June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 1

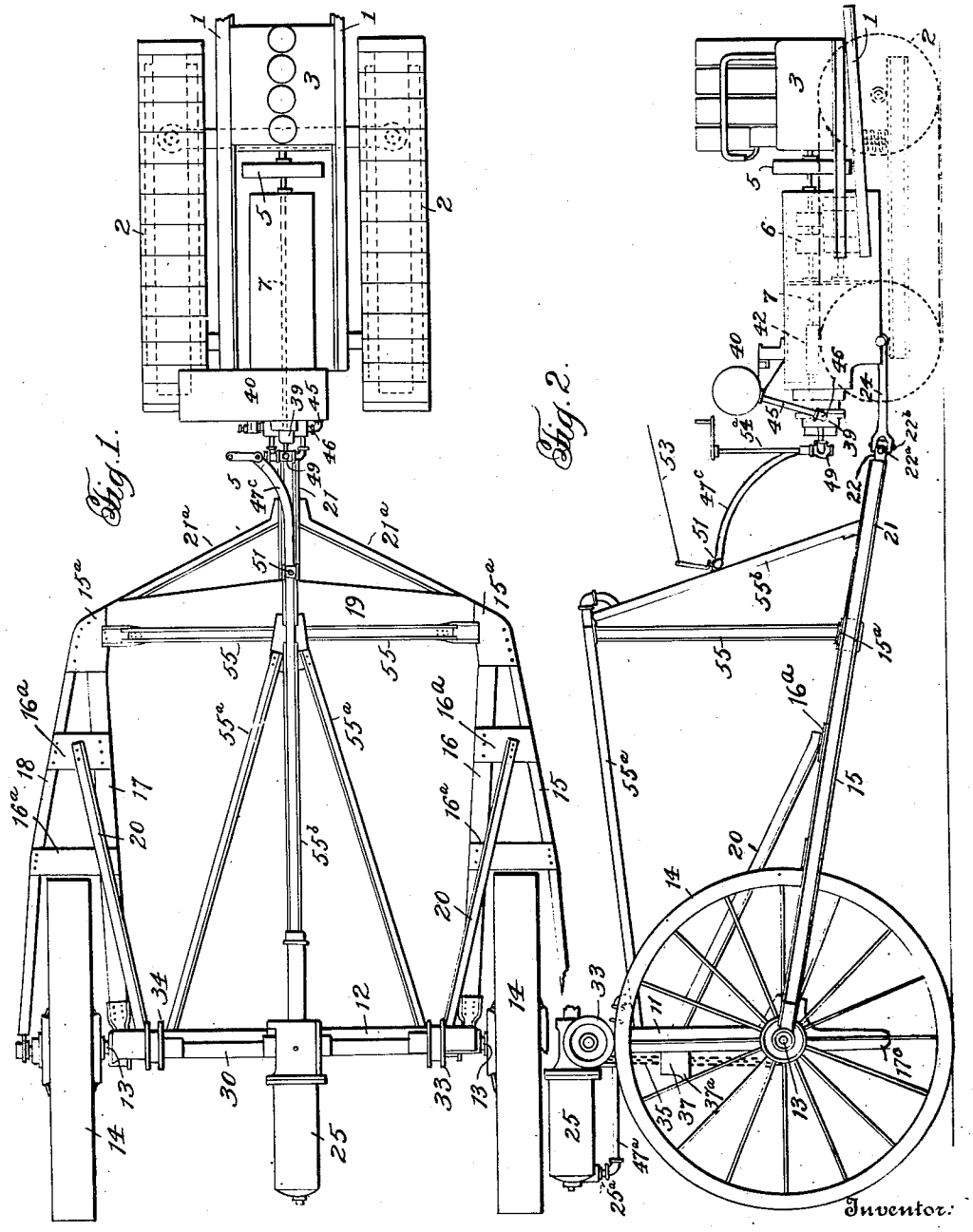


Fig. 1.

Fig. 2.

Witness:
Jas. C. Hutchinson.

Inventor:
Clarence Leo Best
By Milans & Milans
Attorneys.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 2

Fig. 3.

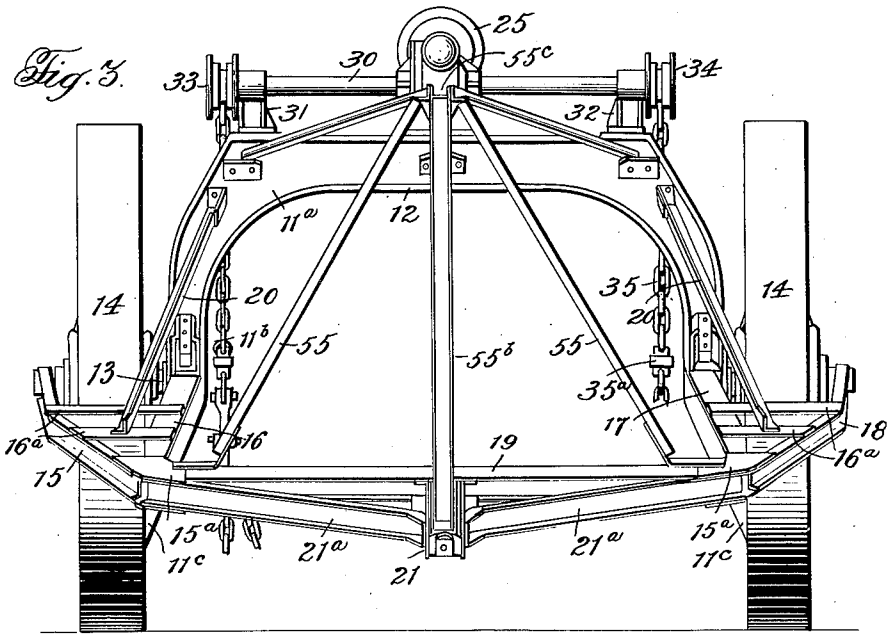
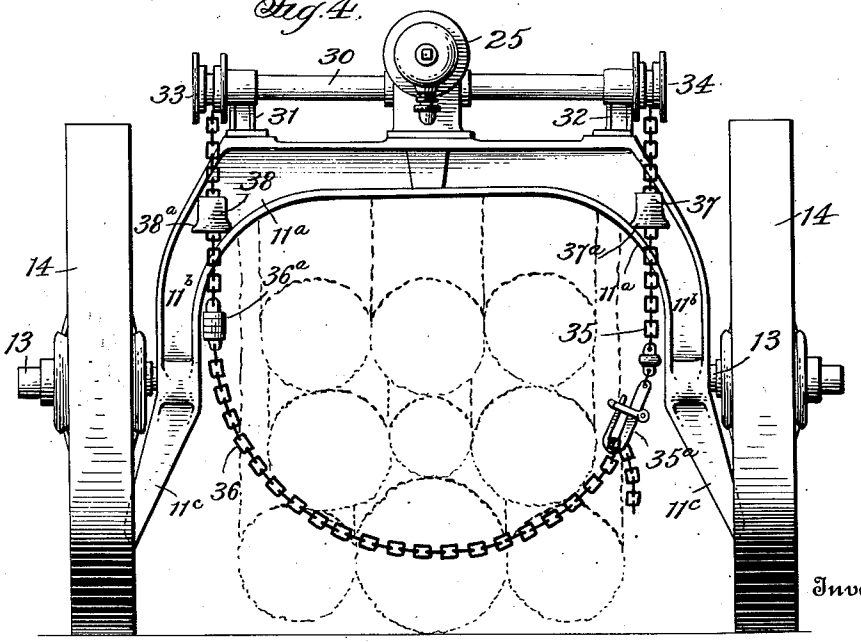


