April 21, 1931. J. B. KINSER 1,802,210

APPARATUS FOR MAKING AND BREAKING JOINTS

Filed Feb. 4, 1928 2 Sheets-Sheet 1

Fig. 2.

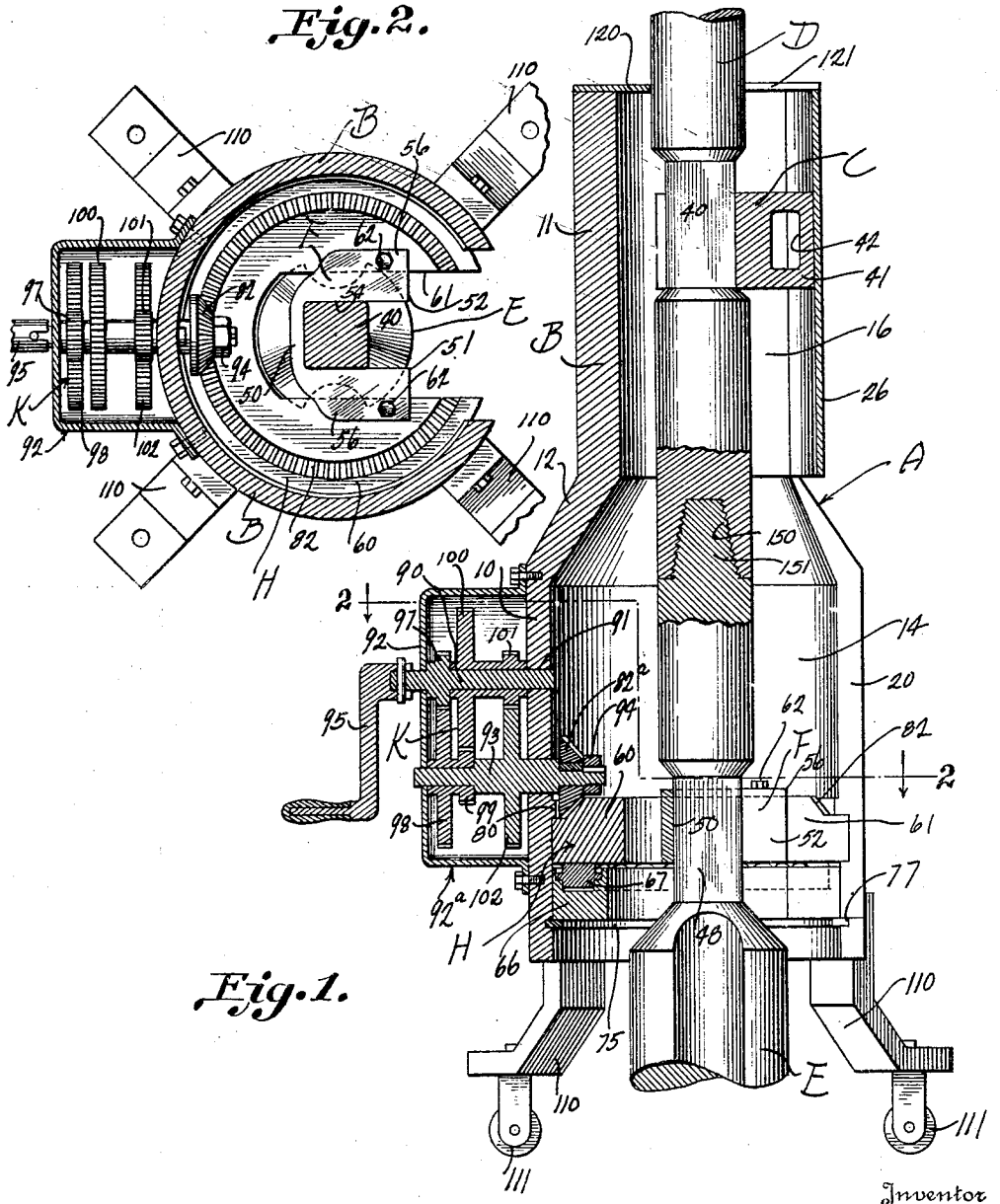


Fig. 1.

