

Nov. 6, 1951

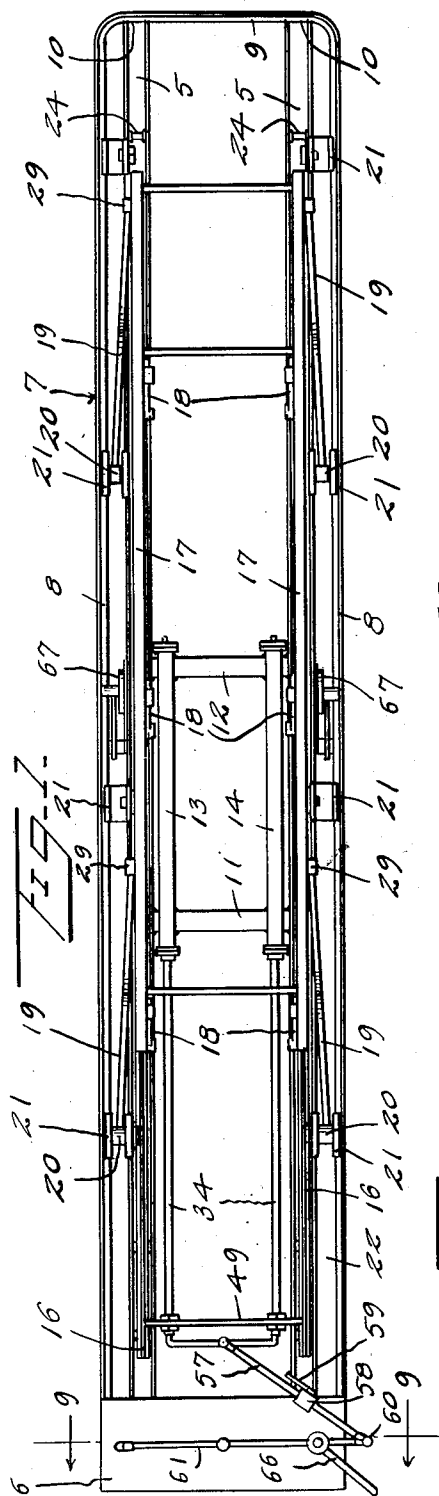
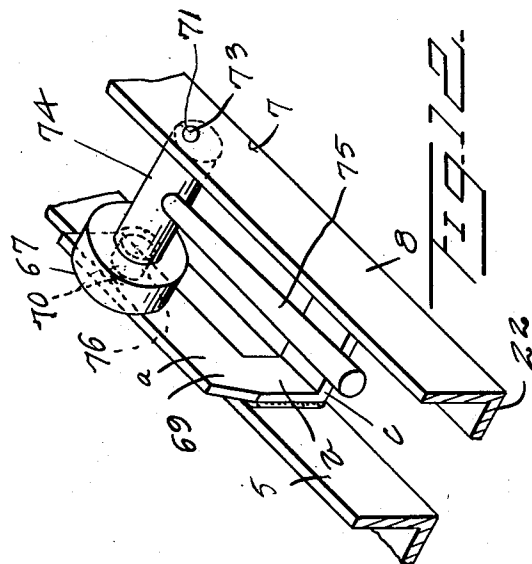
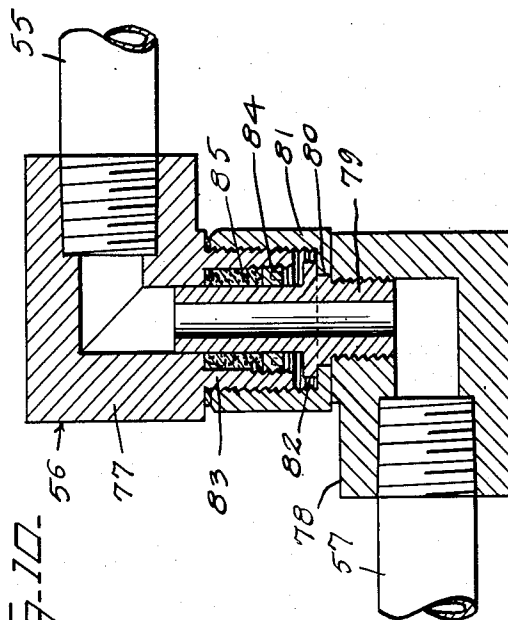
G. R. ARNER, SR

