June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 1

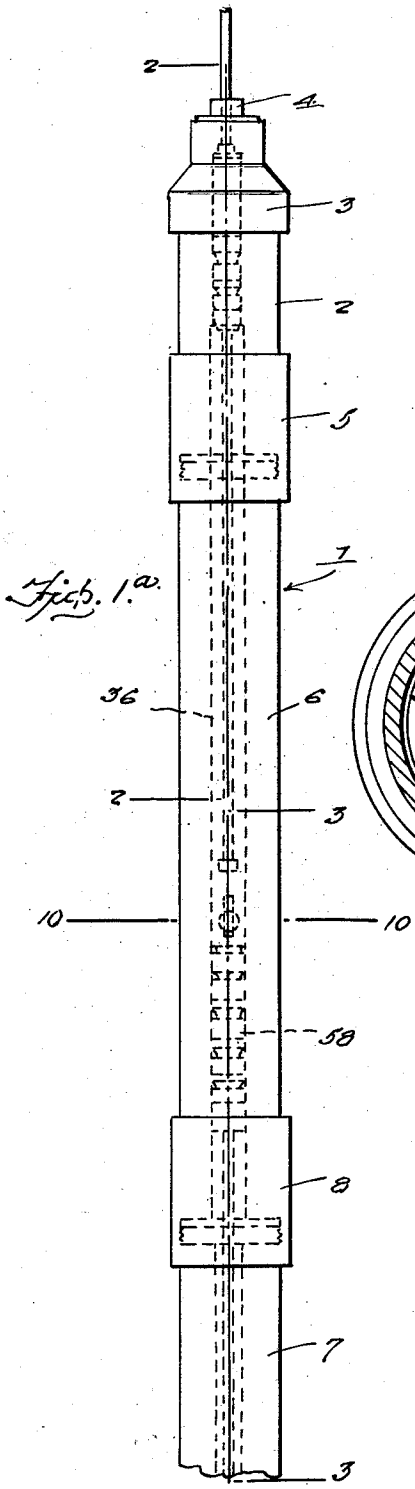


Fig. 1a.

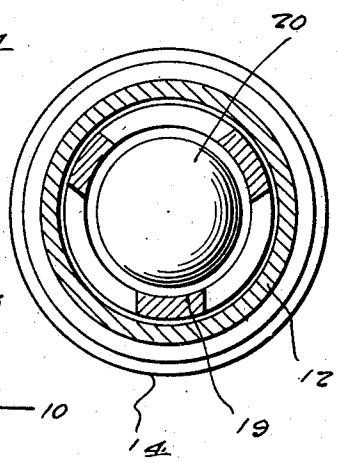


Fig. 16.

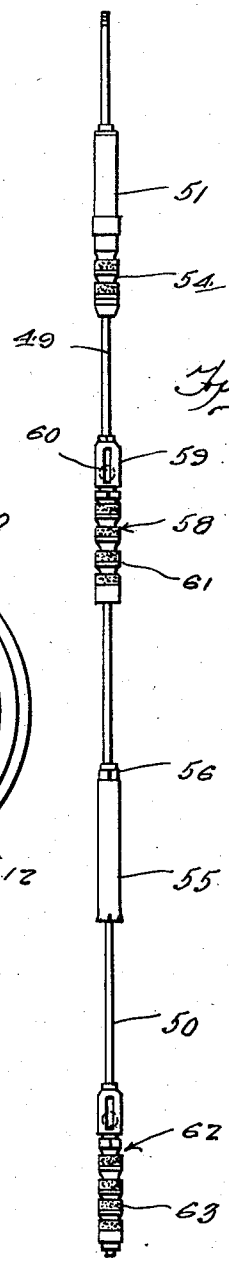


Fig. 17.

Inventor

C. McKissick

By Clarence A. O'Brien

Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 2

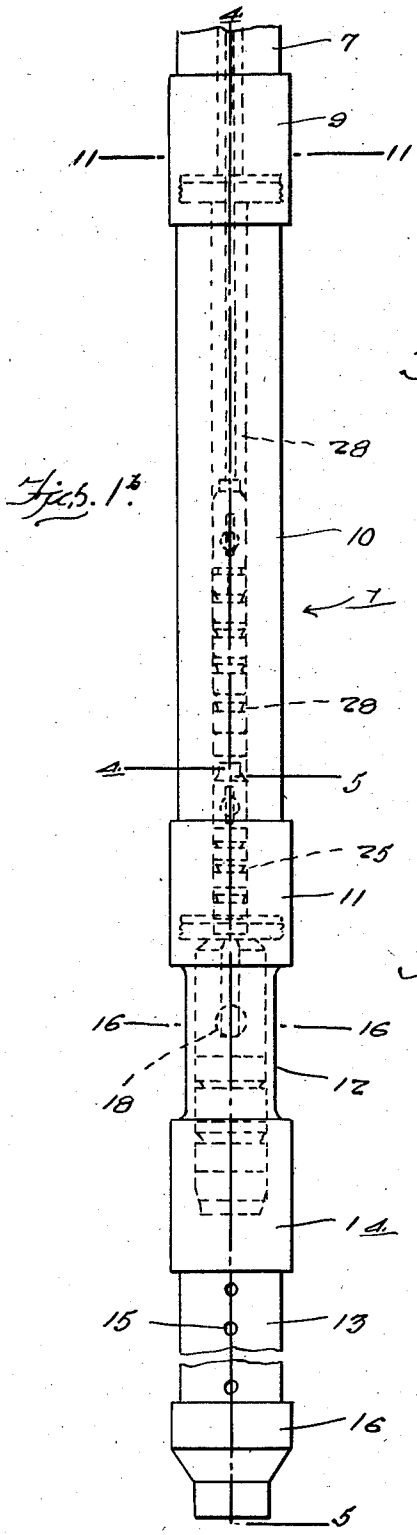


Fig. 1.

