(No Model.) 8 Sheets—Sheet 1.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

No. 475,293. Patented May 24, 1892.

Fig. 3

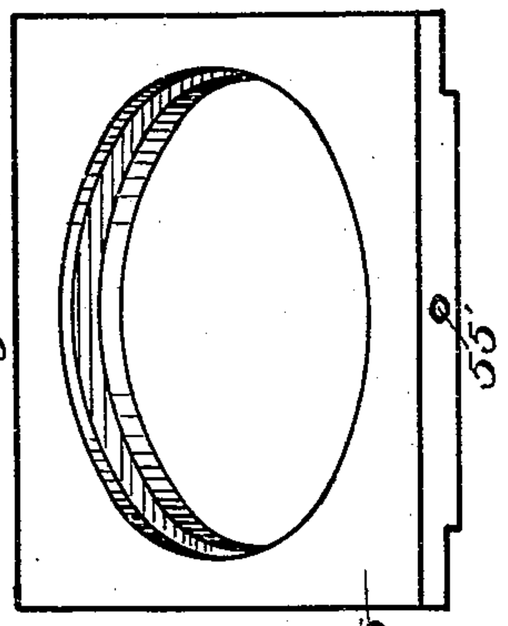


Fig. 2

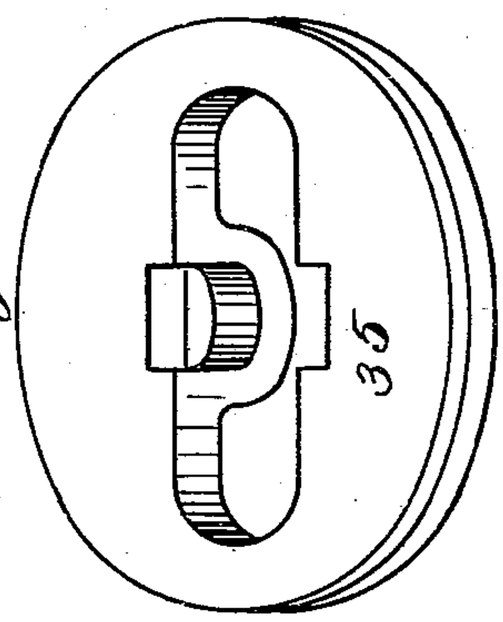
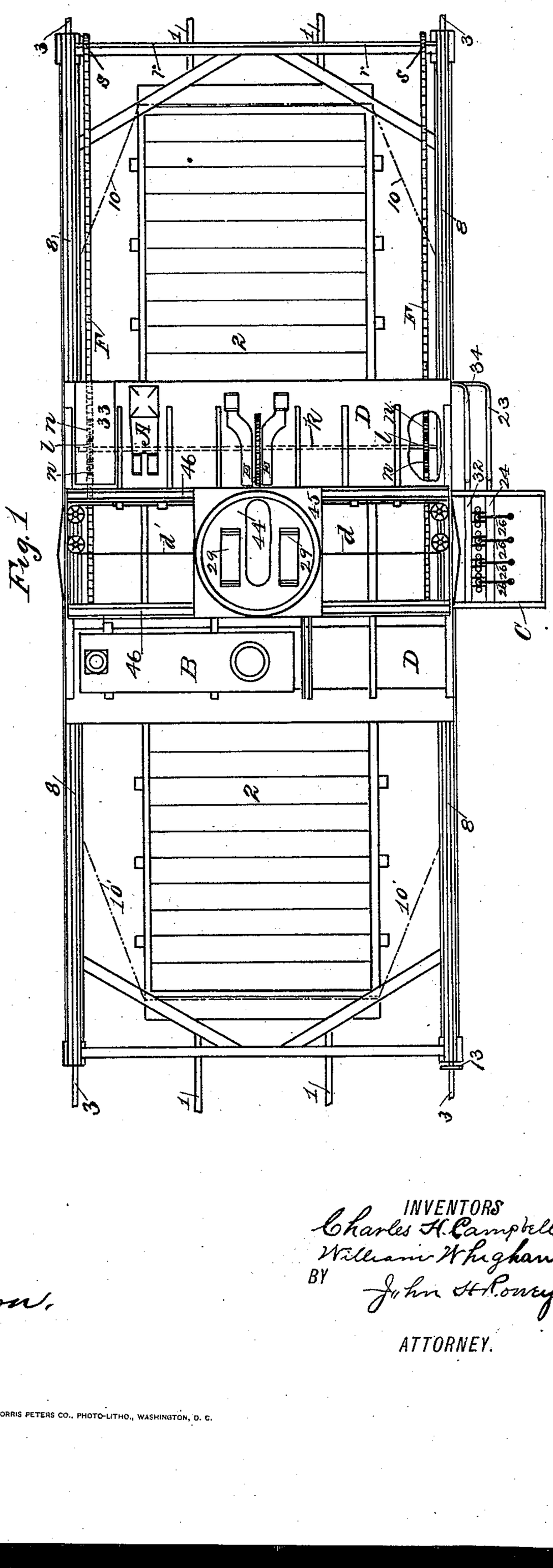


Fig. 1



WITNESSES:
Walter Reese.
H. E. Harrison.

INVENTORS
Charles H. Campbell
William Whigham
BY John H. Lowry
ATTORNEY.

(No Model.) 8 Sheets—Sheet 2.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

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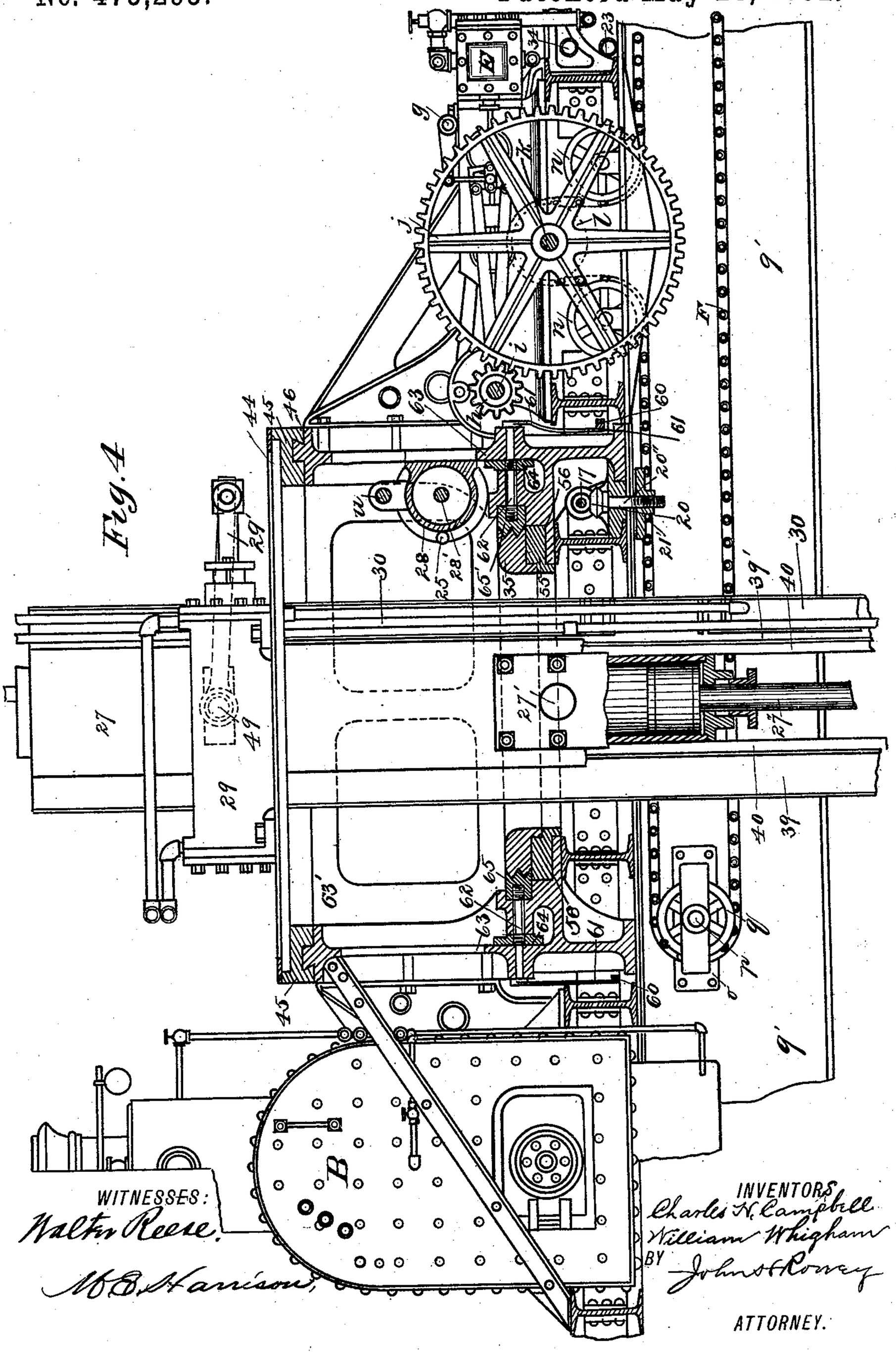
Fig. 4



