

(No Model.)

4 Sheets—Sheet 1.

C. T. FINLAYSON.  
WIRE TRAMWAY AND LOADER.

No. 434,900.

Patented Aug. 19, 1890.

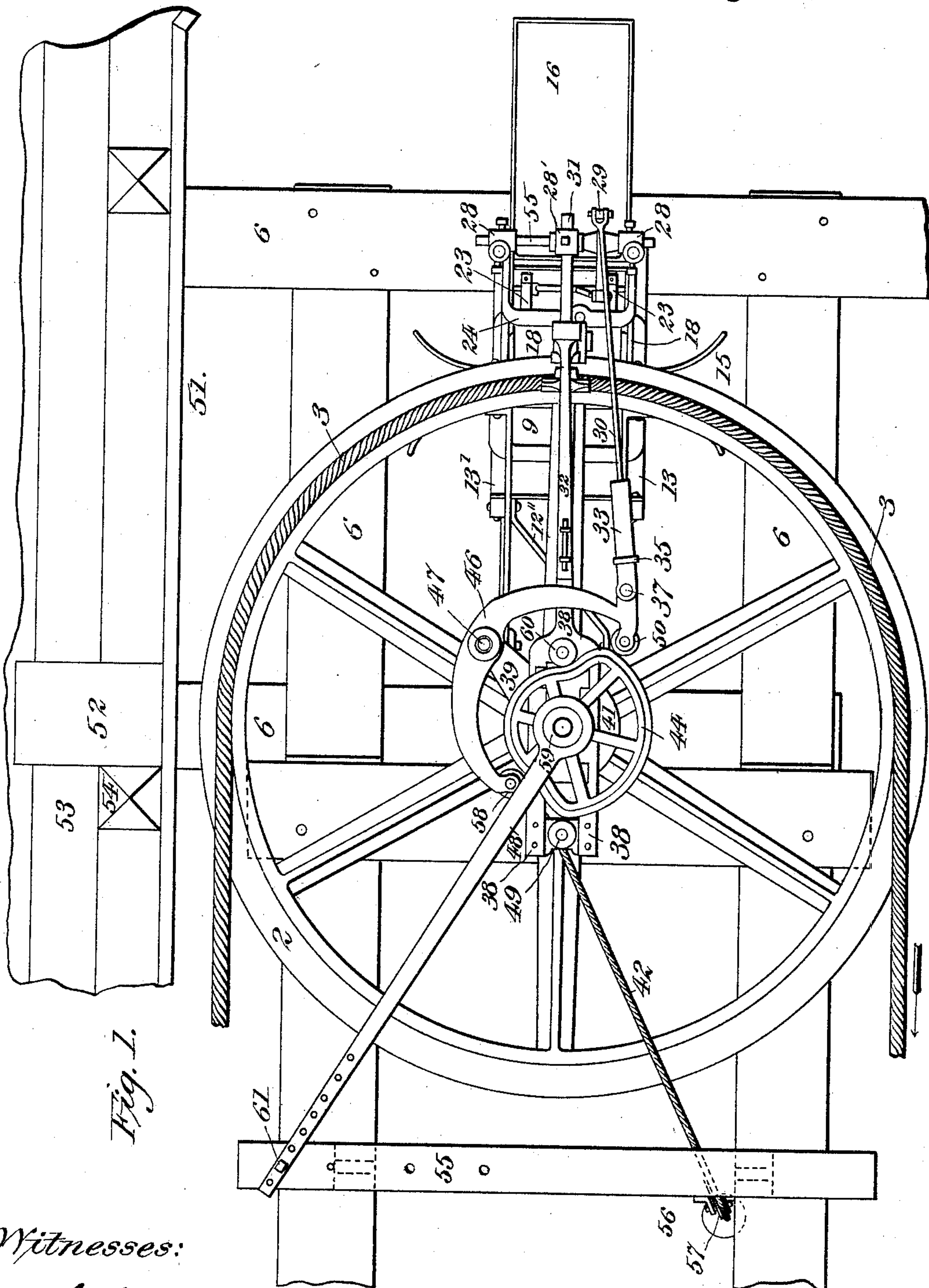


Fig. 1.

