

(No Model.)

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J. H. LANCASTER.  
HOISTING AND CONVEYING APPARATUS.

No. 605,884.

Patented June 21, 1898.

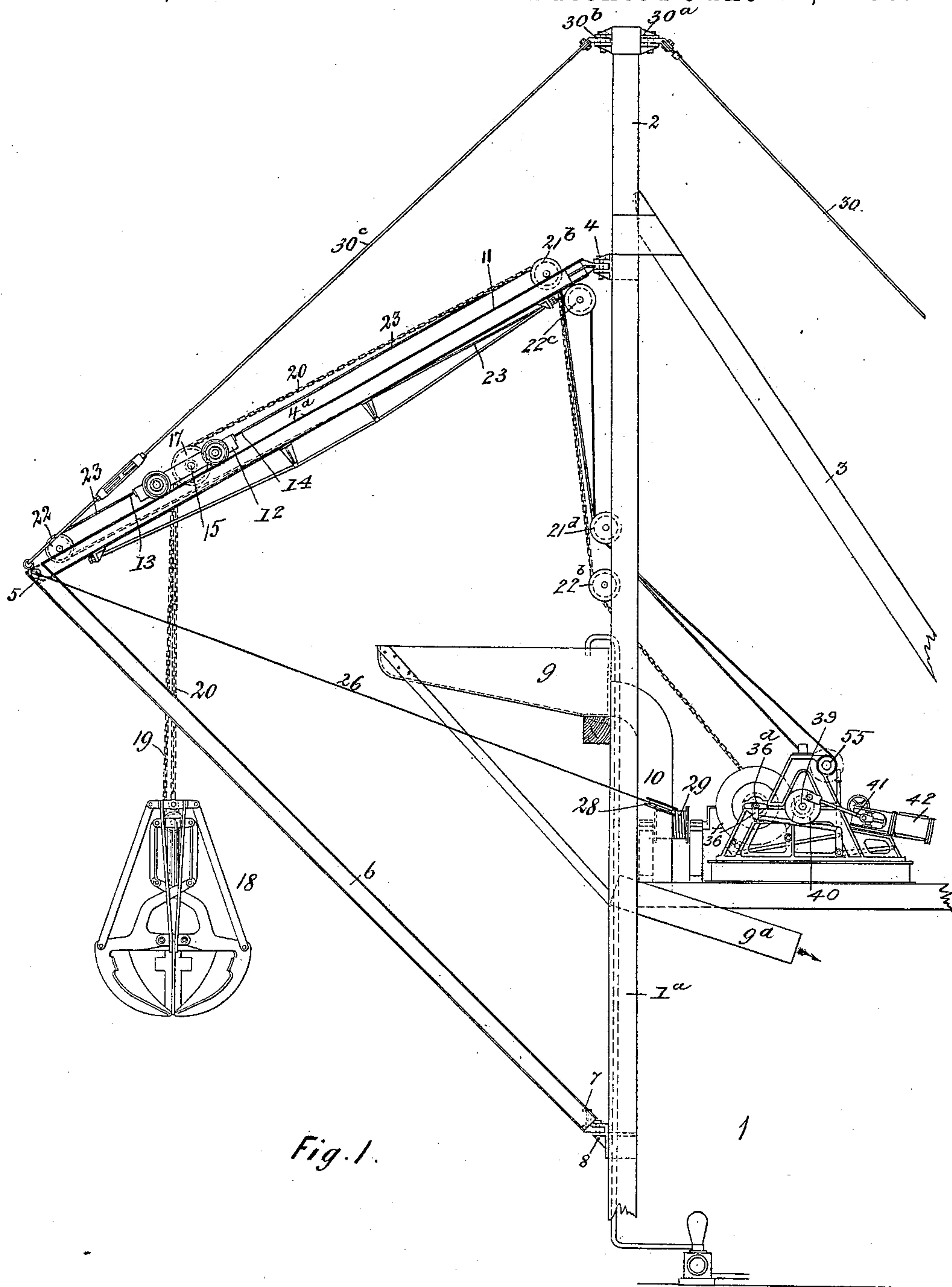


Fig. 1.

Witnesses

J. F. Ritter  
J. Brodin,

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(No Model.)

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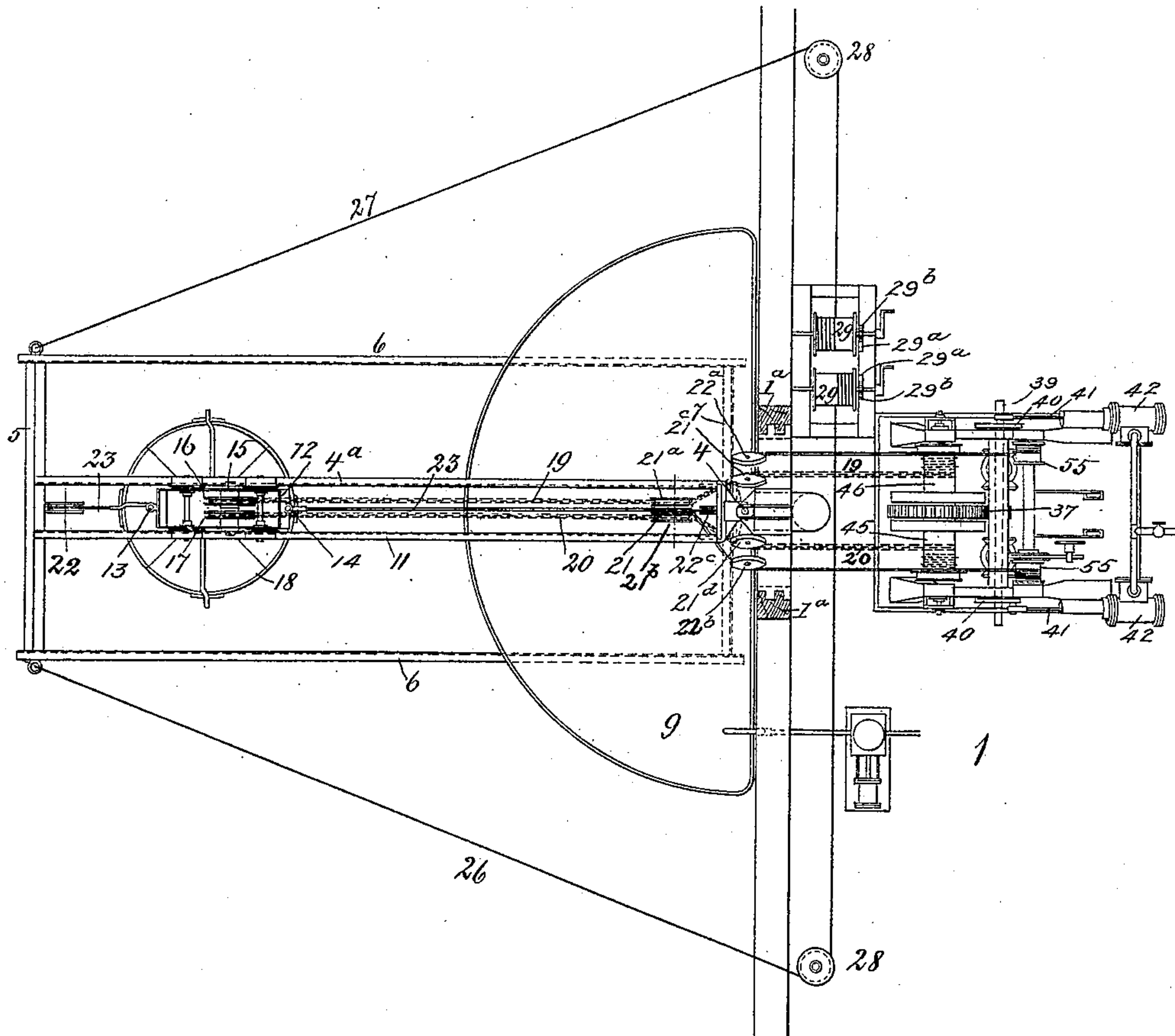


