April 28, 1936. G. W. KRETZSCHMAR 2,038,660

HYDRAULIC BEAM TRUCK

Filed July 1, 1935

Fig. 1

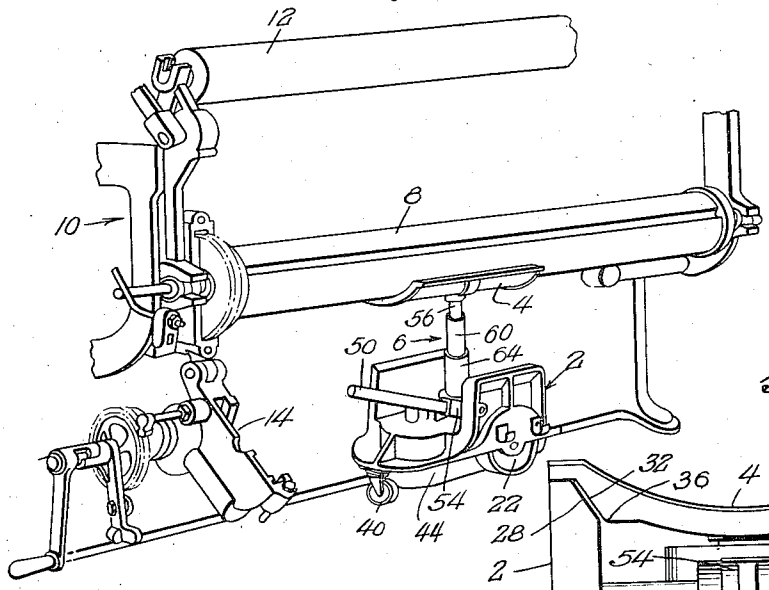


Fig. 3.

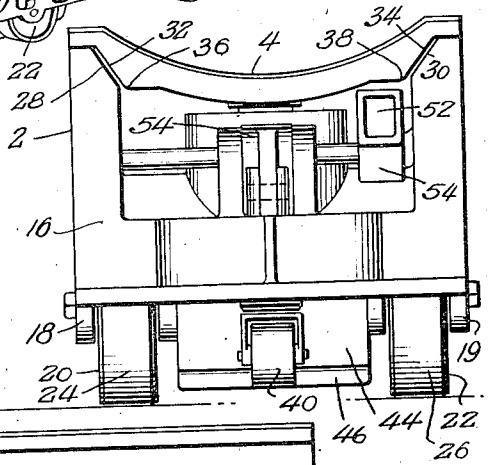


Fig. 2.

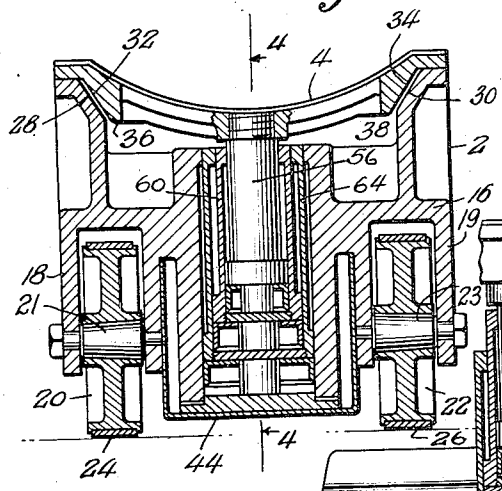
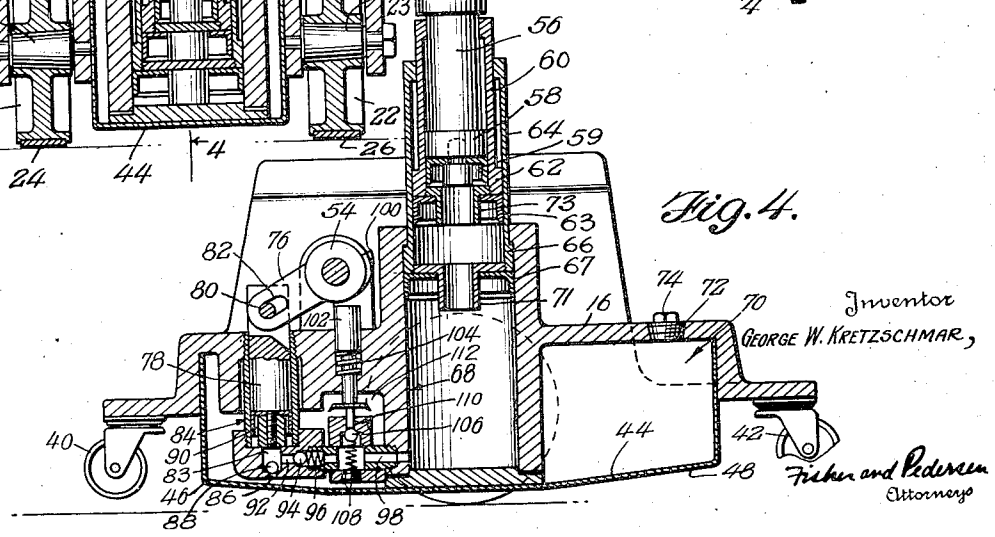


Fig. 4.