(No Model.) 8 Sheets—Sheet 3.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

No. 475,293. Patented May 24, 1892.

Fig. 5

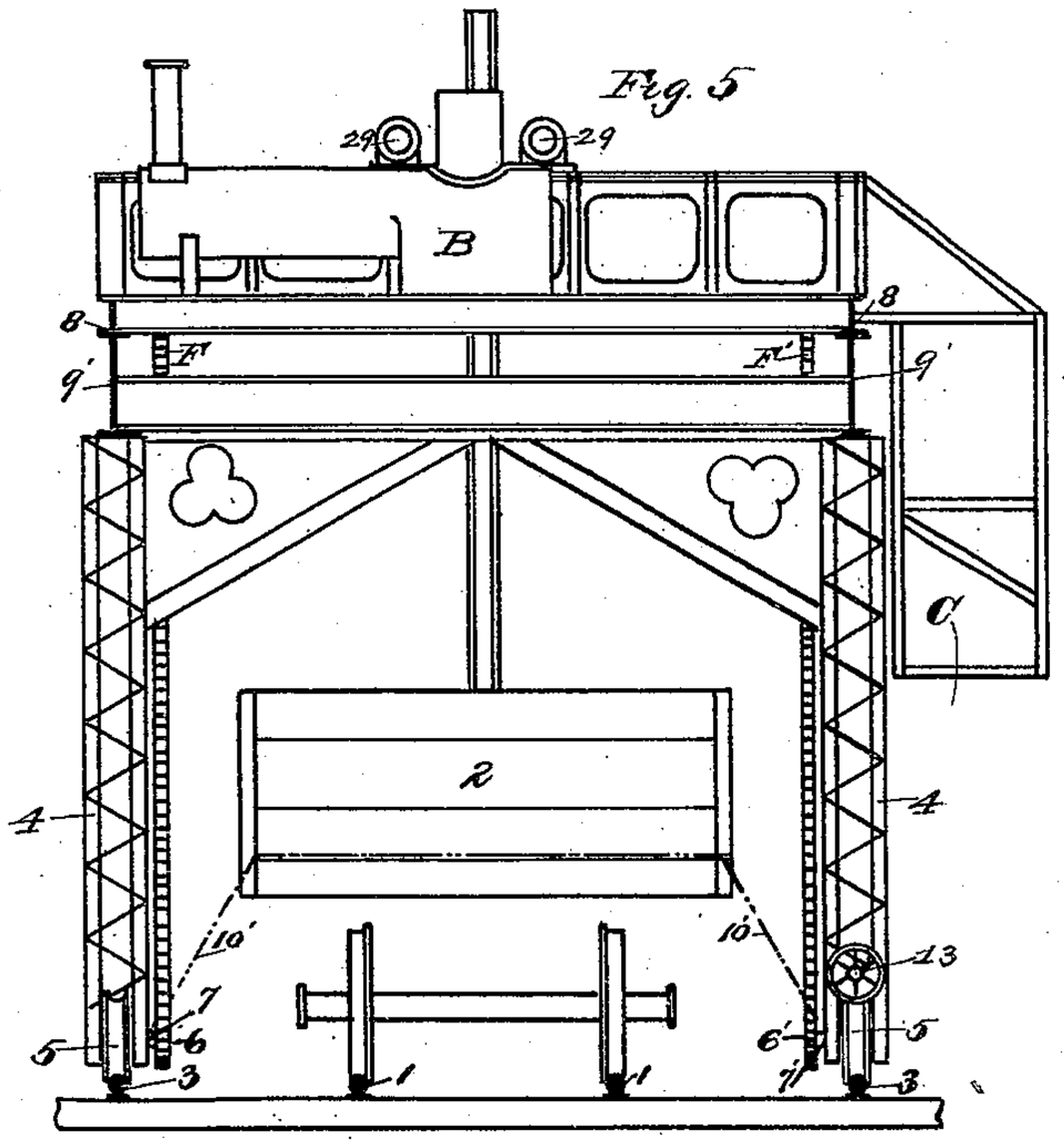
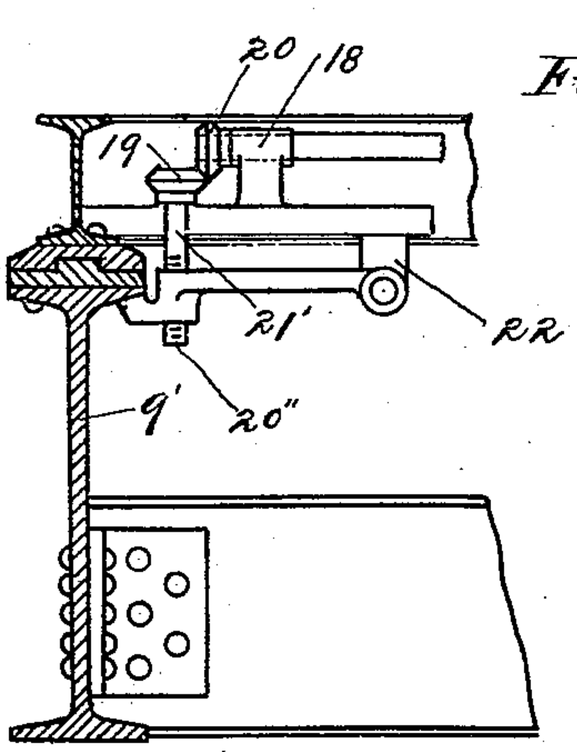
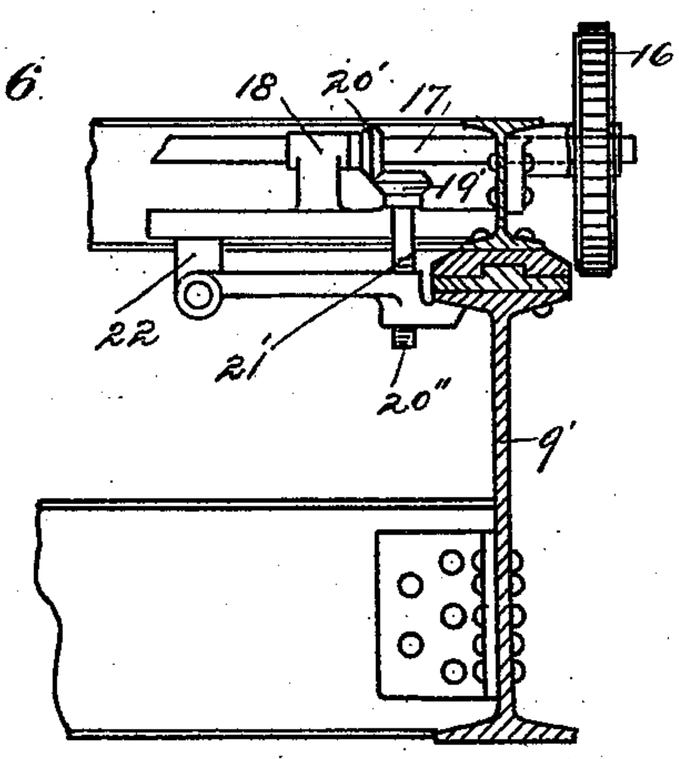


Fig. 6.





