

May 29, 1928.

G. E. MOORE

1,671,252

CRANE

Filed Sept. 30, 1922

4 Sheets-Sheet 1

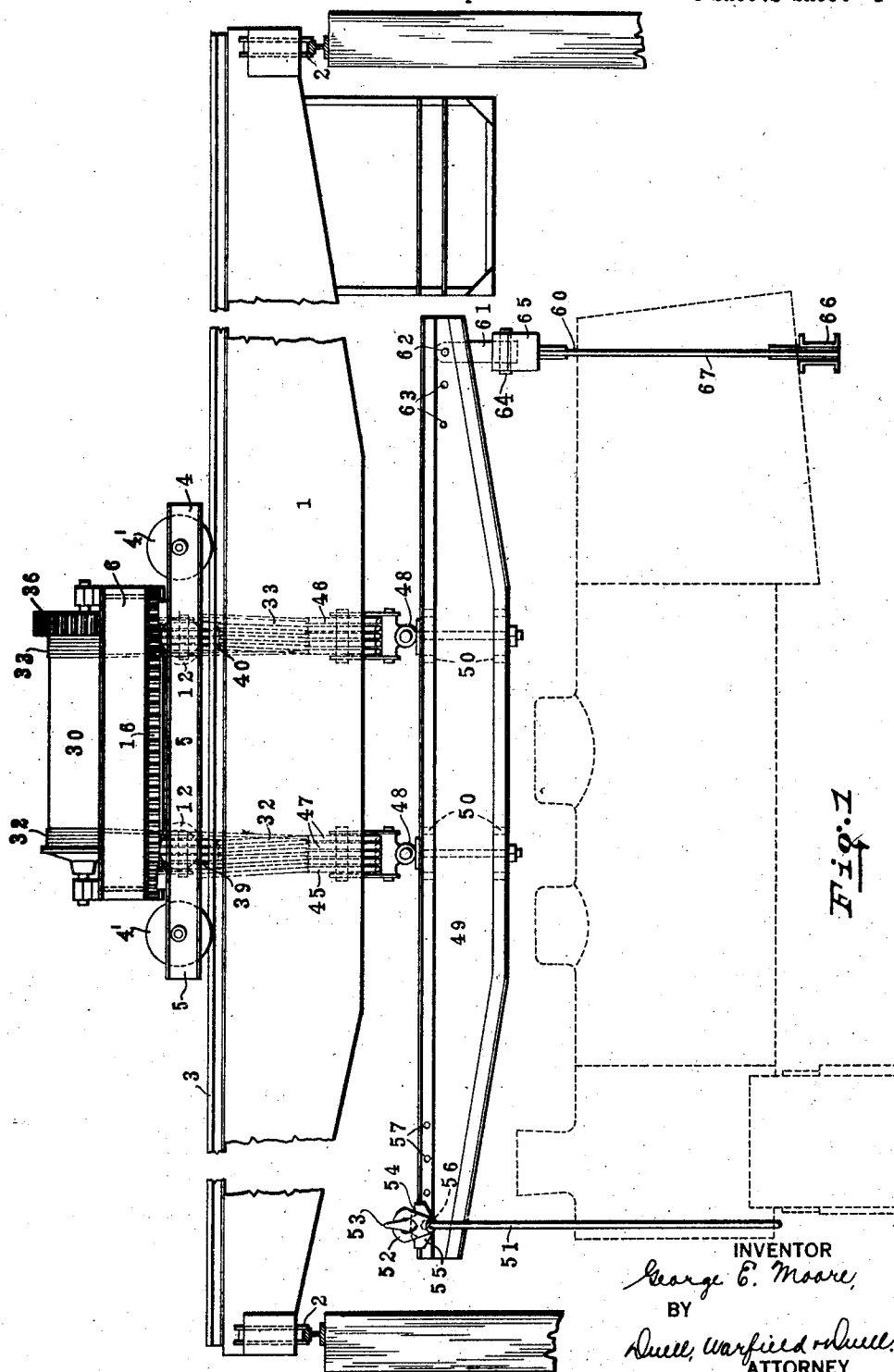


Fig. 1

INVENTOR

George E. Moore,

BY

Swell, Warfield & Swell,
ATTORNEY

May 29, 1928.