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HYDRAULIC BEAM TRUCK

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9 Claims. (Cl. 254—2)

The present invention relates to hydraulic beam trucks and more particularly to a form of hydraulic truck particularly designed for the inserting and removing of warp beams into and from the feeder mechanism of a loom.

In the modern textile mill in which looms are used in weaving, particularly in connection with the weaving of artificial silk, the warp beams which are used weigh, when loaded with the artificial silk, from about 800 to 1,000 pounds and frequently weigh as much as 1500 pounds or more. In view of the fact that the looms are placed close together in a plant in order to economize space it is necessary that these warp beams be handled and put into place with about a foot clearance on each side and there is insufficient room for more than two persons to lift these warp beams and to put them in place on the feeder mechanism.

Heretofore the inserting and removal of these warp beams has been accomplished by two men, one on each side of the beam and serious strains and injury to the men frequently occur, due to the extreme weight handled. The fact that such warp beams are being made in increasing sizes renders it unsafe to handle the beams manually and necessitates a change in the system of inserting and removing the beams from the feeding mechanisms.

One object of the present invention is to provide a form of hydraulic truck which may be employed for the handling of such warp beams and particularly for putting the weighted warp beams in place in the let-off mechanism whereby one man alone may handle the beam without difficulty.

Another object of the invention is to provide a form of hydraulic beam truck which will occupy a minimum of space so as to be adapted for the handling of warp beams on every type of let-off mechanism now on the market and which is designed in a manner so that it is self-adjusting, whereby as the beam support is lowered it will swing into the longitudinal position, that is, lengthwise of the truck, in which position the beam is most readily handled without danger of interference or contact with looms or other machinery distributed over the floor area in the plant.

A further object of the invention is to provide a form of mechanism adapted to maintain and support the beam about its center of gravity, the mechanism being so designed that the beam may be elevated readily to the desired elevation and permit controlled rocking of the warp beam slightly at the ends so that the trunnions or supports may be readily rocked into place in the supports or bearings in the let-off mechanism designed to receive the said trunnions.

With these and other objects in view, the invention comprises the various features hereinafter more fully described and particularly defined in the claims.

The preferred form of the invention is illustrated in the drawing, in which:

Fig. 1 is a view in perspective showing a portion of a let-off mechanism for a loom and a warp beam held by the support member of the hydraulic beam truck, the warp beam being shown in place in the bearings with the locking or latching mechanism lowered out of latching position to permit removal of the beam from the device;

Fig. 2 is a sectional view in elevation at the mid-section of the truck showing the operating piston-cylinder units located in the same vertical plane as the axle of the supporting wheels, the supporting member or cradle being shown in its lowered position;

Fig. 3 is an end view of the truck in which the parts are in the position indicated in Fig. 2; and

Fig. 4 is a detailed sectional view taken on the section line 4—4 of Fig. 2, showing the detailed construction of the hydraulic mechanism by which the device is operated, the supporting member being indicated in the partially elevated position.

Referring more in detail to the drawing, the numeral 2 indicates a hydraulic truck having a cradle or supporting member 4 of circular cross section, being in the form of a section of a cylinder by means of which any commercial size of warp beam may be carried. The cradle or supporting member is preferably carried on an extensible telescoping standard 6 comprising a series or piston-cylinder units, the said units being located in the same vertical plane as the axes of the supporting wheels hereinafter referred to.

The truck is shown in Fig. 1 as supporting a warp beam 8 in the let-off mechanism 10, this mechanism having the usual whip roll 12 and a locking mechanism 14 for holding the warp beam in place, the locking mechanism being indicated in the open or unlocked position, in which position the warp beam may be inserted or removed from the let-off mechanism.

The truck member is preferably constructed

having a body casting 16, as indicated, having flanged members 18 and 19 which extend downwardly and laterally from the body portion of the truck leaving a space on each side between the said body portion and the flanges for the supporting wheels 20, 22 which are protected by means of the flanged members. In order to obtain ease of operation of the truck, the wheels are preferably provided with roller bearings 21, 23 and resilient tire members 24, 26, which are preferably of rubber.

