

Feb. 20, 1945.

J. G. GILLESPIE

2,370,029

DRUM ASSEMBLY FOR PUMPING UNITS

Filed Aug. 18, 1943

2 Sheets-Sheet 1

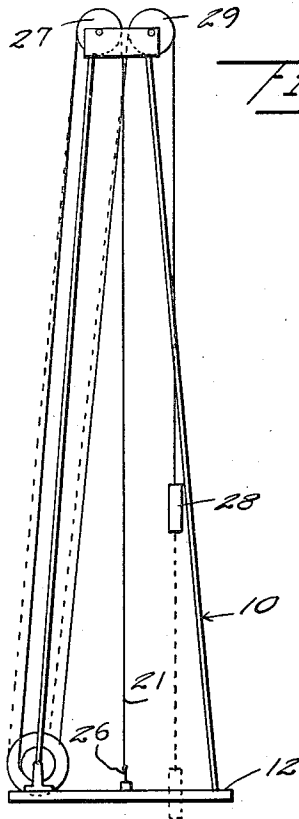


Fig. 1.

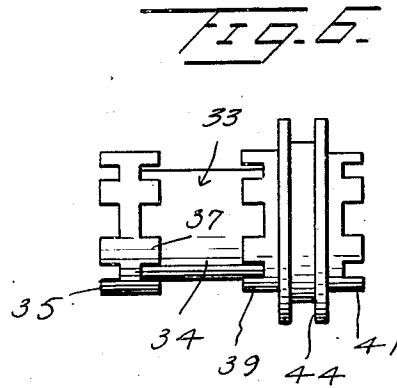


Fig. 6.

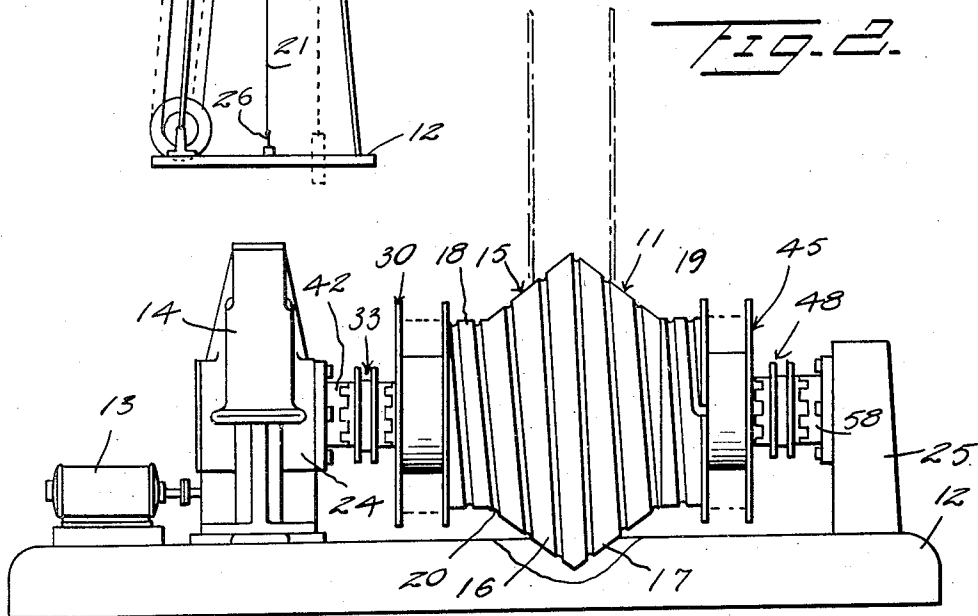


Fig. 2.

Inventor

J. G. Gillespie

By *Kimmel & Crowell* Attorneys

Feb. 20, 1945.

