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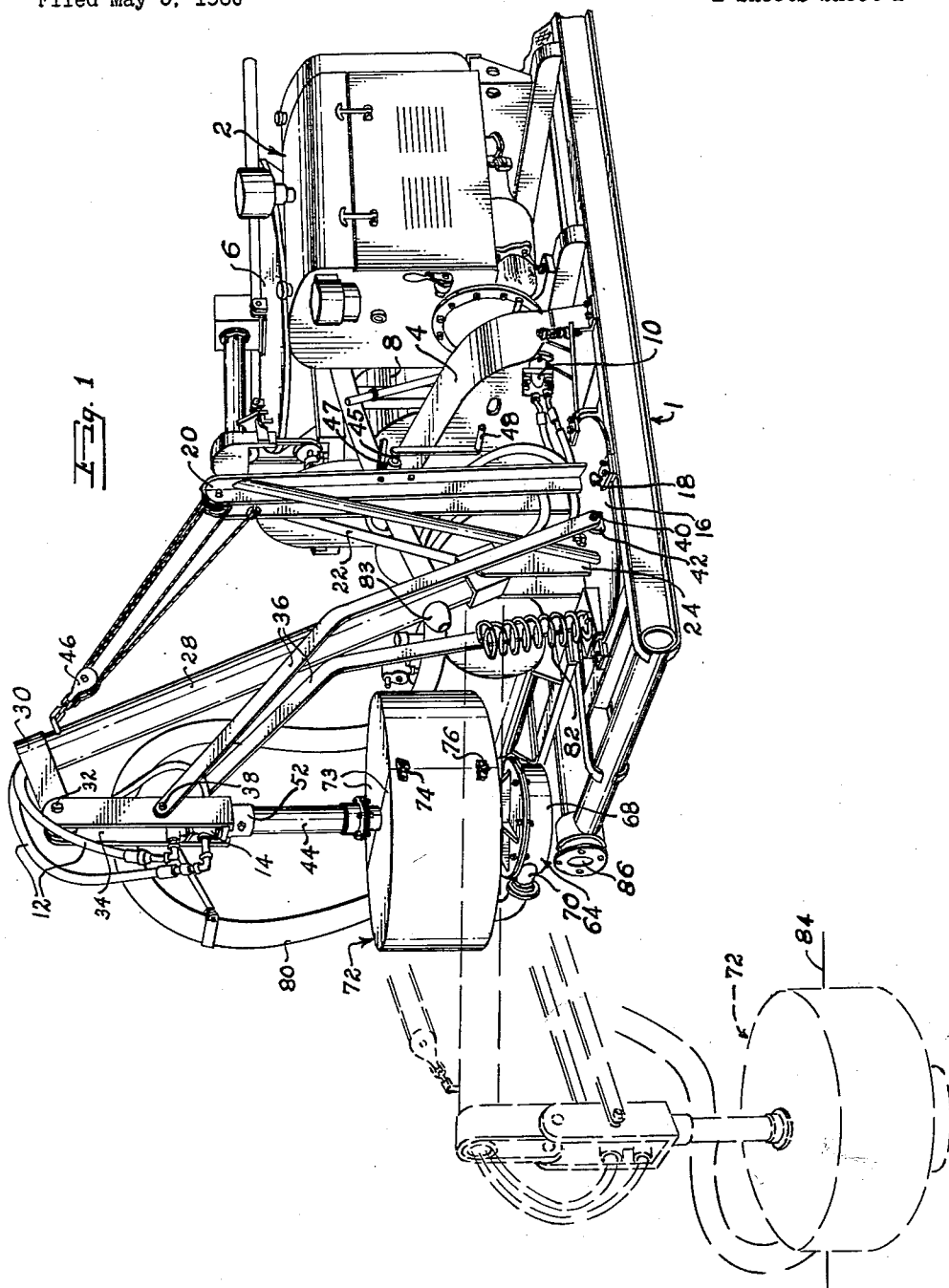
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3,110,263