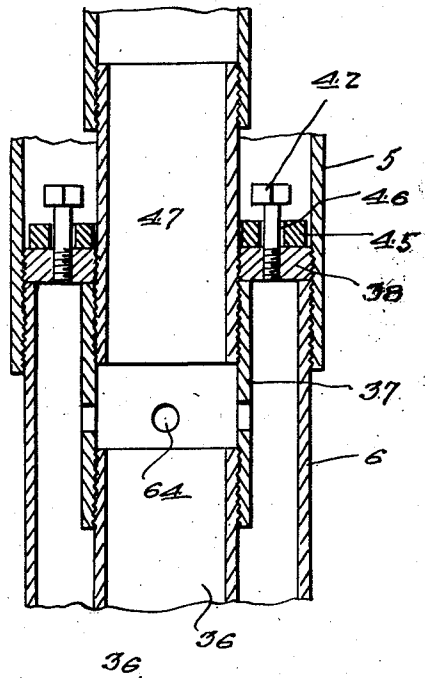


Fig. 8.

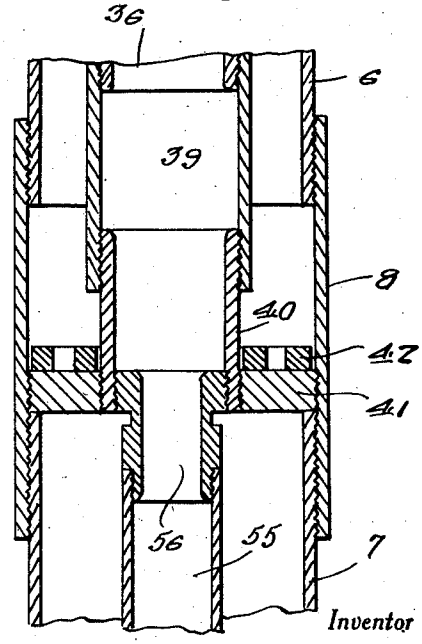


Fig. 9.

Inventor

C. McKissick

By Clarence A. O'Brien

Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 3

Fig. 2.

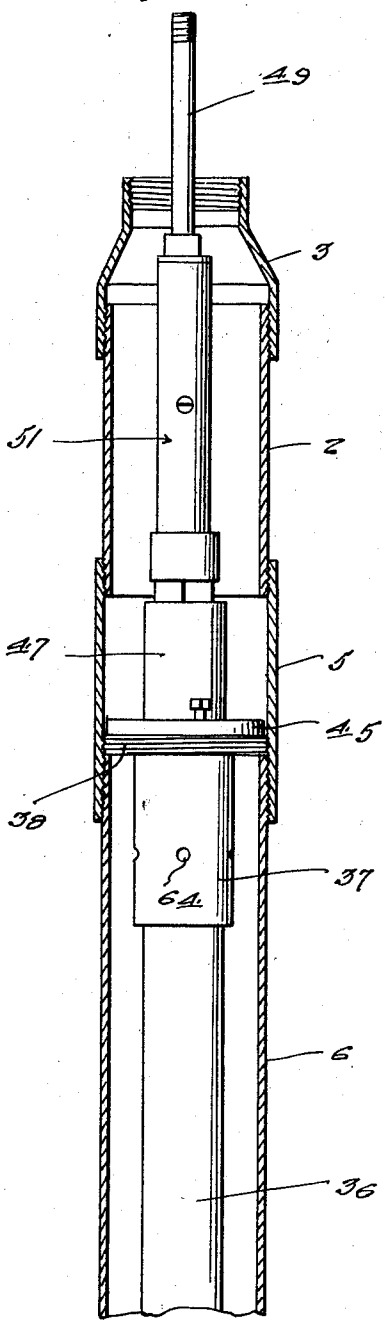
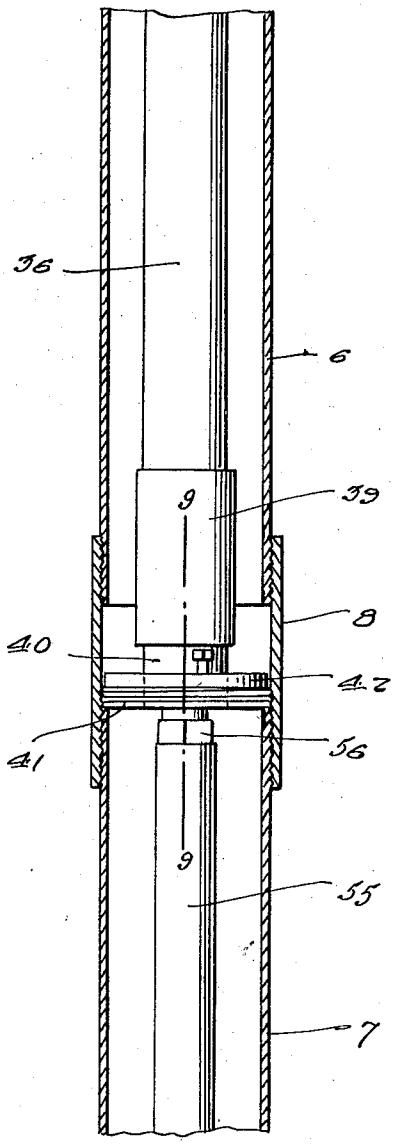