2,574,236

HOISTING APPARATUS

Filed Feb. 8, 1946

6 Sheets-Sheet 1



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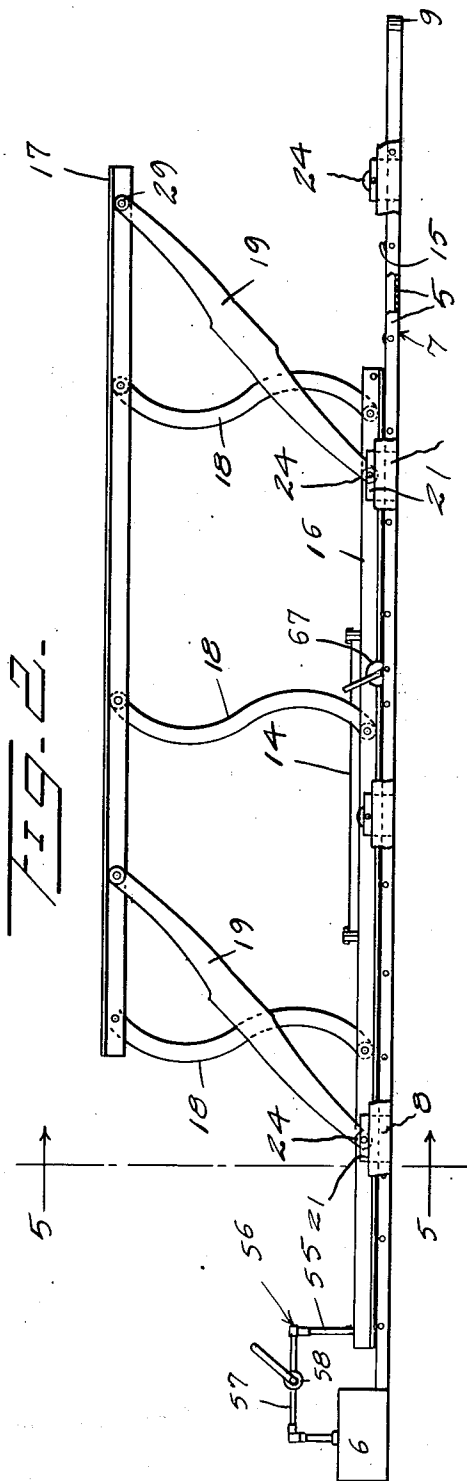
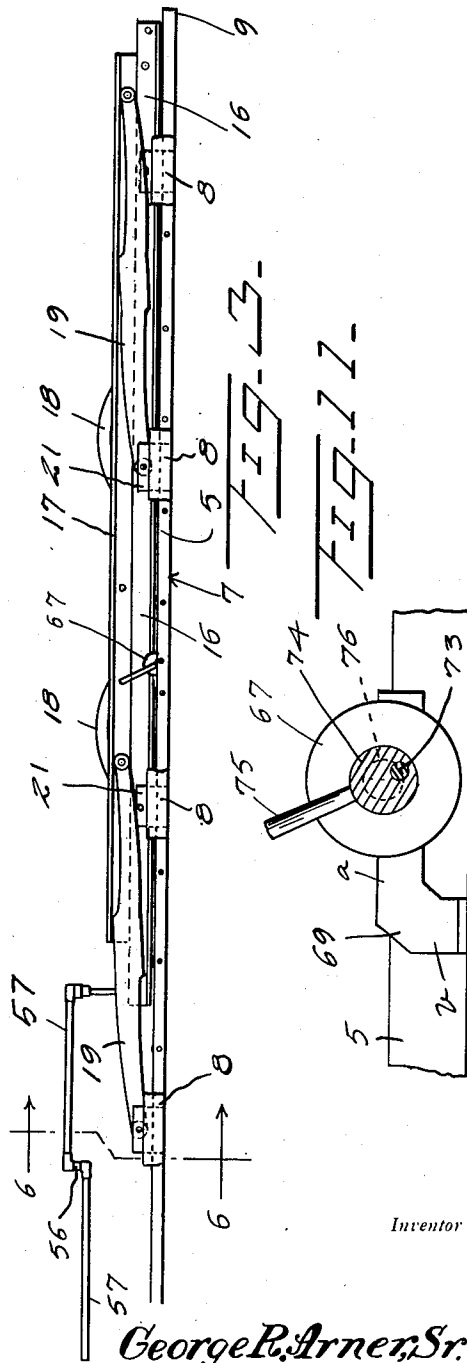
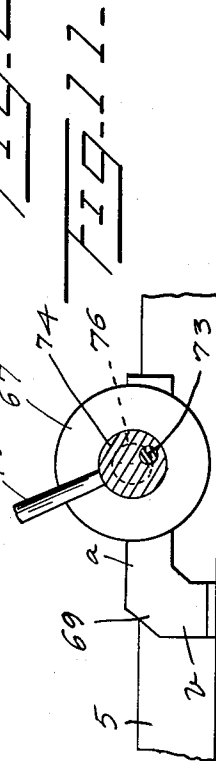
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6 Sheets-Sheet 2



