Jan. 18, 1955 R. R. STRATTON 2,699,875

CRANE

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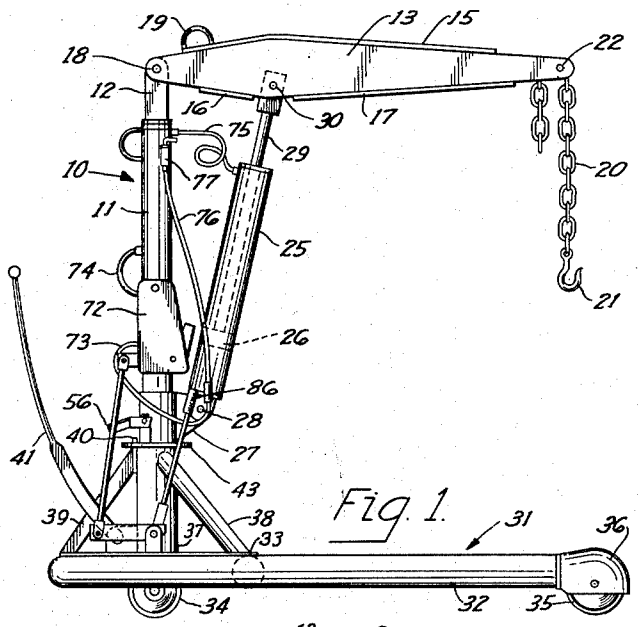


Fig. 1.

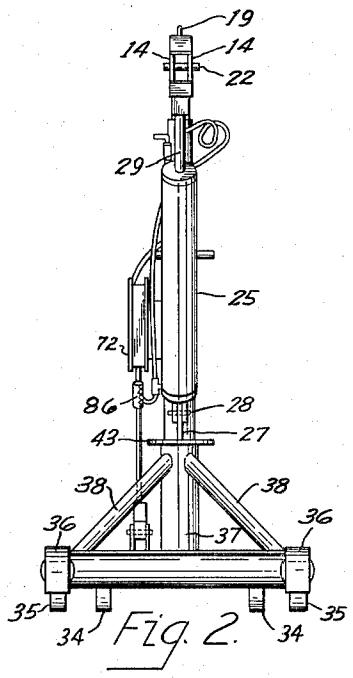


Fig. 2.

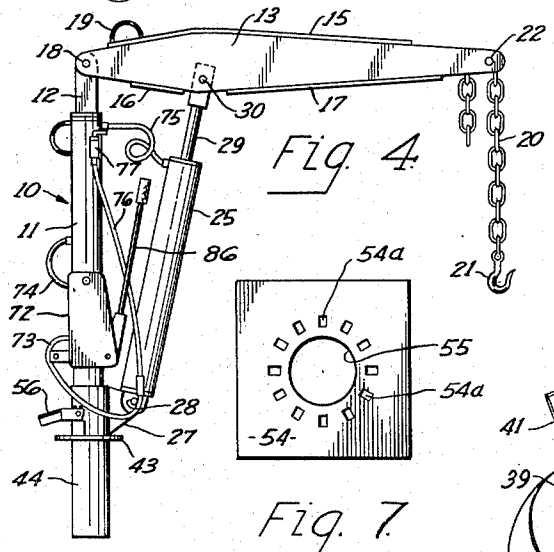


Fig. 4.

Fig. 7.

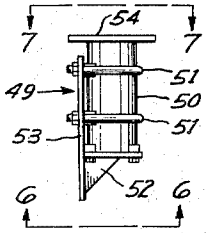


Fig. 5.

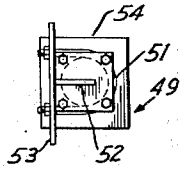


Fig. 6.

