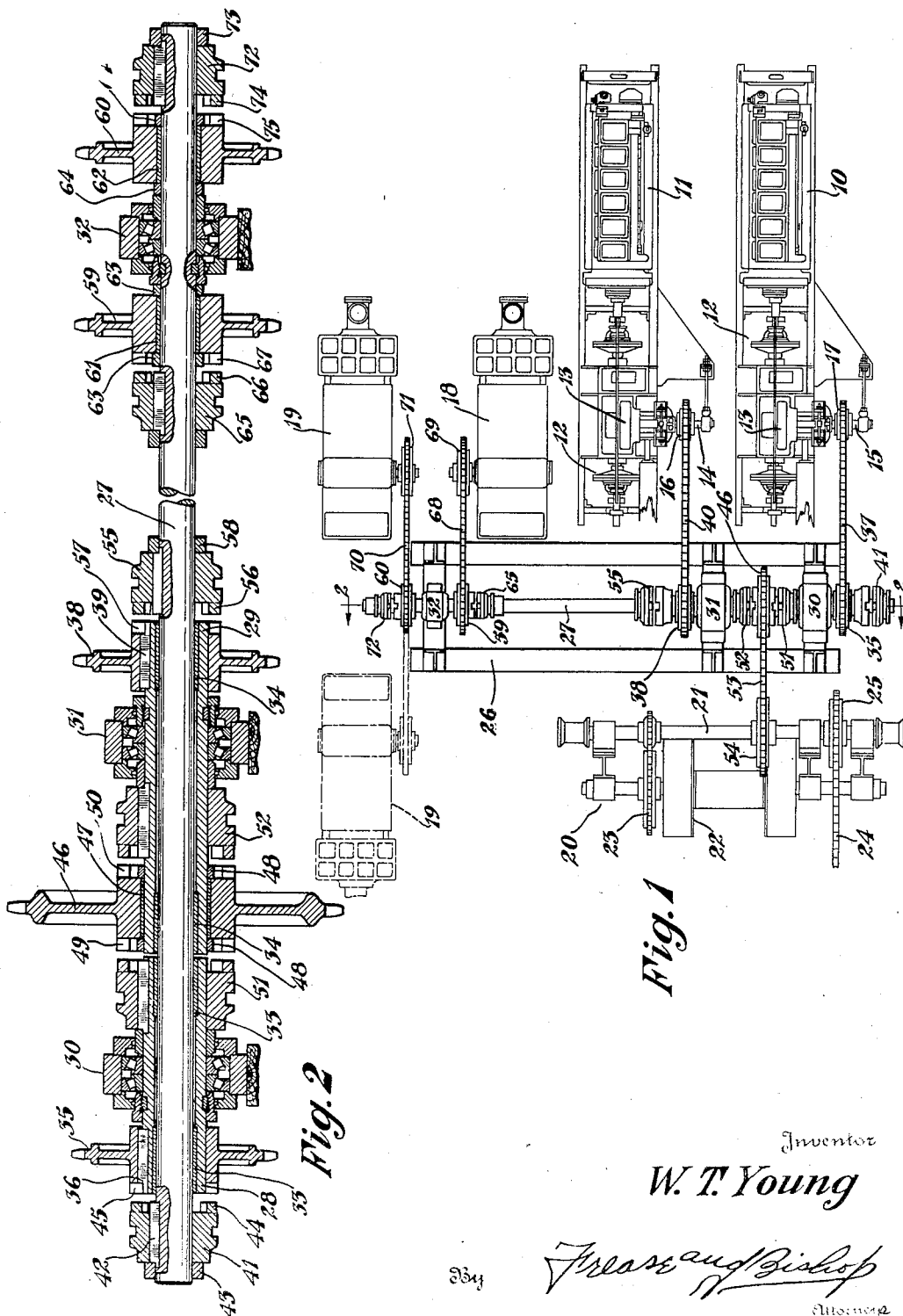


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UNIVERSAL JACK SHAFT

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9 Claims. (Cl. 255—19)

The invention relates to a countershaft adapted for use in the drilling of oil or gas wells or other applications, and so constructed that the power from one, two or more prime movers, such as engines or motors of any well known description, may be utilized to operate a drilling rig and to furnish power to one or more pumps commonly known as "mud hog" pumps which may be located at either end of the shaft.

It is common practice in the drilling of oil wells and the like to use a very complicated and expensive transmission apparatus for distributing the power from the engines or motors to the drilling rig and pumps. Such apparatus are not only complicated and expensive but are very cumbersome and heavy and difficult to set up and move from place to place, as is required in the oil fields.

Furthermore, such apparatus as are now in use are not sufficiently flexible in operation to permit of selectively distributing the power from one or more engines or motors to the drilling rig and pumps.

The object of the improvement is to provide a jack shaft so constructed that the power from one, two or more engines or motors may be selectively distributed to the drilling rig and to one or more pumps.

A further object is to provide a jack shaft of this character which is simple in construction and of such weight that the same is easily portable.

Another object is to provide such a jack shaft which may be turned end for end so that the pumps may be located on either side of the drilling rig, as occasion may require.