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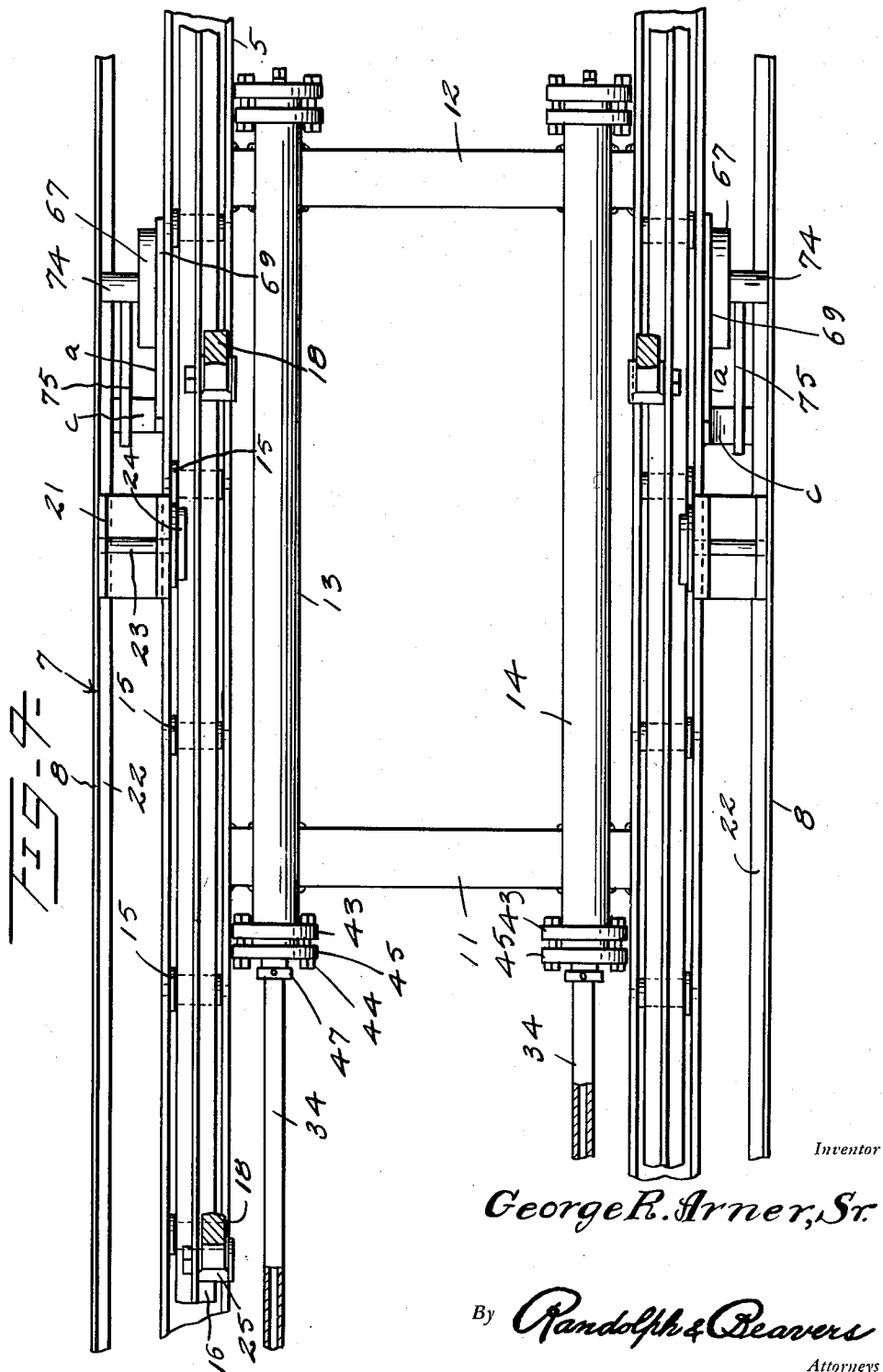
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6 Sheets-Sheet 3



