C. L. TAYLOR.

LADLE CRANE.

APPLICATION FILED JAN. 20, 1909.

967,857.

Patented Aug. 16, 1910.

8 SHEETS—SHEET 1.

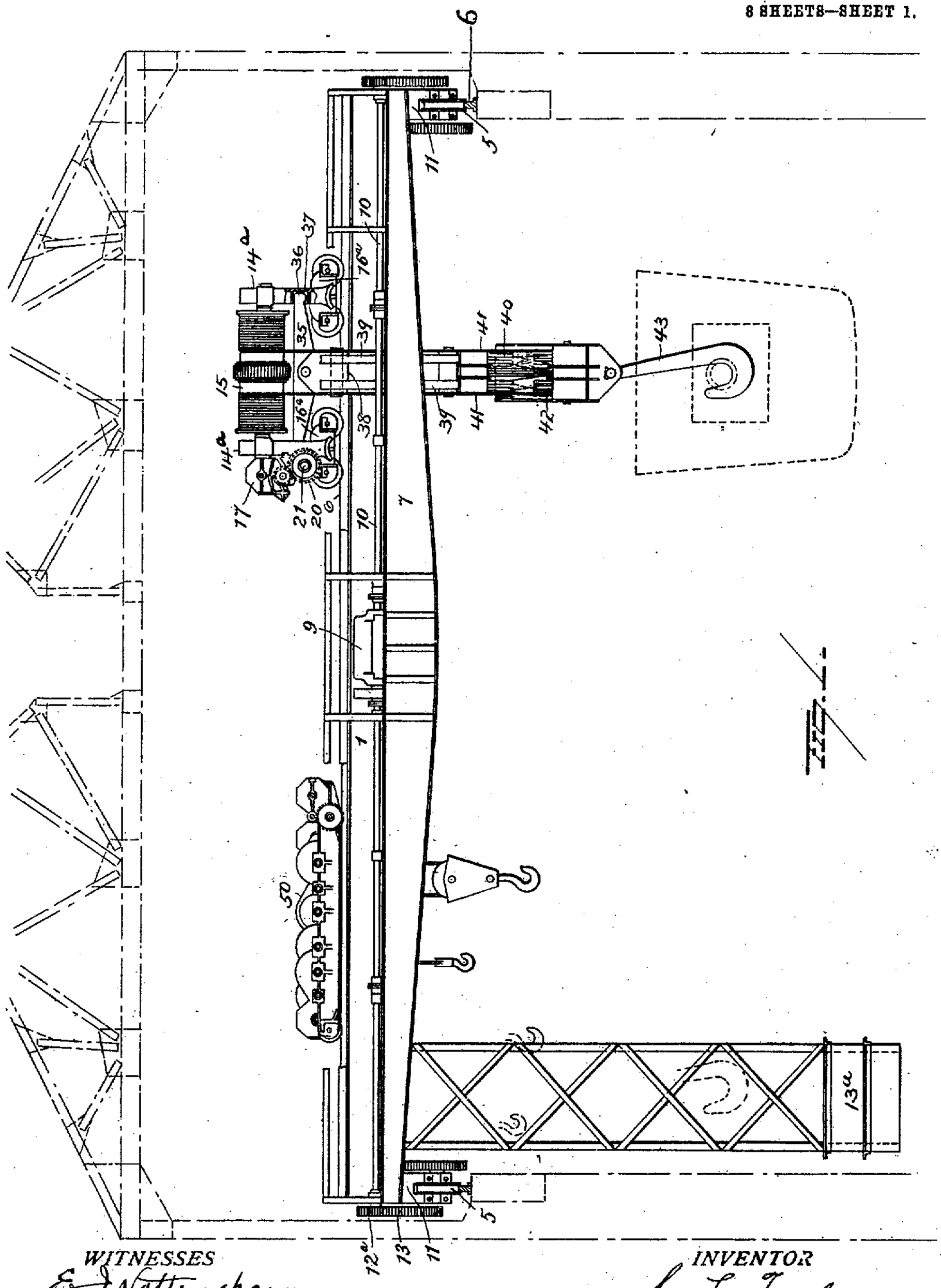

FIG. 1.

WITNESSES

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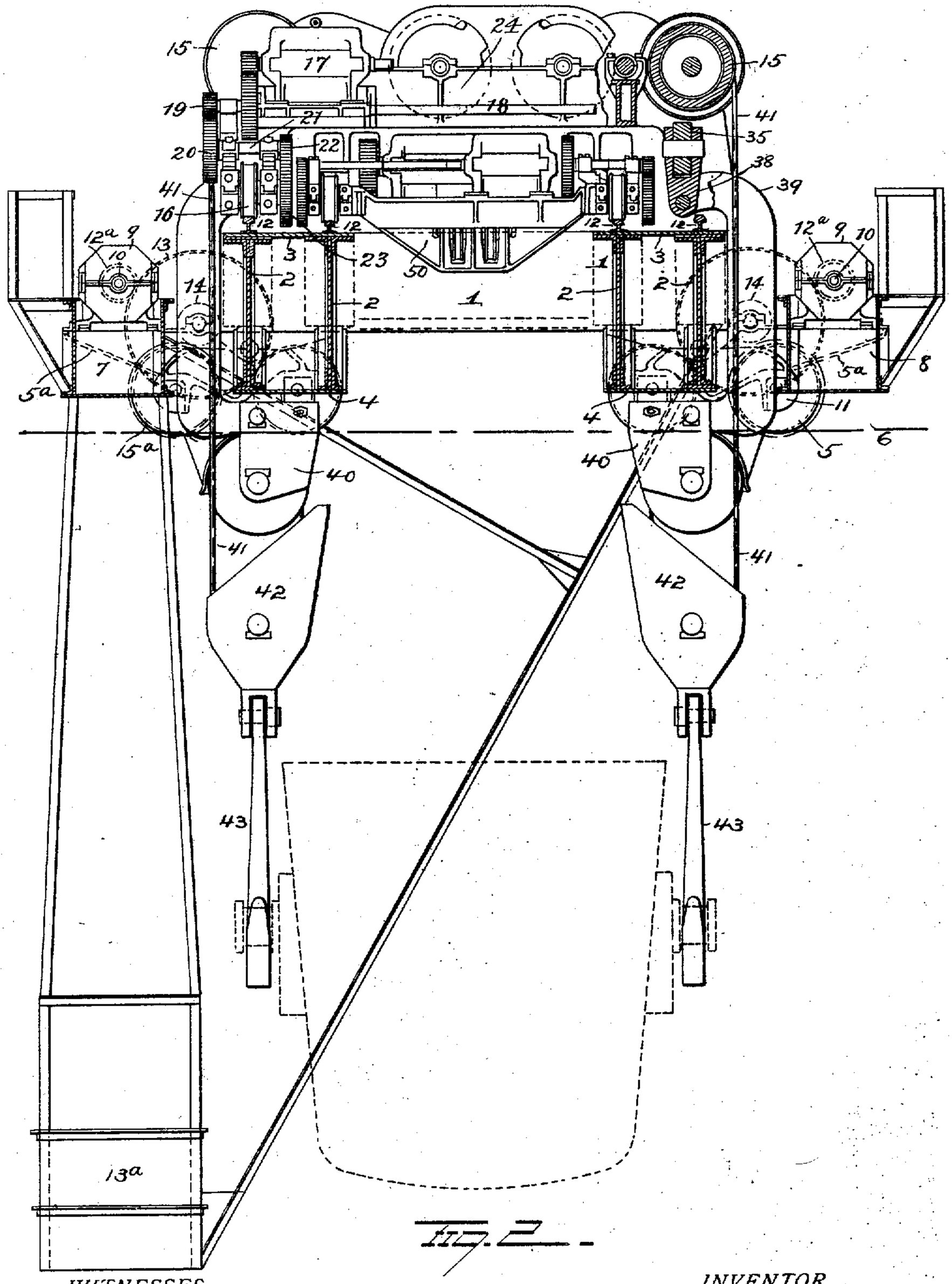

