March 26, 1929. C. W. DAUGHS 1,706,441

CRANE

Original Filed June 23, 1924 4 Sheets-Sheet 1

Fig. 1

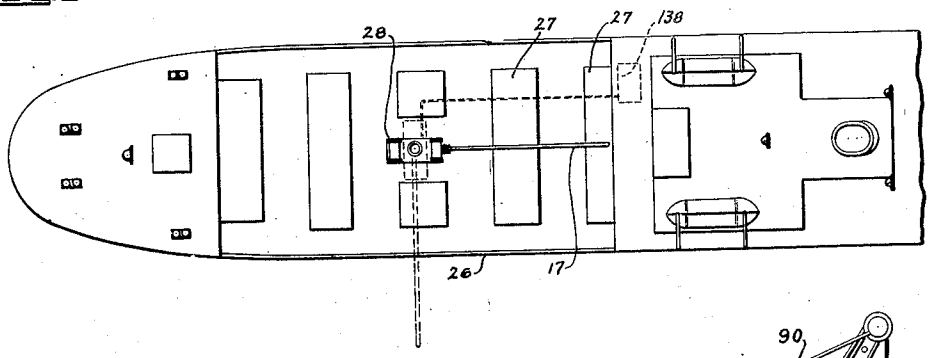
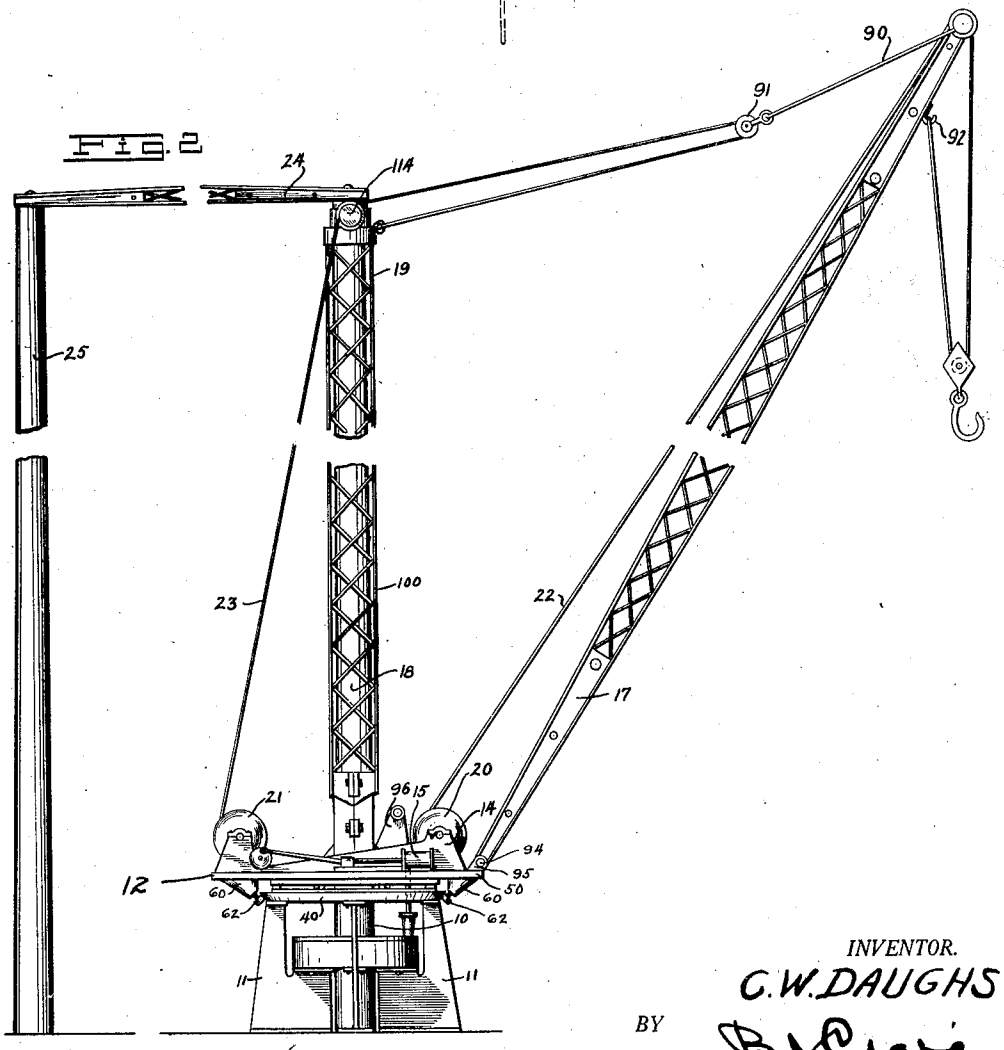



