Jan. 1, 1929. 1,696,967

E. OPFERKUCK

OIL WELL POWER MECHANISM

Filed June 2, 1926 5 Sheets-Sheet 1

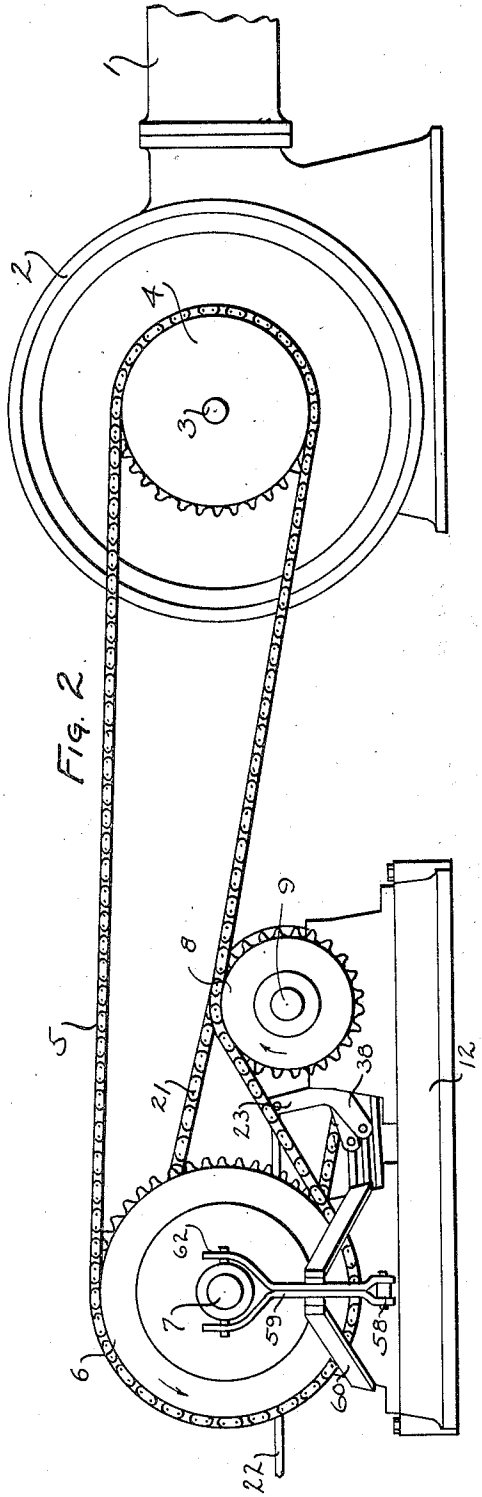


Fig. 2