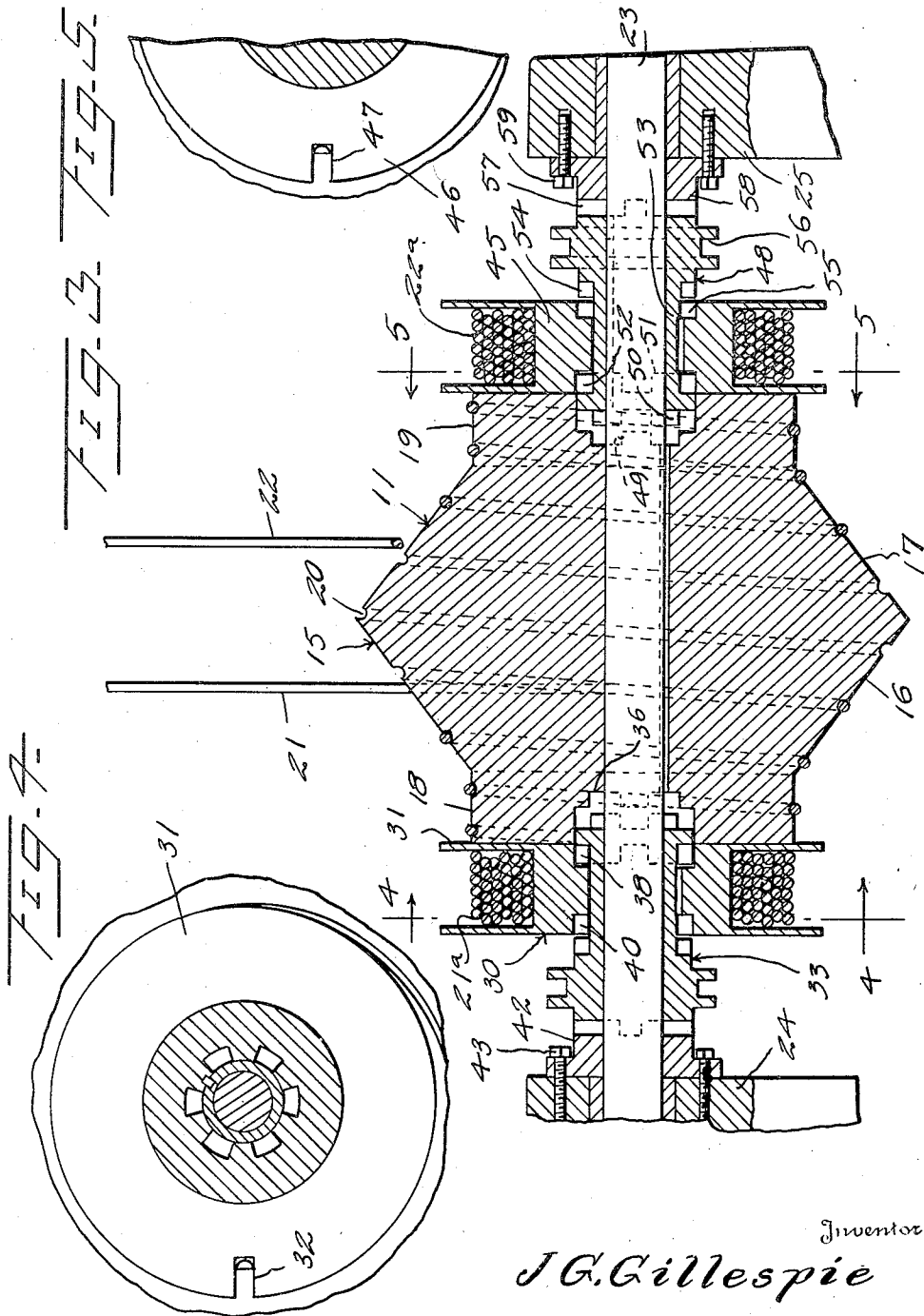
J. G. GILLESPIE

2,370,029

DRUM ASSEMBLY FOR PUMPING UNITS

Filed Aug. 18, 1943

2 Sheets-Sheet 2



Inventor

J. G. Gillespie

By

Kimmel & Crowell

Attorneys

UNITED STATES PATENT OFFICE

2,370,029

DRUM ASSEMBLY FOR PUMPING UNITS

J Gayle Gillespie, Gainesville, Tex.

Application August 18, 1943, Serial No. 499,153

3 Claims. (Cl. 254—185)

This invention relates to long stroke pumping units.

An object of this invention is to provide a pumping unit or assembly for use in operating a well pump, embodying a counter-balance weight which is so constructed and arranged that a pair of operating cables may be wound and unwound on the main drum, and when one or both of the operating cables become worn, additional lengths of cable may be unwound from spare cable drums, the latter being clutched to the main drum and normally rotating therewith but being capable of being individually declutched.

A further object of this invention is to provide in a winding drum a continuous groove of maximum length to be available when rods and tubing are to be pulled.

Another object of this invention is to provide a drum assembly which includes a main operating drum of conoidal configuration and a spare cable drum at each end of the main drum.

With the foregoing objects in view, and others which may hereinafter more fully appear, the invention consists of the novel construction, combination and arrangement of parts, as will be more specifically described, and illustrated in the accompanying drawings, wherein are shown embodiments of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention, as claimed.