Fig. 2.

Witnesses

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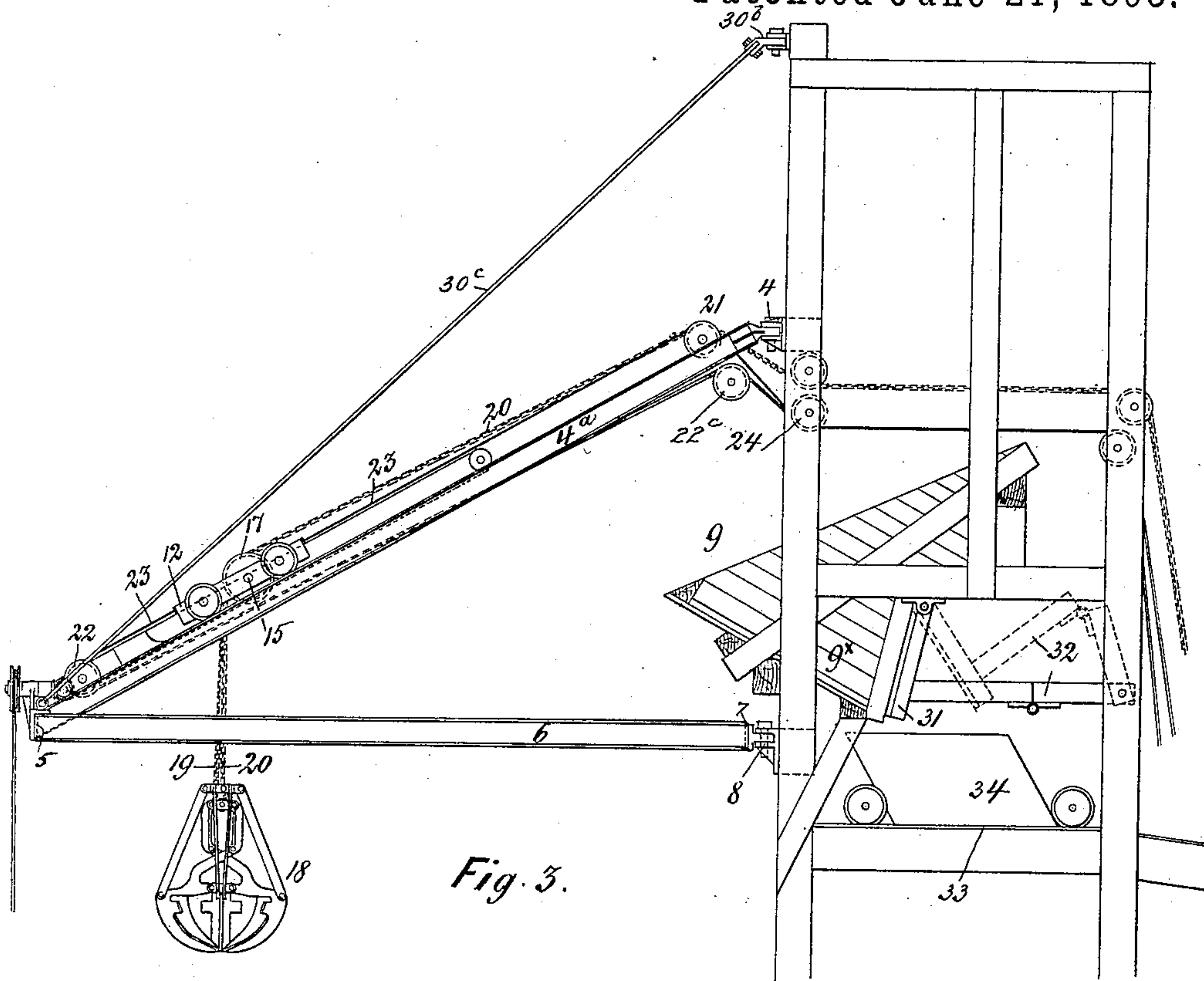


Fig. 3.

