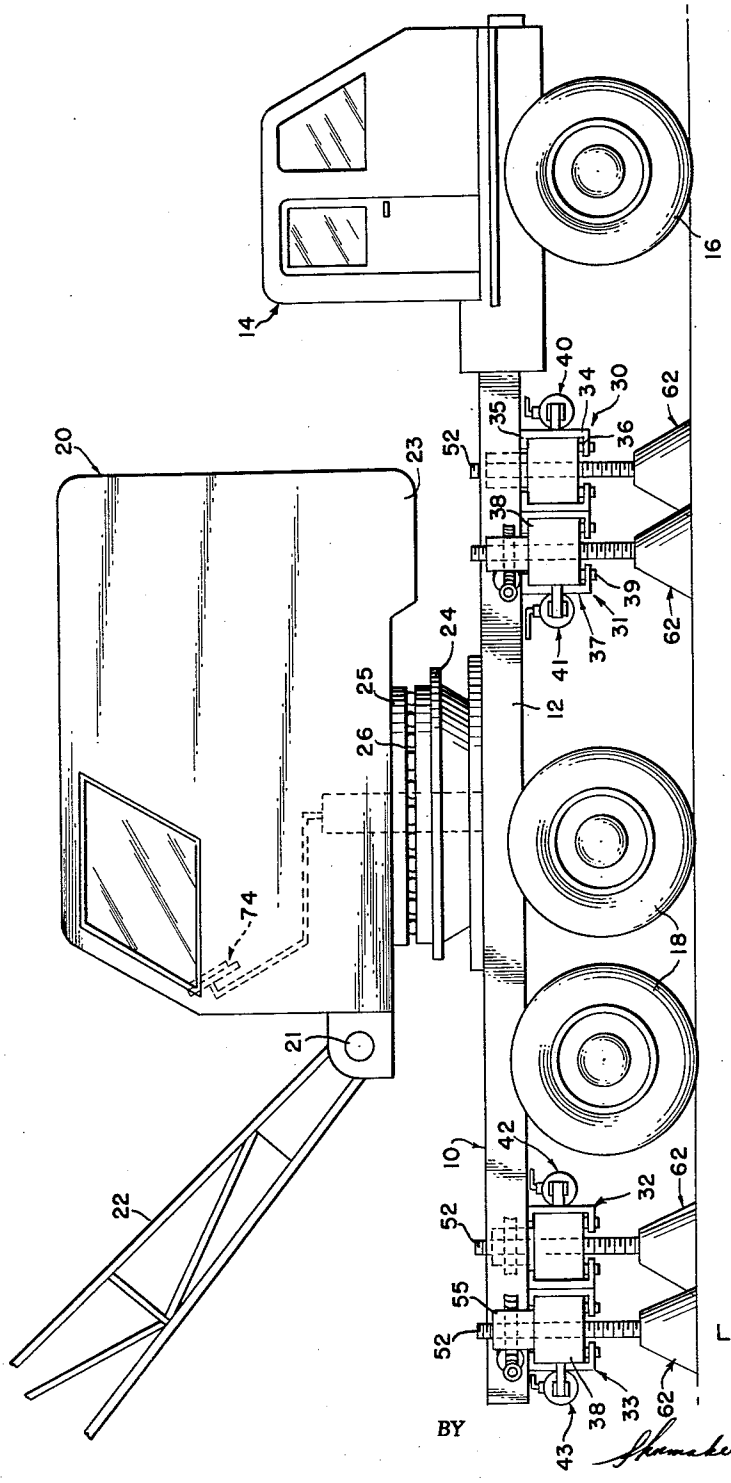
May 22, 1962 L. R. ISERMAN 3,035,713

FULL ROTARY TRUCK MOUNTED CRANE AND BRACING OUTRIGGERS

Filed Oct. 3, 1958 4 Sheets-Sheet 1

FIG. 1.



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FULL ROTARY TRUCK MOUNTED CRANE AND BRACING OUTRIGGERS

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FIG. 2.