Another object is to so construct the jack shaft that the power from any one or more of the prime movers may be applied to the drilling rig and the power from any one or any combination of the prime movers may be simultaneously applied to the pumps.

A still further object of the invention is to so construct the jack shaft that the drilling rig may be operated by one prime mover at one speed while one or more of the pumps may be operated by the other prime mover at a different speed.

An embodiment of the invention thus set forth in general terms is illustrated in the accompanying drawing, in which

Figure 1 is a diagrammatic plan view showing the manner in which the universal jack shaft is located between the prime movers on one side

and the draw works and pumps on the other side; and

Fig. 2 is an enlarged sectional view through the jack shaft, taken as on the line 2—2, Fig. 1. Similar numerals refer to similar parts throughout the drawing.

Although the invention may be carried out to transmit the power from two or more prime movers, such as engines or motors, to the draw works or other drilling rig and pumps, only two engines or motors are ordinarily provided for this work and for the purpose of illustration, the accompanying drawing shows an application of the jack shaft in which two internal combustion engines are used, as indicated generally by the numerals 10 and 11. Each of the engines is provided with a reverse clutch mechanism with reduction gear, indicated generally at 12, for driving, through reducing gears located in the housings 13, the shafts 14 and 15 respectively, upon which are fixed the sprocket wheels 16 and 17 respectively.

The mechanism arranged to be driven by the engines comprises the pumps, commonly known as mud hog pumps, 18 and 19 and the drilling rig which may be a cable tool drilling rig or the draw works indicated generally at 20, and comprising the line shaft 21, the drum 22 driven from the line shaft by the sprocket gearing 23 and the rotary table (not shown) arranged to be driven as by the sprocket chain 24 which passes over the sprocket 25 upon the line shaft 21 or the crank shaft on a cable tool drilling rig. It should be understood that this draw works is illustrated conventionally and that the same does not in itself form a part of the invention and is shown merely to illustrate the application of the invention thereto.

The universal jack shaft to which the invention pertains may be incorporated in the draw works assembly but is preferably separate therefrom, as illustrated in the drawing, and may be mounted upon a steel skid base as indicated generally at 26, whereby the jack shaft may be moved independently of the draw works as well as of the engines and pumps so that it may be placed in the desired position between the engines and the draw works and pumps.

The jack shaft assembly includes the shaft upon which are journaled the sleeves 28 and 29 slightly spaced from each other and located upon one end portion of the shaft, bearings 30 and 31 respectively carried by the skid base 26 supporting said sleeves while the other end portion

of the shaft may be journaled in a bearing 32 also carried by the skid base.

The sleeve 28 may be journaled upon the shaft 27 as by the bushings 33 and the sleeve 29 is journaled thereon as by the bushings 34. A sprocket wheel 35 is fixed upon one end portion of the sleeve 28 as by the key 36 and is connected to the sprocket wheel 17 of the engine 10 as by the chain 37. As shown in Fig. 2, a similar sprocket wheel 38 may be fixed upon the opposite end portion of the sleeve 29 as by the key 39 and is connected to the sprocket wheel 16 of the engine 11 as by the chain 40.

A clutch member 41 is slidably mounted upon the end portion of the shaft 27 adjacent to the sprocket 35, as by means of the key 42, a stop collar 43 upon the end of the shaft limiting the movement of the clutch in that direction. This clutch member, as well as all of the clutch members later referred to, may be of any usual and well known type of clutch, and although all of these members are shown as jaw clutches, it should be understood that this is merely for the purpose of illustration.

Clutch jaws 44 upon the clutch member 41 are adapted to engage with corresponding clutch jaws 45 upon the adjacent end of the hub of the sprocket 35 so that when the clutch 41 is slidably moved into engagement with said sprocket, the shaft 27 will be rotated by means of the engine 10. It will be seen that at all times when the engine 10 is operating, the sleeve 28 will be rotated thereby.

A sprocket wheel 46 is journaled upon the end portion of the sleeve 29 opposite to the sprocket 38, as by a bushing 47 and is held against longitudinal movement on said sleeve as by the collars 48. Clutch jaws 49 and 50 are provided upon opposite ends of the hub of the sprocket wheel 46 for respective engagement with similar clutch jaws upon the sliding clutch members 51 and 52.

The clutch member 51 is slidably keyed upon the end portion of the sleeve 28 adjacent to the sprocket wheel 46 and the clutch member 52 is slidably keyed upon the sleeve 29 between the bearing 31 and the sprocket wheel 46.

The sprocket wheel 46 is connected as by the chain 53 with a sprocket wheel 54 fixed upon the line shaft 21 of the draw works. It will thus be seen that when the clutch 51 is engaged with the sprocket wheel 46, the draw works will be driven by the engine 10 and when the clutch 52 is engaged with the sprocket 46 the draw works will be driven by the engine 11. If both of the clutches 51 and 52 are engaged with the sprocket wheel 46, then the draw works will be driven by both engines.

