position V) the communication between the brake-cylinder and the manometer is interrupted, so that the sudden great change of pressure cannot injuriously affect the sensitiveness of the manometer. When the brake-valve lever *v* is put back to the filling position I, the tube 4 communicates through the notch 15 with the tube 6, and the compressed air still left in the channel *d* and in the tube *f* of the manometer escapes through the leakage or outlet opening 18 into the outer atmosphere.

What I claim is—

1. In compressed-air brakes for railways, the combination with an auxiliary air-reservoir and its brake-cylinder of a differential elastic-tube manometer permanently connected by one of its elastic tubes with the said auxiliary air-reservoir and means controlled by the brake-operating valve for connecting the other manometer-tube to the brake-cylinder on an ordinary service braking so as to indicate then the difference or equality of pressure both in the auxiliary air-reservoir and in the brake-cylinder, substantially as set forth.

2. In compressed-air brakes for railways, the combination with an auxiliary air-reservoir and its brake-cylinder of a differential elastic-tube manometer permanently connected by one of its elastic tubes with the said auxiliary air-reservoir, a brake-operating valve joined on the one hand to the other manometer-tube and on the other hand to the brake-cylinder and means upon said brake-operating valve for completing the connection between this latter manometer-tube and the brake-cylinder when an ordinary service braking is brought about, so as to indicate then the difference or equality of pressure both in the auxiliary air-reservoir and in the brake-cylinder, substantially as described.

3. In compressed-air brakes for railways, the combination with an auxiliary air-reservoir and its brake-cylinder of a differential elastic-tube manometer permanently connected by one of its elastic tubes with the said auxiliary air-reservoir, means controlled by the brake-operating valve for connecting the other manometer-tube to the brake-cylinder on an ordinary service braking so as to indicate then the difference or equality of pressure both in the auxiliary air-reservoir and in the brake-cylinder, and means controlled by the brake-operating valve for allowing communication when the brake-valve is in the filling and running position, substantially as described.

4. In compressed-air brakes for railways, the combination with an auxiliary air-reservoir and its brake-cylinder of a differential elastic-tube manometer permanently connected by one of its elastic tubes with the said auxiliary air-reservoir, means controlled by the brake-operating valve for connecting the other manometer-tube to the brake-cylinder on an ordinary service braking so as to indicate then the difference or equality of pressure both in the auxiliary air-reservoir and

in the brake-cylinder, and means upon said brake-operating valve itself for allowing communication between the latter manometer-tube and an air-escape opening when the brake-valve is in the filling and running position, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LÉON KIRCHNER.

Witnesses:
AMAND BRAUN,
GEORGE GIFFORD.