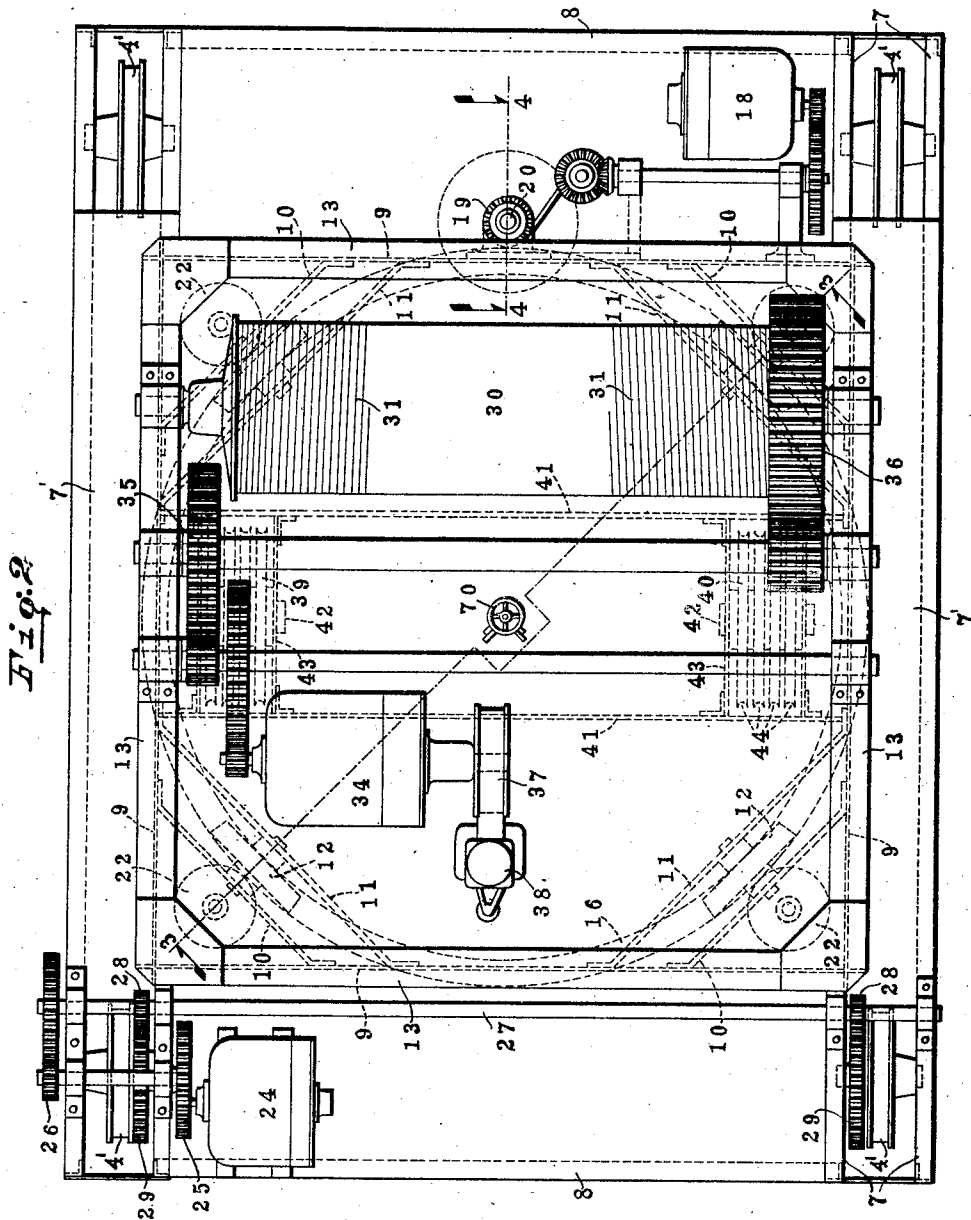
G. E. MOORE

1,671,252

CRANE

Filed Sept. 30, 1922

4 Sheets-Sheet 2



INVENTOR
George E. Moore.
BY
Shull, Warfield & Shull
ATTORNEY

May 29, 1928.