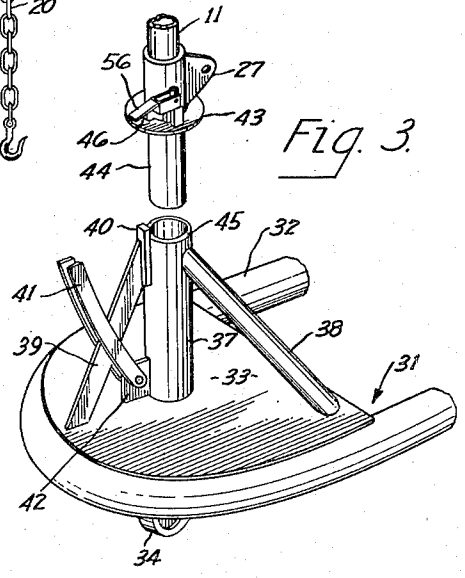


Fig. 3.

INVENTOR.
RONALD R. STRATTON
BY Bosworth & Sessions
ATTORNEYS.

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Fig. 8.

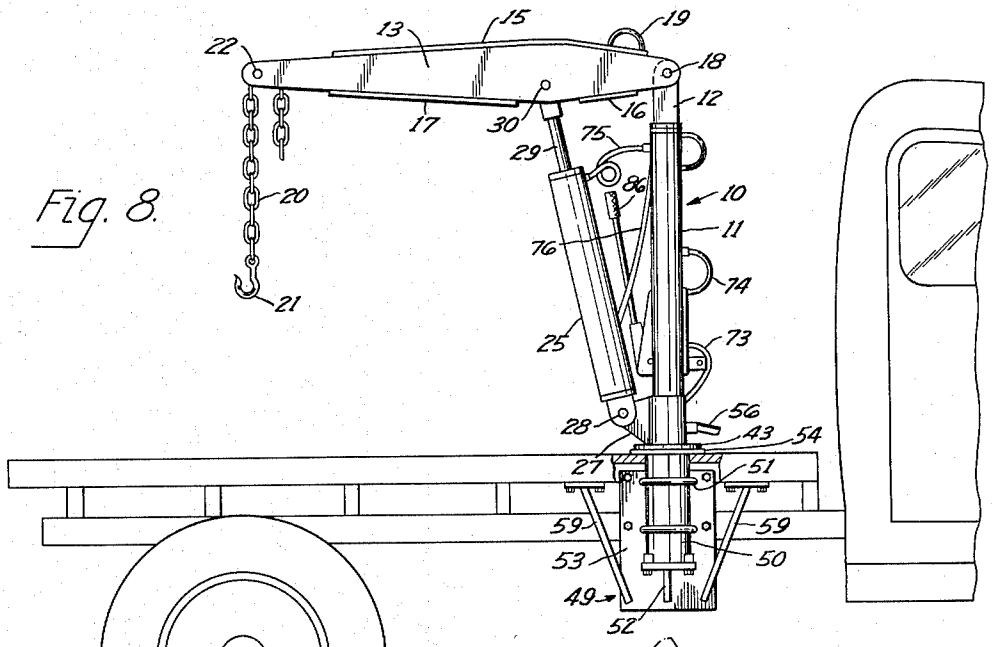


Fig. 9.

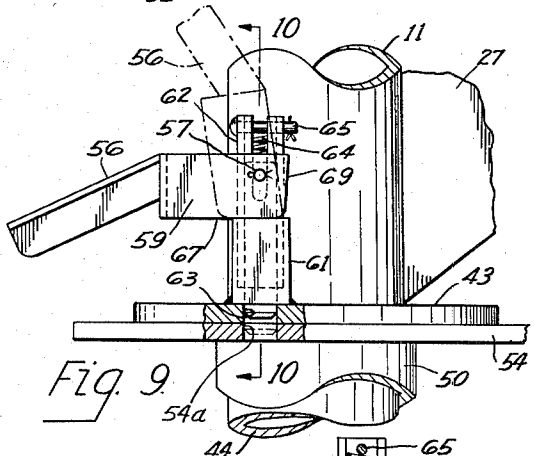


Fig. 11.