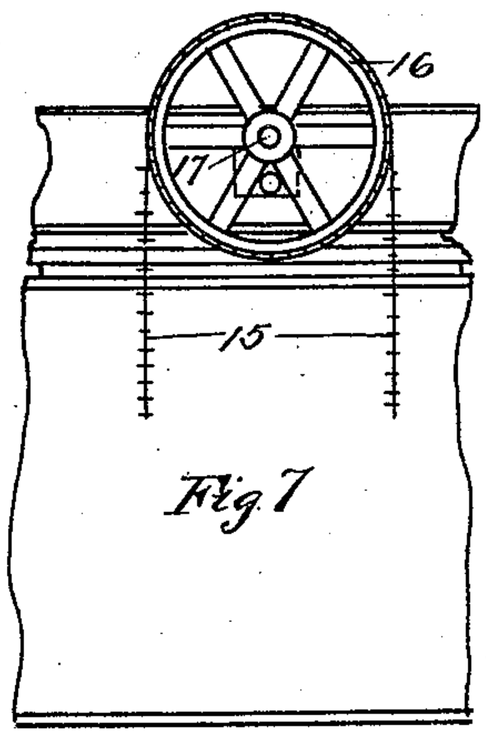


Fig. 7

WITNESSES:

Walter Reese

M. E. Harrison,

INVENTORS

Charles H. Campbell

William Whigham

BY

Johnston & Conway

ATTORNEY.

(No Model.) 8 Sheets—Sheet 4.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

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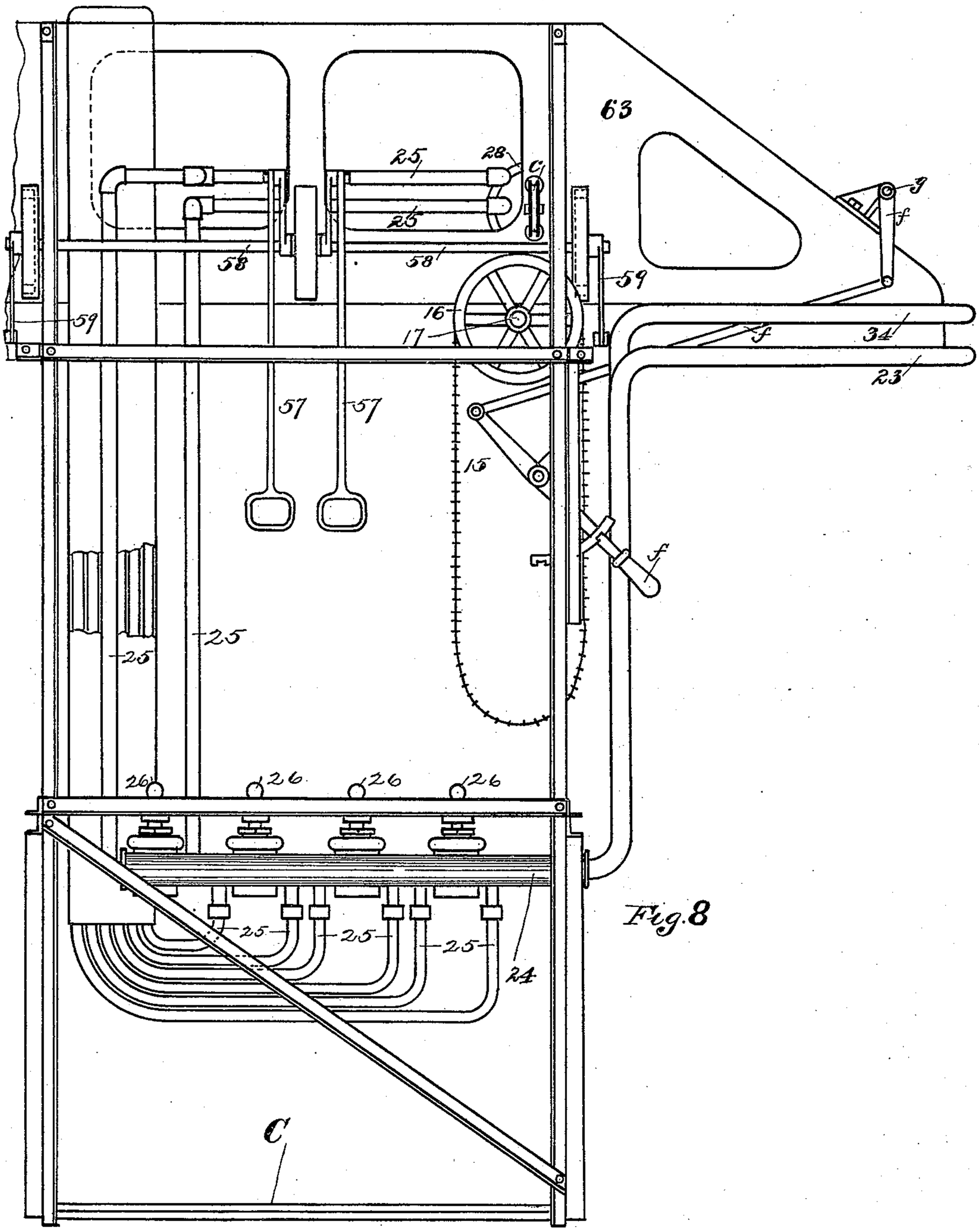


Fig. 8

WITNESSES:
Walter Reese.
M. E. Harrison.

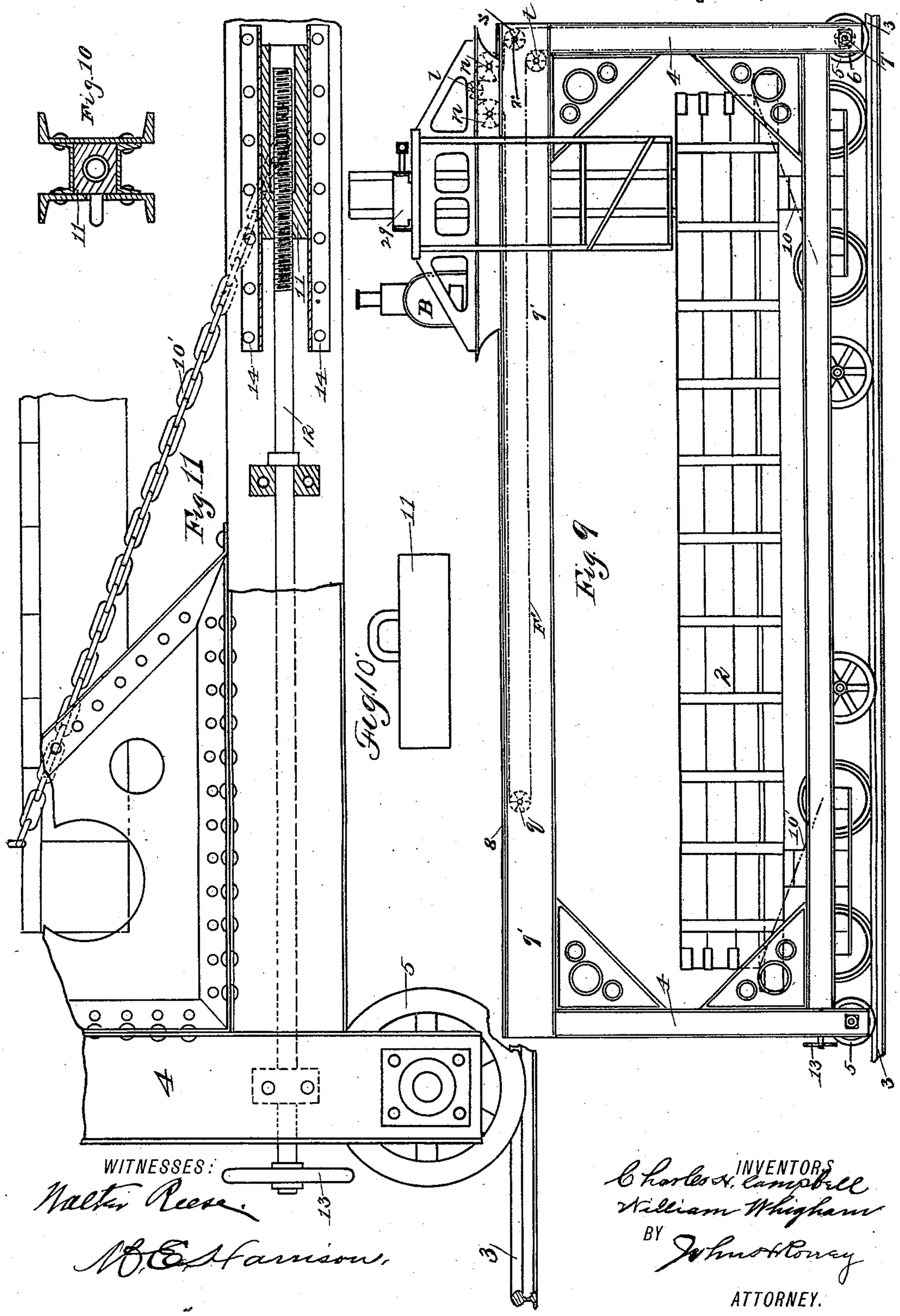
INVENTORS
Charles H. Campbell
William Whigham
BY
Johnston Rowley
ATTORNEY.