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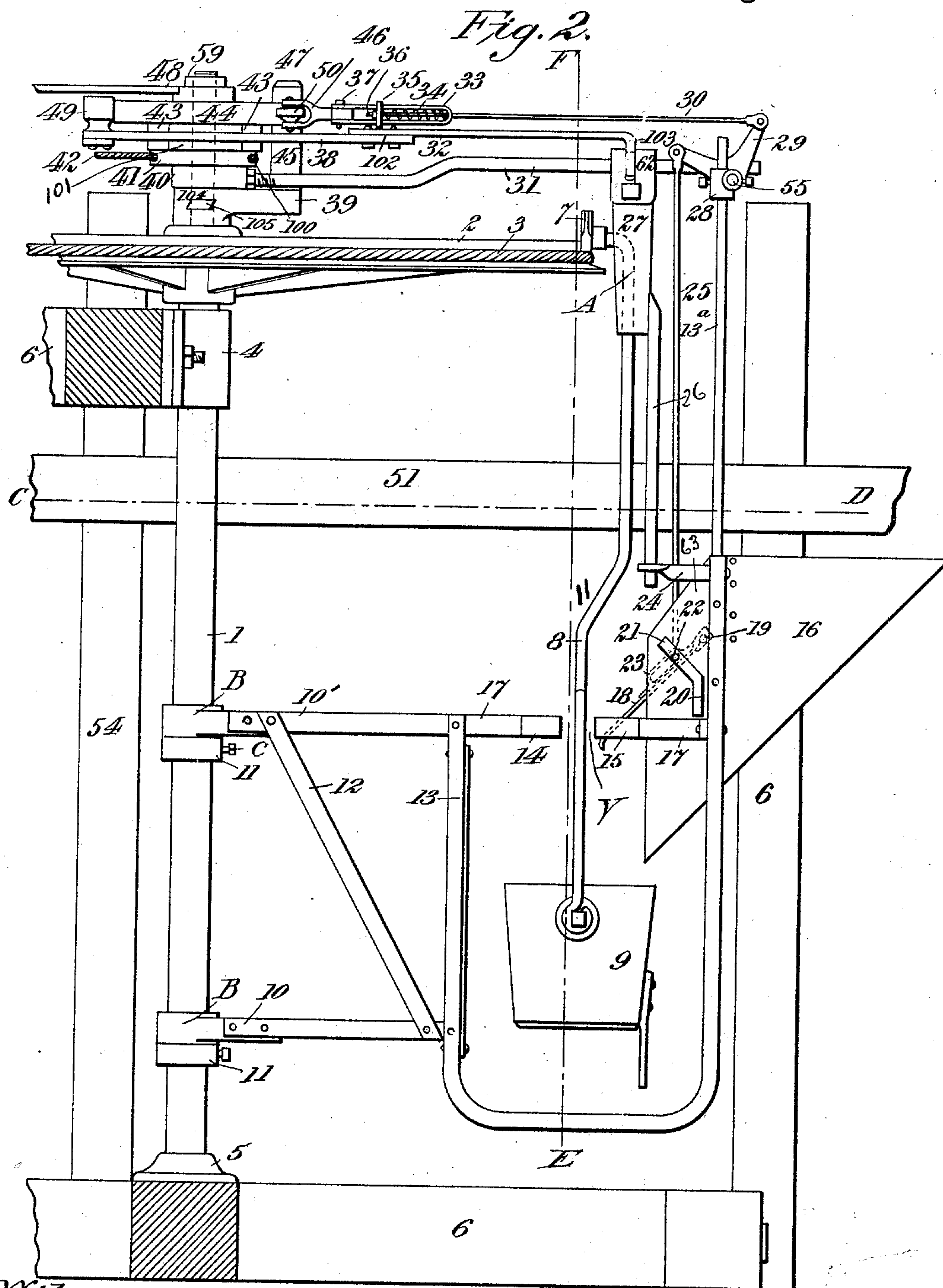
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