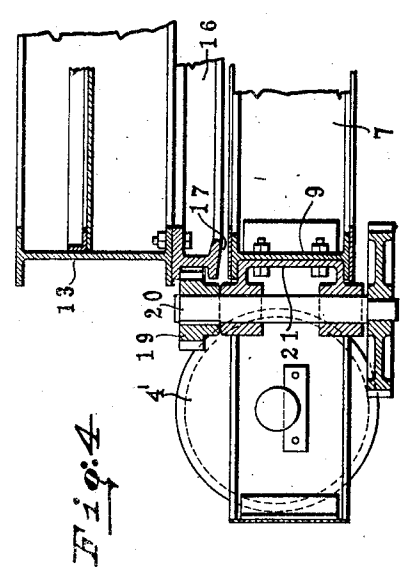
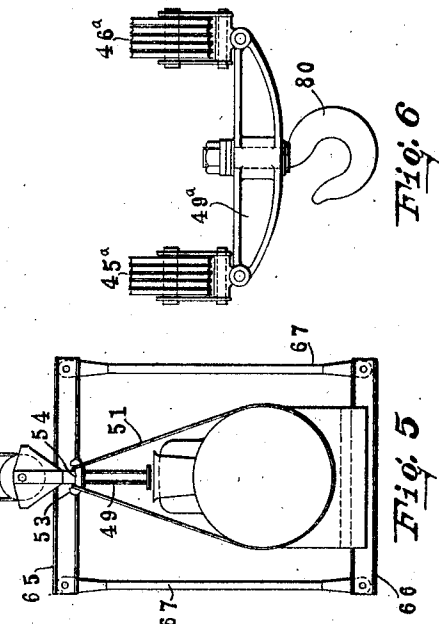
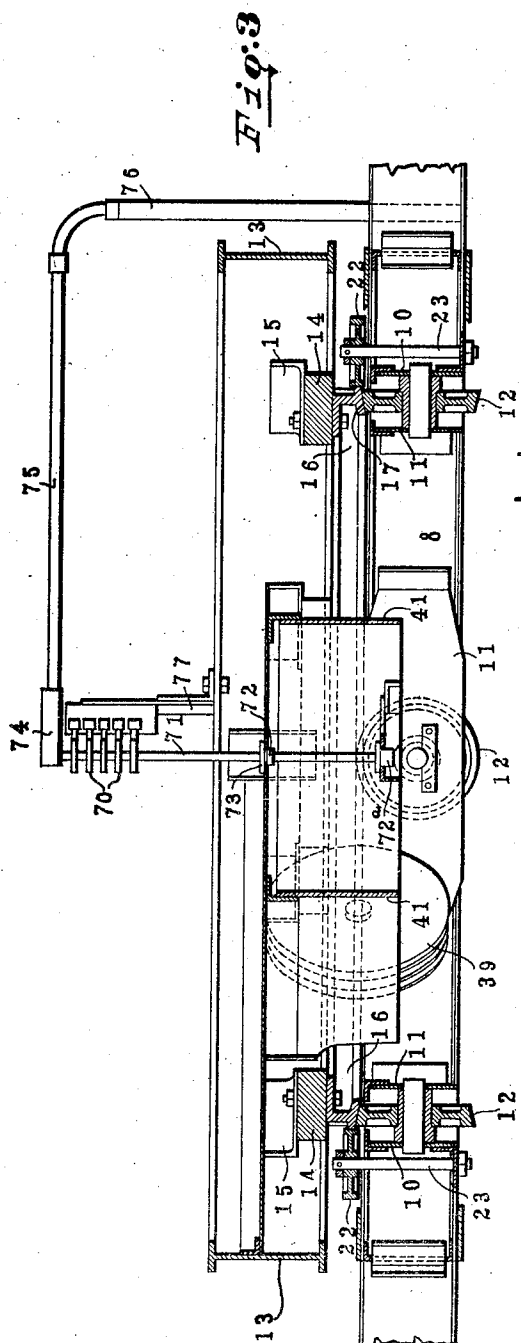
G. E. MOORE

1,671,252

CRANE

Filed Sept. 30, 1922

4 Sheets-Sheet 3



INVENTOR
George E. Moore,
BY
Shull, Warfield & Shull,
ATTORNEY

May 29, 1928.