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Filed Feb. 4, 1928 2 Sheets-Sheet 2

Fig. 3.

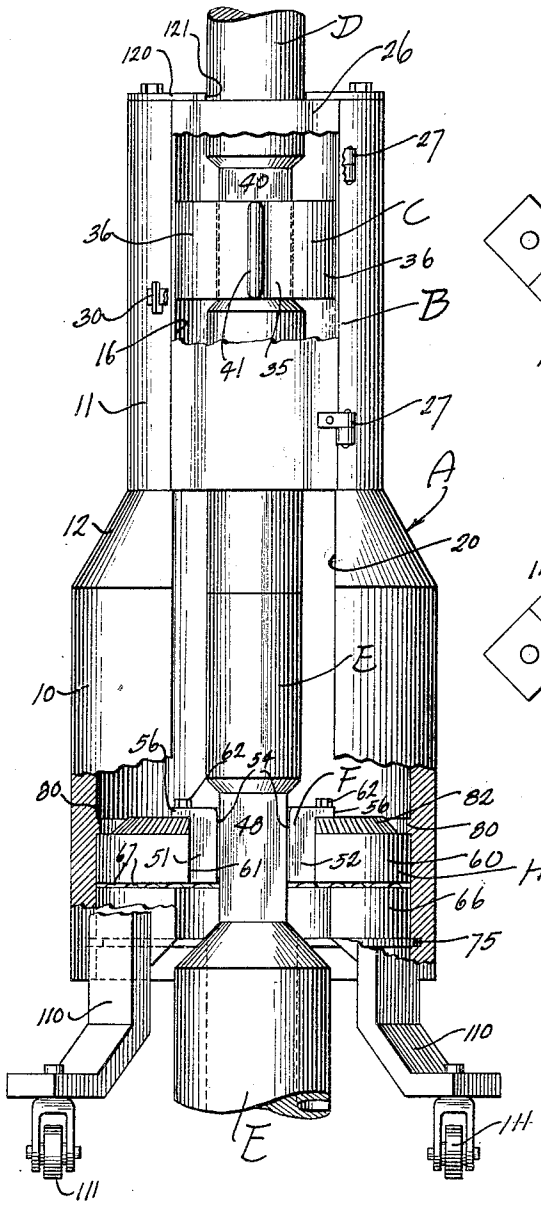


Fig. 4.

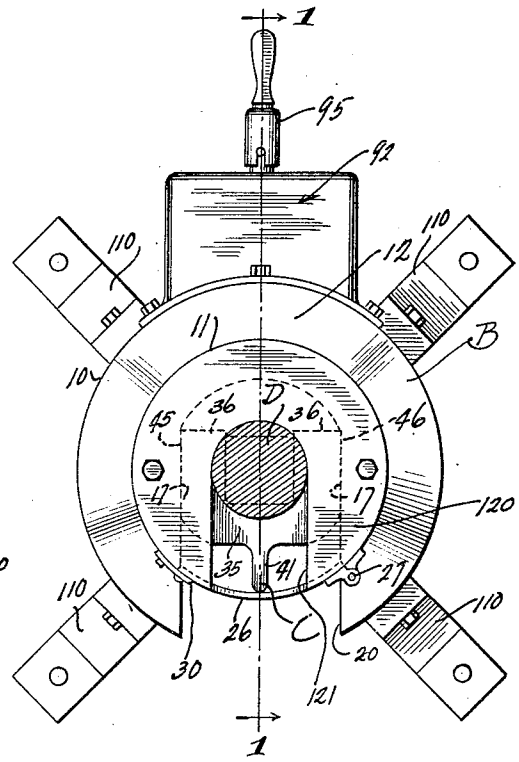
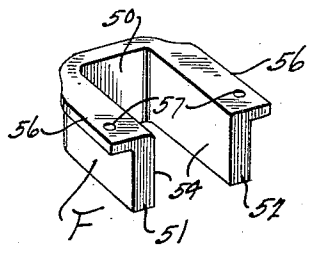


Fig. 5.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR MAKING AND BREAKING JOINTS

Application filed February 4, 1928. Serial No. 251,869.