Fig. 4.



Inventor:

Witness:

Jas. E. Hutchinson.

Clarence Leo Best,

By

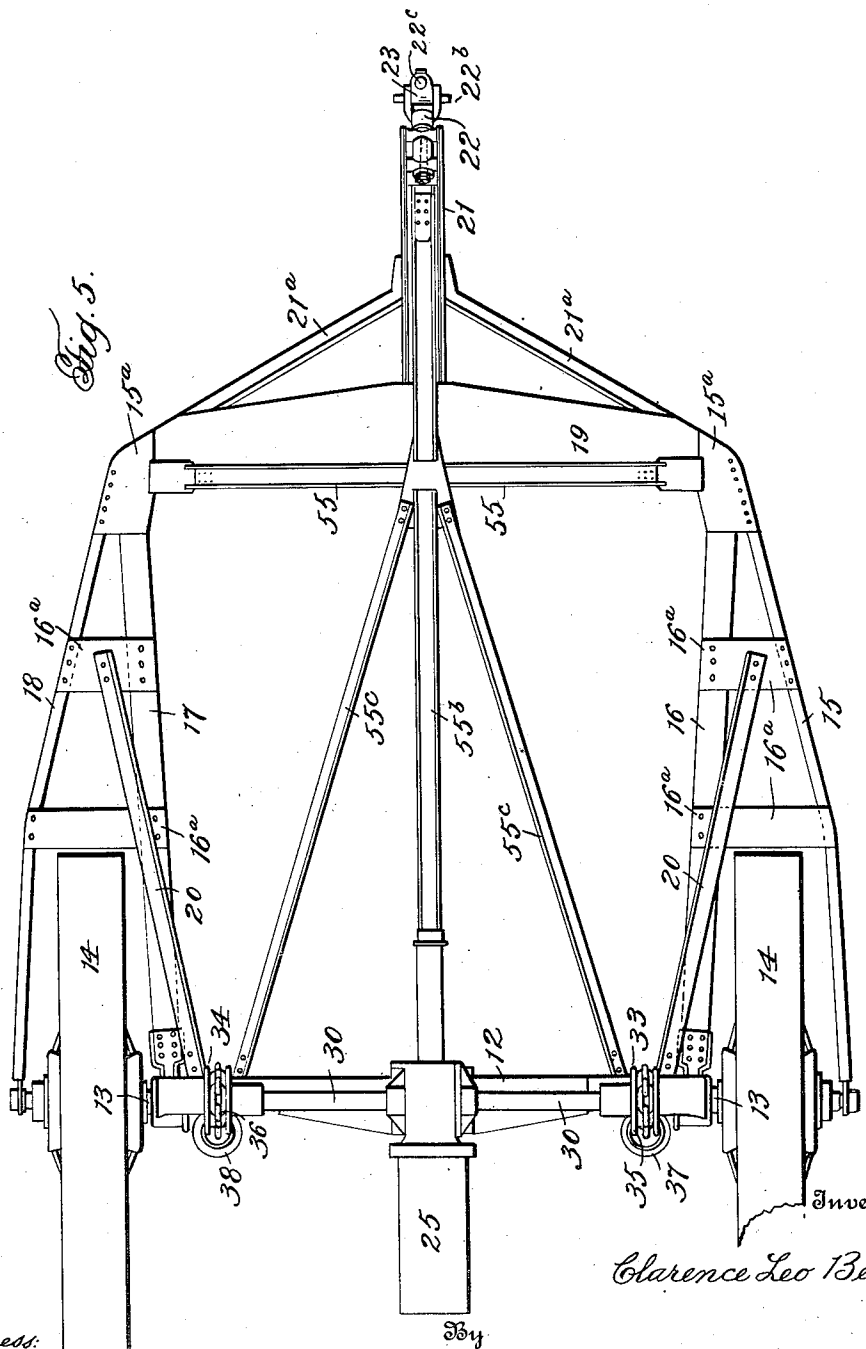
Milans & Milans Attorneys.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 3

Fig. 5.



Witness:
Jas. E. Hutchinson.

