Jan. 24, 1928.

1,657,245

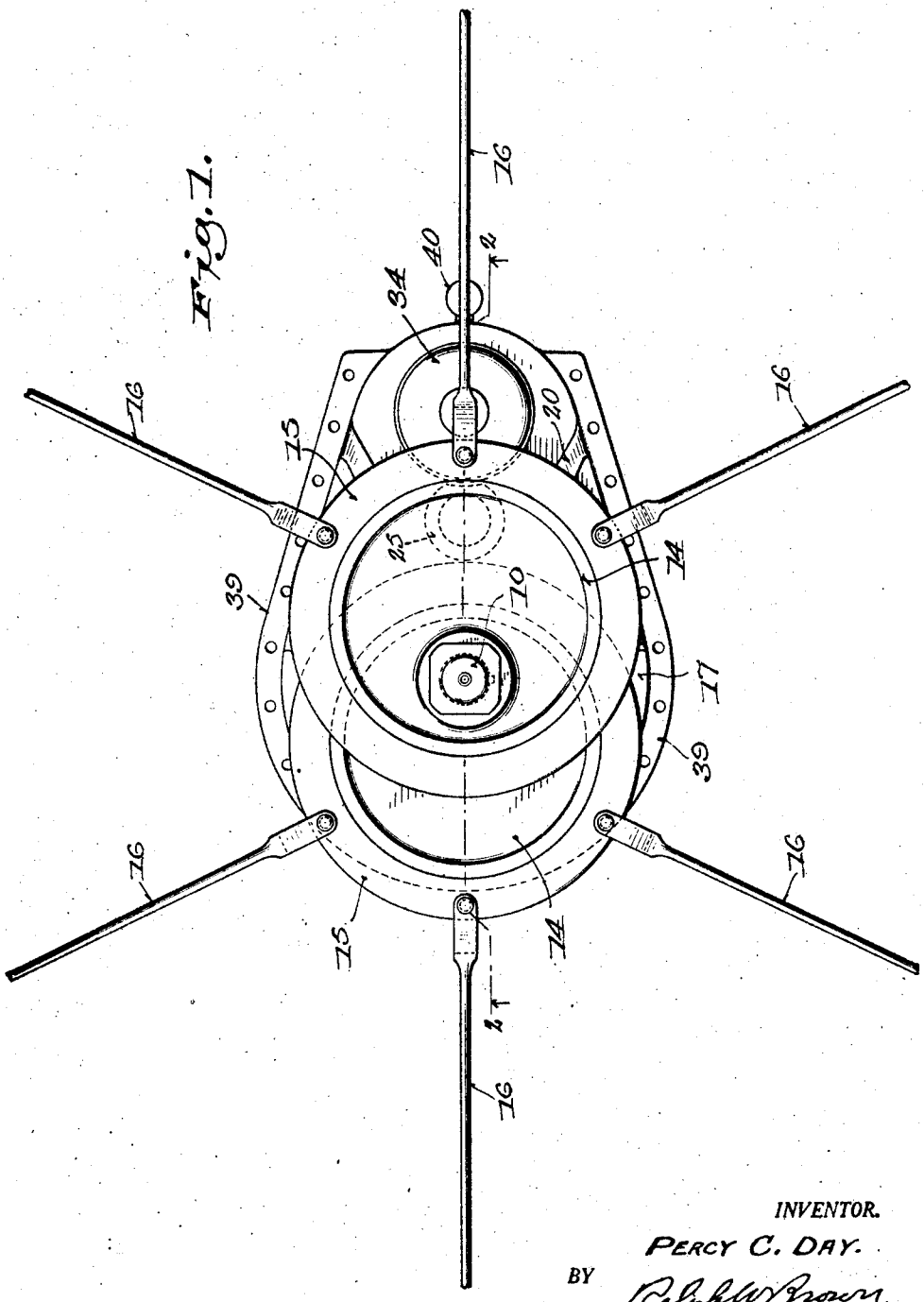
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POWER UNIT

Filed Oct. 31, 1921

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Fig. 1.



