No. 806,571. PATENTED DEC. 5, 1905.

B. C. RIBLET.

AIR CUSHION FOR AUTOMATIC BUCKET LOADERS.

APPLICATION FILED AUG. 2, 1904.

5 SHEETS—SHEET 1.

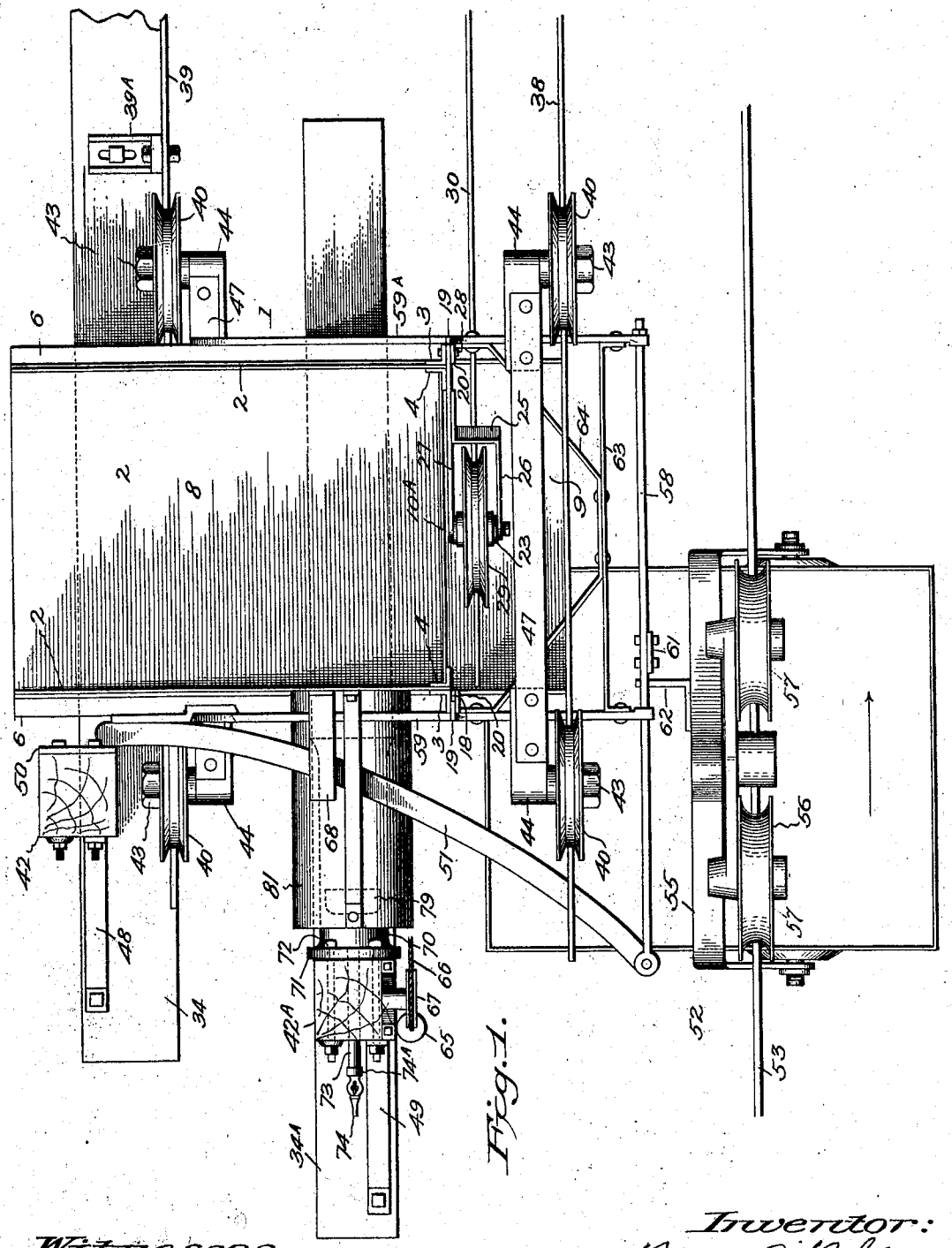

Fig. 1.