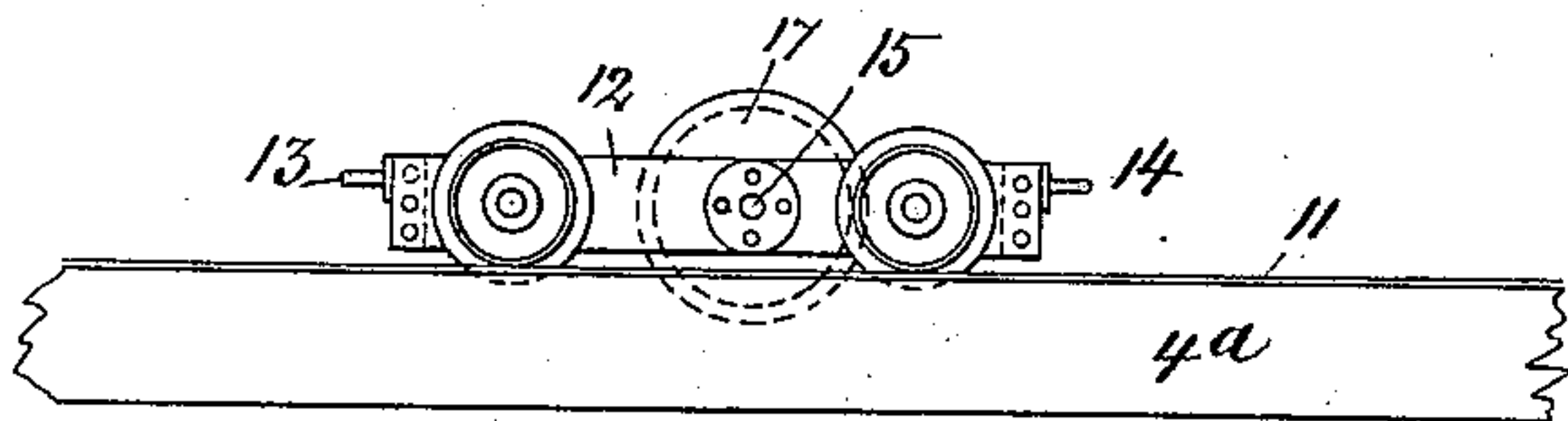


Fig. 4.

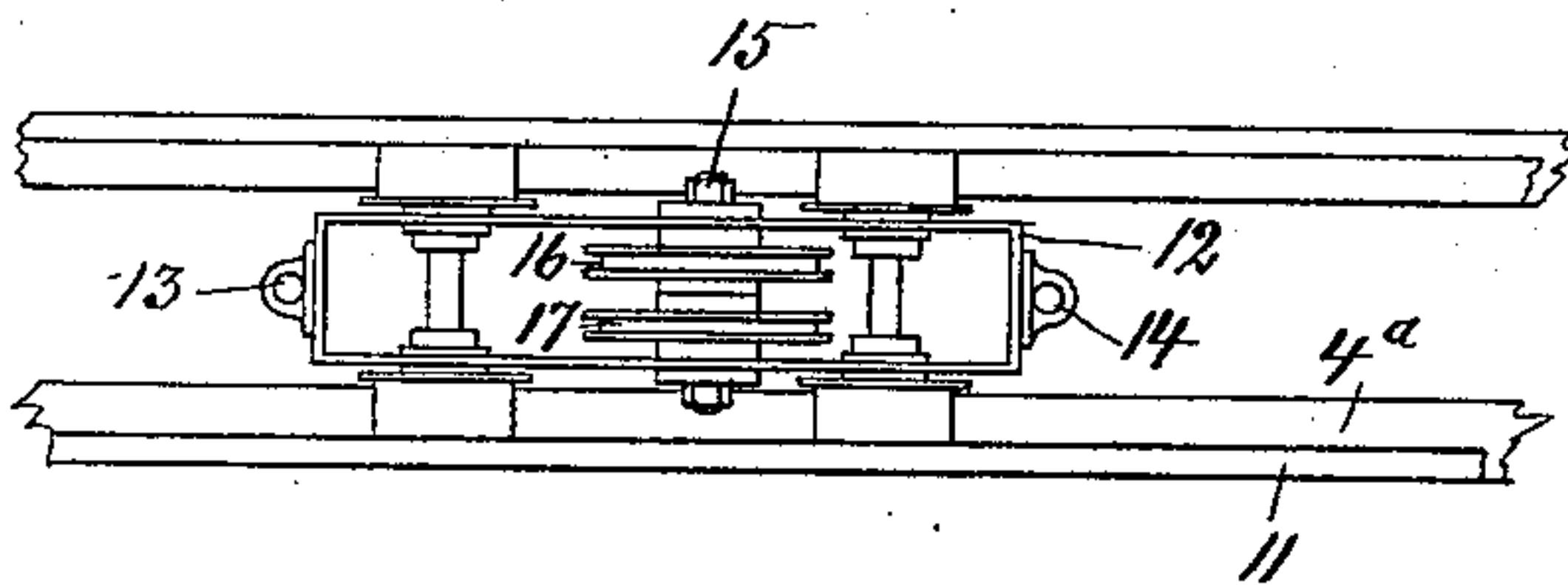


Fig. 5.