Fig. 2.

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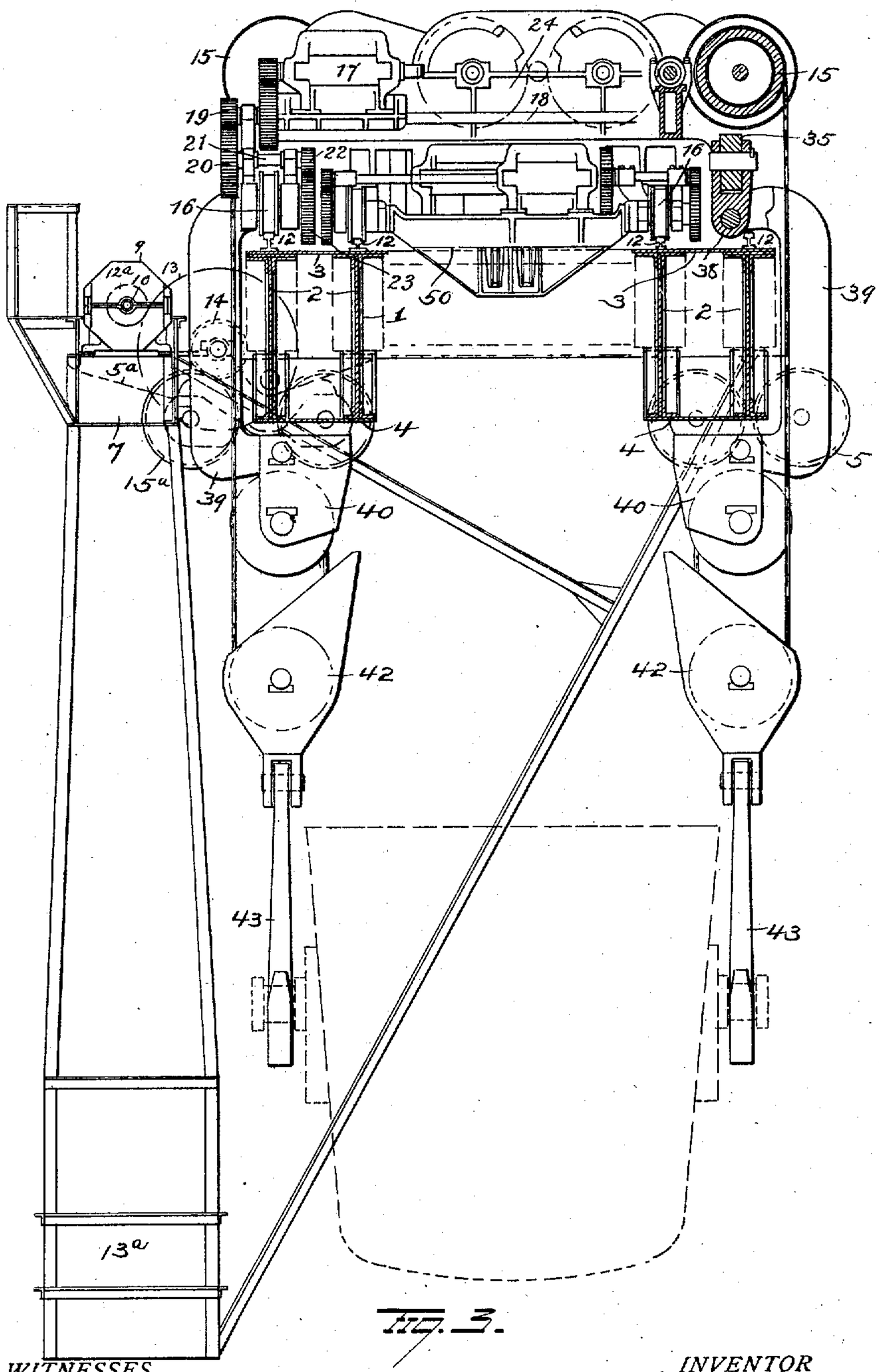

FIG. 3.