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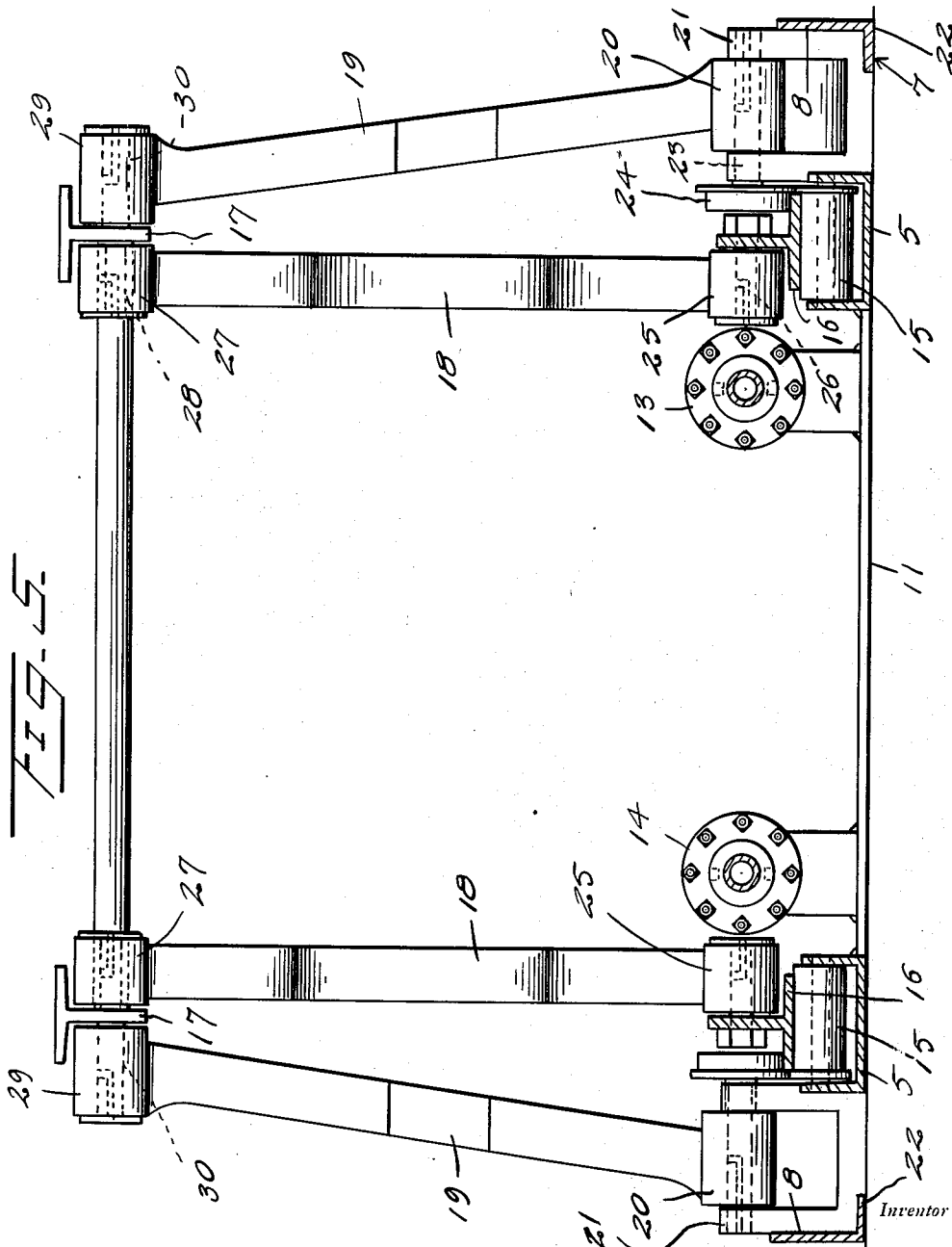
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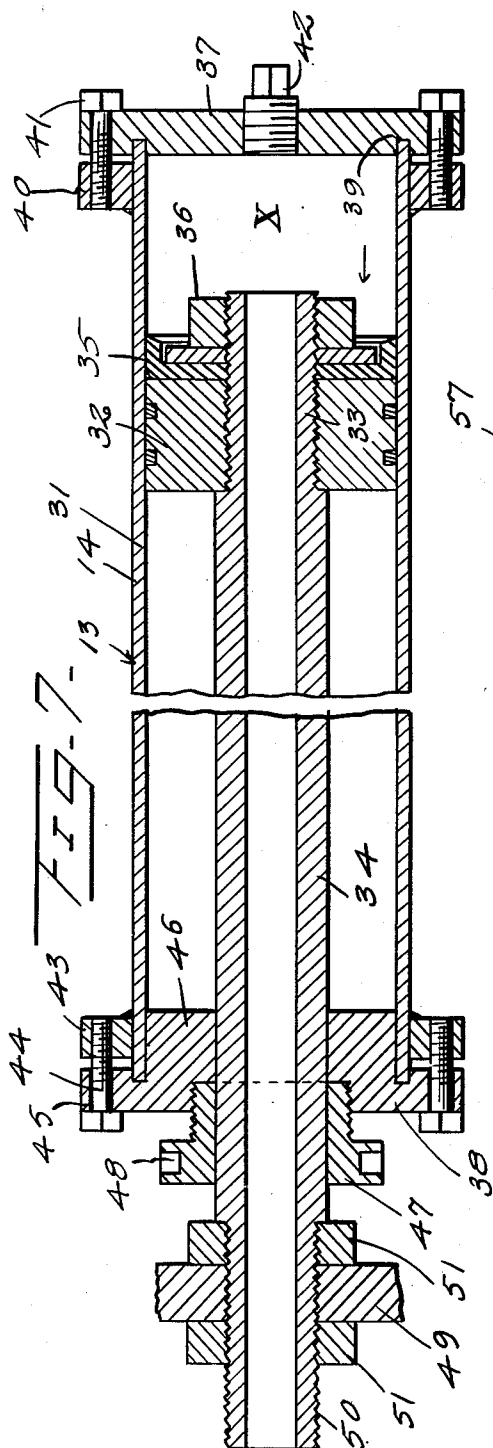
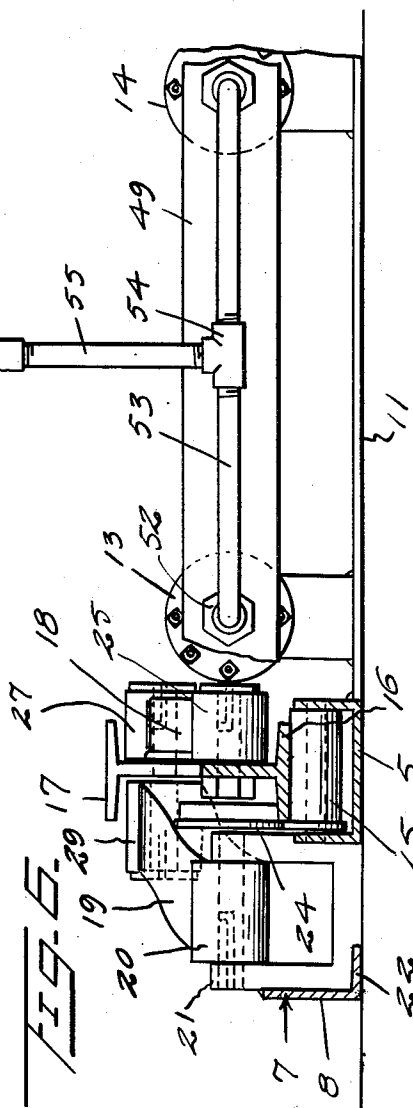
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6 Sheets-Sheet 5



