

July 28, 1970

C. D. ZEHRUNG, JR., ET AL

3,521,860

KNOCKY-DOWN HOIST

Filed March 18, 1968

2 Sheets-Sheet 1

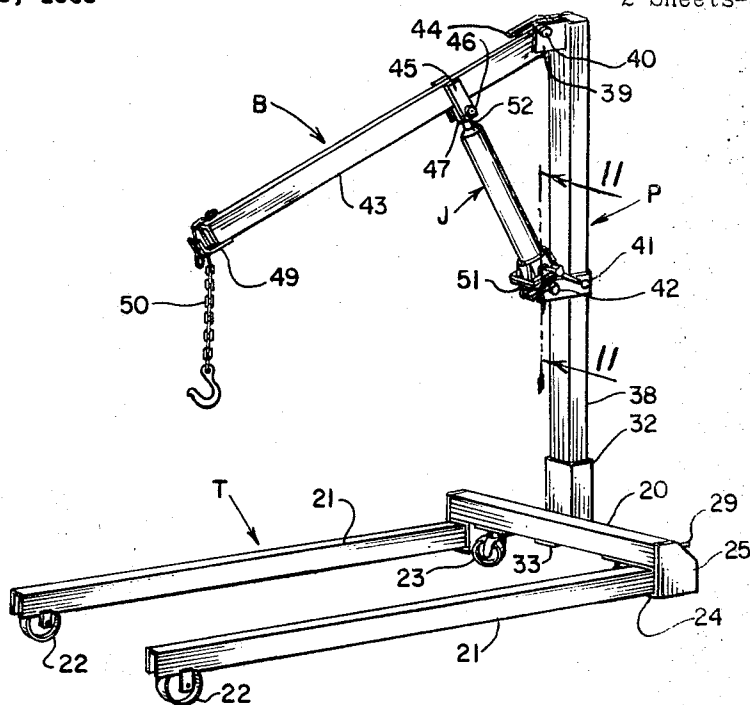


FIG. 1

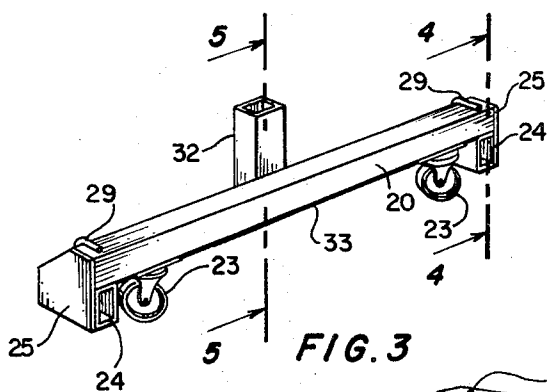


FIG. 3

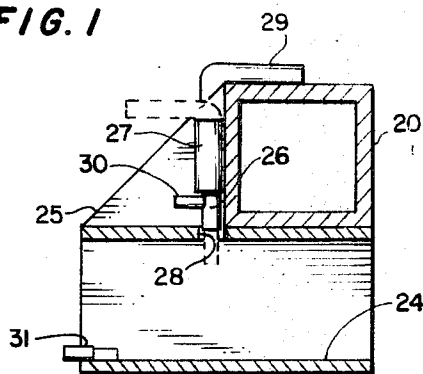


FIG. 4

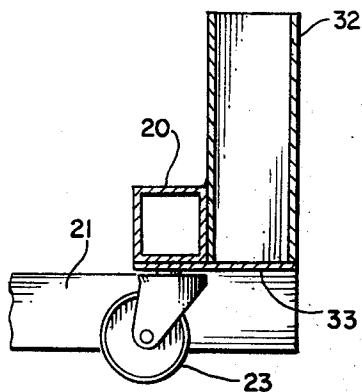