Witnesses

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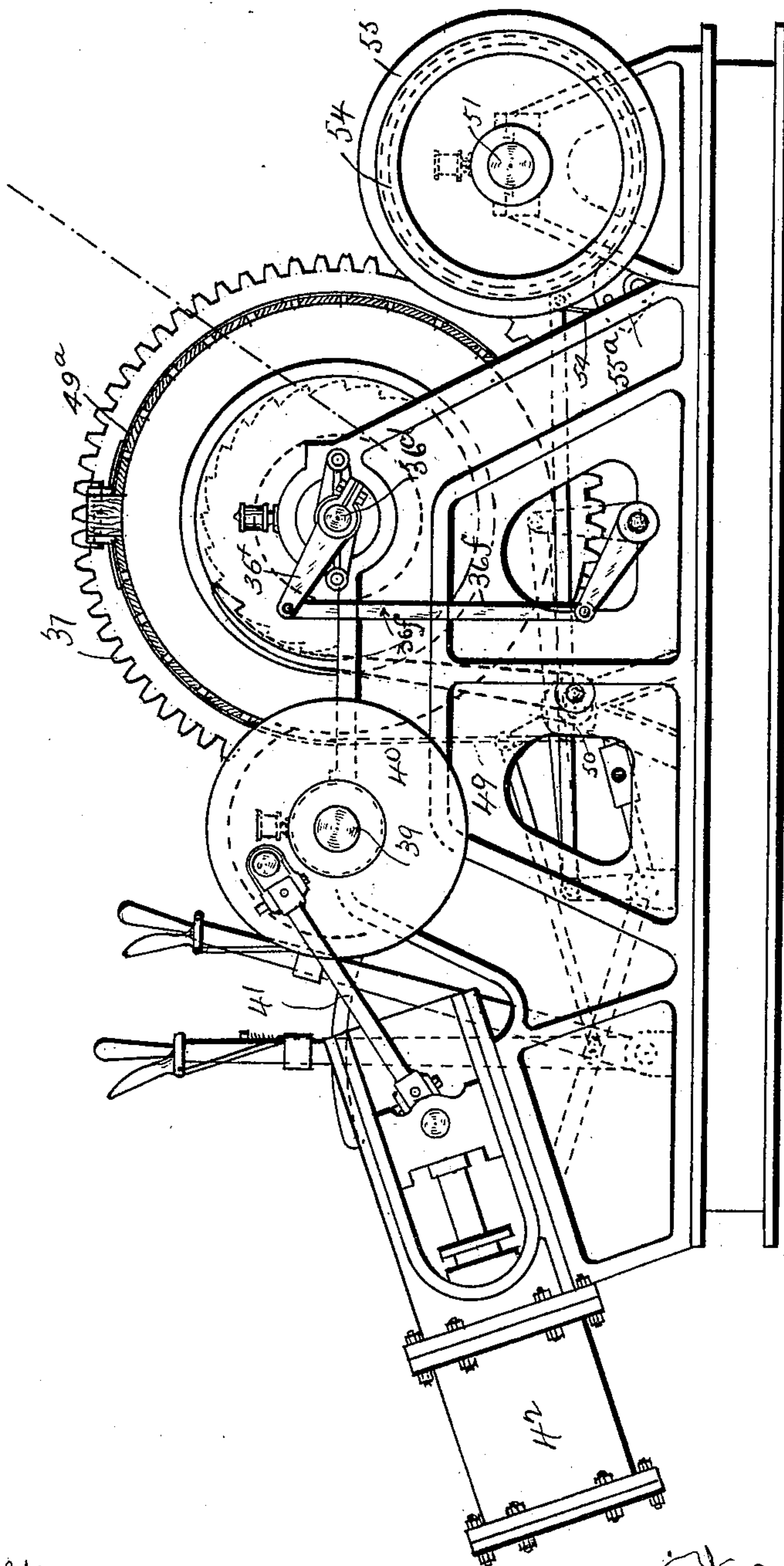
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Fig. 6.