Fig. 3.



Inventor

C. McKissick

By Clarence A. O'Brien

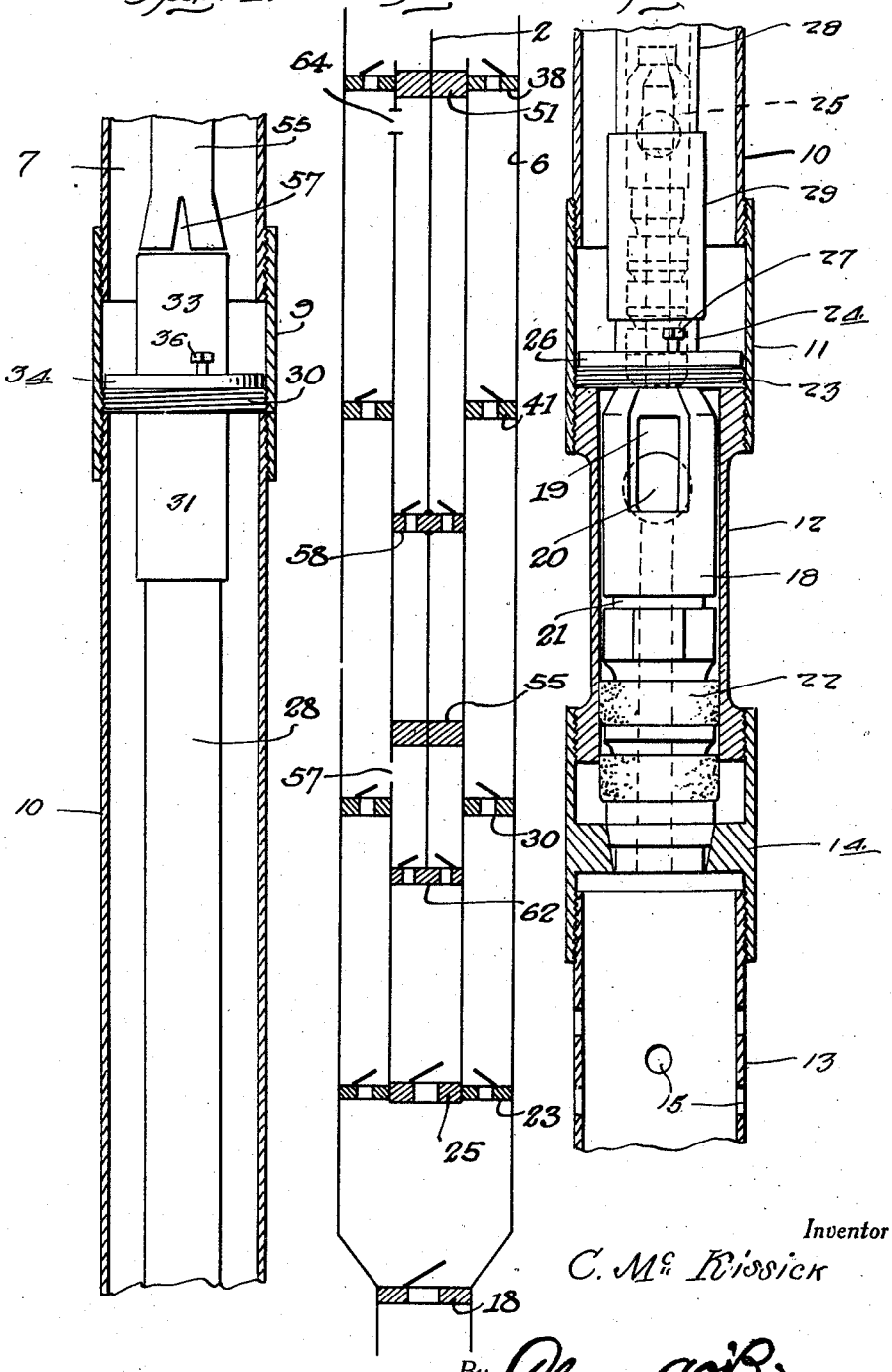
Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 4

Fig. 4. Fig. 20. Fig. 5.



Inventor

C. McKissick

By Clarence A. O'Brien

Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 5

Fig. 6.