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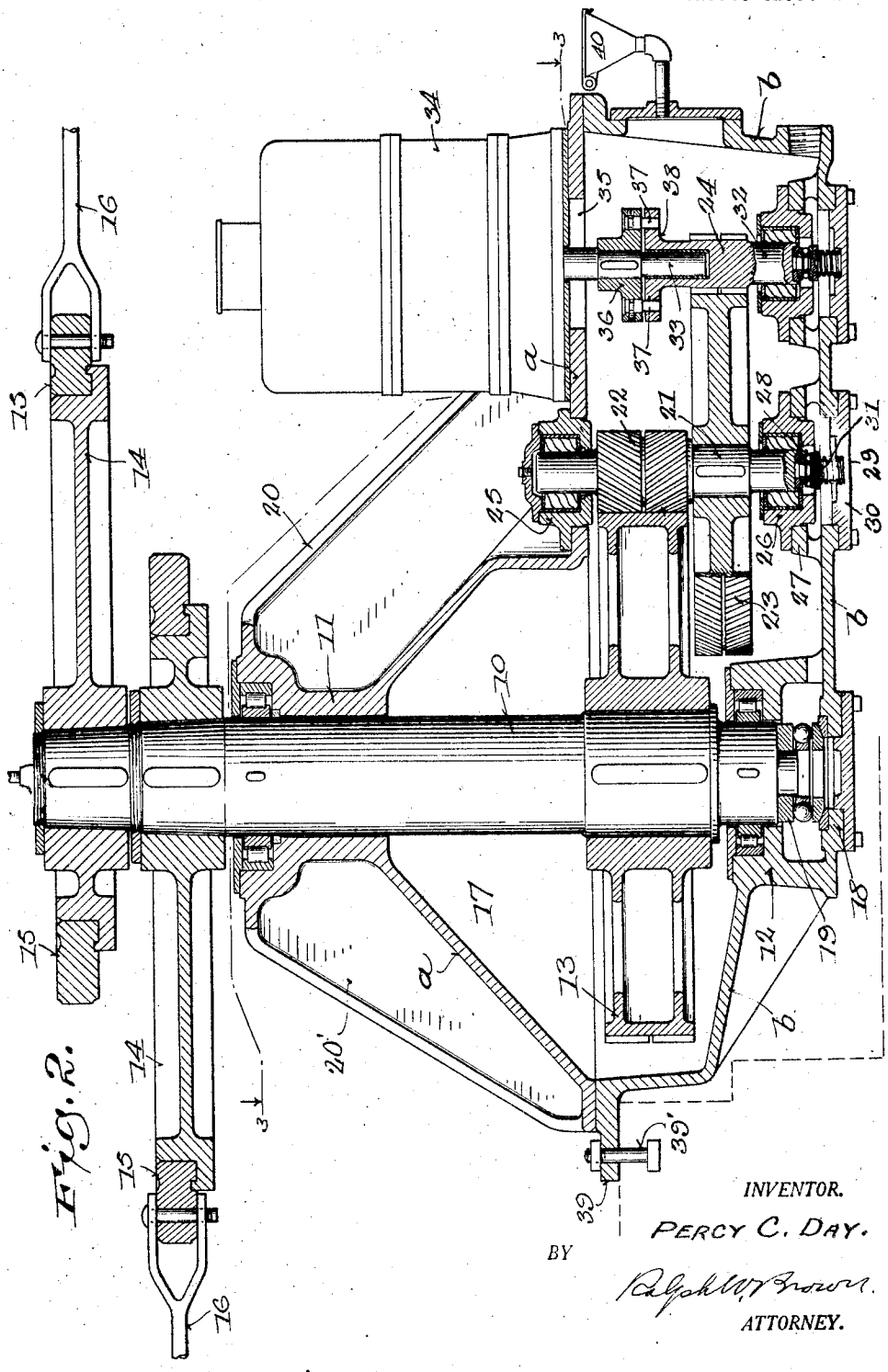


Fig. 2.