PUMPING AND MIXING DEVICES FOR DRILLING MUD

Filed May 5, 1960

2 Sheets-Sheet 1



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Fig. 3

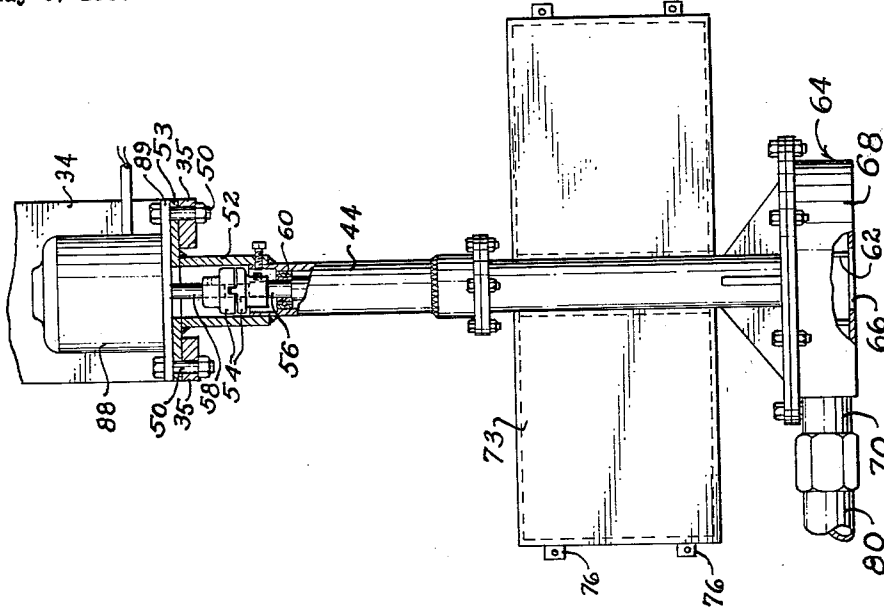


Fig. 2

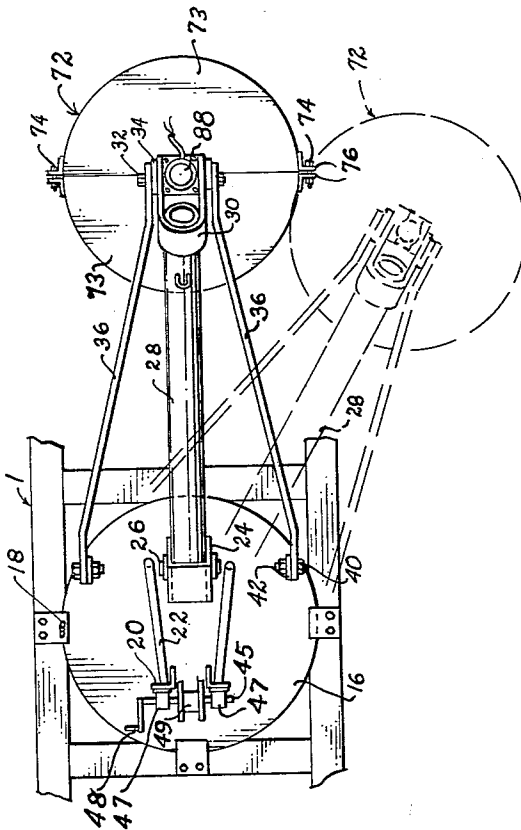
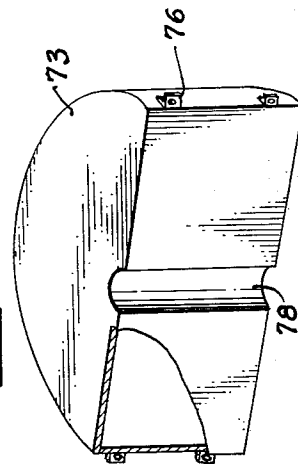


Fig. 4



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3,110,263 PUMPING AND MIXING DEVICES FOR DRILLING MUD

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1 Claim. (Cl. 103—87)

This invention relates to mud pumping and mixing units, and more particularly to a mud pumping unit for use with oil well drilling rigs for pumping and mixing drilling mud as a well is being drilled by the rotary drilling method.