FIG. 5

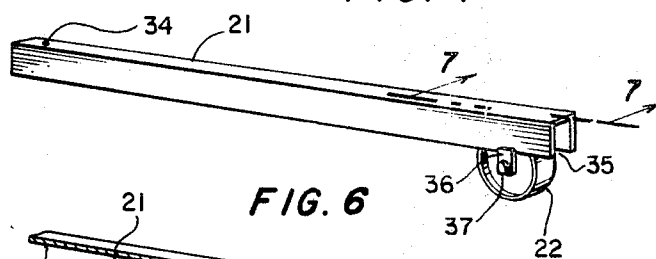


FIG. 6

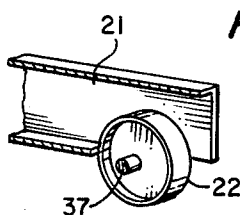


FIG. 7

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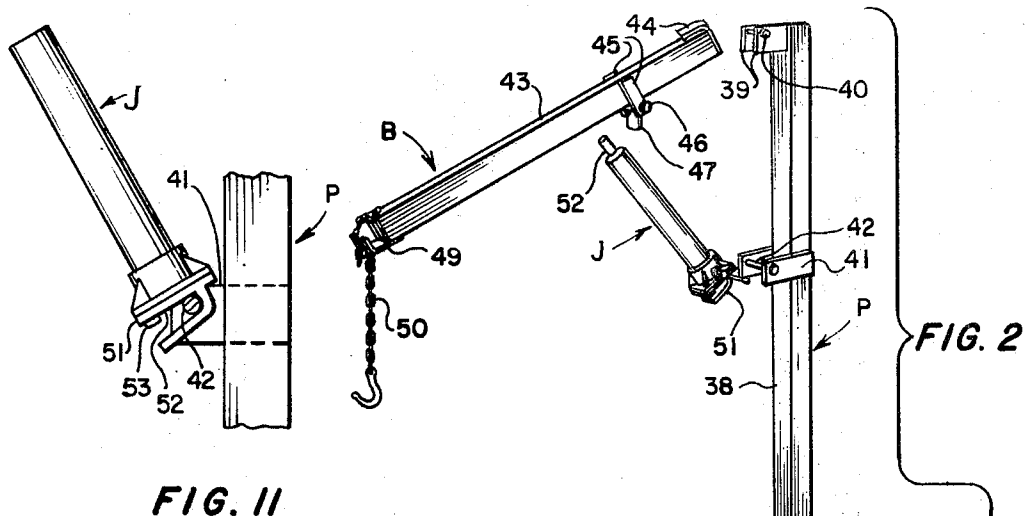
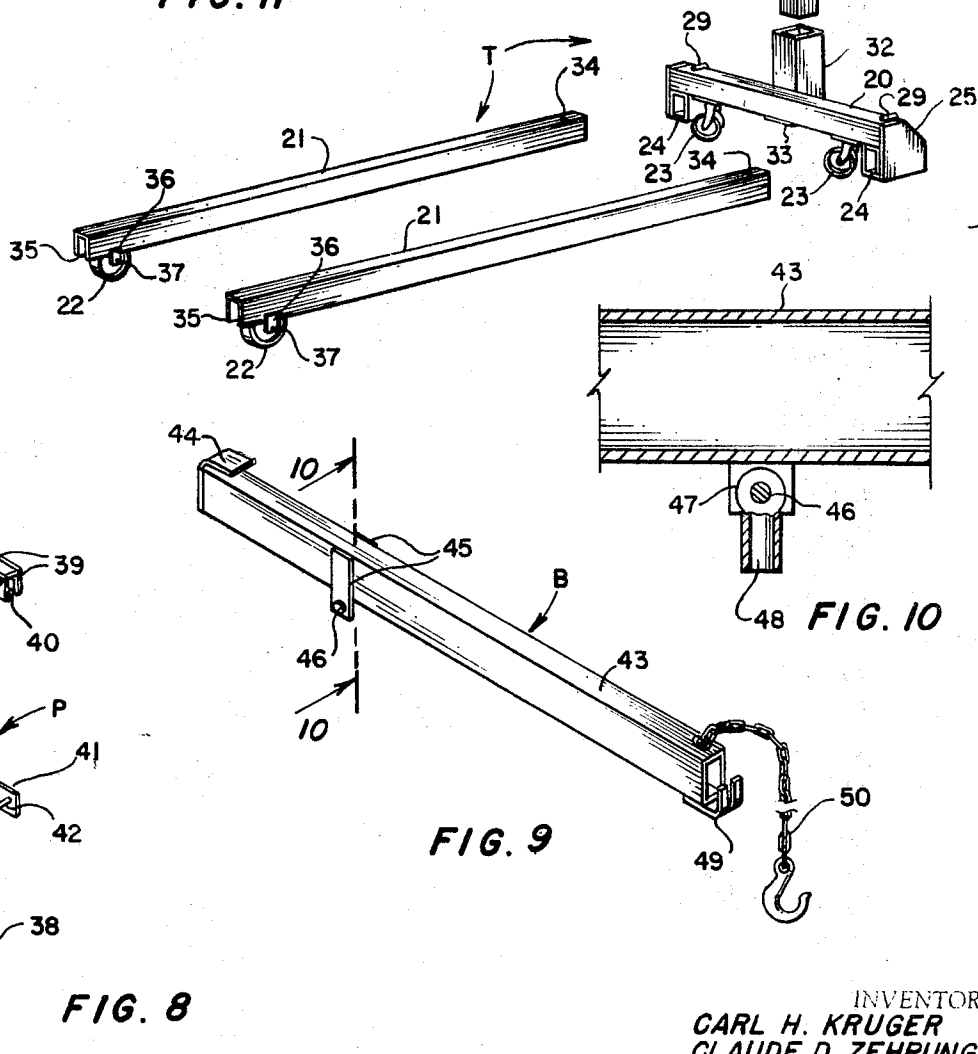
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KNOCKY-DOWN HOIST

