

(No Model.)

2 Sheets—Sheet 1.

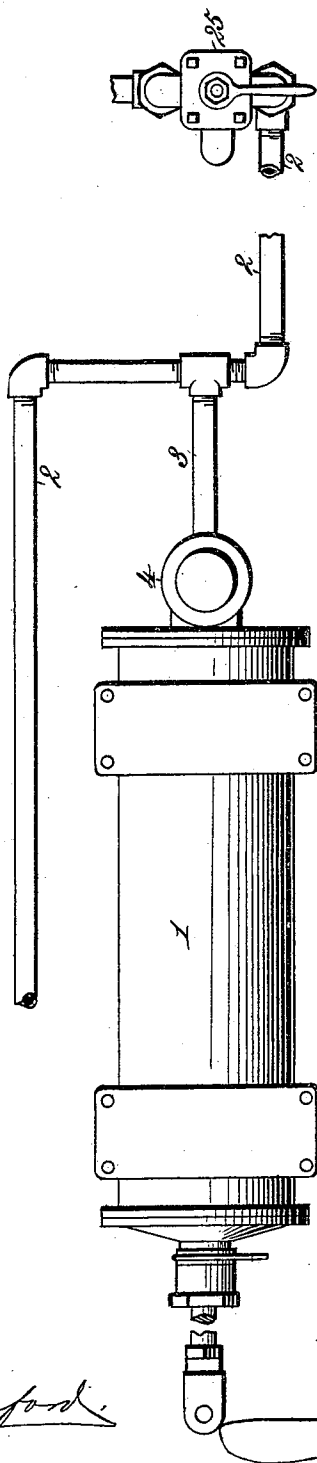
E. G. SHORTT.

RELIEF VALVE FOR AUTOMATIC BRAKE SYSTEMS.

No. 471,441.

Patented Mar. 22, 1892.

Fig. 1.



Witnesses.

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J. A. Rutherford.

Inventor.

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Atty.

(No Model.)

2 Sheets—Sheet 2.

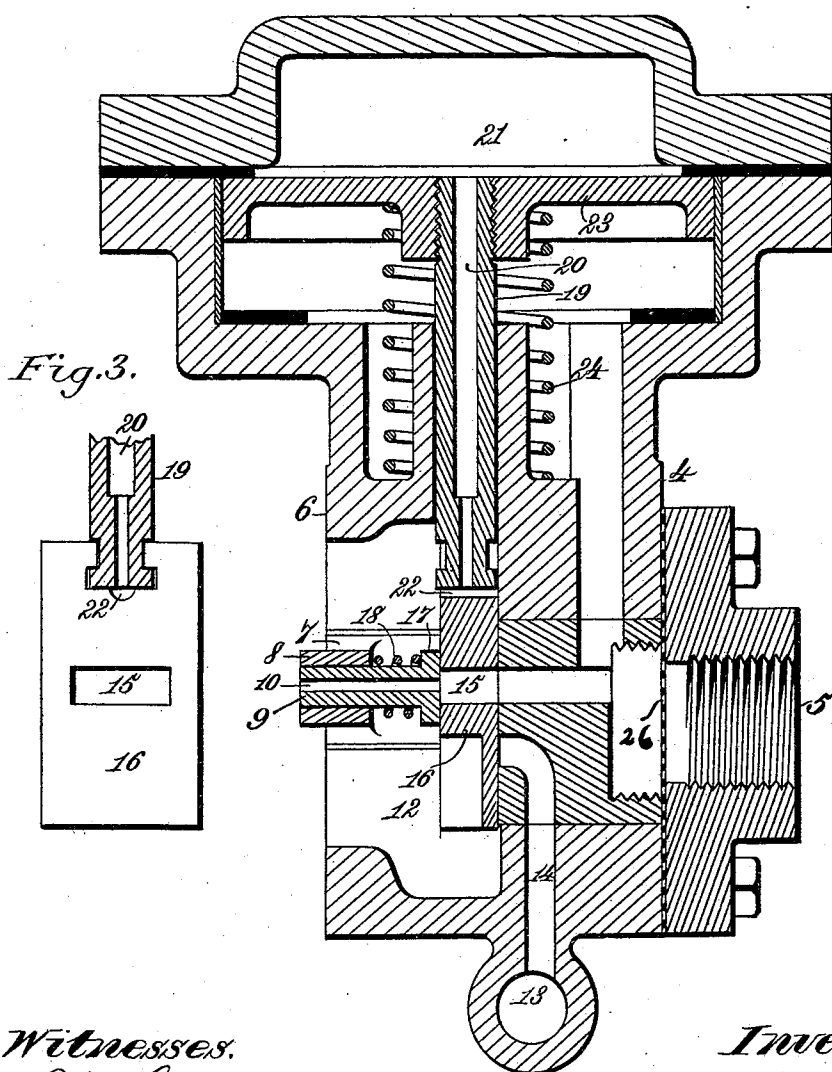
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Fig 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, ASSIGNOR TO CHARLES GOODWIN EMERY, TRUSTEE, OF NEW YORK, N. Y.

