Nov. 5, 1929. E. E. GREVE 1,734,482

ROTARY WITH POWER MEASURING MEANS

Filed July 7, 1928

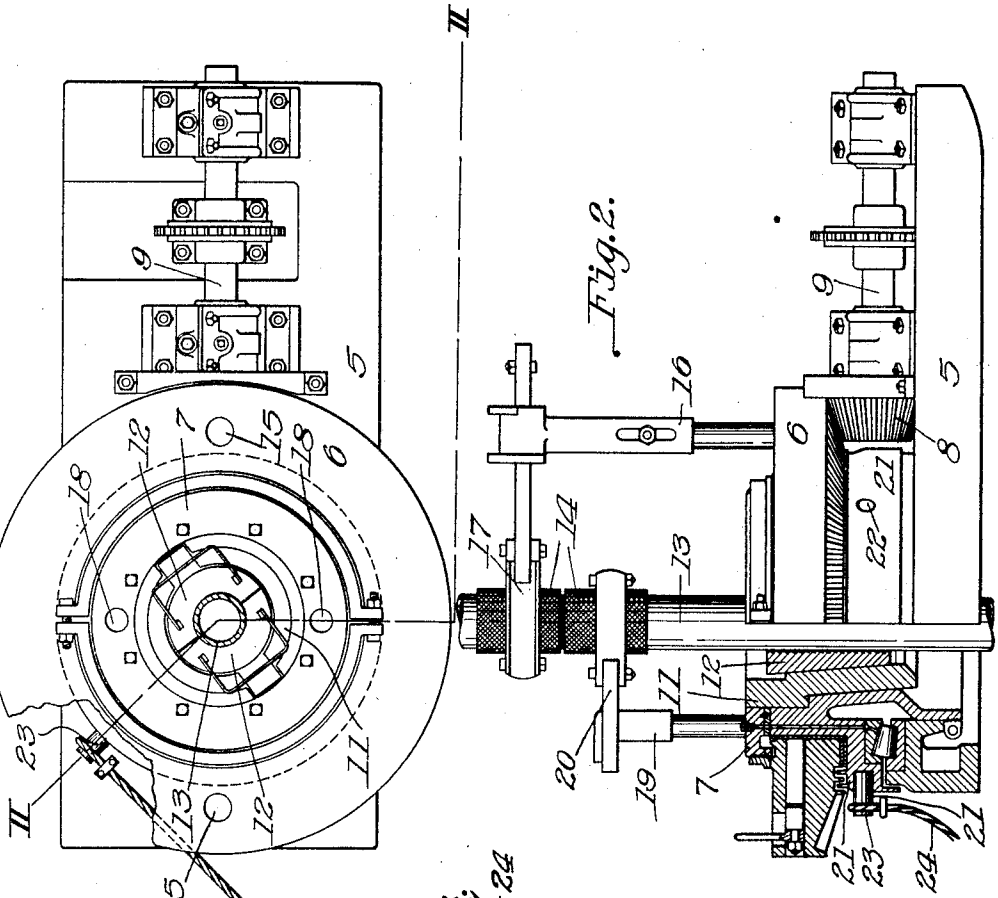


Fig. 2.

