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OIL WELL PUMPING EQUIPMENT

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FIG. 1.

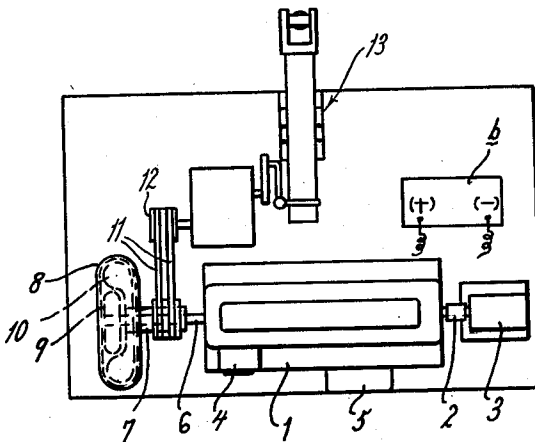


FIG. 3.

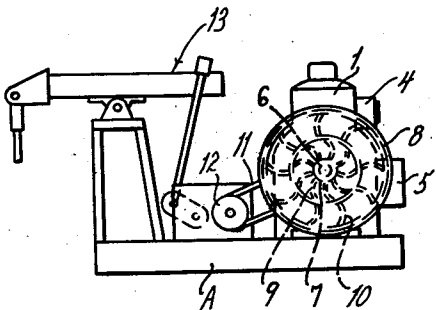


FIG. 2 .

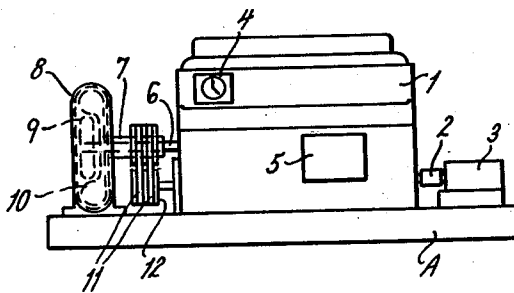
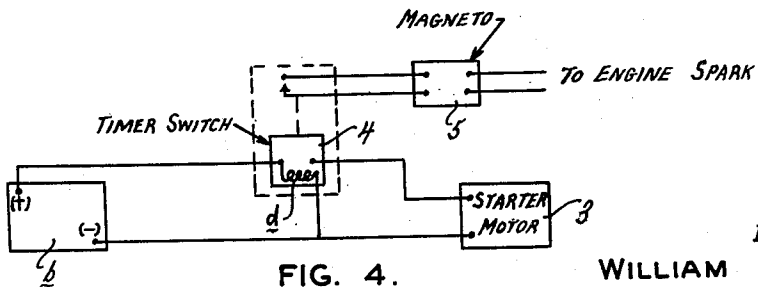


FIG. 4.



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OIL WELL PUMPING EQUIPMENT

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7 Claims. (Cl. 103—22)

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This invention relates in general to certain new and useful improvements in oil well pumping equipment and, more particularly, to a time controlled power unit for driving an oil well pump.

At the present time, in conventionally arranged oil well gathering systems, pumping rigs are usually located at each well head and may be powered by draw-rods running to all parts of the field and connected mechanically to a central power station, as in the case of the older installation, many of which are still in use, or by individual internal combustion engines or electric motors located at each pumping unit. The internal combustion engine systems are comparatively inflexible in that the pumps cannot be shut down and started up readily without manual control.

It is also one of the principal objects of the present invention to provide a power unit for driving well-pumps which is compact, economical in construction, and capable of very flexible operation to meet varying operating demands.

It is also one of the principle objects of the present invention to provide a power unit of the type stated which is time controlled so that it may start up and shut down at predetermined times automatically and thus operate unattended for prolonged periods of time.