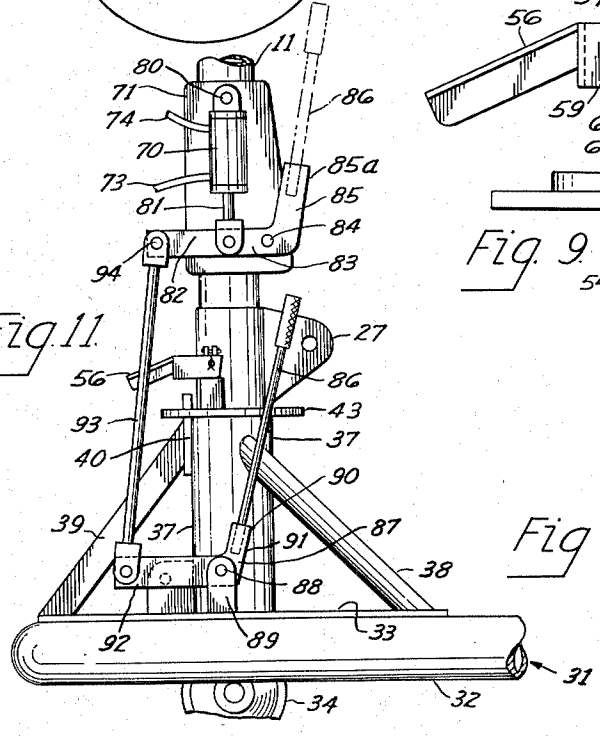
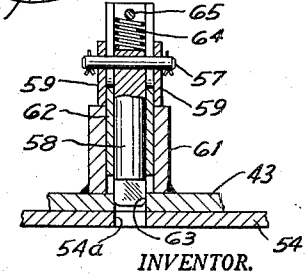


Fig 10.



INVENTOR.
RONALD R. STRATTON
BY Bosworth & Sessions
ATTORNEYS.

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CRANE

Ronald R. Stratton, Cleveland, Ohio, assignor to Stratton Equipment Company, Cleveland, Ohio, a corporation of Ohio

Application May 12, 1950, Serial No. 161,611

2 Claims. (Cl. 212—35)

This invention relates to multi-purpose portable cranes and more particularly to a hydraulic crane adapted to be mounted on a wheeled carriage for use as a floor crane and also to be mounted on a motor truck.

Hydraulic floor cranes and truck-mounted cranes are widely used in garages, service stations and the like. Heretofore it has been necessary for garage and service station operators to have separate floor cranes and truck-mounted cranes. According to the present invention a single crane may be converted from a floor crane to a truck-mounted crane with a minimum of effort and in a very short time. Thus a single crane, with appropriate auxiliary equipment, can be used for purposes heretofore requiring two or three cranes with resultant savings in cost to the garage or service station operator.

A general object of the present invention is the provision of a portable hydraulic crane that can be adapted to a plurality of uses and services with a minimum of effort and time. Another object is the provision of a portable crane that can be used both as a floor crane on a wheeled carriage and as a motor truck-mounted crane. A further object is the provision of such a hydraulic crane in which no hydraulic connections need be connected or disconnected when the crane is converted from one use to another. Another object is the provision of a crane embodying a hydraulic pump that can be operated manually and conveniently whether the crane is used as a floor crane or as a truck-mounted crane. Another object is the provision of a crane which can be swung to various positions of adjustment when the crane is mounted on a truck or platform and which is locked in a single position on the carriage when the crane is used as a floor crane. Another object is the provision of a convertible crane that is of simple and sturdy construction and that can be manufactured at reasonable cost. Further objects are the provision of a simple and sturdy wheeled carriage for supporting the crane and the provision of a simple and sturdy socket for supporting the crane on a motor truck or the like.

Further objects and advantages of the invention will become apparent from the following description of a preferred form thereof, reference being made to the accompanying drawings in which Figure 1 is a side elevation showing a crane embodying the invention adapted for use as a floor crane; Figure 2 is a rear elevation of the crane shown in Figure 1; Figure 3 is a fragmentary perspective view of the front end of the crane shown in Figure 1 illustrating the crane proper detached from the supporting carriage; Figure 4 is a side elevational view of the crane proper detached from the floor carriage; Figure 5 is a side elevational view of a mounting socket adapted to receive the crane of Figure 4 and to be mounted upon a motor truck; Figure 6 is a bottom view of the socket as indicated by the line **6—6** in Figure 5; Figure 7 is a top view on an enlarged scale of the socket taken as indicated by the line **7—7** of Figure 5; Figure 8 is a side elevational view showing the crane mounted on the side of a motor truck, the truck being illustrated somewhat diagrammatically; Figure 9 is an enlarged detail showing the locking mechanism for holding the crane in desired positions of adjustment; Figure 10 is a sectional detail of the locking mechanism of Figure 9, the section being taken along the line **10—10** of Figure 9; and Figure 11 is an enlarged fragmentary side elevation, with a portion of the pump housing removed, illustrating the pump operating mechanism.