The present device is so constructed that the power unit may be set on a platform adjacent the mud pit and a boom pivotally mounted on the device to enable extending the pump a considerable distance out into the mud pit, thereby making possible the complete submerging of the pump in the drilling mud, to a predetermined depth, thereby giving greater efficiency of the pump than if it were mounted at an elevation above the surface of the mud being pumped.

The pump is preferably driven by a motor which is located in close proximity thereto, such as a fluid motor or an electric motor, as shown in FIGS. 1 and 4, respectively, thereby dispensing with gears, cables, chains and the like.

An object of this invention is to provide a pumping unit wherein the pump is submerged within the material to be pumped to a predetermined depth for efficient pumping operation.

Another object of the invention is to provide a pumping unit wherein the pump is mounted on a boom, by which it may be lowered into the fluid to be pumped, a spaced distance outward from the primary source of power.

Still another object of the invention is to provide a pump and power drive unit combined with a mud mixer and a mud feeding hopper, to provide a composite unit for pumping, treating and mixing mud for well drilling operations.

Another object of the invention is to provide a pump the construction of which obviates the necessity of packing elements around the rotating shaft thereof.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings, in which like reference characters designate like parts in the several views thereof, in which:

FIG. 1 is a perspective view taken from above and from an end and side of a composite unit comprising a pump, pump driving mechanism, mud mixer, and a mud feeding hopper, and showing an alternate position of the pump in dashed outline, as lowered into a mud pit;

FIG. 2 is a fragmentary, detailed view of the boom for lowering the pump into the mud pit, and showing an alternate position of the boom in dashed outline, and showing an electric motor attached thereto;

FIG. 3 is an enlarged, fragmentary, detailed, sectional view of the modified form shown in FIG. 2, of an electrical drive motor, and showing the pump positioned below a float, with a portion of the float removed and showing other details in section; and

FIG. 4 is a fragmentary, perspective view of a portion of the float with a portion thereof being broken away to show the details of construction.

With more detailed reference to the drawings, the numeral 1 designates generally the base of a power unit device which is usually of structural steel construction. A power unit 2, such as an engine, is mounted on base 1 and drives through a transmission unit, such as V-belts or the like, which belts are enclosed within housing 4, one of which belt drives an upright agitator mechanism

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6, such as shown in my co-pending application, Ser. No. 27,142, now Patent No. 3,066,821, Apparatus for Feeding Comminuted Material From a Hopper. The transmission drive elements also drive a mud mixer which mud mixer is housed within housing 8, which housing is of a character shown in my Patent No. 2,693,945, issued Nov. 9, 1954, for Mud Mixer.

A further drive drives a hydraulic pump unit 10 to which pump hoses 12 are connected, as disclosed in FIG. 1. The hoses 12 lead to a hydraulic motor unit 14 for furnishing power thereto, as will be brought out more in detail hereinafter.

The base 1 has a turntable 16 rotatably mounted thereon, which turntable may be held in fixed relation with respect to the base 1 by means of a wing screw 18. Upstanding angle members 20 are mounted on turntable 16, which angle members 20 are braced by means of braces 22. A pair of upstanding lugs 24 are mounted on turntable 16, a spaced distance outward from upstanding angle members 20, each of which upstanding lugs has an aperture formed therein near the upper end thereof, which apertures are axially aligned to receive a pivot pin 26 therethrough and through the lower end of an apertured boom 28.

