

June 5, 1945.

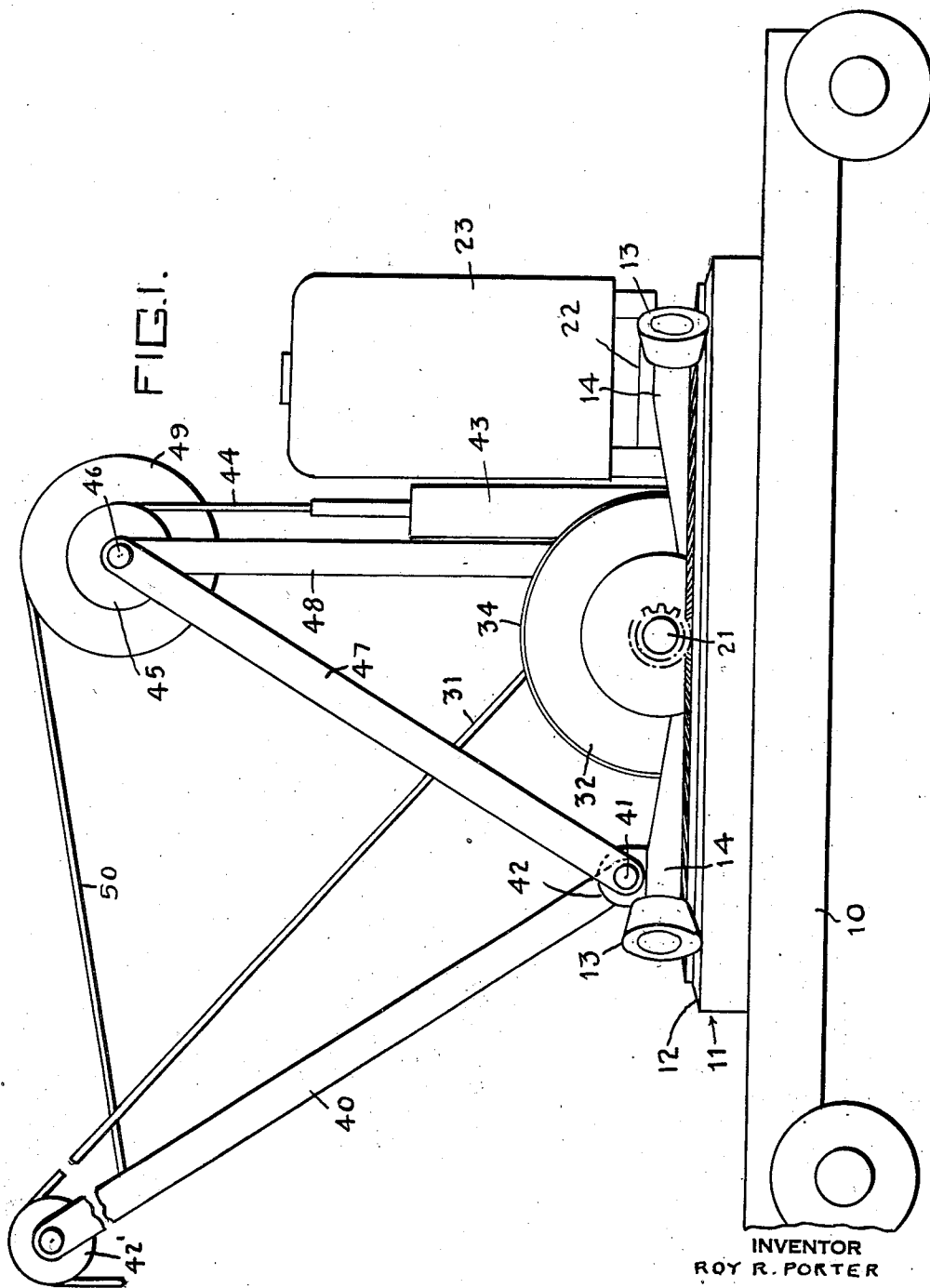
R. R. PORTER

2,377,448

CRANE

Filed Dec. 10, 1943

3 Sheets-Sheet 1