Briefly, a crane embodying the present invention comprises a tubular vertically extending mast, a boom pivotally connected to the top of the mast, a hydraulic cylinder and piston acting between the mast and boom for raising and lowering the boom, manually operated pump means and valve means carried by the mast for supplying and controlling the flow of hydraulic fluid to the cylinder, fluid conduits extending between said pump means and said valve means and said cylinder, and sockets for receiving and supporting the mast, one of the sockets being mounted upon a carriage so that the crane constitutes a floor crane when used therewith and the other socket being adapted to be mounted on a motor truck or a platform to support the crane.

Referring particularly to Figures 1 to 4 of the drawings, a crane embodying my invention is indicated in general at **10** and comprises a tubular mast **11** having a bifurcated top member **12** to which the boom **13** is secured. Boom **13** may be built up of side plates **14** and top and bottom plates **15**, **16** and **17**. The pivotal connection between the boom and the mast is made by a pivot pin **18** and the boom is provided with a lifting eye **19** for convenience in carrying the crane. A load-carrying chain **20** provided with a hook **21** or other convenient means for engaging the load is secured as by pin **22** to the end of the boom remote from the pivot **18**.

In order to raise and lower the boom, a hydraulic cylinder **25** having a piston **26** therein is supported by a bracket **27** and pivotal connection **28** near the lower end of the mast **11**. The cylinder extends upwardly at an angle as shown and the piston rod **29** is pivotally connected to the boom at **30**; admission of fluid under pressure to the cylinder beneath the piston **26** raises the boom and lifts a load on the hook **21** while release of pressure beneath the piston allows the boom to descend.

In order to provide for use of the crane as a floor crane I preferably employ the carriage indicated in general at **31**. This comprises a tubular member **32** bent into U-shape as shown and having a plate or deck **33** welded to the curved front end thereof. Wheels **34** are mounted in suitable swiveling bearings beneath the plate **33** and rear wheels **35** are carried at the rear ends of the arms of the tubular frame member **32** within housings **36**.

In order to detachably support the crane upon the carriage, a tubular socket **37** is mounted upon the deck **33**. The socket is preferably welded to the deck **33** and braced by laterally and rearwardly extending tubular braces **38**, and by a flat brace **39** which extends forwardly from the upper portion of the socket to the deck. The ends of the tubular braces **38** are preferably welded to the socket and deck; the lower end of the forward brace **39** is welded to the deck while the upper end is welded to the upwardly projecting bar or key **40** which in turn is welded to the socket **37**. The carriage may be pulled or pushed along the floor by handle **41**, which is pivoted to bracket **42**, bracket **42** being welded to the deck and the socket **37**.

In order to support the mast in the socket **37** a plate **43** is welded to the mast **11** immediately beneath the bracket **27**. The projecting end portion **44** of the mast beneath the plate **43** is dimensioned to fit closely within the socket **37**. Thus, when the projecting portion **44** is slipped into the socket **37** the socket in effect becomes an extension of the mast and the mast is supported securely on the carriage, with the weight of the crane and its load being taken by the plate **43**, the bottom surface of which engages the upper end **45** of the socket **37**.

In order to prevent rotation of the crane when it is mounted on the carriage **31**, a bar or key **40** is secured to the upper portion of socket **37**, preferably being interposed between the socket **37** and the forward brace **39** as shown. The key **40** projects upwardly beyond the end **45** of the socket **37** and is received in a recess **46** (see Figure 3) in the plate **43** when the crane is assembled with the carriage as shown in Figures 1 and 2; the upper end of the key **40** locks the crane against rotation with respect to the carriage. Thus, the load is properly centered on the carriage and stability of the carriage is assured.

