FIG. 3

FIG. 4

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SCAVENGER OR PUMPING APPARATUS FOR DEEP WELL DRILLING

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The present invention relates, in general, to pumping apparatus and, in particular, to a scavenger or pumping apparatus particularly useful in drilling comparatively deep wells or the like.

During drilling or well-boring operations, as the depth of the bore increases, it is necessary to increase the power output of the associated scavenger or scouring pump apparatus. For this purpose, it is a common practice to use a "stand-by" pump apparatus or assembly which comprises a scavenging pump, a drive motor for the pump and the power transmission mechanism to couple the motor to the pump. The assembly is mounted in such manner that it is readily transportable between drilling sites, as required.

Scouring pumps which are employed in drilling operations are primarily of the dual acting duplex type powered by a drive, either of the diesel engine or electric motor type, and provided with a suitable drive shaft having power transmission means between the drive and the pump. Each end of the drive shaft is provided with a drive gudgeon which extends transversely of the pump cylinder axis. The transmission of power from the drive motor to the pump may be effected by a drive shaft provided with a universal or Cardan joint or by means of a chain drive or a V-belt drive. In the case of the universal joint, it is necessary to align the reduction gear or transmission gear shaft of the pump with the motor shaft. In the case of the chain or belt drive, both shafts are disposed in parallel relation.

It is customary to mount both the pump and the associated drive motor on the common chassis of a vehicle, or the like, for transporting the pump and motor to different drilling sites. Since the length of the pump is usually greater than that of the motor and its drive shaft, the pump has in the past been mounted lengthwise of the chassis or common support, while the motor has been mounted transversely of the chassis.

The maximum width of the vehicle is limited by local traffic regulations so that the foregoing arrangement was possible only where the overall length of the motor and its drive shaft, including the V-belt or chain wheel and journal on the shaft, did not exceed the maximum permissible width of the vehicle. However, where a large motor output is required, the overall length of the motor and its drive shaft exceeds the maximum permissible vehicle width.

Therefore, it is an object of the present invention to provide means which result in the obviation of the disadvantages of the prior art.

It is another object of the present invention to provide means which allow for the disposition of the motor and pump aggregate, when in the inoperative or transportable condition thereof, in such a manner that both the pump and the motor are disposed lengthwise of their vehicular carrying vehicle and in the operative condition thereof, either the pump or the drive motor may be rotated or swivelled so as to extend laterally beyond the carriage.

It is a further object of the present invention to provide means which permit the pump to be rotated or swivelled relative to the drive motor where a universal or Cardan joint is used to transmit power from the motor to the pump and which means permit the motor to be rotated or swivelled relative to the pump where a V-belt or chain drive mechanism is used to transmit the motive power.

It is a still further object of the present invention to provide means which result in a central distribution of weight along the vehicle chassis so as to assure an even and uniform distribution of axle pressure.

These and other objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings showing preferred embodiments of the invention.

In the drawings which illustrate the best mode presently contemplated for carrying out the invention:

FIG. 1 is a side view of a vehicle provided with a pump and motor aggregate, pursuant to the invention, in which the pump may be rotated or swivelled to extend laterally of the vehicle;

FIG. 2 is a top plan view of FIG. 1, showing the pump rotated into its operative position;

FIG. 3 is a view similar to FIG. 1 and shows another embodiment of the invention wherein the drive motor may be rotated or swivelled to extend laterally of the vehicle; and

FIG. 4 is a top plan view of FIG. 3 showing the drive motor rotated into its operative position.

Referring now to FIGS. 1 and 2 of the drawings in detail, there is shown a transportable pump apparatus 20 pursuant to the present invention.

The apparatus 20 comprises a vehicle 21, here shown as a trailer or chassis which mounts a scavenging or scouring pump means 22 and a drive or motor means 3 here shown as a diesel engine, for driving the pump. The trailer 21 is provided with three axles 23, 24 and 25 each of which mounts two wheels, 26, 27 and 28, with a draw bar or coupling 29.

The trailer has a raised rear portion 30, elevating the two rear axles 22 and 23, which is provided with a fixed base or support 31 on which the diesel engine means 3 is fixedly mounted in position longitudinally of the trailer within the opposite side edges 30—31 of the latter. The trailer is provided also with a depressed central portion 32, between rear axle 22 and front axle 21, on which there is mounted a rotary swivel base 4 which mounts the scavenger or scouring pump means for substantially 90 degree rotation to and from its inoperative or transportable position longitudinally of the trailer, as shown in FIG. 1, and its operative position transversely of the trailer, as shown in FIG. 2, as indicated by the arrows 29.

It will be apparent from FIGS. 1 and 2 that, in its inoperative condition the pump means is disposed wholly within the opposing edges 30—31 of the trailer and in its operative position the pump extends laterally beyond edge 31 of the trailer and transversely thereof.