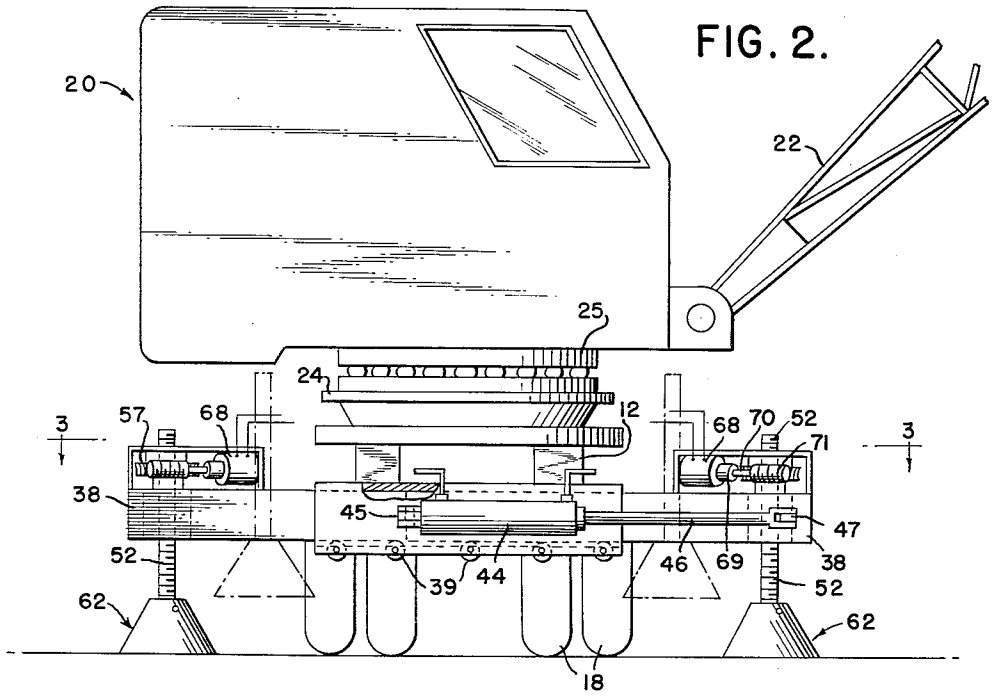


FIG. 3.

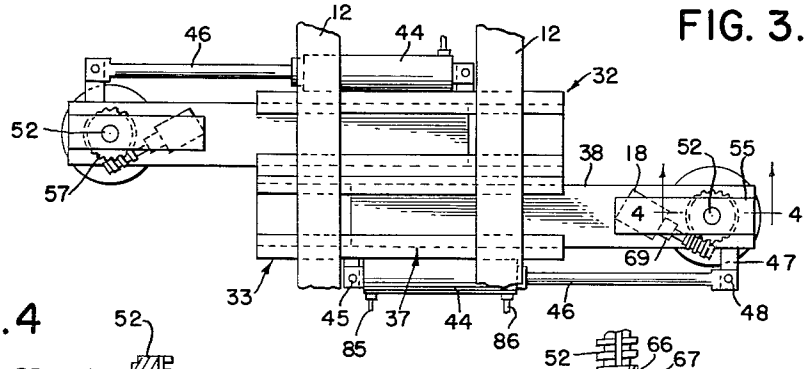
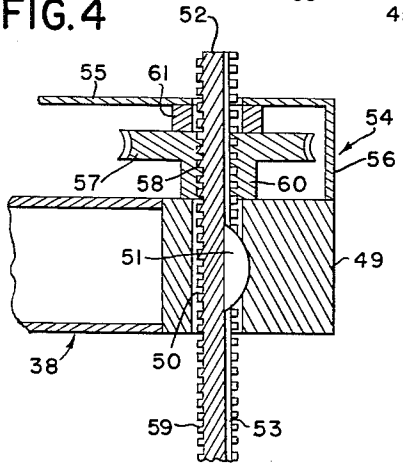


FIG. 4



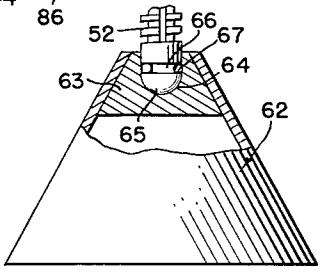


FIG. 5.

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FULL ROTARY TRUCK MOUNTED CRANE AND BRACING OUTRIGGERS

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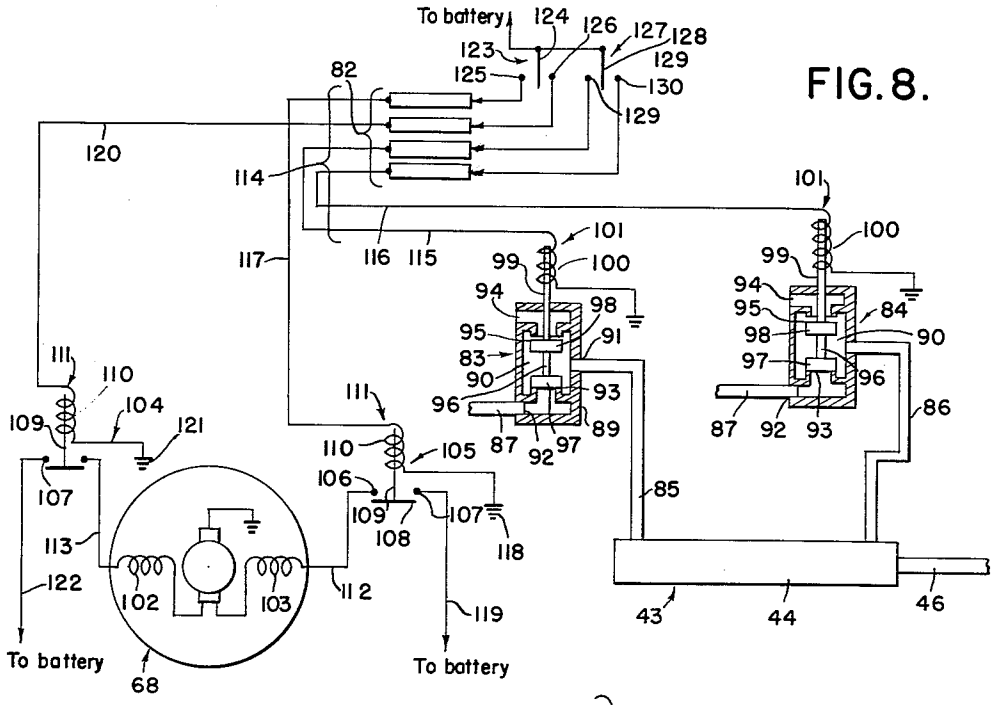


FIG. 8.