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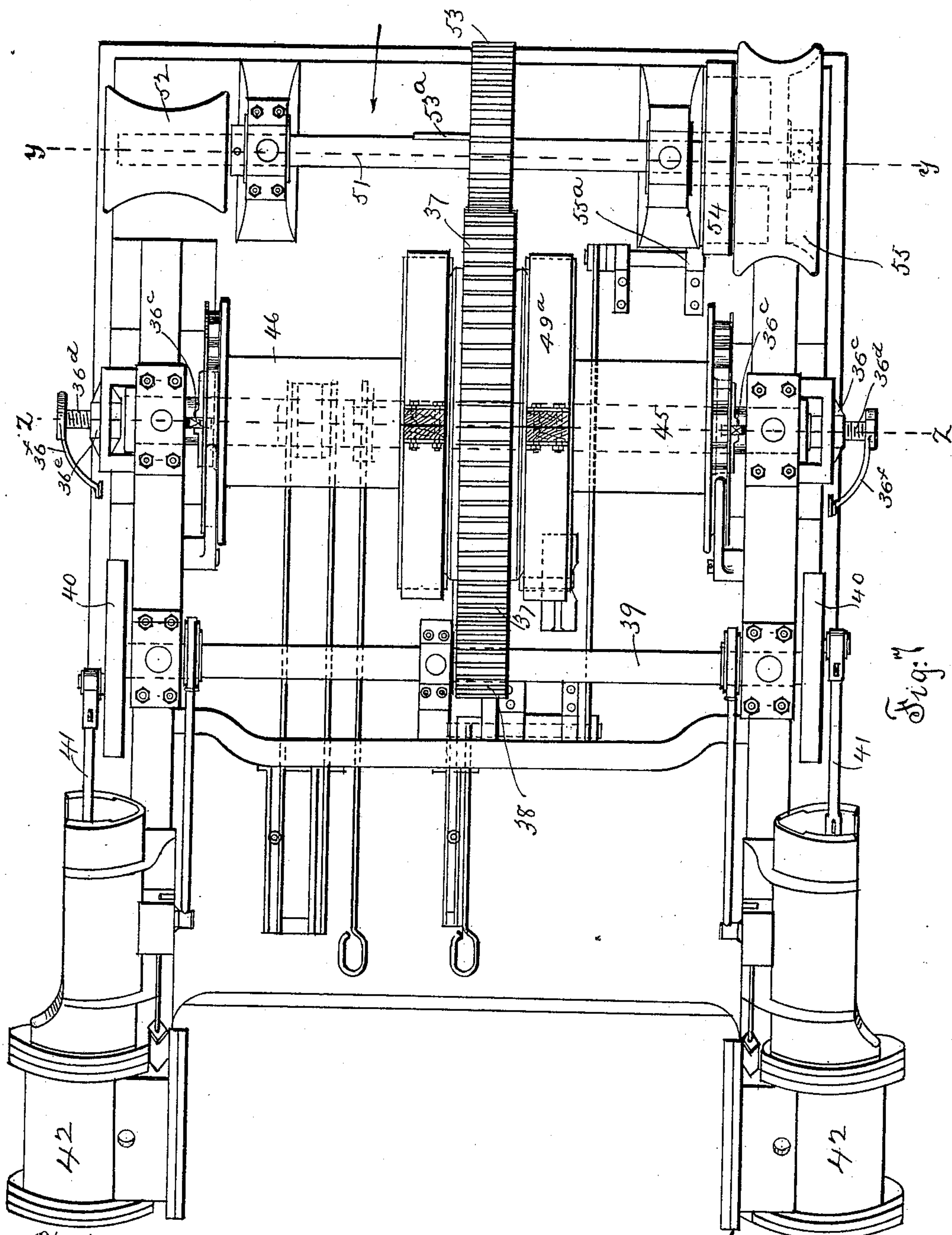
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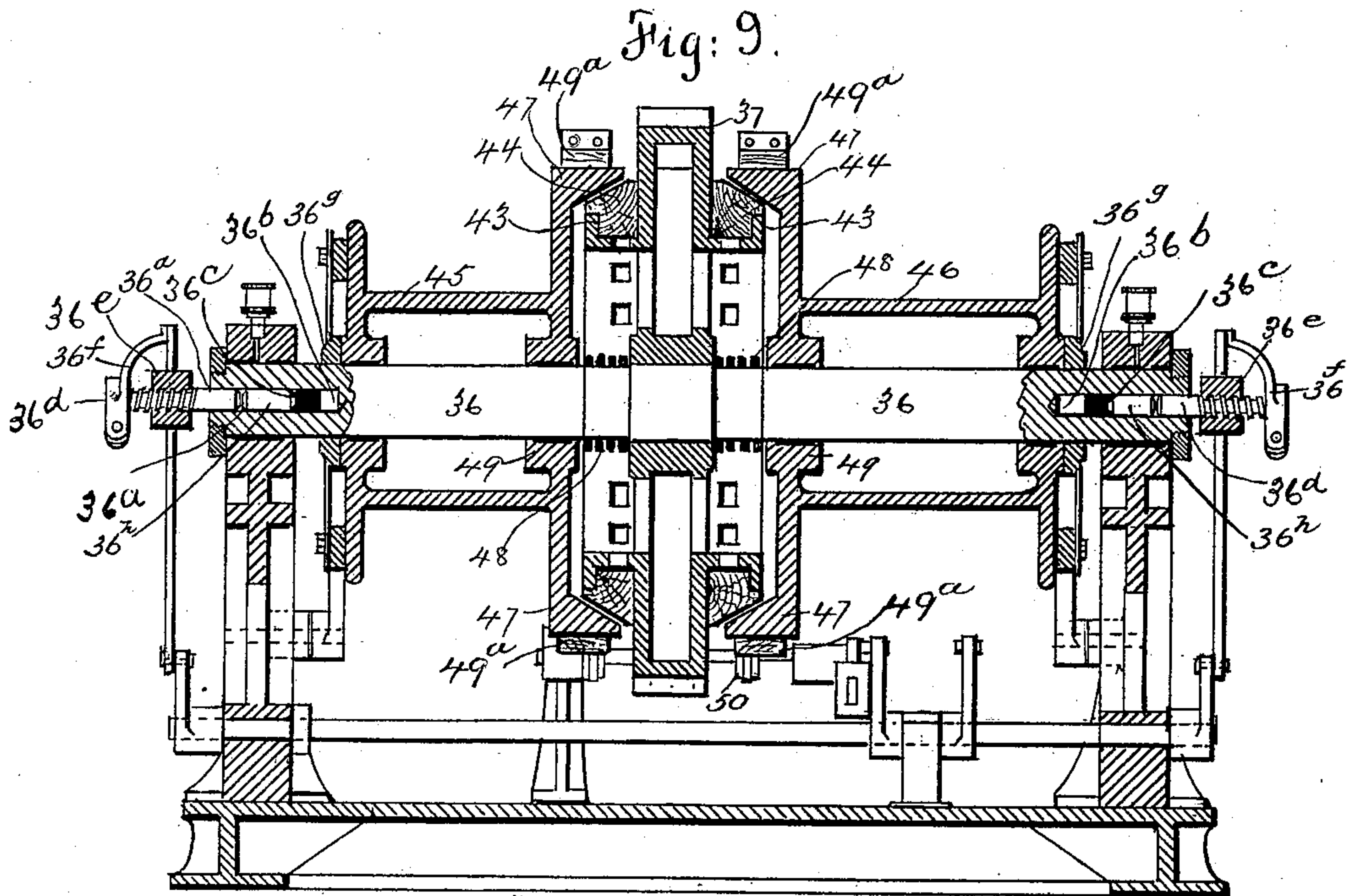
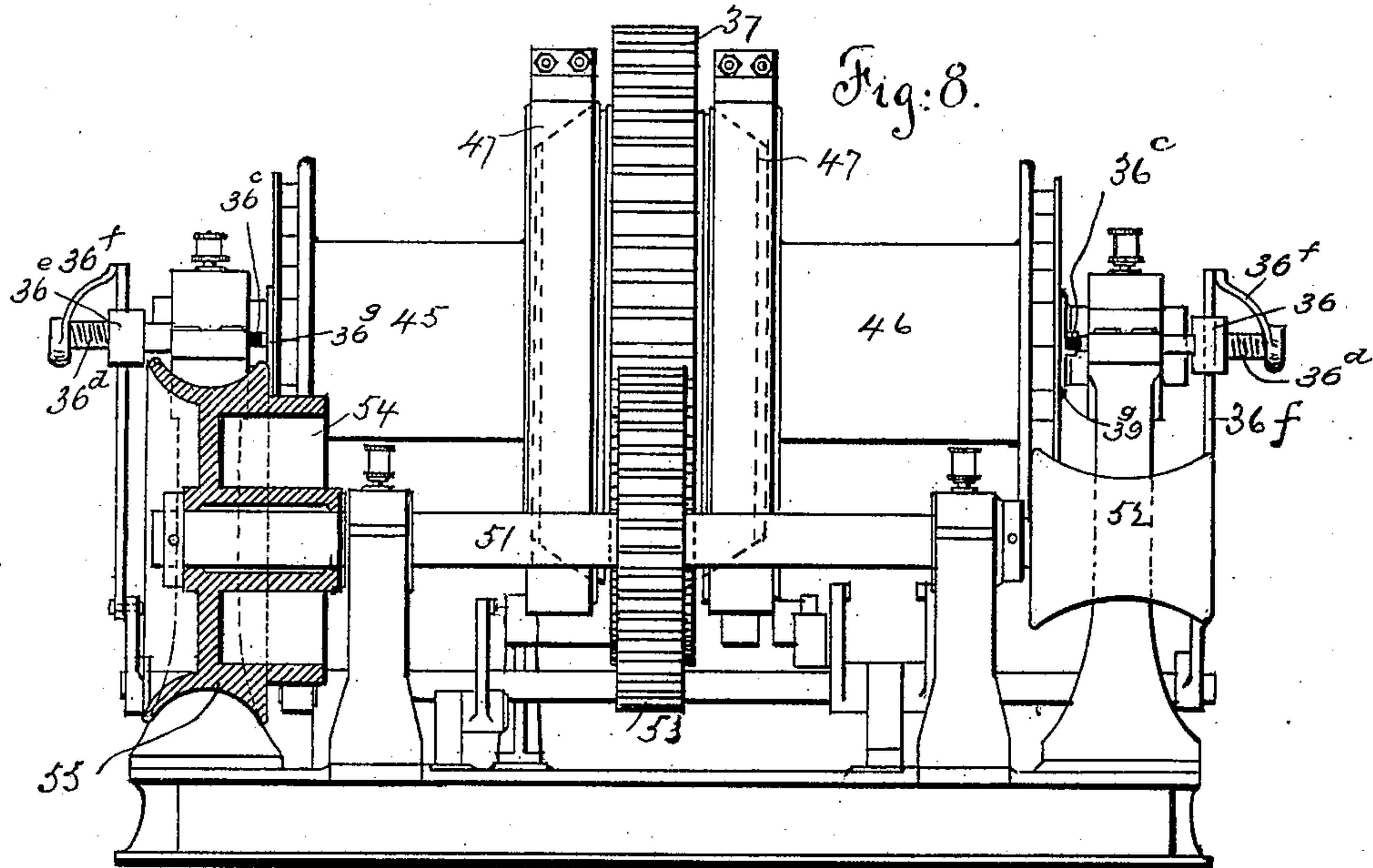
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# UNITED STATES PATENT OFFICE.