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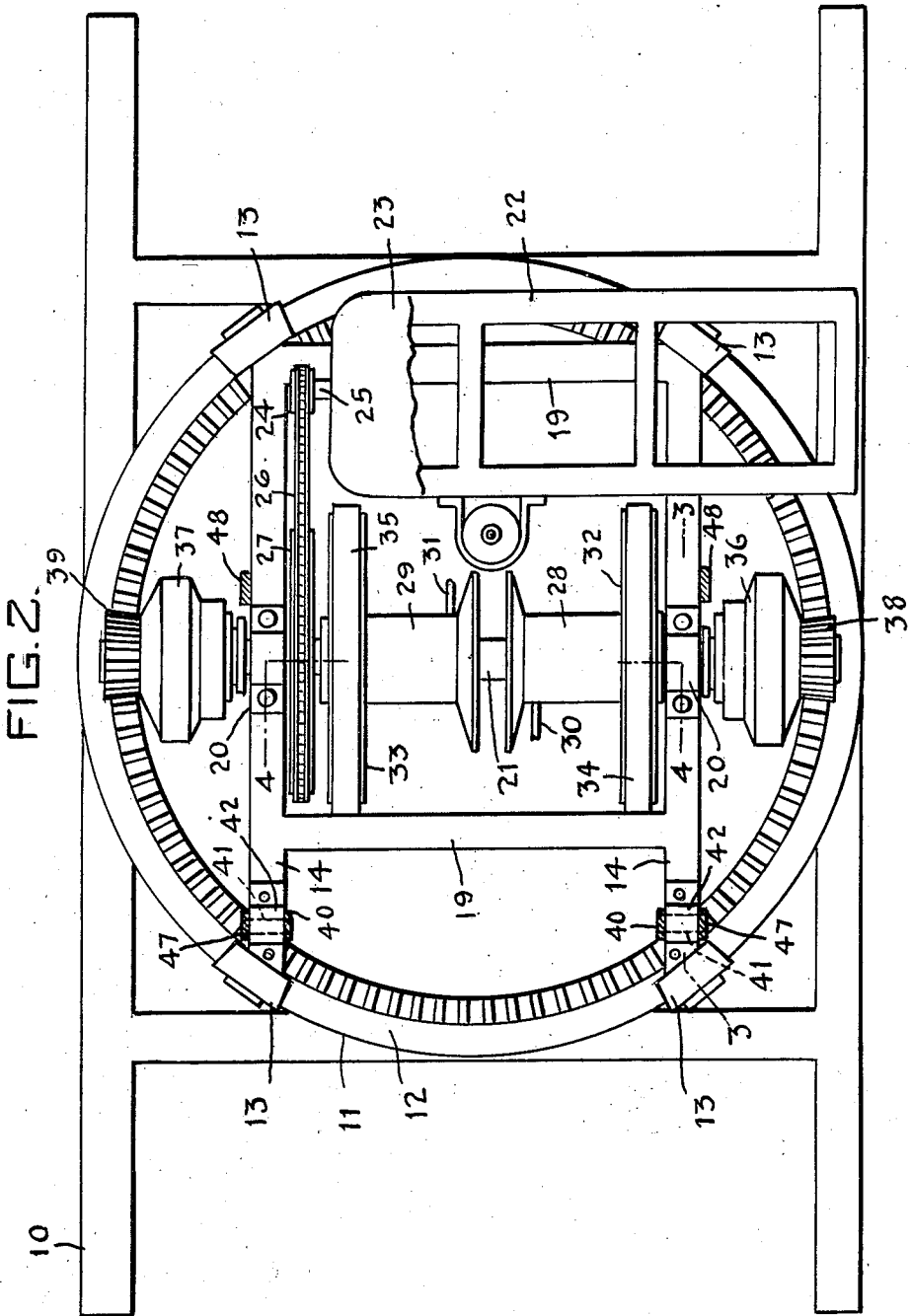
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FIG. 3.