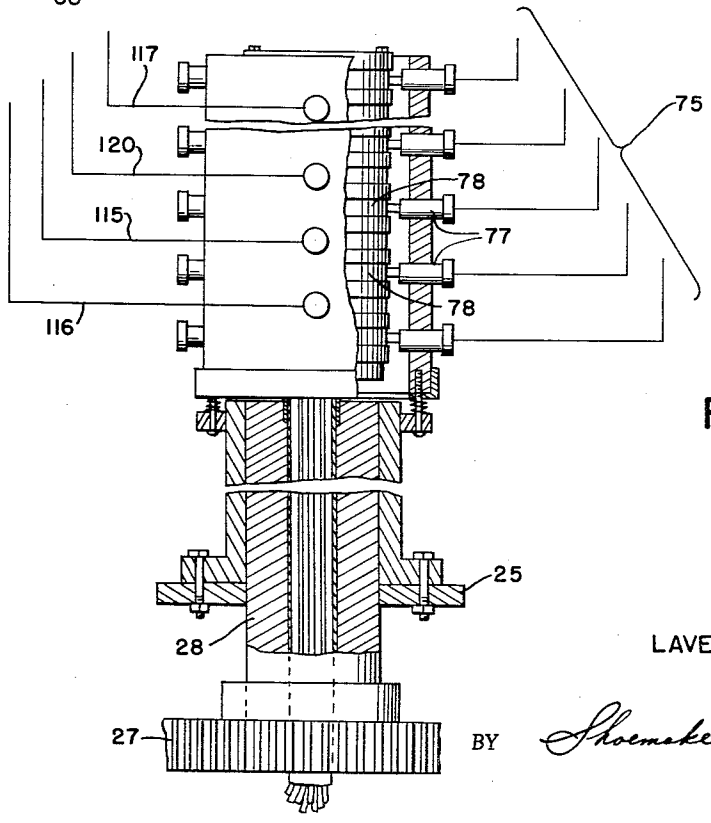


FIG. 6.