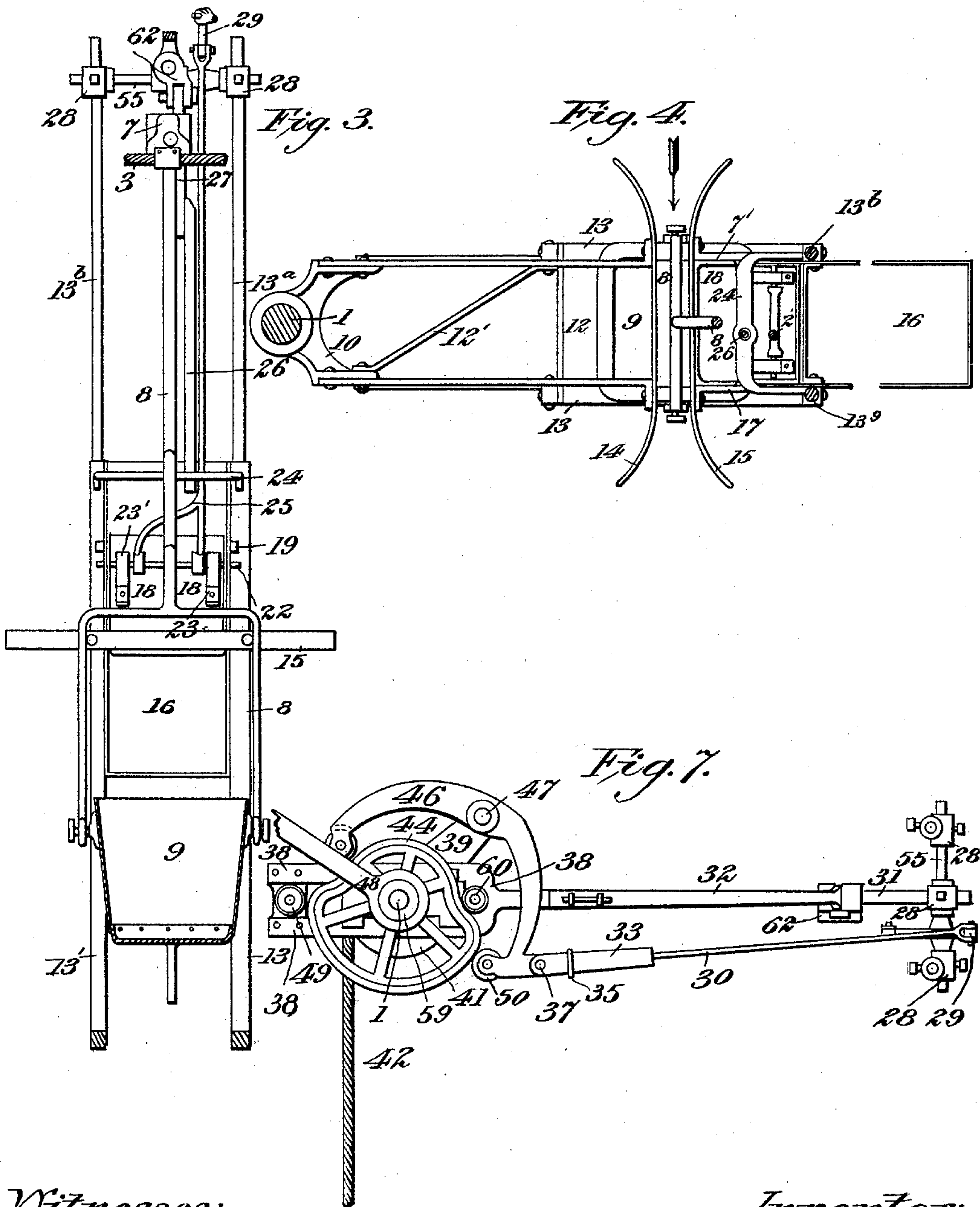
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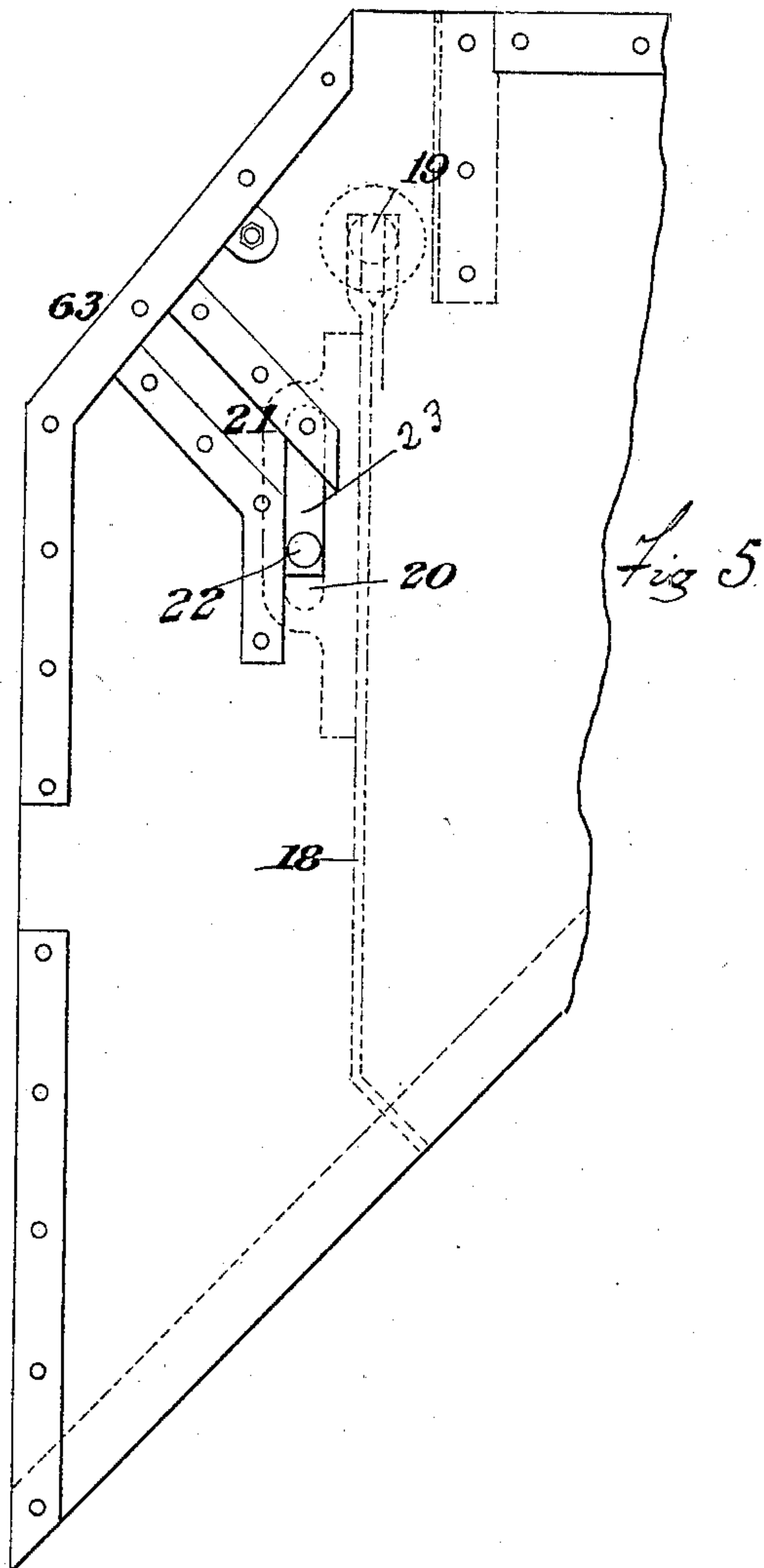