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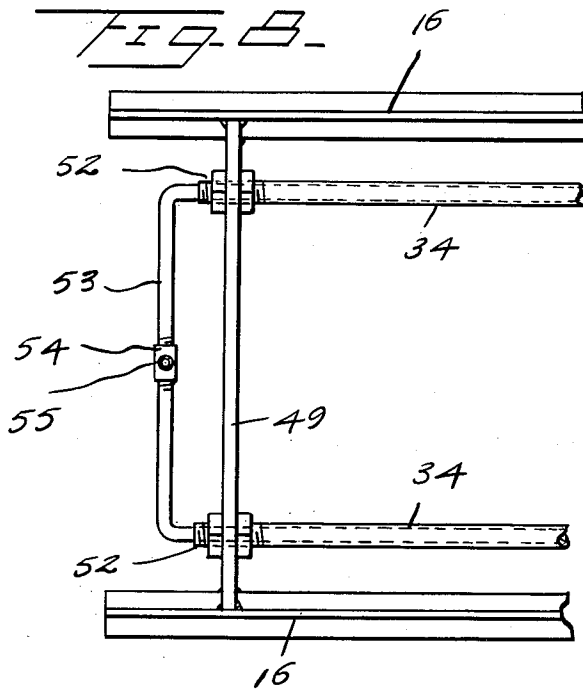
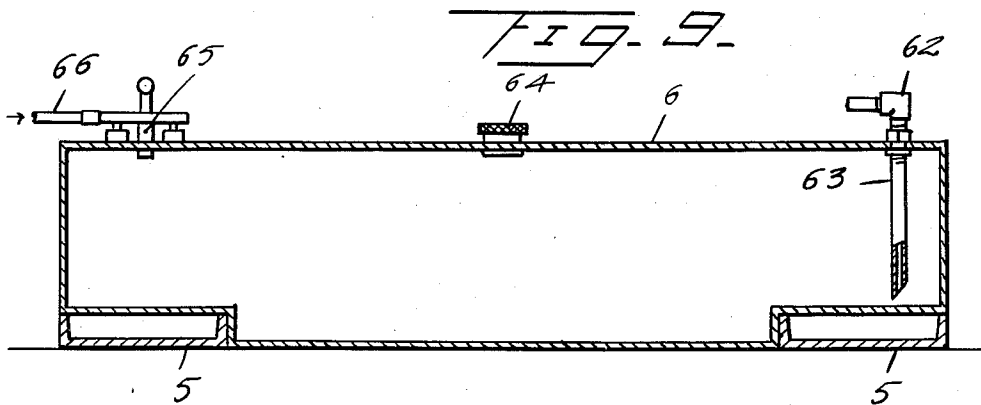
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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

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HOISTING APPARATUS

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Application February 8, 1946, Serial No. 646,259

1 Claim. (Cl. 254—91)

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The present invention relates to new and useful improvements in hoists and more particularly to a portable hoist, especially adapted for use at repair stations and garages, but which can also be used in steel mills, foundries and for lifting and placing aeroplane motors and other heavy machinery.