A clutch member 55 is slidably keyed upon the shaft 27 adjacent to the sprocket wheel 38 and provided with clutch jaws 56 adapted to engage similar clutch jaws 57 upon the adjacent end of the hub of the sprocket wheel 38. A stop collar 58 is fixed upon the shaft 27 to limit the movement of the sliding clutch member 55 in a direction away from the sprocket wheel 38. When the clutch member 55 is engaged with the sprocket wheel 38, it will be seen that the shaft 27 is driven by the engine 11, independently of and at a different speed than the engine 10.

The sprocket wheels 59 and 60 are journaled upon the shaft 27 as by the bushings 61 and 62 respectively and may be held against longitudinal movement on the shaft as by the stop collars 63 and 64 respectively. A clutch member 65 is slid-

ably keyed upon the shaft 27 adjacent to the sprocket wheel 59 and provided with the clutch jaws 66 adapted to engage corresponding clutch jaws 67 upon the sprocket wheel 59. The sprocket wheel 59 is connected, as by the chain 68 with the sprocket wheel 69 upon the pump 18 and the sprocket wheel 60 is similarly connected as by the chain 70 with the sprocket wheel 71 upon the pump 19.

A clutch member 72 is slidably keyed upon the end portion of the shaft 27 adjacent to the sprocket wheel 60 and the movement thereof is limited as by the stop collar 73 upon the end of the shaft 27. This clutch member is provided with jaws 74 adapted to engage similar jaws 75 upon the hub of the sprocket wheel 60. By engaging the clutch 65 with the sprocket wheel 59, it will be seen that this sprocket wheel is operatively connected to the shaft 27 and the pump 18 will be driven by whichever one of the engines 10 or 11 is operatively connected to the shaft as by the clutches 41 or 55. In the same manner, the clutch 72 will operatively connect the sprocket wheel 60 to the shaft 27 so that the pump 19 may be driven by whichever of the engines is operatively connected to the shaft 27. It will be seen that the pumps may be located upon either side of the jack shaft as may be required, as indicated by the broken line position of the pump 19 in Fig. 1.

I claim:

1. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a pump, a jack shaft, means for operatively connecting the prime movers, drilling rig and pump to the jack shaft, and means upon the jack shaft for selectively distributing the power from one or more of the prime movers to the drilling rig and pump whereby any one of the prime movers may drive the drilling rig while any other prime mover simultaneously drives the pump.

2. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a pump, a jack shaft, means for operatively connecting the prime movers, drilling rig and pump to the jack shaft, and means upon the jack shaft for selectively driving the drilling rig by any one or more of the prime movers and for simultaneously selectively driving the pump by any other one or more of the prime movers.

3. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a plurality of pumps, a jack shaft, means for operatively connecting the prime movers, the drilling rig and the pumps to the jack shaft, and means upon the jack shaft for selectively driving the drilling rig by any one or more of the prime movers, and for simultaneously selectively driving any one or more of the pumps by any other one or more of the prime movers.

4. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a pump, a jack shaft, means for operatively connecting the prime movers, drilling rig and pump to the jack shaft, and a plurality of clutches upon the jack shaft for selectively distributing the power from one or more of the prime movers to the drilling rig and pump whereby any one of the prime movers may drive the drilling rig while any other prime mover simultaneously drives the pump.

5. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a pump, a jack shaft, means for

operatively connecting the prime movers, drilling rig and pump to the jack shaft, and a plurality of clutches upon the jack shaft for selectively driving the drilling rig by any one or more of the prime movers and for simultaneously selectively driving the pump by any other one or more of the prime movers.

6. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a plurality of pumps, a jack shaft, means for operatively connecting the prime movers, the drilling rig and the pumps to the jack shaft, and a plurality of clutches upon the jack shaft for selectively driving the drilling rig by any one or more of the prime movers and for simultaneously selectively driving any one or more of the pumps by any other one or more of the prime movers.

7. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a plurality of pumps, a jack shaft, means for operatively connecting the prime movers, the drilling rig and the pumps to the jack shafts, and a plurality of rotatable sleeves and clutch members upon the jack shaft for selectively driving the drilling rig by any one or more of the prime movers and for simultaneously selec-

tively driving any one or more of the pumps by any other one or more of the prime movers.

8. In combination with a plurality of prime movers, a drilling rig and a plurality of pumps, a jack shaft, a sprocket wheel normally rotatable upon the jack shaft and operatively connected to each prime mover, a sprocket wheel normally rotatable upon the jack shaft and operatively connected to the drilling rig, and a sprocket wheel normally rotatable upon the jack shaft and operatively connected to each pump, and clutch means upon the jack shaft for engagement with said sprocket wheels for operatively connecting the drilling rig to any one or more of the prime movers and for operatively connecting any one or more of the pumps to any one or more of the prime movers.

9. In combination with a plurality of prime movers operable at different relative speeds, a drilling rig and a pump, a jack shaft, means for operatively connecting the prime movers, the drilling rig and the pump to the jack shaft, and means upon the jack shaft for selectively driving the drilling rig by either one of the prime movers, and for simultaneously selectively driving the pump at a different speed by another of the prime movers.

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