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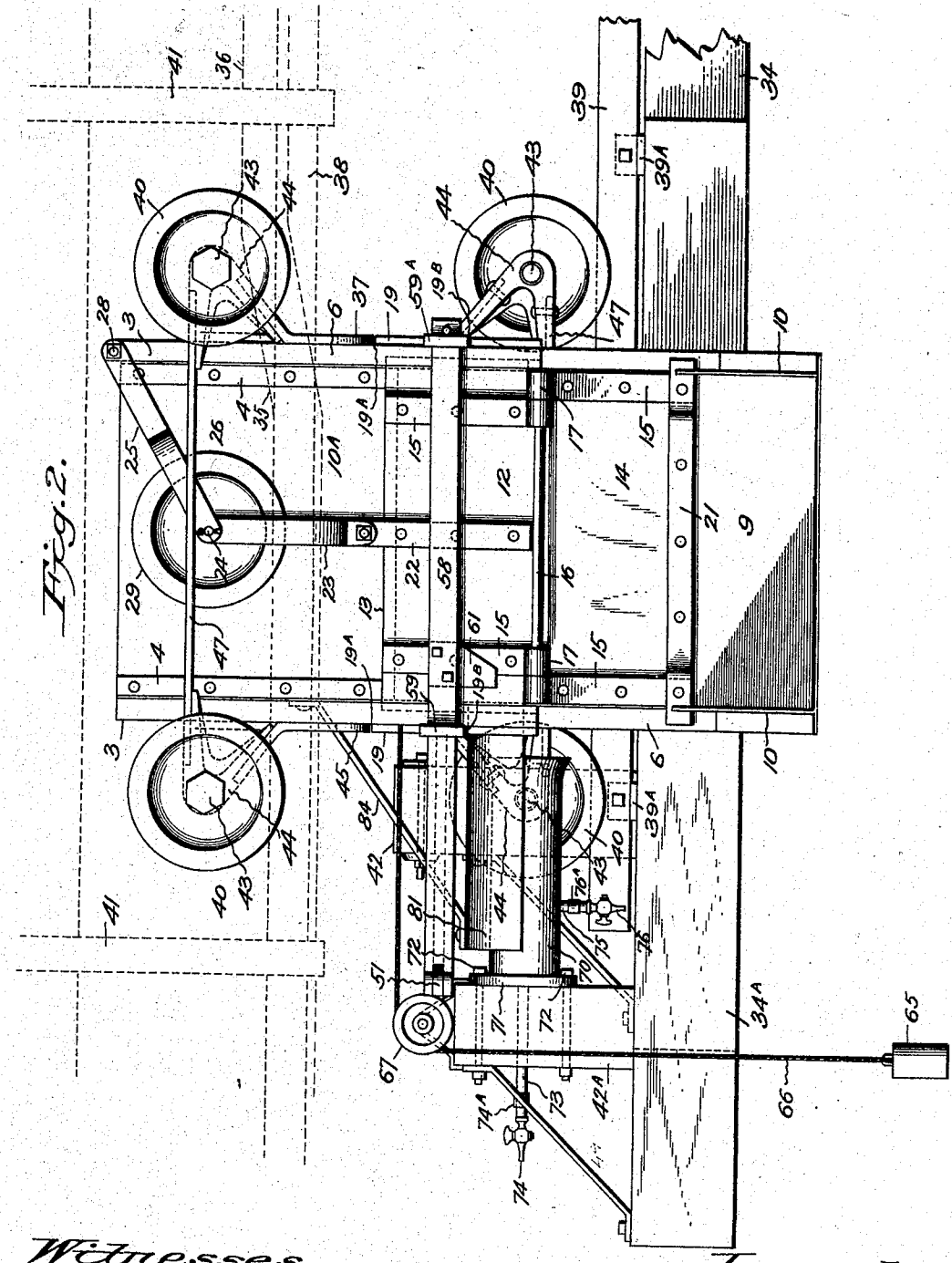
5 SHEETS—SHEET 2.

Fig. 2.