WITNESSES

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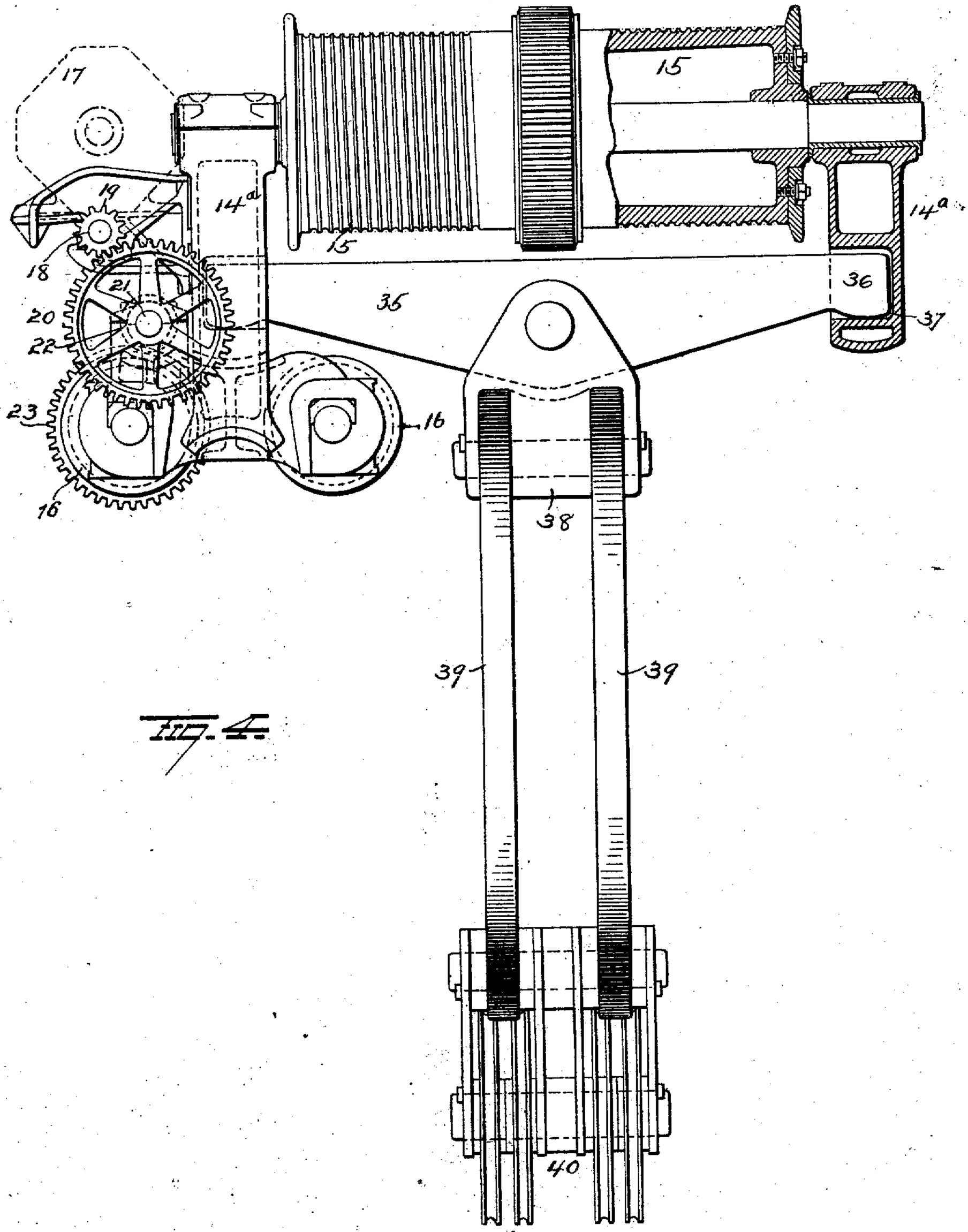

Fig. 4.

WITNESSES

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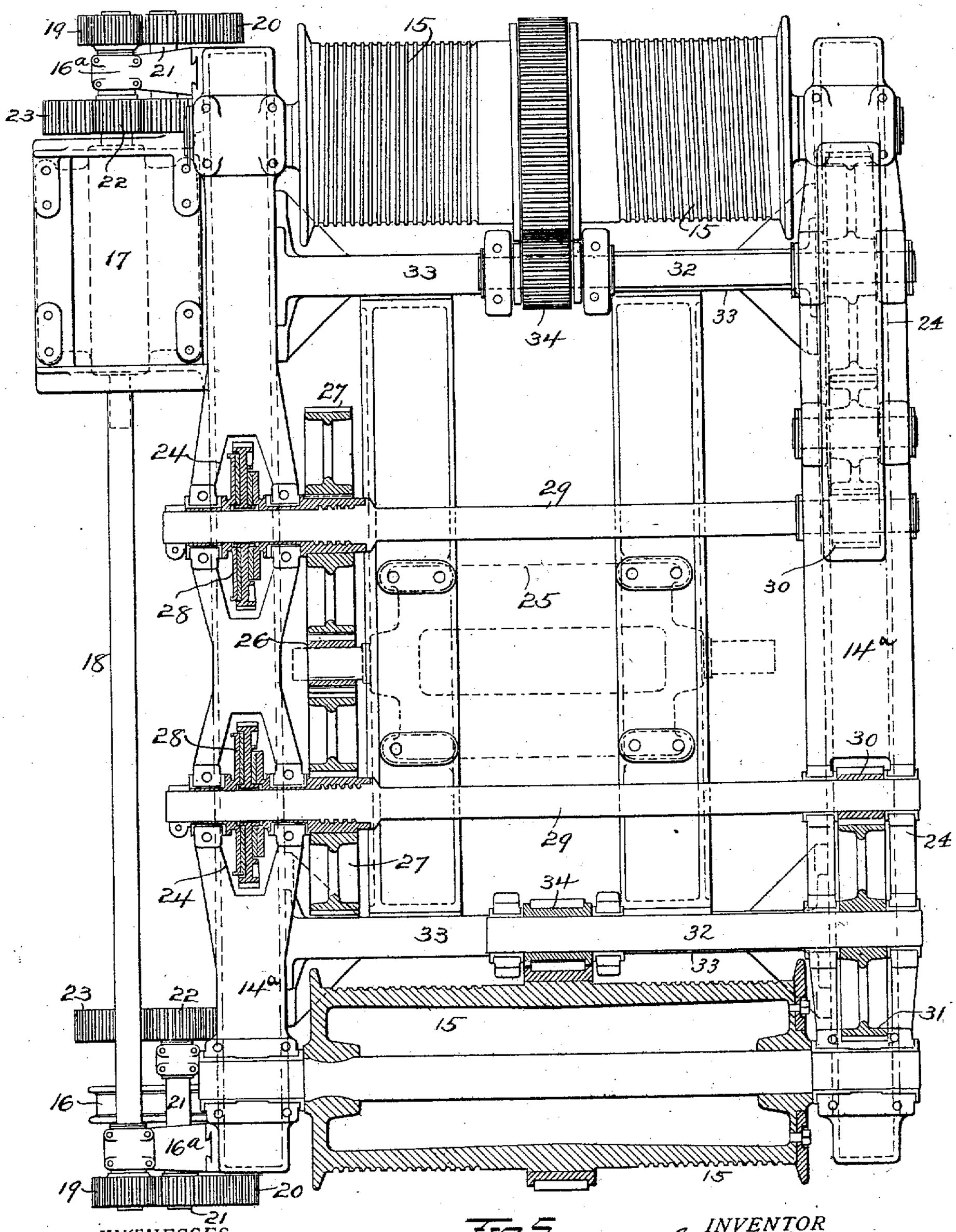

Fig. 5.