With the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawing—

Figure 1 is a top plan view of a well-pumping unit constructed in accordance with and embodying the present invention;

Figure 2 is a side elevational view of the well-pumping unit;

Figure 3 is a front elevational view of the well-pumping unit; and

Figure 4 is a schematic wiring diagram showing the electrical circuits forming a part of the present invention.

Broadly speaking the present invention comprises an internal combustion engine having automatic starting and stopping means so as to provide a power unit particularly adapted for use in the operation of oil well pumping units. Here the power unit is in service for only a portion of the day, commonly termed part-time, or intermittent operation, that is to say operation which may cover any number of periods throughout the day that require the starting and stopping of the internal combustion engine.

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Further, my invention includes a feature, particularly for operation of internal combustion engines in service on reversible load conditions, that will permit constant speed operation rather than cyclic fluctuations as encountered in oil-field well pumping operations, which fluctuations are detrimental to long engine life, cause frequent repair and high maintenance expense. Also, my invention while simulating that of electric motor operation in the features of automatic starting, stopping and constant speed operation, has the long sought advantage of variable speed range, within the operating limit of the engine, without changing the transmission, pulley or sheave, ratio. This is a very important factor particularly in the oil-well pumping field of operations, since varying well conditions require different pumping cycles throughout the well life.

While particularly adapted to intermittent internal combustion engine service in the oil fields, the simplicity of my invention makes it adaptable to any industry wherein automatic starting and stopping of internal combustion engines is desired.

Referring now in more detail and by reference characters to the drawings which illustrate a preferred embodiment of the present invention, A designates a conventional platform constructed of wood or steel and adapted for installation at the well head. Suitably bolted upon the platform A is a conventional internal combustion engine 1 operatively connected through a starter coupling 2 preferably of the so-called "Bendix" type to an electrical starter motor 3. Mounted in any convenient location on the side of the engine 1 is an electrical timer switch 4 and a magneto 5. Also mounted on the platform A is a storage battery b which may be of either six volt or twelve volt type depending upon the voltage for which the starter motor 3 is wired. It will, of course, be apparent that the timer switch should correspondingly operate on six volt or twelve volt direct current, as the case may be.

The drive shaft 6, projecting from the forward end of the gasoline engine 1, extends rotatably through a quill shaft 7 and into a so-called fluid coupling unit or hydraulic drive 8, being rigidly attached to one of the impeller elements 9 thereof. The quill shaft 7 is similarly attached to the other impeller element 10 of the hydraulic drive 8 and extends rearwardly therefrom. Rigidly mounted on the rearward end of the quill shaft 7 is a sheave for connection by conventional V-belts 11 to the driven fly wheel type pulley 12 of a con-

ventional pump 13 also bolted down to the platform A. It should be noted in this connection that although the pump 13 is of the rocking-beam type any other type may be employed equally well.

The starter motor 3 and timer 4 are connected to the battery b, the electric driving means for the timer merely being schematically indicated as at d, all as shown in Figure 4. The switch portion of the timer 4 may be set to open and close at any selected times and thereafter the circuit to the starter motor 3 will be closed at the desired time to, in effect, "crank" the engine 1. At the same time, the magneto-circuit will be closed, so that the engine 1 will start operation and the magneto-circuit is, of course, maintained closed for the period of time during which the engine 1 is to remain in operation. Since it is the inherent nature of the hydraulic drive or fluid coupling 8 to provide for 100% slippage at idling engine speed, the engine 1 may be cranked without any load other than normal compression and no load other than normal compression will be imposed upon the electrical starter motor 3. When the engine 1 has started, the hydraulic drive or fluid coupling 8 very quickly attains engine speed and therefore transmits practically full engine torque, at such speed. When the time for shut-down arrives, the timer 4 interrupts the magneto-circuit and the engine 1 shuts down. Again, since the drive shaft 5 is connected to the load through the hydraulic drive 8, the pump will "coast" to a stop, so to speak, thereby avoiding any abrupt stoppage which might cause damage.