Inventor:
Clarence Leo Best,
By
Milans & Milans Attorneys

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 4

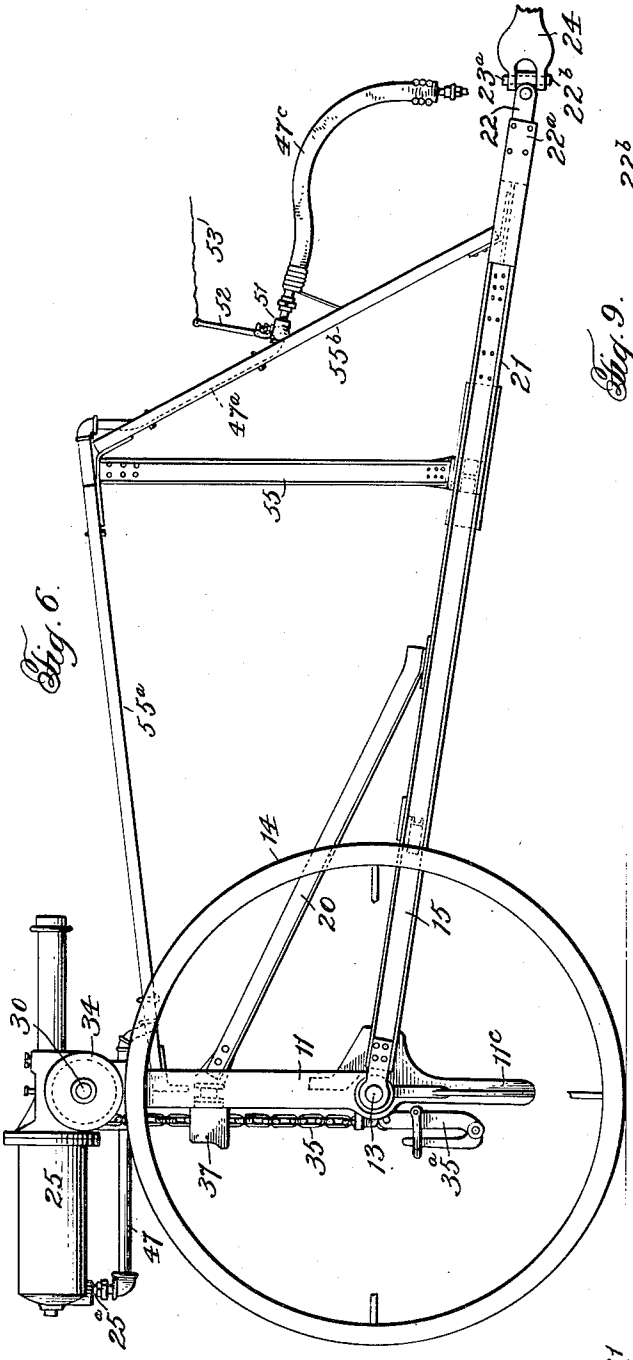


Fig. 6.

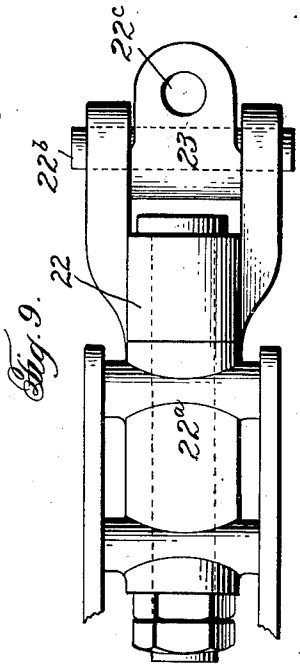


Fig. 9.

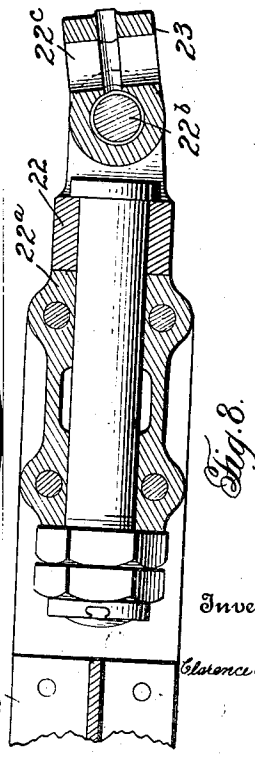


Fig. 8.

Witness:
Jas. E. Hutchinson.

Inventor:
Clarence Leo Best

By
Milans & Milans Attorneys.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 5

