

No. 685,641.

Patented Oct. 29, 1901.

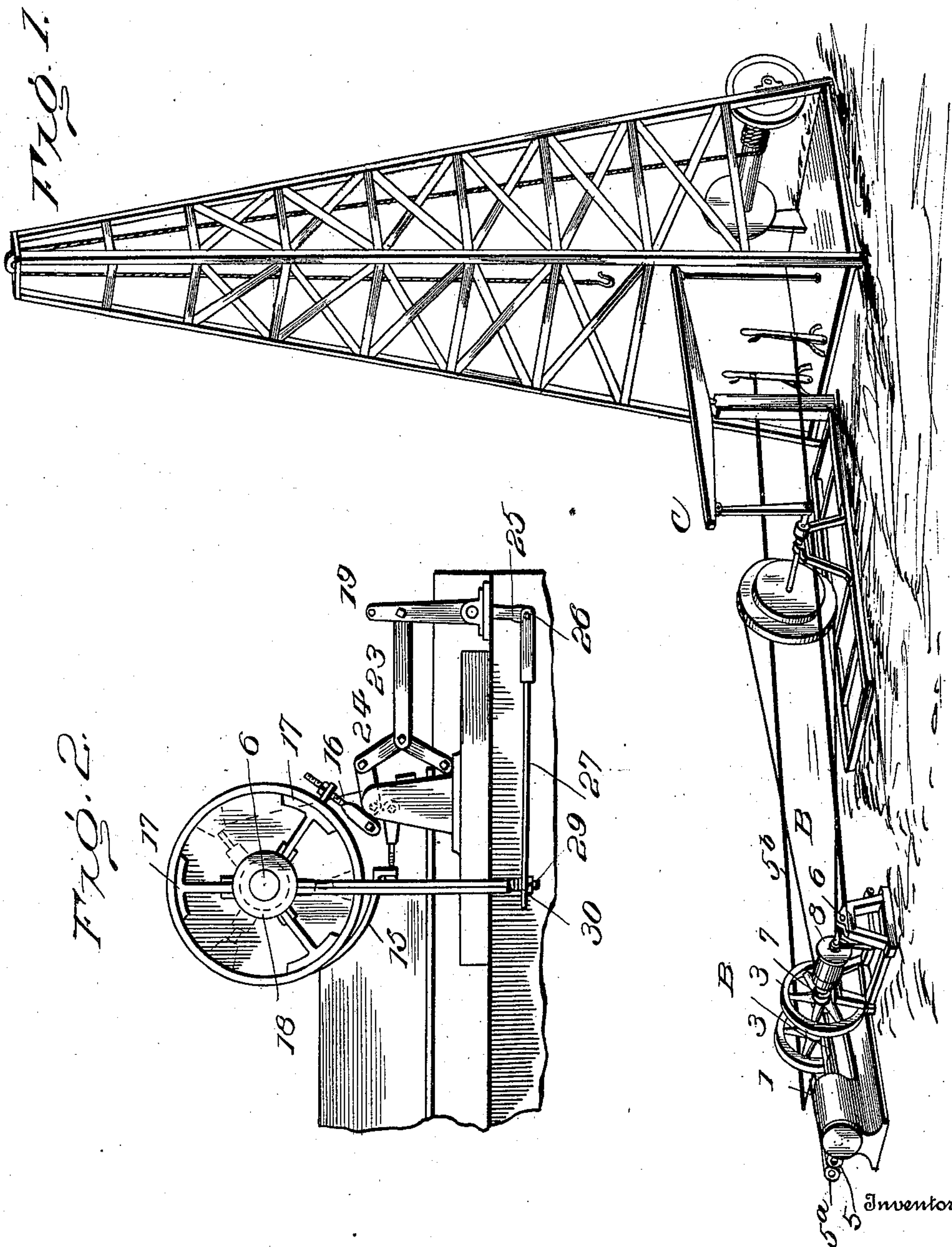
J. REID.

APPARATUS FOR DRILLING AND OPERATING WELLS.