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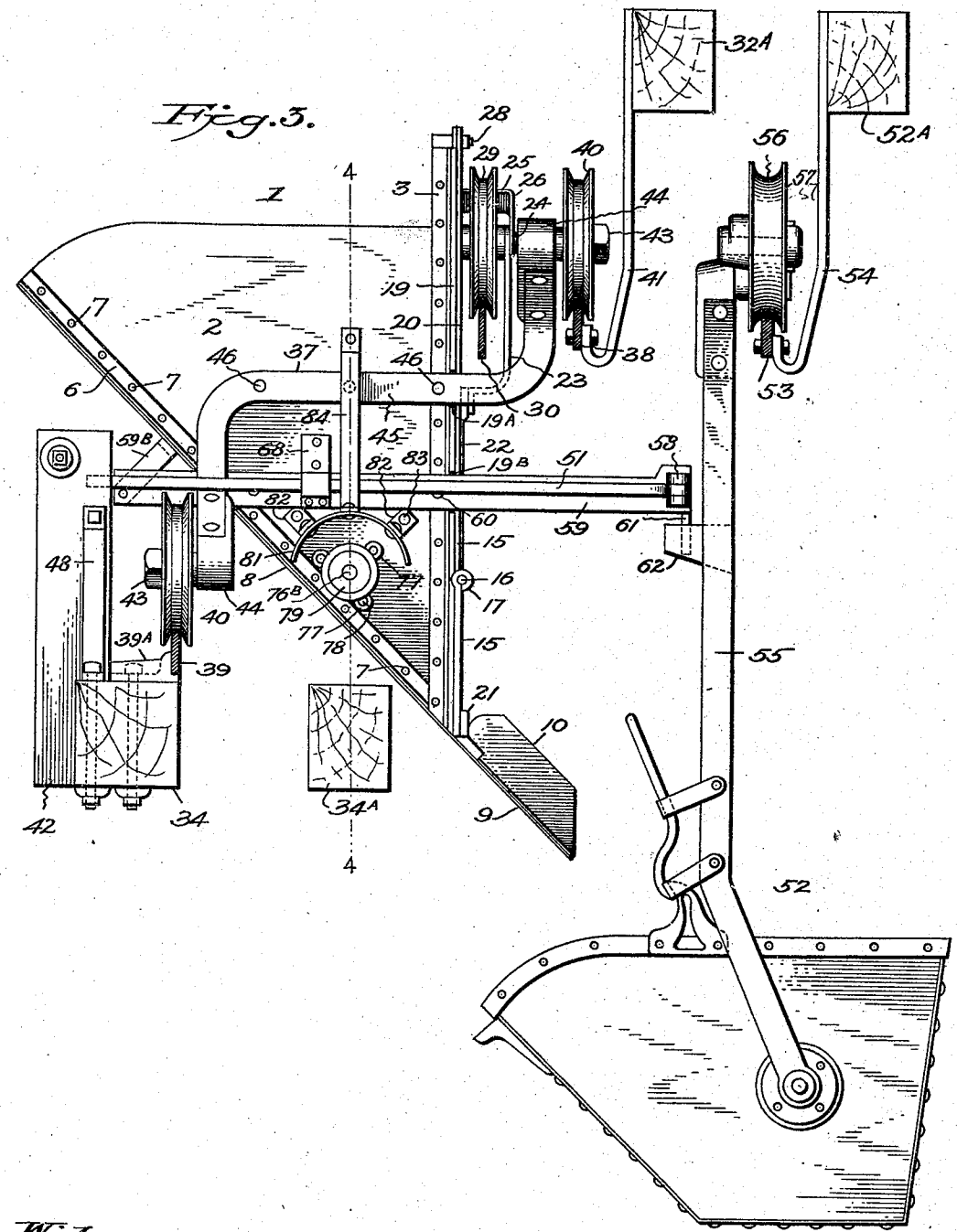
5 SHEETS—SHEET 3.

Fig. 5.



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5 SHEETS—SHEET 4.

Fig. 5.

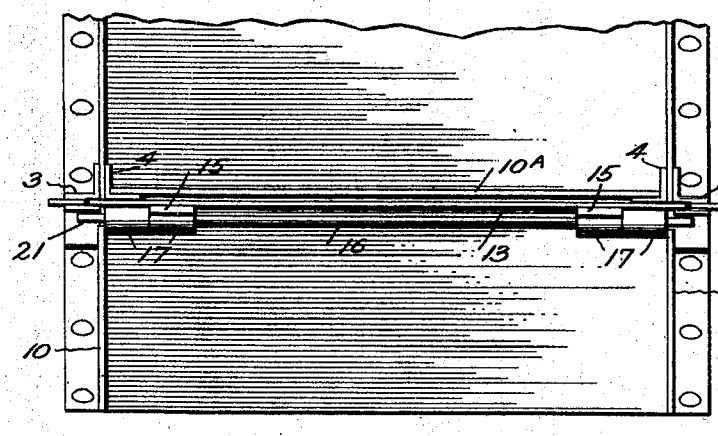
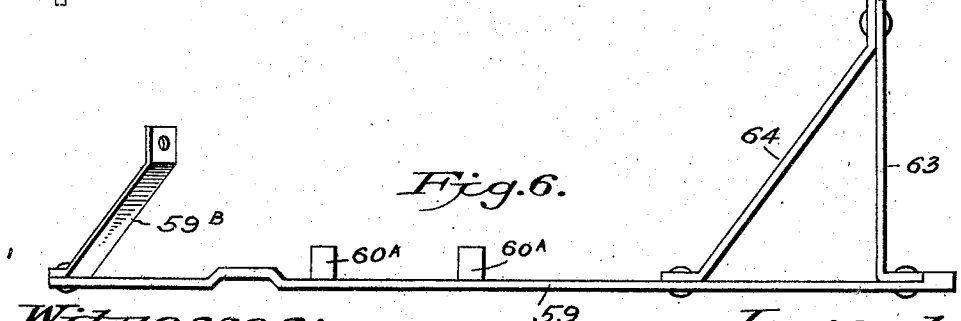


Fig. 4.