If desired, a mechanical timer preferably having a spring wound movement of the seven day clock type may be employed and will function substantially in the same manner as the timer switch 4 previously described. It may also be stated that a conventional type of automatic choke (not shown) may, if desired, be employed in connection with the internal combustion engine 1 thereby facilitating the starting or cranking operation.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the oil well pumping equipment may be made and substituted for those shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A power unit for well-pumps and the like, said unit comprising, in combination, a gasoline engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, an electrical starter operatively connected to the gasoline engine, a battery for driving said starter, and a timer switch means interposed between the battery and the starter for energizing the starter only at a predetermined time.

2. A power unit for well-pumps and the like, said unit comprising, in combination, an internal combustion engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, a fly wheel type driven pulley interposed between the hydraulic drive and the pump, an electrical starter operatively connected to the internal combustion engine, a battery for driving said starter, and a timer switch means interposed between the battery and the starter for energizing the starter only at a predetermined time.

3. A power unit for well-pumps and the like, 75

said unit comprising, in combination, a gasoline engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, an electrical starter operatively connected to the gasoline engine, a battery for driving said starter, a magneto operatively connected to the gasoline engine, and a timer switch means interposed between the battery and the starter for energizing the starter only at a predetermined time, said timer switch means also being operatively interposed in the circuit from the magneto for closing said circuit when the circuit to the starter is closed.

4. A power unit for well-pumps and the like, 15 said unit comprising, in combination, an internal combustion engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, a fly wheel type driven pulley interposed between the hydraulic drive and the pump, an electrical starter operatively connected to the internal combustion engine, a battery for driving said starter, a magneto operatively connected to the engine, and a timer switch means interposed between the battery and the starter 20 for energizing the starter only at a predetermined time, said timer switch means also being operatively interposed in the circuit from the magneto for closing said circuit when the circuit to the starter is closed.

5. A power unit for well-pumps and the like, 30 said unit comprising, in combination, a gasoline engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, an electrical starter operatively connected to the gasoline engine, a battery for driving said starter, a magneto operatively connected to the gasoline engine, and a timer switch means interposed between the battery and the starter for energizing the starter only at a predetermined time, said timer switch means also being operatively interposed in the circuit from the magneto for closing said circuit when the circuit to the starter is closed and maintaining said magneto-circuit closed for a predetermined time interval.

6. A power unit for well-pumps and the like, 45 said unit comprising, in combination, an internal combustion engine, a pump, a hydraulic drive operatively interposed between the prime mover and the pump, a fly wheel type driven pulley interposed between the hydraulic drive and the pump, an electrical starter operatively connected to the internal combustion engine, a battery for driving said starter, a magneto operatively connected to the engine, and a timer switch means interposed between the battery and the starter 55 for energizing the starter only at a predetermined time, said timer switch means also being operatively interposed in the circuit from the magneto for closing said circuit when the circuit to the starter is closed and maintaining said magneto-circuit closed for a predetermined time interval.

7. A power unit for well-pumps and the like, 60 said unit comprising in combination a gasoline engine and pump having a drive shaft extending outwardly therefrom and being provided on its outer end with a fly-wheel type pulley, a hydraulic coupling unit including a driven member and a driving member, a drive shaft operatively projecting from said gasoline engine and being directly connected to said driving member, a quill-shaft rotatively mounted on the drive shaft and being directly connected to the driven member, said quill-shaft projecting externally from the hydraulic coupling unit and being provided 70 on such external portion with a sheave, a belt

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drivingly connecting the sheave and the fly-wheel type pulley, an electrical starter operatively connected to the gasoline engine, a battery for driving said starter, a magneto operatively connected to the gasoline engine, and a timer switch means interposed between the battery and the starter for energizing the starter only at a pre-determined time, said timer switch means also being operatively interposed in the circuit from the magneto for closing said circuit when the circuit to the starter is closed.

WILLIAM HUBER DYE.

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