(Application filed June 8, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses

*Wm. L. Smith*  
*Harry A. Knight*

By

*Joseph Reid*

*Knight Bros*

Attorneys

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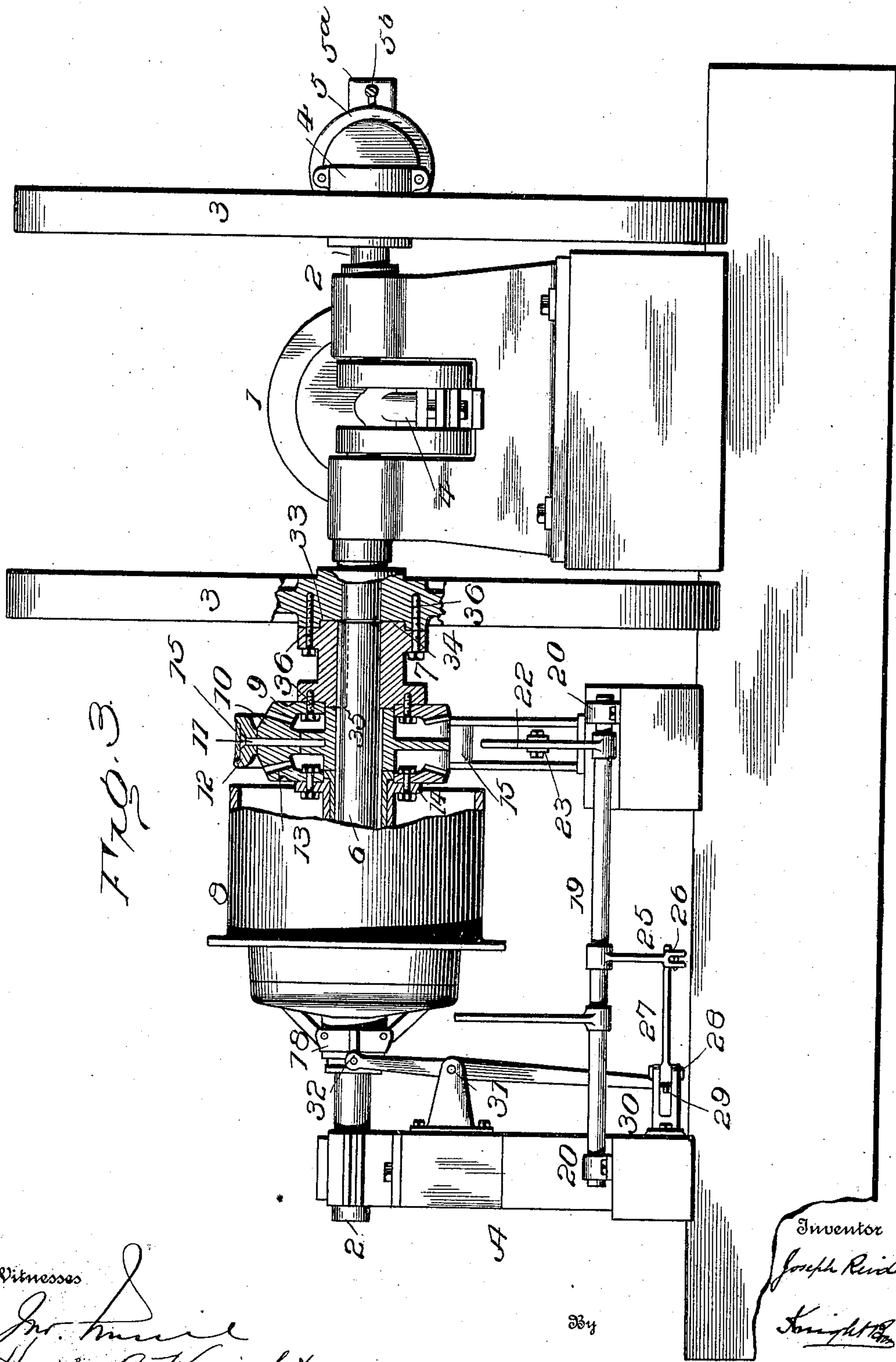
J. REID.

APPARATUS FOR DRILLING AND OPERATING WELLS.

(Application filed June 3, 1901.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses

J. Reid  
Harry A. Knight





# UNITED STATES PATENT OFFICE.

JOSEPH REID, OF OIL CITY, PENNSYLVANIA.

## APPARATUS FOR DRILLING AND OPERATING WELLS.

SPECIFICATION forming part of Letters Patent No. 685,641, dated October 29, 1901.

Application filed June 3, 1901. Serial No. 62,923. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH REID, a citizen of the United States, and a resident of Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Drilling and Operating Wells, of which the following is a specification.

My invention relates to apparatus through the medium of which explosive-engines may be combined with ordinary well-drilling and well-operating apparatus in a manner to meet the requirements of handling the tools, materials, and implements incident to constructing oil-wells and the performance of work incident to the operating of such wells. Certain improvements in this class of apparatus are described and claimed in my Letters Patent No. 626,933, granted June 13, 1899, in which was described a well-rig having a constantly-running explosive-engine and means for stopping, starting, and reversing its connection with the rig, all under control of the operator on the derrick-floor.