The principal object of the invention is to provide a hoist capable of lifting from five hundred to twenty-five thousand pounds, capable of being moved about from one point to another at repair stations and garages, thus dispensing with the conventional permanently located lifts and especially with respect to the bolsters used on such lifts, which present obstructions to the free access of the transmission and other parts underlying an automobile or other vehicle.

Still another important object of the invention is to provide a hoist, which as before stated eliminates the conventional bolster and which because of the fact that it rises against and lifts a vehicle by its axles, permits free rotation of the wheels of the vehicle to permit testing of the brakes, etc.

A further object of the invention is to provide a hoist which does away with the necessity of digging for hydraulic cylinder placement and to a material extent eliminates installation costs.

Still a further object of the invention is to provide a hoist capable of being hydraulically or semi-hydraulically operated in an easy and convenient manner and without the likelihood of mishaps occurring.

Still another object of the invention is to provide a hoist wherein the parts are co-related in such a manner as to facilitate operation, yet minimize considerably the occurrence of wear on moving parts.

Still a further object of the invention is to provide a hoist having retractable wheels, which when lowered at a center point of the weight of the apparatus, permits the hoist to be moved about from one point to another with but a minimum amount of energy expenditure.

An additional object is to provide a hoist of the character stated which can be manufactured and employed at a considerably less cost than present day hoists capable of performing the same line of work.

Various other important objects and advantages of the invention will become apparent to the reader of the following description.

Figure 1 is a top plan view of the hoist.

Figure 2 is a side elevational view showing the hoist raised.

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Figure 3 is a side elevational view showing the hoist lowered.

Figure 4 is a fragmentary top plan view particularly showing the cylinders.

Figure 5 is a cross-sectional view taken substantially on line 5—5 of Figure 2.

Figure 6 is a cross-sectional view taken on line 6—6 of Figure 3.

Figure 7 is a fragmentary detailed sectional view taken through one of the cylinders.

Figure 8 is a fragmentary top plan view showing the fluid line and slide rails.

Figure 9 is a section taken on line 9—9 of Figure 1.

Figure 10 is a fragmentary detailed sectional view of one of the swivel fluid joints.

Figure 11 is a fragmentary detailed sectional view of one of the cam operated wheels.

Figure 12 is a fragmentary prospective and sectional view showing one of the adjustable wheels.

Referring to the drawings wherein like numerals designate like parts, it can be seen that numerals 5, 5 denote a pair of channeled tracks disposed in parallel spaced relation and these tracks are preferably reduced somewhat at a pair of their ends to form a seat for a tank 6, these elements being suitably welded together.

Numerals 7 denotes an outside frame, made up of a pair of angle side members 8, 8, connected by an end bar 9, which bar is preferably welded to the adjacent ends of the tracks 5, 5 as at 10. Thus it can be seen, that while additional struts or cross members may be employed between the tracks 5, the tank 6 at one end, and the bar 9 at the other end of this track arrangement serves to hold these tracks in proper spaced relation.

Nevertheless, bridge means 11, 12 must be provided between the tracks 5, 5 in order to support a pair of hydraulic cylinders 13, 14, which are arranged in spaced parallel relation.

Referring again specifically to the tracks 5, 5, it can be seen that rotatably mounted between the sidewalls of each track 5 are rollers 15, upon which lower inverted T means 16 are adapted to move.

The lower inverted T means 16 underlie corresponding elongated T beams 17 which form part of a super structure.

Numerals 18 denote elevator arms, while stabilizer arms 19 are located outwardly of the arms 18 and each has a bearing knuckle 20 at its lower end interposed between the upstanding leg portions of a U-shaped bracket 21, interposed be-

tween the corresponding frame side member 22 and the adjacent track 5. The bracket 21 is preferably welded in this position and has a shaft 23 disposed through its legs and through the knuckle 20, this shaft having a flanged wheel 24 at its inner end adapted to ride the adjacent underlying edge portion of the complemental rail 16, thus holding the rail down and snugly against the rollers 15.