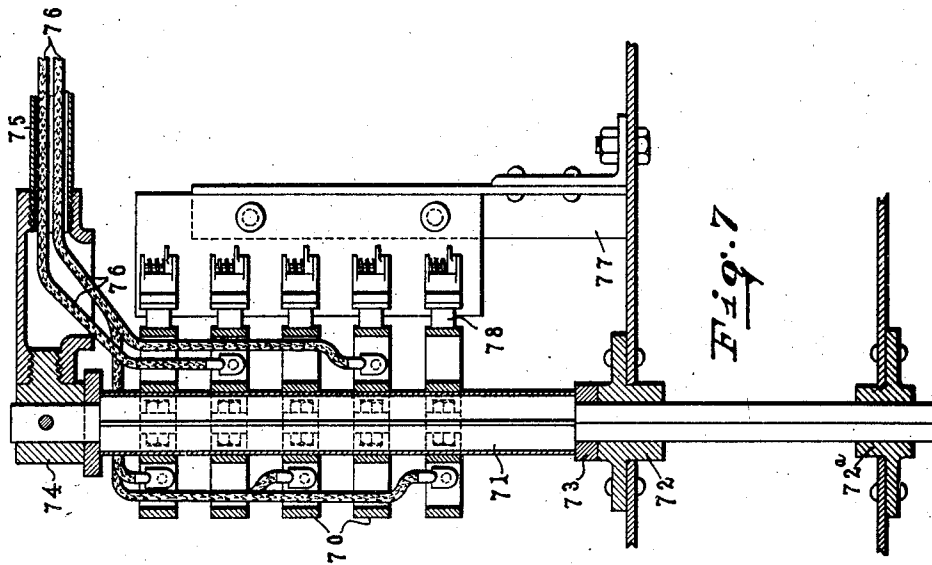
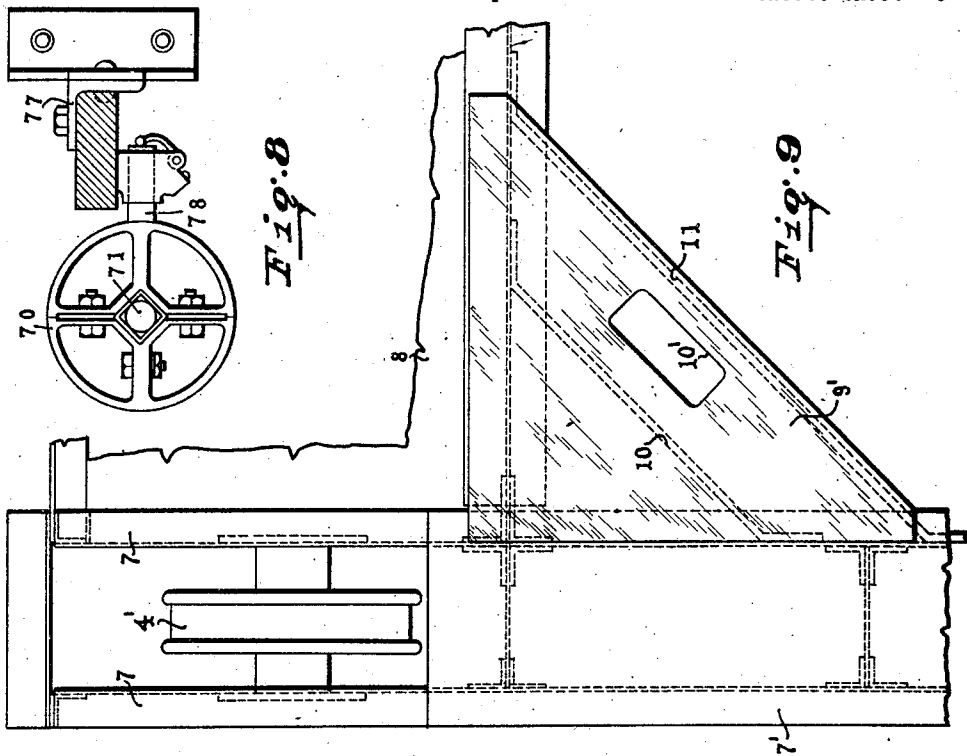
G. E. MOORE