Fig. 2




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Fig. 3

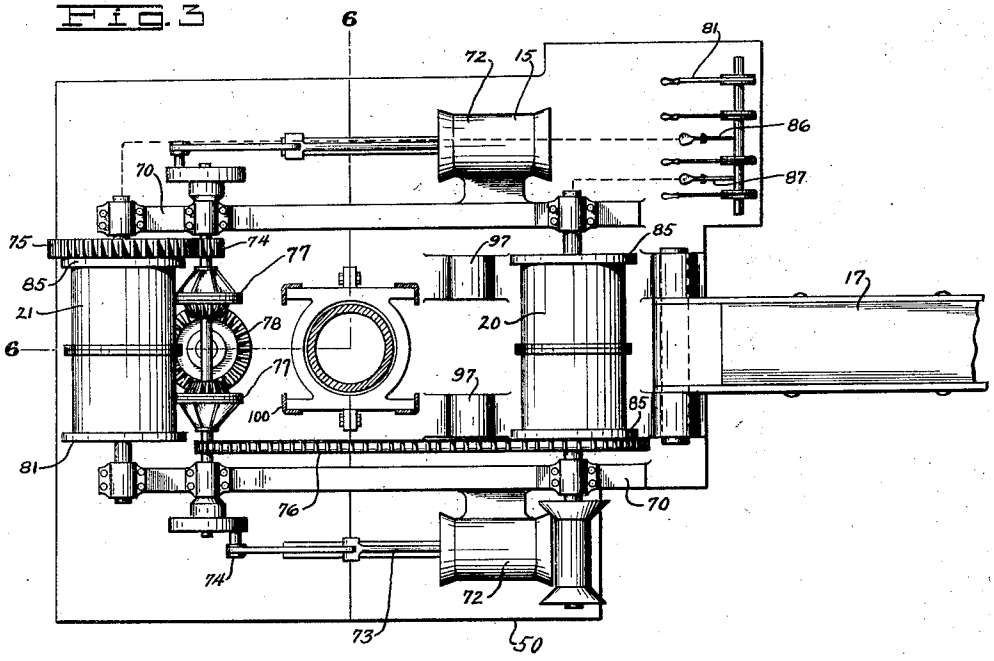
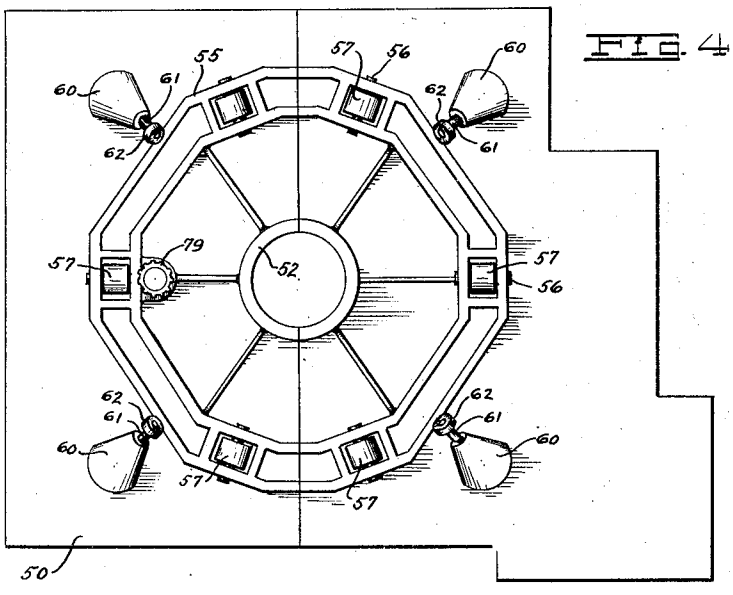