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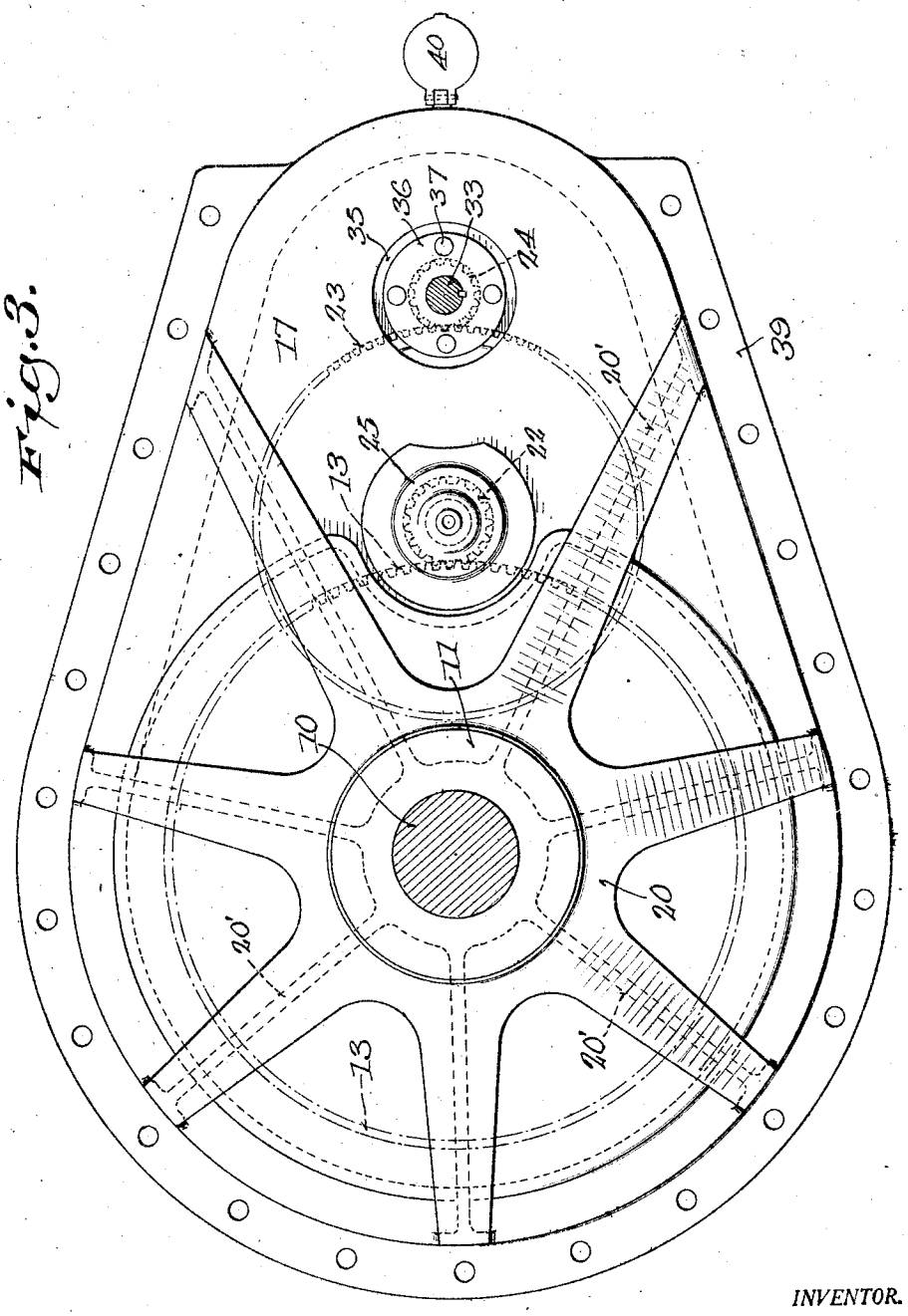
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Filed Oct. 31, 1921 3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

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POWER UNIT.

Application filed October 31, 1921. Serial No. 511,629.

This invention relates to power units for driving the pumps of multiple oil wells and similar apparatus.