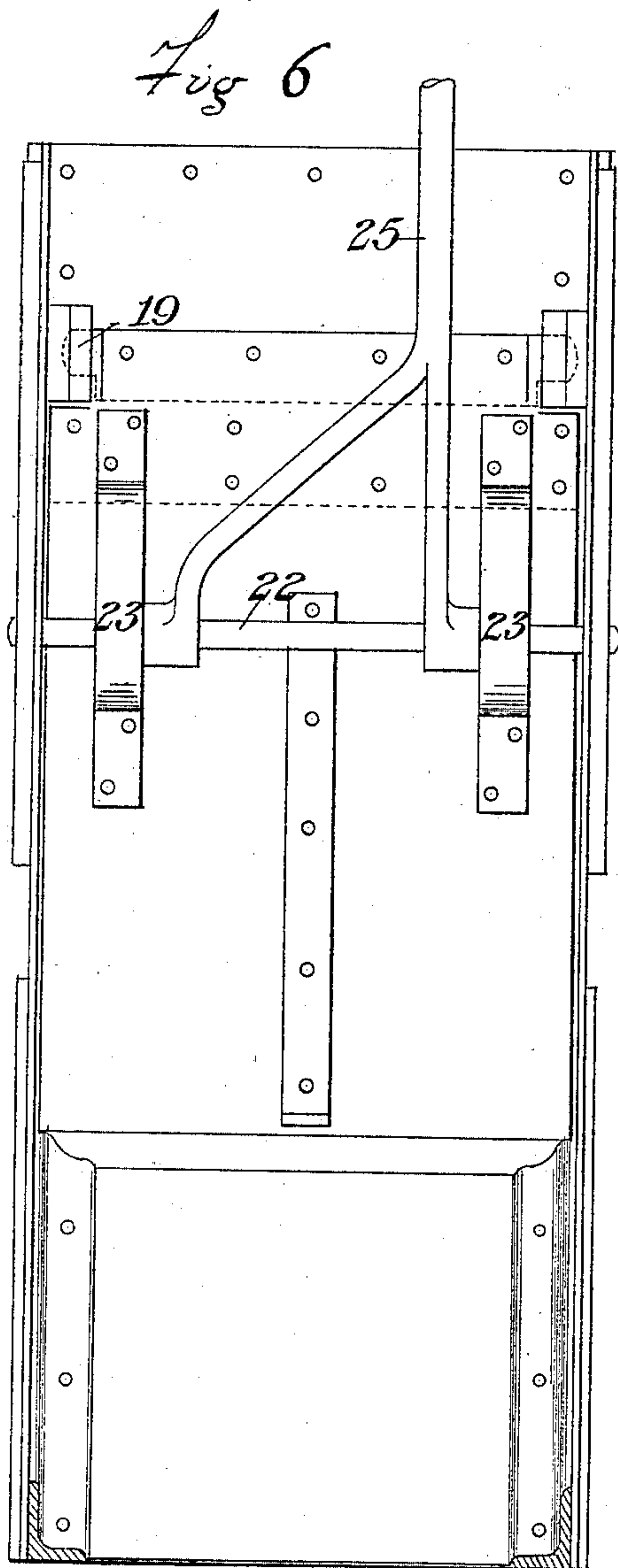
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# UNITED STATES PATENT OFFICE.