(No Model.) 8 Sheets—Sheet 5.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

No. 475,293. Patented May 24, 1892.



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APPARATUS FOR LOADING CARS.

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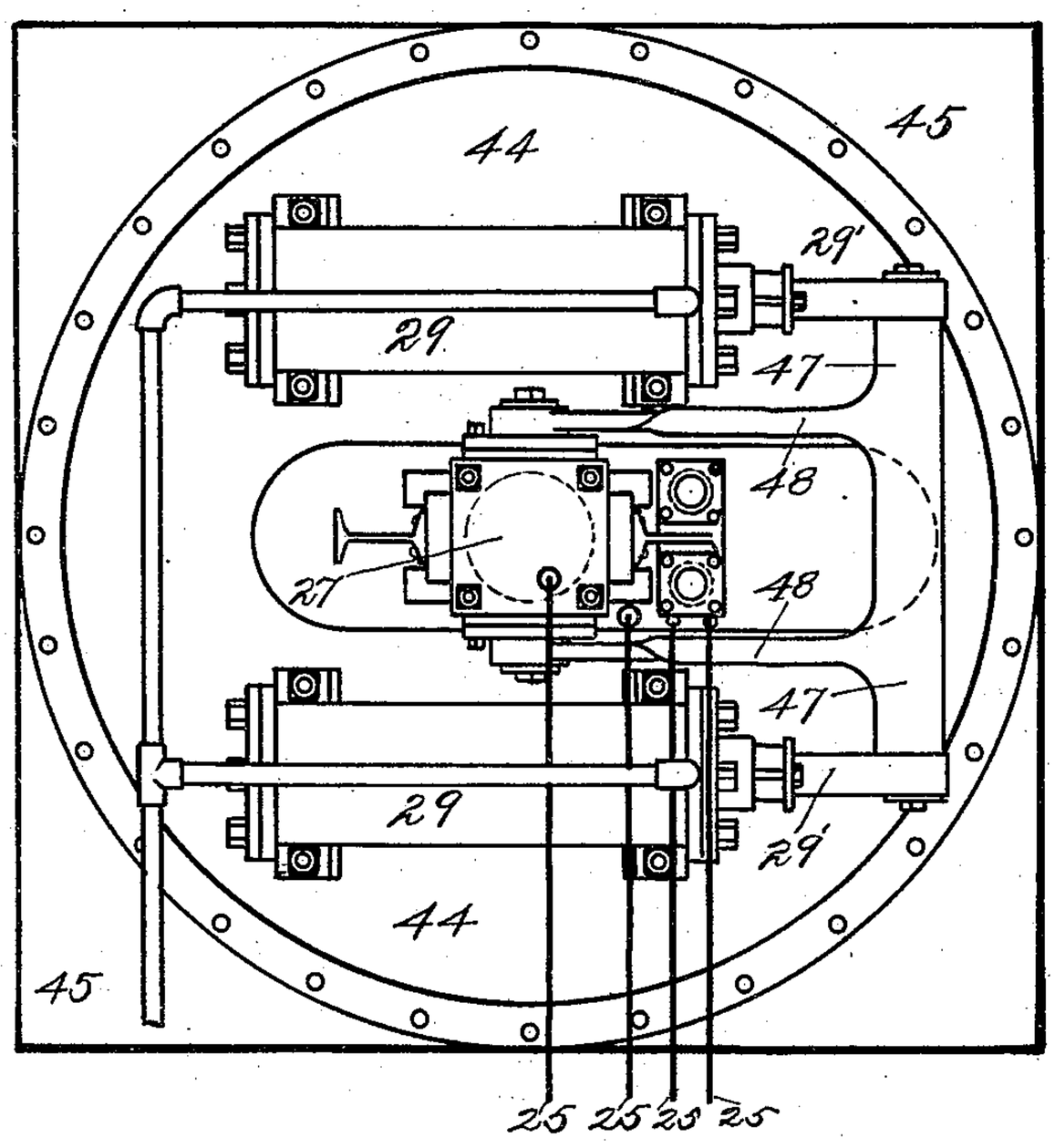
Fig 12.



WITNESSES:

Walter Reese

M. C. Harrison.

INVENTORS

Charles H. Campbell

William Whigham.

BY Johnston & Roney

ATTORNEY.

(No Model.) 8 Sheets—Sheet 7.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

No. 475,293. Patented May 24, 1892.