1,671,252

CRANE

Filed Sept. 30, 1922

4 Sheets-Sheet 4



INVENTOR

INVENTOR
George E. Moore,

BY

Shull, Warfield & Shull.
ATTORNEY

ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE EDWARD MOORE, OF MUSKEGON, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SHAW CRANE-PUTNAM MACHINE CO. INC., OF MUSKEGON, MICHIGAN, A CORPORATION OF DELAWARE.

CRANE.

Application filed September 30, 1922. Serial No. 591,460.

This invention relates to cranes and, more particularly in some of its details, to heavy duty traveling turn-table cranes for use in connection with machine shops, repair shops, and the like.

The invention has for its general object an improved construction of the parts and assembly of a crane of the class mentioned resulting in an arrangement which is efficient in use and comparatively inexpensive in manufacturing cost.

Another object is to provide a crane of the class mentioned having novel features and arrangement of parts especially adapting it for the quick and efficient handling in repair shops or the like, of heavy apparatus such as locomotives.

Another object is to provide an improved crane wherein novel and effective means are employed for mounting and operating the turn-table hoist.

Still another object is to provide an improved suspension mechanism adapted particularly for use in turn-table cranes where by a load is readily attached in properly balanced position and swung on a vertical axis to any desired position.

Another object is to provide a novel and effective current-carrying connection for transmitting electric energy to the motors of the crane.

Other objects will be in part pointed out in connection with the following detailed description of an illustrative embodiment of the invention, and will be in part obvious in connection therewith.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of their application will appear in the appended claims.

In the accompanying drawing forming part of this specification and wherein similar reference characters refer to similar parts throughout the several views;

Figure 1 is a fragmentary side elevation of a crane equipped with the invention;

Fig. 2 is a plan view of the traveling trolley for the crane showing parts of the hoisting mechanism;

Fig. 3 is a fragmentary sectional view taken approximately on the line 3—3 of Fig.

2 looking in the direction of the arrows, certain parts being omitted for clearness and simplicity of disclosure;

Fig. 4 is a detail enlarged sectional view on the line 4—4 of Fig. 2 looking in the direction of the arrows;

Fig. 5 is a view of the suspension means for suspending the load;

Fig. 6 is a view of an alternative form of lifting beam;

Fig. 7 is a vertical section of the current collector;

Fig. 8 is a plan view of the same; and

Fig. 9 is a plan view of one corner of the lower frame of the trolley with parts omitted.

Referring to the drawing for a detailed description of the illustrative embodiments shown, the main bridge 1 of the crane includes parallel spaced girders supported at opposite ends by trucks 2 and running on rails supported in any desired manner and extending in elevated position along opposite sides of a machine shop or the like. The longitudinal bridge girders are suitably secured together in spaced parallel relationship by transverse frame members (not shown). Any desired mechanism may be employed for driving this bridge along the isle.

Tracks 3 extend along these bridge girders and a trolley 4 having wheels 4' is mounted thereon for longitudinal travel. This trolley is constructed in two parts, a lower frame 5 and an upper frame 6. The lower frame includes longitudinal frame members or sills 7 arranged in spaced parallel pairs at each side of the frame, the wheels 4' being supported at each end thereof for rotation between the sills of each pair. Cover plates 7' are secured to the upper flanges of these longitudinal sills forming in effect longitudinal box girders for the lower frame. The transverse sills or frame members 8 are connected at opposite ends to longitudinal sills 7. Transverse frame members or sills 9 in the form of I-beams are spaced inwardly from the end of the lower frame, being secured at opposite ends to the inner sills 7. One of these I-beams is shown in section in Fig. 4, and both are shown in dotted lines in Fig. 2.

