

(No Model.)

2 Sheets—Sheet 1.

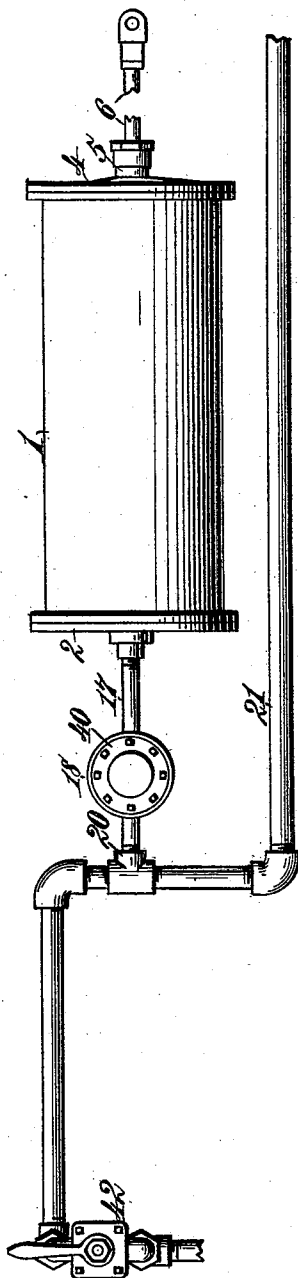
E. G. SHORTT.

RELIEF OR EXHAUST VALVE FOR AUTOMATIC AIR BRAKES.

No. 466,434.

Patented Jan. 5, 1892.

Fig. 1.



Witnesses,
Phil G. Smith,

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Inventor,

Edward G. Shortt,

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

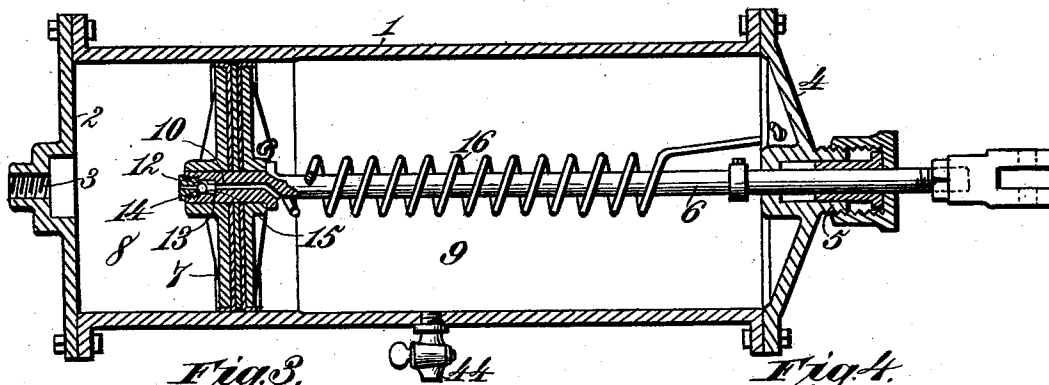


Fig. 3.

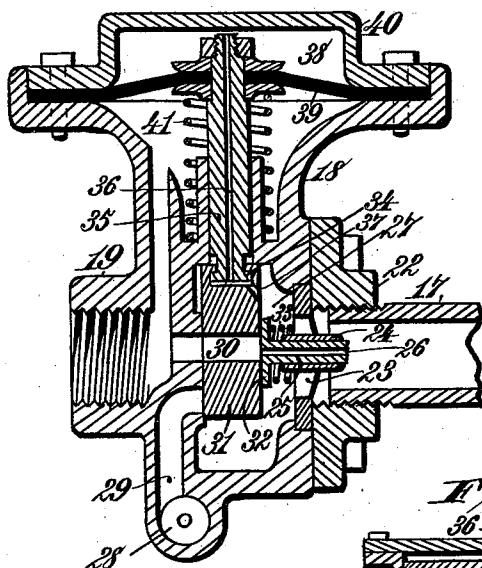


Fig. 4.