Fig. 4




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Fig. 5

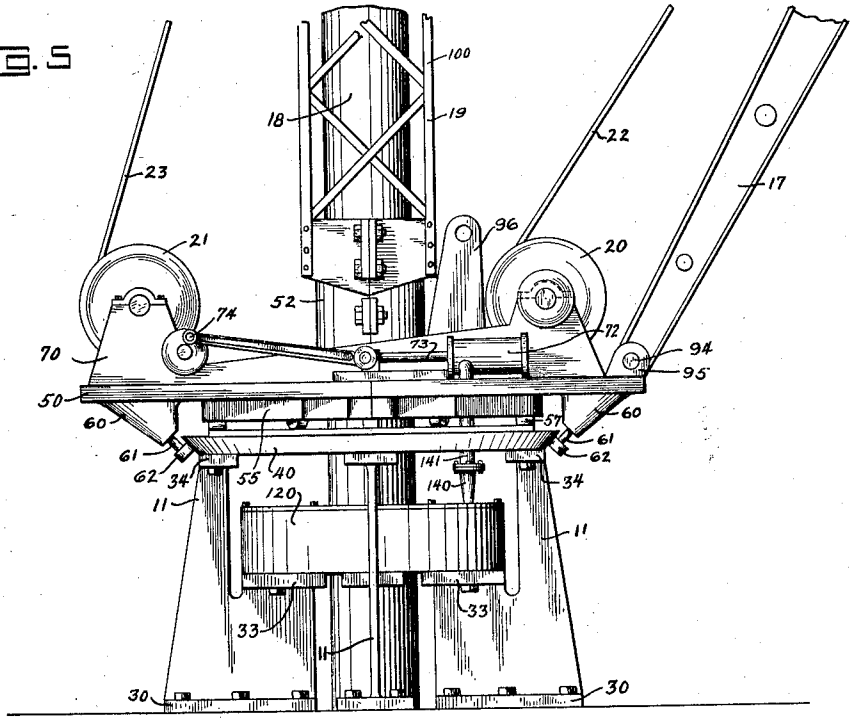
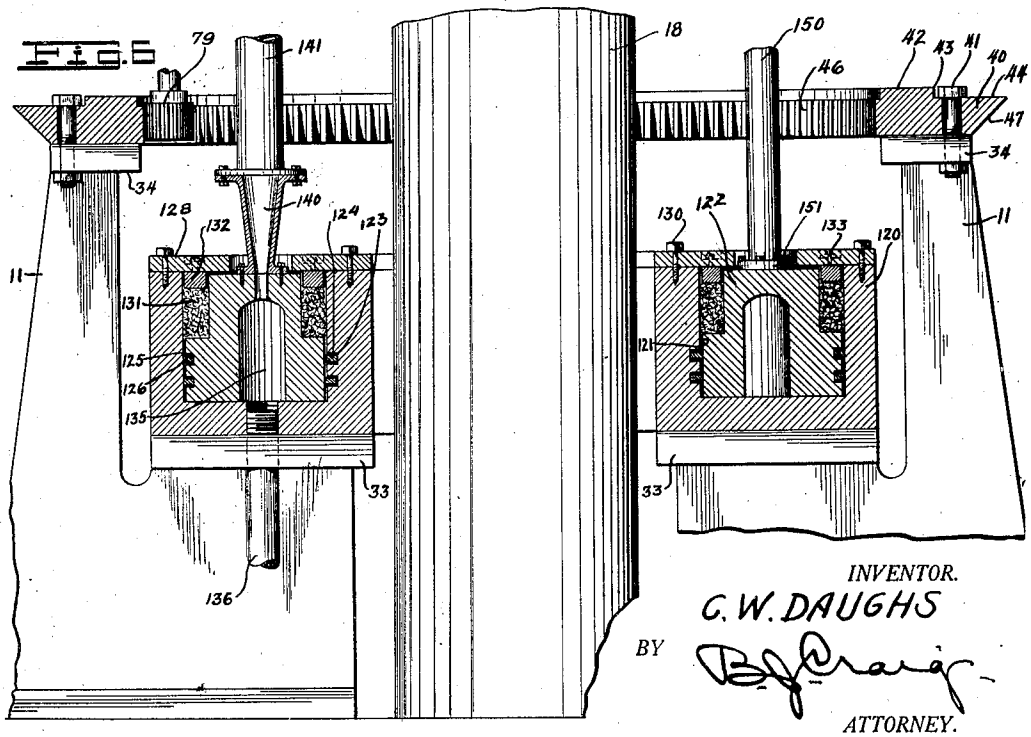