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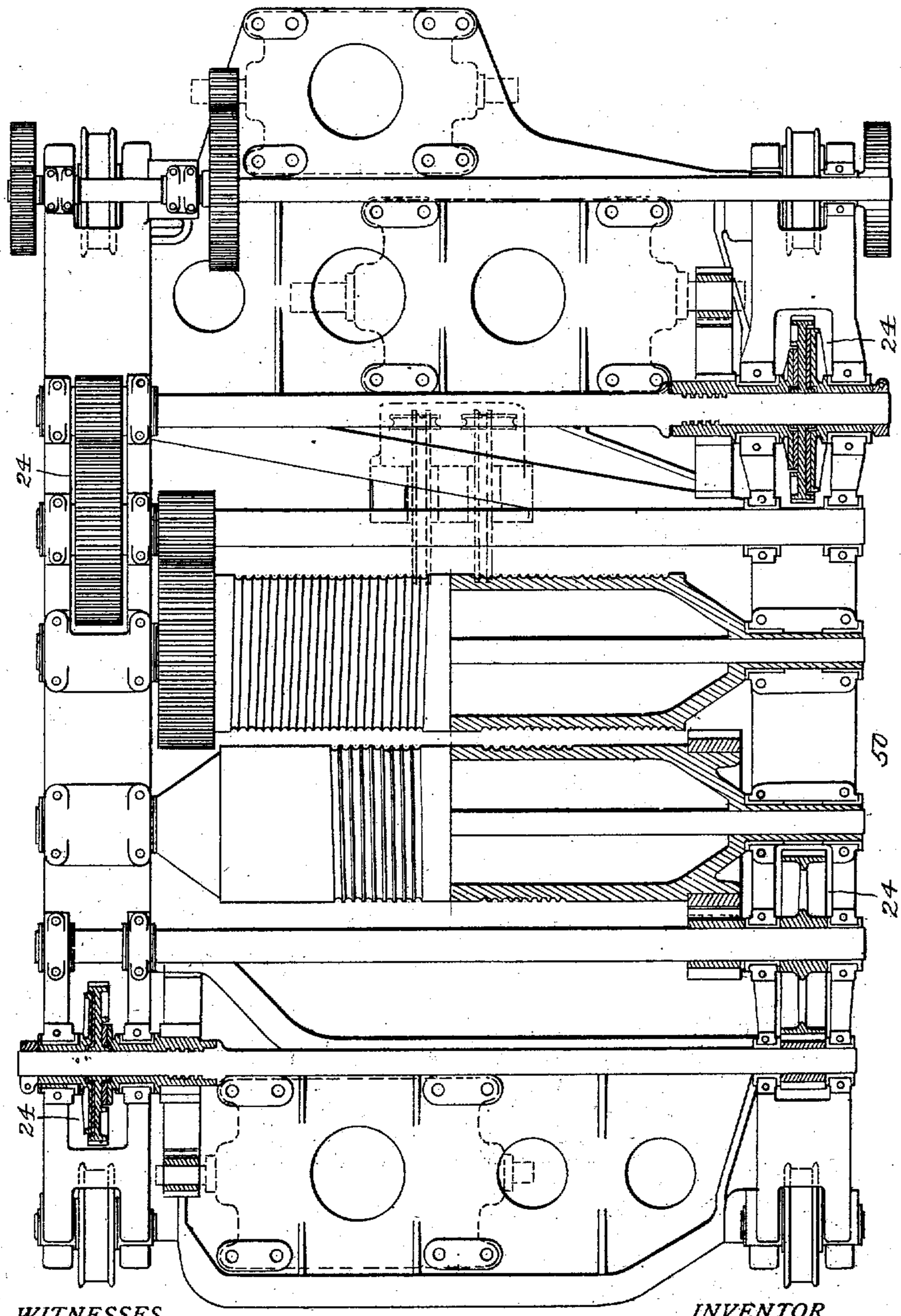

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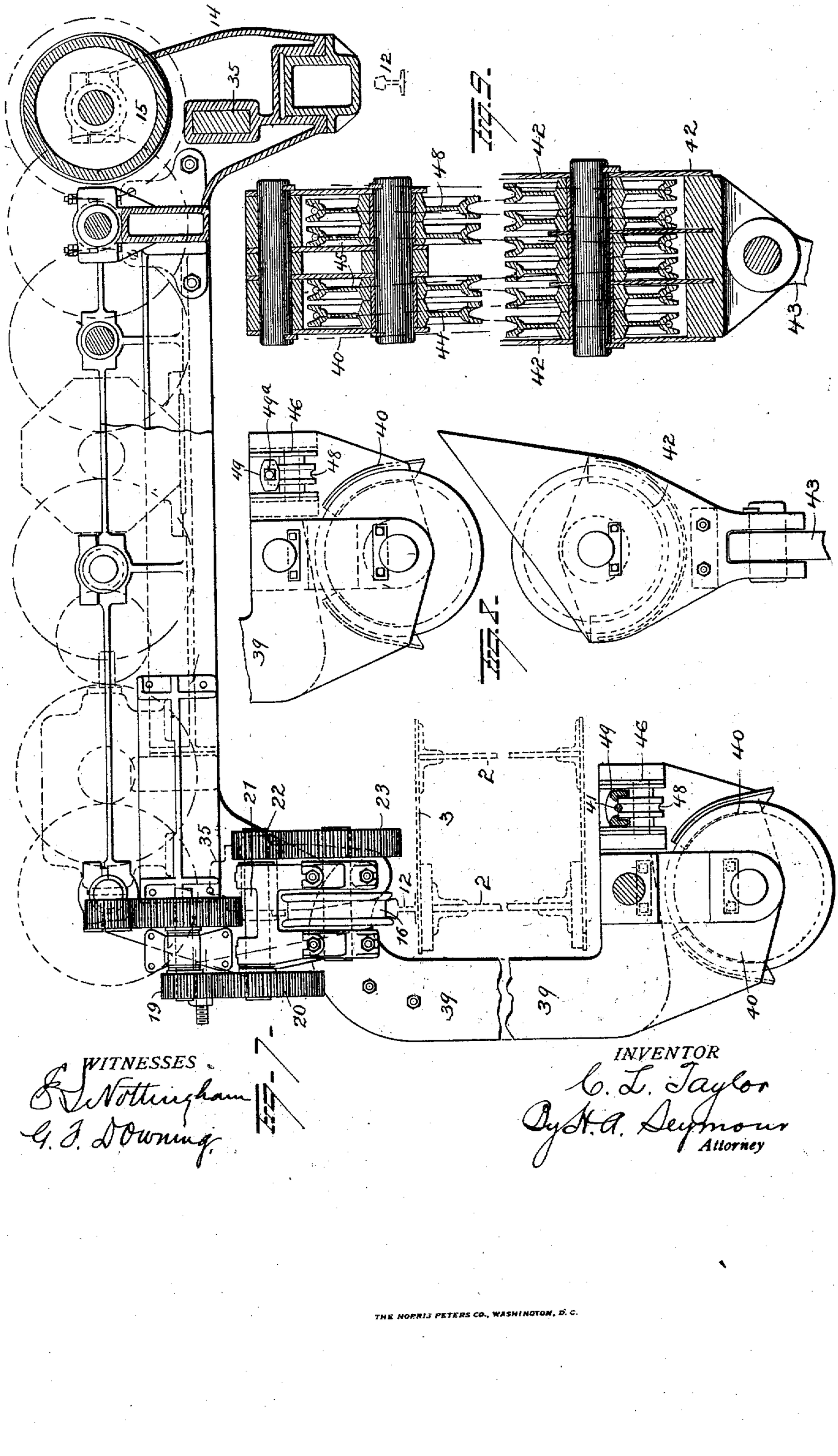
8 SHEETS—SHEET 7.