Diagonally disposed braces 10 and 11 ex-

tend across the corners between the inner sills 7 and I-beam sills 9 as shown in Fig. 3, and in dotted lines in Fig. 2. These braces are arranged in parallel pairs and act not only as bracing members rigidifying the frame structure but also support conical rollers 12 upon which the upper frame of the trolley is adapted to rest. These rollers are provided with supporting axles supported at opposite ends by the braces.

A gusset plate 9' is secured to the braces and to the sills 7 and 9 at each corner of each face of the frame. These plates strengthen and reinforce the frame, and the vertically disposed pairs of plates at each corner of the frame are provided with registering openings 10' through which wheels 12 extend.

The upper frame section of the trolley is supported for horizontal rotation on the lower frame on the conical rollers 12, and has longitudinal and transverse I-beam sills 13 secured together at the corners by gusset plates and connecting angles riveted thereto. The upper frame is somewhat smaller in horizontal dimensions than the lower frame, thus providing marginal areas on the latter for placing certain driving mechanism referred to hereinafter. Heavy metallic bearing slabs 14 are secured in diagonal position across the corners of the upper frame as by brackets 15 which are riveted to the frame to which the slabs are bolted. These slabs not only function as rigidifying braces for the frame but also an important function thereof is to form supports at the corners of the frame for supporting a circular track 16. For this purpose, the lower faces of these slabs lie flush with the lower faces of the I-beams 13, and a continuous 100% bearing for the track is thus provided conjointly by the beams 13 as the supporting slabs 14.

The track 16 is formed at its lower part with an inclined flange 17 forming an inclined or conical surface adapted to contact with the upper periphery of the conical rollers for rotatably supporting the upper frame on the lower. This track is provided with gear teeth in its outer periphery which are heavily shrouded by the projecting lower flange of the track, as clearly shown in Figure 4. This lower flange is slightly inclined to form a conical supporting surface for cooperating with the conical surfaces of the supporting rollers 12. The toothed construction of this track as described provides a continuous circular integral rack for rotating the upper frame, resulting in a compact and durable construction. The upper frame mounted as described forms a turn-table rotatable in a horizontal plane and this is rotated by a motor 18 mounted on the lower frame. A pinion 19 meshes with the driving rack formed

in the track, being carried at the upper end of a shaft 20 mounted vertically in bearing carried by a bracket 21 bolted to the I-beam 9. The train of the gearing shown in Figs. 2 and 4 is arranged to transmit power from the driving motor to rotate the turn-table.

For supporting the turn table in properly centered position on the supporting rollers 12, centering rollers 22 are supported upon vertical shafts or rods 23 suitably secured to the lower frame 4. The rollers are mounted in position to contact the outwardly disposed annular surfaces presented by the lower flange of the track 16 as clearly shown in Fig. 3, these surfaces being turned to true circular form for this purpose. It will therefore be seen that the turn-table may be rotated as desired while being always retained in properly centralized relation. For driving the trolley along the traveling bridge a motor 24 is supported on the lower frame having a driving pinion 25 co-operating with a gear train 26 for transmitting power to the transversely disposed shaft 27 carrying pinions 28 meshing with driving gears 29 secured to trolley wheels 5. The turn-table motor 18 and trolley motor 24, as well as the hoisting motor hereinafter referred to are controlled in any approved manner by an operator stationed in a fixed cab carried by the bridge.

The hoisting mechanism for the crane is mounted upon the turn-table. As shown in Fig. 2, this mechanism includes a hoisting drum 30 mounted on the turn-table section in suitable pedestals and having peripheral grooves 31 for receiving flexible winding connections such as wire, rope or cable shown at 32 and 33 in Fig. 1. This drum is driven by a hoisting motor 34 to which it is connected by gear trains 35 and 36. A brake for controlling the motor and hoisting mechanism is shown at 37 and is operated electrically by a solenoid 38 connected for electrical control from the operator's cab.