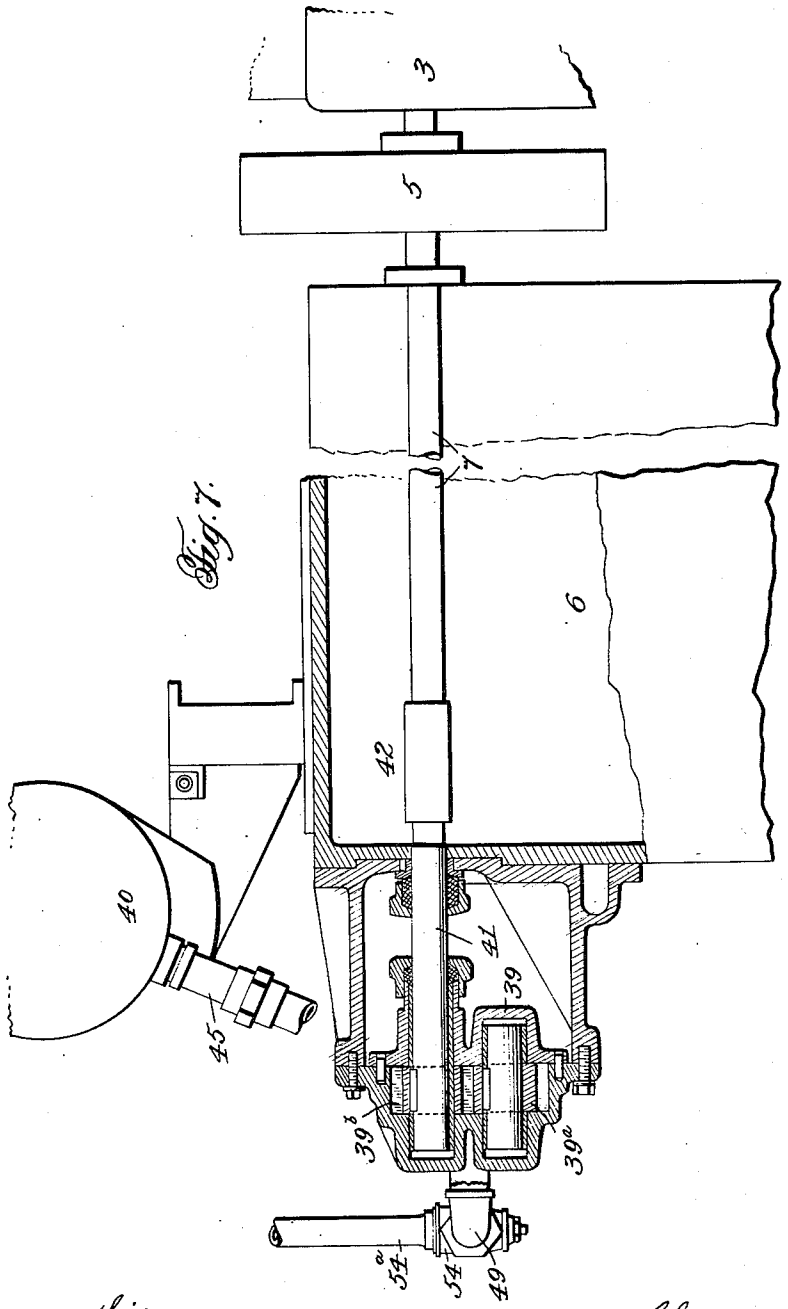


Fig. 7.

Inventor:

Witness:

Clarence Leo Best,

Jas. E. Hutchinson.

By Milans & Milans

Attorneys.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 6

Fig. 11.

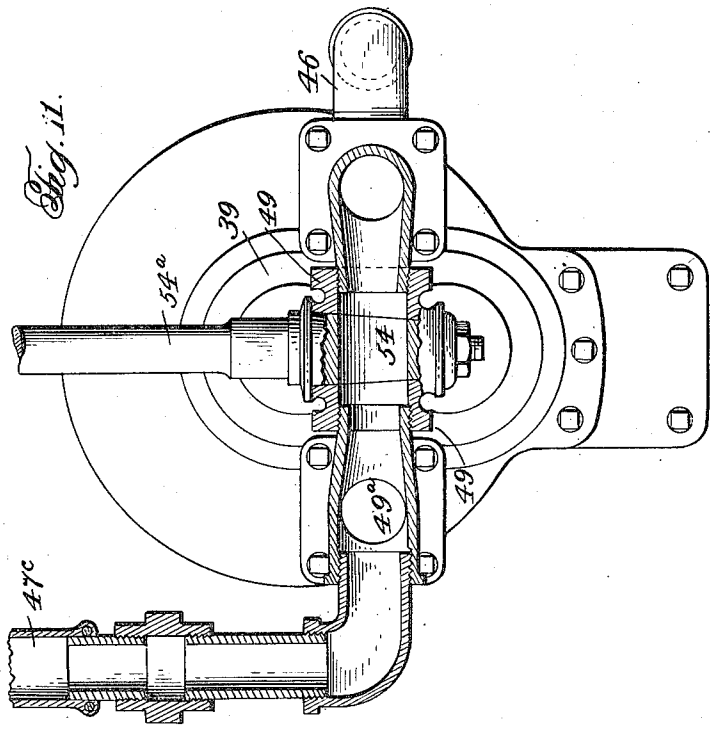
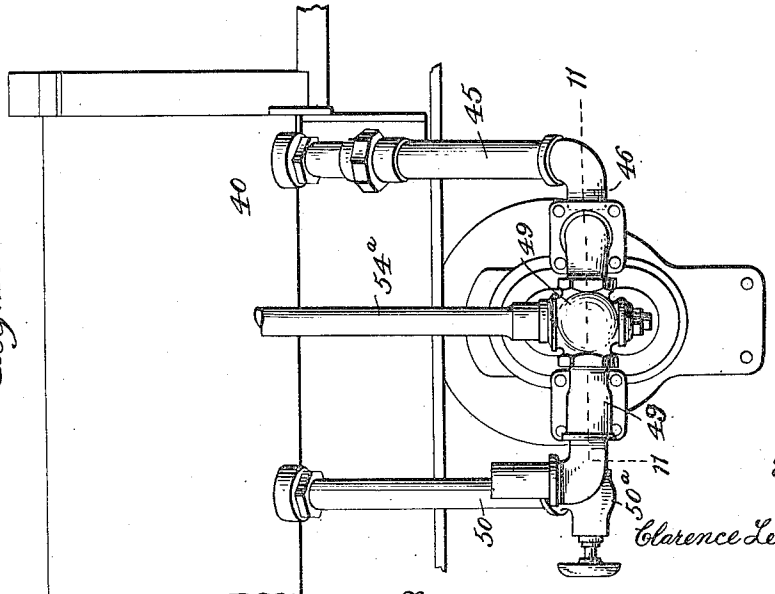


Fig. 10.



Inventor:
Clarence Leo Best,
By Milans & Milans
Attorneys.

Witness:
Jas. E. Hutchinson.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 7

Fig. 13.