The upper end of the boom 28 has a yoke 30 thereon, which yoke is apertured to receive a pin 32 therethrough and through link members 34, which link members are supported by the yoke 30. Each link member 34 has an aperture formed therein intermediate the length thereof, to which each of the arms 36 is pivotally attached by means of pivot pin 38. The lower end of each arm 36 is apertured and has a pivot pin 40 passing therethrough and through the respective upstanding lugs 24 which are mounted on turntable 16. The arms 36 are pivoted in such manner that, as the boom 28 is lowered, the link members 34 and tubular housing 44 will be maintained in a substantially vertical position. The boom 28 may be raised and lowered by a block and tackle device which is designated generally by the numeral 46. A shaft 45 is mounted on and journaled in bearings 47, which bearings are mounted on upstanding angle members 20, as will best be seen in FIGS. 1 and 2. A winch drum 49 is mounted on and secured to shaft 45 and is rotatable therewith, to which winch drum a rope or cable is attached, which rope or cable extends outward and through the block and tackle 46, so upon turning a winch handle 48, which winch handle is mounted on and secured to shaft 45, winch drum 49, on which the rope or cable of block and tackle 46 is wound, is turned.

Each link member 34 is intumed, as indicated at 35, at the lower end thereof, as will best be seen in FIG. 1, which intumed ends 35 are each apertured, which apertures are adapted to receive bolts 50 therethrough, as will be more fully brought out hereinafter.

A plate 53 is mounted on and secured to the upper end of a collar 52 on housing 44, so that the plate 53 and collar 52 will be integral with housing 44. The plate 53 has a hole formed therein which is substantially the size of the hole in said collar. A shaft coupling 54 has one portion thereof mounted on shaft 56 within bearing 60 and the other portion thereof is connected to shaft 58 of motor 88. The hole within plate 53 is of a size to enable the passing of the shaft coupling 54 therethrough. The plate 53 is adapted to seat on the upper face of intumed ends 35 of the respective link members 34 and has holes formed therein, which holes are adapted to register with the apertures in the intumed ends of the respective link members. A motor 88 has a flanged mounting plate 89 on the lower end thereof which plate has bolt holes formed therein, which holes are adapted to register with the holes in plate 53 and with the apertures in the intumed ends 35 of link members 34, so

the bolts 50 may pass into the apertures in inturned ends 35, the holes in plate 53 and the holes in plate 89 to secure the motor 88 in fixed relation with respect to link members 34. The collar 52 may have a hole drilled radially therethrough so as to register with a set screw within the lower portion of coupling 54 to give access to the screw so the screw may be tightened or loosened to facilitate the assembly and disassembly of the unit.

By having the motor 88 supported on the link members 34 in the manner described, the motor may be readily removed by the removal of bolts 50 and the motor lifted upward to cause the coupling portions of coupling 54 to be separated. While the above is a description in some detail with respect to the mounting and removal of an electric motor 88, the fluid motor 14 is mounted in the same manner.

As pointed out above the motor may be a fluid driven motor or an electric motor, as will be more fully brought out hereinafter. It is preferable to have one or more bearings 60 mounted within tubular housing 44 to journal shaft 56 therein, which shaft extends downward and is connected in driving relation with the impeller 62 of a pump, which pump is designated by the numeral 64.

The pump 64 has an inlet opening 66 in the bottom of the housing thereof. A discharge pipe 70 is connected to pump housing 68 so as to discharge the fluid being pumped outward therethrough. The pump 64 is operated when completely submerged in the drilling fluid, therefore it requires no packing elements.

A float unit, designated generally at 72, is composed of two semi-cylindrical members 73, which members 73 are bolted together by bolts 74 which pass through adjacent complementary, apertured lugs 76 on each of the semi-cylindrical members 73, so as to bindingly engage a groove portion of the semi-cylindrical members 73 of float 72 in binding relation with the outside diameter of the lower portion of tubular housing 44. The float unit 72 is preferably of sheet metal and is fluid tight, as will best be seen in FIGS. 3 and 4, which float has sufficient buoyancy to support pump 64 and an outlet hose 80 which leads from discharge pipe 70 of the pump, which pump is submerged in the drilling fluid within the mud pit. The discharge hose 80 may lead from discharge pipe 70 to a chute located beneath the hopper 6, into which chute dry bentonite materials may be fed before being directed into mud mixer 8.