The flexible hoisting connections are divided into two spaced parts 32 and 33, each connected to the grooves of the hoisting drum and threaded to spaced blocks 39 and 40 respectively. These blocks are supported on the turn-table section of the trolley by transverse frame members 41 disposed in parallel relationship and rigidly secured at their ends to the I-beam 13. The blocks are supported upon axes 42 carried by transverse plates 43 rigidly secured to the frame members 41, each block being made up of a plurality of sheaves 44 in order that a number of turns of the flexible hoisting cable may be employed for multiplying power in a manner known in the art.

Spaced hoisting blocks 45 and 46 are supported respectively below the upper blocks 39 and 40 and each is made up of a plurality of sheaves 47 over which the hoisting cables

pass. The lower blocks are secured to a lifting beam at spaced portions thereof by any suitable connecting means such as eye-bolts 48.

5 The hoisting connections for attachment of the load are designed more especially for handling very heavy apparatus of considerable longitudinal extent, such for example as locomotives and means for connection at spaced parts of the load are included. For providing efficient means for convenient attachment to, and for balancing and turning the load in a horizontal plane a lifting beam 49 is employed. This beam may be of built-up girder construction and is supported in horizontal or approximately horizontal position from the hoisting mechanism of the turn-table described above as shown in Fig. 1. The securing means 48 are spaced apart on the lifting beam and attached to the latter to properly balance the combined beam and load. Adjustability of this connection is secured by forming additional spaced openings 50 in the girders whereby the spaced connections thereto can be adjusted at will.

For suspending the load from the lifting beam, load slings are adjustably connected at opposite ends of the beam. In the embodiment illustrated, these slings are especially adapted for supporting a locomotive or the like, and are formed for co-operation with the forward boiler end and fire-box end respectively. The forward sling 51 for the boiler end includes a flexible member adapted to pass around the boiler, and loops 52 are secured to the terminals thereof for passing over opposite upwardly extending horns 53 of a sling hanger 54 seated upon the upper surface of the lifting girder. Flanges 55 extend downwardly from the sling hanger on opposite sides of the girder, holes being provided for a securing pin or bolt 56 and positioned for registry with any one of a series of holes 57 in the girder, so the hanger can be secured in any adjusted position as desired.

The opposite sling 60 is attached to the lifting beam by means of a link 61 secured to the beam by a pin 62 adapted to pass through any one of a plurality of holes 63 in the beam end. The lower end of this link is pivotally attached at 64 to the upper sling girder, centrally of its length. This sling is of special construction adapted for co-operation with a load having a flat contact surface, and includes an upper girder 65 and a lower girder 66 connected at juxtaposed ends by vertical bars or links 67 having pivotal connections to the respective girders. It will be seen that this sling is easily placed in carrying position and readily adjusts itself to the load.

The adjustable connections to the lifting beam enables the load to be placed as de-

sired so as to transmit stresses equally to the turn-table and other parts of the crane, and to maintain the parts in proper alignment. By the spaced arrangement of the upper and lower blocks as described, it will be seen that the transmission of turning moments from the turn-table to the lifting beam and its load to adjust the angular position of the latter in a horizontal plane may be accomplished without any substantial relative angular displacement of the load with respect to the turn-table. This facilitates handling of heavy loads. In existing repair shops and other machine shops, there is usually an isle extending along one side or along the center with angularly disposed side areas or stalls for receiving the locomotive or the like. These shops are often low, furnishing little room so the load cannot be elevated to pass over machinery in the angularly disposed stalls. Also the isles are usually so narrow that the loads cannot be carried broad-side. Under such conditions as these, the arrangement provided by this crane is particularly advantageous, as the load can be moved forwardly in the isle head on and quickly swung into position for placing in any angularly disposed stall with material saving of time. Also it will be noted that the trolley is relatively small and vertical over all dimensions whereby installation is not obstructed in shops where over head room is limited.