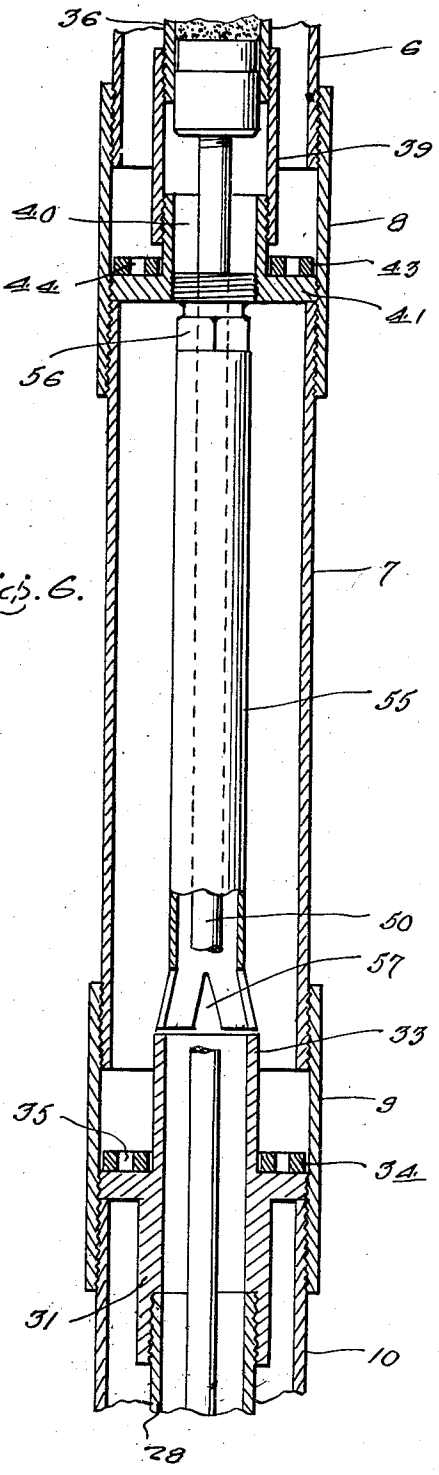
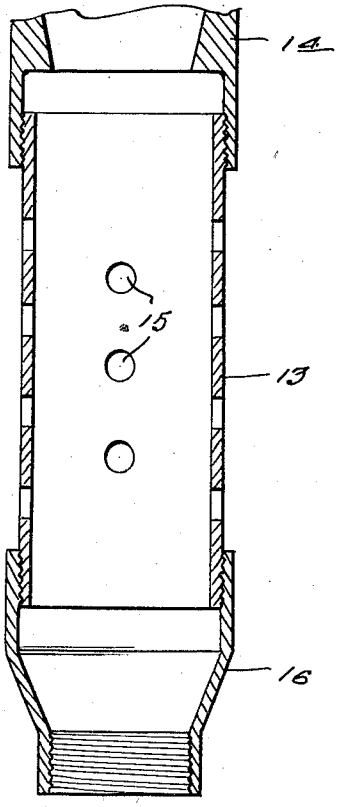


Fig. 7.