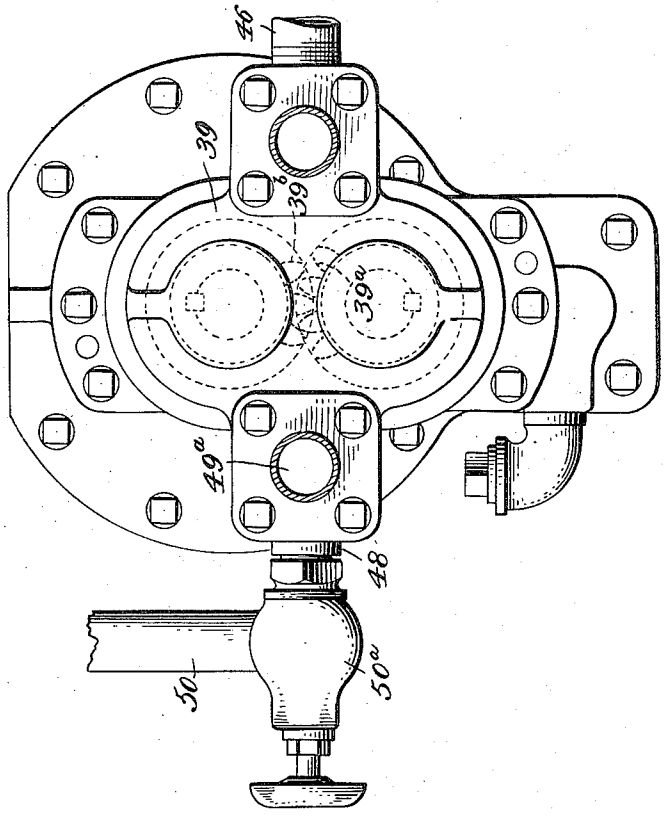
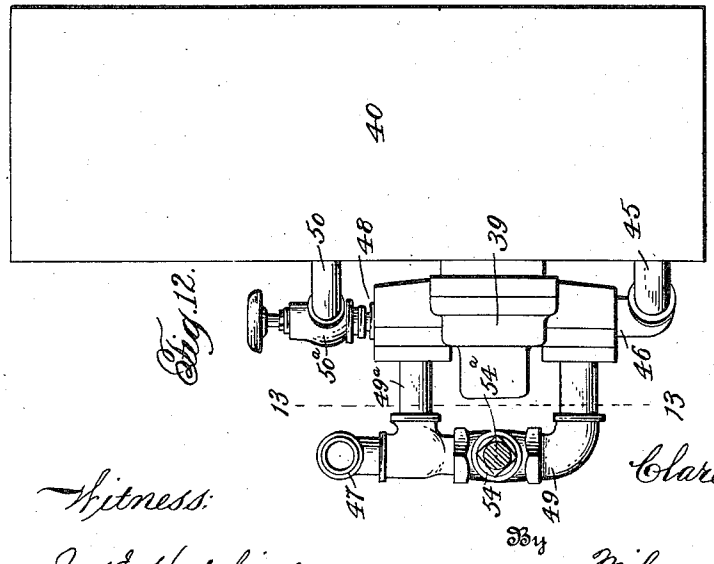


Fig. 12.



Witness:
Jas. E. Hutchinson.

Inventor:
Clarence Leo Best,
By
Milans & Milans
Attorneys.

June 17, 1930. C. L. BEST 1,763,747

HOISTING AND TRANSPORTING APPARATUS

Filed Sept. 10, 1924 8 Sheets-Sheet 8

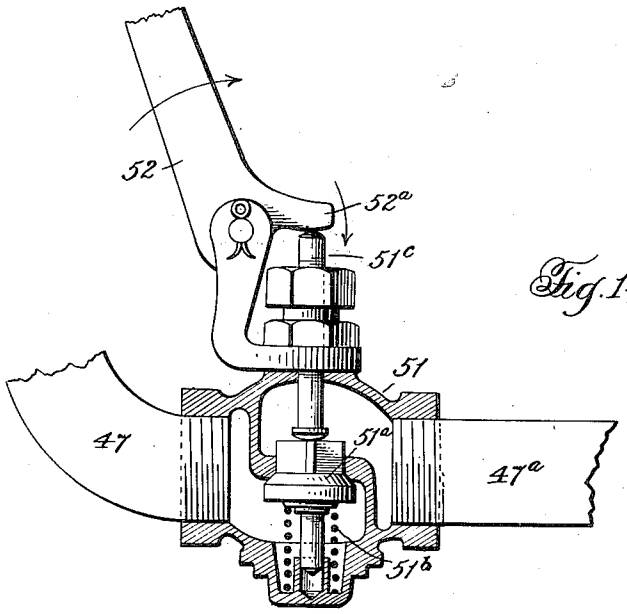


Fig. 14.

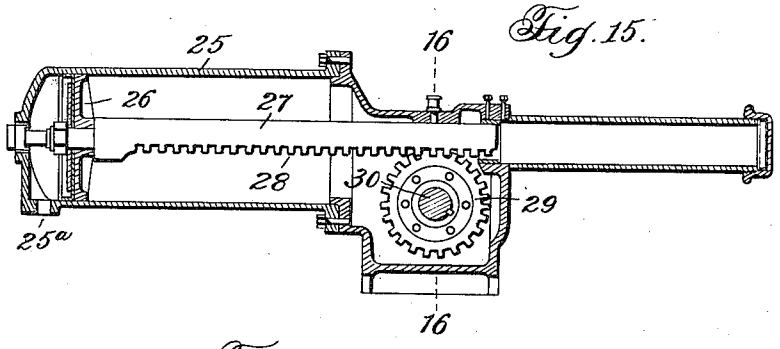


Fig. 15.

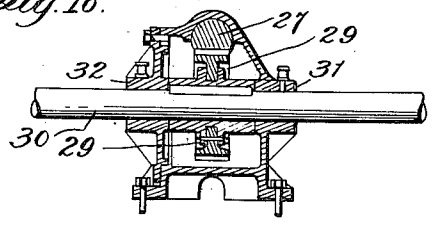


Fig. 16.

Inventor:

Witness:

Clarence Leo Best,

Jas. E. Hutchinson.

By Milans & Milans

Attorneys.

Patented June 17, 1930 1,763,747

UNITED STATES PATENT OFFICE

CLARENCE LEO BEST, OF SAN LEANDRO, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CATERPILLAR TRACTOR CO., OF SAN LEANDRO, CALIFORNIA, A CORPORATION OF CALIFORNIA

HOISTING AND TRANSPORTING APPARATUS

Application filed September 10, 1924. Serial No. 736,975.