In the drawings:

Figure 1 is a diagrammatic view of a pumping unit constructed according to an embodiment of this invention;

Figure 2 is a detail front elevation of the drum assembly;

Figure 3 is a longitudinal sectional view, taken through the assembly;

Figure 4 is a sectional view, taken on the line 4—4 of Figure 3;

Figure 5 is a fragmentary sectional view taken on the line 5—5 of Figure 3; and

Figure 6 is a detail side elevation of one of the clutch elements.

Referring to the drawings the numeral 10 designates generally a derrick with which a pumping unit, to be hereinafter described, is adapted to be used. The drum assembly, generally designated as 11, is mounted on the base 12 of the derrick, and is operated from a motor 13 connected to a source of electric current supply, and preferably a reduction gearing 14 is in-

terposed between the motor 13, and the drum assembly 11.

The drum assembly 11 includes a main drum 15 which is formed of a pair of opposed conoidal drum members 16 and 17 having their bases integral and opposing each other. The small ends of the drum members 16 and 17 are outermost and terminate in cylindrical drum portions 18 and 19 respectively. The drum member 15 is former with a spiral groove 20 within which cables 21 and 22 are adapted to engage. The main drum 15 is fixedly mounted on a drive shaft 23 which is journaled in bearings 24 and 25 mounted on the base 12. The cable 21 is the service cable which is connected to a pumping rod 26 and the cable 21 extends from the main drum 15 upwardly and is trained about an upper sheave 27. The cable 22 is the counterweight cable being connected to a counterweight 28, and trained about an upper sheave 29 carried by the derrick 10.

The two cables 21 and 22 are so mounted on the main drum 15 that when cable 21 is being wound upon the drum 15, the counterweight cable 22 is being unwound from the main drum. A spare cable drum 30 is loosely mounted on the shaft 23 at one end of the main drum 15, and is adapted to have cable 21a wound thereupon. The inner wall 31 of the spare service drum 30 is formed with a slot 32 so that the cable 21a on the drum 30 may be extended through the slot 32 and then continued about the cylindrical portion and the balance of the main drum 15. During normal operation of the drum the cable 21a will be inoperative or unused, but when the cable 21 becomes worn or subject to fatigue the cable 21 may be unwound from the main drum 15, and then a length of cable 21a from the drum 30 may be unwound from the drum 30 and wound upon the main drum 15, the worn portion of the cable 21 being cut off and the new cable 21a connected to the pumping rod 26.

The spare service drum 30 may be coupled to the main drum 15 or uncoupled therefrom by means of a compound clutching element, generally designated as 33. The clutching element 33, shown in detail in Figure 6, comprises a sleeve 34 which is keyed on the drum 30, and is slidable endwise on this drum. The sleeve 34 is formed at its inner end with clutch teeth 35 which are adapted to engage in sockets 36 which are formed in the adjacent end of the main drum 15. The sleeve 34 also has formed thereon outwardly facing clutch teeth 37 which are engageable in

sockets 38 formed in the inner side of the spare surface drum 30.

The sleeve 34 also is formed with a third series of clutch teeth 39 confronting the teeth 37, and engageable in sockets 40 formed in the outer side of the spare surface drum 30. The sleeve 34 also has formed on the outer end thereof outer clutch teeth 41 which are adapted to engage a complementary stationary clutch member 42 secured by fastening members 43 to the bearing 24. A grooved collar 44 is formed between the clutching members 39 and 41, and it will be understood that a conventional shifting fork may be engaged with the collar 44 so as to provide for the shifting of the clutch member 33 to the desired clutching position.

The teeth 37 and 39 are spaced apart a sufficient distance so that when the teeth 37 are engaged in the sockets 38, the teeth 39 will be disengaged from the sockets or clutch element 40, formed on the outer side of the drum 30.

A second spare cable drum 45 is loosely mounted on the shaft 23, and has wound thereabout a spare counterweight cable 22a. The inner wall 46 of the spare drum 45 is formed with a slot 47 through which the cable 22a extends, and is then wound about the main drum 15 extending from the right to the left. A clutch member, generally designated as 48, which is similar in detail to the clutch member 33 shown in Figure 6, is rotatable on the shaft 33 and keyed to drum 45. The adjacent or right end of the main drum 15 is formed with a clutch element 49 with which the inner clutch element 50 of the clutch member 48 is adapted to engage. The inner side of the drum 45 is formed with a clutch element 51, with which the clutch member 52 formed on the sleeve 53 is adapted to engage. The clutch member 52 is oppositely disposed with respect to the clutch member 50. The clutch member 54 is also formed on the sleeve 53 and is adapted to engage an outer clutch member 55 formed on the outer side of the drum 45. A grooved shifting collar 56 is formed on the sleeve 53 and the outer end of the sleeve 53 has formed thereon an outer clutch element 57 which is engageable with a stationary clutch element 58 secured by fastening members 59 to the bearing 25.