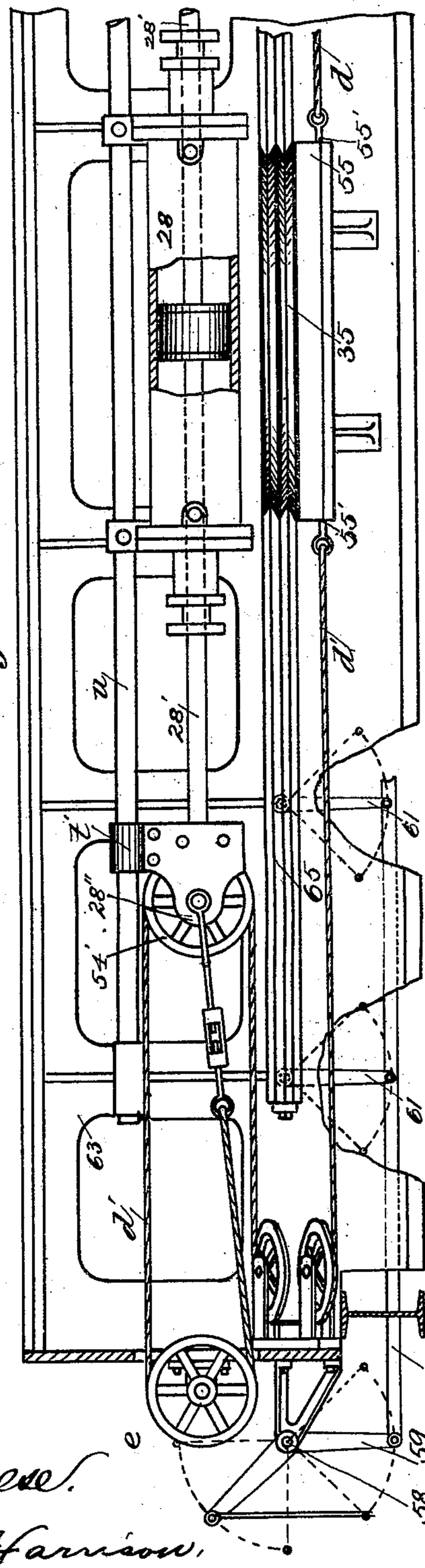


Fig. 13

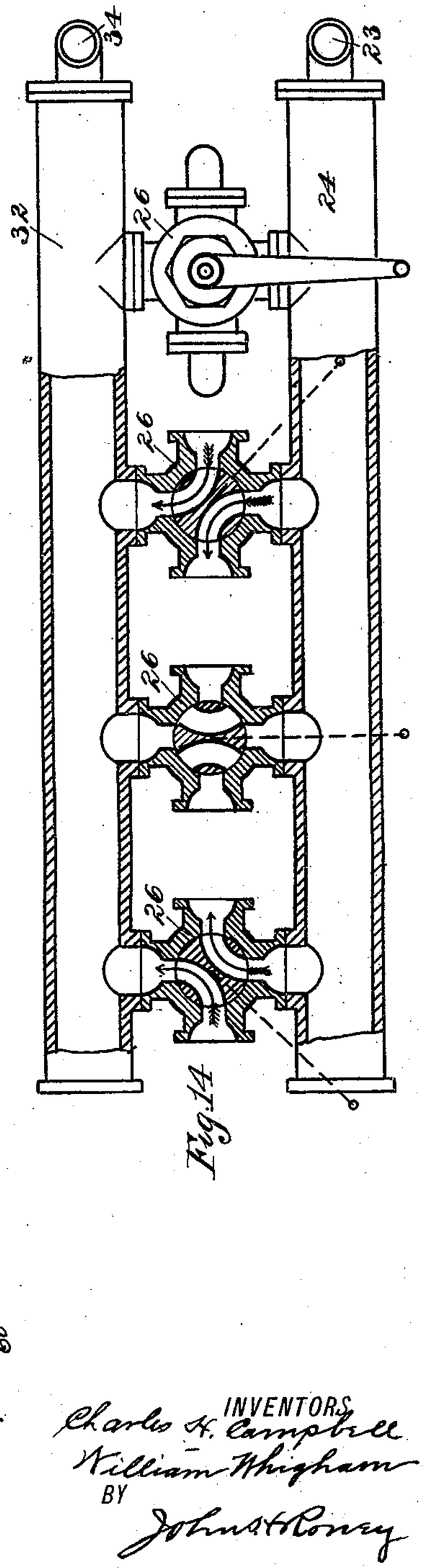


Fig. 14

WITNESSES:
Walter Reese.
M. E. Harrison.

INVENTORS,
Charles H. Campbell
William Whigham
BY
Johnston Conroy
ATTORNEY.

(No Model.) 8 Sheets—Sheet 8.

C. H. CAMPBELL & W. WHIGHAM.

APPARATUS FOR LOADING CARS.

No. 475,293. Patented May 24, 1892.