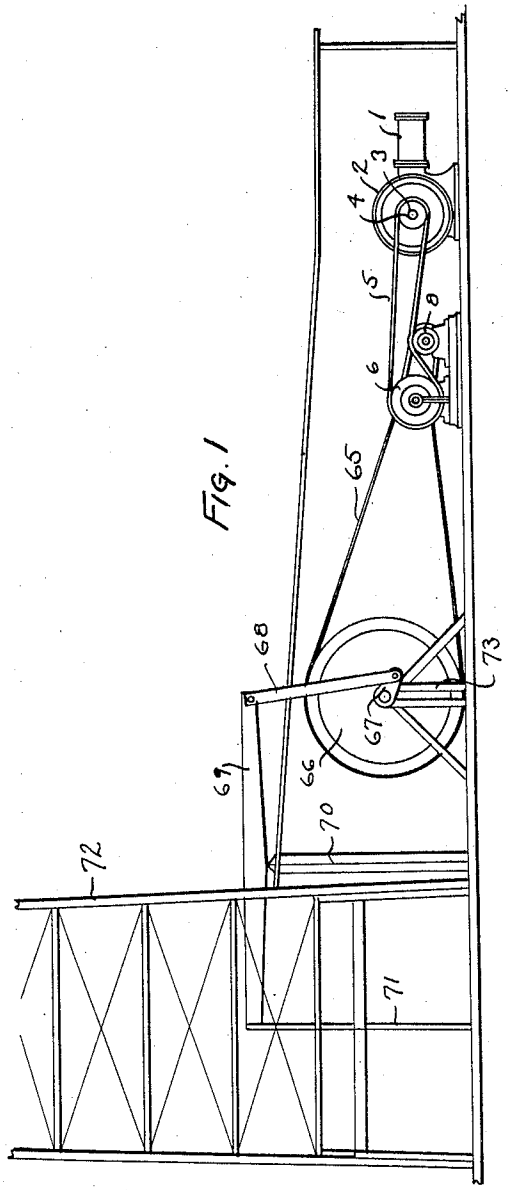


Fig. 1

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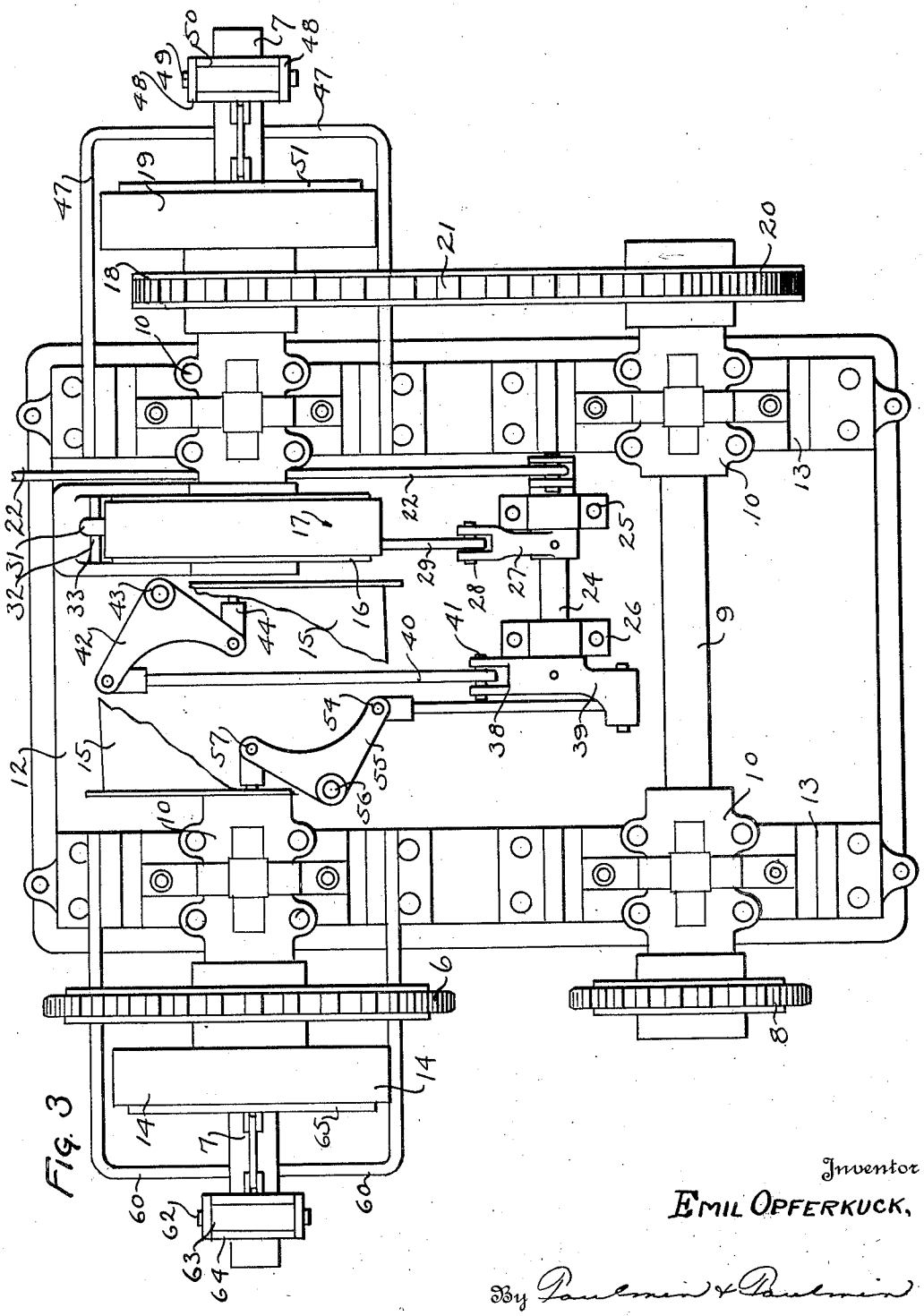