CHRISTOPHER T. FINLAYSON, OF DENVER, COLORADO.

## WIRE TRAMWAY AND LOADER.

SPECIFICATION forming part of Letters Patent No. 434,900, dated August 19, 1890.

Application filed October 1, 1889. Serial No. 325,732. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTOPHER T. FINLAYSON, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Wire Tramways and 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 letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to endless wire-rope tramways of the class typified by the Huson tramway, and more especially to an improved form and construction of automatic loading devices therefor, a part of the invention being also adapted for use as an automatic unloading or bucket-dumping apparatus.

Its objects are to furnish an automatic bucket for loading and unloading machines of positive reliable action, adapted to hold and control the bucket being loaded, that the same may not swing out of the path of the one being delivered thereto by the loader, in which the loader is so constructed that it may readily and easily be opened at the proper moment, and as readily as well as securely closed and locked; a loading mechanism in which provision is made against undue strain of any of the parts, in order that durability and freedom from breakage or disarrangement of the parts may be secured, a mechanism comparatively simple in construction and reliable in operation, to which ends the invention consists in the features, construction, combinations, and arrangements more particularly hereinafter described and claimed.

A distinctive feature of the invention is that the loader or the bucket that transfers the material from the bin to the bucket that is to transport it is permanently secured in a suitably-trussed frame pivoted and adapted to swing upon the shaft of the terminal wheel. An arm pendent in such frame lies normally in the path of the bail of the bucket, so as to be picked up thereby and the frame and loader carried with the bucket. The door of the loader is pivoted at its top, so as to open

by the weight of the load, but is held securely locked by a transverse locking-rod adapted to slide vertically and extending at its end into slots akin to slots of bayonet-joints on either side of a projecting part of the body of the loader, the pin being lifted therefrom by a rod connected to a bell-crank lever connected in turn to a rod extending toward the axis of the frame, near which it forks, the ends taking against a fixed cam, by which it is reciprocated, the horizontal reciprocation by the bell-crank lever being converted into a vertical reciprocation of the rod attached to the locking pin or bolt. The depending arm acting as the pick-up arm is arranged to slide in a line diametrically to the axis of the frame and to swing in the circumferential direction. The bail of the bucket as it comes around and reaches the loading-point engages this depending arm and carries the entire loading mechanism the proper distance—say a quadrant—when an arm adapted to reciprocate horizontally and actuated by the fixed cam referred to pushes the pendent arm so that it and the bucket-bail are disengaged, the latter traveling on the rope unimpeded to the dump, whereupon a weight attached to a rope passing over a wheel at the axis of the frame swings the latter around to its shutting-point, with the loader in position to be again filled from the bin.