This invention relates to improvements in apparatus for making and breaking joints.

The primary object of this invention is the provision of an improved device which may be used in connection with well drilling apparatus for quickly making and breaking the joints of any well drilling, well pumping, or other apparatus.

A further object of this invention is the provision of a compact, powerful, and relatively small and portable device which may be used for connecting and disconnecting the joints of parts of oil well drilling or operating mechanism; the improved device replacing the conventional circle jack and manually operated wrenches, which necessitate the services of two or three men to make or break the joint, in contradistinction to the improved apparatus of this invention, which requires but the service of one man to make or break a joint, however difficult.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a vertical sectional view taken through the improved machine in position for breaking the joint at the connection of sections of sucker rods, drilling tools, fishing tools or like oil well apparatus.

Figure 2 is a cross sectional view taken substantially on the line 2—2 of Figure 1.

Figure 3 is a fragmentary side elevation of the improved machine, at the entrance side thereof from which the machine is assembled upon a string of oil well apparatus; the parts being broken away to show upper and lower detachable slips engaging the parts to be severed.

Figure 4 is a top plan view of the improved machine.

Figure 5 is a perspective view of a novel wrench slip detachably used in connection with the machine.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of the invention, the letter A may generally designate the improved machine for making and breaking joints, which may consist of a supporting casing B having means for detachably and adjustably receiving an upper wrench slip or member C for wrench engagement with a section D of oil well equipment, which is to be severed from a lower part E. A lower slip F is adapted to be detachably carried in the machine for engaging the section E of the oil well equipment to be parted; the wrench slip F being rotatably supported by means H in the lower part of the housing B; the means H being operated with facility by means K.

The housing or casing B is of vertical substantially cylindrical shaped construction, including an enlarged lower portion 10 of substantial cylindrical formation, and an upper portion 11 of cylindrical formation; the parts 10 and 11 being connected by an upwardly sloping or tapered frusto-conical portion 12. The lower part 10 is provided with a large compartment 14 therein, which is restricted upwardly through the connecting portion 12. The portion 11 is provided with a passageway 16 therethrough having opposite flat sides 17. At one side the portions 10, 11 and 12 have the compartments and passageways thereof opened exteriorly by slotting or removal of a vertical portion of the side walls of said parts, to provide an entrance way 20, best illustrated in Figure 3 of the drawings, so that the parts D and E to be connected or disconnected may be conveniently assembled within the housing B for engagement with the parts of the machine therein.

As an important part of the invention I prefer to provide a closure 26, for the upper part 11 of the casing or housing, hinged at 27 along one side edge of the opening or slot 20, and at the opposite side having a latch 30 by means of which the closure 26 may close the opening 20 in the part 11; the closure 26 thus being complementary with the other portion of the upper part 11 in providing a cylinder. The door 26 cooperates effectively with the upper wrench slip C in holding the same in proper position upon the section D of the joint to be disconnected or connected.

The wrench slip C is well illustrated in Figures 1 and 4 of the drawings, the same being of substantially U-shaped cross section, including a body portion 35, having the substantially parallel gripping fingers or flanges 36 extending therefrom to one side thereof, and the same having facing flat sides adapted to engage the opposite flat sides of the polygonal wrench engaging portion 40 of the oil well apparatus section D. The wrench slip C furthermore includes a hand engaging portion 41, provided with an opening 42 therethrough, more particularly shown in Figures 1 and 4 of the drawings. The slip fingers 36 have outer flat surfaces 45 and 46, as shown in Figure 4 of the drawings, which engage snugly against the opposite flat sides 17 of the passageway through the portion 11 of the housing B. In assemblage, the apparatus part D is of course placed within the machine casing B with the wrench part 40 thereof at the proper position within the same, and the wrench slip C is then placed in the passageway 16 on the wrench engaging portion 40, and the door or closure 26 is shut and latched. It is noted that the passageway 16 is of considerable height, and which will permit adjustment of the wrench slip C therealong to suit the variable spacing of the wrench engaging portions of the joint to be disconnected, inasmuch as the joint wrench portions do not run uniform as to their spacing along the parts to be disconnected or connected.

