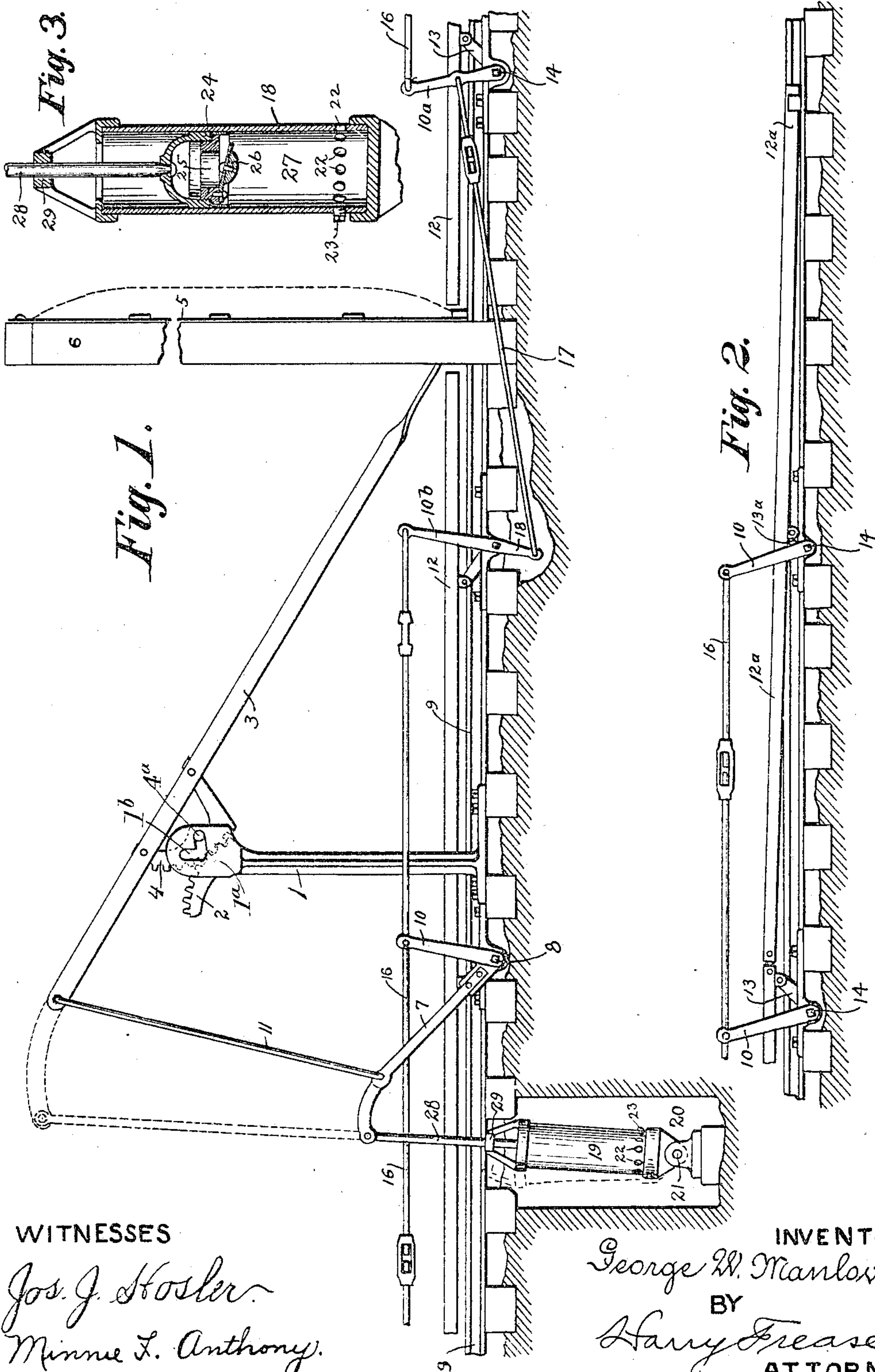


G. W. MANLOVE.
MINE CURTAIN RAISER.
APPLICATION FILED OCT. 22, 1904.



WITNESSES

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MINE-CURTAIN RAISER.

SPECIFICATION forming part of Letters Patent No. 787,200, dated April 11, 1905.

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To all whom it may concern:

Be it known that I, GEORGE W. MANLOVE, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Mine-Curtain Raisers, of which the following is a specification.

The invention relates to an automatic mechanism for raising and lowering a mine-curtain by lifting its lower edge upward and gathering the curtain in folds or for operating other forms of mobile mine-partitions; and the object of the invention is to provide means for controlling and cushioning the mechanism so that it will not damage the curtain or other partition or rack itself by being stopped too suddenly at the end of the opening movement and at the same time will permit the curtain to stand open and to be closed without restraint, and it is furthermore necessary that the end of the opening movement should be controlled and cushioned without materially affecting the rapidity of the remainder of the movement—that is to say, it is desirable that the curtain should be raised quite quickly and without any retarding restraint to a point near the roof of the mine-entry, so as to surely clear above a passing car, and thus the controlling and cushioning means should only come into effective play at or near the end of the movement.

When mine-cars are pushed by hand or pulled by mules, the movement is usually so slow and their weight so moderate that when they ride on the depressible bars usually depended on to operate the curtain-raising mechanism they do not depress the same quickly enough to damage the curtain or the intervening mechanism; but with the introduction of motor-cars for hauling the loads, the same being quite heavy and capable of very rapid movement, the quick depression of the operating-bars and the consequent rapid and forceful upward movement of the lifting devices soon results in injury to or destruction of the curtain or the operating mechanism by the sudden stop at the end of the movement. This difficulty is overcome and the object named above is attained by the construction,

mechanism, and arrangement illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a section of mine-track with a curtain and the improved raising mechanism mounted thereon; Fig. 2, a fragmentary elevation of a section of track, showing the inclined end depressible bars; and Fig. 3, a detached vertical section of the cushion-cylinder with the plunger therein.