Central power stations are sometimes employed in the oil fields for driving the pumps of a number of wells in an immediate vicinity. This is quite frequently the case, particularly when the individual yield of the several wells is insufficient to warrant the installation or maintenance of a separate driving mechanism for each. Such stations ordinarily include one or more large horizontally disposed eccentrics fixed to and driven by a vertical shaft and mechanically connected through links or chains with the pumping apparatus of the several wells. In this way, the desired reciprocating motion is transmitted directly to each of the several pumps from a common source.

In these central stations, the vertical shaft has heretofore been retained in upright position by a series of guys, thus necessitating a belt drive therefor. A pulley, sometimes as large as fifteen feet in diameter, is ordinarily required for driving the shaft. This pulley is keyed to the shaft and is driven by a large belt of considerable length connected with an intermediate mechanism necessarily situated at quite a distance from the vertical shaft, and in turn driven from a prime mover through another length of belting. Such a layout is obviously not only unwieldy but expensive as regards initial as well as maintenance costs.

The general aim of the present invention is the provision of a compact, self-contained, geared unit particularly adapted for use as a unitary drive mechanism for multiple oil well apparatus.

Other more specific objects and advantages will hereinafter appear.

One embodiment of this invention is illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of a power unit constructed in accordance with the present invention.

Figure 2 is a longitudinal sectional view, on a somewhat larger scale, taken substantially on the line 2—2 of Figure 1.

Figure 3 is a plan view of the unit with the eccentrics and motor removed.

The geared power unit selected for illustration includes a heavy power shaft 10, journaled in spaced bearings 11 and 12, and rigidly maintained in fixed vertical position thereby. This shaft is driven by a large gear 13, fixed thereto at a point preferably adjacent the lower bearing 12, and carries a pair of large eccentrics 14 keyed to the upper end thereof at points preferably immediately above and adjacent the upper bearing 11. Each eccentric 14 is provided with an eccentric strap 15 of any standard or approved construction adapted to be connected in the usual manner through suitable links 16 with the several pump mechanisms (not shown) of a group of wells. These eccentrics are preferably oppositely disposed so as to provide a balanced unit.

The shaft 10 and the driving mechanism therefor are mounted in a unitary frame of rigid construction preferably in the form of a casing 17, horizontally divided into separable sections *a* and *b*. The lower section *b* contains the lower bearing 12, preferably formed as an integral part thereof, and is also preferably fashioned, as at 18, to receive a suitable thrust bearing 19 adapted to sustain the weight of the main shaft 10 and parts contained thereby. The thrust bearing shown is a self-aligning ball bearing of a well known type.

The upper section *a* contains the upper bearing 11, preferably formed as an integral part thereof. This portion of the casing is preferably arched upwardly so that the bearing 11 is well spaced from the gear 13, and is preferably reinforced by a spider 20 arranged concentrically of the bearing 11 and united with the bearing and casing through the radially disposed vertical webs 20′. By this construction, the gear 13 is not materially affected by the lateral strains imposed upon the shaft 10 through the eccentrics 14.

The large gear 13 is driven through a train of gearing, preferably such as will now be described. This gearing includes a countershaft 21 journaled in vertical position within the casing 17 and provided with a

small pinion 22 meshing with the large gear 13, and a gear 23 meshing with a drive pinion 24. The countershaft 21 is journaled at its upper end in a bearing 25 preferably removably secured within the wall of the upper section *a*, and at the lower end is journaled in a bearing 26 preferably removably secured within a suitable seat 27 formed upon the wall of the lower section *b*. A roller thrust bearing 28 of standard construction is employed for sustaining the weight of the countershaft and gears. A resilient support is preferably provided for the countershaft, particularly when herringbone gears are employed, so that the pinion 22 may readily adjust itself to the large gear 13 meshing therewith. In this instance, a heavy coil spring 29 is provided for this purpose. This spring rests upon a removable plate 30 secured to the wall of the lower section *b* and bears against a disk 31 interposed beneath the thrust bearing 28.