In the operative position of the pump means a drive shaft 5 interconnects the universal or Cardan joint 32 on the output end of the motor means 3 and the transmission gear mechanism 6 of the pump means.

Referring now to FIGS. 3 and 4 in detail, there is shown another embodiment of the invention in which the same reference numerals are used to designate parts similar to those in FIGS. 1 and 2.

In the apparatus 20A shown in FIGS. 3 and 4, the vehicular trailer or chassis 7 is provided with two rear axles 33—34 mounting wheels 35 and 36, respectively, and with two front axles 37—38 mounting wheels 39 and 40, respectively.

The trailer 7 has a lowered central portion 41 on which the pump means 8 is mounted in fixed position longitudinally of the vehicle and within the opposite side edges 30—31 of the latter. The vehicular trailer or chassis is provided with a raised portion 42, elevating the front wheels 39—40. A rotary swivel base 10 is mounted on the raised portion 42 and the drive motor means 9 is supported on said swivel base for rotary movements through substantially 90 degrees, as shown.
by arrows 43a, to and from an inoperative or transportable position longitudinally of and within the side edges of the trailer, as shown in FIG. 3, and an operative position in which it projects laterally and outwardly of trailer edge 34, as shown in FIG. 4, being disposed transversely of the trailer. In its operative position (FIG. 4) the output of the motor means 9 is coupled by a chain or V-belt 11 to the gear reduction shaft 12 of the pump 8. From the foregoing, it will be apparent that in each of the embodiments it is possible to place or accommodate, on a vehicular chassis having a maximum width of 2500 mm., a scrounging or scavenging pump assembly or aggregate comprising a pump means and a drive means therefor, wherein the combined length of the pump and drive means exceeds the width of the vehicle.

It will be understood that the rotary swivel bases 4 and 10 may operate as in a rotary crane, said bases each comprising a roller-bearing base journal, or the like, mounted in a rotary supporting base having a main gudgeon and supporting rolls. The latter are preferably journaled on an eccentric shaft so that the pump means and the drive means therefor are disposed in inoperative or transportable position on the rotary base, while the pump or the motor, as the case may be, is lifted somewhat by rotation of the eccentric shaft during the rotation or swivelling thereof. The raising of the pump or motor means, as the case may be, for effecting the swivelling thereof may also be effected by the operation of a hydraulic cylinder or by other suitable means, for example, a spindle-type elevating mechanism.

In the operative position of the pump-drive motor assembly the projecting pump, as in FIG. 2, or the projecting motor, as in FIG. 4, may be propped or supported by means of mechanical or hydraulic supports 13. Similar supports 14 may be used to prop the vehicular chassis on the ground so as to somewhat relieve the pressure on the axles.

While the present invention has been described in connection with a vehicular trailer or chassis, or the like, it will be understood that it is applicable also to a self-propelled or powered vehicle. For example, as shown in FIGS. 1 and 2, a drive motor 43 may be provided at the front end of the vehicle.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

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

1. Drilling apparatus comprising, in combination, an elongated road vehicle having a width within legal limits for highway operation; a pump means; a motive drive means for said pump means; one of said means being mounted on said vehicle in fixed position to extend longitudinally thereof substantially centrally of said vehicle between the opposite sides thereof; the other of said means having a length in excess of the width of said vehicle, and support means mounting said other means on said vehicle for horizontal rotation between an operative position, extending laterally of said vehicle, and an inoperative transport position, extending longitudinally of said vehicle between the opposite side edges of the latter; said one means and said other means being operatively interconnected in the operative position of said other means and being disconnected in the inoperative position of said other means.

2. Drilling apparatus as in claim 1, said one means being said drive means and said other means being said pump means.

3. Drilling apparatus as in claim 1, said one means being said pump means and said other means being said drive means.

4. Drilling apparatus as in claim 1, the rotation of said other means being substantially 90 degrees.

5. Drilling apparatus as in claim 1, the combined length of said pump means and said drive means exceeding the width of said vehicle.

6. Drilling apparatus as in claim 5, said width being substantially 2500 millimeters.

7. Drilling apparatus as in claim 2, including universal joint means, provided at the output of said drive means in the operative position of said pump means and said pump means having a drive shaft releasably coupled to said joint means.

8. Drilling apparatus as in claim 3, including flexible means releasably coupling the output of said drive means in the operative position of said pump means and said pump means having a drive shaft releasably coupled to said joint means.

9. Drilling apparatus as in claim 8, said flexible means being a chain drive.

10. Drilling apparatus as in claim 9, said flexible means being belt means.

11. Drilling apparatus as in claim 1, said vehicle being a trailer.

12. Drilling apparatus as in claim 1, said vehicle being self-propelled.

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