Fig. 3

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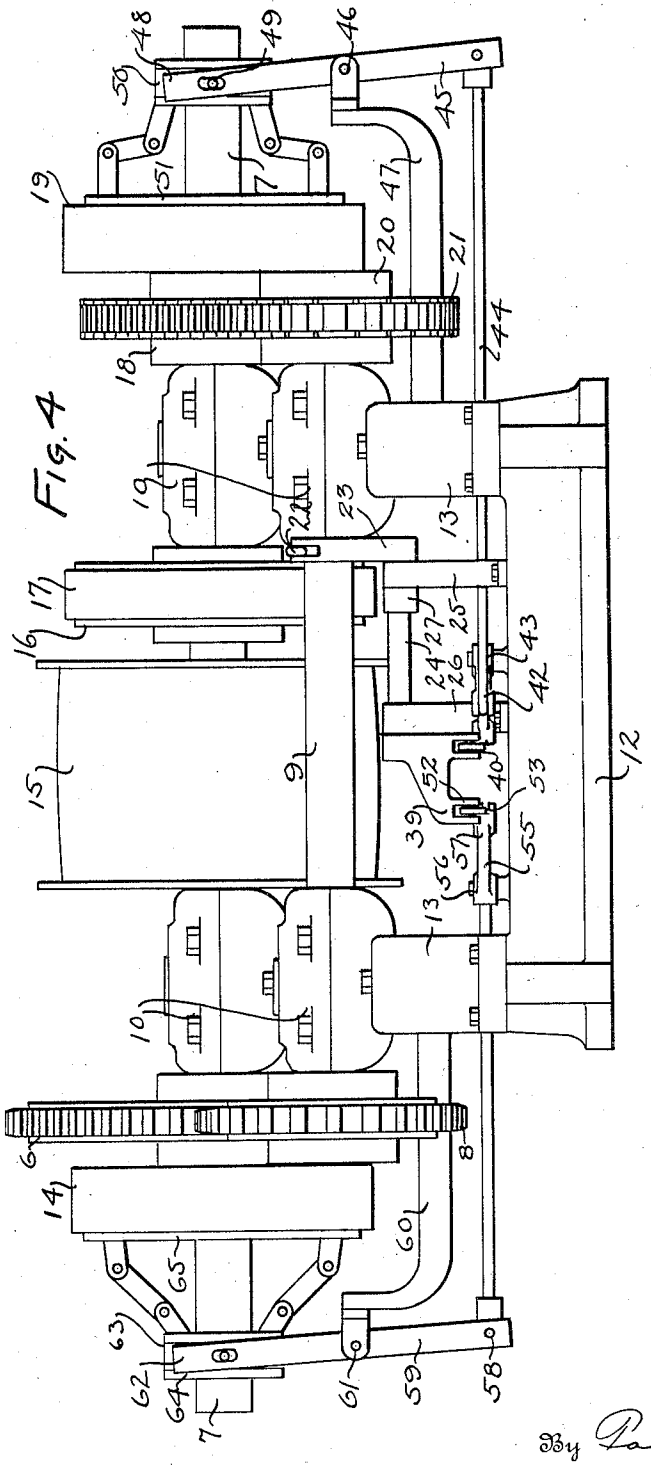