Steam-engines are very expensive for operating wells, first, because of the cost of the outfit; secondly, because of the expense of fuel and the cost of hauling it to the place of use, often difficult of access; thirdly, because of the expense of procuring water for the boilers, and, fourthly, because of difficulty of repeatedly moving the outfit from point to point. An explosive-engine offers superior advantages in all of the above-recited particulars; but explosive-engines were formerly not available for these purposes owing to the impracticability of readily reversing them or accurately varying their speed at will or stopping or starting. My previous patent provided means whereby explosive-engines may be used as the source of power employed for performing all of the various kinds of work incident to deep-well drilling; but the control of the transmission of power was by a separate mechanism located at an intermediate point between the engine and the derrick and having belt connection to each. This particular embodiment of my patented ideas is objectionable in some cases, because of the extra amount of mechanism and belting employed, which entailed original expense, un-

certainty of operation, and bulkiness in transportation. The parts of an outfit must be as few as possible and such that they can be readily handled without special means for lifting and may be carried on comparatively small vehicles without danger of injuring shafting and other parts. Long shafting cannot therefore be used with satisfactory results.

My present invention consists in a novel construction and arrangement of the stopping, starting, and reversing mechanism in combination with the other parts of the well drilling or operating rig set forth in my afore-said Letters Patent, the above-mentioned mechanism being arranged in alinement with and directly coupled to the main shaft of the explosive-engine, so that all intermediate belting is disposed of and so constructed as to make a novel means of connection between the said stopping, starting, and reversing mechanism and render the parts readily separable for easy transportation, the controlling-levers extending forward to the derrick-floor in the same manner as described in my afore-said patent.

In the accompanying drawings, Figure 1 is a perspective view of a well-drilling outfit embodying the features of my invention. Fig. 2 is a detail view showing in side elevation the stopping, starting, and reversing gear. Figs. 3 and 4 are respectively a sectional elevation and a plan, showing the manner of operating the stopping, starting, and reversing mechanism with the constantly-running explosive-engine.

A represents the source of power, which is a constantly-running oil or gas engine.

B is a stopping, starting, and reversing gear, through the medium of which the source of power is connected with the rigging to be operated, and C represents the well-operating mechanism of the outfit.

The engine comprises the cylinder 1, a counter-shaft 2, driven by a piston in said cylinder, balance-wheels 3, a pitman 4, connected with a balance-wheel and operating a pump 5 and injecting the explosive fuel into the cylinder 1, and suitable controlling-valves 5<sup>a</sup>, which regulate the supply of fuel, and consequently the speed of the engine. The regulating-



valves are of any suitable type, being connected with the oil or gas pipe and air-pipe, which discharge into a mixing-chamber in quantities and proportions regulated by the valves and whose stems are connected to a controlling lever or rod 5<sup>b</sup>, which extends forward to a point within convenient reach of the operator on the floor of the derrick, as fully described in my previous patent.

Located end to end with the motor-shaft 2 is a shaft 6 of the stopping, starting, and reversing member B, connected with the hub of the balance-wheel 3 by a flange-coupling sleeve 7, which is suitably keyed to the shaft 6 and having loosely mounted upon it a winding-drum or band-pulley 8, through which power is communicated to the well-rig C or the reel thereof, described in my Letters Patent already referred to. The stopping, starting, and reversing gear B is of known construction and need not be more specifically described here than to state that the reversing-gear may comprise bevel-pinion 9, bolted to the outer end of flange-coupling sleeve 7, whereby it is driven by the shaft 6, cone-pinions 10, mounted upon radial axles 11 in a brake-wheel 12, which is loose upon shaft 6, and bevel-pinion 13, fixed to the hub 14 of the band-pulley 8, (loose upon shaft 6,) a brake-band 15 being applied to the wheel 12 by a lever 16, as shown in Fig. 2.

The friction-clutch comprises shoes 17, forced into engagement with the periphery of band-pulley 8 or withdrawn from such engagement by the longitudinal movement of the clutch-sleeve 18 on the shaft 6. When no opposition is offered to the revolution of the brake-wheel 12 and the clutch 8 is forced into engagement with the pulley 6, all the parts of the gear B, excepting its brake-band, but including the clutch and pulley, rotate in the same direction as the shaft 6; but if the clutch-shoes 17 are released and revolution of the wheel 12 is opposed through the medium of its brake-band 15 cone-pinions 10 cannot travel about the shaft 2 and rotation of the bevel-pinion 9, with the shaft 6, is converted by the cone-pinions 10 and imparted to the bevel-gear 13 on the pulley in a direction opposite to the rotation of the shaft 6, and the pulley or drum 8 drives the parts connected with it in a direction opposite to the running of the engine. If neither the brake-band 15 nor the friction-clutch shoes 17 are applied, the band pulley or drum 8 remains stationary, since the cone-pinions 10 will simply travel over the face of the bevel-gear 13 proportionally to the rotation that is imparted to said pinions by the gear 9, which rotates at all times with the main shaft 6.