Inventor

C. McKissick

By Clarence A. O'Brien

Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 6

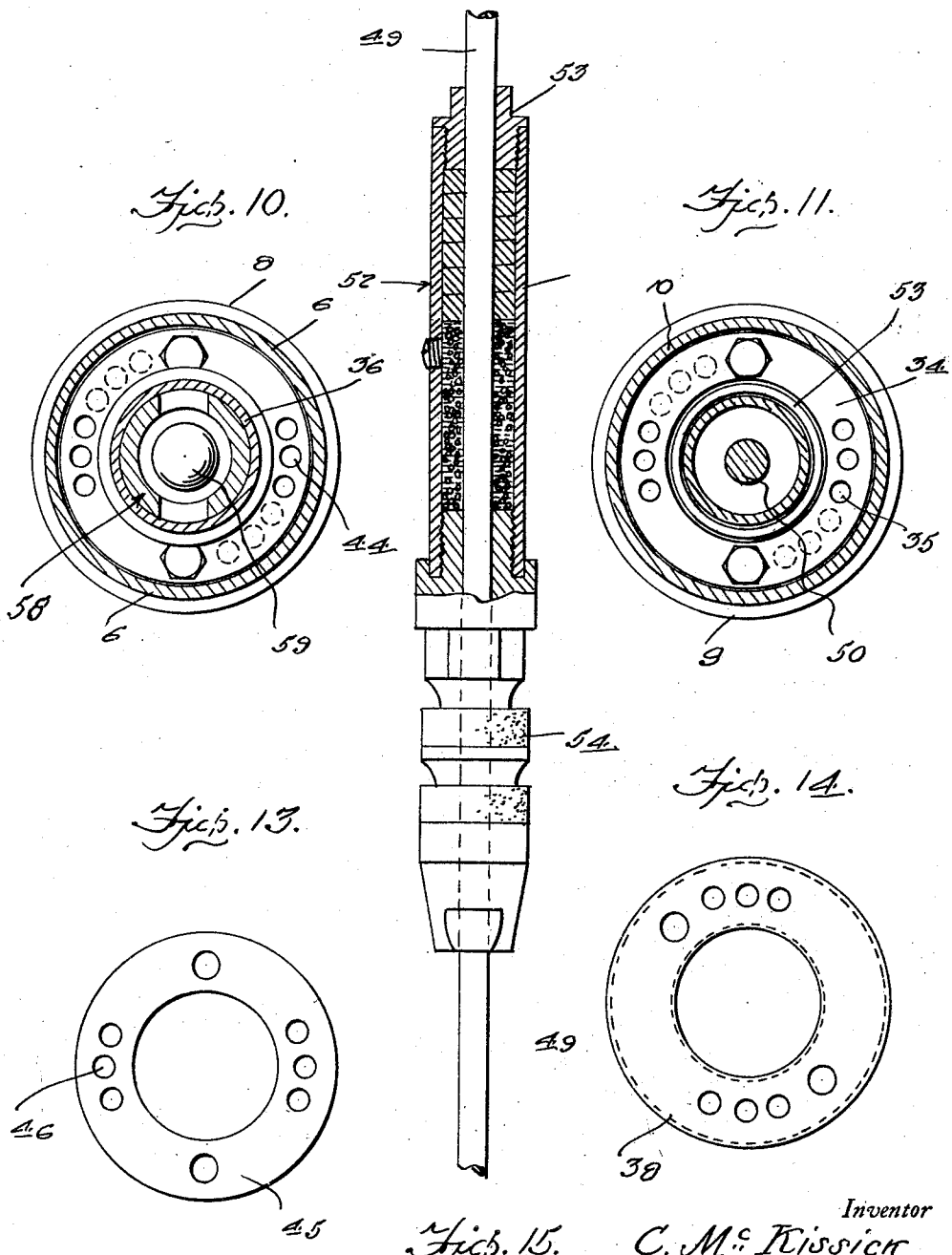


Fig. 10.

Fig. 11.

Fig. 13.

Fig. 14.

Fig. 15.

Inventor
C. McKissick

By Clarence A. O'Brien
Attorney

June 3, 1930. C. McKISSICK 1,761,355

MULTIPLE PUMPING UNIT

Filed March 7, 1929 7 Sheets-Sheet 7

Fig. 18.

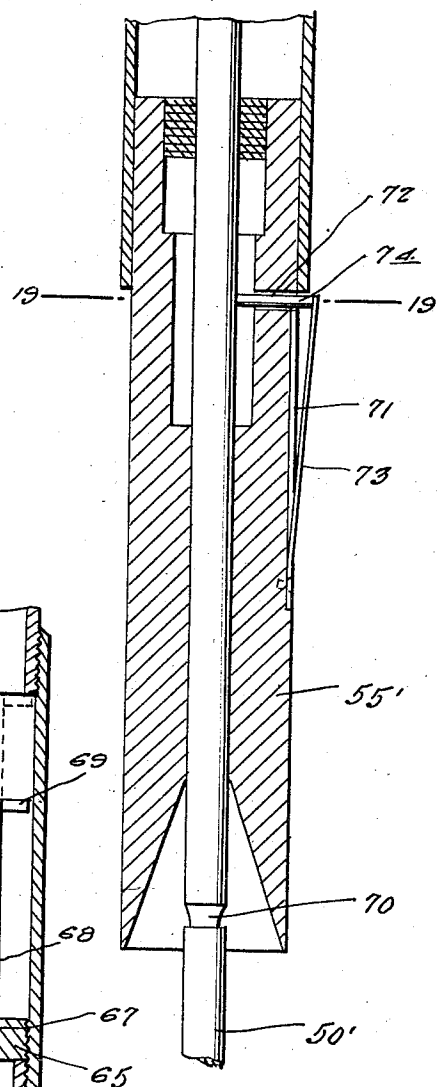


Fig. 19.

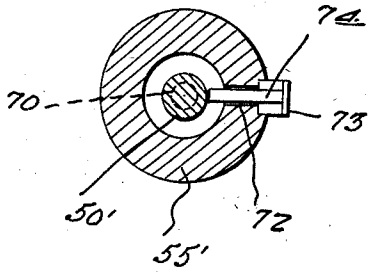
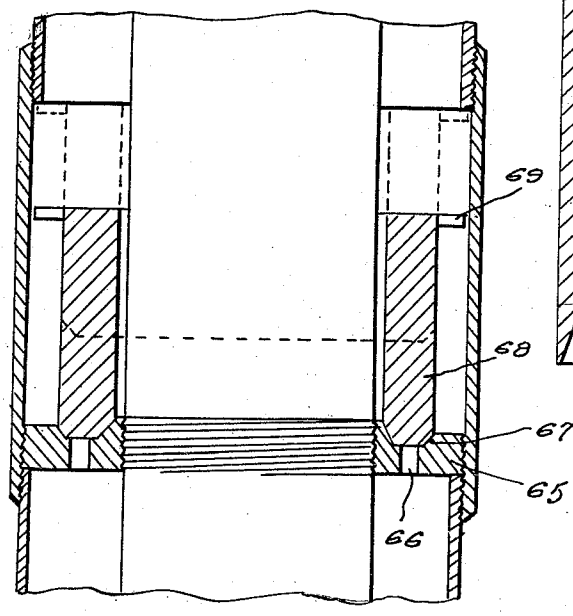


Fig. 17.