Fig. 6




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Fig. 7

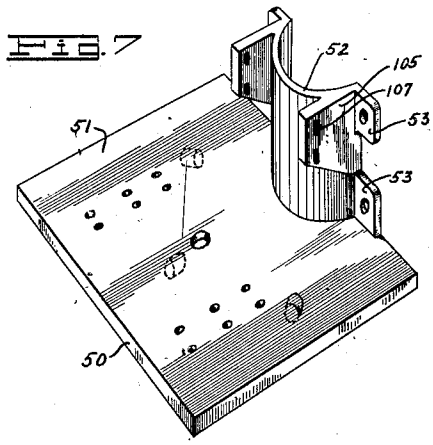



Fig. 8

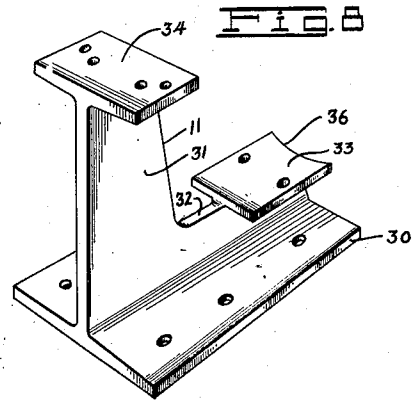
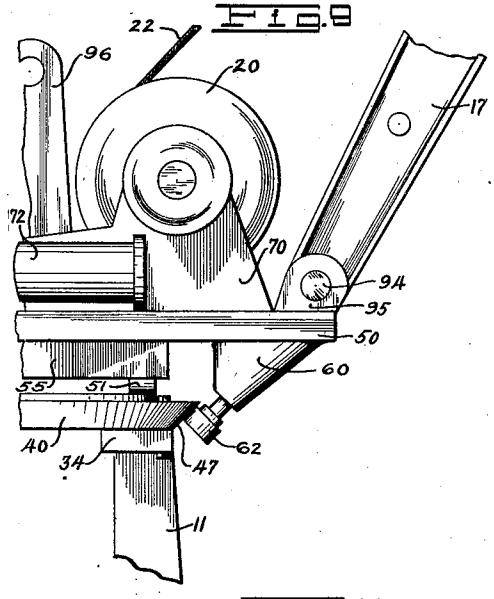