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FULL ROTARY TRUCK MOUNTED CRANE AND BRACING OUTRIGGERS

Filed Oct. 3, 1958 4 Sheets-Sheet 4

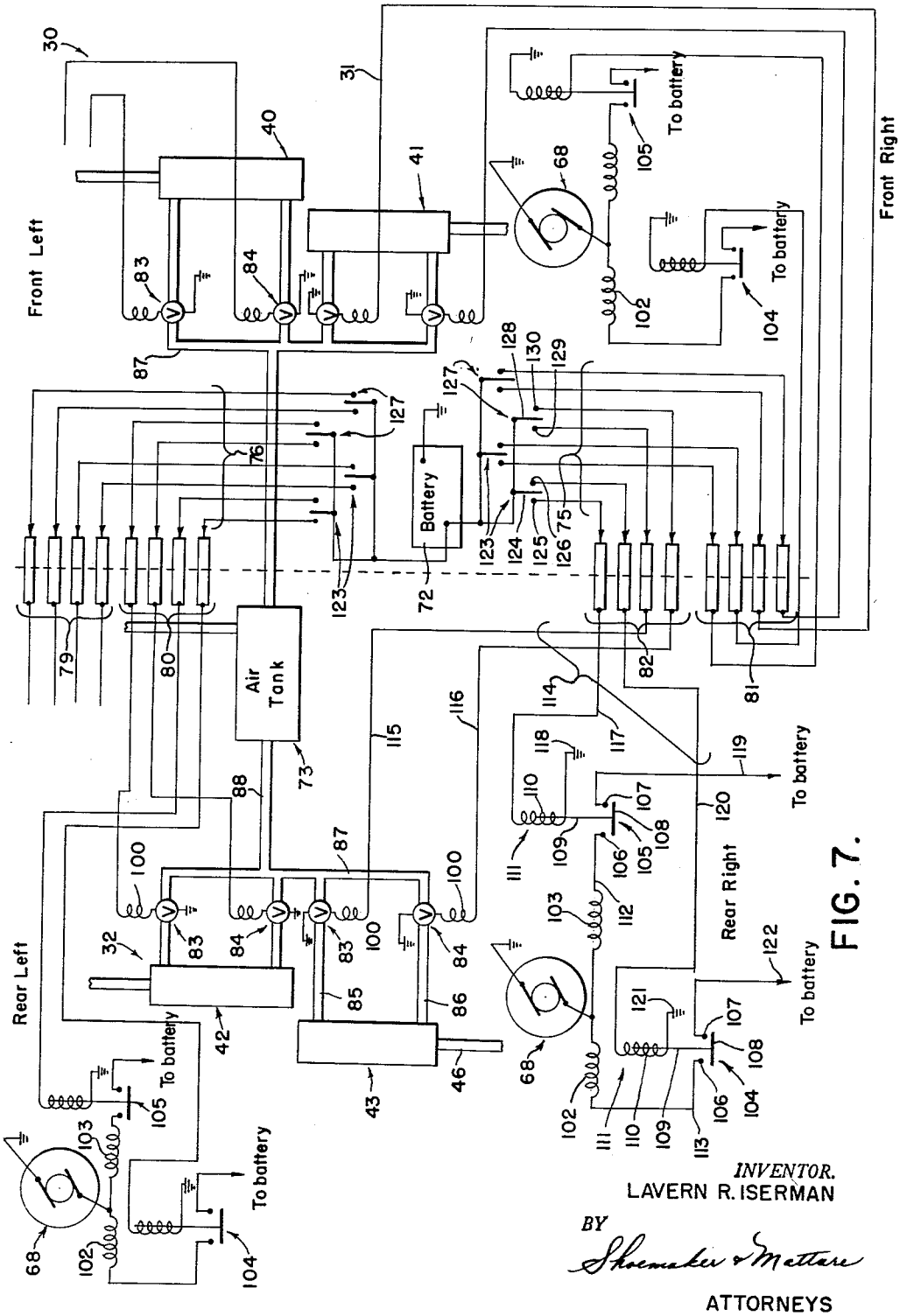


FIG. 7.

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United States Patent Office 3,035,713 Patented May 22, 1962

3,035,713

FULL ROTARY TRUCK MOUNTED CRANE AND BRACING OUTRIGGERS

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Filed Oct. 3, 1958, Ser. No. 765,158
4 Claims. (Cl. 212—145)

This invention is directed broadly to heavy duty truck mounted excavation and other type equipment and pertains particularly to improvements in fully rotatable truck mounted cranes and novel outriggers therefor.

A particular object of the present invention is to provide a new combination of crane structure mounted for full 360° rotation upon a truck bed and bracing outriggers designed with control equipment whereby the outriggers can be extended on opposite sides of the truck supported crane by means of controls located within the crane cab.

Another object of the invention is to provide equipment of the above described character wherein such outriggers can be projected and/or retracted during the operation of turning the crane or in any position to which the fully rotatable crane structure may have been turned, whereby there is avoided the necessity of the crane operator leaving the cab for adjusting the positions of the outriggers.

A still further object of the invention is to provide in apparatus of the character stated, an outrigger system embodying a novel means by which ground engaging float members may be raised and/or lowered after the extension of outrigger beams or the retraction of the same, by manipulation of control switches located in the crane cab.

It is another object of the invention to provide a motor operated means, controllable from a remote point, for lowering the float members from the outer ends of the supporting beams for engagement with the ground and for applying a desired pressure to the float member whereby to effect the rigid bracing of the outrigger against the ground, whereby to insure proper support of the crane supported truck against tipping.

Another object of the invention is to provide apparatus associated with a truck supported rotatable crane for bracing the truck and crane structure on one or the other or both sides to prevent tipping and wherein novel means is provided which will guard against overbalancing or tipping of the crane in the event of the failure of electrical or fluid operated means for extending the outriggers and ground engaging floats forming a part of the apparatus.

Still another object of the invention is to provide outrigger bracing apparatus for truck supported cranes together with vertically adjustable ground engaging jacks carried by the outriggers or outrigger beams wherein an electrically operated means is provided for raising and lowering the jacks which is so designed that the support of the jacks will be maintained even though the electrical control means for raising and lowering the jacks should fail while the outriggers and jacks are in operative or working position.

Still another object of the invention is to provide in apparatus of the character stated electrical and fluid power means for extending and retracting the outriggers and for raising and lowering the ground engaging jacks carried by the outriggers with means operative from within the crane cab for actuating the electrical and fluid means through the medium of electric current transferring collector rings whereby the crane cab and crane structure can be rotated through a full 360° while effecting the extension or retraction of the outrigger beams and the operation of the ground engaging jacks.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming part of the specification, with the understanding, however, that the invention is not confined to a strict conformity with the showing of the drawings but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

FIG. 1 is a view in side elevation of a conventionally illustrated motor truck and crane structure mounted thereon and showing the arrangement and mounting of the outriggers and float carried jacks forming elements of the present invention;

FIG. 2 is a view in rear elevation of the structure shown in FIG. 1, showing the crane structure rotated 90° and illustrating the outriggers and float carrying jacks in operative position for supporting the truck and crane structure against tipping, a portion of the structure illustrated being in section;

FIG. 3 is a horizontal section taken approximately on the line 3—3 of FIG. 2, looking down upon the extended outrigger beams and adjacent parts of the truck frame on the under side of which the beams are swung;

FIG. 4 is a detail sectional view on an enlarged scale taken approximately on the line 4—4 of FIG. 3;

FIG. 5 is a view partly in side elevation and partly in section illustrating the ground engaging float and the lower portion of the jack, showing the rotatable coupling between the float and jack;

FIG. 6 is a view illustrating in part the electric current transfer means employed between electrical apparatus in the crane cab and that on the truck structure by which operation of the elements connected with the truck structure is effected from within the cab;

FIG. 7 is a diagrammatic view of the electrical and fluid system for controlling the operation of the outriggers and jacks;

FIG. 8 is a diagrammatic view showing on an enlarged scale and in more detail the fluid and electrical system for controlling one of the four outrigger beams and jack associated therewith, which system in this FIGURE is quadruple for the entire system as illustrated in FIG. 7.

Referring now more particularly to the drawings, there is shown in FIGS. 1 and 2, in generally diagrammatic form, such parts of a conventional truck carried crane as are necessary for the illustration of the present invention, it being understood that the truck and crane structure and the mounting for the crane structure on the truck are laid out solely for the purpose of explaining the manner in which the present invention may be constructed and connected with a truck body, without in any manner limiting the invention to the type of truck body or crane in association with which the invention is to be used.