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2 Sheets-Sheet 2



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3,521,860

KNOCK-DOWN HOIST

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6 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure concerns a mobile knock-down hoist carried on a truck having a U-shaped frame. The hoist-supporting post upstands from the center of the base of the U-frame at the rear end of the truck. A hoist boom cantilevers from the post for actuation in the vertical plane of longitudinal symmetry of the truck. The knock-down features of this hoist reside in socketing the side arms of the truck U-frame into the base thereof, socketing the hoist-supporting post at the center of the base and providing a removable boom at the top of the post. The boom is articulated by a hydraulic jack held in position on an abutment at the side of the post and in a socket on the boom.

This invention relates to mobile hoists, and more particularly to a knock-down mobile hoist of the general type which is carried upon a wheel-mounted truck having a U-shaped frame, and with the hoist boom being cantilevered from a support post upstanding from the center of the frame base at the rear of the truck and extending forwardly in a straddling position over the side arms of the frame.

An object of the invention is to provide a novel and improved mobile hoist which is adapted to be disassembled or knocked down into component sections to provide a compact package when the hoist is not in use and to simplify the problems of handling and transporting the same.

Another object of the invention is to provide a novel and improved mobile hoist which may be quickly and easily disassembled into elementary components and thereafter quickly and easily reassembled.

Another object of the invention is to provide, in a knock-down hoist, an arrangement of basic components which, when disassembled, can form a compact, easily portable package, yet which does not include any small, easily misplaced component parts, such as bolts, lugs or the like.

Another object of the invention is to provide, in a knock-down hoist, a simple arrangement of sockets and hooks for holding the components together in a secure, safe manner when the hoist is in use, yet which will not require wrenches or special tools for separation of the component parts when the hoist is to be disassembled.

Other objects of the invention are to provide a novel and improved knock-down hoist which is a lightweight, economical, neat appearing, rugged and durable unit.

With the foregoing and other objects in view, all of which more fully hereinafter appear, our invention comprises certain constructions, combinations and arrangements of parts and elements, as hereinafter described, defined in the appended claims and illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of the mobile hoist assembled and ready for use.

FIG. 2 is an exploded perspective view in an arrangement similar to FIG. 1, and depicting the components which are to be disconnected from each other when the hoist is knocked down.

FIG. 3 is an isometric view of the base of the truck frame, but illustrated in a position reversed from that shown at FIGS. 1 and 2.

FIG. 4 is a transverse, sectional detail, as taken from the indicated line 4—4 at FIG. 3, but on an enlarged scale and with broken lines indicating the locking position of a lock bolt.

FIG. 5 is a sectional detail as taken from the indicated line 5—5 at FIG. 3, but on an enlarged scale.

FIG. 6 is a perspective view of one arm of the truck frame.

FIG. 7 is a fragmentary, sectional view of the end of the arm, as taken from the indicated line 7—7 at FIG. 6, but on an enlarged scale.

FIG. 8 is a perspective view of the hoist post, but illustrated in a position reversed from that shown at FIGS. 1 and 2.

FIG. 9 is a perspective view of the hoist boom, but illustrated in a position reversed from that shown at FIGS. 1 and 2.

FIG. 10 is a fragmentary, sectional detail as taken from the indicated line 10—10 at FIG. 9, but on an enlarged scale.

FIG. 11 is a fragmentary, sectional detail as taken from the indicated line 11—11 at FIG. 1, but on an enlarged scale.