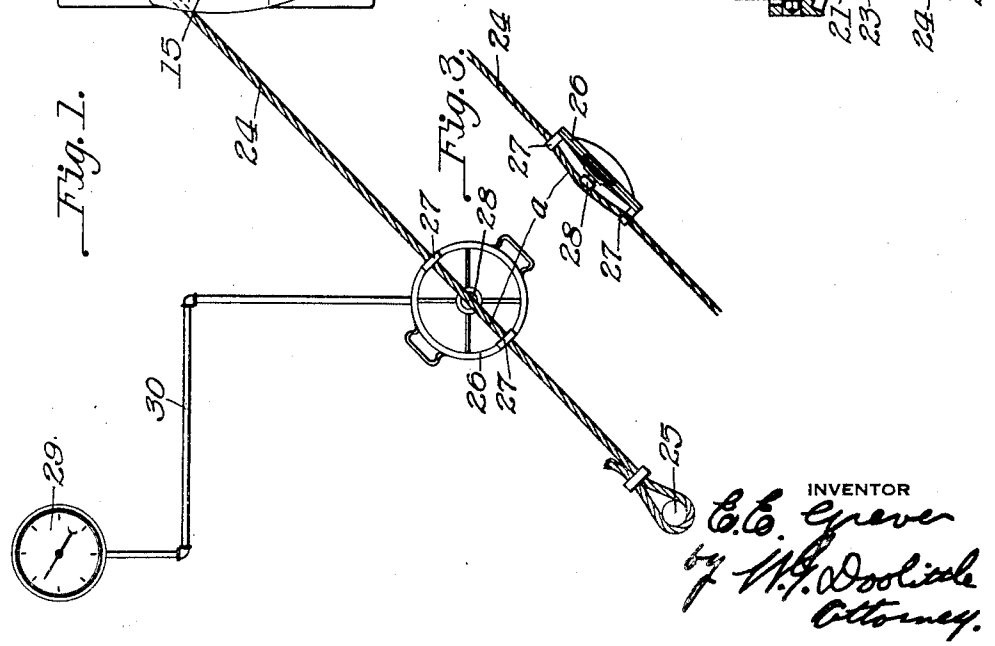


Fig. 1.

Fig. 3.

INVENTOR
E. E. Greve
by W. F. Doolittle
Attorney.

Patented Nov. 5, 1929 1,734,482

UNITED STATES PATENT OFFICE

EDGAR E. GREVE, OF BELLEVUE, PENNSYLVANIA

ROTARY WITH POWER-MEASURING MEANS

Application filed July 7, 1928. Serial No. 291,116.

My invention relates to improvements in rotary drilling apparatus, and more particularly to rotary drilling apparatus having power measuring means designed to be employed with the rotary in the operation of making-up and breaking-out casing, drill pipe, and tool joints, whereby the joints may be uniformly made up and with a predetermined load or pressure applied in screwing or unscrewing said parts.

As heretofore practiced, it has been impossible in making up or screwing pipe sections together in the field, to determine just the proper time to stop the rotation of the gear or the revoluble part of the rotary employed in connection with make-up tongs for screwing the sections together, consequently the threads of the pipe sections or the tool joints used in connection therewith are frequently injured.

The prime object of the present invention is to provide in an apparatus of the character stated, means for determining the amount of power or pressure required to be imparted to the joints for effecting the desired tightness in making up the joints and further, with the assurance that all joints being made up may be screwed together uniformly.

Other objects and advantages of the present invention will be hereinafter specifically referred to or will be apparent from a consideration of the following description taken in connection with the accompanying drawings.

In the accompanying drawings, which illustrate an application of my invention:

Fig. 1 is a top plan view of a rotary drilling apparatus embodying my invention;

Fig. 2, a part elevational view and a part sectional view, the section being taken on line II—II of Fig. 1; and

Fig. 3, a detail elevational view showing a load measuring or indicator device and its means of connection with a revoluble part of the rotary.

Referring to the drawings, I have shown a rotary of the make-up and break-out type, that is to say, a rotary particularly adapted for screwing up sections of casing, drill pipe, and tool joints, and for breaking-out or unscrewing the same.

As illustrated, 5 designates the base of the rotary, 6 a revoluble member or gear ring, and 7 a drive ring or another revoluble member. The member 6 is designed to be driven in the usual manner by a pinion 8 carried on the end of a shaft 9. It will be understood that in this form of apparatus, when the drilling operation is going on the gear ring and the drive ring are locked together and revolved as a unit. When handling pipe however, these rings are unlocked. The drive ring including the large spider 11, is mounted concentrically of the gear ring and, as shown, is provided with slips 12 designed to hold the string of pipe or casing indicated by the numeral 13. As illustrated, I have shown tool joints 14 employed at the respective end sections of the pipe or casing, but it is understood that my apparatus is designed for screwing and unscrewing casing or drill pipe without the employment of the said tool joints.