Fig. 6.



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5 SHEETS—SHEET 5.

Fig. 7.

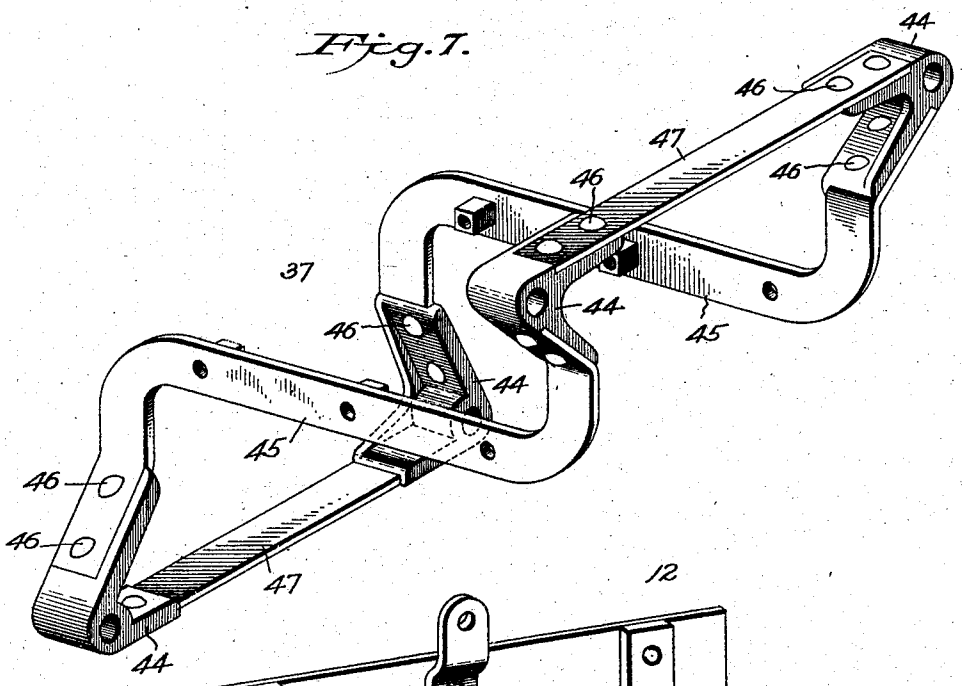
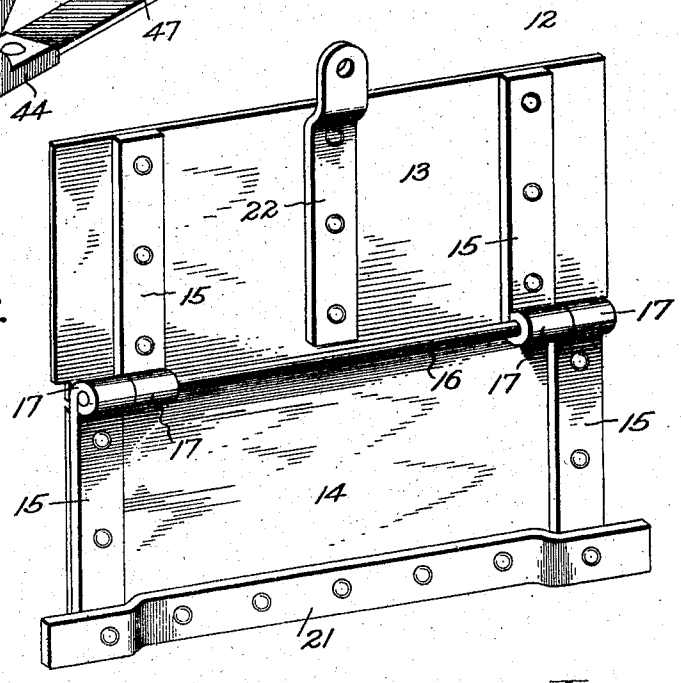


Fig. 8.



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UNITED STATES PATENT OFFICE.

BYRON C. RIBLET, OF SPOKANE, WASHINGTON.

AIR-CUSHION FOR AUTOMATIC BUCKET-LOADERS.