JAMES H. LANCASTER, OF NEW YORK, N. Y.

## HOISTING AND CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 605,884, dated June 21, 1898.

Application filed December 26, 1894. Serial No. 532,923. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES H. LANCASTER, a citizen of the United States, and a resident of New York city, in the county of New York, State of New York, have invented certain new and useful Improvements in Hoisting and Conveying Apparatus, of which the following is a full, clear, and exact specification.

The present invention has reference to apparatus for dredging, digging, unloading, or similar operations, and contemplates more particularly a comparatively simple arrangement by which the grapple, bucket, or dredge can be elevated at any point of a radius of definite length and moved to or from the point of discharge without the necessity of manipulating the boom for each operation of the grapple, the boom only being laterally moved to change the radius in which the grapple works both in filling and discharging.

In the drawings accompanying this description I have set forth my invention as being designed for use in connection with a floating dredge and gold amalgamator, riffle, and concentrator, and also an apparatus for unloading coal and sand barges or scows.

In said drawings, Figure 1 is a view showing in vertical side elevation my improved dredging, digging, and unloading apparatus designed for use in connection with a floating dredge. Fig. 2 is a plan of the apparatus shown in Fig. 1, the upper end portions of the vertically-converging timbers comprising the end support being omitted to expose the guidance-rollers and arrangement of the operating chains and cables. Fig. 3 is a vertical side elevation of an apparatus intended more particularly for unloading coal. Figs. 4 and 5 are an enlarged detail side and a plan view, respectively, of the grapple carriage or carrier. Figs. 6 and 7 are a side elevation and plan view, respectively, of the mechanism for controlling the operations of the grapple and the movements of its carriage, the parts for immediately operating the carriage-controlling cables being slightly different from those represented in Figs. 1 and 2. Figs. 8 and 9 are transverse sectional elevations taken in the plane indicated by the dotted lines Y Y and Z Z, Fig. 7, looking in the direction of the arrow.

Referring to Figs. 1 and 2 it will be seen

that at one end of the boat 1 is located a vertical support comprising upwardly-converging timbers 1<sup>a</sup> 1<sup>a</sup>, terminating at the top in a short vertical mast 2, the entire support being braced by a rear inclined brace 3. To a bracket 4, secured between the upper converged portion of the end support aforesaid, a tongue-casting is pivotally attached to swing laterally, said casting being secured to a pair of outwardly and downwardly inclined rails 4<sup>a</sup>, constituting a trolley-way sustained at its outer end by a transverse bar 5, connected to parallel beams 6, joined at their inner ends by a bar 7, said bars and beams constituting an inclined rectangular boom-frame which is pivotally secured to a fixed part of the boat or to the end support by a tongue casting and bracket, as indicated at 8 in Fig. 1 and similar to the connection previously described, the arrangement being such as to permit the lateral swing of the boom-frame coincident with the movement of the inclined trolley-way without altering or effecting the rigid rectangular character of said boom-frame.

Immediately in vertical line with the inner portion both of the trolley-way and boom-frame a stationary hopper 9 is permanently located, the discharge 10 thereof extending within the boat to suitably deliver the material introduced into the hopper 9 by, for instance, a grapple or bucket.

Of course the material will be handled according to its character. In said Figs. 1 and 2 I have illustrated the apparatus as being constructed for handling material suitable for treatment in an ore-separator and placer-gold amalgamator, only the receiving-hopper 9<sup>a</sup> of which is represented and to which the discharge 10 of the hopper 9 delivers.

The rails of the trolley-way have secured thereto or are of such character as to present suitable track-rails 11, upon which the wheels of the carriage are guided and travel. The frame 12 of the carriage is furnished at each end with eyebolts 13 14, as shown most clearly in Figs. 4 and 5, while a central transverse shaft bears in the sides of its frame and carries a pair of loosely-turning sheaves 16 17.

The grapple 18 is of a type familiar in certain other applications for patents filed by me and is essentially a double-chain arrangement—i. e., one chain to effect the opening



and closing of the pivoted digging or blade sections, while the other chain participates in the raising and lowering of the grapple. These chains coöperate with the hoisting mechanism to be hereinafter described, so that a windlass or drum is first revolved to insure a pull on the opening and closing chain to effect the closing of the blade or digging sections, and then a second drum or windlass is thrown into operation to simultaneously exert a tension on both chains to cause the elevation of the grapple while in a closed position. The opening and closing chain 19 passes up around the sheave 16 of the carriage and is guided over one of a pair of guide-rollers 21<sup>a</sup> 21<sup>b</sup>, loosely bearing between the rails 4<sup>a</sup> of the trolley-way adjacent to the pivotal connection of the latter, and from thence said chain 19 descends in guiding contact with one of a series of four rollers 21<sup>c</sup> 21<sup>d</sup> 22<sup>a</sup> 22<sup>b</sup>, supported in suitable bearings carried by the end support, said four last-mentioned rollers being oppositely inclined in pairs, as indicated in Fig. 2. The chain 19 is next diverted at an inclination and passes to one of the drums of the hoisting mechanism. The raising and lowering chain 20 is similarly guided and oppositely diverted and passes to the other drum of the hoisting-machine.