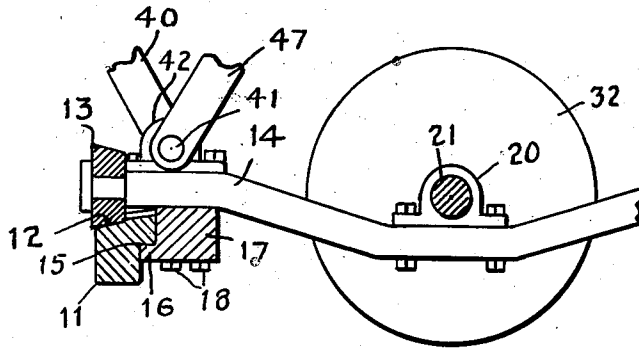
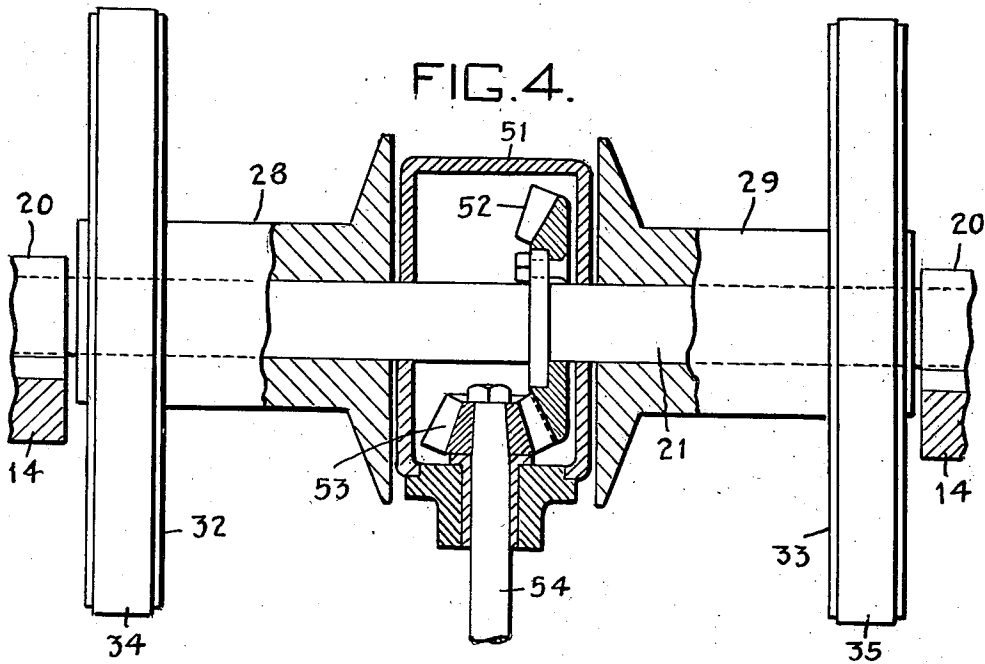


FIG. 4.



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UNITED STATES PATENT OFFICE

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CRANE

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9 Claims. (Cl. 212—69)

The invention relates to cranes.

The principal object of the invention is to provide a crane particularly adapted for use in handling comparatively light loads, that is on the order of six to eight ton capacity, the parts of the crane being of extreme simplicity and all of standard construction and easily fabricated members.

A further object is to provide a crane that is operable in exceedingly cramped quarters and one in which the boom of the crane may travel in a complete circle.

Another important object is the provision of a single power shaft which carries the drums for carrying a drag cable and a hoisting cable, the operating means for these drums, the means for rotating the boom, and the operating means for the boom rotating means.

An additional object is to provide for the elimination of long gear trains, and to provide a crane in which all the mechanical operating parts are easy of access.

A further object is to provide a crane in which the parts are of light weight in comparison to the work accomplished thus making the crane easily portable from a truck to a trailer or vice versa, or for that matter to any location to which it is desired to move the crane.

In addition to the foregoing other objects and advantages will become apparent as this specification proceeds. Referring to the drawings forming a part thereof and in which preferred embodiments of the invention are illustrated:

Fig. 1 is a side elevation;

Fig. 2 is a top plan view with parts omitted and parts broken out and parts in section;

Fig. 3 is a fragmentary detail sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary detail sectional view taken on the line 4—4 of Fig. 1 but showing a modified form in which the crane is driven by a power take-off from the truck engine instead of a separate motor.

In the drawings the various operating parts all being of standard known construction none is illustrated in detail and for the sake of simplicity various operating levers and foot pedals have been omitted.

Referring again to the drawings the reference numeral 10 designates a frame which might be the body of a trailer or truck or any other frame upon which the crane is to be mounted.

A ring bevel gear 11 is mounted on the frame. This gear is of standard construction and part of its teeth are machined off to form an annular

path 12 for a series of rollers 13. There are four of these rollers and they are mounted on the ends of axle members 14 which form part of a frame for carrying the crane mechanism.

The ring is undercut at 15 to provide an annular path for lips 16 which are formed on blocks 17. These blocks are bolted at 18 to the axle members 14 and act to prevent the frame from tilting when heavy loads are picked up or set down.

Cross members 19 welded or otherwise secured to the axle members 14 complete the frame. Bearings 20 are centrally located on the axle members and these bearings carry the shaft 21 upon which is mounted all of the operating mechanism of the crane.