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8 SHEETS—SHEET 8.

Fig. 10.

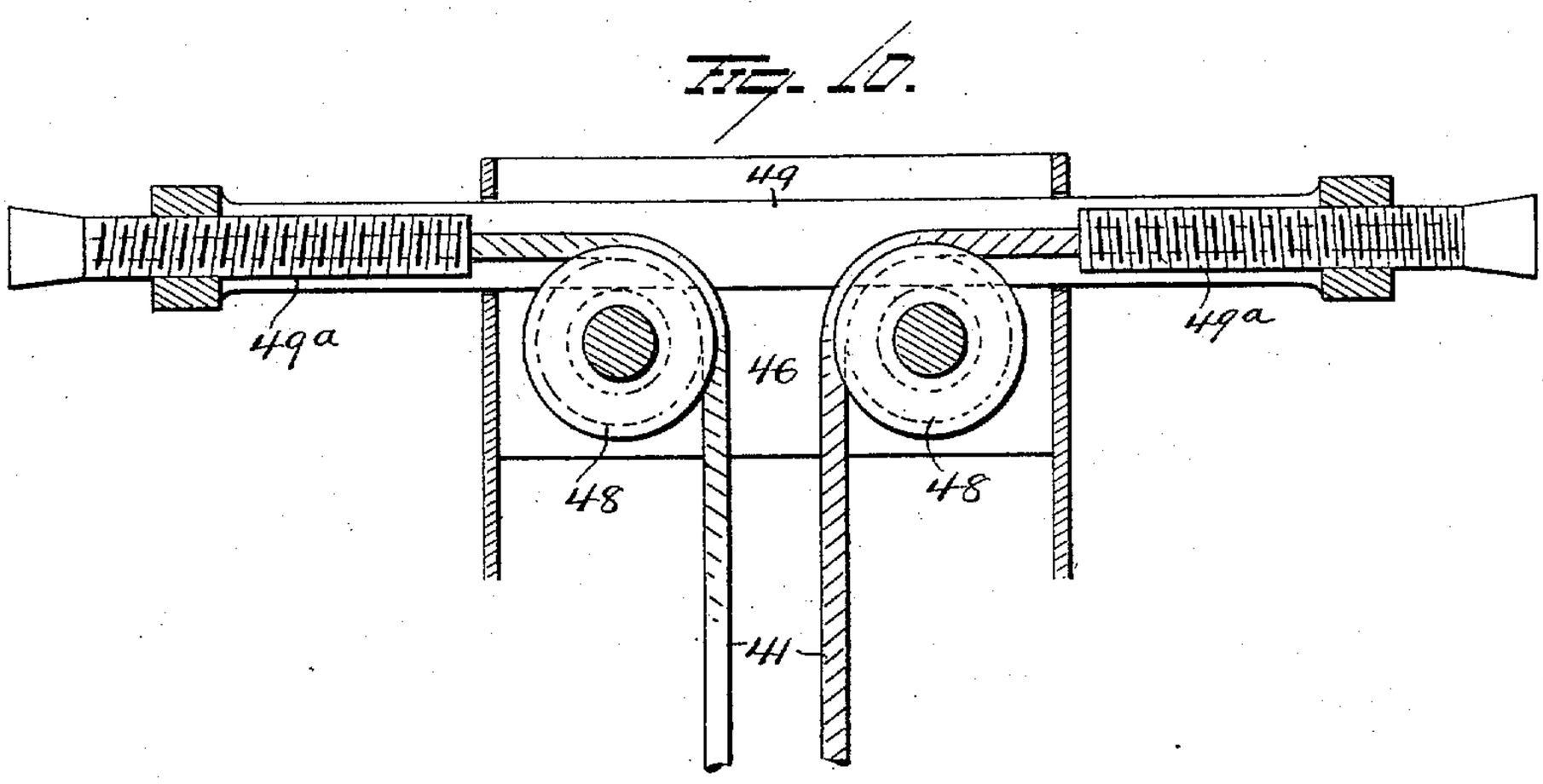
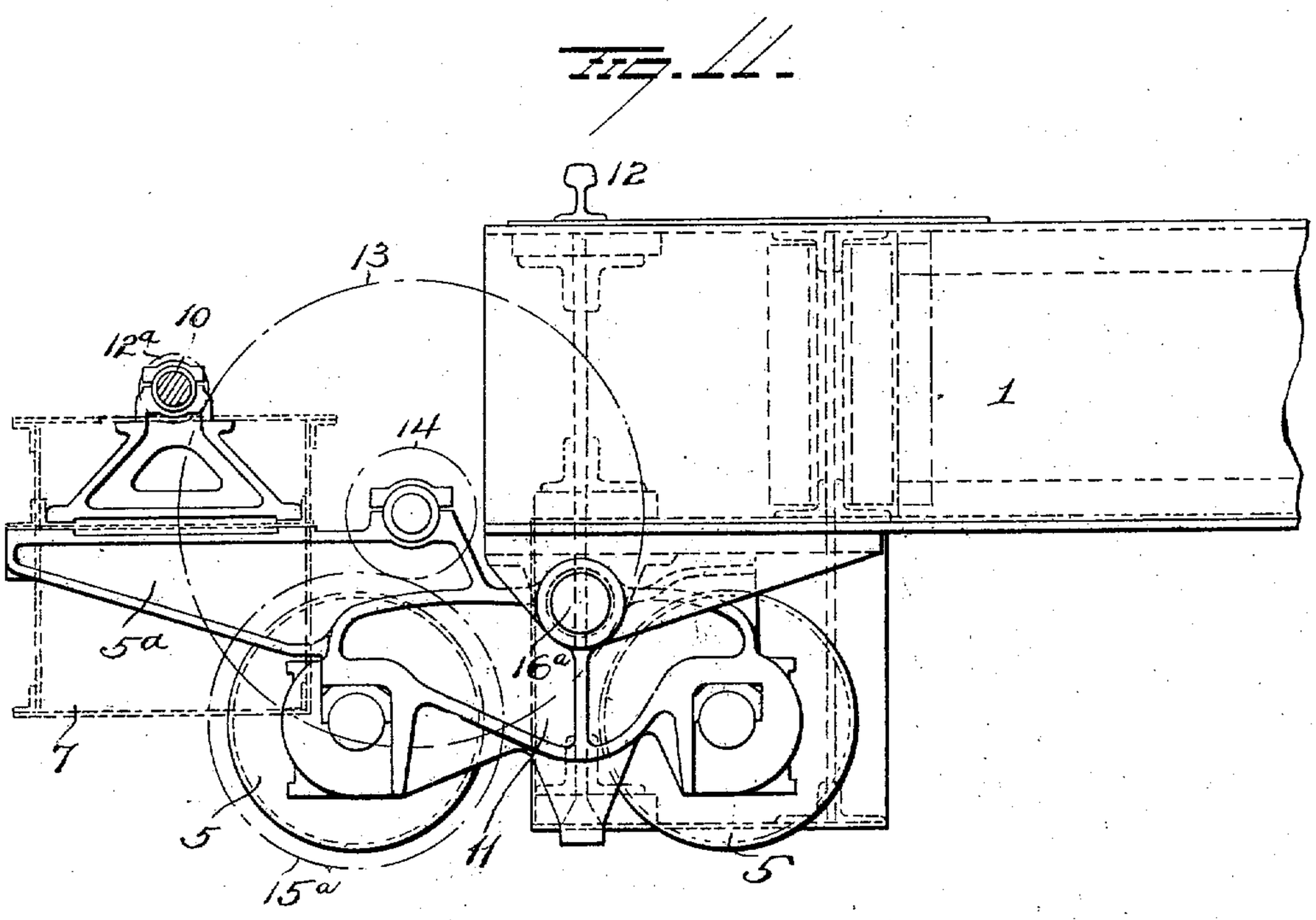