Fig. 9



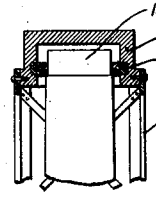




Fig. 10

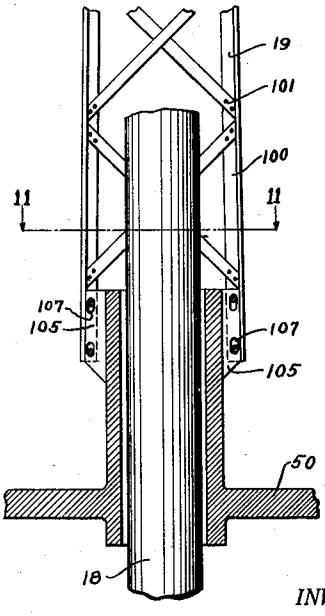
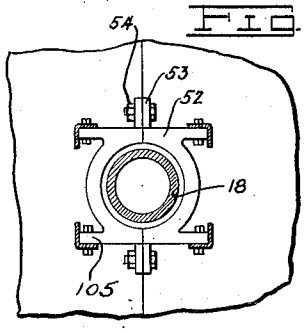



Fig. 11




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Patented Mar. 26, 1929. 1,706,441

# UNITED STATES PATENT OFFICE.

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## CRANE.

Application filed June 23, 1924, Serial No. 721,738. Renewed January 25, 1929.

This invention relates to cranes.

The general object of the invention is to provide an improved crane which is adapted for use for general purposes such as loading and unloading vessels, in railway work, as a lugging crane, as a quarry crane or in fact for any purposes where cranes are adapted to be operated.

One of the specific objects of my invention is to provide a crane which is mounted for free rotary movement, wherein the prime mover operating the crane is mounted to rotate with the crane and wherein a separate, relatively fixed, source of power is at all times in communication with the prime mover on the crane.

Another object of my invention is to provide a rotary crane having a mast and a boom and having a steam engine mounted to rotate with the crane, wherein a separately mounted relatively fixed boiler is provided and wherein there is means connecting the boiler and engine so that the two are in constant communication notwithstanding that the crane is sluing back and forth.

A further object of my invention is to provide a crane including a platform having a boom and a mast thereon together with winches and cables controlling the position of the boom and a load and wherein the mast is free to move with the platform.

An additional object of the invention is to provide a rotary crane, including a boom, with a plurality of supports for the boom so that the boom can be arranged in two positions.

A further object of the invention is to provide an improved support for cranes whereby the operating mechanism may be supported without tipping or binding or otherwise interfering with the operation of the crane.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein Fig. 1 is a plan view of a portion of a ship showing a crane embodying the features of my invention thereon; Fig. 2 is a side elevation of a crane embodying the features of my invention; Fig. 3 is a plan of the crane, the mast being shown in section with a part of the boom broken away; Fig. 4 is a plan of the under portion of the base plate; Fig. 5 is a side elevation of the crane showing a portion of the mast and boom; Fig. 6 is a section on line 6—6, Fig. 3; Fig. 7 is a perspective view of one-half of the base plate; Fig. 8 is a perspective view showing a foundation standard; Fig. 9 is a detail elevation; Fig. 10 is a sectional view partly in elevation showing the lattice sleeve mast and its mounting and Fig. 11 is a section on line 11—11, Fig. 10.

Referring to the drawing by reference characters, I have shown a crane at 10. This crane includes a foundation standard 11 having a rotating base plate 12 mounted thereon. The base plate is indicated as provided with a side housing 14 which is shown as supporting a steam engine 15. The base plate is also shown as provided with a pivotally mounted boom 17. The crane is preferably associated with a mast 18 and upon this mast I show an auxiliary mast 19 which is provided with suitable supporting means so that may rotate with the crane about the mast 18.

Arranged upon the base plate to rotate therewith, are cable drums 20 and 21 which are connected with load lifting and boom hoisting cables 22 and 23. The mast 18 may be stayed at the top in any desired manner. In the embodiment of my invention shown it is connected by means of a cross piece 24 with a supplemental mast 25.

My improved crane is adapted for general use. It may be used as a wrecking crane, as a logging crane, as a quarry crane and as a general loading and lifting crane. I now prefer, however, to use my invention for the purpose of loading and unloading vessels. The great flexibility of operation of my crane together with its rapidity of action, its economy of construction, and easy repair render it particularly suitable for use with vessels and although in the following description I have indicated it as applied to a vessel I wish it to be understood that I do not wish to be limited to this use.