An auxiliary frame 22 is welded or otherwise secured to the main frame and this frame carries a standard motor and clutch housing unit 23. A sprocket 24 is fast to a shaft 25 driven by the motor 23 and a sprocket chain 26 passes over the sprocket 24 and a sprocket 27 secured to the shaft 21.

Drums 28 and 29 are freely mounted on the shaft 21, the drum 28 having a drag cable 30 wound thereon and the drum 29 having a hoisting cable 31 wound upon it. Clutches 32 and 33 are formed as part of the drums 28 and 29 and brake bands 34 and 35 pass over the clutches. The drums 28 and 29, their clutch and brake assemblies and sprocket 27 are mounted on the shaft 21 between the axle members 14.

Beyond the axle members 14 conventional twin disc clutches 36 and 37 are mounted on the shaft 21 and the rotation of bevel gears 38 and 39 is controlled by the clutches 36 and 37. The bevel gears 38 and 39 mesh with the teeth of the ring gear 11. When the bevel gear 38 is clutched to the shaft 21 by its clutch 36 the main frame of the crane and the parts carried thereby will rotate in one direction and when the bevel gear 39 is clutched to the shaft by its clutch 37 the main frame will be rotated in the opposite direction. From the foregoing it will be apparent that a 360° movement of the main frame and the parts carried thereby may be readily effected in either direction. It will also be evident that all operating parts, including the drums and their clutch and brake assemblies, and the bevel gears and their disc clutches are all carried by the shaft 21. Well known control levers are provided for the clutches 32 and 33 and 36 and 37, and conventional foot pedals are provided for the brakes 34 and 35.

The hoisting boom 40 is pivoted at 41 to lugs

or plates 42 secured to the axle members 14 and carries at its outer end the conventional sheave 42' over which the hoisting cable 31 passes.

The means for raising or lowering the boom may be varied. As illustrated in Fig. 1, a hydraulic boom hoist cylinder 43 is provided. A cable 44 is secured to a sheave 45 pivotally mounted at 46 in an A-frame comprising two pairs of legs 47 and 48. The legs 47 are mounted on the boom pivot 41 and the legs 48 are suitably secured to the main frame. Mounted on the pivot 46 is a larger sheave 49 to which is secured a cable 50, the other end of which is fast to the hoisting boom 40. With this arrangement the movement of the plunger in the hydraulic cylinder 43 is multiplied to obtain sufficient movement of the hoisting boom. Suitable mechanism operable by the shaft 21 might be provided for raising and lowering the hoisting boom or mechanism other than the hydraulic cylinder might be utilized.

Fig. 4 illustrates an arrangement wherein a power take-off from the truck engine might be used to drive the shaft 21 instead of the motor 23. A gear case 51 is located between the drums 30 and 31. This gear case contains a bevel gear 52 which is secured to the shaft 21 and meshes a bevel gear 53 secured to a vertical shaft 54 which has conventional connections to the truck engine or its main driving shaft. With this arrangement the motor 23, sprockets 24 and 25 and sprocket chain 26 would be eliminated. Otherwise the arrangement of parts would be the same.

Changes in details of construction and arrangements of parts such as would occur to one skilled in the art are to be considered as coming within the spirit of the invention as defined by the appended claims.

I claim:

1. A crane having in combination, a main frame, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a horizontal shaft supported on said main frame, means carried by said shaft for raising and lowering a load on said hoisting boom, a ring gear upon which said main frame is rotatably mounted for 360° movement, pinions mounted on either end of said shaft, said pinions meshing said ring gear, a vertical shaft, and bevel gears on said vertical shaft and said horizontal shaft whereby said vertical shaft rotates said horizontal shaft, said vertical shaft forming part of a power take-off.

2. A crane having in combination, a ring gear, a main frame supported on said ring gear for rotational movement through a path of 360°, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a horizontal shaft supported on said main frame, a drum freely mounted on said shaft for carrying a cable connected to said hoisting boom whereby a load may be raised or lowered by said hoisting boom, a clutch and brake assembly carried by said shaft whereby said drum may be clutched to or unclutched from said shaft, pinions mounted on either end of said shaft, said pinions meshing said ring gear, a vertical shaft, and bevel gears on said vertical shaft and said horizontal shaft whereby said vertical shaft rotates said horizontal shaft, said vertical shaft forming part of a power take-off.