Fig. 11.



WITNESSES

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UNITED STATES PATENT OFFICE.

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LADLE-CRANE.

967,857. Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed January 20, 1909. Serial No. 473,343.

To all whom it may concern:

Be it known that I, CLARENCE L. TAYLOR, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Ladle-Cranes; and I 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 appertains to make and use the same.

My invention relates to an improvement in ladle cranes, and more particularly to the type of crane shown in Patent No. 826,127 granted to me July 17th, 1906, wherein the hoist chains or cables from the main trolley pass downwardly outside the main girders of the bridge, the object being to provide means carried by the main trolley for transferring the weight of the load from the outer side of the main girders, to planes between the main trolley supporting rails on the girders, thereby eliminating any tendency of the trolley to tip in the event the load be suddenly shifted to the chains or cables at one side.

A further object is to provide a traveling bridge with two trolleys, both mounted in the same plane on the same girders, the hoist cables of the main trolley passing downwardly to the outer side of the main girders and the hoist cables of the auxiliary trolley passing downwardly between the main girders.

With these and other objects in view my invention consists in the parts and combination of parts as will be more fully described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a traveling crane embodying my invention. Fig. 2 is a view in transverse section of the bridge. Fig. 3 is a similar view of a modified form. Fig. 4 is a view in side elevation, partly in section of the main trolley. Fig. 5 is a view in plan partly in section of same. Fig. 6 is a similar view of the auxiliary trolley. Fig. 7 is an enlarged view of a portion of the main trolley, and one load carrying hook, showing the relation of the center of the load to the carrying rails of the main trolley. Fig. 8 is an enlarged view of one of the load carrying hooks and its sheaves. Fig. 9 is a view in elevation of the sheaves. Fig. 10 is a view of the equalizing device for the cable, and Fig. 11 is a view of a part of the bridge and one end truck, showing the gearing for driving the bridge.

1 represents a traveling bridge consisting of four girders 2 arranged in pairs, the two girders of each pair being connected by top and bottom plates 3 and 4 thus forming two box girders, one at each side. These box girders are connected at their ends in the usual manner, and the structure thus formed is mounted on the end carriages or trucks 11, the track wheels 5 of which travel on the elevated trackway 6 which extends lengthwise the mill. The trucks 11 which carry and support the bridge, are each provided at its outer end with an extension 5^a to which the motor carrying girders 7 are secured, as shown in Figs. 2 and 11. In Fig. 3 I have shown one such girder 7, and in Fig. 2 I have shown a second girder 8 on the opposite side of the bridge. These girders are preferably of less depth than the bridge girders as shown in Figs. 2 and 3, and are designed to carry the travel motor 9 of the bridge and the shaft, the motor being preferably centrally located on the girders, thus obviating to a large extent the twisting tendency due to eccentric loading on these girders.

If two supplementary girders be used, each motor and its shafts will be coupled up to two track wheels 5 at the opposite ends of the bridge, and as the gearing is alike, a description of the connection between one motor 9 and its connected track wheels 5, will suffice for both. This gearing connecting the travel motor and track wheels 5 at the opposite ends of the bridge, comprises shafts 10, the adjacent ends of which are geared or coupled up to the armature shaft of the motor 9, which is located at, or about the center of the bridge. These shafts are supported in bearings carried by the supplementary girder 7, and are provided at their outer ends with the small toothed wheels 12^a, meshing with the larger wheels 13 carried by the end carriages or trucks 11. The shafts carrying wheels 13 are also provided with the smaller pinions 14, meshing with the toothed wheels 15 fixed to the axles of the track wheels 5.