In order to mount the crane upon a motor truck or a platform of any desired sort, a separate supporting member indicated in general at **49** and preferably constructed as shown in Figures 5, 6 and 7 is provided. Member **49**

comprises a tubular socket 50 adapted to receive the end 44 of the mast 11 and supported by U-bolts 51 and a bracket 52 upon a vertically extending plate 53. At its upper end the socket 50 is provided with an indexing plate 54 which has an aperture 55 therein of the same diameter as the socket 50 and a plurality of indexing apertures 54*a* surrounding the aperture 55. The plate 54 is preferably welded to the socket 50. The vertical plate 53 is arranged to be bolted or otherwise secured to the chassis frame or body of a motor truck as shown, for example, in Figure 8, braces or struts 59 preferably being employed to strengthen the connection.

In Figure 8 the socket is shown as mounted on the side of a truck where the crane is useful for general hoisting purposes. It will be understood that the crane may be located in any desired position on the truck; for example, a crane may be mounted at the rear of a truck where it can be used for lifting and towing purposes.

The crane 10 may be installed in the socket 50 simply by inserting the lower end 44 of the mast 11 into the socket; the plate 43 engages the upper surface of the plate 54 to take the vertical load while the telescoping fit of the portion 44 within the socket holds the mast 11 in proper vertical position.

In this installation the crane is rotatable with respect to the socket so that it can be used in any desired position, pivoted while carrying a load, and the boom swung back over the truck while the truck is being driven. In order to lock the crane in a desired position of adjustment, the mechanism shown particularly in Figures 9 and 10 is employed. This mechanism comprises a foot pedal 56 which is secured by a pin 57 to locking key or plunger 58, the pin 57 passing through the bifurcated end portion 59 of the foot pedal.

The plunger 58 is supported for vertical movement by means of an outer sleeve 61 which is welded to the plate 43 and an inner sleeve 62 welded to the outer sleeve 61 (see Figure 10). The outer sleeve is welded to plate 43 in registration with opening 63 therein and in such position that as the crane is rotated with respect to the socket 50 and plate 54, the plunger 58 is placed successively in registration with the openings 54*a* in plate 54. Thus, when the plunger is moved downwardly into the position indicated in broken lines in Figure 9, the end of the plunger projects into the selected opening 54*a* and the crane is locked against accidental rotation.

In order to urge the plunger 58 downwardly a spring 64 is compressed between the upper end of the plunger and a pin 65 secured near the upper end of the inner sleeve 62. The sleeve 62 above the sleeve 61 is slotted as shown to receive the pin 57 and configuration of bifurcated portion 59 of the pedal 56 is such as when the pedal is in the lower position as shown in full lines in Figure 9, the surfaces 67 of end 59 engage the top of sleeve 61 holding the plunger 58 above the plate 54 and out of engagement with the apertures 54*a* as shown in full lines in Figure 9 and in Figure 10. When the pedal is moved to raised position as shown by broken lines in Figure 9 the end surfaces 69 of the end 59 of the pedal engage the upper end of the outer sleeve 61, and inasmuch as the distance from the end surfaces 69 to the pin 57 is less than the distance from the lower surfaces 67 to the pin 57, the plunger is permitted to move downwardly under the influence of the spring 64 and as soon as the plunger registers with an opening 54*a* the spring moves it into the locking position shown in broken lines in Figure 9.

Hydraulic actuating fluid for the cylinder 25 is preferably supplied by a hand operated pump 70 (see Figure 11) which is mounted upon a plate 71 secured to the mast 11; the pump mechanism is shielded by another plate 72 (see Figures 1 and 2), plate 72 being removed in Figure 11 of the drawing for convenience of illustration. The hollow mast 11 is utilized as a reservoir for hydraulic fluid and flexible conduits 73, 74, 75 and 76 are employed to make the required connections between the pump, the cylinder and the storage space within the hollow mast 11. A valve 77 in the return line from the lower end of cylinder 25 controls the backflow of fluid from the cylinder and hence controls the lowering of the boom and the load carried thereby. It will be noted that pump, valve and flexible conduits are all supported either on the mast or the boom; it is therefore unnecessary to make or break any fluid connections in changing the crane from one mounting to another.