In the figures of the drawings above referred to, the numeral **10** generally designates a truck bed or chassis here shown as embodying a pair of longitudinal and parallel beams **12**. The numeral **14** generally designates a conventional truck cab structure while the numeral **16** designates one of a pair of front wheels and the numeral **18** designates dual rear wheels such as are commonly found upon heavy duty trucks.

The numeral **20** generally designates the conventional crane operator's cab which is mounted upon the truck frame for full 360° rotation about a vertical axis and at one end of such cab **20** is mounted at **21** a boom **22** which is adapted to be raised and lowered by conventional apparatus, not here shown. At the opposite end of the cab there is conventionally mounted counterbalancing weight means in the area designated by the reference numeral **23**.

The crane cab may be mounted for rotation to the ex-

tent stated, in the manner illustrated in my prior Patent 2,761,569. Such mounting embodies a fixed or stationary turntable base 24 and a swing platform here designated 25. In the present illustration of the cab mounting suitable bearings 26 are shown between the swing platform and the stationary turntable base.

Associated with the stationary turntable and fixed with relation thereto is the bull gear, a portion only of which is illustrated and designated 27, with which is operatively coupled driving mechanism, not shown, carried by the swing platform and connected with a suitable motor or engine, not shown, all as set forth in my patent hereinbefore referred to.

As is also disclosed in my prior patent, there is a center pin 28 which extends axially upwardly from the bull gear and is stationary relative thereto, and surrounding this center pin and secured to the floor plate forming a part of the swing platform is a sleeve 29. The function of this pin 28 and sleeve 29 is the same as illustrated in my prior patent and as hereinafter more particularly set forth.

In accordance with the present invention there are provided four outrigger units as illustrated particularly in FIG. 1, and designated 30, 31, 32 and 33. These units are of duplicate construction and, therefore, a description of one will apply to the others and the same reference characters will be applied to the parts of the different units with the exception that the fluid pistons and cylinders for reciprocating the beams of the units will be individually identified.

The outrigger units 30 to 33, inclusive, are mounted to extend transversely of the truck frame and preferably they are hung from the under sides of the longitudinal frame beams 12 as shown in FIG. 3. Two of these units are positioned for bracing one side of the truck frame and crane structure and the other two are positioned for bracing the opposite side and as illustrated in FIG. 1 the units 30 and 32 are arranged so that the outrigger beam forming a part thereof may be extended to the left of the machine and the other two units are mounted so that the outrigger beams forming a part thereof may be extended to the right of the machine or truck frame. However, this is merely an arbitrary arrangement and it is to be understood that they may be set in any other manner as may be found convenient or desirable. Each of the outrigger units comprises an elongate housing here illustrated as embodying two channel beams 34 which are secured to and across the under sides of the truck frame beams 12 with the channels in spaced opposed relation so that the upper and lower flanges 35 and 36 respectively of the channel beams will be in spaced edge opposed relation and the beams together form a guide housing or box 37.

Slidably mounted in each of the guide housings 37 is the elongate outrigger beam 38 and to facilitate the in and out movement of the beam, suitable rollers or bearings 39 are provided. Such rollers are here illustrated as being mounted in or upon the lower flanges 36 of the channel beams and have the outrigger beams resting thereon.

Each of the units 30, 31, 32 and 33 has mounted upon the outer side thereof a fluid power motor by which an adjacent outrigger beam 38 is extended and retracted. These fluid motors which embody a piston and a cylinder, are designated 40, 41, 42 and 43. A cylinder for each fluid motor is designated 44 and each cylinder has the inner or back end pivotally mounted as at 45 to the adjacent channel beam 34 and lies longitudinally of or alongside the channel beam with the piston actuated rod 46 thereof directed laterally toward the side of the truck structure from which the adjacent outrigger beam is extended and the outer end of the piston rod is pivotally coupled by means of a bracket 47 and pivot pin 48 to the outer end of the adjacent outrigger beam 38.

The outrigger beam 38 may be of any suitable construction and in the sectional detail shown in FIG. 4, the beam is illustrated as being hollow and as having fixed to the outer end a jack guide block 49 having a vertical passage or bore 50 therethrough formed with a key 51 set in the wall thereof in the manner shown.

Each outrigger beam has associated with it a jack screw 52 which extends vertically through the guide block 49 and which has a key slot 53 in which the adjacent key 51 engages whereby the screw may be moved axially through the block by the hereinafter described internally threaded gearing without being rotated.

Mounted upon the top of each outrigger beam 38 at the outer end thereof is a thrust bracket which is generally designated 54 and which comprises a long top portion 55 which extends longitudinally of the beam and is supported in spaced relation from the top of the beam by the end plates 56.

Positioned within the thrust bracket 55 is a worm gear 57 which has an internally threaded bore 58 therethrough, the teeth of which are formed to mesh with the teeth 59 of the jack screw 52 which is extended through the bore of the worm gear. The worm gear, as shown in FIG. 4, has an elongate hub portion 60 which has a bearing upon the top of the guide block 49 and interposed between the top of the gear 57 and the top 55 of the thrust bracket and encircling the jack screw 52 is a thrust bearing 61.