This invention relates to an improved hoisting and transporting apparatus.

The object of the invention is to provide an improved carrying vehicle or trailer provided with improved hoisting and supporting means of a simple efficient nature in combination with a tractor adapted to serve as means for hauling the vehicle or trailer and also to furnish power for the hoisting means of the carrying vehicle or trailer.

A further object of the invention is to provide an improved hoisting and transporting apparatus of the character referred to particularly adapted for logging operations capable of efficiently operating over rough hilly country and by which the lifting, loading, and hauling operations can be expeditiously performed and the logs securely held in lifted position on the carrying vehicle or trailer during transportation.

The invention, with other objects and advantages thereof, and the particular construction, combinations, and arrangements of parts comprising the same, will be understood from the hereinafter contained detail description, when considered in connection with the accompanying drawings forming part hereof and illustrating one embodiment of the invention.

In the drawings:

Figure 1 is a top plan view of a hoisting and transporting apparatus constructed in accordance with the present invention.

Fig. 2 is a side elevation.

Figs. 3 and 4 are respectively front and rear elevations of the carrying vehicle or trailer.

Fig. 5 is a top plan view, on an enlarged scale, of the carrying vehicle or trailer.

Fig. 6 is a side elevation on an enlarged scale of the carrying vehicle or trailer.

Fig. 7 is a detail vertical section of the pump and parts associated directly therewith.

Figs. 8 and 9 are detail views, on an enlarged scale, of the coupling means between the traction engine and carrying vehicle.

Fig. 10 is a detail front elevation of the pump and associated parts of the fluid pressure system.

Fig. 11 is a section on the line 11—11 of Figure 10.

Fig. 12 is a detail top plan view of the pump and adjoining parts of the fluid pressure system.

Fig. 13 is a detail section on the line 13—13 of Figure 12.

Fig. 14 is a detail view of the check valve.

Fig. 15 is a detail section of the fluid pressure mechanism.

Fig. 16 is a section on the line 16—16 of Figure 15.

The invention comprehends the use of a traction engine having an internal combustion engine as power means for driving the same, in combination with a carrying vehicle or trailer, suitably coupled with the traction engine to be drawn thereby and having fluid pressure actuated hoisting mechanism thereon including a cylinder and piston, together with fluid pressure supply means for said mechanism comprising a pump on the traction engine driven by the internal combustion engine of the tractor, and a fluid pressure supply connection between said pump and said cylinder.

Referring to a detail description of the particular embodiment of the invention illustrated in the drawings, the traction engine shown is one of the well known types of track layer tractors having a main frame 1 supported upon a pair of endless tracks 2, which are pivotally connected to the main frame for independent oscillatory movement, and the tractor being provided with an internal combustion engine 3 as the power unit for driving the endless tracks. 5 designates the engine clutch, 6 the transmission, and 7 the drive shaft. Drive connections including control clutches (not shown) and which may be of any of the well known forms are provided between the drive shaft 7 and the endless tracks 2.

The carrying vehicle or trailer, in the present instance, takes the form of a two wheel vehicle or cart, comprising an arched axle or frame having sides or legs 11 and an upper horizontally extending portion 12. Extending outwardly from the side portions 11 are stub axles 13 upon which are mounted wheels

14. The wheels 14 are large size and the arched frame or axle is of a size to straddle and have lifted upwardly therein a bunch of logs, the arched frame or axle being shown as constructed from a continuous heavy steel I-beam, and the wheels 14 being stoutly constructed of steel. The sides or legs 11 of the arched frame or axle have upper inwardly curved portions 11[a], straight portions 11[b], and lower outwardly and downwardly inclined portions 11[c], the construction being free from abrupt surfaces and facilitating the ready entrance of the bunch of logs within the arched frame without hindrance, the end portions 11[c] extending at an inclination outwardly and downwardly from the straight portions 11[b] to near the vertical planes of but clear of the inner sides of the wheels 14, acting to deflect or guide the logs within the arched frame in the lifting operation and to hold the logs off from the wheels. The carrying vehicle or cart is provided with a draft tongue comprising side bars 15, 16, 17, 18 and a front transverse bar 19. The bars 15, 18, are conducted at their rear ends with the stub axles 13 at the outer ends thereof. The bars 16, 17, are disposed at the inner side of the wheels 14 being secured at their rear ends to the lower portions of the sides or legs 11 of the arched frame or axle. The bars 15, 16, 17, 18, extend forwardly at a downward inclination well in advance of the wheels, and the bars 16, 17, which extend along the inner sides of the wheels 14 also incline outwardly, as shown, said bars 15, 16, and 17, 18 being secured at their forward ends to each other and to the front transverse bar 19 by tie plates 15[a]. 16[a] designates tie plates connecting the bars 15, 16, and 17, 18, intermediate the ends thereof. 20 are brace members secured at opposite ends to the forward tie plates 16[a] and to the upper portions of the legs 11 of the arched frame or axle. Projecting forwardly from the transverse bar 19 is a tongue portion 21 braced on either side by bars 21[a] each secured at one end to said tongue portion 21, and secured at their other ends to the tie plates 15[a]. The tongue portion 21 is coupled to the tractor to provide for rocking movement of the carrying vehicle or cart relatively to the tractor, and also for relative angular movement of the tongue vertically and laterally. Any suitable form of coupling may be employed, the particular coupling means shown comprising a draw bar 22 having a swiveled connection 22[a] at one end with the tongue portion 21, pivotally connected at its other end by a horizontal pin 22[b] with a coupling link 23 that is provided at its forward end with an eye 22[c] to fit between the jaws of and to be pivotally connected by a pin 23[a] to a draw bar 24 connected with the axle of the tractor.