The lower ends of the arms 18 are provided with bearing knuckles 25 which are journaled on stub shafts 26 carried by the upstanding flanges of adjacent rail 16. The upper ends of the arms 18 having bearing knuckles 27 journaled on sub-shaft 28 projecting inwardly from the upper beams 17, while the upper ends of the stabilizer arms 19 have bearing knuckles 29 journaled on sub-shafts 30 protruding outwardly from the rails 17. It will be understood that any form of lubricating means may be provided for the various bearings employed in this apparatus. As is clearly shown in Figure 2, while the stabilizer arms 19 may be straight, it is necessary that the elevator arms 18 take the form of a slight or stretched S. The purpose in this is so that the elevator arms will assume an off center position when the apparatus is collapsed to the position shown in Figure 3.

Each of the cylinders 13, 14 consist of a cylindrical case 31 in which a piston 32 operates, this piston being located on the reduced end 33 of an elongated tubular rod 34. One or more backing elements 35 may be employed in addition to the piston 32 and these elements held on the tubular rod 34 by a nut 36. As is apparent in Figure 7, the rod 34 is open at its end within the case 31.

The case 31 is provided with headers 37, 38, the header 37 having a circumferential groove 39 for receiving the adjacent end of the case 31. Welded on adjacent end of the case 31 is a ring or flange 40 having threaded openings therein for receiving machine bolts 41 which are disposed through openings in the peripheral portion of the header 37. A plug 42 is provided at the center of the header 37, which when removed permits access to the interior of the case and also to the interior of the tubular rods 34.

On the opposite end of the case 31 is a flange or ring 43, welded to the case and formed with threaded openings for receiving machine bolts 44 which are disposed through openings in a flange 45, which is radially disposed with respect to a plug plate 46, inserted into the adjacent end of the case 31. The threaded ring 47 is provided on the tubular rod 34 and is threadably disposed into a threaded recess in the plug plate 46. The ring 47 may have tool engageable recesses 48 therein.

A bridge bar 49 is disposed between the rails 16 and has its ends welded thereto as is apparent in Figure 8.

The outer ends of the tubular rod 34 are threaded as at 50 and these portions pass through openings in the bridge bar 49 and carry jam nuts 51, 51, one at each side of the bar 49. A sufficient amount of the threaded portion 50 protrudes beyond the bar 49 so as to permit connection as at 52 with a connecting pipe or conduit 53 in which is a T 54 from which a pipe 55 extends upwardly and is connected by a swivel joint 56 to a pipe 57 in which a lock valve 58 having a control handle 59 is located. This pipe is connected by a swivel joint 60 to an elongated pipe 61, which in turn is connected by a swivel

joint or coupling 62 to a tube 63 which depends into the tank 6 and terminates adjacent the bottom thereof.

As is shown in Figure 9, the end portions of the tank are slightly reduced or stepped into to accommodate the reduced adjacent end portions of the tracks 5. It is also to be understood that the adjacent ends of the side members 8 of the frame 7 are welded to the tank.

Numeral 64 denotes a filler cap for the tank, while numeral 65 denotes a compressed air inlet and a conduit 66 therefor. It is here to be understood, that the tank 6, when the apparatus is collapsed is full of oil and this oil is displaced from the tank to the cylinders 13, 14 when air pressure is delivered to the tank by way of the inlet 65.

At the center of weight of the machine are wheels 67, which are capable of being lifted or lowered by cam means. There is one of these wheels and cam assemblies at each side of the machine, and as above stated at the intermediate or center weight position thereof, and each assembly includes a bracket 69 having a horizontal portion *a* and a depending portion *b*, this portion having a horizontal foot *c* which extends across the space from the outside wall of the journaled track 5 to the base flange of the adjacent frame side member 22, this foot portion *c* being welded to the base flange, while the depending portion *b* is welded at its side edges to the journaled track 5.

The free end of the arm portion *a* has an opening 70 opposite to an opening 71 in vertical flange 8 of the frame side member 22.

Disposed through the openings 70, 71 is a shaft 73 on which a roll 74 is eccentrically disposed, this roll 74 being provided with a handle 75 and a reduced hub 76 for carrying the wheel 67. Normally, when the wheel is in elevated position, the handle 75 is resting upon the foot *c*, but when the handle is swung away from the foot *c*, the wheel 67 is lowered and by moving the handle 75 approximately to a point 180° removed from the foot *c*, the wheel 67 will have been rotated past dead center and the wheel 67 will remain in lowered position, thus permitting the hoist to be shifted around from one point to another, with very slight effort on the part of the person pushing the same. These wheels 67 will substantially balance the apparatus when being rolled.

Figure 10 shows one of the universal or swivel couplings, particularly the coupling shown between the pipes 55 and 57.