The lower end of each jack screw is designed for detachable connection with a ground engaging float which is generally designated 62. This float is approximately of frusto-pyramidal form, and has in the apex portion thereof the bearing block 63 in which is a socket 64 which forms an upwardly opening step bearing and into this socket is extended the semi-spherical lower end portion 65 of the jack screw 52. This lower end portion 65 of the jack screw has an encircling locking groove 66 therein in which is engaged the locking pin 67 which is extended through a receiving bore formed transversely through the block 63. This locking pin 67 is readily removable from the block 63 in the head of the float 62 whereby the float can be easily and quickly detached from or coupled to the lower end of the screw 52.

Each outrigger unit includes in its structure a reversible electric motor each of which is designated 68 which is mounted upon the top of the outrigger beam beneath the top 55 of the thrust bracket 54. Each of these reversible electric motors 68 is operatively coupled through a torque clutch 69 with a shaft 70 connected with a worm gear 71 which is operatively coupled with the adjacent worm gear or worm wheel 57 as shown in FIGS. 2 and 3.

Reversible motors of the type employed in the present invention are conventional and well known and, therefore, detailed illustration of the same is not believed necessary, outside of the diagrammatic showing made in FIGS. 7 and 8.

Also torque clutches are well known and a torque clutch of any suitable construction may be employed in the present invention for forming the driving connection between the reversible motor and the worm gear 71. The torque clutch preferred is of the type which may be set to a desired tension for exerting a predetermined thrust upon the jack screw with which it is coupled and is for the protection of the driving motor after the motor has been operated sufficiently to lower the jack screw 52 until the float 62 connected therewith has been firmly pressed against the ground. An example of such a clutch mechanism which might be employed is illustrated in Patent No. 2,457,801.

The several electrical units embodied in the present invention and diagrammatically illustrated in FIGS. 7 and 8, are actuated by electric current supplied from the conventional electric battery, designated 72 in FIG. 7, which forms a part of the standard electrical equipment on trucks such as the one upon which the rotatable crane structure is mounted.

The fluid operated motors are also supplied with fluid under pressure from the tank 73 which is also a unit com-

monly found on truck structures for the operation of air brakes and the like and which is supplied with air under pressure from a suitable air pump, not shown, mounted on the truck and operated by the truck engine, not shown.

Within the cab **20** a switchboard generally designated **74** is mounted upon which are located suitable control switches such as those illustrated in FIG. 7 for establishing an electrical connection between the battery **72** and the several electrical units through the medium of wire cables **75** and **76** leading to wiper fingers **77** having engagement with the collector rings **78** to function in the manner illustrated in FIG. 6, which collector structure functions in the same manner as that shown in my hereinbefore referred to issued patent. In this structure the wiper fingers are supported to be turned with the swing platform around the collector rings which are carried upon the pivoted post **28** and which is stationary with respect to the fingers **77** and in FIG. 7 the collector rings are shown in groups of four and each group is associated electrically with the electrical elements provided for effecting extension and retraction of an outrigger beam and for effecting the clockwise or counter-clockwise operation of the electric motor associated with that beam for raising and lowering the jack screw and float, also associated with that beam.

In the diagrammatic lay-out of FIG. 7 the collector rings associated with the electric units of the left front outrigger unit **30** are generally designated **79**; those associated with the electrical units for the left rear outrigger unit **32** are designated **80**; those collector rings associated with the electrical units of the right front outrigger unit are generally designated **81** and those collector rings associated with the electrical unit of the right rear outrigger unit are generally designated **82**.

The wiring, electrical units and fluid lines for operating each outrigger unit are the same for each and every one of the other outrigger units and accordingly it is believed that a description of such wiring, electrical units, fluid lines, etc. for one outrigger unit will be sufficient for a clear understanding of the operation of the invention as a whole by considering FIG. 7 which is merely a quadruple multiplication of what is shown in FIG. 8. Accordingly, referring now to FIG. 8 wherein there is shown a fluid motor which may be considered as the fluid motor **43** described as forming a part of the rear right outrigger unit, there are shown two electromagnetically actuated valves **83** and **84**. The valve **83** is here shown as supplying fluid from the air tank **73** shown in FIG. 7, to the back end of the cylinder **44** by way of the pipeline **85** while the valve **84** when opened supplies fluid under pressure from the air tank **73** by way of pipeline **86**. These valves **83** and **84** are connected with a supply manifold **87** which is connected by the pipe **88** with the air tank **73**, as shown in FIG. 7.

Each of the valves **83** and **84** comprises a housing **89** having an air chamber **90** from which lead the cylinder supply pipes, by way of the port **91**. Upon one side of the outlet port **91** is an inlet passage **92** with which the air supply manifold is connected and within the chamber this port opens through a valve seat **93**. On the opposite side of the port **91** and at the opposite end of the chamber **90** is an exhaust port **94** at the inner end of which is a valve seat **95**.

Extending through the valve chamber **90** is a valve stem **96** which carries the two spaced valve discs **97** and **98** and at the exhaust port end of the valve body or casing the stem extends to the outside of the valve and carries an electromagnet armature **99** which is positioned axially within the electromagnet coil **100** of the actuating electromagnetic unit which is generally designated **101**. When this unit **101** is deenergized, the exhaust valve disc **98** is in open position, but when it is energized, the disc **98** will be drawn onto its seat **95** to close the exhaust port and the inlet valve disc **97** will be lifted from its seat **93** to permit air to pass from the pipe **87** through the port **91** and into the line connected with this port **91**. Consequently when the electromagnet for the valve **83** is energized, air will be passed under pressure through the line **85** into the cylinder **44** to extend the piston rod **46** and this will move the outrigger beam attached thereto outwardly from the side of the truck frame.