A coil spring 82 is mounted on the turntable 16, which spring 82 is adapted to engage a boss 83 on the lower side of boom 28 to resiliently support the boom in its lowered position, as indicated in dashed outline in FIG. 1. The base or frame 1 is adapted to seat on a foundation of beams or earth beside a mud pit, so that the boom, when moved into the position as indicated in dashed outline will position the float 72 in such position that it will be buoyed up by the fluid within the mud pit, at a point remote from the base 1, which fluid is indicated at 84, FIG. 1. The mud mixer 8 has a pipe 86 extending outward therefrom, which pipe is adapted to discharge mud therefrom into a reservoir. In lieu of directing the mud through the mud mixer 8, it may be directed directly from discharge pipe 70 through hose or other suitable conduit 80 to a point of use to agitate mud within a pit to cause the mud to flow properly, or it may be directed into a jet for jetting mud, solids and the like from a mud pit.

The motor to drive the pump 64 may be a fluid driven motor, as indicated at 14 in FIG. 1, or it may be an electric motor, as indicated at 88 in FIGS. 2 and 3.

Operation

With the device, as shown in FIG. 1, located adjacent a mud pit, and with the base 1 seated on a foundation or the like, the boom 28, float 72, and pump 64 may be lowered by the block and tackle 46, by manipulation of winch handle 48, so that the float will be buoyed up

by the drilling fluid which is indicated at 84, and the pump 64 will be submerged within the drilling fluid. With the pump 64 submerged within the drilling fluid in the mud pit, and with the motor 14, as shown in FIG. 1, being driven by fluid power, the mud will be drawn into the pump through inlet opening 66 and the impellers 62 of the pump will discharge the mud out through discharge pipe 70 into outlet hose 80, and thence into a fluid chute into which dry solids are being fed by an agitator designated generally at 6, and which is more specifically defined in my above-mentioned co-pending application. Whereupon, the fluid being pumped by pump 64 and the dry solids, such as bentonite clay or the like, will be directed into mud mixer 8 to be mixed into a homogenous mass which is discharged out through discharge pipe 86 into the mud pit or slush pump for use during the drilling operation.

While the invention has been described in some particularity for use with mud mixers, it is to be understood that the mud discharge line 80 may be directed to any of a number of uses for which it is adapted, as for supplying fluid in any volume to a desired point, such as to mud pits for agitating and jetting mud and the like.

While the invention, together with a modification thereof has been illustrated and described in some detail, it is to be understood that changes may be made in the minor details of construction, and adaptations made to different installations without departing from the spirit of the invention or the scope of the appended claim.

Having thus fully illustrated and described the invention what is claimed as new and desired to be secured by Letters Patent is:

A pumping unit for pumping viscous liquids from a reservoir, which unit comprises:

- (a) a base,
- (b) a support member mounted on said base,
- (c) a tubular housing extending down from said support member,
- (d) a rotary pump mounted on said tubular housing;
 - (1) said rotary pump having an inlet opening formed in the lower end thereof,
 - (2) said rotary pump having an outlet opening formed in a side thereof,
 - (i) a flexible conduit connected to said outlet opening in said pump and leading upward therefrom,
- (e) a pair of grooved, semi-cylindrical, closed float members,
 - (1) bolt means bindingly engaging said semi-cylindrical float members to said tubular housing in adjusted, attached relation a spaced distance above said rotary pump to submerge said pump to a predetermined depth in said viscous liquid in said reservoir,
- (f) a shaft connected in driving relation with the rotating element of said rotary pump and extending upward through said tubular housing,
- (g) a bearing mounted in said tubular housing and journaling said shaft therein,
- (h) a separable coupling portion mounted on the upper end of said shaft and being spaced above said bearing,
- (i) power drive means mounted on said support member and having a shaft extending downward therefrom into said tubular housing,
- (j) a separable coupling portion mounted on and secured to said downwardly extending shaft and being complementary to and engageable with said separable coupling portion on said first shaft,
- (k) a source of power remote from said power drive means to supply power thereto,
- (l) means connected to said base and to said housing to maintain said tubular housing in a vertical position, and
- (m) block and tackle means connected to said base and

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to said support member for raising and lowering said power drive means, said pair of semi-cylindrical, closed float members, and said pump.

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