No. 806,571. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed August 2, 1904. Serial No. 219,237.

To all whom it may concern:

Be it known that I, BYRON C. RIBLET, a citizen of the United States of America, residing at Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Air-Cushions for Automatic Bucket-Loaders; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in automatic bucket-loaders for wire-rope tramways; and the objects of my invention are, first, to provide an automatic air-cushioning device for automatic bucket-loaders; second, to provide a reciprocative-movement bucket-loading hopper mechanism provided with a piston that is movable with the bucket-loading hopper and with an air-cushioning cylinder that is secured to an abutment-block in the reciprocating path of the piston; third, to provide means for regulating the air-pressure in the cylinder; fourth, to provide a simple, durable, and effective air-cushioning device for cushioning the reciprocal traveling movement of automatic bucket-loaders. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my improved air-cushion for automatic bucket-loaders. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a side elevation of Fig. 1. Fig. 4 is a sectional view of the air-cushioning cylinder and piston. Fig. 5 is a fragmentary front side elevation of the hopper-door, showing an enlarged view of the hinge of its lower outward-swinging section. Fig. 6 is a fragmentary side elevation of the bar the accelerator rolls on. Fig. 7 is a perspective view of the carriage that supports the hopper, and Fig. 8 is a front side elevation of the combined lifting and swinging door of the hopper.

Similar figures of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1 designates the loading-hopper. It comprises a square-shaped receptacle which is composed of the sheets of iron 2 and the angled irons 3 at the outer corners of the sheets and the angle-irons 4 at the inner corners of the sheets at the front or discharge end of the hopper. The side angles 6 also extend along the bottom edges of the bottom and sides. The sides and angle-irons are riveted together by rivets 7. The bottom 8 of the hopper slopes downward from the top of its rear end at an angle that will permit ore to run freely from the hopper. The bottom plate extends beyond the front end of the hopper and forms a discharge-chute 9. On each side edge of the discharge-chute a plate 10 is secured to prevent the ore from running over the sides of the chute. The front side of the hopper comprises a plate 10^A, which covers the upper half, leaving an opening which extends across it from side to side and about two-thirds of its height. Over this opening I fit a vertically-sliding door 12. This door is preferably made in two halves 13 and 14, which are hinged together at the horizontal center of their heights by the hinge-straps 15 and the pin 16, which passes pivotally through the eyes 17 of the hinge-straps. The upper portion of this door is made wider than the lower portion, and its side edges extend loosely and slidably into slideways 18, formed in the opposite side edges of the hopper, which are formed by securing a bar 19 to the outer front and angle-irons 3. This bar is the same width as the angle-iron and is positioned to extend beyond the outer edge thereof, and a bar 20 is placed against each bar 19, and they are both riveted to the corner angle-irons, thus forming a slideway-slot between the bars 20 and the angle-irons, in which the side edges of the door extend. The bars 19 and 20 extend from the top of the hopper to opposite the hinge of the door. The swinging half is made enough narrower than the upper half to fit loosely between the bars 20, so that it is free to swing outward past them when the upper half of the door is raised in its slideway, as will be explained hereinafter. The outer edge of each bar 19 is notched at 19^A and 19^B, (see Figs. 2 and 3,) the inner edge of the notches being flush with the angle-bar and bar 20. The object of these notches will presently be stated. To the bottom of the swinging half of the door I rivet a bar 21, which I term a "locking-bar," the ends of which extend beyond the side edges of the door and as the door is lowered engage the rounded ends of the guide-boards 10 and fall in behind them, thus locking the swinging half of the door closed. To the top central portion of the upper end of the door I secure a strap 22, which extends a short distance above the door. To the top of this strap I pivot one end of a lever 23, the

opposite end of which is pivoted to a stud 24. This stud is supported by a yoke 25, which consists of two straps 26 and 27. The strap 27 is pivotally secured at one end to the stud and at its opposite end to a stud 28, which is secured to the top of the corner angle-iron 3, which is extended a short distance above the hopper to receive this stud. The strap 26 is pivotally secured at one end to the opposite end of the stud 24 and is bent around against the strap 27 and secured to it in such a manner as to form a yoke. Upon the stud 24 in this yoke I mount revolubly a sheave-wheel 29, which is mounted on a track 30. This track is suitably supported by overhead brackets that are secured to an overhead beam that is supported by brackets, which arrangement is not illustrated. This track is an upwardly-inclined track at its forward end portion 35, where it terminates in a straight terminal end 36. The gate is thus suspended from the sheave and track, and the sheave is swingingly pivoted to it by means of the swinging yoke and the pivotal joint at the connection between the door and the strap 22.