Special connections for transmitting electric power to the hoisting motor 34 and brake solenoid 38 are shown in Figs. 3 and 7. These connections embody a multiple contact slip ring construction with slip rings 70 carried on a post 71 which is covered with insulating material, so that the rings are insulated from the post and from each other. The middle portion of the post is square, the lower end being cylindrical, and journaled in bearing bosses 72 and 72^a on the trolley frame. A thrust collar 73 is arranged on the cylindrical portion of the post at the junction of the square portion therewith, just above the bearing boss 72. The upper end of the post is held in a boss 74 having threaded engagement with one end of a conduit 75. The conduit extends radially outside of the turn-table section of the trolley and is bent down to a connection with the lower trolley frame 4. Each of the rings 70 is composed of halves, which are bolted onto the square shaft as shown. As shown in Figure 8, the sections of each ring have a square hub for engaging the post. The rings are skeleton rings as shown, and the terminals of the cables 76 which lead to the motor and brake solenoid, are bolted to the respective rings. The cables are threaded upwardly through the rings, and into the conduit 75. A support 77 of steel or the like is secured to the upper trolley frame,

and this support carries a wooden block, forming an insulator, to which are attached the carbon brushes 78, and the brushes engage the collector rings. While only one brush for each ring is shown, for large capacities, two brushes would be used. In practice the square portion of the post will be insulated with mica. The center post which carries the collector rings is journaled on the upper trolley frame, and is held from turning therewith by the conduit 75 which contains the insulated cables.

An alternative form of lifting beam 49^a is shown in Fig. 6, adapted for employment with the hoisting mechanism as above disclosed when but a single connection therefrom to the load is desired. Spaced lower hoisting blocks 45^a and 46^a are connected to the beam 49^a, and a single load attaching hook 80 is secured to the beam intermediate its ends.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a crane, in combination, a traveling bridge, a trolley mounted to travel longitudinally of said bridge, a hoisting mechanism including a winding drum rotatably mounted on said trolley, a lifting beam, blocks attached to said lifting beam at spaced apart points, blocks connected with said trolley having their axes disposed substantially coincident with a center line of said trolley, said hoisting drum being mounted to one side of and above said last mentioned blocks, and hoisting cables extending between the blocks on the lifting beam and trolley and said drum.

2. In a crane, in combination, a traveling trolley including upper and lower members, means for mounting said upper member on the lower member to turn about a vertical axis, blocks carried by said upper member located one at each side of said vertical axis, the axis of rotation of said blocks being at

right angles to said vertical axis of rotation of said upper member, a hoisting drum rotatably mounted on said upper member above and to one side of said blocks, other blocks located directly below the first mentioned blocks and flexible hoisting connections extending between the drum and said first and second mentioned blocks.

3. In a crane, a traveling trolley for said crane including upper and lower members, said upper member being mounted on the lower member to turn about a vertical axis, said upper member comprising a rectangular frame having spaced apart connected sides and ends, two spaced apart frame members extending between opposite sides of the frame and securely connected thereto at their ends, blocks, one adjacent each end of said frame members mounted between and supported by the frame members, the axes of rotation of the blocks being in alignment and at right angles to and intersecting the vertical axis about which the said upper member turns, other blocks located below the first mentioned blocks, a hoisting drum carried by said upper member above and to one side of said frame members, and flexible hoisting connections between said drum and the first and second mentioned blocks.

4. In a crane, in combination, a traveling bridge, a trolley mounted to travel longitudinally of said bridge, a turn table mounted on said trolley and adapted to be turned about a vertical axis, spaced apart hoisting blocks carried by the turn table and mounted to turn about horizontal axes located in alignment and at right angles to and intersecting the vertical axis about which the turn table turns, a lifting beam disposed below the bridge, spaced apart blocks connected to and located above said lifting beam, a hoisting drum located above and to one side of said first blocks, and flexible hoisting connection one at each end of the drum extending therefrom to said blocks attached to the lifting beam and thence around the blocks carried by the turn table.

5. In a turn table for cranes of the character described comprising, a rectangular frame having spaced apart sides and ends connected together, two spaced apart transverse frame members located between the sides of the frame and attached thereto at their ends, hoisting blocks disposed between said frame members adjacent their ends, and a hoisting drum carried by said frame above and to one side and substantially parallel to said frame members.

In testimony whereof I affix my signature.

GEORGE EDWARD MOORE.