The body portion of the truck is preferably provided with ways or laterally inclined face portions 28 and 30 to permit proper seating of the cradle or support member, and the support member 4 is also provided with similarly inclined face portions 32 and 34, so that as the supporting member or cradle is lowered, the advanced edges 36 and 38 will strike some portion of the inclined surfaces 28 and 30, thus rotating the cradle and guiding it into position as it is lowered into place.

At the forward and rear ends, the truck is provided with stop members 40, 42 adapted to limit rocking movement of the truck about the supporting wheels as an axis. The stop members are preferably wheels positioned centrally at the forward and rear ends of the truck and are positioned a short distance from the floor or supporting plane in the horizontal position of the truck so as to permit rocking movement or oscillation about the axle of wheels 20 and 22 as an axis. These wheels or stop members 40 and 42 are also preferably provided with rubber tires and with ball bearings in order to reduce friction thereof to a minimum.

The base plate or housing member 44 is preferably positioned as low as possible on the truck body so as to provide a sufficient volume for holding the hydraulic operating fluid. The base plate is preferably formed having the end portions inclined upwardly, the middle portion being elevated a short distance above the floor or supporting plane. The end portions 46 and 48 are preferably upwardly inclined at an angle of about 20 degrees so that as the truck is supported on one of its forward wheels 40 or 42 on the three point support including the two wheels 20 and 22, the housing member will not contact with the floor.

The supporting member or cradle of the truck is preferably operated through a pump mechanism including a handle or lever member 50 fitting into a slot or opening 52 in the pump operating part 54.

In order to elevate the supporting member 4, a series of aligned piston cylinder units telescoping within each other and connected to the base of the said member are provided, the upper support 56 having attached thereto a piston member 58 fitting within the cylinder 60, the cylinder 60 in turn being provided with a piston member 62 fitting within the cylinder 64 and the cylinder 64 being in turn provided with the piston member 66 fitting within the cylinder 68 provided in the housing member.

The series of piston cylinder units are hydraulically operated through a series of valves and passages by means of which the hydraulic operating fluid may be pumped from the reservoir 70, formed by the base plate, to the piston cylinder units so as to operate them in turn. The reservoir 70 which extends forwardly and to the rear of the cylinders may be filled with a hydraulic medium, such as oil, through an opening 72 having the usual closure means 74 which may be screwed into place.

The pumping member 54 is preferably connected through a slotted lever 76 to a piston member 78, a pin member 80 being slidably held in the slot 82 to permit axial movement of the piston 78 in the cylinder 84.

As the piston member 78 is raised in position, oil from the reservoir 70 passes up through the passageway 86 raising a ball valve 88 from its seat, whereby the oil passes into a passageway 83 into the cylinder member 84. As the piston member 78 is forced downwardly, the cup member 90 forces the oil downwardly through the passage 83 so that the ball valve 88 is seated, closing the passage 86 and forcing the oil into the passageway 92, the ball valve 94 which is spring pressed to its seat by means of a spring member 96, being raised from its seat whereby the oil passes into the passageway 98, from whence it passes into the lowermost cylinder 68 and passes upwardly through the opening 71 in the piston member 66 and opening 73 in piston member 62 until it contacts with the cup member 59 of the piston 58.

In the raising operation, the large cylinder 64 is moved upwardly first through the pressure of the oil in cylinder 68 against the large area of the piston member 66 and the cup member 67, the cylinder 64 moving upwardly until it reaches its uppermost position, as shown in Fig. 4 of the drawing. The oil then passes through the opening 71 into the interior of cylinder 64, forcing the piston 62 and cup member 63 attached thereto upwardly, whereby the cylinder 60 is raised until the piston member 62 contacts with the upper interior surface of the large cylinder 64. Oil then passes through the opening 73 into the interior portion of cylinder 60, forcing the piston member 58 and cup member 59 attached thereto upwardly in the cylinder 60 until the piston 58 contacts with the top of the cylinder 60.

It is obvious that the member 56 and the cradle member 4 are elevated through the successive positions by the continuous pumping of the piston cylinder unit 78, 84 by means of the handle member 50.

When it is desired to lower the support member or cradle 4, the handle 50 is moved upwardly whereby the cam member 100 on the lever 76 moves into engagement with the rod member 102 which moves downwardly against the action of the spring 104 moving the ball member 106 from its seat against the action of the spring 108 whereby the hydraulic fluid flows back to the reservoir past the ball 106 and the piston cylinder units collapse, the upper piston 58 moving downwardly in the cylinder 60 first, the cylinder 60 then moving down into cylinder 64 and cylinder 64 being then retracted into its lowermost position into the cylinder 68 in the housing of the truck.