Obviously from the foregoing it will be seen that when the electromagnet **101** for the valve **84** is energized and that for the valve **83** is deenergized, air will be passed through the line **86** to retract the piston rod and the air behind the piston in the inward movement thereof will be exhausted through the line **85** and the valve **83** by way of the port **94** of that valve.

Associated with the valves **83** and **84** is, of course, the two-way or reversible electric motor **68** having the usual field coils **102** and **103**.

Associated with the reversible electric motor are the two relays **104** and **105**. Each of these relays embodies the usual spaced contacts **106** and **107** with the bridging contact **108** with which is connected the armature **109** passing through the usual electromagnet coil **110**, which armature and coil constitute the actuating electromagnet for the relay, which is generally designated **111**.

For purposes of clarity of description, the electromagnet for the relay **105** may be described as adapted, when energized, to transmit current to the field coil **103** which will effect the rotation of the motor in a direction to lower the jack screw **52** with which it is operatively connected, and the relay **104**, when energized, will operate to transmit current to the field coil **102** which will reverse the motor to effect the raising of the jack screw.

Accordingly, the terminal **106** for the electromagnet **111** of relay **105** is connected by the wire **112** with the jack raising field coil **103** while the corresponding terminal **106** of the electromagnet of the relay **104** is connected by the wire **113** with the jack lowering motor field coil **102**.

Considering now the group of collector rings **82**, shown in FIGS. 7 and 8, it will be seen that each is electrically connected with a current conducting wire making in all a group of four, which is generally designated **114**. Such a group, it will be understood, will pass as a cable, together with the corresponding groups for the other electrical units, downwardly through the pivot post **28** so that the wires of the group may be distributed to the different units. One of the wires of the group **114**, designated **115**, leads to the electromagnet coil for the electromagnetic valve **83** while a second wire of the group, designated **116**, leads to the electromagnet coil for the electromagnetic valve **84**. A third wire of this group, designated **117**, leads from a collector ring to one end of the coil of the electromagnet **111** associated with the relay **105**, the other end of this coil being grounded as indicated at **118**. The terminal **107** of this relay **105** is connected by the wire **119** directly to the battery **72**.

The fourth wire or conductor connected with the fourth collector ring of the group **82** is designated **120** and this wire leads to the coil for the electromagnet **111** which forms a part of the relay **104** and the other end of this coil is grounded as indicated at **121**. In this electromagnetic valve also the terminal **107** is connected by a wire, designated **122**, with the battery on the carrier.

The switch panel **74** in the cab **20** has suitable switches mounted thereon for enabling the cab operator to transmit electric current as desired to any of the electrical units associated with the four outrigger units. In this FIG. 8 only one group of switches is shown for effecting passage of current from the battery **72** to the collector rings **82** and one of these switches which is designated **123** is shown as a single-pole, double-throw switch, whereby the blade **124** is movable for electrical connection with either of the two terminals **125** and **126** for

the transmission of electric current respectively to the relay leaders **117** and **120**. The energization of the coil **101**, either of the relay **104** or the relay **105**, will effect the electrical connection of the terminals **106** and **107**, as will be obvious, so that electric current will then be transmitted directly from the battery through the closed relay switch to one or the other of the motor field coils **102** or **103**. The other switch associated with the electrical units of the one relay unit under consideration is generally designated **127** and it also is shown as a single-pole, double-throw switch embodying the blade **128** and the terminals **129** and **130** through which electric current may be selectively directed, respectively, to the conductors or distributor lines **115** and **116** controlling the operation respectively of the electromagnetic valves **83** and **84**.

From the foregoing it will be understood that a group of four switches corresponding to the relay control switches **123** and a second group of four switches corresponding to the electromagnetic valve control switches **127**, will be under the hand of the operator in the cab **20** on the switch panel **74** and accordingly since the current impulses are passed through the switches from the battery **72** carried in the cab **20** to the various collector rings around which the contact fingers **77** move, and from the rings, which are stationary, to the different selected electrical units, the operator from within the cab can effect the extension and/or retraction of any selected one of the outrigger beams and the raising and/or lowering of the float carried jacks on such beams in any position of rotation of the cab **20** within a full 360° swing. One outrigger beam can be extended or retracted by itself, or two outrigger beams on one side can be so moved, or all four beams can be extended or retracted together, as may be desired. When the switch blade **128** of switch **127** is closed on contact **129**, for example, electromagnetic valve **83** will be energized and operated so that air will enter the rear end of the piston cylinder for the fluid motor **43** to extend the outrigger beam connected therewith. Upon completion of the extension of the outrigger beam to the proper degree, the operator will then move the switch blade **124** of switch **123** to contact **126** so as to effect the closing of relay **104** which will pass current to the field coil **102** of the motor **68** to cause the motor to rotate in the proper direction to screw the jack **52** downwardly until the float **62** contacts the ground. When sufficient contact of the float is made with the ground to obtain the desired stability for the truck frame, the pre-set torque clutch will then function to prevent over-loading the motor and the operator will, of course, cut off the current to the motor. It will be readily apparent in what way the foregoing operation can be repeated by the crane cab operator for each of the other outrigger units.