The bars 16 and 17 extending along the inner sides of the wheels 14 in addition to serving as part of the draft tongue or rigging for the trailer or cart assist in maintaining the logs centrally of the arched frame or axle off from the wheels and serve to prevent chafing.

The cart is provided with fluid pressure actuated hoisting mechanism including a cylinder and piston 25, 26. The cylinder 25 is securely mounted upon the horizontally extending upper part 12 of the arched frame or axle of the cart, the cylinder 25 being arranged horizontally to extend transversely of the horizontal part 12 of the arched frame or axle and centrally of the ends thereof. The piston 26 has a rod 27, which is provided with a rack 28 that meshes with a pinion 29 fixed on a shaft 30 extending longitudinally of the horizontal part 12 of the arched frame or axle. The shaft 30 is mounted in bearings 31, 32, on the horizontal part 12 of the arched frame, the ends of the shaft 30 extending slightly beyond the ends of the horizontal part 12, as shown, and having fixed thereon sheaves 33, 34. 35, 36, designate chains each secured at one end to one of the sheaves 33, 34, to be wound thereon, one of said chains being longer than the other and adapted to be reefed about a bunch of logs, the ends of the chains being connected, as indicated in Figure 4 of the drawings providing a sling for lifting and supporting the bunch of logs, the shaft 30 being rotated through the rack 28 and pinion 29 to wind up the chains 35, 36, on the sheaves 33, 34, and the bunch of logs being lifted when the piston 25 is forced in one direction by fluid pressure supplied to the cylinder 25. 36[a] designates a swivel in the chain 36 to prevent twisting of the chains, and 35[a] is a coupling hook on the other chain 35.

Tubular members 37, 38 are provided on the arched frame or axle through which the chains 35, 36, pass. The tubular members 37, 38, are arranged below and in vertical alignment with the sheaves 33, 34, and have lower flaring end portions 37[a], 38[a], as shown, said tubular members 37, 38, serving as guides for the chains 35, 36, functioning to maintain the upper stretches of the chains in alignment with the sheaves 33, 34, and also acting to prevent strains, due to side sway of the load, from being transmitted to the sheaves.

39 designates the pump on the tractor for supplying fluid under pressure to the cylinder 25. In the particular exemplification of the invention shown in the drawings, a liquid is employed as the fluid pressure medium, and 40 is a reservoir or receiving vessel for the liquid, preferably oil. The pump 39 which is shown as one of the well known forms of gear pumps having the rotary elements 39[a], 39[b], is driven from the internal combustion engine 3 of the tractor. One of the rotary pump elements 39[a] has a shaft 41 extending in alignment with the engine shaft 7 and connected thereto for rotation therewith by a

coupling sleeve 42. The fluid pressure system includes a connection 45 leading from one end of the reservoir or liquid receiving vessel 40 to the pump intake 46, a pipe connection 47 from the pump outlet 48 to the inlet 25ª of the cylinder 25, a by pass connection 49 leading from the pipe connection 47 around the pump 39 to the pump connection 45 near the pump intake 46, and a branch relief pipe connection 50 leading from the pipe connection 47 to the other end of the reservoir or liquid receiving vessel 40. 51 designates a check valve in the pipe connection 47, said valve operating automatically to permit the passage of fluid past the valve to the inlet 25ª of the cylinder 25 and to prevent back flow of fluid from the cylinder. The check valve 51 may be of any suitable construction, that shown being one of the well known constructions. 51ª designates the valve proper and 51ᵇ is a spring for yieldably holding the valve to its seat. In order to provide for relieving the pressure on the piston 26, means is provided for holding the check valve 51 open. For this purpose the valve 51ª is shown provided with a stem 51ᶜ projecting outside the valve casing and 52 is an operating lever having an arm 52ª adapted to engage the upper end of the valve stem 51ᶜ and depress the same and the valve 51ª when said lever is rocked in one direction. 53 is a pull cable connected with one end of said lever. In the by-pass connection 49 is a hand operated control valve 54 adapted to completely cut off the passage of liquid through the by-pass or to be set to restrict the flow through the by-pass in varying degree. The valve 54, which is a rotary valve of any of the conventional forms, is provided with an operating rod 54ª. The branch relief pipe 50 is controlled by an automatically acting relief valve 50ª, said valve, which may be of any of the well known constructions, normally closing the relief pipe 50 and being adapted to open under conditions of excessive pressure in the system.

As will be understood, when the valve 54 is closed and the pump 39 is operated, fluid will be supplied to the cylinder 25 through the pipe connection 47 from the pump outlet 49ª to actuate the piston 36 and the hoisting mechanism. When the load has been lifted, the valve 54 is opened, allowing the fluid to flow around through the by-pass connection 49. To relieve the pressure on the piston 26 and lower the load, the check valve is opened by operating the lever 52. By setting the valve 54 of the by-pass connection, the back flow can be retarded as desired to suit different conditions of operation.

The pipe connection 47 from the pump outlet 48 to the inlet 25ª of the cylinder 25 has a rigid pipe section 47ª supported on the carrying vehicle or cart, a rigid pipe connection 47ᵇ on the tractor, and an intermediate section 47ᶜ bridging the distance between the tractor and the carrying vehicle or cart, said intermediate connection 47ᶜ being flexible, constructed of rubber hosing or the like to provide for relative movement of the rigid pipe sections 47ª, 47ᵇ, due to relative movement between the tractor and the carrying vehicle or cart. The support for the rigid pipe section 47ª on the carrying vehicle comprises an A-frame 55 secured at its lower ends to the transverse bar 19 and tie plates 15ª of the draft frame, braces 55ª extending from the upper end of the A-frame 55 to the upper part 12 of the arched axle or frame, and channel members 55ᵇ, 55ᶜ, directly receiving the rigid pipe section 47ª, the channel member 55ᵇ being secured at opposite ends to the tongue portion 21 and the upper end of the A-frame 55, and the channel member 55ᶜ extending from the upper end of the A-frame 55 to the upper portion 12 of the arched axle or frame.