The type of hoist herein considered is carried upon a wheel mounted truck having a U-shaped frame, and it is commonly used in shops, factories and warehouses, and especially in the repair of automobile engines. The truck is adapted to move against an automobile or the like, with the arms of the frame embracing the automobile to place the boom of the hoist at a proper position over the automobile for lifting the engine from it. It may then be moved to transport the engine to the location where it is to be repaired.

This type of hoist has become very popular in the rental equipment business, especially where a mechanic wants to use it for only a short period of time, as to lift a motor out of or into an automobile. As a piece of rental equipment, the hoist is used at many different locations and must be transported from one location to another. As exemplified in the Pat. No. 3,154,290 issued to W. O. Johnson on Oct. 27, 1964, a similar structure called a "Trailer-type Hydraulic Lift" includes pneumatic tired wheels at the back of the base and a trailer hitch on top of the post so that it may be tipped backwards and attached to an automobile to function as a trailer and be towed to its destination. Due to various circumstances, including state laws which discourage the use of trailers of this type, and because of problems involved in the licensing and lighting requirements for such trailers where they are permitted, there has been a need for providing a hoist of this general type which can be conveniently placed in the bed of a pickup truck or the like and subsequently assembled at the point of use.

With such a need in view, the present invention was conceived and developed and comprises, in essence, a knock-down hoist carried upon a wheel mounted truck having a U-shaped frame and a hoist supporting post upstanding from the base of the U-shaped frame. This frame base is formed as a socketed member to connect with the arms of the frame and with the upstanding post, the boom of the hoist is pivotally secured to the top of the post and an hydraulic jack is carried on the post to extend to and actuate the boom.

Referring more particularly to the drawing, the assembled hoist structure, illustrated at FIG. 1, includes a truck T, a post P, a boom B and an hydraulic jack J which is adapted to operate the boom. The truck, as heretofore stated, has a U-shaped frame. The frame consists of a transversely disposed base 20 at its rear end,

and a pair of side arms 21 extending forwardly from each side of this base. The frame is rendered mobile by a fixed wheel 22 at the forward end of each arm 21 and by a pair of spaced-apart caster wheels 23 at the underside of the base 20.

The base 20 forms the central unit of the knock-down hoist. The base is a strong, rigid, tubular member, preferably square in cross section, and having a width and thickness sufficient to withstand severe torsional stresses to which it will be subjected.

This base 20 includes a heavy socket 24 at each end to hold an arm 21 in position. Each socket 24 is a short, tubular member, rectangular in section, sized to receive an arm and is welded to the underside of the base tube. Each socket 24 has a length approximately twice the width of the base tube, with the excess of length extending rearwardly from the base. Each socket is reinforced by an end plate 25 which covers the end of the base tube 20 and overlies the outer side of the socket 24 and which is securely welded to both members. In order to lock an arm 21 in a socket 24, a draw blot 26 is mounted in a bearing guide 27 which is welded to the rearward side of the base tube 20 above the socket tube 24. The bolt is aligned to extend into a hole 28 in the top of the socket 24 to drop into the socket cavity and into a registering orifice in the arm for locking an arm in place, as will be further described. The bolt 26 is made as an L-shaped member with an offset arm 29 at its top. The length of the bolt is such that the arm 29 will rest upon the top of the base tube 20 when the bolt is in its retracted position. However, the bolt will extend downwardly from this position when the arm 29 is rotated away from the base tube, as in the manner indicated in broken lines at FIG. 4. It is contemplated that the bolts 26 shall not ordinarily be removable from the base, and to prevent such removal, a roll pin 30 is driven into a hole in each bolt at a suitable location between the guide 27 and the top of the socket tube 24. The pin 30 will fit tightly, but it can be removed, if necessary. To complete the socket 24, a stop 31 is located at the inner rearward edge of the socket to facilitate a proper positioning of an arm 21 therein.

This base also includes an upstanding socket 32 at its center to hold the center post P. The socket 32 is square in section, sized to receive the end of the post, and is welded to the rear wall of the base tube. The height of this socket is approximately three times the width of the base tube with the excess height upstanding above the base. The bottom of the post socket 32 is closed by a reinforcing plate 33 which extends underneath the socket and across the bottom edge of the base tube 20, as in the manner illustrated at FIG. 5, and is securely welded to both members.