The hopper is supported by a wheeled frame or carriage 37, which moves over tracks 38 and 39, the wheeled frame being provided with sheaves 40. The track 38 is supported at its ends by brackets 41, which depend from the beam 32^A, to which they are bolted at one end. Their opposite ends are secured to the track. The track 39 is secured to lugs 39^A, which are bolted to the foundation-timber 34. All three tracks extend from the normal position of the hopper, which is against the abutments 42 and 42^A, to a sufficient distance beyond them to allow it traveling movement enough to load while traveling the length of the tracks. The tracks are arranged parallel with one another. The four sheaves are rotatably mounted on cap-screws 43, which are threaded to cast lugs 44, that are riveted to bars 45, which are secured to the opposite sides of the hopper by rivets 46 and to bars 47, which extend across the front and under the rear ends of the hopper. The hopper-supporting wheeled frame comprises these bars 45 and 47, together with the cast lugs 44 and the four sheave-wheels 40, which together form a rolling supporting-frame for the hopper. A perspective view of this frame is shown in Fig. 7.

The abutments 42 and 42^A consist of vertical timbers framed to the foundation-timbers 34 and 34^A and braced against the return shock of the hopper by brackets 48 and 49, which are bolted to them and to the foundation-timbers. To the side of the abutment 42 opposite the hopper I secure a plate 50. The hopper is started on its bucket-loading reciprocal movement by an accelerating-lever 51, which is actuated by a bucket 52, moving over the tram-line, which I do not illustrate, except a fragment of a metal track 53, which is inserted in the tram-line opposite the hopper and becomes a part of the tram-line. This track-section of the tram-line is supported from the timber 52^A by curved brackets 54. The bucket comprises the bucket-body 52 and pendants 55 and the trolley 56, the sheaves 57 of which are mounted on the track.

The hopper-accelerator comprises the curved lever 51, which is pivotally connected to one end of a bar 58, that is slidably mounted in slots formed in the ends of two bars 59 and 59^A, which are bolted to the opposite sides of the hopper by bolts 60. These bars lie in the notches 19^B of the bars 19 and are provided with apertured lugs 60^A, which rest against the sides of the hopper and through which the bolts 60 pass. These bars project in front of the hopper to near the path of the pendant of the bucket. A depending arm 61 is secured to the sliding bar 58, and an arm 62 is secured to the pendant of the bucket and projects far enough therefrom to engage the depending arm on the sliding bar. The slotted ends of the side bars 59 are supported by brace-rods 63 and 64, which are riveted together and to the side bars. The accelerating-lever is a curved lever that extends from its pivotal end to the abutment-block 42, against which it normally rests, being held between it and the rear end of the adjacent side bar 59, against which the free end of the accelerating-lever bears. A weight 65 is attached to a rope or chain 66, that passes over a sheave 67 to the hopper and pulls the hopper back against the abutment-blocks after it has made an operative bucket-loading movement to the end of the tracks. The end of the side bar against which the end of the accelerating-lever bears is braced by a bracket 59^B, which extends from its end to the hopper, to both of which it is secured. The accelerating-lever is supported by a guide-bracket 68, in which a slot 69 is formed, through which the lever extends loosely.

To the side of the abutment 42^A facing the hopper I secure a cylinder 70, bolting it, through a flange 71, formed on the rear end of the cylinder, to the abutment by bolts 72. The front end of this cylinder is bell-shaped and is open, and the cylinder is provided with a straight bore. In the rear end of the cylinder a pipe 73 is threaded, which extends through the abutment-block, and petcock 74 is connected to its end by a coupling 74^A. To the bottom side of the cylinder a pipe 75 is threaded, and a petcock 76 is connected to it by a coupling 76^A. These petcocks are used to vary or regulate the pressure that may be formed in the cylinder by the rush of the oncoming piston. To the side of the hopper I bolt a piston-rod 76^B, which is provided with flanged feet 77 at its rear end, that are bolted to the hopper by bolts 78. The free end of the piston-rod is provided with a piston-head 79, which is preferably provided with suit-

able packing-rings 80. This piston-head is adapted to fit closely but reciprocally in the bore of the cylinder. I secure a hood 81 over the top of the piston, which also extends over the top of the cylinder when the hopper is at its standing station. This hood is adapted to protect the piston-head from the fine ore and dust from the hopper. The hood is secured to the cylinder by angled clips 82, which are bolted to the cylinder by bolts 83 and also by a bracket 84, which is secured at one end to the hood and at its opposite end to the hopper. The piston and its hood consequently travel with the hopper, while the cylinder is stationary.