Inventor

C. McKissick

By Clarence O'Brien

Attorney

Patented June 3, 1930 1,761,355

UNITED STATES PATENT OFFICE

CLYDE McKISSICK, OF SAND SPRINGS, OKLAHOMA

MULTIPLE PUMPING UNIT

Application filed March 7, 1929. Serial No. 345,060.

The present invention relates to improvements in pumping units and has for its principal object to provide a pumping unit that is of such construction as to increase the capacity of the pump.

One of the important objects of the present invention is to provide a pumping unit that includes upper and lower working barrels arranged within a suitable casing, suitable working valves being arranged for operation within the respective barrels, said valves being associated with operatively connected polish rod sections that reciprocate through the working barrels.

Another object is to provide a multiple pumping unit of the above mentioned character that includes a particular flutter valve structure for association between the working barrels and the outer casing.

A further object is to provide a multiple pumping unit of the above mentioned character that will at all times be positive and efficient in its operation, the same being further of such construction as to permit the parts to be readily and easily assembled or disassembled whenever necessary.

A still further salient object of the invention resides in the provision of a structure of the above mentioned character whereby additional working barrels may be added to increase the capacity of the pump, and as many working barrels may be used as is consistent with the size of the tubing in which the same is inserted.

Still a furter object of the invention is to provide a multiple pumping unit of the above mentioned character which is simple in construction, inexpensive, strong and durable and further well adapted to the purpose for which it is designed.

Other objects and advantages of the invention will become apparent from the following description when taken in connection with the accompanying drawings.

In the accompanying drawings wherein like reference characters indicate corresponding parts throughout the same:

Figure 1[a] is a side elevation of the upper portion of the casing.

Figure 1[b] is a side elevation of the lower end portion of the casing showing the fluid inlet openings formed therein.

Figure 2 is a partial vertical sectional view taken approximately on the line 2—2 of Figure 1[a].

Figure 3 is a similar section taken approximately on the line 3—3 of the same figure.

Figure 4 is a vertical sectional view taken approximately on the line 4—4 of Figure 1[b].

Figure 5 is a vertical sectional view taken on the line 5—5 of the same figure.

Figure 6 is a longitudinal sectional view through the casing for more clearly illustrating the relationship between the adjacent ends of the working barrels.

Figure 7 is a vertical sectional view through the lower end of the casing.

Figure 8 is a detail sectional view showing the fluid inlet for the upper working barrel and the adjacent flutter valve unit.

Figure 9 is a vertical sectional view taken approximately on the line 9—9 of Figure 3.

Figure 10 is a transverse section taken approximately on the line 10—10 of Figure 1[a].

Figure 11 is a similar section taken approximately on the line 11—11 of Figure 1[b].

Figure 12 is an enlarged detail of a modification of the flutter valve construction.

Figure 13 is a top plan view of the upper section of the flutter valve unit forming a salient part of the present invention.

Figure 14 is a similar view of the lower section of the flutter valve.

Figure 15 is a detail sectional view through the stuffing box that is associated with the upper polish rod section, and also showing the valve cups arranged on said polish rod section.

Figure 16 is a transverse section taken approximately on the line 16—16 of Figure 1[b].

Figure 17 is a detail elevational view of the sectional polish rod showing the working valves and the stuffing boxes associated therewith.

Figure 18 is a sectional view through the lower stuffing box showing a modification of the means for holding the same between the upper and lower working barrels in a stationary manner.

Figure 19 is a transverse section taken ap-

proximately upon the line 19—19 of Figure 18.

Figure 20 is a diagrammatic view showing the entire pump.

In the drawings wherein for the purpose of illustration is shown the preferred embodiment of my invention, the numeral 1 designates generally the cylindrical sectional casing within which is housed my improved pumping mechanism.

In this casing there is included a short pipe section 2 that is externally threaded at its respective ends, a bell shaped coupling 3 affording a connection between the upper end of the pipe section 2 and the fluid outlet tubing 4.

A sleeve like coupling 5 connects the lower end of the pipe section 2 to the upper end of the longer pipe section 6 and this pipe section is in turn connected to an intermediate pipe section 7 through the medium of the coupling 8. A similar coupling 9 provides a means for connecting the lower end of the intermediate pipe section 7 with the upper end of the lower pipe section 10. A shorter pipe section 12 is connected to the lower end of the pipe section 10 by means of a coupling 11 and a perforated liquid inlet pipe 13 is operatively connected with the pipe section 12 by means of the coupling 14.

The pipe 13 is formed with the spaced fluid inlet openings 15 and attached to the lower end of this perforated pipe section 13 is the bell shaped unit 16, the smaller lower end of which is internally threaded whereby a plug or the like may be threaded therein to close the same. The lower end of the perforated pipe is adapted to be anchored in the sand in the bottom of the well.