A third guide-roller 21 is loosely mounted between the inner pair of rollers within the rails 4<sup>a</sup>, a similar guide-roller 22 being hung at the outer extremity of the trolley-way, while still another guide-roller 22<sup>c</sup> is suspended from the under side of said way contiguous to the bracket 4. Cables 23 23 are connected to the eyes 13 14 of the carriage-frame, one of said cables passing back over the roller 21, thence down in guiding contact with another of the inclined rollers, and finally diverted to continue downward and wind upon one of a pair of bull-wheels 55 55, turning with a driven shaft forming part of the hoisting mechanism. The other cable 23 passes around the outer guide-roller 22 and is led rearwardly beneath the trolley-way to the lower guide-roller 22<sup>c</sup>, hung therefrom and over which roller it passes, after which it descends in guiding contact with the companion inclined roller and is diverted to the other bull-wheel 55, upon which it winds in a direction opposite to that of the other cable.

From the foregoing description it will be understood that in connection with the hoisting mechanism, the main drums of which can be either independently or conjointly rotated according to the will of the operator, the chain 19 can be first operated so that the grapple 18 will close on a quantity of material, at which time the chain 20 will be coincidently operated, so that both chains will effect the elevation of the closed grapple through the boom-frame to the trolley-way, after which the bull-wheels 55 55 can also be caused to revolve to haul the carrier upward on the trolley-way and bring the grapple immediately over the

hopper 9, at which point the cables and chain 20 are rigidly held while the chain 19 is slackened to permit the grapple to open and discharge its contents into said hopper.

It will be seen that the construction of the inclined trolley-way and boom-frame and the arrangement of carriage enables the grapple to work from a point somewhat distant from the locality of and toward the hopper, and yet deliver to the latter without the necessity of shifting the boom during each filling and discharge of the grapple. Moreover, by having the hopper in vertical line with the pivotal axis of the trolley-way and boom-frame the grapple can work in a comparatively extended radius or sweep by simply laterally moving said trolley-way and boom-frame whenever it is desired to dredge in a path representing a new radial line relative to the hopper. Under any circumstances the boom does not have to be swung in order to bring the grapple to a position suitable for discharging. The grapple can be worked at any point within the length in the opening of the boom-frame directly under and in line with the trolley-way, the position of the grapple-suspending carrier being readily controlled by the cables 23, differentially winding on the bull-wheels 55 55.

Efficient means are provided for effecting the lateral movement or adjustment of the trolley-way and boom-frame. In Figs. 1 and 2 I have shown one arrangement for accomplishing the purpose stated, and which consists in connecting cables 26 27 to the outer corners of the boom-frame and leading said cables around pulleys 28, suitably located on the boat, after which said cables are independently wound upon hand-windlasses 29, provided with locking-pawls 29<sup>a</sup> and ratchet-disks 29<sup>b</sup>. (See Fig. 2.) Therefore when traction is exerted upon one of the cables 26 27 the other will be paid out, and thus not only serve to shift the boom to the desired extent, but permit the cables to act as lateral guides or braces for the same. In this connection a hand-adjustment is all that is required, since it will only be necessary to periodically change the working position of the boom-frame, as will be clearly understood.

Instead of employing two bull-wheels 55 upon a single driven shaft and around which wheel the cables 23 23 are differentially wound, as heretofore explained, another, and in some instances a preferred, arrangement is that wherein a single bull-wheel 55 is mounted on the driven shaft forming part of the hoisting mechanism, as exemplified in the last four figures of the drawings, in which case a single cable 21 is attached to the eye 14 of the carriage, passes rearwardly over the several guide-rollers, descends and makes several passes around the bull-wheel 55, and is thereafter guided upwardly and forwardly around the outer guide-roller 22 back to and connected to the eye 13 on the carriage. While the construction and operation of the hoist-



ing-machine will be described more at length, it will be well to here state that the bull-wheel 55 when not positively driven can be controlled in its reverse movement by a brake-band 54, which when released will permit the wheel 55 to revolve freely under the draft exerted by the tendency of the carriage to move down the trolley-way.

In arranging the trolley-way carriage and controlling cables or cable it is highly important to so dispose the parts that when the brake 54 of the bull-wheel 55 is released the carriage will descend upon the trolley-way by gravity, the revolutions of the drums controlling both chains of the grapple being so timed that said chains will be paid out to an extent that will permit the gravital descent of the carriage. When the latter has reached the desired point on the trolley-way, the brake of the bull-wheel can be operated to hold the latter, while the continued paying out of the grapple-chains will permit said grapple to descend in an open position to penetrate the material and take a new charge.

Of course it will be understood that the support of the mast 2 is a secondary consideration, for if necessary it can be vertically extended and braced by rearwardly-extending guys 30, as indicated in Fig. 1, said guys being attached to a head-block 30<sup>a</sup> at the top of the mast, to which block is also secured by a swivel connection 30<sup>b</sup> an inclined suspending-stay 30<sup>c</sup>, also connected to the outer extremity of the trolley-way and boom-frame.

In Fig. 3 I have shown an arrangement particularly adapted for unloading coal from barges for delivery into a hopper 9, from which it is discharged into a truck for conveying same to bins or pockets. In such construction the grapple also clears the boom-frame and then moves with the carriage to a point above the hopper 9 to discharge the coal thereto. To provide for this particular application, the hopper is specially constructed, so that the coal will always move to the deep forward part 9<sup>x</sup> and pass therefrom whenever the jointed bar 32 is moved, as shown, to swing the gate 31 to an open position, as indicated by dotted lines. Track-rails 33 are suitably supported in connection with the framework, so that the trucks 34 can move along said track to a point below the hopper-discharge, receive coal therefrom, and carry it to the bins or elsewhere, as may be desired. The hoisting mechanism which I have previously alluded to comprises in part a shaft 36, Fig. 9, having a large central gear-wheel 37, in mesh with a pinion 38 on the driving-shaft 39, (see Fig. 7,) the extremities of which carry the disk-wheels 40, driven by the pitmen 41, actuated by pistons in the steam-cylinders 42.

As most clearly seen in Fig. 9, the gear-wheel 37 has at its sides annular boxes 43, in which are seated a series of wooden blocks 44, having their exposed faces beveled, so that

said blocks, in connection with said boxes, constitute friction-disks carried by said wheel 37.