In order to provide for convenient operation of the pump 70 the pump cylinder is pivotally mounted on the plate 71 as at 80 and the piston rod 81 of the pump is pivotally connected to the leg 82 of a bell crank 83. The bell crank is pivoted to the plate 71 at 84 and the other leg 85 of the bell crank is provided with a socket 85*a* to receive the handle 86. The pump can be operated conveniently with the handle in socket 85*a* when the crane is mounted on a truck as in Figure 8.

In order to provide for convenient operation of the pump when the crane is mounted on the carriage 31, the carriage is provided with a bell crank 87 pivoted at 88 on bracket 89 secured to the deck 33; bell crank 87 has a socket 90 in the leg 91 thereof to receive the handle 86, and the leg 92 thereof is pivotally connected to the link 93 which extends upwardly and is pivotally connected at 94 to the end of the link 82 of the upper bell crank. With this arrangement, the handle 86 can be used either in the upper position shown in Figure 8 and in broken lines in Figure 11 or, when the crane is mounted on the carriage 31, in the lower position shown in Figures 1 and 2 and in solid lines in Figure 11.

When it is desired to transfer the crane from the carriage 31 to the socket 50 mounted, for example, on a truck, it is only necessary to disconnect the pivotal connection 94 and move the handle 86 from the socket 90 in the lower bell crank 87 to the socket 85*a* in the upper bell crank. The crane can then be lifted out of the socket 37 and placed in the socket 50 where it may be locked in any desired position by means of the pedal 56 and plunger 58. To reinstall the crane on the carriage, the end 44 of the mast is placed in socket 37 with the opening 46 receiving the key 40, and the link 93 is reconnected to pivot 94. It is unnecessary to change any hydraulic connections and the pump actuating handle is located in a convenient position for operation wherever the crane is located. It will be noted that when the crane is mounted on a truck the pump and handle swing with the crane when the mast 11 is rotated to desired positions of adjustment, whereas the crane is locked in correct position for actuation of the pump through the connecting linkage when the crane is mounted on the carriage 31.

From the foregoing description of a preferred form of my invention it will be evident that I have disclosed herein a simple and sturdy crane which can be adapted readily to multiple uses either as a floor crane or as a truck or platform-mounted crane. Those skilled in the art will appreciate that various changes and modifications may be made in the preferred form of apparatus disclosed herein. It is therefore to be understood that my invention is not limited to the preferred form thereof described herein and that the appended claims are intended to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

I claim:

1. A hydraulic crane comprising a mast having a cylindrical bottom end portion, a boom pivoted to the mast, a hydraulic cylinder and piston acting between the mast and the boom for raising the boom, a pump mounted on the mast for supplying fluid under pressure to said cylinder, a lever supported on the mast for operating said pump, an actuating handle, means on said lever for removably connecting said handle to said lever, a wheeled carriage having a cylindrical socket rigidly mounted thereon, said socket receiving the bottom end portion of said mast, means for preventing rotation of said mast with respect to said socket comprising a plate secured to said mast and having an aperture thereon and a key rigidly secured to said socket and projecting into said aperture, a lever pivotally mounted on said carriage, a link adapted to connect said lever on said carriage with said lever mounted on the mast, said link being detachable from the lever mounted on the mast, said handle being connectable to said lever on said carriage for operation of said pump.

2. A hydraulic crane comprising a mast, a boom pivoted to the mast, a hydraulic cylinder and piston acting between the mast and the boom for raising the boom, a pump mounted on the mast for supplying fluid under pressure to said cylinder, a lever supported on the mast for operating said pump, an actuating handle, means on said lever for removably connecting said handle to said lever, a wheeled carriage having a socket rigidly

mounted thereon, said socket receiving the bottom end portion of said mast, a lever pivotally mounted on said carriage, a link adapted to connect said lever on said carriage with said lever mounted on the mast, said link being detachable from the lever mounted on the mast, said handle being connectable to said lever on said carriage for operation of said pump.

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