FIG. 4

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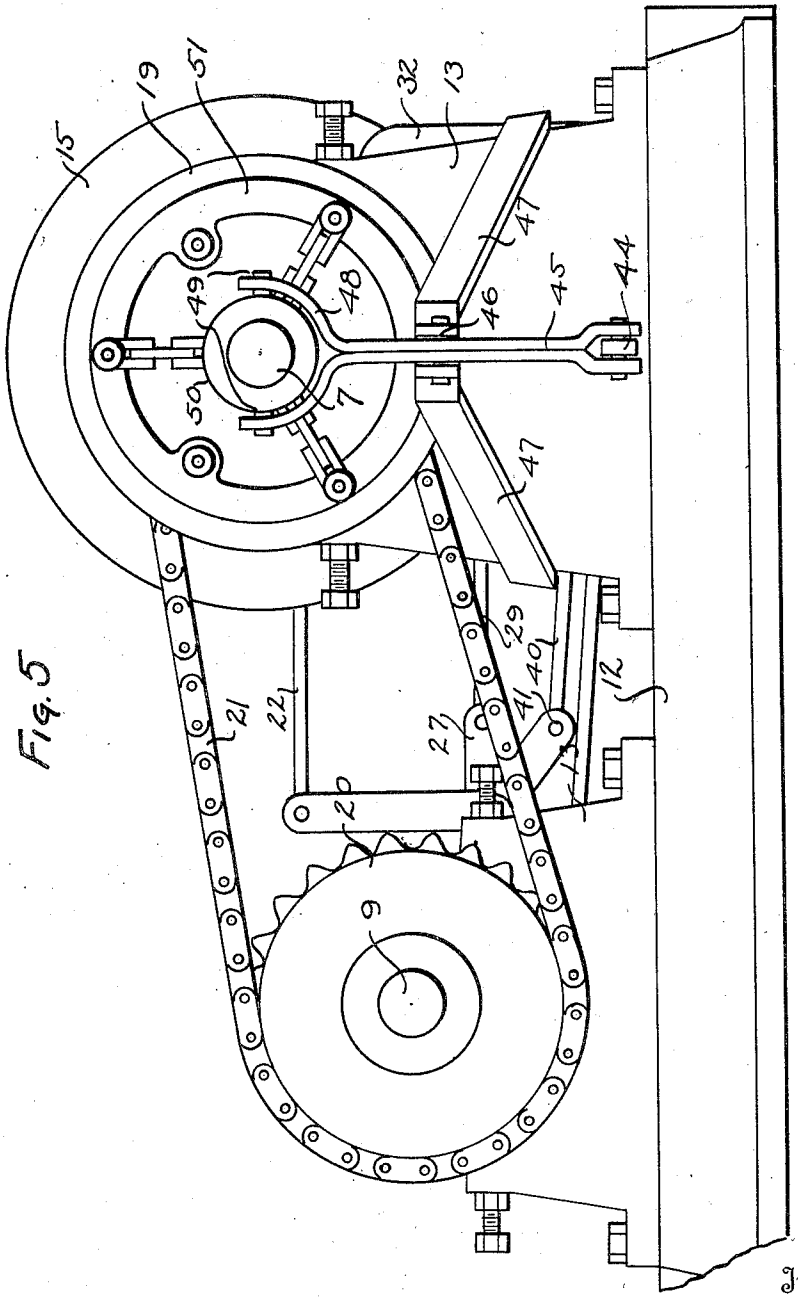