RELIEF-VALVE FOR AUTOMATIC BRAKE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 471,441, dated March 22, 1892.

Application filed October 21, 1891. Serial No. 409,399. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented new and useful Improvements in Relief or Exhaust Valves for Automatic Brake Systems, of which the following is a specification.

This invention relates to the relief or exhaust valve mechanism which constitutes the subject-matter of Letters Patent No. 466,434, issued to me January 5, 1892, wherein compressed air in an air chamber or space at one side of a diaphragm or partition serves to move a valve for the purpose of establishing communication between the brake-cylinder and the external atmosphere when the fluid-pressure in the train-pipe is released for the sudden application of the brakes in case of an emergency or immediate danger.

The present invention has for its object to improve the prior construction by providing means whereby the air chamber or space is placed in continuous communication with the working chamber of the brake-cylinder for insuring positive action of the slide-valve and obtaining a reliable mode of operation under all circumstances.

To accomplish this object my invention consists in the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view showing a portion of a brake mechanism to illustrate a suitable arrangement of the relief or exhaust valve. Fig. 2 is a vertical central sectional view of the relief or exhaust valve mechanism; and Fig. 3 is a detail face view of the slide-valve, showing a portion of its stem.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The numeral 1 indicates a brake-cylinder of any suitable type, but preferably of the construction described and shown in my Letters Patent, No. 469,176, dated February 16, 1892. The train-pipe 2, as here shown, is provided with a branch or section 3 to connect

with a screw-socket 5 at one side of the relief-valve casing 4, and the opposite side 6 of the latter is secured to the brake-cylinder. I do not, however, confine myself to this arrangement, for obviously the relief or exhaust valve can be otherwise arranged to operate conjointly with the train-pipe and the working chamber of the brake-cylinder.

The casing 4 of the relief or exhaust valve mechanism is provided at one side with a spider 7, constructed with or supporting a sleeve 8, in which is adapted to yield a valve or device 9, having a contracted channel or orifice 10, extending longitudinally there- through. The valve-casing 4 is formed with a suitable partition constituting a valve-chamber 12, and is furnished with a port 13, adapted to connect by a channel 14 with the valve-chamber 12 through a transverse port 15, formed in slide-valve 16, when such valve is moved in such position that the port 15 registers with the channel 14. The valve or device 9, having the contracted channel 10, is provided at one extremity with a face-plate or disk 17, resting against one side of the slide-valve and acted upon by a spring 18, interposed between the face-plate or disk and the spider for the purpose of permitting the valve 9 to yield and enable the slide-valve to properly operate without binding. The face-plate or disk 17 subserves the function of a valve to the transverse port 15 of the slide-valve, so that when pressure is restored in the train-pipe the fluid entering the port 15 will move the face-plate or disk 17 away from such port to open the latter its full capacity for the rapid flow of liquid to the working chamber of the brake-cylinder 1, thereby obtaining a quick release of the brakes. The slide-valve is so connected with the lower end of a valve-stem 19 that such valve and valve-stem have practically a rigid connection and are compelled to move at all times in unison. In other words, while the slide-valve can adjust itself to its seat it is impossible for the valve-stem to move lengthwise independent of the slide-valve. The valve-stem 19 is provided with a longitudinal channel 20, extending entirely through it and communicating at one end with an air chamber or space 21 and at its opposite end by a port 22 with the

valve-chamber 12. The air chamber or space 21 is formed in the top portion of the valve-casing through the medium of a movable diaphragm or partition, which, as here shown, is composed of a piston 23, having suitable packing at its periphery to bear against the internal surface of the valve-casing. An expandible spring 24, of suitable form, acts on the piston 23 to elevate the same to the position indicated in Fig. 2, and in this position the slide-valve is adjusted to close the channel 14, which communicates with the outlet-port 13. When the pressure of air is raised in the train-pipe 2, the air flows through the transverse port 15 of the slide-valve 16 and presses the disk or plate 17 away, as before explained. The air flows through the port 15, chamber 12, and channel 10 into the brake-cylinder for releasing the brakes to place them in position for running the train. When the engineer's valve 25, Fig. 1, is adjusted to retain the fluid-pressure in the train-pipe, relief-valve, and brake-cylinder, the air-pressure beneath the diaphragm or partition 23 equals the air-pressure in the air-chamber 21; but the actual pressure beneath the diaphragm or partition is somewhat greater, owing to the power of the spring 24, which tends to press the diaphragm or partition in an upward direction. If now air-pressure in the train-pipe is reduced by the engineer through the medium of a suitable valve mechanism 25, Fig. 1, for the gradual application of the brakes, as in stopping at stations, the air flows from the brake-cylinder through the contracted channel 10 and port 15 to the train-pipe. When the engineer's valve is adjusted for the slow release of the pressure in the train-pipe and the gradual application of the brakes, the power of the spring 24 holds the diaphragm or partition 23 in the position indicated in Fig. 2. By this means the slide-valve 16 will not be moved to close the port 15 when the pressure in the train-pipe is slowly released for the gradual application of the brakes. If the brakes are to be applied suddenly, as in case of an emergency or immediate danger, the valve mechanism 25 is operated by the engineer to release the entire pressure in the train-pipe, whereupon the compressed air in the air-chamber 21 of the valve-casing 4 will instantly act to depress the movable diaphragm or partition 23 against the tension of the spring 24, and thereby adjust the slide-valve into such position that its transverse port 15 will register with the channel 14, and consequently air will escape to the external atmosphere through the air-outlet 13. By this means the air-pressure is suddenly released from the brake-cylinder, and consequently the brakes are instantly applied. It will be obvious that the same mode of operation would occur as regards the sudden application of the brakes were the train-pipe ruptured, as by an accident to the train or the unintentional uncoupling of the cars, because the air-pressure