Fig. 15

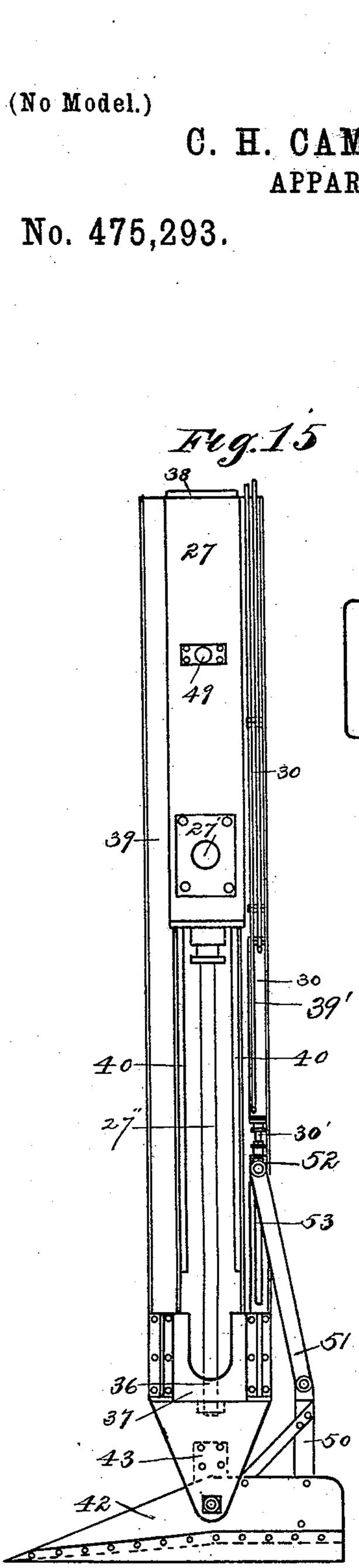


Fig. 16

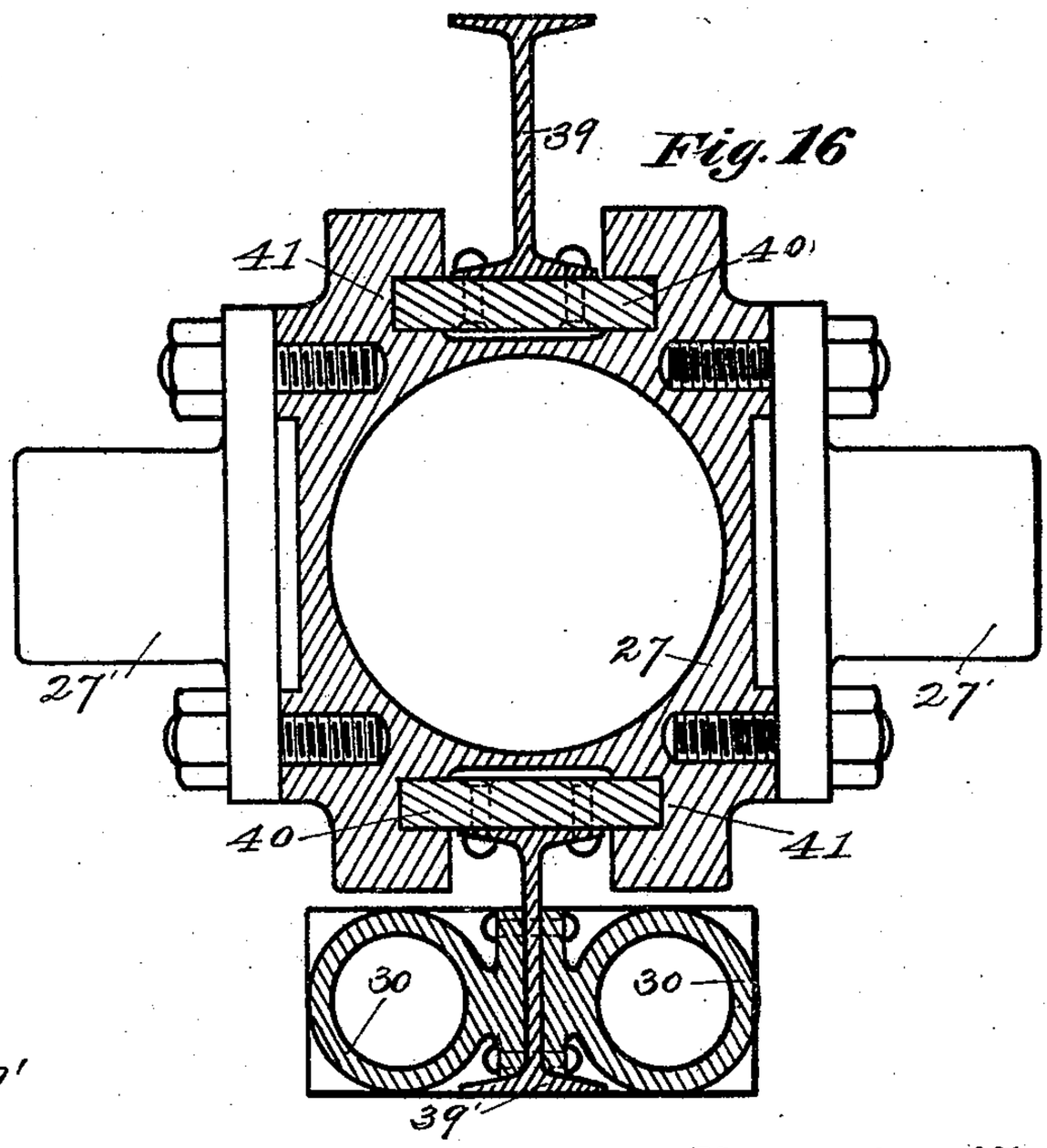


Fig. 17

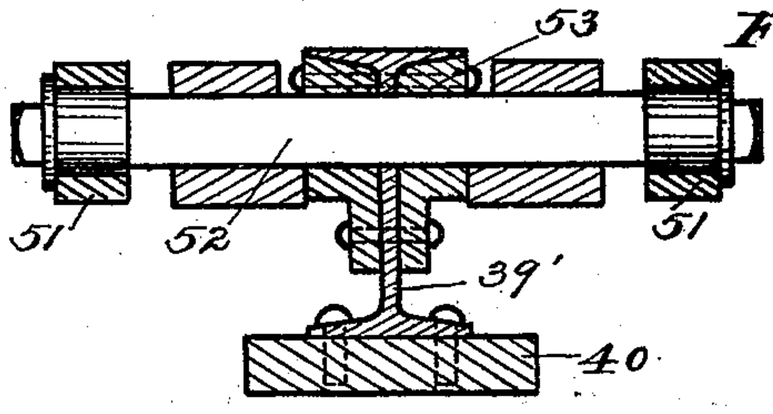
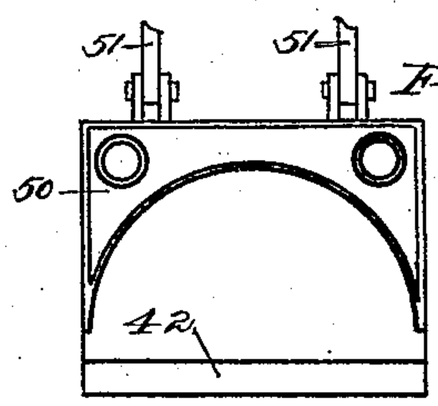


Fig 18



WITNESSES:

Victor Reese

M. E. Harrison

INVENTORS

Charles H. Campbell

William Whigham

BY Johnston & Coney

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES HENDERSON CAMPBELL, OF NEW YORK, N. Y., AND WILLIAM WHIGHAM, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR LOADING CARS.

SPECIFICATION forming part of Letters Patent No. 475,293, dated May 24, 1892.

Application filed February 18, 1891. Serial No. 382,007. (No model.)

To all whom it may concern:

Be it known that we, CHARLES HENDERSON CAMPBELL, of New York, N. Y., and WILLIAM WHIGHAM, of Pittsburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Apparatus for Unloading Cars; and we do hereby 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 pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a plan of the apparatus. Fig. 2 is a perspective of the annular ring which supports the elevating devices. Fig. 3 is a perspective view of a plate upon which said ring is carried. Fig. 4 is an elevation, partly in section, of cylinder-carriage. Fig. 5 is an end elevation of same and of car-conveying truck and car secured thereto. Fig. 6 is an enlarged detail of the clutching device. Fig. 7 is an enlarged end view of wheel for operating the same. Fig. 8 is an elevation of the operating-platform, showing flexible connections between various cylinders and pressure and exhaust main, also elevation of clutch and operating-levers. Fig. 9 is a side elevation of the apparatus. Fig. 10 is an end section of block 11. Fig. 10′ is a side view of said block. Fig. 11 is a view of one end of truck, partly in section, showing the block which operates in slides therein and chain connected with said block. Fig. 12 is a plan of the central portion of the cylinder-carriage, showing loading-cylinders, elevating and agitating cylinders, and the flexible connections of the same with four-way cocks or valves. Fig. 13 is an enlarged side elevation of opposite side, partly in section, of one end of said cylinder-carriage. Fig. 14 is a plan of four-way cocks, partly in section. Fig. 15 is an elevation of the elevating device and shovel. Fig. 16 is a sectional view of elevating device through line *y y* of Fig. 15, showing sectional views of cylinders 27 and cylinders 30 30, secured upon one side of said elevating device. Fig. 17 is an enlarged section through cross-head of agitating-cylinder of said elevating device. Fig. 18 is a rear end view of the shovel.

Our invention relates to an apparatus for unloading ore-cars. Said apparatus consists of a cylinder-carringe mounted on ways elevated above the car to be unloaded, a truck carrying said carriage and ways and mounted upon a track inclosing the ordinary railway-track. Mounted and suitably secured upon said carriage is a number of hydraulic cylinders, as follows: a vertical cylinder, which we have designated the "elevating-cylinder," one or more cylinders, which we designate as "loading-cylinders," secured on said carriage above the plane of said elevating-cylinder, the piston rod or rods of which are connected, as hereinafter described, with said elevating-cylinder near the top of the same, a cylinder or cylinders secured upon a vertically-movable mast, which is adapted to be elevated and lowered by the piston-rod of said elevating-cylinder and to swing or oscillate upon the trunnions of said cylinder, the piston rod or rods of the cylinder or cylinders secured upon the vertically-movable mast being connected to the rear end of a shovel pivotally attached to the lower end of said mast, and minor details of construction hereinafter described.

We will now more specifically describe our invention, reference being had to the accompanying drawings, forming part hereof, in which like letters and figures indicate like parts wherever they occur.

1 is a railway. 2 is a car thereon.

3 is a railway, the rails of which are parallel with and inclose the rails of the ordinary track 1.

4 is a car-conveying truck supported on wheels 5 and adapted to be moved on track 3.

6 and 6′ are sprocket-gears on shaft 7 and 7′, respectively, which are journaled in suitable bearings in the upright supports for main slides 8 on beams 9′.

10 and 10′ are chains which pass around each end of said car, respectively, the end of chain 10 being securely fastened to the inside lower frame of said truck at one end thereof, the ends of chain 10′ being respectively fastened to the inside lower frame of said truck and to the block 11 at the opposite

side of said truck. Said block 11 is provided with a socket in the center thereof longitudinally, the same having a thread for the reception of the correspondingly-threaded inner end of shaft 12, which is supported in suitable bearings on the side of the frame of said truck, the outer end of said shaft being provided with the hand-wheel 13, by rotating which in the proper direction the block 11 is caused to move backward and forward horizontally in the slide 14, formed between the lower beams of said truck, thereby tightening the chain 10′ around one end of said car and causing the same to move in the same direction as said block until the slack of chain 10 at the opposite end of said car is taken up, thereby securely fastening said truck and car together preparatory to operating the unloading device, as hereinafter described.

15 is a chain to operate the wheel 16, secured upon the shaft 17, which extends transversely said device and is suitably journaled in bearings 18. Keyed on said shaft at either side of said machine and at almost the extreme ends thereof, respectively, are the beveled gears 20 and 20′, which mesh with the beveled gears 19 and 19′ on the upper ends, respectively, of the threaded shafts 20″ and 20″. The lower ends of said vertical threaded shafts 20″ and 20″ respectively operate in a correspondingly-threaded orifice through one end of the shoe or brakes 21′ 21′, the opposite end of said brakes, respectively, being pivoted upon the brackets 22 22, whereby the motion communicated to said shaft 17 by operating said wheel 16 by means of the chain thereon is transmitted through the beveled gears to the threaded shafts which operate in the free ends of said brakes, whereby the same may be drawn tightly against or released from **I**-beams 9′, accordingly as said wheel may be rotated, thereby rigidly clamping said device upon or releasing it from said **I**-beams.