The speed of lowering the cradle 4 with a beam or roll thereon may be regulated by the size of the outlet of the release valve 102.

It will be understood that the lifting and lowering of the cradle 4 is accomplished by means of the same handle 50 and it will be obvious that the device may be operated or worked by a single operator, one hand being used for operating the pump handle 50 while the other hand is used for steering or controlling the beam or load which is being put into place.

It will be understood that any preferred form of construction may be employed in connection

with the piston cylinder units for elevating and lowering the support member 4, although I prefer the construction as shown in the drawing in which the piston units 58, 62, and 66 which fit within the respective cylinders 60, 64, and 68 have a sufficient length so as to serve as a guide in the movement of the pistons in the cylinders and to provide a sufficiently rigid support so that if a warp beam or other load should be off center on the cradle 4, the piston cylinder units would be able to carry the unbalanced load without danger of breaking or causing binding of the piston cylinder units.

During the downward movement of the cylinders, the oil flows from the cylinders through the passageway 98 then past the ball valve 106 and into the passage 110 which communicates through a passageway 112 directly with the reservoir 70, whereby the oil flows back into the reservoir.

It will be understood that in the operation of this device by the use of telescoping cylinders, as described, a much higher lift may be obtained than by the use of hydraulic jacks or trucks of the form heretofore used in which toggles are employed to obtain a lift of from about four to six inches. It will be obvious that by the form of device above described and illustrated in the drawing a very wide range of lifts may be obtained without the limitations which are imposed on devices in which toggles are used, these devices being limited by the minimum height represented by the closed position of the toggles.

It is obvious furthermore that in the form of device above described, the power transmitted to the piston cylinder units may be gradually applied, whereas in the use of toggles the leverage varies with the changing positions of the toggle levers during ascent or descent.

It will be understood furthermore, that the method of mounting of the cradle upon piston cylinder units as above described permits rotation of the cradle to any desired extent without interfering with the operation of the lifting device. As soon as the cradle 4 leaves the ways 28, 30, either the truck or the beam may be revolved to any position. The truck and the beam may be positioned, for example, to form an angle of 90° between the longitudinal axis of the truck and the longitudinal axis of the cradle. This position is obviously the natural position for riding a beam into place in the loom bearings, although after the beam has been put into place, the truck body may again be turned into the position in which the longitudinal axes are parallel with each other as indicated in Fig. 1 of the drawing, in which position the truck may be readily withdrawn.

While this invention has been described as particularly applied to warp beams for the insertion of such beams into the feeder mechanism of a loom, it is obvious that it may be applied to place or remove beams in entering, beaming, sizing, twisting-in machines and for various other uses in the textile industry.

It will be obvious also that the form of the invention which has been described is particularly adapted for use in paper mills, and in connection with textile dyeing and finishing plants, and in fact for any use in which rolls of material are handled from one lift to another, or to a rack or to various other devices. In connection with the paper mill industry, for example, in which paper rolls weighing 3,000 pounds or more are to be handled, a hydraulic lifting truck of the form above described is particularly advantageous in view of the difficulties encountered in such mills with the present system for handling such large rolls.

While the invention has been illustrated and described in its preferred form, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the spirit of the invention or from the scope of the annexed claims.

Having thus described the invention, what is claimed as new is:

1. A hydraulic beam truck comprising a supporting member for supporting wheels in axial alignment permitting rocking of the truck forwardly and rearwardly of the said wheels, a series of aligned telescoping piston cylinder units the axes of which are in the vertical plane including the axis of the said supporting wheels, a housing comprising a reservoir communicating with said cylinders, a pumping means for operating the said piston cylinder units to expand the same into the uppermost position, means for releasing the hydraulic medium so as to bypass directly to the reservoir to permit rapid lowering of the said supporting member and stop means to limit the angular pivotal movement or rocking of the said truck on both sides of the said vertical plane including the said axis.

2. A hydraulic truck particularly adapted for inserting and removing warp beams into and from a let-off mechanism which comprises a supporting member in the form of a portion of a cylindrical surface for receiving a warp beam, a housing member providing a reservoir, supporting wheels for the truck carrying said housing member, a flange member extending outwardly and downwardly from the housing member so as to shield the said supporting wheels, means for elevating and lowering the said support comprising a series of aligned telescoping piston cylinder units, the axis of which units is midway between said supporting wheels, a pump for operating the said piston cylinder units to progressively expand the same so as to lift the said support into its uppermost position, valve means for releasing the hydraulic medium from the piston cylinder units to return the same to the reservoir and to permit rapid lowering of the said supporting member and means for angularly guiding the said supporting member in its downward movement so as to return the said supporting member into aligned collapsed position of the mechanism.