This will be better understood by reference to the drawings, wherein is clearly illustrated an embodiment of my invention, and wherein Figure 1 is a top or plan view of the improved loader. Fig. 2 is a side view or elevation thereof. Fig. 3 is a horizontal section on the line E F, Fig. 2, looking toward the right. Fig. 4 is a vertical section on the line C D, Fig. 2, looking down. Fig. 5 is a side view of a part of the loading-bucket. Fig. 6 is a front view of Fig. 5. Fig. 7 is a top view in detail of the tripping mechanism secured to the top of the main shaft.

In the views, the reference-numeral 16 indicates the loader or loading-bucket rigidly secured in a frame pivoted on the main shaft 1 of the main wheel 2, around which passes the cable 3 of the tramway. This frame is composed of the U-shaped frames 13 13, whose outer limbs are somewhat upwardly extended and secured to the sides of the loader 16,



brace-rods or framing-pieces 13<sup>a</sup> and 13<sup>b</sup>, extending thence upwardly and secured to the upper horizontal piece 35 of the frame by means of suitable connections 28. Below the

5 U-shaped frames are supported by one or more sets of braces from hubs or bearing-boxes B, rotatably seated on the shaft 1 and supported in position thereon by collars 11, secured thereto by set screws or bolts C.

10 Herein two sets of braces 10 10 are shown as extending outwardly to the U-shaped frames 13, they being further braced by such stays 12 as may be deemed necessary. The top of the U-shaped frame is nearly closed by

15 the inwardly-extending framing-pieces 17, which support at their inner ends guide-plates 14 15, between which is left the slot through which may pass the bucket-bail as the bucket passes through the U-shaped

20 space. The number of outwardly-projecting brace-arms and of stays is to be determined by the weight of the load to be carried, the essential thing being that they be of such number that the loader may be firmly sup-

25 ported and space left where the bucket 8 may pass through the frame. The bucket 9 (one only being herein shown as typical of any desired number that may be used) is sup-

30 ported from the cable 3 by a bail or pendent 8, secured to the cable by a clip 7, which has the outward top bend A, enabling its body to pass the sheaves in its course, and the inward bend 11 bringing the bucket beneath the point of suspension or clip 7.

35 It is well known there is often difficulty in moving an upward-sliding gate, owing to the weight of the material against the gate of the loader and the consequent friction. Hence the gate herein shown is a pivoted one, so ar-

40 ranged that when locked the weight of the material to be unloaded shall itself immediately open the gate sufficiently for a free discharge, to which ends the loader is constructed as follows: The gate thereof is on the inner

45 side or side facing the main wheel, and its floor slopes down thereto, the general contour of the side elevation being that of a right-angled triangle with a corner cut off, leaving thereat edges 63, Fig. 2, on either side at ob-

50 tuse angles to the face and top. The gate 18 sets back some distance within the sides of the loader, and is secured near or at its top by pivot 19. Upon its outer face are secured the slotted guideways 23, Figs. 2 and 5, within

55 which ways is adjustably secured the locking bar or rod 22, which projects beyond either edge of the gate and has a longitudinal movement within ways 23 relatively to the face of the gate. Extending inwardly from at or

60 about at a right angle to the edges 63 are slots 21 on either side, which, at the point where the gate is to be locked, connect with slots 20, parallel to the front edges of the loader and of a size to permit free movement of the lock-

65 ing rod or bar therein. It is evident then that if such bar or rod be lowered into the slots 20 the gate will swing into place and be

there held, the slots and the locking rod forming a lock akin to a bayonet-joint; but if the locking-bar be elevated it will open the gate 7 as it passes up the slots 21 out of the plane of slots 20, in which opening it will be aided by the weight of the material pressing against the gate.