The trucks or end carriage 11 pivotally support the crane bridge on the trunnions 16^a as shown in Fig. 11, and as all the driving parts including the motor, shafts and carrying girders 7 are carried by the trucks, it will be seen that all movements of the

truck due to any irregularities in the track, will be transmitted through the girders 7 to the motor and gearing connecting the latter with pinions 15[a] on the track wheels. These supplementary or bridge motor girders 7 and 8, are parallel to the main bridge girders, and form foot ways extending throughout the length of the bridge, hand rails being provided for the purposes of safety in stepping from the main bridge girders to the motor carrying girders, the tops of which as shown, are in a lower plane than the tops of the main girders. One of these motor carrying girders also affords a convenient support for the operator's cage 13[a] as shown in Fig. 2. Each main girder carries two rails 12 in the same plane, the outer rail of each girder forming a track for the main trolley, and the two inner ones the track for the auxiliary trolley, the main trolley being of arch shape, so as to permit the auxiliary trolley to pass under same and thus have free and unobstructed movement throughout the length of the bridge irrespective of the position of the main trolley.

The main trolley, shown partly in plan and partly in section in Fig. 5, and in side elevation in Fig. 4, consists of a frame the two side members 14[a] of which carry the hoist drums 15 overhanging the main bridge girders as shown in Fig. 2. This trolley is mounted on four trucks 16[a], one at each corner, the flanged wheels of which travel on the outer rails of bridge girders. The outer wheels 16 of the two trucks at one end of the trolley, are driven by the motor 17 through the shaft 18 and the gearing shown. This gearing comprises two pinions 19 at the opposite ends of shaft 18, each of which meshes with a larger pinion 20 on a short shaft 21. Each shaft 21 carries a smaller pinion 22 meshing with the larger pinion 23 rigidly secured to the axle of the outer or forward track wheel 16, hence a rotation of the shaft imparts rotation to one wheel of each truck at one end of the trolley. This motor 17 as well as all the other motors on, or carried by the bridge, are connected up to controllers located within the operator's cage 13[a]. The sides 14[a] of the main trolley are provided with oil pockets 24, in which the driving pinions and friction brakes which actuate and control the movements of the hoist drums rest and move. (See Figs. 5 and 6.) By having the pinions and brakes run in oil, the life of these parts is very materially increased.

Both hoist drums 15 on the main trolley, are simultaneously rotated so as to wind or unwind, by a single motor 25. The armature shaft of this motor is provided with a small pinion 26 which meshes with the two pinions 27, each connected to a friction brake mechanism 28 shown in Fig. 5. This friction brake mechanism may be of any approved form, that herein used being of the type shown in Patent No. 633,667 granted to me Sept. 26th, 1899, and as shown, are located in oil pockets 24 in the sides 14 of the trolley, and are mounted on the shafts 29 each of which is provided on its end opposite its friction brake 28, with a small pinion 30 meshing with a larger pinion 31 on shaft 32. The shafts 32 are incased in the elongated sleeve like bearings 33 projecting inwardly from the side frames of the case, and which are designed to contain oil, and each shaft carries a centrally located pinion 34 which meshes with the toothed section of its respective hoist drum 15. The sleeves 33 are shown in elevation to the left of pinion 34 and broken away or in section at the right of pinion 34 in Fig. 5. Each shaft, except the armature shaft is supported in bearings on the opposite sides of the gears and brakes, consequently there are no overhanging gears or pinions except the motor pinion 26, and in the latter case the strains cause as much tendency to rise as to fall, consequently no strain, due to pressure on the teeth of this pinion, falls on its shaft bearing.

Loosely mounted at each side of the main trolley, in a plane to the inner side of the main trolley supporting rail on the bridge girder, as shown in Fig. 7, is a load supporting beam 35. This beam (one at each side) has rounded or curved ends 36 resting in recessed pockets 37 in the side frames 14[a] of the main trolley, so as to permit it to have a rocking movement, and is provided centrally with the depending bracket 38, pivoted to swing in the direction of the travel of the trolley, to which brackets the hooks 39 are pivotally suspended so as to swing in a direction transversely to the travel of the main trolley. These hooks, one at each side of the trolley, are made of forgings, in one part or in sections secured together, and extend downwardly to a point below the bridge girders and are then bent inwardly under said girders, as clearly shown in Fig. 7. Each hook carries a sheave block 40 having preferably four sheaves mounted on a common axis, which rests in a plane to the inner side of a vertical line passing through the main trolley rails on the bridge girder, thus bringing the center of the load on each hook between the main trolley supporting rails, and absolutely eliminating any tendency of the main trolley to overturn should the load, from accident or otherwise come on either of the hooks separately.

Two cables 41 are secured to each drum 15, and pass down at the outer side of the bridge girders, to the sheave block 42 carrying the ladle carrying hooks 43. The cables pass under the outside sheaves in said block, and over the outside sheaves 44 in blocks 40 on the load carrying hooks, thence down and

under the next pair of sheaves in block 42, up to and over the inner sheave 45 in sheave block 40, and thence down and around the inner pair of sheaves in block 42, and from thence up to the cable equalizers 46 secured to the inner ends of the load carrying hooks. The equalizers, one for each hook 39, consist of two rollers 48 over which the cable pass, and a sliding frame 49, mounted in the hooks and adjustably connected by the screws 49ª with the ends of the cables 41. The screws 49ª are hollow and the cables 41 are passed through the screws and secured against withdrawal therefrom. By this arrangement differences in length of the cables may be compensated for by the longitudinal movement of the frame 49.

In all cranes of the overhanging type and also those in which the cables depend between the girders, there is more or less bending moment of the trolley, the amount or extent of such moment being dependent on the distance the load lifted from the center of the rail carrying the trolley. With my improved construction, the center of gravity of the load may be directly under the supporting rail for the trolley, and thus eliminating the bending moment entirely from the trolley frame, or if desired the suspending links for the hooks may be in a plane to either side of the rail, thus shifting the center of gravity to either side of the rail. So far as I am aware it is impossible, in a ladle crane, to get rid of this bending moment, and it is apparent that it will be much safer to transfer this moment to forged steel pieces the physical characteristics of which are known and are fixed and certain, than to let it remain in a steel casting of which comparatively little can be determined, due to its somewhat irregular shape. With my construction, I practically eliminate it from the trolley and lifting beam and put it in the forged parts, the trolley frame serving simply as a support for the gears and shafting.