Fig. 5

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OIL WELL POWER MECHANISM

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Fig. 6

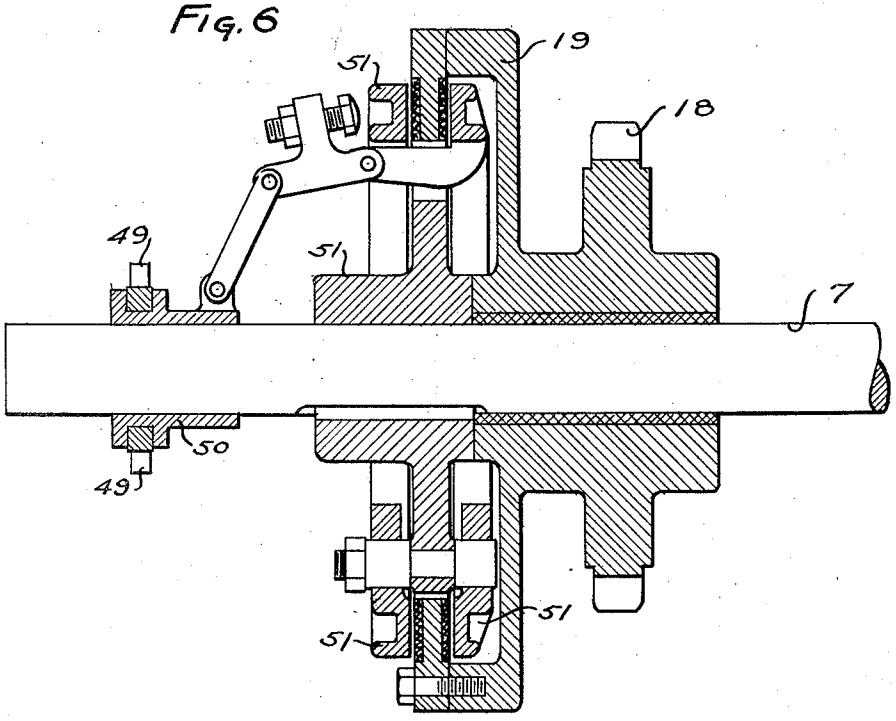
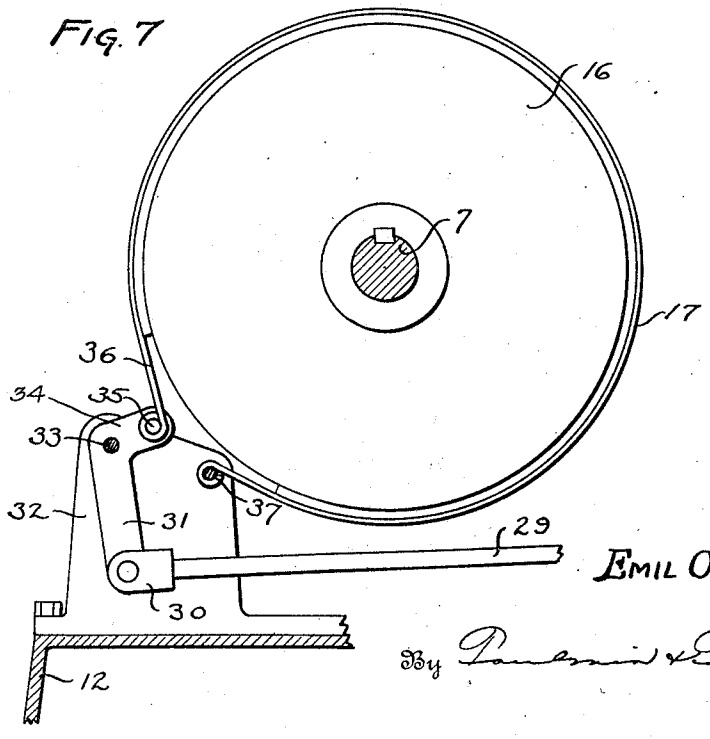


Fig. 7



Inventor

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Patented Jan. 1, 1929. 1,696,967

UNITED STATES PATENT OFFICE.

EMIL OPFERKUCK, OF SPRINGFIELD, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SUPERIOR ENGINE COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF DELAWARE.

OIL-WELL POWER MECHANISM.

Application filed June 2, 1926. Serial No. 113,320.

My invention relates to an apparatus for oil wells.

It is the object of my invention to provide a unitary structure on a single base casting which is so arranged as to transmit power from the engine to the pumping or hoisting apparatus of the well so that the maximum speed and horse power of the engine may be secured, so that the pumping operation may be converted into a hoisting operation and so that slow speed of pumping may be converted into high speed of hoisting without reducing the effectiveness of the engine.

It is my object to provide a unitary apparatus which will permit of using a very much shorter belt from the driving pulley to the band wheel, thus shortening the length of the belt and engine house and the size of the foundations.

It is my object to provide a single power transmission unit, which because of its unitary nature, will maintain its shafts in alignment, will permit of the reversal of the direction of movement of the belt on the band wheel at any speed, all of which can be secured by a single movement of a single control rod.

In detail it is my object to secure this result by the use of a single, relatively short chain from the engine to the intermediate apparatus of my invention, the driving chain being so arranged that it will always continue in motion in the same direction at the same speed, but upon moving the single control lever, the apparatus will be braked, the clutches shifted and the power diverted from the slow speed mechanism to the high speed mechanism, the single master driving chain being adapted to actuate both mechanisms.

Heretofore, considerable difficulty has been experienced in providing adequate clutch mechanism between the engine and the driving mechanism, due to the fact that the long belt to the band wheel, some fifty feet in length, in addition to the strains of driving, not only put considerable strains on the clutch and brake mechanisms, but resulted in pulling shafts out of alignment, warping bearings and injuring the wrist pin connections of the piston rod with the shaft.

My present invention not only eliminates these difficulties as the clutch, reverse and brake mechanism are removed from the engine, but also provides a shorter belt with a larger driving surface for the belt, thus securing greater efficiency. It is also possible to now maintain the engine at its maximum speed and horse power without the loss heretofore occasioned due to the use of the previous methods of reversal. A larger pulley can be used to increase the belt contact, the belt house can be reduced in length and the alignment of the parts is insured by mounting all the parts which are subjected to any strain upon a single base casting with short shafts thereon supported in heavy bearings.