The operation of my improved air-cushioned automatic bucket-loader is as follows: The hopper and accelerating-rod stand normally against the abutment, as shown in Fig. 1, with the piston in the cylinder, against or close to the bottom of the cylinder, and with the free point of the accelerating-lever wedged or confined closely between the hopper and plate 50 on the abutment 42. The bucket then comes along the line, moving in the direction of the arrow, and enters on the track, and its arm engages the arm of the sliding bar, moving the sliding bar through its supporting-bars and pulling the accelerating-lever after it, the point of which is wedged between the bar of the hopper and the abutment 42, which acts as a fulcrum. The bar moves very gradually at first and pushes the hopper along with a gradual accelerating speed as the curved accelerating-lever rolls along the bar at the side of the hopper until the sliding bar and the accelerating-lever have reached the end of their stroke, when the hopper is moving at substantially the same speed as the bucket is when the hopper is pushed along its tracks, rolling on its sheaves directly by the moving bucket, which while it was moving the accelerating-lever moved itself directly in front of the hopper, with its bucket-body directly under the discharge-chute of the hopper. The hopper is then carried along its tracks by the bucket, and when the sheave-wheel of the door reaches the upward-inclined track it runs up it and lifts the door, and the swinging half of the door swings outward the instant it is raised high enough to swing out past the side guide-boards of the chute, allowing the ore in the hopper to commence to discharge gradually, and as the door is raised fully by the sheaves entering on the straight portion of the inclined track and is held open the entire contents of the hopper discharges from the hopper into the bucket. The bucket then reaches the end of the tracks, and the arm of the bucket is released by a downward-inclined depression in the track the bucket is running on, (which depression I do not illustrate,) which lowers its arm below the arm of the sliding bar. Any other suitable means may, however, be employed to free the bucket's arm from the sliding bar. The weight 65 at the end of the rope 66 then starts the hopper back, and its speed increases as it nears the abutments, and the door closes as the door-sheave runs down the inclined track. The free end of the accelerator strikes the abutment 42 as the hopper nears the abutments, and it rolls on its bar and draws the sliding bar back to its normal standing position, ready for another bucket. Meanwhile, as the hopper approaches the abutments with considerable speed, which is gradually accelerated by the weight, the piston enters the open-mouthed cylinder and compresses the air therein as it plunges into it, thus forming an air-cushion that effectually and gradually cushions the hopper and brings it to a stop without a shock or concussion of the piston-head against the bottom of the cylinder. The petcocks may be set to permit the air compressed in the cylinder to escape gradually and allow the piston to settle against or close to the bottom of the cylinder and the hopper to move against or close to the free end of the accelerator. When another bucket comes along the operation is repeated.

My invention is simple, durable, thoroughly practical, and very effectually cushions the hopper.

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

1. An air-cushioning device for automatic bucket-loading for aerial wire-rope tramways comprising a reciprocally-moving hopper adapted to be moved in one direction of its movement by a moving bucket, a piston secured to said hopper and a fixed air-cushioning cylinder arranged to receive said piston on the return stroke of said hopper's reciprocal movement, substantially as described.

2. An air-cushioning device for automatic bucket-loading, the combination with the bucket and reciprocating hopper, of a piston secured to said hopper and a fixed air-cushioning cylinder arranged in the path of said piston and adapted to receive said piston on the return stroke of said hopper's reciprocal movement, substantially as described.

3. In an air-cushioning device for automatic bucket-loaders, the combination of the tracks, the abutments, the hopper mounted on said tracks, the piston secured to said hopper and the cylinder fixed to said abutments, and arranged to receive said piston, substantially as described.

4. The combination in an automatic bucket-loader, of the tracks, the frame and sheaves mounted on said tracks, the hopper mounted on said frame, the abutment, the bucket and the accelerating mechanism with the piston secured to said hopper and a fixed cylinder arranged to receive said piston, substantially as described.

5. The combination with the foundation-

timbers, and the tracks of the sheave-supported frame mounted on said tracks, the hopper mounted on said frame, bucket-actuated means for moving the hopper while loading, means for returning the hopper to its normal position, and an air-buffer for retarding the hopper on its return, substantially as described.

6. The combination with the foundation-timbers, the tracks, the sheaves mounted on said tracks, the frame supporting said sheaves and the hopper supported by said frame with an abutment secured to said foundation-timbers, a cylinder secured to said abutment having an open end and a piston secured to said hopper arranged to enter and compress air in said cylinder during the reciprocal movement of said hopper on said tracks, substantially as described.