Each arm 21 is formed as a rigid, tubular member, preferably rectangular in cross section, with its rearward end portion being adapted to snugly fit into a base socket 24. When so fitted, the rearward edge of the arm abuts against the stop 31 in the socket 24, and an orifice 34, formed in the top of the arm 21, will be in registration with the hole 28 so that the bolt 26 may drop into the orifice 34 to secure the arm to the base. The forward end of each arm is slotted at its undersurface, as at 35, to provide a socket for its wheel 22, and an extension lug 36 depends from each side of this arm 21 to carry a shaft 37 which supports the wheel 22.

The post P is formed as a rigid, tubular member 38, preferably square in cross section, with its bottom portion being adapted to snugly fit into the socket 32 on the base 20. Being upright, the bottom of the post will rest against the plate 33, and a locking means is not required to secure the post in position. The upper end of the post includes a pair of outstanding, forwardly extended ears 39, which carry a pintle shaft 40 between them for connection with the boom, as will be described. A U-shaped strap 41 embraces the post at an intermediate position,

near the center of the post, with the ends extending forwardly therefrom to carry an abutment pin 42 between them, at the outer, upper corner of the ends. This pin 42 supports the base of the jack J, as will be described. These ears 39 and the strap 41 are securely welded to the post, and the shaft 40 and the pin 42 are locked in position so that they cannot be removed, a feature of the present invention being to avoid any small component parts from being lost when the crane is in use.

The boom B is likewise formed as a tubular body 43, preferably rectangular in cross section, with the depth being greater than the width to better resist bending moments imposed upon it when it is lifting a load. This boom is connected to the top of the post to extend forwardly therefrom, to articulate in the longitudinal vertical plane of symmetry at a position between and straddling the arms 21 therebelow. The rearward end of this boom B carries a flat hinge hook 44 formed as a flat strap abutting and welded to the rearward end of the boom body 43, with a projecting portion at the topside of the boom turning and extending forwardly in parallelism to the upper surface of the body member 43. This places the crotch of the hook at the end of the boom to resist an outward pulling movement thereof. The spacing of the ears 39 on the post P is such that the boom body 43 may be placed between these ears 39 with the pivot hook extending about and embracing the pintle shaft 40 in its crotch. Whenever a load is placed upon this boom B, there is a forward pull of the hook 44 against the shaft 40 and also, an upward thrust of the end of the boom against the shaft 40 to relieve, to a substantial degree, the pressure of the shaft against the hook. The result is that the connection of the hook 44 on the pintle shaft 39 will be quite secure at any position of the hoist boom; nevertheless, whenever there is no load upon the hoist, and when desired, the boom B may be easily disconnected from the post P by simply disengaging the hook 44 from the shaft 40.

A plate 45 is welded to each side of the boom at an intermediate location on the boom, and is spaced apart from its mating plate 45 to carry a transverse pivot shaft 46. A head 47, formed with a socket 48, is mounted upon this pivot 46 as in the manner illustrated at FIG. 10, to connect with a jack plunger as will be described. The boom is completed by providing a pair of upturned fingers 49, outstanding from the underside of its forward end, and a chain and hook 50 attached to the topside of its forward end. Adjustments to the chain length from the end of the boom is effected by securing a selected link in the fingers 49 in a well known manner.

This knock-down arrangement is completed by a conventional hydraulic jack J, preferably of a type which may be extended by a manual pump associated with the jack. The base of the jack is attached to a connector plate 51 which is wider than the space between the legs of the strap 41. The plate 51 has a flat hook 52 at its underside which is adapted to reach under and embrace the abutment pin 42. The hook is downturned to extend forwardly and parallel to the underside of the plate so as to remain on the pin when the jack falls to a horizontal position where the underside of the plate abuts against the ends of the U-strap 41 to prevent the jack from moving below the horizontal position. In this manner, if the boom were accidentally lifted, releasing the top of the jack, the jack will not fall beyond the horizontal position. A small transverse key 53 is welded to the underside of the plate 51 at the mouth of the hook to prevent the jack from accidentally slipping backwardly and off the pin 42. At the opposite end of the jack, the plunger 52 is adapted to fit into the socket head 47.

Assembly of this hoist consists in connecting the several components together as illustrated at FIG. 1. Each frame arm 21 is fitted into a base socket 24. The post P is mounted upright in the socket 32. The boom is hooked onto the pintle shaft 40. The base of the jack J is placed upon the abutment pin 42, and the plunger of the jack

is fitted into the socket 46 to complete the assembly. The boom may then be raised and lowered by extending and retracting the plunger of the jack.