3. A hydraulic truck particularly adapted for inserting and removing warp beams into and from a let-off mechanism which comprises a supporting member in the form of a portion of a cylindrical surface for receiving a warp beam, a housing member providing a reservoir, supporting wheels for the truck carrying said housing member, a flange member extending outwardly and downwardly from the housing member so as to shield the said supporting wheels, means for elevating and lowering the said support comprising a series of aligned telescoping piston cylinder units the axis of which units is midway between said supporting wheels, a pump for operating the said piston cylinder units to progressively expand the same so as to lift the said support into its uppermost position, valve means for releasing the hydraulic medium from the piston cylinder units to return the same to the reservoir and to permit rapid lowering of the said supporting member, means for angularly guiding the said supporting member in its downward

movement so as to return the said supporting member into aligned collapsed position of the mechanism and stop means forwardly and to the rear of said supporting wheels positioned so as to permit pivotal movement of the truck about the axles of the said supporting wheels as an axis, the position of said stops preventing engagement of other parts of the truck with the floor during rocking movement of the truck to adjust the position of the load carried thereby.

4. In a hydraulic jack, a cradle for holding the part to be manipulated, a series of concentric piston-cylinder units connected to said cradle, a base member on which said piston-cylinder-units are mounted, supporting wheels in axial alignment for supporting said base member and permitting rocking movement thereof on both sides of the axis of the said wheels, a pump and pumping mechanism for raising said piston-cylinder units and for releasing the same to lowered position, a reservoir connected to said pump for furnishing fluid to operate said piston-cylinder units and means for mounting said base member to allow relative rotary movement between the said cradle and the said base member, thereby permitting adjustment of the part by movement of the base member while the said part is being held by said cradle.

5. In a hydraulic truck, a cradle member for holding a part to be manipulated, a base member, a series of concentric piston-cylinder units connecting said cradle with said base member, supporting wheels on said base member so disposed with reference to said piston-cylinder units that the longitudinal axis of said units crosses the axis of the said wheels, and guide means whereby the said cradle in its lowering movement will be brought into alignment with said base member so that the longitudinal axis of the cradle and that of the base member will lie in substantially the same plane.

6. In a hydraulic truck, a cradle member for holding a part to be manipulated, a base member, a series of concentric piston-cylinder units connecting said cradle with said base member, and guide means on the said cradle and on the said base member so that in the said jack, lowering movement of the cradle will be brought into alignment with the said base member.

7. In a hydraulic jack, a cradle for holding the part to be lifted, a base member, supporting wheels mounted on said base member to permit rocking of the base member about the axles of the wheels as an axis, a series of concentric piston-cylinder units connected to said cradle and mounted on said base member, a pump and pumping mechanism for raising said piston-cylinder units, a reservoir connected to said pump for furnishing fluid to operate said piston-cylinder units, means for releasing the said fluid to bring the said piston-cylinder units into lowered position, mounting means for said base member to permit rotary movement of the base member without disturbance of the said cradle and the part held thereby, so as to permit adjustment and movement of the jack while it is in operation and stop wheels at each end of the base member to limit the rocking movement forwardly and rearwardly of the said supporting wheels.

8. In a hydraulic jack, a cradle for holding the part to be lifted, a base member including a truck mounting, a series of concentric piston cylinder units connecting said cradle to base member, a pump and pumping mechanism for operating said piston-cylinder units, means for releasing the said units into lowered position, wheels mounted on said truck in alignment with said piston-cylinder units to permit relative rotary movement between the said cradle and the said base member and means for guiding the said cradle during its lowering movement whereby when the said cradle is brought within a certain range of its longitudinal position in the truck it will be guided mechanically into place.

9. In a hydraulic truck, a cradle member for holding a part to be manipulated, a base member, a series of concentric piston-cylinder units of progressively varying size connecting said cradle with said base member, the smallest unit being connected to the cradle and the largest unit being connected to the base member, supporting wheels in axial alignment on said base member disposed directly under the said piston-cylinder units so as to permit rocking movement of the truck forwardly and rearwardly about the wheels as a pivot, guide wheels on the said base member to permit limited rocking movement of the truck whereby the said cradle may be raised or lowered at one end so that the part carried by the cradle may be brought into alignment with the bearings or part into which the warp beam or other device is to be inserted, the said construction permitting a single operator to fully control the movement of the truck and part carried thereby during operation.

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