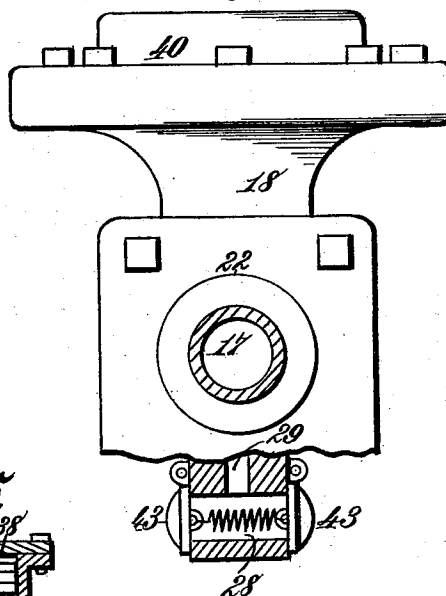
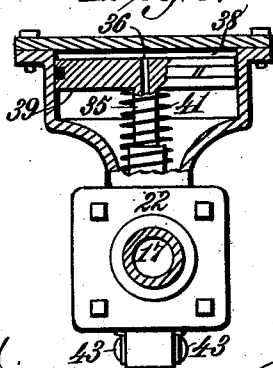


Fig. 5.



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UNITED STATES PATENT OFFICE.

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RELIEF OR EXHAUST VALVE FOR AUTOMATIC AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 466,434, dated January 5, 1892.

Application filed June 19, 1891. Serial No. 396,829. (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 Brakes, of which the following is a specification.

This invention relates to automatic fluid-pressure brakes, and has for its object to provide a novel relief or exhaust valve mechanism for reducing the air-pressure at one side of a piston in a cylinder and applying the brakes gradually at stations, or suddenly in case of an emergency or immediate danger, or as occasion may demand.

To accomplish this object my invention involves 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 sufficient of an automatic-brake mechanism to illustrate my invention. Fig. 2 is a longitudinal central sectional view of the brake-cylinder. Fig. 3 is a vertical central sectional view of the improved relief-valve mechanism for connecting the brake-cylinder with the train-pipe. Fig. 4 is a sectional end elevation of the same, and Fig. 5 is a similar view showing a modification.

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 having at one end a suitable head 2, provided with a central orifice 3, and at the opposite end a head 4, suitably bolted in position and carrying a stuffing-box 5, through which passes a rod 6, which connects the movable diaphragm or partition 7 with the brake-actuating levers. The connection between the rod 6 and the brakes may be of any well-known construction, and therefore it is not deemed necessary to illustrate the same.

The movable diaphragm or partition 7 (shown in Fig. 2) is composed of a disk in the form of an ordinary piston, rigidly secured at its center to the rod 6, and serving to di-

vide the brake-cylinder into a chamber 8 and an air-tight reservoir 9, through which latter passes the brake-actuating rod 6. The piston is provided at its center with a passage-way or port 10, which serves to place the chamber 8 at one side of the piston in communication with the air-reservoir at the opposite side of the piston. The passage-way or port 10 is formed into two distinct valve-seats 12 and 13 for a spherical or other suitably-constructed valve 14, which is adapted to rest against either one of the valve-seats in such manner as to permit the flow of air from the chamber 8 into the air-reservoir and prevent the escape of air from such reservoir into the chamber. To accomplish this the valve-seat 13 is preferably constructed with a series of slots 15, so that when the spherical valve is at rest against such valve-seat the air may flow through the passage-way or port and past the valve into the air-reservoir, as will be quite obvious.

A spiral or other suitably-constructed spring 16 of considerable power is arranged around the brake-actuating rod 6 within the air-reservoir of the brake-cylinder, and this spring is secured at one end to the cylinder-head 4 and at the opposite end to the piston or to the rod in juxtaposition to the piston. The spring is of the type known as a "retractile spring," and consequently its tendency is to pull or draw the piston in a direction to release the brakes and compress the air contained in the air-reservoir.