Disassembly is the reverse of assembly. It is to be noted that this hoist, when dismantled, consists of six individual components; that there are no small bolts or pins to disconnect or to loosen, that each component may be quickly and easily mounted and dismantled without the need of special tools. A crane of the type described, large enough to handle the ordinary automobile motor, may be easily dismantled and placed into the bed of a pickup truck, or even the trunk of an automobile, transported to the point of destination, assembled, dismantled when used, and returned to the rental organization.

We have now described our invention in considerable detail, however, it is obvious that others skilled in the art can devise and build alternate and equivalent constructions which are, nevertheless, within the scope and spirit of our invention. Hence, we desire that our protection be limited only by the proper scope of the appended claims.

We claim:

1. In the combination of a knock-down hoist adapted to be disassembled into component parts as for transportation, and to be reassembled when needed, which comprises:

- (a) a wheel mounted, U-shaped frame having a transverse base at one end thereof, a longitudinal side arm extending from each end of the base and an upstanding socket at the center of the base;
- (b) a support post whose bottom is adapted to be fitted into the said socket to upstand therefrom, and having a pivot means at its top and an abutment means at an intermediate position between its bottom and top;
- (c) a crane boom having a pivot means at one end thereof and an abutment means at an intermediate position thereof, said pivot means being adapted to be connected to the post pivot means to generally outstand therefrom and to swing in a vertical plane between the arms of the frame; and
- (d) a jack means adapted to be secured to the post abutment means and the boom abutment means to be extended and retracted to swing the boom, the improvement, wherein:
- (a) said pivot means at the top of the post includes a shaft and said pivot means on the boom includes a hook formed by a strap-like member secured to the end of the boom and being turned therefrom towards the opposite end of the boom to lie in parallelism with the adjacent edge of the boom, to engage said shaft, and to be disengaged from the shaft only by a longitudinal movement of the boom sliding the hook off the shaft.

2. A knock-down hoist adapted to be disassembled into component parts as for transportation and to be reassembled when needed, and comprising in combination:

- (a) a wheel mounted, U-shaped frame including a transverse base member, an upstanding socket at the center of the base and a longitudinally directed socket at each end thereof;
- (b) a support post whose bottom is adapted to be fitted into the center socket to upstand therefrom, and including a pivot means at its top and an abutment means at an intermediate position between its bottom and top;
- (c) a side arm for each end socket, an end of which is fitted into an end socket to extend longitudinally

from the base so the base and two side arms form a U-shaped frame;

(d) a releasable lock means at each side socket adapted to secure its arm therein;

(e) a crane boom having a pivot means at one end thereof and an abutment means at an intermediate position thereof, said pivot means being adapted to be connected to the post pivot means to generally outstand therefrom and to swing in a vertical plane between the arms of the frame; and

(f) a jack means adapted to be secured to the post abutment means and the boom abutment means to be extended and retracted to swing the boom said pivot means at the top of the post includes a shaft and said pivot means on the boom includes a hook formed by a strap-like member secured to the end of the boom to lie in parallelism with the adjacent edge of the boom to engage said shaft and to be disengaged from the shaft only by a longitudinal movement of the boom sliding the hook off the shaft

3. In the organization defined in claim 2, wherein: the abutment means on the boom comprises a pivoted socket adapted to engage the plunger end of the jack, wherein the jack means includes a hydraulic jack having an enlarged base plate and a flat hook beneath the base plate, and

the post abutment means includes a transverse pin out-standing from the post, side plates on the post supporting the pin with the ends of the side plates forming abutments, said hook engaging the pin and said base plate engaging the sideplate abutments below the pin whenever the jack drops downwardly, to thereby limit the downward movement of the jack on the post.

4. In the organization set forth in claim 2 wherein said lock means to secure each side arm into its end socket includes:

- a hole in the end of the side arm,
- a passageway through the end socket adapted to register with the arm hole when the arm is inserted into the base; and
- a drop pin carried on the base adapted to be inserted into the two holes when they are registered whereby to lock the side arm to the base.

5. In the organization set forth in claim 4, wherein said drop pin is carried in a guide above the end socket passageway and a member on the pin forming an abutment to limit the movement of the pin into the holes.

6. In the organization set forth in claim 1, wherein said strap-like member secured to the end of the boom overlies the top adjacent edge of the boom.

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U.S. Cl. X.R.

212—8; 254—124