A main standing valve 18 of any conventional construction is arranged within the pipe section 12, the cage 19 having its upper end extending into the sleeve like coupling 11 and the check valve 20 operates within the cage 19 in the usual manner.

A short piece of tubing 21 extends through the pipe section 12 and into the pipe coupling 14, the upper end of the tubing being secured in the bottom of the cage 19. Suitable valve cups 22 are arranged on the lower portion of the tubing as more clearly indicated in Figure 5.

An externally threaded ring 23 is threaded within the lower portion of the coupling 11 and this ring has a central tubular extension 24 projecting upwardly therefrom. An auxiliary standing valve 25 is associated with the tubular extension 24 and the same extends upwardly into the lower end of the pipe section 10. The ring 23 is formed at diametrically opposite points with vertically arranged fluid passages and disposed around the tubular extension 24 is the vertically movable valve ring 26.

This ring 26 is formed at opposite points with similar vertically arranged fluid passages, the same being out of alinement with the passages formed in the lower ring 23. The rings 23 and 26 are however provided with registering openings to receive suitable bolts 27, the heads of the bolts engaging with the upper face of the ring 26 under certain conditions while the threaded ends are threaded in the threaded openings provided therefor in the lower ring 23. The heads of the bolts are normally spaced with respect to the upper face of the ring 26 to permit slight vertical movement of the upper ring 26 by the action of the fluid passing upwardly through the passages formed in said ring 23 under pressure as will hereinafter be more fully described.

Extending longitudinally through the pipe section 10 of the casing 1 and being spaced from the inner wall thereof is the lower working barrel 28. A coupling 29 operatively connects the lower end of the working barrel with the tubular extension 24 as clearly indicated in Figure 5. The axuiliary standing valve 25 also extends through the coupling 29 and into the lower end of the lower working valve 28.

An externally threaded ring 30 is threaded within the coupling 9 for rest upon the upper edge of the pipe section 10 and a tubular extension 31 depends from the central portion of this valve ring 30 for connection with the upper end of the lower working barrel 28, as disclosed very clearly in Figures 4 and 6.

This ring 30 is provided with diametrically opposed vertically arranged fluid passages and also with diametrically opposed threaded openings, the purpose of which will be presently apparent.

A central tubular extension 33 projects upwardly from the ring 30 into the lower end portion of the pipe section 7 and encircling this tubular extension 33 is the valve ring 34. This ring is identical in construction with the ring 26 heretofore described. The fluid passages formed at diametrically opposite points in the ring 34 are indicated at 35 and this upper ring 34 is also formed with diametrically opposed openings to accommodate bolts that are threaded into the threaded openings formed in the lower ring 30.

The construction just described constitutes what I term as a flutter valve unit, and in Figures 13 and 14 of the drawings there is disclosed in detail the construction of this valve unit.

Arranged centrally in the pipe section 6 is the upper working barrel designated by the reference character 36. The upper end of this barrel is threaded within the lower end of a tubular extension 37 that depends from the bottom of the externally threaded ring 38 that is secured within the coupling 5 for rest upon the upper end of the pipe section 6, as shown more clearly in Figure 2.

The lower end of the upper working barrel 36 is secured in the upper end of a sleeve like connection 39, the lower end of which is threaded on the upper end of a tubular extension 40 that projects upwardly from the externally threaded ring 41 which ring is secured within the coupling 8 for rest upon the pipe section 7 as shown in Figure 3.

The ring 41 is formed with a series of diametrically opposed vertically arranged fluid passages and cooperating with this ring is the vertically movable valve ring 43 which encircles the tubular extension 40. The ring 43 is formed at diametrically opposite points with the fluid passages 44 that are out of alinement with the fluid passages formed in the underlying ring 41. Suitable bolts provide a means for operatively connecting the rings 41 and 43 together to limit the upward movement of the top most ring with respect to the underlying ring.

Cooperating with the ring 38 is the ring 45. The fluid passages formed in the upper ring 45 are out of alinement with the fluid passages formed in the ring 38 and suitable bolts extend through the upper ring 45 and are threaded at their lower ends in the ring 38 for limiting the upward movement of the ring 45. This ring 45 encircles a short piece of tubing 47 that is threaded into the ring 38 as suggested in Figure 8. The bolts 42 that are associated with the rings 38 and 45 are shown in Figure 8 and the same type of bolts are employed in connection with the other flutter valve units heretofore described.

The multiple pumping unit further includes the provision of a sectional polish rod, the upper section of which is designated by the numeral 49, while the lower section is designated by the numeral 50.

A stuffing box 52 is carried by the upper polish rod section 49 and in Figure 15 of the drawings there is disclosed in detail the construction of this stuffing box. This stuffing box includes a cylinder 52 that encircles the rod section 49. Suitable closure plugs 53 are arranged in the respective ends of the cylinder and contained within the cylinder 52 for disposition around the adjacent portion of the rod section 49 is a quantity of hard oil, wheat, babbitt and felt washers.

A plurality of leather valve cups 54 are arranged on the upper polish rod section 49 directly below the stuffing box 51.