In practice the orifice 3 of the head 2 is connected with the usual train-pipe of the compressed-air system, and when the air-pressure in the train-pipe is raised the air flows into the chamber 8 and through the communicating passage-way 10 into the air-reservoir 9, at the same time forcing the diaphragm or piston 7 in the direction of the retractile movement of the spring for the purpose of releasing the brakes. By this means the brakes are held released and the power of the spring by its pulling action on the diaphragm or piston additionally compresses the air in the air-reservoir, and thereby creates a pressure in the latter which is in excess of the pressure in chamber 8. In consequence of this the spherical valve is held properly against its seat 12

by the pressure of the air within the air-reservoir in the effort of such confined air to escape through the passage-way or port into the air-chamber 8 and equalize the pressure at opposite sides of the piston. It will be obvious from the foregoing that when the air-pressure is raised in the train-pipe and the brakes are held released it is impossible for the valve to move or fall by gravity away from its valve-seat 12, and therefore all danger of air escaping past the valve when the air-pressure in the train-pipe is reduced is entirely avoided. If the valve were employed without the spring operating to move the diaphragm or piston in a direction to compress the air in the air-reservoir, the valve would move or fall from its seat when the pressure at opposite sides of the diaphragm or piston became equal, and therefore if the pressure in the train-pipe were reduced the air from the air-reservoir might escape past the valve and render the brake mechanism defective and objectionable.

The orifice 3 of the air-chamber 8 connects by a tube 17 with an automatic relief or exhaust valve mechanism. (Exhibited in detail in Figs. 3 and 4.) The casing 18 of this valve mechanism is provided at one side with a screw-socket 19, connected, as at 20, with the train-pipe 21, and at the opposite side with a detachable coupling 22, attached to the tube 17 and serving to confine in position a vertically-arranged spider 23, supporting a sleeve 24, in which is adapted to yield a valve or plug 25, having a contracted channel or orifice 26 extending longitudinally there-through.

The valve-casing is formed with a suitable partition constituting a valve-chamber 27, and is furnished with a port 28, adapted to connect by a channel 29 with the valve-chamber 27 through a transverse port 30, formed in slide-valve 31, when such valve is moved in such position that the port 30 registers with the channel 29.

The plug valve or device 25, having the contracted channel 26, is provided at one extremity with a face plate or disk 32, resting against one side of the slide-valve and acted upon by a spring 33, interposed between the face plate or disk and the spider, for the purpose of permitting the valve-plug to yield and enable the slide-valve to properly operate without binding. The face plate or disk 32 subserves the function of a valve to the transverse port 30 of the slide-valve, so that when the pressure is restored in the train-pipe the fluid entering the port 30 will move the face plate or disk 32 of the valve-plug 25 away from such port to open the latter its full capacity for the rapid flow of fluid to the chamber 8 of the brake-cylinder, thereby obtaining a quick release of the brakes.

The slide-valve is provided with a cavity at its upper portion, with which loosely engages the shouldered head 34 of a valve-stem 35, having a longitudinal channel 36 extend-

ing entirely through it. The cavity with which the head 34 engages connects by a port 37 with the valve-chamber 27 for the admission of air to the channel 36, from whence such air flows into the air-chamber 38, formed in the top portion of the valve-casing, through the medium of a movable diaphragm or partition 39, which, as shown in Fig. 3, is composed of a flexible material clamped at its periphery to the valve-casing through the medium of a chambered head 40, suitably bolted in position.

An expansible spring 41, of suitable form, acts on the diaphragm or partition to elevate the same to the position indicated by Fig. 3, and in this position the lower extremity of the head 34 is lifted from the port 37 for the purpose of placing the latter in communication with the valve-stem channel 36, whereby air may flow from the valve-chamber 27 through the port 37 and channel 36 into the air-chamber 38.

When the engineer's valve 42 is adjusted to retain the fluid-pressure in the train-pipe, relief-valve, and brake-cylinder, the air-pressure beneath the diaphragm or partition 39 equals the air-pressure in the chamber 38; but the actual pressure beneath the diaphragm or partition is somewhat greater, owing to the power of the spring 41, which tends to press the diaphragm or partition in an upward direction.