The drive pinion 24 is carried by a vertical shaft 32 supported and journaled at its lower end in a manner similar to the countershaft 21. The upper end of the shaft 32 is hollowed out to journally receive the lower end of the drive shaft 33. The drive shaft 33, in this instance, constitutes the armature shaft of a vertically disposed electric motor 34 of any standard or appropriate construction. This motor is shown mounted upon the wall of the upper section *a* of the casing so that the shaft projects through an opening 35 formed therethrough. Rotation is imparted to the shaft 32 and pinion 24, preferably through an axially yieldable clutch, so that the pinion 24 may adjust itself to the gear 23. The clutch shown includes a disk 36 keyed to the drive shaft 33 and provided with a series of pins 37, projecting through suitable perforations in a cooperating flange 38 formed upon the adjacent end of the shaft 32.

Thus it will be seen that an assembly of such rigidity has been provided that a gear drive for the main power shaft may be advantageously employed. In use, the lower section *b* of the casing is ordinarily countersunk in a shallow pit and is securely anchored in place by any appropriate means, such as bolts 39′ embedded in the cement foundation and extending through a flange 39 of the lower section *b*.

It will be further noted that the gearing shown provides a double reduction in speed between the motor and power shaft so that each may operate at their most efficient speeds. These gears are preferably of the herringbone type, although it is obvious that other types may be satisfactorily employed. By arranging all the gears within the lower section *b* of the casing, they may be maintained in a bath of oil. A combined oil intake and gauge through which the oil may be introduced into the casing is shown at 40.

Various changes may be made in the embodiment of the invention hereinabove specifically described, without departing from or sacrificing any of the advantages of the invention as defined in the appended claims.

I claim:

1. In a self contained heavy duty power unit for multiple oil wells and the like, the combination of a horizontal casing constituting a lubricant retainer, bearings in the bottom of said casing flooded by the lubricant therein, a plurality of vertical shafts journaled in said bearings, a detachable rigid bearing for one of said shafts disposed above said casing, power transmitting means carried by said last mentioned shaft above said last named bearing, and a set of speed reduction gears on said shafts within said casing for driving said last mentioned shaft.

2. In a self contained heavy duty power unit for multiple oil wells and the like, the combination of a horizontal casing constituting a lubricant retainer, bearings in the bottom of said casing flooded by the lubricant therein, a plurality of shafts journaled in said bearings, a rigid brace for one of said shafts projecting upwardly from said casing, a bearing in said brace for said last mentioned shaft, power transmitting means carried by said last mentioned shaft above said brace and operating in a substantially horizontal plane, speed reduction gears on said shafts for driving said last mentioned shaft, and a motor on said casing for driving said gears, said motor being disposed below the plane of operation of said power transmitting means.

3. In a self contained heavy duty power unit for multiple oil wells and the like, the combination of a horizintal casing, bearings in the bottom of said casing, rigid means comprising reinforcing webs extending upwardly from said casing above one of said bearings, a vertical shaft journaled in said means and said last mentioned bearing, power transmitting means on said shaft above said means, a gear on said shaft within said casing, a second vertical shaft journaled in another of said bearings, a motor on said casing for driving said second shaft, a pinion on said second shaft, a third vertical shaft journaled in another of said bearings, a gear on said third shaft meshing with said pinion, and a pinion on said third shaft meshing with said gear on said first named shaft.

4. In a self contained heavy duty power unit for multiple oil wells, the combination of a horizontal casing, bearings in the bottom thereof, rigid means extending upwardly from said casing above one of said bearings, a vertical shaft journaled in said means and said last mentioned bearing, power transmission means carried by said

shaft above said means, a herring-bone gear on said shaft in said casing, a second vertical shaft in said casing journaled in another of said bearings, a herring-bone pinion on said second shaft, a third vertical shaft journaled in another of said bearings, a herring-bone gear on said third shaft meshing with said pinion, a herring-bone pinion on said third shaft meshing with said first named gear, and yieldable means for supporting said second and third shafts.

In witness whereof, I hereunto subscribe my name this 28th day of October, 1921.

PERCY C. DAY.