in the train-pipe would be entirely released and the compressed air in the air-chamber 21 would move the slide-valve into position to register its port with the channel leading to the air-outlet 13.

The engineer's valve may be of any construction suitable for the conditions required to partially or entirely release the air-pressure in the train-pipe for the gradual application of the brakes. I prefer, however, to employ the engineer's valve described and shown in my Letters Patent No. 466,433, dated January 5, 1892.

The air-outlet 13 may be provided with a valve to exclude the entrance of external air, but permit the escape of the fluid from within for the purpose of adapting the relief-valve to a vacuum-brake system, as described and shown in my Letters Patent, No. 466,434, hereinbefore alluded to.

In the construction shown in my last-mentioned patent the channeled valve-stem is so constructed and connected with the slide-valve that when the fluid-pressure in the train-pipe is released for the sudden application of the brakes the valve-stem first moves independently of the slide-valve to close the air-channel in the valve-stem and cut off communication between the air-chamber or space and the brake-cylinder. This is to some extent objectionable in that the air-pressure in the air-chamber or space may be insufficient to instantly move the slide-valve into the position required for the sudden application of the brakes in case of an emergency or immediate danger. The cause of this resides in the fact that when the diaphragm or partition descends or moves inward the actual air-pressure in the air-chamber becomes reduced by reason of the gradually-increasing area of the air-chamber; but since communication between the latter and the brake-cylinder has been closed there is no provision to continue the supply of compressed air to the air-chamber to maintain the power which may be required to positively actuate the slide-valve in case of an emergency. In my present invention the valve-stem 19 has no lengthwise movement independent of the slide-valve, and consequently I establish a continuous communication between the air-chamber 21 and the working chamber of the brake-cylinder. Since the continuity of this communication is never broken, even when the partition or piston 23 descends or moves inward for the sudden application of the brakes, it will be obvious that the air-chamber 21 is continuously supplied with compressed air from the brake-cylinder to maintain the required power in the air-chamber for the positive and reliable action of the slide-valve under all circumstances.

In the present construction it is not essential that the air-chamber 21 be placed in communication with the working chamber of the brake-cylinder by a channel or passage 20

through the valve-stem 19. The communicating channel or passage may be otherwise arranged.

In practice I prefer to arrange a strainer 26 between the screw-socket 5 and the casing 4, as in Fig. 2, to exclude foreign matter from the relief-valve mechanism.

Having thus described my invention, what I claim is—

10 1. The combination, with a brake-cylinder, of a relief or exhaust valve having a port for communicating with the external air and an
5 air-chamber having a passage always open therefrom to the brake-cylinder, a slide-valve
15 having a port and controlling the external air-port, and means whereby the slide-valve is moved by the pressure of air in the chamber to place the valve-port in communication
20 in the train-pipe is released for the sudden application of the brakes, substantially as described.

2. The combination, with a suitable brake-cylinder, of a relief or exhaust valve case having
25 a port for communicating with the external atmosphere and a movable diaphragm or partition forming an air-chamber having a passage always open therefrom to the brake-cylinder, a slide-valve having a transverse
30 port, a stem connected with the diaphragm or partition, a spring acting to move the valve-stem and diaphragm or partition in one direction, and a valve having a reduced chan-

nel for conducting the air from the brake-cylinder to the transverse port in the slide-valve, 35 substantially as described.

3. The combination, with a brake-cylinder and a train-pipe, of a relief-valve casing having an outlet to the external atmosphere and a diaphragm or partition to provide an air- 40 chamber having a passage always open therefrom to the brake-cylinder, a valve having a stem connected to the diaphragm or partition, a transverse port for the passage of the fluid, and means for the flow of air to the air-cham- 45 ber, and a yielding valve-plug having a reduced channel and controlling the port through the valve, substantially as described.

4. The combination, with a brake-cylinder and train-pipe, of a relief-valve casing hav- 50 ing an outlet to the external atmosphere and a diaphragm or partition to provide an air-chamber having a passage always open therefrom to the brake-cylinder, a slide-valve having a port, a valve-stem having a longitudi- 55 nal channel, and a spring-yielding valve-plug having a reduced channel and seating against one side of the slide-valve, substantially as described.

In testimony whereof I have hereunto set 60 my hand and affixed my seal in presence of two subscribing witnesses.

EDWARD G. SHORTT. [L.S.]

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.