Referring again to the drawings I show a vessel at 26. This vessel is indicated as provided with an improved system of hatchways 27 which I have invented. These hatchways 27 extend transversely of the vessel and extend almost across the upper deck, so that practically all of the hold space can be reached by my crane which is shown at 28 in Fig. 1. By referring to this figure it will be seen that the crane can very readily pick up articles on either side or both sides of the

vessel and can transport them to and from the hold and dock.

The foundation standard 11, is shown in detail in Fig. 8. This foundation standard comprises a base portion 30 having an upstanding web 31 thereon. The web 31 is shown as cut away at 32 and upon the cut away portion a bearing plate 33 for my improved rotary valve, to be presently described, is provided. The upper portion of the web 31 is provided with a bearing block 34 which is adapted to receive and support a rack and roller path to be presently described.

I now prefer to provide four of the foundation standards arranged at an angle of 90° about the mast 18, as shown in Figs. 2 and 5. The inner portion of the foundation standard is preferably curved as at 36 so that it may be fitted close to the mast 18.

Upon the bearing blocks 34 I show a rack and roller path 40. This path is secured to the bearing block 34 by means of securing members such as bolts 41. The rack and roller path is provided with a plane upper surface 42 and with a shoulder 43 which provides a rabbeted portion 44 so that the head of the bolt 41 will not interfere with the rollers operating on the path 42. The inner periphery of the roller path is provided with teeth 46 as shown while the outer periphery of the roller path is preferably beveled, as at 47 to engage steadying rollers to be presently described.

Mounted upon the rack and roller path I show a base plate 50. The base plate 50 is preferably constructed of two parts which may be suitably secured together. Each half of the base plate includes a portion 51 having a semi-cylindrical upstanding collar 52 thereon. The two portions of the collar are provided with apertured flanges 53 which are adapted to receive fastening members such as bolts 54 to secure the parts of the collar together. The under surface of the body portion 51 of the base plate is shown as provided with a plurality of strengthening ribs 55, as best shown in Fig. 4. The strengthening ribs 55 also provide supports for shafts 56 of anti-friction rollers 57. In the drawings I show six of these anti-friction members, although it will be understood that more or less of these rollers may be used as desired. The rollers 57 are adapted to engage the roller path 42 previously described.

The base plates are also shown as provided with protuberances 60 which are shown as fitted with shafts 61 on which are mounted steadying rollers 62. The steadying rollers 62 are adapted to engage the beveled face 47 of the rack and roller path 40. I show four of these steadying rollers although any desired number may be employed. The beveled surface 47 is preferably arranged at an angle of 45° in respect to the roller path 44 and the steadying rollers serve to prevent any tipping of the base plate or the boom which might be occasioned by the weight of the boom and load. The steadying rollers also serve to hold the base plate in its proper position as it rotates around the mast 18.

Mounted upon each side of the base plate 50 I show a side housing 70. This side housing provides a support for the cable drums 20 and 21 and also for the parts of the steam engine 15. The side housings are each preferably made as a one piece member and when secured to the base plates serve to rigidly connect the two portions of the base plate. The steam engine 15 is preferably of the double cylinder non-reversible type and includes cylinders 72 with the usual piston rods 73, wrist pins, 74, etc. The engine is adapted to drive the gearing for rotating the drums as well as the sluing gear.

The engine as shown in Fig. 3 is connected by gears 74 and 75 with the drum 21. The engine is also connected by means of a drive chain 76 with the drum 20. A suitable clutch arrangement 77 may be combined with a differential 78 to drive a gear 79, as shown in Figs. 4 and 6. The gear 79 is adapted to mesh with the rack 46 on the roller path 40. The steam engine is adapted to be controlled by operating levers 81 which may be mounted on a projecting portion of the base plate 50.