The lower stuffing box is stationary and includes a sleeve 55 that is arranged in the pipe section 7 and through which the sectional polish rod operates. The upper end of the sleeve 55 is threaded in the lower end of a bushing 56 that is in turn threaded at its upper end in the lower end of the pipe 40 as shown more clearly in Figure 9. The intermediate portion of the bushing is formed with suitable tool engaging faces to facilitate assembly or disassembly of this portion of the multiple pumping unit. The lower end of the stationary sleeve 55 is slightly flared and is slit as at 57 for engagement with the upper end of the extension 38 as clearly indicated in Figure 6.

Associated with the upper polish rod section 49 is the valved piston unit denoted generally by the numeral 58. This unit includes a cage 59 and a ball check valve 60 for draining the upper working barrel. A series of leather valve cups 61 are arranged on the polish rod section 49 below the piston 58 as clearly indicated in Figure 17.

The lower polish rod section 50 has also associated therewith at its lower end portion a working valve unit denoted generally by the numeral 62. This working valve unit 62 is of identical construction with the piston unit 58. A series of leather valve cups 63 are arranged on the lower end portion of the polish rod section 50 as shown also in Figure 17 of the drawings.

The upper end of the polish rod section 49 is adapted to be operatively connected to a pump jack, not shown, whereby the same may be actuated for reciprocatory movement within the respective working barrels.

The tubular extension 37 that is associated with the ring 38 is formed with a series of fluid inlet openings or passages 6^4.

Where crude oil is laden with paraffin, the flutter valve shown in the drawings will not operate very efficiently, and it is therefore necessary to employ the type of valve shown in Figure 12. This particular valve eliminates the upper movable ring and the lower ring 65 is formed with the fluid openings or passages 66 and is also provided with a ground seat 67 with which cooperates the lower edge portion of a relatively wide band 68. Stop lug 69 extends from the upper edge of the band 68 to limit the upward movement of the band. Normally the band has its lower ground edge seated in the ground seat 67 to cut off communication between the parts of the casing on opposite sides of the ring 65.

Attention is now directed to Figures 18 and 19 of the drawings wherein there is illustrated a means for facilitating the retention of the lower stuffing box and at the same time permitting the lower stuffing box to be pulled. To this end, the polish rod 55 is formed with an annular notch 70. The lower stuffing box 55′ is formed with a longitudinal cavity 71 in the outer face thereof and the upper end of this cavity has communication with a transverse bore 72 which bore extends into the longitudinal bore of the cylindrical stuffing box 55′.

A spring finger 73 is attached at its lower end in the lower end of the cavity 71 and carried by the upper end of this spring finger is the bolt 74 that is operable within the transverse opening 72.

The inner end of the bolt is in engagement

with the polish rod and under normal conditions, the bolt is held outwardly so that the same engages with the lower edge of the adjacent working barrel.

When the polish rod 50′ is moved upwardly, it is obvious that when the notch 70 reaches a position in alinement with the opening 72, the spring finger 73 will urge the bolt 74 inwardly so that the inner end of the bolt enters the notch 70 and when in this position, the spring finger 73 will fit within the recess or cavity 71.

When the parts are thus arranged, the bolt 74 will be out of engagement with the lower edge of the adjacent working barrel so that the stuffing box can be moved upwardly through said working barrel to be removed with the upward pulling of the rod.

The operation of my improved multiple pumping unit may be briefly stated as follows:

When the polish rod moves upwardly, the valves in the partition 23 are closed as well as the valves in the solid pistons 58 and also the valves in the working valves 62 while the standing valve 18 and the auxiliary standing valves 25 are opened to permit liquid to flow through the lower working barrel. The liquid above the working valve 62 and the piston 58 is forced upwardly and out through the port in the upper end portion of the upper and lower barrel and is forced above the valved partition plate 41 at the upper end of the upper barrel. On the down stroke, the liquid below the working valve 62 passes therethrough to a position above said working valve while the piston 58 draws liquid through the standing valve 18 and the valve in the partitions 23 and 34 into the upper portion of the upper working barrel.

During the upstroke of the polish rod there is high pressure exerted against the packing in the piston 58, the result of which will be leakage passes. The liquid which thus leaks past the piston will accumulate in the lower part of the upper working barrel above the stuffing box 55. Upon the down stroke of the plunger any liquid accumulated in the lower portion of the upper working barrel will raise the valves in the piston 58 and reenter the upper portion of said upper barrel. In this manner, binding of the pump due to the accumulation of the liquid below the piston 58 is prevented.

While I have shown the preferred embodiment of my invention it is to be understood that minor changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention and the scope of the appended claim.

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

A multiple pumping unit of the character described comprising a casing, aligned upper and lower working barrels disposed in the casing and of less diameter than said casing having ports in the upper portion thereof, a working valve mounted for reciprocation in the lower barrel, a piston mounted for reciprocation in the upper working barrel having a drain valve therein for draining fluid which may leak past the piston and accumulate in the lower part of the upper working barrel, a partition extending between the lower working barrel and the casing having a check valve therein and disposed below the port in said working barrel and a partition extending between the upper working barrel and the casing having a check valve therein and disposed above the port in the upper working barrel.

In testimony whereof I affix my signature.

CLYDE McKISSICK.