A winding drum assembly constructed as hereinbefore described will greatly facilitate the pumping operation as a worn length of cable can be easily and quickly removed and a new length of cable substituted therefor. It will be understood that the spare drums 30 and 45 have a sufficient amount of cable wound thereon to permit one or more additional lengths of operating cable to be unwound therefrom. In the use and operation of this assembly the two cables, 21 and 22, are connected respectively to the pump 26 and the weight 28. The cables 21 and 22 are on the drum 15 closely adjacent to each other, and are so arranged that as the drum rotates in one direction, cable 21 will unwind therefrom, and cable 22 will follow behind cable 21, and will be wound upon the drum 15. At the time the pumping rod 26 is at its lowermost position cable 21 will be substantially entirely unwound from drum 15 on the left side thereof and will extend from the cylindrical part 18. At this time cable 22 will be positioned on the conoidal surface 16 adjacent the small end of this surface. When the drum 15 is rotated in a reverse direction to raise the pumping rod 26, cable 21 being extended at this time from the small end of drum 15 will not place an undue tensional strain on the drum or shaft

during the initial upward movement. After the pumping rod 26 begins its upward movement this movement will be speeded up during the time that cable 21 is being wound on the large inner end of the drum portion 16 and counterweight 28 will gradually reduce its movement downwardly as cable 22 moves to the right or small end of drum member 17.

With both drums clutched to the main drum and renewing cable portion 21, all the drums, clutched together, would be rotated in the direction to unwind cable 22 from drum 11 till it extended from storage drum 45. At this time the storage drum 45 would be unclutched from drum 15 and clutched to the standard 25 to hold storage drum 45 and cable 22 stationary. Drums 11, 15 and 30 being free from cable 22 would now be rotated in the reverse direction to unwind all of cable 21 and a sufficient amount of cable 21a from storage drum 30 to renew the worn portion 21. The unwound portion of cable 21a would now be wound on the drum 15 by again reversing the direction of rotation of drums 11, 15 and 30. The worn cable portion 21 can be cut out and the new portion 21a secured to the pump rod. When a sufficient amount of cable 21a is wound on drum 15 storage drum 45 is re-clutched to drum 11 and cable 22 would be led onto drum 11 for rewinding thereon. Cable 22 would be renewed by following the same operations performed in regard to cable 21. The storage drum 30 in renewing cable 22 would be clutched to stationary part 42.

I claim:

1. A drum assembly for a long stroke pumping unit which comprises a main drum formed of opposed conoidal surfaces positioned with their bases innermost, a drive shaft for said drum, a pair of auxiliary storage drums at opposite ends of said main drum and rotatable therewith, each of said pair of drums having a slot in the inner wall thereof, a cable wound upon each auxiliary drum, each cable passing through its respective slot and wound upon said main drum in a manner whereby the lead-off portions thereof will be closely adjacent to each other.

2. A drum assembly for a long stroke pumping unit which comprises a main drum formed of opposed conoidal surfaces positioned with their bases innermost, said main drum having a spiral groove in the outer conoidal surfaces thereof, a drive shaft for said drum, and a pair of auxiliary storage drums at opposite ends of said main drum and rotatable therewith, each of said pair of drums having a slot in the inner wall thereof, a cable wound upon each auxiliary drum, each cable passing through its respective slot and wound upon said main drum with the lead-off portions of the cables closely adjacent to each other.

3. A drum assembly for a long stroke pumping unit which comprises a main drum formed of opposed conoidal surfaces positioned with their bases innermost, a drive shaft for said drum, a pair of auxiliary storage drums at the opposite small ends of said main drum, and loose on said shaft, each of said pair of drums including an inner wall having a slot therein, a cable wound upon each auxiliary drum, each cable passing through its respective slot and wound upon said main drum in a manner whereby the lead-off portions thereof will be closely adjacent to each other, and clutch means for selectively clutched said auxiliary drums to said main drum.

J GAYLE GILLESPIE.