The engine, as well as the sluing gear, per se, is old and well known in the art and is the standard type now in use on locomotive cranes, and it is believed that a further description of the construction and operation of the steam engine and the sluing gear is unnecessary. The cable drums 20 and 21, which receive the load hoist cable and the boom hoist cable, may be each constructed as a double or two section drum in order to permit operating a bucket line when clam shell buckets are used or for controlling lifting magnets which may be used in discharging or loading bulk cargo.

The drums 20 and 21 are shown as provided with a pair of wide flanges 85 on each end thereof for receiving brake bands. The brakes on the drum 21 may be controlled by an operating lever 86 while the brakes on the drum 20 may be controlled by the operating lever 87. It is important that ample braking surface be provided so that the operator may have absolute and certain control of the boom and load movement.

The boom which is shown at 17 is provided with a member 90 at the top for engaging a block 91 which is in turn engaged by the cable 23. The boom is also shown as provided with the usual attachments 92 for the load lifting cable. The inner end of the

boom is shown as mounted on a shaft 94 which is removably arranged in a bracket 95 mounted on the base plate 50. It is frequently desirable that the inner end of the boom be mounted so that the boom may, in sluing, clear deck loads or other objects, in loading and unloading, and for this purpose I provide a supplemental boom support shown at 96. The supplemental boom support comprises spaced brackets 97 which are adapted to receive the shaft 94 of the boom.

The boom 17 may be supplied with a removable section so that its length may be increased or decreased when desired.

The crane described is adapted to be used in various locations and as shown it is indicated as arranged about a ship's mast 18. This mast may be a regular ship's mast located amidship or it may be on a mast disposed at one end of the vessel, when the crane is used on very large vessels.

In order to support the boom I provide an auxiliary mast 19. This auxiliary mast which is preferably of the lattice sleeve type comprises a plurality of vertical members 100 which are indicated as jointed by diagonal lattice members 101 to form a semi-rigid structure. The lattice sleeve mast is shown as secured at its bottom upon flanges 105 which are arranged upon the cylindrical portion 52 of the base plate 50. The construction shown provides four of the flanges 105 as shown in Fig. 11. The flanges 105 are provided with elongated slots 107 through which the fastening members 108 extend. These fastening members 108 secure the lattice sleeve mast in position in such a manner that a flexible connection with the base plate is provided. This flexible connection absorbs any spring that might take place in the mast which would be occasioned by reason of any sudden heavy load lift.

At the top of the mast 18 the lattice sleeve is provided with a terminal member 110 which is shown as provided with an anti-friction member 111 indicated as engaging the mast 18. This mounting provides a free bearing at the top for the lattice mast when it is slued back and forth. The member 110 may serve as a support for wire rope blocks 114, as shown in Fig. 2, which are adapted to receive the boom hoist cable.

In order that a continuous flow of steam may be furnished from the ship's boiler to the crane engine while the crane is sluing back and forth I provide an improved rotary steam valve. The crane described is adapted to swing around with a 360 degree swing. The valve embodying the features of my invention is arranged around the mast 18. The valve is supported on the bearing plates 33 which are arranged on the foundation standards 11. The valve comprises a body portion 120 which is shown as provided with an eccentric recess 121 therein. Within this eccentric recess I provide a valve member 122 which is mounted for free movement in the recess 121. The inner wall of the member 120 is provided with piston ring grooves 123 for the reception of piston rings 124 while the outer wall of the valve 122 is provided with piston ring grooves 125 and with piston rings 126 fitted therein. The grooves in the piston rings are so placed that the outward thrust of the rings is against the outside wall on both the inside and the outside portions of the valve member 122.