The frame of the main trolley is arched as shown in Fig. 7 so as to permit the auxiliary trolley 50 to pass thereunder without interference.

With this improvement while the cables depend outside the main girders, the hooks 39 transfer the center of the load of each hook, to points between the trolley supporting rails thus eliminating any and all tendency to overturn.

I may if desired provide the trolley with foot walks thus permitting the workmen or operator to step from the girder to the trolley at any point and cross over between the main girders. Again the horizontal bearings on the trolley are all in the same plane which permits of the removal of any one shaft without disturbing the others.

The load carrying hooks 39 being pivotally connected to rocking supports carried by the trolley, are free to swing which is a very desirable feature, as it does away with the very uncertain strains which occur when it is attempted to keep the hooks from swinging.

It is evident that many slight changes might be resorted to in the relative arrangement of the parts shown and described without departing from the spirit and scope of my invention hence I would have it understood that I do not wish to confine myself to the exact construction and arrangement of parts shown and described, but

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

1. In a crane, the combination with a bridge, of a trolley thereon, a drum on the trolley, a cable extending downwardly outside the bridge, and means carried by the trolley for transferring the center of the load on the cable from a point outside of the bridge to a point under the bridge.

2. In a crane, the combination with a bridge, of a trolley thereon, a drum on the trolley, a cable extending downwardly outside the bridge girder and means carried by the trolley and extending below the bridge girder for transferring the center of the load on the cable from a point outside the bridge girder to a plane under or intermediate the trolley supporting rails.

3. In a crane, the combination with a bridge, of a trolley thereon, a drum on the trolley, a cable extending downwardly outside the bridge girder and swinging means carried by the trolley and extending below the bridge girder for transferring the center of the load on the cable from a point outside the bridge girder to a point under or intermediate the trolley rails.

4. In a crane, the combination with a bridge, of a trolley thereon, a hoist drum on the trolley, a cable connected to said drum and depending outside the bridge girders and a load carrying hook carried by the trolley and provided at a point between the bridge girders with sheaves around which the hoist cable passes, the axis of said sheaves being intermediate the centers of the trolley rails on the girders.

5. In a crane, the combination with a bridge, of a trolley thereon, hoist drums on the trolley, cables carried by said drums and depending outside the girders, load carrying hooks carried by the trolley outside the girders and terminating below the girders and sheaves carried by each of said hooks the axis of said sheaves being intermediate the centers of the trolley supporting rails on the girders.

6. In a crane, the combination with a bridge, of a trolley thereon, a hoist drum on the trolley, a hook carried by the trolley and

depending outside the girder, the said hook having a swinging connection with the trolley, sheaves carried by said hook, the vertical axes of said sheaves being intermediate the trolley supporting rails on the bridge and a cable carried by the drum and passing down outside the bridge girder and over the sheaves on the lower end of the hook.

7. In a crane, the combination with a bridge, of a trolley thereon, a hoist drum on the trolley, a load carrying bar loosely mounted on the trolley adjacent to and below the drum, a hook suspended from the bar and depending outside the bridge girder and terminating below the latter, sheaves carried by the hook and a hoist cable carried by the drum and also by the sheaves on the hook.

8. In a crane, the combination with a bridge, of a trolley thereon, two drums on the trolley, a hook depending from the trolley adjacent to each drum, sheaves on the lower ends of each hook, the axis of the sheaves being intermediate the rails on which the trolley runs, and cables for each drum, the cables passing around the sheaves on the hook.

9. In a crane, the combination with a bridge, of a trolley thereon, two drums on the trolley, two hooks loosely depending from the sides of the trolley outside the bridge and terminating below the bridge, sheaves on the lower ends of the hooks, the axis of the sheaves being between the trolley carrying rails on the bridge, and cables carried by the drums and passing around the sheaves on the hooks.

10. In a crane, the combination with a bridge, of a trolley thereon, a drum on the trolley, cables depending from said drum outside the bridge girder, means carried by the trolley for transferring the center of the load on the cables from a point outside the bridge girders to a plane intermediate the trolley supporting rails, and equalizing means carried by said transferring means and connecting the ends of the two cables.

11. In a crane, the combination with a bridge, of a trolley thereon, a drum on said trolley, two cables carried by said drum, a load carrying hook depending from the trolley outside the bridge girder, sheaves on said hook around which the cables pass and an equalizing device carried by said hook and connecting the two ends of the cables.

12. In a crane, the combination with a bridge, of a trolley thereon two drums on the trolley, a cable on each drum, a load carrying bar for each drum, the said bars being located in vertical planes intermediate the rails on which the trolley travels, and load carrying hooks depending from said bars and carrying sheaves the latter being located below the girders, the axes of the sheaves being in planes intermediate the vertical planes of the rails on which the trolley travels.

13. In a crane, the combination with a bridge and two track rails on each bridge girder, the said rails being supported in the same horizontal plane, of a trolley mounted on the outer rails of the two girders and a trolley mounted on the inner rails of both girders.

14. In a crane, the combination with a bridge and two rails on each bridge girder, the said rails being in the same horizontal plane, of an arched shaped trolley mounted on the outer rails of the two girders and a trolley mounted on the inner rails of the two girders.

15. The combination with a bridge and trucks supporting same, of a girder carried by two of said trucks, and a bridge travel motor on said girder.

16. The combination with a bridge and swiveled trucks supporting same, of a girder parallel with the bridge girder and mounted at its ends on two of the swiveled trucks.

17. The combination with a bridge and trucks supporting same, of a girder parallel to the bridge and carried by two of said trucks, and a hand rail on said girder.

18. The combination with a bridge mounted on trucks, of two motor carrying girders carried by said trucks, motors on said girders and gearing connecting the motors and track wheels of the trolley.

19. The combination with a trolley frame the side members of which have pockets therein and bearing on opposite sides of each pocket, of a drum, a motor and a series of shafts connecting the motor and drum, the pinions connecting the several shafts resting and moving in the oil pockets in the sides of the frame.

20. In a traveling crane, the combination of a bridge mounted on trucks, an auxiliary girder mounted on two of the bridge trucks and a bridge travel motor and gearing carried by said auxiliary girder.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

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Witnesses:
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