To automatically raise the locking-bar for 75 the opening of the gate, devices as follows are brought into operation: 44 is a stationary cam supported upon the upper extremity of main shaft 1 which turns freely within the cam. This cam is secured in position and kept sta- 80 tionary by the use of an arm 48, rigidly secured to the cam at one extremity and to the framework at the opposite extremity as shown at 61. Upon the periphery of cam 44 takes the rollers 50, one on each end of an arm 46 of 85 somewhat irregular shape, yet approximating an arc of a circle. This arm 46 is pivoted at 47 and supported upon a standard 45, projecting from a horizontal arm 39, connected with the main shaft by means of a suitable collar 90 through which said shaft passes. Near one end of the curved arm 46 is pivoted at 37 one extremity of a rod 30 33, whose other end is pivoted to the outer end of a bell-crank lever 29. To the other end of this lever is pivoted 95 a rod 25, connected at its lower end to the transverse locking-bar 22, Figs. 2 and 6, such rod 25 preferably being forked at its lower end, as shown in Fig. 6, to grasp the bar at two points for greater certainty of movement. 100 It is evident from this that as the curved arm 46 is rotated partially around the cam in one direction, say from a "loading-hole" 52, Fig. 1, to its position shown in Fig. 1, the rod 30 33 will be projected outwardly, depressing the 105 farther end of the lever 29, and causing the inner end of said lever to raise rod 25 and the locking-bar 22, opening the gate, while on the return-movement the rod 25 will be retracted and the reverse series of operations take 110 place.

It might happen that the complete closure of this gate would sometimes be impeded by ore or material lumping and sticking to the bottom of the loading-bucket or by some for- 115 eign unyielding material getting or being placed in the path of the gate, which, if not provided for, might cause the breakage of some of the parts. To guard against danger of such breakage, the rod 30 33 should not be 120 made of one rigid piece, but of two spring-united parts 33 and 30, as shown in Fig. 2, the part 33 constituting a cage provided with a cross-head 35. One end of part 30 enters the outer extremity of the cage and passes through 125 the cross-head 35, after which a nut 36 is screwed upon said end of part 30. Within the cage and between the cross-head and the extremity of the cage through which part 30 enters, there is located a coiled spring 34, sur- 130 rounding part 30. The tension of the spring is regulated by turning the nut upon the end of part 35 and engaging the cross-head, as before described. This enables the rod 30 33 to



give and yield to abnormal pressure against the movement of any of its associated parts, preventing undue strain thereon.

It is now necessary to describe how an empty bucket 9 "picks up the loader," as it is termed, and carries the same with it from the loading-hole 52 until such bucket has received its load therefrom and the loader returned to its original position. It will be necessary to observe here that rod 31 is rigidly secured to the frame of the loader, being connected at one extremity with the main shaft by means of a collar 40, adapted to turn thereon, the outer extremity of said rod being made fast to the cross-bar 55, connecting the upright extensions 13<sup>a</sup> and 13<sup>b</sup> of the U-shaped frame. Rigidly secured to or formed integral with collar 40 and located above the same, is a sheave 41, over which passes the rope 42, having one extremity suitably secured to the periphery of the sheave or to the connecting parts, as shown at 100, the opposite extremity of the rope being made fast to a suitable weight 56, the rope passing over a guide-pulley 57, suitably secured to the frame-work. Above sheave 41 and rigidly secured thereto or formed integral therewith is a guide-plate 101, having the vertical parts 43 43 projecting upward therefrom. Parts 43 are provided with slots cut in their sides for the reception of the arms of the sliding yoke 38, parts 43 acting as guides for said yoke, which is adjustably secured at 102 to a rod 32, which turns downward at 103, where it is rigidly secured to a cap 62, which slides easily upon the fixed rod 31. Rigidly secured to cap 62 and projecting downward therefrom is a plate or arm 27, of sufficient length and width to give a suitable bearing for the bucket-bail, as shown at A, while loading the bucket. Secured to plate 27 and extending downward therefrom is the rod 26, the lower extremity of which is loosely secured within an aperture formed in a yoke 24, made fast to the upright extensions of the U-shaped frame. The object of having rod 26 fit loosely within yoke 24 is to allow said rod the necessary movement when cap 62 with its connections slides on rod 31.