Referring to the drawings:

Figure 1 is a diagrammatic side elevation of the lower portion of a derrick, the pumping apparatus, the power transmission apparatus of my invention and the engine;

Figure 2 is a large side elevation from the engine driving side of the engine and the power transmission unit, showing the arrangement of the single chain driving both slow speed and high speed sprockets and driven and high speed shafts;

Figure 3 is a plan view of the mechanism partially broken away to show the arrangement of clutch control reverse and bell cranks;

Figure 4 is a rear elevation of the power transmission mechanism;

Figure 5 is an end elevation of the right hand side of the mechanism shown in Figure 4;

Figure 6 is a section through the clutch sprocket and shaft, showing a typical installation of the clutch and its associated mechanism.

Figure 7 is a view showing a brake wheel and band, with part of the means for operating the brake.

Referring to the drawings in detail, 1 is an engine having a fly wheel 2 and a shaft 3 upon which shaft is mounted a sprocket 4 actuating a master driving chain 5 which is mounted upon the master driving sprocket 6 turning in the direction of the arrow. This sprocket 6 is mounted on the driven shaft 7. The chain 5 rests upon the reverse sprocket 8 which is carried on the reverse shaft 9.

Turning to the shaft 7 again, it will be noted that it is supported in the bearings 10 and 10 on the base casting 12 which is

a rectangular, single, integral supporting base. The bearings supported thereon are mounted in the usual columns 13. This master driven shaft 7 carries on it not only the sprockets 6, which is loosely mounted thereon, but also the clutch generally designated 14 which fixes the sprocket 6 on the shaft, when desired. The shaft 7 carries the driving pulley 15 which is fixed thereon and turns therewith. The shaft also carries the brake drums 16, which turns therewith beneath the brake band 17. The right hand of the shaft 7 carries loosely thereon a small high speed reverse sprocket 18 and a clutch 19.

The reverse shaft 9 carries on one end the driving reverse sprocket 8 which is fixed thereon on the left hand side and the companion reverse sprocket 20 on the right hand side which is fixed on the shaft 9. This shaft is carried in the usual bearings 10 on the columns 13. A chain 21 is mounted upon the sprocket 20 and the sprocket 18. The control mechanism for alternately having slow forward driving for pumping and fast reverse driving for hoisting is arranged and operated as follows.

A master control rod which leads to a place adjacent the operator is designated 22. This rod extends to a point approximately midway the base casting where it is pivotally connected to an upstanding arm 23 pivoted on a stub shaft 24 supported in bearings 25 which are mounted in supports 26 on the base casting 12. This arm 23 is adapted to rock the shaft 24. On this shaft is a brake arm 27 being pivotally connected at 30 to a lever 31, which lever in turn is pivoted upon a bracket mounted on the base casting. This bracket is designated 32 and the lever 31 is pivoted thereon at 33. The lever is extended into a second arm 34 so that the two arms form a bell crank. The free end of this arm is connected at 35 to the moving arm of the brake band 36, the other end of which is pivotally fixed at 37 on the supporting frame.

Returning to the shaft 24, it will be noted that it is provided with a bell crank having arms 38 and 39. The arm 38 is connected by a link 40 which is pivotally mounted thereon at 41 to a bell crank 42 which is pivotally mounted on the base casting at 43. This bell crank has attached to it another rod 44 which is the clutch rod for the reverse mechanism. This rod 44 is pivotally mounted to the bottom of a lever 45 which in turn is pivotally supported at 46 on a bracket 47 on the right hand side of the machine. The upper end of this lever 45 terminates in a jaw 48. The jaw is mounted between the shoulders 49 which in turn are mounted on a sleeve 50 carrying the movable clutch member 51.

This sleeve slides back and forth upon the shaft 7. The left hand movement of the clutch will bring it into engagement with the engaging face of the clutch member 19.

Returning to the bell crank arm 39, it will be noted that there is pivoted thereon at 52 a link 53 which is pivoted at 54 to the bell crank 55, which is in turn pivotally mounted at 56 upon the base 12. The other arm of this bell crank is connected to a link 57 which is the forward driving clutch link. This link is pivoted at 58 to the shifting arm 59 which in turn is supported on the bracket 60 at 61. The upper end of this arm 59 terminates in a yoke 62 working within spaced collars 63 on the sleeve 64 on the shaft 7. This sleeve carries the clutch 65 which serves to connect the pulley 6 with the shaft 7 or disconnect it.