7. The combination of an automatic bucket-loading hopper operatively supported to reciprocate a predetermined distance, a fixed air-cushioning cylinder at the end of said hopper's reciprocal stroke and a piston reciprocating with said hopper and adapted to enter said cylinder and cushion the reciprocal movement of said hopper, substantially as described.

8. The combination in an automatic bucket-loader of the tracks, the wheeled hopper reciprocally mounted on said tracks, an air receiving and cushioning cylinder fixed at the end of the reciprocal movement of said hopper, means connected with said cylinder for regulating the air-pressure within said cylinder and a piston reciprocable with said hopper and adapted to enter said cylinder at the end of said hopper's reciprocal stroke, substantially as described.

9. The combination of the bucket and the wheeled hopper having a discharge-aperture and reciprocally mounted, an upwardly-inclined track, a sheave mounted on said track, a door connected to said sheave and arranged to control said discharge-aperture, means connected with said bucket and said hopper for connecting said hopper and bucket together and for moving said hopper to cause said sheave and inclined track to open said door, with a piston reciprocating with said hopper and a fixed air-cushioning cylinder arranged to receive said piston at the end of said hopper's reciprocating movement, substantially as described.

10. In an automatic bucket-loader, the combination with the bucket and the reciprocally-mounted hopper, provided with a discharge-gate, bars projecting from said hopper, a bar slidingly mounted in said bars, a projection on said sliding bar, an abutment at the side of said hopper, a curved lever pivoted at one end to said sliding bar, having its opposite end resting normally between said hopper and said abutment, an arm on said bucket adapted to engage the arm on said sliding bar, and an air-buffer for retarding the hopper on its return, substantially as described.

11. In an air-cushion for an automatic bucket-loader, the combination with the movable bucket and the reciprocating hopper, of the sliding bar provided with a projecting arm adapted to be engaged and disengaged by the bucket, the accelerating-lever, the abutments and the air-cushioning cylinder and piston arranged to cushion the reciprocal movement of said hopper, substantially as described.

12. In an air-cushion for automatic bucket-loaders, the combination of the foundation-timbers, the reciprocal hopper and the abutments, of an air-cushioning cylinder secured to one of said abutments and having its rear end closed, and its front end open and outwardly flaring, suitable valve-controlled outlets in said cylinder, and a piston carried by said hopper arranged and adapted to enter said cylinder and to compress air therein, at the end of said hopper's reciprocal stroke and a hood projecting from said hopper over said piston, substantially as described.

13. In an air-cushioning device for automatic bucket-loaders, the combination of the reciprocating hopper, the hopper starting and accelerating device, the bucket and the vertically-sliding and outwardly-swinging door operatively arranged, means for engaging said bucket with said hopper and to gradually start and accelerate said hopper and convey it a predetermined distance with said bucket, with a piston carried by said hopper, a fixed air-cushioning cylinder secured at the end of said hopper's reciprocal movement and arranged to receive said piston, and a protecting-hood extending from said hopper over said piston, substantially as described.

14. In an air-cushioning device for automatic bucket-loaders, the combination with the hopper, of the abutments, the cylinder provided with the flanged end arranged to be bolted to said abutment, the curved, open opposite end, the petcocks in the bottom and rear ends of said cylinder, with a piston carried by said hopper and arranged to reciprocate in said cylinder, and having its outer end rounded, substantially as described.

15. In an air-cushioning device for automatic bucket-loaders, the combination of the foundation-timbers, the clips secured to said timbers, the tracks secured to said clips, the wheeled frame mounted on said tracks, the hopper supported by said wheeled frame, the door-controlled discharge-chute in said hopper, means including an inclined track for raising said door, the bucket, the accelerating-lever, the abutment, the cushioning-cylinder secured to said abutment, the piston carried by said hopper, and the hood, substantially as described.

16. In an air-cushioning device for automatic bucket-loaders, a reciprocating hopper,

a moving bucket adapted to operate said hopper in one direction of its movement, a weight for operating said hopper in the opposite direction of its movement, a piston carried by said hopper, and a fixed air-cushioning cylinder arranged and adapted to receive said piston and cushion said hopper at the end of its reciprocal bucket-loading movement, substantially as described.

17. In an air-cushioning device for automatic bucket-loaders, the combination with the bucket and a reciprocally-mounted hopper arranged to be operated by said bucket to load the same, of a piston carried by said hopper and a fixed air-cushioning cylinder arranged to receive said piston and cushion the reciprocal stroke of said hopper, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

BYRON C. RIBLET.

Witnesses:

G. SARGENT ELLIOTT,

BESSIE THOMPSON.