When the pressure of air is raised in the train-pipe 21, the air flows through the transverse port 30 of the slide-valve 31 and presses the valve 25 away, as before explained. The air flows through the port 30, chamber 27, and channel 26 into the air-chamber 8 of the brake-cylinder, whereby the movable diaphragm or partition in the brake-cylinder is moved to release the brakes to place them in position for running the train. If now air-pressure in the train-pipe is reduced by the engineer through the medium of a suitable valve mechanism 42, Fig. 1, for the gradual application of the brakes, as in stopping at stations, the air flows from the air-chamber 8 of the brake-cylinder through the contracted channel 28 and port 30 to the train-pipe.

When the engineer's valve is adjusted, as described, for the slow release of the pressure in the train-pipe and the gradual application of the brakes, the power of the spring 41 holds the diaphragm or partition 39 in the position indicated in Fig. 3, so that some of the air in chamber 38 can escape through the channel 36 and port 37. By this means the slide-valve 31 will not be moved to close the port 30 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 42 is operated by the engineer to release the entire pressure in the train-pipe, whereupon the compressed air in the air-chamber 38 of the valve-casing 18 will

instantly act to depress the movable diaphragm or partition 39 against the tension of the spring 41, and thereby move the head 34 to close the port 37 and adjust the slide-valve into such position that its transverse port 30 will register with the channel 29, and consequently air will escape to the external atmosphere through the air-outlet 28. By this means the entire air-pressure is suddenly released from the air-chamber 8 of 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 consequently the compressed air in the air-chamber 38 would move the slide-valve into position to register its port with the channel leading to the air-outlet 28.

The engineer's valve 42 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 or sudden application of the brakes. I prefer, however, to employ the engineer's valve described and shown in my application for Letters Patent filed March 30, 1891, Serial No. 387,012.

Instead of employing a flexible diaphragm to create the air-chamber 38, I may use a sliding piston, as represented by the modification Fig. 4, to form the diaphragm or partition 39, which will attain the same result.

The brake-cylinder, its diaphragm, piston, or partition, and the retractile spring constitute the subject-matter of my application for Letters Patent filed March 30, 1891, Serial No. 387,011, and therefore I do not herein claim such features. The air-outlet 28 preferably opens at opposite sides, and at each side is arranged a valve 43, which valves exclude the entrance of external air, but permit the escape of the fluid from within. The brake-cylinder is provided with an air-escape cock or valve 44, which enables the compressed air in the reservoir 9 to be discharged. In using the improved mechanism with a vacuum-brake system the air cock or valve 44 is opened to permit the inflow and outflow of the atmosphere.

I do not confine myself to the employment of the improved relief or exhaust valve mechanism with the particular brake-cylinder described and shown.

Having thus described my invention, what I claim is—

1. The combination, with a brake-cylinder, a movable diaphragm or partition, a train-pipe, and a suitable engineer's valve, of a

relief or exhaust valve case connected with the train-pipe and the brake-cylinder and having a port for communicating with the external air and an air-chamber adapted to communicate with the brake-cylinder, a slide-valve having a port and controlling the external air-port, a device having a reduced channel for conducting the air from the brake-cylinder through the port in the slide-valve, and means whereby the slide-valve is moved by the pressure of the air in the said air-chamber to place the valve-port in communication with the external air-port when the pressure in the train-pipe is released for sudden application of the brakes in case of an emergency, substantially as described.

2. The combination, with a brake-cylinder, a piston, and a train-pipe, of the relief or exhaust valve case connected with the train-pipe and the brake-cylinder and having a port for communicating with the external atmosphere and a movable diaphragm or partition forming an air-chamber for communicating with the brake-cylinder, a slide-valve having a transverse port and a stem connected with the diaphragm or partition and constructed with a longitudinal channel to place the valve-chamber in communication with the air-chamber, a spring acting to move the valve-stem and diaphragm or partition in one direction, and a valve having a reduced channel for conducting the air from the brake-cylinder through the transverse port in the slide-valve, 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-chamber, 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-chamber, 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 having an outlet to the external atmosphere and a diaphragm or partition to provide an air-chamber, a slide-valve having ports, a valve-stem having a longitudinal channel, and a spring-yielding valve-plug having a reduced channel and seating against one side of the slide-valve, substantially as described.

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

EDWARD G. SHORTT. [L. S.]

Witnesses:

H. B. EDMONDS,
CHAS. B. HALL.