Similar numerals refer to similar parts throughout the drawings.

The curtain-raising mechanism used to illustrate the invention comprises on each side of the track a supporting-post 1, having the short rack 2 thereon and the lifting-arms 3, having the pinion-segment 4 thereon meshing with the rack, by means of which the lifting-arms are adapted to rock on the posts. The plate 1^a, having the L-shaped guide-slot 1^b, is provided on the post at the side of the rack, and in this slot the pin 4^a on the side of the pinion-segment is entered and operates, by means of which slot and pin the rack and pinion are held in mesh. The lifting-arms are normally inclined downward to an attachment or connection with the lower edge of the curtain 5, which is suspended from the top on the further side of the frame 6. An operating-arm 7 is securely mounted on each end of a transverse rock-shaft 8, journaled under the track-rails 9, from which shaft the rock-lever 10 is extended upward, and each operating-arm is connected to the free end of the adjacent lifting-arm by a link 11.

The lifting mechanism is operated by means of the depressible bars 12, normally located slightly above and along the outer side of the track-rail 9, with the end section 12^a inclined downward at its free end to the level of the rail. The depressible bars are pivoted on the short arms 13 and 13^a of the compound cranks 14, which are transversely pivoted at the side of the track, the long arms or rock-levers 10^a and 10^b of which cranks are joined by the connecting-rods 16. The connecting-rod 17 intervenes between the series of cranks on the opposite sides of the curtain and is connected to the rock-lever 10^a above its pivot and to the extension 18 of the rock-lever 10^b below

its pivot. It will be noticed that when a car-wheel strikes the inclined end section 12^a of the operating-bar if the car is heavy and the speed is rapid the depressible rails will be forced downward almost instantaneously, with the result that the lifting-arms, with the curtain, are thrown suddenly upward with great force and will strike a severe blow against the top of the frame or the roof of the mine-entry, and the curtain is liable to be cut and the operating mechanism damaged or broken.

To control and cushion the end of the movement of the mechanism, a cylinder 19 is mounted on end, one on each side of the track, adjacent to and preferably underneath the rear ends of the operating-arms. For convenience each cylinder is preferably placed in a pit 20 at the side of the track and is provided with the trunnion-support 21 to permit a slight oscillation of the cylinder. The lower ends of the cylinders are closed except for the exhaust-apertures 22, which are preferably located in the sides adjacent to the lower ends and are arranged to be closed at will, as by the plug-screws 23, so that the total area of the exhaust-apertures can be regulated.

In each cylinder is provided a plunger or piston 24, having the middle port or opening 25, which port is provided with the ordinary check-valve 26, arranged to close the port against the passage or pressure of air from the cushion-chamber 27, formed in the cylinder below the plunger, and to be opened by the passage or pressure of air from above it. The piston-rod 28 is preferably guided by the bracket 29, formed or attached on the upper and preferably open end of the cylinder, and the upper end of the piston-rod is pivotally connected to the operating-arm 7, as illustrated by full lines in Fig. 1, or in some cases it may be desirable to connect it with the lifting-arms, as shown by broken lines in the same figure. The trunnion-support for the cylinder permits it to go and come with the movements of the operating-arm, as shown by the broken line in Fig. 1.

When the operating-arm is suddenly thrown downward by the action of the mechanism for raising the curtain, the valve in the piston is closed and the air which is thus caught in the cushion-chamber is compressed and forms a cushion to resist the operation of the mechanism. This resistance is slight at first, but increases in intensity as the piston is forced down, and at the end of the stroke—that is, when the curtain is raised to a point at or near the top of its frame or the roof of the mine—the resistance is at the maximum. The action of the mechanism is so quick that there is not time enough for an escape of air through the ex-

haust-apertures sufficient to materially affect the compression of the air as a cushion; but when the operation is completed the compressed air rapidly exhausts through the apertures and relieves the mechanism of any restraint while the curtain remains raised. When the curtain is being lowered and the piston is being raised by the reverse action of the mechanism, the piston-valve is opened, so there is no restraint in the movement.

It is not intended to limit the scope of the invention to the particular operating mechanism used to illustrate it or the specific form of cylinder and piston or of check-valve and exhaust-apertures, as these features of construction and arrangement are evidently not essential to the general spirit of the invention. It is also evident that the exhaust-apertures and check-valve are not essential to the proper working of the piston in the cylinder for cushioning the direct action of the mechanism. When the exhaust-apertures and check-valve are omitted, the compressed air in the cushion-chamber serves to assist or augment the reverse operation of the mechanism for closing the curtain.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination, a mine-curtain-raising mechanism having a rocking arm therein, an adjacent cylinder with a trunnion-support and having a guide-bracket thereon, there being exhaust-apertures in the cylinder, a piston in the cylinder having a port with a check-valve therein, and a rod connecting the piston and the rocking arm and adapted to operate in the guide-bracket.

2. In combination, a mine-curtain-raising mechanism having a rocking arm therein, an adjacent cylinder having exhaust-apertures therein, a piston in the cylinder having a port with a check-valve therein, and a connecting-rod between the piston and the rocking arm.

3. In combination, a mobile mine-partition-operating mechanism, an adjacent cylinder open at the top and having a piston therein, and operative connections between the piston and the mechanism, there being means for a restricted exhaust from the cylinder when the piston is thrust inward and means for freely admitting air into the cylinder when the piston is drawn outward.

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

GEO. W. MANLOVE.

Witnesses:

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