A is an ordinary hydraulic pump suitably connected with the boiler B. When the requisite pressure is obtained in any ordinary and usual manner, the water is carried under pressure through the pipe 23 to the operating-platform C, which is secured to the trolley or cylinder-carriage D, resting and adapted to travel on slides 8, which are supported upon the **I**-beams 9′, and then into the pressure-main 24.

25 25 25 25 are pipes provided with four-way valves or cocks 26 26 26 26, and connect the pressure and exhaust mains with, respectively, the hydraulic cylinder 27, the operation of which vertically elevates the load, as hereinafter described, and a traversing cylinder 28, the operation of which, as hereinafter described, enables the device to move laterally in either direction. The loading-cylinder 29 29, the operation of which is hereinafter described, oscillates the vertically-movable mast, operating in grooves on the side of said cylinder 27, and advances the shovel which is connected therewith in a horizontal direction, and the discharge-cylinders 30 30, the operation of which, as hereinafter described, depresses and elevates the rear end of the shovel, whereby the contents thereof are discharged from either end thereof, the function of said cylinders when operated during the loading operation being to agitate the rear end of said shovel in such manner as to enable the front or nose of the same to get under lumps and irregular portions of the contents of the car. The pressure being conveyed from the pump through pipe 23 into the pressure main 24 is applied to the cylinders by operating the four-way valve in one direction, and by reversing the same pressure is alternately applied to and exhausted from either end of said cylinder. As explanatory of this, referring to the position of the lever which operates said valves or cocks, as shown in Fig. 1, the pressure in said cylinders is static when said levers are in said position. Given that the pipe on the left of the outer cock communicates or connects with the upper end of cylinder 27 by throwing the outer lever operating the same toward the left, pressure is applied to the top of said cylinder, and the lower end of the same exhausts through the pipe at the right of said lever into the exhaust-main 32 and thence into the tank 33 through pipe 34. Said main cylinder 27 is provided with trunnions 27′, journaled in the sides of the annular ring 35, and is also provided with a long piston-rod 27″, operating therein, the lower end of which is rigidly secured in the orifice 36 in a solid block 37 of steel or iron, which forms the lower end of the vertically-movable mast 38, the sides of which are formed of **I**-beams 39 39′, the interior sides thereof being provided with slides 40 40, bolted or otherwise suitably secured thereon, said slides being adapted to operate in grooves 41 41 on the exterior sides of said cylinder 27, whereby said elevating device and the shovel 42, which is pivotally connected with lower ends of the plates 43 43, secured to the lower end of said vertically-movable mast 38, may be lifted vertically by operating said piston 27″.

29 and 29 are cylinders rigidly secured upon the annular plate 44, which rests and is adapted to rotate upon slides 45, which move laterally in either direction on ways 46 46, as hereinafter described. Said cylinders are respectively provided with piston-rods 29′ 29′, the outer ends of which are suitably connected by the rod or strap 47. 48 and 48 are arms suitably secured to said rod or strap 47 near the ends thereof, the inner ends of said arms, respectively, being pivoted upon the trunnions 49 and 49 on either side of said main or elevating cylinder 27 at a point above and in line where said cylinder 27 is trunnioned in the said annular ring 35, whereby when said pistons 29′ 29′ are actuated in either direction said vertically-movable mast 38 and the main or elevating cylinder 27 are caused to oscillate or swing on said trunnions 27′ backward and forward, accordingly as said piston-rods are moved. To the rear end

of said shovel 42 and suitably secured thereon is the bracket 50, to the upper end of which is pivotally connected the links 51 51, the upper end of said links being respectively similarly connected with the cross-head 52 on the piston-rods 30′ 30′, which operate in the discharge-cylinder 30 30, said cylinders 30 30 being suitably secured to the I-beam 39′ on either side thereof, which forms one side of the vertically-movable mast 38.

53 is a slot in the lower part of the I-beam 39′ longitudinally the same, in which said cross-head 52 is adapted to move. The function of said cylinders is, first, to elevate and depress the rear end of said shovel, whereby the contents of the same may be discharged from either end; second, to hold the rear of said shovel in a stationary position at any required angle while said shovel is forced into the contents of the car, and, third, to agitate the rear end of said shovel rapidly while the same is being forced forward into the ore or other substance, thereby giving said shovel a vibrating or searching motion and enabling the front or nose of the same to get under or avoid lumps or irregularities in whatever is being unloaded. The operation of said cylinder is as follows: Power or pressure being admitted alternately to either end of said cylinders, by operating the proper four-way valve or cock, as heretofore described, the piston-rods operating therein are actuated vertically in either direction, thereby depressing and elevating alternately the rear end of said shovel, and by actuating said pistons rapidly vibrates the same simultaneously it is forced forward by the operation of the cylinders 29 29, as heretofore described.

28 is a cylinder, and 28′ is a long piston-rod extending through both ends thereof and adapted to operate therein. The ends, respectively, of said piston-rod are provided with cross-heads 28″ 28″, the top of which are provided with slides *t′*, adapted to operate on the rod *u*, which is suitably fastened to the sides of upright supports 63. Said cross-heads 28″ 28″ are respectively provided with sheaves 54′ 54′, over which respectively pass wire ropes *d* and *d′*, respectively, the inner ends of which respectively are fastened to the cross-heads 28″ 28″, respectively.

c c are sheaves suitably secured to plates 63′, which are secured to upright supports 63 63 at either end of said device, over which said ropes *d* and *d′* pass, whereby the platform or carriage 55 (to either end of which at point 55′ 55′ the ends, respectively, of said ropes, respectively, are attached) is enabled to travel at greater speed and a greater distance than said cross-heads 28″ 28″, and said movable carriage 55 is caused to move laterally in either direction on stationary slides 56 56, extending transversely said machine, accordingly as either end of said piston-rod is operated, carrying, also, in the same direction the slides 45 45, on which is mounted the annular plate 44 and the cylinders thereon.

57 57 are levers, and 58 58 are shafts connected therewith, the outer ends of said shafts, respectively, having secured thereto levers 59 and 59, which are connected at their outer ends, respectively, with the rods 60 and 60, respectively. Said rods 60 and 60 are respectively connected with the lower end of levers 61 61, respectively, and are adapted to operate the same. The upper ends of said levers 61 61 are secured, respectively, upon the outer end of the shafts 62 62, which are respectively supported in suitable bearings formed in the sides of the upright supports 63 63. Said shafts 62 62 are respectively provided with right and left handed threads, said right-hand threads being formed on said shafts about intermediate their length and adapted to operate in suitably-threaded bearings 64 64, bolted upon the inner sides of said upright supports 63 63. The inner ends of said shafts or bolts, respectively, are provided with left-handed threads which operate in a number of correspondingly-threaded orifices in one side the bars 65 and 65′, respectively, which extend transversely the width of the trolley D and on either side said annular ring 35, the other or inner sides of said bars, respectively, having V-shaped grooves therein adapted, when forced against the correspondingly-shaped rim of said annular ring 35 by the operation of the levers 57 57, the shafts 62 62, and intermediate mechanism, to clutch and hold the same stationary during the loading operation. When it is desirable to turn said shovel around, by releasing the clutch on either side of said annular ring 35 accordingly as it is desirable to turn said shovel, and by the application of power to cylinder 28, as heretofore described, said annular ring is caused to rotate in a direction toward the point in which the same is held in clutch, turning therewith the cylinder 27, trunnioned therein, and the elevating device and shovel connected therewith, also the annular plate 45, whereon the cylinders 29 29 are mounted.

E is an ordinary reversing-engine, which is suitably supported on the platform cylinder-carriage D. By operating the levers *f f*, connected with the shaft *g* from the platform C, said engine is actuated as in the case of an ordinary locomotive. Power is transmitted to the spur-gear *h*, secured on the power-shaft *i*, and thence to the large spur-gears *j*, keyed on the shaft *k*, which extends transversely the width of platform D and is suitably journaled in the sides of said platform. At either end, respectively, of said shaft *k* are keyed the sprocket-wheels *l l*.