Yoke 38 is provided with two rollers or cams 49 and 60—one at each extremity of its slot. These cams engage the periphery of the stationary cam 44. By means of this connection, cap 62 with its connections is given a reciprocating movement upon rod 31. It must be here observed that collar 40, sheave 41, and guide-plate 101, being rigidly secured together, as before stated, are loosely mounted upon shaft 1, and move upon said shaft, but not with it. These parts form in effect one casting, to the lower reduced portion of which is adjustably secured the collar 104 by means of a set screw or bolt 105. Collar 104 is provided with the horizontally-projecting arm 39, provided with the upright extension 45, to the upper extremity of which is pivotally secured the arm 46, as before stated.

In describing the operation of my improved device, it must be understood that the bucket-bail is made fast to the cable, as shown at 7. Then as the bucket moves around the bail engages arm or plate 27 and carries it along, together with the loader 16 and all the connecting parts which move around shaft 1, until the roller-cams 50 of arm 46 reach the position on cam 44 shown in the drawings, when rod 30 is thrust outward, rod 25 raised, and the gate of the loader opened, as shown in Fig. 2, and the contents discharged into the bucket. As soon as the bucket is loaded, cams 60 and 49 of yoke 38, moving upon the periphery of the fixed cam 44, thrust the yoke, together with rod 32, cap 62, and plate 27, outward, thus disengaging said plate from the bucket-bail. The loader 16, together with the frame and all connecting parts, is now returned to the loading-hole 52 by means of rope 42 and its weight, the gravity of which is so regulated that it shall not offer too much resistance to the movement of the frame when acted upon by the bucket, but which shall at the same time be sufficient to return the frame and loader to the loading-hole as soon as plate 27 is released from the bucket-bail.

The combination and arrangement thus set out form a thoroughly reliable and efficient automatic loader for wire tramway buckets or carriers, and a similar pivoted frame may be used at the lower discharging end to carry the buckets over suitable bent arms or cams to cause their tipping and unloading.

Having thus described my invention, what I claim is—

1. In an endless-wire tramway, the combination, with the main wheel-shaft thereof and the cable passing therearound, of a loader, a frame supporting the loader pivoted upon the main shaft and adapted to be engaged and moved by a bail or pendant, and means, substantially as described, for opening the loader and disengaging it from the bucket bail or pendant, substantially as set forth.

2. The combination of the main drum 2, its shaft 1, a loader-frame pivoted and adapted to swing upon the shaft, a loader 16, suspended in such frame and having a pivoted gate, locking devices for such gate, and means for automatically operating such locking devices, substantially as set forth.

3. A loader having side slots 20 and 21, a pivoted gate, slotted guideways 23 in such gate, and a locking-bolt 22, moving in such guideways and taking in the side slots, substantially as set forth.

4. The combination of the main shaft 1, main wheel 2, the cam 44, pivoted lever 46, arm 30 connected thereto, bell-crank lever 29, arm 25 depending therefrom, and a loader 16, having a gate connected to arm 25, substantially as set forth.

5. The combination of a main wheel, a main shaft, a loader-frame pivoted thereon, an arm depending therefrom and normally



in the path of the bucket or carrier-bails, a cam 44, and a slotted arm 32 38, and suitable connection for disengaging such arm and the bails or pendants, substantially as set forth.

5 6. The combination of a main wheel, a main shaft 1, a loader-frame pivoted thereon carrying a loader, an arm 27, rod 26 depending therefrom and adapted to slide thereon, an arm 32, engaging therewith and having a slot-  
10 ted or yoke end 38, and a cam 44, moving such arm 32 38, substantially as set forth.

7. The combination of a main wheel, a main shaft therefor, a loader-frame pivoted upon the main shaft, a loader rigidly secured  
15 thereto, a cam 44, secured upon the shaft, pivoted lever 46, arm 30 33, secured thereto, crank-lever 29, arm 25, secured to the pivoted gate of the loader, and arm 32, having a slot-  
20 thereto and arranged to normally lie in the

path of the bails or pendants of the buckets or carriers, substantially as set forth.

8. The combination of a main wheel, a main shaft, a loader-frame pivoted thereon and having an opening for the passage there- 25 through of the buckets, an arm in such frame arranged to normally lie in the paths of the bails or pendants of the buckets and be caught thereby, and a cam stationary on the main shaft and an arm reciprocated by such cam 30 to cause the disengagement of the first arm and the bails of the buckets or carriers, substantially as described.

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

CHRISTOPHER T. FINLAYSON.

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