45 46 designate drums or windlasses for controlling the grapple opening and closing chain or cable and the raising and lowering chain or cable, respectively. These drums are loosely mounted on the shaft 36 and are provided with flanges 47, the inner surfaces of which are beveled and adapted to bear against the friction-surfaces of the wheel 37, but normally held out of contact therefrom by means of strong coiled springs 48, interposed between the hub of the wheel 37 and the inner hub portions 49 of the winding-drums.

The drums 45 and 46 are designed to be successively and laterally shifted on the shaft 36, so that the beveled faces of their flanges will be brought in contact with the friction-disks of the gear-wheel 37, and thus the grapple is first closed and then raised to the carriage and thereafter with the latter moved along the trolley-way. The shifting of the drums is effected through the following means: The shaft 36 is provided at each end with a central opening 36<sup>a</sup>, which communicates at its inner end with a transverse slot 36<sup>b</sup>, through which extends a bar 36<sup>c</sup>. A pin 36<sup>d</sup> is seated in each opening 36<sup>a</sup> and bears against a second pin 36<sup>e</sup>, which impinges at its inner end against the bar 36<sup>c</sup>, the outer projecting portion of the pin 36<sup>d</sup> being threaded to bear in a fixed nut 36<sup>e</sup>, so that when the outer crank-arm 36<sup>f</sup> of each pin is turned through the medium of connections and lever appliances extending to the operator's position of the machine the pin will travel inward and move the bar 36<sup>c</sup> along its slot, causing it to bear against the collar 36<sup>g</sup> of the adjacent drum and shift the latter into contact with one of the friction-disks. A reverse turn of the crank-pin will enable the coil-springs 48 to throw the drum out of frictional contact, so that the latter can freely revolve on the shaft to pay out its chain or cable under the tension exerted thereon when released.

The flanges 47 have flexible brake-bands 49<sup>a</sup> embracing their peripheries, the ends of the bands being connected to pivotal eccentrics 50, which are mounted on a lower shaft and designed to be moved by hand appliances, so as to control the opening and lowering of the grapple after the drums are released from frictional engagement.

A shaft 51 has keyed on one end a winch-head 52 to be used for general purposes in connection with the hoisting mechanism, the required revolving motion being secured, when desired, by a gear-pinion 53, adapted to be slid by suitable means along a spline or feather 53<sup>a</sup>, carried by the shaft 51, when desired. On the other end of said shaft is a bull-wheel 55, before referred to, adapted to turn therewith and around which the cable connected with the respective ends of the carriage makes several passes. The result of this



arrangement is that when the carriage ascends under the traction exerted on the hoisting-chain the cable on the bull-wheel will revolve the latter so as to wind upon the same at one end and pay out at the other. Now when the drums are operated to release the grapple-chains the gear-pinion 53 can be slid out of driving engagement and the shaft and bull-wheel can be held against reverse rotation through the agency of a brake-band 54, engaging a collar integral with the wheel, the ends of the band being connected with an eccentric 55<sup>a</sup>, mounted on a shaft controlled by the operator. By turning the eccentric-shaft so as to release the brake the tension exerted by the tendency of the carriage to run back down the trolley-way will cause the bull-wheel and its shaft 51 to freely revolve, and thus result in a reverse winding and paying out of the carriage-cable. It will also be seen that this latter arrangement in connection with the pivoted boom-frame moving in an arc of a circle at the center of which the fixed hopper is located enables the grapple to not only operate in any part of the arc, but the bull-wheel so controls the movement of the carrier at any point of the radius to or from the hopper that the grapple can descend and work at any intermediate radial and lateral point represented by the extended sweep capacity of the boom-frame.

By having the friction-surfaces of the central gear-wheel 37 presented by a series of several wooden blocks radially arranged and relatively separated intermediate spaces are formed for the free circulation of air, and the blocks are thus preserved from heating.

When the improved apparatus is used on a scow or barge, as herein explained, suitable spuds may be used to positively anchor said scow or barge.

I claim—

1. In a dredging or unloading apparatus, the combination with a vertical standard or support, of an inclined trolley-way pivotally connected thereto at its higher end to swing laterally, a rectangular boom-frame supporting the free end of the trolley-way and also pivotally connected to swing coincident therewith without changing its shape, together with a sheave-equipped carriage on said way, grapple-operating chains guided through the carriage and suspending a grapple, and an independently-controlled cable for propelling the carriage and adapted to hold the same at any point on the way to permit the operation of the grapple, substantially as set forth.

2. In a dredging or unloading apparatus, the combination with the inclined trolley-way and supporting rectangular boom both pivotally secured at their inner ends to coincidentally swing laterally without altering the

shape of the boom, of a sheave-equipped carriage movably mounted on said way, means for laterally adjusting the trolley-way and boom, a grapple and grapple and carriage operating connections disposed with reference to the carriage, together with operating mechanism for said connections adapted to positively hold the carriage at any point throughout the length of the trolley-way, substantially as set forth.

3. In a dredging or unloading apparatus, the combination with an inclined trolley-way and supporting rectangular boom both pivotally secured at their inner ends to coincidentally swing laterally without alteration in the shape of the boom, of a sheave-equipped carriage on said way, means for laterally adjusting the trolley-way and boom, a grapple, and grapple and carriage operating cables, together with drums therefor adapted for both independent and joint rotation, substantially as set forth.

4. In a dredging or unloading apparatus, the combination with the laterally-swinging inclined trolley-way pivotally secured at its inner end and braced by a lower boom-frame pivoted in vertical line with the trolley-way, means for horizontally adjusting said boom and way, a sheave-equipped carriage movably mounted on the latter, a grapple, and grapple and carriage operating connections disposed with reference to the carriage together with operating mechanism for said connections adapted to positively hold the carriage at any point throughout the length of the trolley-way and cause the ascent or descent of the grapple, substantially as set forth.

5. In apparatus substantially as described, the combination with suitable conveying and discharge means, of a receiving-hopper 9, having a lower deep-formed portion 9<sup>x</sup>, closed at the rear by a pivotally-depending door, and a jointed brace secured to said door to swing the same to an open position when the brace breaks joint, substantially as set forth.

6. The combination with the inclined trolley-way, carriage and grapple as described, of operating mechanism including the wheel 37, having double friction-disks, and independently-movable drums at each side thereof, and carriage and grapple operating cables guided to the rear of the trolley-way, led around inclined rollers contiguous thereto and thereby diverted to their drums, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand.

JAMES H. LANCASTER.

Witnesses:

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JOHN F. RITTER.