It will also be apparent from the foregoing that in addition to effecting the desired stabilization of the crane structure on level ground, the structure can be braced in locations where the truck may be on an incline where the outrigger beams may be extended to bracing position on the down-hill side of the crane.

It will also be readily apparent from the foregoing that by the novel arrangement here disclosed for setting the jack floats in bracing position against the ground, there is no danger of the crane overturning in the event of failure of the electrical system while the crane is extended from the braced side of the truck, as would be the case if fluid means were employed for extending the float carrying jacks downwardly and holding them by fluid pressure in bracing position.

While no illustration has been made of the mountings for the electromagnetic valves and connections between the latter and the cylinders of the hydraulic motors, or the connections between the electromagnetic valves and the source of compressed fluid for operating the motors, it will be understood that these parts may be located in any position upon the chassis frame for the truck which will be found desirable or most convenient. The compressed air tank and compressor motor are conventional units upon truck structures such as that upon which the present crane may be mounted and accordingly it is believed that any illustration and description of these mechanical units is not necessary to a proper understanding and claiming of the invention.

I claim:

1. In a wheeled structure having a hoisting machine mounted thereon for rotation about a pivot post, outrigger units each embodying an elongate housing slung upon and transversely of the underside of the wheeled structure and an outrigger beam slidable in the housing, there being at least two of said outrigger units adjacent to the forward part of the wheeled structure and at least two of the outrigger units adjacent to the rear of the wheeled structure and the outrigger beams being adapted for extension laterally of both sides of the wheeled structure, for facilitating smooth extension and retraction of the outrigger beams in the housings, each of said outrigger beams having a vertically disposed jack screw extending therethrough at its outer end and the outer end of each beam being formed as a guide block having a vertical passage therethrough for the reception of the jack screw, a key member fixed in the passage of each guide block for slidable engagement in a keyway formed longitudinally of the jack screw, a thrust bracket mounted upon the top outer end portion of each outrigger beam, a worm wheel having a threaded axial passage therethrough and disposed within the thrust bracket and having the adjacent jack screw threaded axially therethrough, each thrust bracket having a top wall overlying the adjacent worm wheel, a thrust bearing interposed between the top wall of the thrust bracket and the top of the worm wheel, a reversible electric motor supported on the outer end of each outrigger beam within the thrust bracket, a worm gear connected with the electric motor and having driving connection with the adjacent worm wheel, a ground engaging float attached to the lower end of each jack screw, means for electrically driving the reversible motor in either direction from the hoisting machine through relatively rotatable electric current conductors located between the pivot post and the rotatable hoisting machine, and fluid actuated motors operatively coupled between the wheeled structure and each outrigger beam for effecting the extension and retraction of the outrigger beams.

2. The invention according to claim 1, wherein each of said fluid actuated motors comprises a fluid cylinder having a fixed position with respect to the adjacent outrigger beam and a fluid extended and retracted piston rod operatively connected with the adjacent outrigger beam, conduits for conducting fluid under pressure to the two ends of each motor cylinder from a source of fluid under pressure on the wheeled structure, electromagnetically operated valves in said conduits, there being a pair of such valves associated with each fluid motor, one valve of each pair being open when energized to pass fluid to its respective end of the adjacent cylinder while the other de-energized valve being set to exhaust air from the opposite end of such cylinder, and means operable from the rotatable hoisting machine for controlling the selective opening and closing of the electromagnetic valves.

3. The invention according to claim 1 wherein the said housing for each outrigger unit comprises a pair of channel beams disposed in parallel relation with the channels facing one another and the said means facilitating smooth extension and retraction of the outrigger beams in the housings comprising anti-friction elements supported upon the lower flange of each of said channel beams.

4. In a wheeled structure having a hoisting machine mounted thereon for rotation about a pivot post, outrigger units each embodying an elongate housing formed of

a pair of channel beams arranged with the channels in opposed relation and slung upon and transversely of the underside of the wheeled structure and an outrigger beam slidable in the housing, there being at least two of said outrigger units adjacent to the forward part of the wheeled structure and at least two of the outrigger units adjacent to the rear of the wheeled structure and the outrigger beams being adapted for extension laterally of both sides of the wheeled structure, a guide block carried by each beam at the outer end thereof, each guide block having a guide bore extending vertically therethrough, a vertical jack screw extending through each guide bore for vertical reciprocatory movement, a reversible electric motor, including an armature shaft, mounted upon each beam adjacent to said bore and the jack screw extending therethrough, gearing means coupling each motor with the adjacent jack screw and comprising a worm gear mounted on top of said block and having a hub aligned with said guide bore and threaded on the jack screw and a worm connected to the motor armature shaft and in threaded connection with the worm

gear, means coupling the jack screw with the block permitting axial movement of the screw while preventing rotation thereof, means for selectively electrically driving the reversible electric motors in either direction from the hoisting machine through relatively rotatable electric current conductors located between the pivot post and the rotatable hoising machine, and fluid actuated motors operatively coupled between the wheeled structure and each outrigger beam for effecting the extension and retraction of the outrigger beams.

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