F F are endless chains, which pass along sprocket-wheels 6 and 6′, respectively, upon shafts 7 and 7′, respectively, at the bottom of said conveying-truck 4. Said chains are fed, respectively, under idlers *n n* on either side of said sprocket-wheels *l* and *l*, respectively.

Bolted on I-beams 9′ 9′ are brackets *o*, which carry bearings for the shafts *p p* on either side of said device, secured on which are sprocket-wheels *q q*. *r* is a shaft at one end of said truck, at the top thereof, having secured to either end thereof the idlers *s s′*, the top of said idlers being in line with the bottom of idlers *n* and *n* for the purpose of giving direction to said chains.

t t are idlers secured in brackets somewhat below the plane of idlers *n n* and secured upon either side said truck near the top thereof.

We deem it unnecessary to further describe the operation of our device, it being only necessary to repeat the action hereinbefore described to unload said car or cars. It may be, however, necessary to change the relative position of the unloading device and the car during said operation, which may be done as follows:

By clamping the cylinder-carriage, as heretofore described, and the engine being in operation, it is obvious that the truck 4 will be drawn along its track, and, providing the car is secured thereto, as heretofore described, it will move in unison therewith and may be carried to and from the place of unloading.

It is obvious that the connections between the pressure and exhaust mains and the various cylinders must be flexible, so as to enable said device to move laterally and in a circle, as hereinbefore described. It is also obvious that the ways whereon said cylinder-carriage is mounted may be permanently located at any point independent of said car-conveying truck and said truck dispensed with and the cars to be unloaded conveyed to and from said cylinder-carriage or unloader in any suitable manner and the contents removed therefrom, as heretofore described, and dumped on endless belt or belts or the ordinary car-conveyers and from thence discharged into the proper bins therefor.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus for unloading cars, substantially as described, the combination of a vertically-movable lever, means to oscillate the same, a shovel pivotally connected with the lower end of said lever, and means to depress and elevate the rear end of said shovel, whereby said shovel may be given a vibrating or searching motion when being forced into earth or other substances, as set forth.

2. In an apparatus for unloading cars, substantially as described, the combination of a vertically-movable lever, means to rotate the same, a shovel pivotally connected with said lever, and means to depress and elevate the rear end of said shovel, whereby said shovel is given a vibrating motion and turned, substantially as and for the purpose herein set forth.

3. In an apparatus for unloading cars, substantially as described, the combination of a vertical cylinder trunnioned in the sides of an annular ring and having a piston-rod adapted to operate therein, means to actuate said piston, a vertically-movable mast the lower end of which is rigidly secured to the lower end of said piston and adapted to operate in grooves in the sides of said cylinder, and a shovel pivotally connected to the lower end of said mast, substantially as described.

4. In a hydraulic unloader, substantially as described, the combination of a carriage mounted on ways, a cylinder trunnioned in the sides of an annular ring suitably secured thereon, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, a vertically-movable mast the lower end of which is rigidly secured to the lower end of said piston and having on its interior sides slides adapted to operate in grooves on the exterior of said trunnioned cylinder, and a shovel pivotally connected with the lower end of said mast, whereby the said mast and the shovel connected thereto are elevated and lowered, substantially as and for the purpose herein described.

5. In a hydraulic unloading device, substantially as described, the combination of a carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring suitably secured thereon, means to rotate said ring, said cylinder having a piston-rod adapted to operate therein, means to actuate the same, an elevating device rigidly connected at its lower end with the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the exterior of said trunnioned cylinder, and a shovel pivotally connected with the lower end of said elevating device, whereby said elevating device and the shovel secured thereto are elevated, lowered, and turned around, substantially as and for the purpose herein set forth.

6. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected with the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and a cylinder or cylinders suitably secured on an annular plate adapted to rotate, said cylinders having piston-rods adapted to operate therein and means to actuate the same, the outer ends of said pistons being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, whereby the shovel connected to said elevating device may be ad-

vanced or forced into a mass of earth, ore, or other substance and lifted, substantially as herein set forth.

7. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon and means to rotate said ring, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected with the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and a cylinder or cylinders suitably secured on an annular plate, said cylinders having piston-rods adapted to operate therein and means to actuate the same, the outer ends being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, whereby the shovel connected to said elevating device may be advanced or forced into a mass of earth, ore, or other substance, elevated, and turned in a circle, substantially as and for the purpose herein set forth.

8. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected with the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and a cylinder or cylinders suitably secured on an annular plate adapted to rotate, said cylinders having piston-rods adapted to operate therein and means to actuate the same, the outer ends of said piston-rods being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, and a cylinder suitably secured upon one side said elevating device and having a piston-rod adapted to operate therein and means to actuate the same, the lower end of said piston-rod being suitably connected to the rear end of said shovel, whereby said shovel may be advanced or forced into a mass of earth or other substance with a vibrating or searching motion and elevated, substantially as and for the purpose herein set forth.

9. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon and means to rotate said ring, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected with the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and a cylinder or cylinders suitably secured on an annular plate adapted to rotate, said cylinder having piston-rods adapted to operate therein and means to actuate the same, the outer ends being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, and a cylinder suitably secured upon one side said elevating device and having a piston-rod adapted to operate therein and means to actuate the same, the lower end of said piston-rod being suitably connected to rear end of said shovel, whereby said shovel may be advanced or forced into a mass of ore or other substance with a vibrating or searching motion, elevated, and turned in a circle, substantially as and for the purpose set forth.

10. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon and means to rotate the same, said cylinder having a piston-rod adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected to the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and cylinder or cylinders suitably secured on an annular plate mounted on slides and adapted to rotate thereon, said cylinders having piston-rods adapted to operate therein and means to actuate the same, the outer ends of said pistons being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, a cylinder having a piston-rod extending through both heads of said cylinder and means to actuate the same, and a platform or carriage mounted on slides and adapted to move thereon, and means to connect either end, respectively, of said platform with either end, respectively, of said piston-rod, whereby said shovel may be advanced, lifted, and turned and said device moved laterally, substantially as herein set forth.

11. In a hydraulic unloader, substantially as described, the combination of a cylinder-carriage mounted on ways and having a cylinder trunnioned in the sides of an annular ring mounted thereon and means to rotate the same, said cylinder having a piston-rod

adapted to operate therein and means to actuate the same, an elevating device the lower end of which is rigidly connected to the lower end of said piston-rod and having on its interior sides slides adapted to operate in grooves on the sides of said trunnioned cylinder, a shovel pivotally connected to the lower end of said elevating device, and cylinder or cylinders suitably secured on an annular plate mounted on slides and adapted to rotate thereon, said cylinders having piston-rods adapted to operate therein and means to actuate the same, the outer ends of said pistons being suitably connected by a strap, to which are suitably secured arms, the inner ends of which are pivotally connected on either side said trunnioned cylinder near the top thereof, a cylinder suitably secured upon one side said elevating device and having a piston-rod adapted to operate therein and means to actuate the same, the lower end of said piston-rod being suitably connected to the rear end of said shovel, and a cylinder having a piston-rod extending through both heads of said cylinder and means to actuate the same, a platform or carriage mounted on slides and adapted to move thereon, and means to connect either end, respectively, of said platform with either end, respectively, of said piston-rod, whereby said shovel may be advanced or forced into a mass of ore or other substance with a vibrating or searching motion, elevated, turned in a circle, and said device moved laterally in either direction, substantially as and for the purpose herein set forth.

In testimony that we claim the foregoing we hereunto affix our signatures this 14th day of February, A. D. 1891.

CHARLES HENDERSON CAMPBELL.
WILLIAM WHIGHAM.

In presence of—
C. C. LEE,
JOSEPH H. CAMPBELL.