3. A crane having in combination, a ring gear, a main frame supported on said ring gear for

rotational movement through a path of 360°, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a shaft supported on said main frame, a drum freely mounted on said shaft for carrying a cable connected to said hoisting boom whereby a load may be raised or lowered by said hoisting boom, a clutch and brake assembly carried by said shaft whereby said drum may be clutched to or unclutched from said shaft, another drum freely mounted on said shaft for carrying a cable to function as a drag line, another clutch and brake assembly carried by said shaft whereby said second mentioned drum may be clutched to or unclutched from said shaft, pinions mounted on either end of said shaft, said pinions meshing said ring gear, and means for rotating said shaft.

4. A crane having in combination, a main frame, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a shaft supported on said main frame, means carried by said shaft for raising and lowering a load on said hoisting boom, a ring gear upon which said main frame is rotatably mounted for 360° movement, pinions freely mounted on either end of said shaft, a clutch for each of said pinions whereby either of said pinions may be clutched to or unclutched from said shaft so that said main frame may be rotated through a path of 360° in either direction, and means for rotating said shaft.

5. A crane having in combination, a ring gear, a main frame supported on said ring gear for rotational movement through a path of 360°, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a shaft supported on said main frame, a drum freely mounted on said shaft for carrying a cable connected to said hoisting boom whereby a load may be raised or lowered by said hoisting boom, a clutch and brake assembly carried by said shaft whereby said drum may be clutched to or unclutched from said shaft, pinions freely mounted on either end of said shaft, a clutch for each of said pinions whereby either of said pinions may be clutched to or unclutched from said shaft so that said main frame may be rotated through a path of 360° in either direction, and means for rotating said shaft.

6. A crane having in combination, a ring gear, a main frame supported on said ring gear for rotational movement through a path of 360°, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a shaft supported on said main frame, a drum freely mounted on said shaft for carrying a cable connected to said hoisting boom whereby a load may be raised or lowered by said hoisting boom, a clutch and brake assembly carried by said shaft whereby said drum may be clutched to or unclutched from said shaft, another drum freely mounted on said shaft for carrying a cable to function as a drag line, another clutch and brake assembly carried by said shaft whereby said second mentioned drum may be clutched to or unclutched from said shaft, pinions freely mounted on either end of said shaft, a clutch for each of said pinions whereby either of said pinions may be clutched to or unclutched from said shaft so that said main frame may be rotated through a path of 360° in either direction, and means for rotating said shaft.

7. A crane having in combination, a main frame, a hoisting boom pivoted on said main

frame, means carried on said main frame for raising and lowering said hoisting boom, a horizontal shaft supported on said main frame, means carried by said shaft for raising and lowering a load on said hoisting boom, a ring gear upon which said main frame is rotatably mounted for 360° movement, pinions mounted on either end of said shaft, said pinions meshing said ring gear, a vertical shaft, means whereby said vertical shaft drives said horizontal shaft, and a power take-off for rotating said vertical shaft.

8. A crane having in combination, a ring gear, an annular path formed on said ring gear, a main frame, rollers carried by said main frame engaging said annular path on said ring gear so that said main frame may be moved in a complete circle, an undercut portion formed on said ring gear, means carried by said main frame to engage said undercut portion and prevent said main frame from tilting, a hoisting boom pivoted on said main frame, hydraulic means carried by said main frame for raising or lowering said main frame, a shaft supported on said main frame, means carried on said shaft for raising and lowering a load on said hoisting boom, means carried on said shaft for operating a drag line, pinions mounted on either end of said shaft, said pinions meshing said ring gear, and means for rotating said shaft.

9. A crane having in combination, a ring gear,

an annular path formed on said ring gear, a main frame, rollers carried by said main frame engaging said annular path on said ring gear so that said main frame may be moved in a complete circle, an undercut portion formed on said ring gear, means carried by said main frame to engage said undercut portion and prevent said main frame from tilting, a hoisting boom pivoted on said main frame, means carried on said main frame for raising and lowering said hoisting boom, a shaft supported on said main frame, a drum freely mounted on said shaft for carrying a cable connected to said hoisting boom whereby a load may be raised or lowered by said hoisting boom, a clutch and brake assembly carried by said shaft whereby said drum may be clutched to or unclutched from said shaft, another drum freely mounted on said shaft for carrying a cable to function as a drag line, another clutch and brake assembly carried by said shaft whereby said second mentioned drum may be clutched to or unclutched from said shaft, pinions freely mounted on either end of said shaft, a clutch for each of said pinions whereby either of said pinions may be clutched to or unclutched from said shaft so that said main frame may be rotated through a path of 360° in either direction, and means for rotating said shaft.

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