This coupling consists of a pair of fittings 77, 78 with which the pipes 55, 57 respectively connect. The connecting factor of this coupling involves a nipple 79 threaded into the fitting 78 and having a shoulder 80 against which an internally flanged nut 81 engages, the nipple 79 having a flange 82 bearing against the internal flange of the nut. Depending from the fitting 79 is an externally and internally threaded apron 83 for the outer threads which engages the threads of the nut, while the internal threads receive a threaded follower 84 which is adapted for compressing V packing elements 85 between the apron 83 and the adjacent portion of the nipple 79, this nipple 79 extending from the fitting 78 and terminating within the fitting 77. Thus a high pressure sealed swivelled coupling is provided between the pipes 55, 57 and this scheme of construction may be carried out in any further swivelled couplings that may be needed.

In the operation of this apparatus, the tank

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6 is substantially filled with oil of the proper grade, and of course the filler cap 64 tightened before the machine is to be operated.

When the valve 58, which is a gate valve, is opened, and compressed air supplied to the tank 6 by way of the conduit 66 (suitable control means being employed, but now shown), the oil will be displaced from the tank 6, through the pipes 61 and 57 to the transverse pipe 53 and from there to the tubular rods 34 and into the cylinders 13, 14. (See Figures 1 and 7.)

As oil is forced into the chamber X, force is exerted on the piston 32 in the direction of the arrows, with the result that the tubular rods 34 are forced outwardly and carry with them, the tie bar 49, which as before stated, ties the rods and the lower T beams 16 together. When this action of the tubular piston rods 34 takes place, the tie bar 49 is moved to the left in Figure 1, hinging the pipes 57, 61 and moving the lower beams 16 longitudinally on the rollers 15. This action of the beams 16 causes the elevator arms 18 to be pulled along the apparatus and due to the counteracting effect of the stabilizing arms 19, the upperbeams 17 are caused to rise against the axles of an overlying vehicle or other structure to be lifted, with the ultimate result that the work is lifted off of the ground into the desired elevation, and in the instance of an automobile, the vehicle is lifted with the wheels thereof free, so that the wheels can be brake tested or otherwise tested or repaired while free to rotate.

As is apparent, the arms 19 serve to stabilize the structure and due to the fact that the ends thereof are pivotally fixed to the upper and lower beams 17, 16, the shifting motion of the lower beams 16 with the lower ends of the elevator arms 18 being pivotally connected thereto, effects the lifting action of the machine.

Due to the slight S form of the elevator arms 18, the pull on these arms by the sliding action of the lower beams 16, will always affect the elevator arms because they will be in off center position when the machine is fully collapsed.

The outer frame 7 acts to adequately stabilize the apparatus in so far as foundation is concerned, the outer frame side members 22 also acting to afford means whereby the brackets 21 are firmly held in place. It will be observed that by welding the brackets 21 to both the channelled tracks 5 and the frame members 22, the lower ends of the stabilizer arms 9 are firmly anchored and there is no tendency of the hoist, by reason of this special construction, to vibrate or wobble.

With the cylinders 13, 14 charged with oil, the operator may simply close the gate valve 58, thus closing off the return of the oil to the tank 6, with the result that the hoist will remain in elevated position until such time as it is desired to permit the lowering thereof, when by opening the valve 58, the oil will return by gradual flow to the tank 6, gradually lowering the vehicle and this can be regulated by the degree of opening or closing of the valve 58.

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While the drawings and the foregoing description disclose this invention as being hydraulically or semi-hydraulically operated, obviously, with certain modifications, the apparatus can be electrically operated or operated by some other power source.

An apparatus such as this would be particularly suitable also in elevating heavy aeroplane engines for placement on aircraft, or for lifting various other machinery for placement, such as in industrial plants.

The hoist can be lightly constructed and can be conveniently used to lift loads which customarily tax energy of workmen. This is particularly acceptable due to the portable nature of the apparatus.

As garagemen and automobile service repairmen realize, the usual bolster on present day hydraulic lifts creates an obstacle to the free access of parts under an automobile, especially the transmission. With the present invention, there is no bolster plate across the beams 17 and thus this present day obstacle is eliminated.

While the foregoing specification sets forth the invention in specific terms, it is to be understood that numerous changes in the shape, size and materials may be resorted to without departing from the spirit and scope of the invention as claimed here and after.

I claim:

A hoist comprising an elongated frame forming a base, a trackway at either side of said base, a super-frame, a plurality of transversely extending rollers mounted in each of the trackways, a rail supported for longitudinal reciprocal movement upon the rollers in each of the trackways, a plurality of supporting arms each pivotally connected at one end with the sides of the super-frame and pivotally connected at its other end with one of the rails, brackets affixed to the base, stabilizing links pivotally interconnecting the brackets and the super-frame, and hydraulic means for reciprocating the rails.

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