In order to secure the valve member 122 in place, I provide an annular closure member 128. This closure member 128 is adapted to fit over the mast 18 and is secured to the member 120 by suitable fastening members 130. The valve 122 is provided with space to receive steam packing 131 and the closure 128 is provided with packing rings 132 which engage the packing 131 to force the latter to place. The packing rings 132 are shown as coacting with threaded members 133 which serve to force the packing rings downwardly against the packing to insure a tight joint. The valve member 122 is shown as provided with an annular hollow cavity 135 which extends entirely around the valve. This cavity is shown as communicating with a fixed steam pipe 136 which is arranged in the stationary valve member 120. In order that the engine 15 may be continuously in communication with the valve chamber 135 and consequently with the steam line 136 to the boiler 138 (shown in dotted line position in Fig. 1) I provide a coupling member shown at 140. This coupling member serves to connect the rotary valve 122 with a steam line 141 which is in communication with the cylinders 72 of the engine 15 as shown in Fig. 5.

As the crane slues back and forth the valve 122 rotates within the valve member 120 and continuously supplies steam to the engine 15. In order that the thrust of this torque may be taken from the steam connection 140, I provide a pair of brackets 150 as shown in Fig. 6. These brackets are preferably arranged on diametrically opposed sides of the valve 122 and one end of each bracket is secured to the valve while the other end of the bracket may be secured in slots in the base plate, thus taking off the strain from the steam connection when the crane slues back and forth.

From the foregoing description, it will be apparent that I have invented an improved crane which can be readily manufactured and installed and which is highly efficient and which permits economy in operation and great flexibility in action so that a load can be very quickly transferred from one place to another.

Having thus described my invention, I claim:

1. In a ship's crane, a supporting deck, a fixed mast on the deck, a plurality of radially arranged foundation standards mounted on the deck, a base plate, means on said foundation standards for supporting said base plate, said base plate surrounding said mast, a crane structure on said base plate, means supported on the base plate coacting with means on the foundation standard to prevent the base plate from tilting.

2. In combination with a deck having a mast stepped therein, a foundation standard mounted independently of said mast on said deck and about said mast, a rack and roller path fixed upon said foundation standard about said mast, a base plate, a crane on said base plate, said base plate having rollers thereon which engage said roller path to rotatably support the base plate, an auxiliary mast mounted on said base plate, said auxiliary mast surrounding said fixed mast, and having a part thereof engaging the fixed mast to assist in holding the auxiliary mast in position.

3. In combination with a deck having a mast stepped therein a foundation standard mounted independently of said mast upon said deck and about said mast, a rack and roller path arranged upon said foundation standard, a base plate, said base plate supporting the crane mechanism and having rollers thereon which engage said roller path to rotatably support the base plate, a collar rigid with said base plate, said collar surrounding said mast and being disposed close to said mast, an auxiliary mast mounted on said collar and surrounding said fixed mast.

4. In a ship's hoisting tackle, a stationary fixed mast, a base mounted to rotate about said mast, an auxiliary mast mounted on said base and surrounding said first mast and adapted to rotate independently of the first mast, said auxiliary mast comprising vertical members connected together, means to secure said members to said base, said means including a slip joint whereby undue strains will cause the supplemental mast to move relative to the stationary mast without serious breakage of parts.

5. In combination with a deck having a fixed mast secured directly thereon, a foundation standard secured directly to said deck about said mast, a rack and roller path fixed upon said foundation standard, a base plate, said base plate having a crane structure thereon and having rollers thereon which engage said roller path to rotatably support the base plate, an auxiliary mast mounted on said base plate and surrounding said fixed mast, and means supported on said base plate coacting with means on said foundation standards for preventing upward movement of said base plate, said means allowing free rotation of said base plate.

6. In combination with a deck having a mast stepped therein, a foundation standard secured to said deck about said mast, a rack and roller path fixed upon said foundation standard, a two part base plate, said base plate having rollers thereon which engage said roller path and thereby support the base plate, a collar mounted on the base plate and surrounding said mast, an auxiliary mast mounted on said collar, said auxiliary mast surrounding said fixed mast and being freely rotatable, a pinion on said base plate engaging the rack on said rack and roller path and means mounted on the base plate to turn said pinion and rotate said base plate.

In testimony whereof, I hereunto affix my signature.

CHARLES W. DAUGHS.