In order to enable the operator on the derrick-floor to apply the clutch-shoes 17 to impart direct rotation to the band-pulley or drum 8 or apply the brake-band 15 to rotate said band-pulley or drum in the opposite direction or to hold said parts in intermediate positions, so that the pulley or drum 8 may

remain at rest while the shaft 6 is constantly rotated by the explosive-engine, I employ the following means:

19 is a rock-shaft mounted in bearings 20 and moved in either direction by a lever 21, through which all of the mechanism above described is to be controlled and which has a connection running to the stopping, starting, and reversing lever on the derrick-platform of the well-drilling rig.

22 is a lever projecting vertically from the rock-shaft 19 and having connection through a link 23 and toggle-levers 24 with the brake-band lever 15, hereinbefore referred to.

25 is a lever projecting downwardly from rock-shaft 19 and having universal connection 26 with one arm of a bell-crank lever 27, fulcrumed at 28 and having its outer end connected at 29 to the clutch-lever 30, which is fulcrumed at 31 and has controlling connection at 32 with the hub 18 of the clutch-shoes 17. These connections are such that when the lever 21 is moved toward the derrick the brake-band 15 will be released and the clutch-shoes 17 will be applied; but if said lever is held in an intermediate position both the brake-band and clutch will be released, while by the movement of said lever from said intermediate position in a direction opposite to that first described the brake-band 15 will be applied to call into operation the reversing-gear while the clutch-shoes 17 will be released. These movements of the single lever afford means for starting or stopping or reversing apparatus driven by the continuously-running explosive-engine, and said actions or changes in running conditions may be effected as gradually as desired by proper manipulation of the lever. The lever 21 might obviously project oppositely to its disclosed position and be moved in directions just the reverse to those above described for accomplishing the purposes stated.

The flange-coupling 7 comprises the depression 33 in the balance-wheel hub, the centering-boss 34, and flange 35 on the shaft 6, and screws 36.

The combination of features above described accomplishes all of the objects of my aforementioned patent by a direct-coupled but readily-detachable gear, and the parts are adapted for convenient handling and transportation.

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

1. The combination of a well drilling and operating apparatus, a continuously-running explosive-engine having a main drive-shaft, a power-transmitting shaft in alinement with said main drive-shaft, a coupling detachably securing the transmitting-shaft directly to the main shaft end to end, and a stopping, starting and reversing clutch on said transmitting-shaft and suitable means including a brake pulley and band for the direct driving connection and connections from the mov-



able member of the clutch and the brake-band.

2. The combination with a well drilling and operating apparatus, of a continuously-running explosive-engine having a main drive-shaft, a power-transmitting shaft in alinement with main drive-shaft, having a drive pulley or drum, a coupling detachably securing the transmitting-shaft directly to the main shaft end to end, a stopping, starting and reversing clutch including a brake wheel and band on said transmitting-shaft, and suitable means to operate the said clutches extending forward to the derrick-floor, consisting of rods extending from the clutch and brake-band to the derrick-floor, and a lever having connections including other levers, through which it controls the operation of the clutch and brake-band and moves said reversing-gear and clutch simultaneously and throws one into and the other out of driving relation to said pulley or drum.

3. The combination of a well drilling and operating apparatus, a continuously-running explosive-engine having a main drive-shaft, a power-transmitting shaft in alinement with said main drive-shaft, a coupling detachably securing the transmitting-shaft directly to the main shaft end to end and stopping, starting and reversing clutch on said transmitting-shaft and suitable means to operate

the said clutch extending forward to the derrick-floor; said clutch and operating means consisting of a transmitting pulley or drum loose upon said shaft, a reversing-gear on said shaft thrown into and out of driving relation with said pulley or drum, a wheel concentric with said shaft and a brake-band applied to said wheel, a brake-band lever for applying said brake, a friction-clutch forced by a movement longitudinally to the shaft into and out of driving relation with the transmitting pulley or drum, a bell-crank lever having one end presented in a direction to impart said longitudinal movement to the clutch, and a rock-shaft parallel with the continuously-rotating shaft having oppositely-projecting levers connected respectively with the brake-band lever and with the bell-crank lever and thereby adapted to impart movements transversely and longitudinally of the rotating shaft and throw the reversing-gear and friction-clutch alternately into and out of driving relation to the transmitting pulley or drum.

The foregoing specification signed this 14th day of May, 1901.

JOSEPH REID.

In presence of—

HERVEY S. KNIGHT,  
E. K. FOX.