The gear ring or revoluble member 6 of the rotary is provided with two diametrically opposed openings indicated by 15, said openings being adapted to receive a make-up post and carriage indicated by the numeral 16. This make-up post is designed to carry a make-up tong 17, which latter is employed to engage the upper section of the pipe shown or the tool joint thereof as the case may be.

The drive ring 7 is provided with two similarly disposed openings 18 designed to receive back-up posts 19, the latter carrying at the upper end thereof a back-up tong 20 designed to engage the lower adjacent tool joint or the adjacent pipe section.

As illustrated, the drive ring 7 has an annular exposed portion 21; said portion is provided with a number of openings 22 in its periphery designed to receive, in one of said openings, a plug or engaging member 23 of the power or load measuring device employed in combination with the rotary. 24 designates a flexible cable having one end attached to the member 23 and its opposite end attached to an anchor indicated by the numeral 25. This flexible connector 24 is designed to en-

gage and cooperate with a load or weight meter structure 26, and for this purpose it will be seen that the weight meter or indicator 26 is provided with lugs 27 through which the flexible connector 24 is passed. The weight indicator is of a well known form, and, as shown, the flexible connector 24 makes contact with a plunger 28 of the said meter or indicator. The indicator 26 is of the diaphragm fluid type; it will be understood that actuation of the plunger will cause fluid to pass from the indicator proper to an indicating gauge 29 through suitable piping 30. The plunger is actuated when sufficient load is exerted upon connector 24 to cause its portion *a* between the lugs 27 to straighten out.

The power or load measuring means when in operative engagement with the drive ring of the rotary acts to retard the rotation of said ring and thus functions as a back-up mechanism as well as a power measuring means; these means may be differently arranged relatively to the rotary than as shown, for instance, the meter or indicator 26 may be disposed close to the rotary or within the rotary base or parts, and a different means of connecting the rotary with the plunger of the device 26 may be employed.

In the operation of making-up or screwing sections of pipe together, the gear ring with the make-up tong mounted thereon and connected with one of the tool joints or directly to a pipe section, is revolved by the gear ring in a clockwise direction. At this time it is the intention to prevent the drive ring 7 and the adjacent lower pipe section from turning; it is evident however, that when revolving the upper pipe section the friction created tends to turn the lower adjacent pipe section, the back-up tong and the drive ring 7, this tendency of the said parts to turn is prevented by the back-up mechanism including the connector means 24. The power required by the gear ring to tighten the joint is reflected through the back-up means and is registered on the indicating gauge 29 due to the straightening action of that portion of the connector in contact with the plunger 28 of the indicator 26.

It will, of course, be understood that by reversing the operations just described, I am enabled to break the joints and also am enabled to determine by the mechanism the amount of power necessary to break joints.

What I claim is:

1. The combination with a rotary having a plurality of revoluble members, one of said members carrying pipe make-up means, and the other member having power measuring and back-up means connected therewith.

2. The combination with a rotary having a plurality of revoluble members, of a make-up tong carried by one of said members and engaging a section of a pipe, means carried by a second revoluble member for engaging an adjacent section of pipe, and power measuring means connected with the said second member.

3. The combination with a rotary having concentrically assembled revoluble members, of a make-up tong carried by the outer member and engaging a section of pipe, a back-up tong carried by the inner member, and power measuring means connected with the said inner member.

4. The combination with a rotary having concentrically assembled revoluble members, of a make-up tong carried by the outer member and engaging a section of pipe, a back-up tong carried by the inner member, and power measuring means connected with the said inner member, said inner member having an exposed annular portion formed with plug receiving openings, said power measuring means connected with the inner member by a plug entered in one of the receiving openings.

In testimony whereof I affix my signature.

EDGAR E. GREVE.