In the use of the apparatus a number of logs are bunched together, the number of the logs depending upon the size of the same, and a transversely extending shallow trench is provided beneath the logs. The carrying vehicle or cart is backed over the bunch of logs, and the longer chain 36 is carried beneath the bunch of logs at the shallow trench and the end portions of the chains 35, 36 are coupled together. The valve 54 in the by-pass connection 49 is then closed, fluid pressure being supplied to the cylinder 25 to lift the bunch of logs. When the forward portion of the bunch of logs has been raised to the desired position within the arched frame or axle, the valve 54 is opened, the bunch of logs being held supported in the sling formed by the chains 35, 36, the check valve 51 closing automatically as soon as pressure at one side thereof from the pump is relieved, the fluid from the pump flowing through the by-pass connection 49. To lower the logs in unloading or so that the logs will act as a brake in going down hill, the valve 54 is set to provide for a retarded flow through the by-pass connection 49, and the check valve 50 is operated by the pull cord 52 to hold said valve open, the fluid pressure against the piston being relieved to gradually lower the load, the liquid flowing back from the cylinder 25 through the pipe connection 47 and by-pass connection 49 to the liquid reservoir or receiving vessel 40.

When the pump 39 is running idle, valve 54 is set in open position to permit free flow of the fluid through the by-pass connection 49, thereby allowing the fluid to circulate through the pump without any pressure. The relief pipe connection 50 and valve 50ª function as safety means. Under excessive pressure conditions in the system, the relief valve 50ª will automatically operate to open the relief pipe connection 50 leading to the reservoir 40, said valve automatically closing

when the pressure is reduced to that for which said valve is set.

It will be noted that the particular construction, combination and arrangement of parts, hereinbefore described affords a hoisting and loading apparatus of a strong durable nature, capable of operating over rough mountainous country, and by which the lifting and loading operations can be quickly and easily accomplished and the logs are securely held during transportation, provision being made for preventing strains due to side sway of the load from being transmitted through the hoisting chains to the sheaves of the hoisting mechanism, for preventing the logs from catching on the sides of the frame in the lifting operation and for holding the logs off from the wheels. The hoisting means is of an efficient nature adapted to be easily controlled, providing for lifting the bunch of logs evenly at either side to avoid rolling of the logs in the lifting operation, providing for the easy release of the mechanism in lowering the load and at the same time all of the advantages of the use in the combination, of a modern type of tractor with an internal combustion engine as the power unit therefor, are retained.

While a specific embodiment of the invention is illustrated in the drawings, it will of course be understood that changes and modifications in the particular construction shown and the embodiment of the invention in other forms for use as hoisting and carrying means for other than logging purposes, for instance for snow plows, excavator mechanism, land levelers and the like may be practiced without departing from the spirit of the invention.

What I claim is:

1. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels at each side of the frame for supporting the same, said arched frame having lower portions extending outwardly and downwardly at an inclination.

2. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels supporting the frame at either side, said arched frame having lower outwardly and downwardly inclined portions extending to points adjacent the vertical plane of the inner sides of the wheels.

3. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels supporting the frame at either side, said frame having straight side portions and lower portions extending outwardly and downwardly at an inclination from said straight side portions.

4. A log hoisting and transporting apparatus including a cart comprising an arched frame with wheels supporting the frame at either side, said arched frame having lower portions extending outwardly and downwardly at an inclination below the axles of the wheels.

5. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels supporting the frame at either side thereof, and fluid pressure actuated mechanism including a cylinder mounted on the frame, a piston in the cylinder, a shaft mounted for rotation on the upper part of the frame, said shaft extending longitudinally of the frame, sheaves fixed on the outer end portions of said shaft, chains secured to the sheaves, a connection between the piston and shaft providing for rotation of the shaft upon movement of the piston, means on the arched frame for engagement by the chains and acting to prevent strains due to side sway of the load from being transmitted to the sheaves by the chains, and means for supplying fluid under pressure to the cylinder.

6. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels at either side of the frame for supporting the same, and fluid pressure actuated mechanism including a cylinder mounted on the frame, a piston in the cylinder, a shaft mounted for rotation on the upper part of the frame, said shaft extending longitudinally of the frame, sheaves on the outer end portions of the shaft, chains secured to said sheaves, tubular guides for the chains on the arched frame, and means for supplying fluid under pressure to the cylinder.

7. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels at each side of the arched frame for supporting the same, and bars secured to the arched frame and extending downwardly therefrom to one side thereof along the inner sides of the wheels to prevent chafing.

8. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels at each side of the arched frame for supporting the same, and bars extending from the arched frame to one side thereof at an outward inclination along the inner sides of the wheels to prevent chafing.

9. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame, wheels at each side of the arched frame for supporting the same, and bars secured to the arched frame and extending along the inner side of the wheels at a downward and outward inclination to prevent chafing.

10. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame having axle portions extending outwardly from the sides thereof, supporting wheels mounted on said axle por-

tions at either side of the arched frame, and a draft frame including a pair of bars each connected at one end to one of the axle portions at the outer end thereof and extending forwardly in advance of the wheels, a pair of bars each secured at one end to one side of the arched frame and extending downwardly and outwardly therefrom along the inner sides of the wheels, and a front transverse member to which the pairs of bars are connected at their outer ends.

11. A log hoisting and transporting apparatus including a carrying vehicle comprising an arched frame having axle portions extending outwardly from the sides thereof, supporting wheels mounted on said axle portions, and a draft frame including a pair of bars each connected at one end to one of the axle portions at the outer end thereof and extending forwardly in advance of the wheels, a pair of bars each secured at one end to one side of the arched frame and extending downwardly and outwardly therefrom along the inner sides of the wheels, a front transverse member to which the pairs of bars are connected at their outer ends, and a pair of inclined brace members, each of said brace members being secured at opposite ends respectively to two of the said bars and to the upper portion of the arched frame, said brace members extending along the inner sides of the wheels.

In testimony whereof I hereunto affix my signature.

CLARENCE LEO BEST.