The lower section E includes a preferably polygonal wrench engaging portion 48, of the usual construction, and the slip F provided therefor is of U-shaped formation, as detailed in Figure 5 of the drawings, the same including a body portion 50, having parallel outstanding legs 51 and 52, provided with facing flat sides 54. At the upper edges thereof the same are provided with outwardly extending supporting flanges 56, apertured at 57.

The means H provided for supporting the wrench slip F consists in the provision of a segmental supporting member 60, radially slotted at 61 from the outer peripheral edge thereof and providing facing flat sides against which the legs 51 and 52 may rest with the supporting flanges 56 overhanging the top surface of the disc or member 60, and the same are bolted thereto, as at 62, through the openings 57 illustrated in Figure 5. This positions the detachable wrench slip F with its socket facing the opening 20 of the housing A, as illustrated in Figures 1 and 2 of the drawings. A roller bearing race 66, of segmental formation, is provided, having roller bearings 67 supported thereby in upwardly projecting relation from the top surface thereof, and upon which the bottom flat surface of the member 60 is supported for rotation. The segmental roller bearing race 66 is held in place beneath the supporting member 60 by means of a detachable split expansion ring 75, which is held in place in a suitable slot 77 provided peripherally within the lower portion of the skirt or part 10 of the housing B, as is shown in Figure 1 of the drawings. In this position the member 60 is forced upwardly into the portion 10 of the housing, against an annular projecting flange 80, to prevent the riding of the supporting gear or member 60 upwardly into the housing, and maintaining the wrench slip F in a proper position. The member 60 is provided with bevel teeth 82 thereabout, terminating at the ends thereof short of the slot 61, as shown in Figure 2, and the operating means K has a bevel pinion 82^a, which operates on the gear teeth 82 to rotate the member 60.

The means K consists in the provision of a crank shaft 90 rotatably supported at one end in an opening 91 in the wall of the portion 10 of the housing B, and at its other end being extended in a bearing relation in the side wall 92 of a gearing housing 92^a of the means K. A counter shaft 93 is also rotatably supported by the wall 92 and at an end extends through a suitable bearing opening in the portion 10 of the housing B, and within the compartment 14 supports the bevel gear 82^a, held on the shaft 93 by means of a nut 94 or the like. The crank shaft 90 exteriorly of the wall 92 is provided with a detachable crank handle 95, or other means of rotating the same. The shaft 90 is provided with a pinion 97 thereon, meshing with a larger gear 98 freely rotatable on the shaft 93. Rigid with the gear 98 is a pinion 99 freely rotatable on the counter shaft 93, which meshes with a large gear 100, which is freely rotatable upon the shaft 90. Rigid with the gear 100 is a pinion gear 101 which meshes with a larger gear 102 keyed on the counter shaft 93. Through this train and succession of gearing it is apparent that the counter shaft 93 is driven at a considerably reduced rate of speed from the crank shaft 100, so as to secure a powerful action in rotating the part E which the wrench slip F engages, as will be perfectly apparent.

From the foregoing the operation of the invention will be apparent, to those skilled in the art. The housing B is portably mounted on legs 110 attached to the housing and extending below the skirt 10; the same having rollers 111 thereon by which the device A may be wheeled into position. Ordinarily the parts forming the joint are positioned above the platform and the device A is wheeled into position with the parts D and E entered into the passageways of the housing B. The wrench slip C is then positioned on the wrench engaging portion 40 of the section D, and the door or closure 26 is closed and latched to hold the slip C in place. Of course,