The remainer of the mechanism is of any conventional type. The pulley wheel 15 drives the belt 65 on the band wheel 66 which has connected to a crank 67 a stirrup 68 which in turn is connected to the walking beam 69 mounted on the Samson post. The free end of the walking beam is connected to the pumping mechanism generally designated 71 within the derrick 72. The band wheel is supported on the jack post 73.

Method of operation.

The engine 1 runs continuously driving the chain 5. This chain in turn drives the sprocket wheel 6 continuously and the small reverse sprocket 8, such sprockets turning in opposite directions. The sprocket 8 is fixed on the shaft 9 so that the shaft 9 also turns continuously. The sprocket 6, however, is mounted loosely on the shaft 7. When the sprocket 6 is clutched to the shaft 7 through the clutch 65 the shaft is driven forwardly at low speed for the purpose of pumping. At this time, the sprocket 18 is loose upon the shaft 7 and the clutch 51 is in its disengaged position. The sprocket 18 is turning in the reverse direction because it is connected by the chain 21 to the sprocket 20 which is mounted on the shaft 9.

When the operator desires to reverse, he moves the rod 22 rotating the shaft 24 thereby applying the brake 17 opening the clutch 65 allowing the sprocket 6 to turn loosely on the shaft 7 and closing the clutch 51 connecting the sprocket 18 to the shaft 7 to turn the shaft 7 in the reverse direction with the sprocket 18 which is being driven by the chain 5, sprocket 8, shaft 9, sprocket 20 and chain 21. This is a high speed reverse drive due to the sizes of the parts. It is thus possible for the operator without disturbing the engine or its speed or decreasing the effective horse power therefrom and without shutting down his equipment by one movement to shift from slow speed forward pumping position to high speed reverse hoisting position.

When I refer to chains and sprockets, it will be understood that I comprehend within my invention other forms common in the art of driving mechanism. I use these definite terms for the purpose of convenience and not for the purpose of limiting myself to the detail mechanism specified, as it is obvious, under some conditions, belts, gear trains or equivalent mechanism may be used for driving.

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

1. In combination, a bed plate, a driven shaft mounted thereon, a forward driving sprocket mounted thereon loosely, a clutch adapted to engage said sprocket with said shaft, a driving pulley mounted on said shaft turning therewith, a reverse sprocket loosely mounted on said shaft, a clutch for connecting said sprocket to said shaft, a reverse shaft mounted on said bed plate, sprockets mounted on either end thereof, a common driving means passing around said forward driving sprocket first mentioned and over one of the reverse shaft sprockets, a chain connecting the other of reverse shaft sprockets with the reverse sprocket on the driven shaft, means for throwing said clutches into and out of engagement alternately mounted on said common base plate, whereby the common driving chain continuously rotates the forward driving sprocket, the reverse shaft and the reverse sprockets, a brake drum mounted on the driven shaft, a brake band associated therewith, means to actuate said brake band interconnected with the clutch actuated mechanisms and a common control means for controlling the clutches and the brake mechanism whereby the driven shaft may be driven in alternate directions without changing the direction of movement of the common driving chain.

2. In combination, a bed plate, spaced parallel driven and reverse shafts journaled thereon, a relatively large driving pulley between the bearings supporting said driven shaft, a brake adjacent thereto, a driving sprocket on the outside of one of said bearings loosely mounted on the driven shaft, a clutch exterior thereof, a bracket mounted on said base plate for supporting the clutch operating mechanism, a second clutch mounted on said driven shaft on the outside of the other bearing, a second bracket so mounted for supporting the second clutch mechanism, a reverse sprocket mounted in between the second bearing and the second clutch on said driven shaft, a clutch control shaft mounted on said bed plate, means connected to said shaft for operating said clutches and said brake, a common means for actuating said clutch control shaft, sprockets mounted on the outside of the bearings supporting said reverse shaft and on said reverse shaft, a common driving chain passing around said forward driving sprocket on the driven shaft and over one of the sprockets on the reverse shaft actuating both of said sprockets continuously, a second chain connecting the reverse sprocket on the driven shaft and the other reverse sprocket on the reverse shaft.

In testimony whereof, I affix my signature.

EMIL OPFERKUCK.