prior to this the slip F of the proper size to fit the wrench portion 48, has been positioned on the rotatable support 60, and it is apparent that the vertical adjustment of the slip C permits the slips C and F to be relatively spaced to conform to the spacing of the wrench engaging portions 40 and 48. If the joint is to be broken, with the parts arranged as in Figure 1, it is apparent that a turn of the crank 95 will slowly rotate the support 60 and the slip F therewith, while the section D is held immovable by the slip C, and a partial rotation of the support 60 will break the joint of the sections D and E. Such joint is ordinarily formed by providing a screw threaded socket 150, inwardly of the lower end of the part G, within which the tapered externally screw threaded extension 151 of the part E, so that slight rotation is necessary to sever the parts. Under normal circumstances, the work of the machine A will be merely to perform the heavy duty work of tightly screwing the tools or parts D and E together after they have been initially assembled, or the initial break may be provided by the relative rotation of the parts D and E, which may be accomplished by the machine A, as will be apparent.

A detachable cover 120, having a radial slot 121 therein, as shown in Figures 1, 2 and 3 of the drawings, receives the section D to center the same for receiving the slip C.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a device for making and breaking joints of oil well equipment a housing having an elongated passageway therethrough provided with an opening thereto, a closure carried by the housing for said opening, a detachable slip having a non-rotatable engagement with the housing in the passageway thereof permitting sliding of the wrench slip along the passageway, said wrench slip including a socket for wrench engagement with one part of a joint and in position to be engaged by the closure when closed to hold it in position against detachment from the opening of the housing passageway, and means rotatable in the housing including a wrench device for engagement with the other joint part.

2. In apparatus for making and breaking joints a housing having a passageway therethrough, a segmental rotatable member in said housing having a radial opening for lateral slipping of a joint part therethrough, a substantially U-shaped wrench socket member detachably connected in the opening of said rotatable member and opening in the same direction as said opening first mentioned and having facing polygonal sides in the socket thereof for wrench engagement with a joint part, and a vertically slidable wrench slip in said housing passageway in non-rotatable engagement therein including a wrench socket aligning with the wrench socket member above mentioned.

3. In apparatus for making and breaking joints a housing having a compartment therein, and a side opening thereto into which joint parts may be received, an abutment in the compartment of the housing, a rotatable segmental member having a slot aligning with the entrance opening of the housing, a U-shaped wrench slip carried in the slot of the rotatable member, an anti-friction race supporting said rotatable member, and a releasable split spring ring detachably held in the housing for supporting said race and the rotatable member.

4. In apparatus for making and breaking joints, a frame having an elongated passageway therealong for receiving parts of a joint to be connected or disconnected, means rotatably carried by the frame for engagement with one of the joint parts in order to rotate the same, and a detachable wrench slip spaced from said rotatable means and non-rotatably connected in longitudinal sliding relation in the passageway of the frame for receiving a wrench engaging portion of the other part of the joint to hold the same against rotation.

5. In apparatus for making and breaking joints, a frame, means rotatably carried by the frame for wrench engagement with a part of a joint to rotate the same, and a wrench engaging slip non-rotatably carried by the frame for free sliding towards and away from said rotatable means and having a wrench opening therein for receiving a wrench engaging portion of the other part of the joint to hold the same against rotation.

6. In apparatus for making and breaking joints, the combination of a frame having rotatable wrench means thereon for engagement with the wrench engaging portion of one part of a joint to rotate said part, said frame having an elongated passageway therein spaced in alignment with the rotatable wrench means, and a wrench slip freely slidable in said passageway toward and away from the rotatable wrench means and held against rotation with respect to the frame.

7. In apparatus for the making and breaking of joints, a one-piece integral frame consisting of substantially cylindrical upper and lower integrally connected sections having a passageway longitudinally therethrough radially opening upon the outer periphery of the frame through the height of both the upper and lower sections, means rigid with the frame in the upper section for engaging with one of a pair of connected joint parts to hold the same fixed against rotation in the frame, a wrench rotatably mounted in the

lower section of the frame for engagement with the other joint part, and means connected with the lower section of the frame for causing rotation of said rotatable wrench member to relatively rotate the joint parts to effect a connection.

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