Oct. 3, 1933. C. GAMER 1,928,885

PUMP

Filed July 31, 1930

Fig. 1.

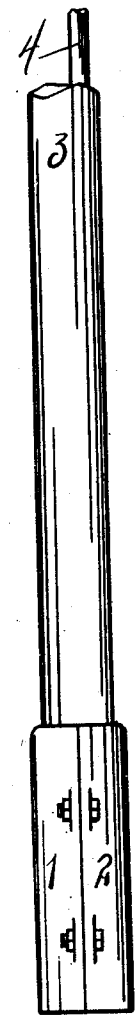


Fig. 2.

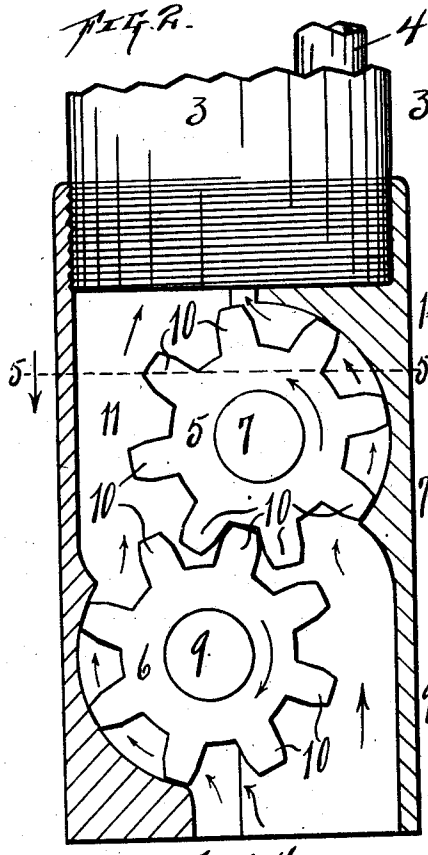


Fig. 3.

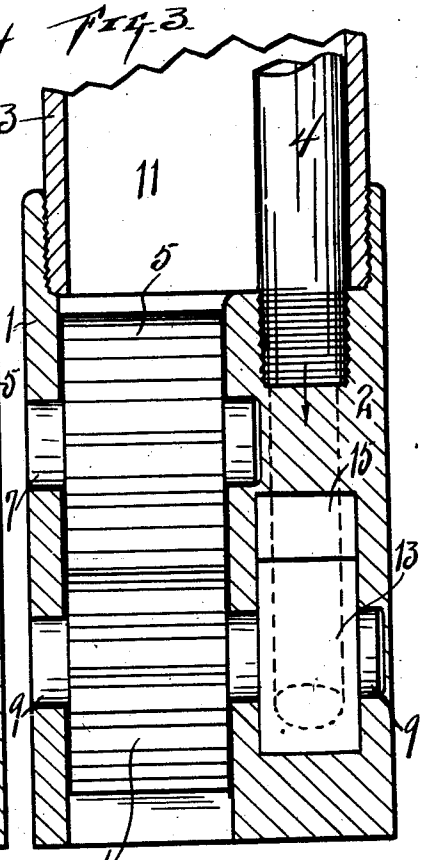


Fig. 4.

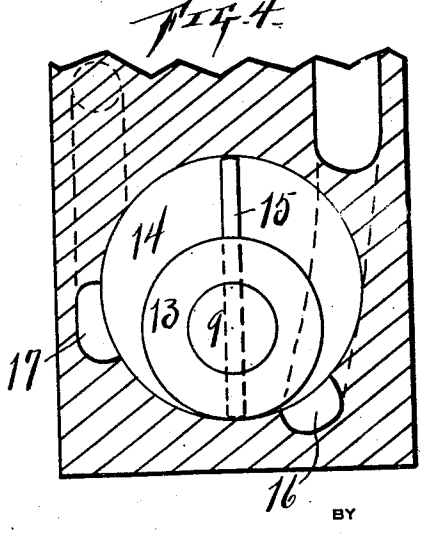
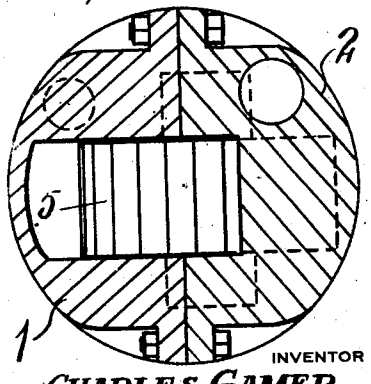


Fig. 5.



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6 Claims. (Cl. 103—5)

This invention relates to rotary pumps, and it has particular reference to pumps wherein rotary impellers are employed and driven by air or liquid, and its principal object resides in the provision of a compact arrangement of impellers and driving mechanism therefor encased within a compact housing capable of being inserted into a conventional oil well, or the like, wherein the space is restricted to only a few inches.

Another object of the invention resides in the provision of a novel driving mechanism, primarily designed for operation by compressed air, which is provided from the surface by a compresser, or other apparatus, and being delivered through the casing of the well thereby conserving space and providing a compact structure by which results may be accomplished heretofore obtained only by the use of surface pumps.

Broadly, the invention seeks to comprehend the provision of a pump, as described, which may be placed at the bottom of a well or at any joint in the casing thereof and which may be as readily inserted into the well, or removed therefrom as any of the conventional equipment which is ordinarily used in the drilling or operation of an oil or water well.

While the foregoing objects are paramount other and lesser objects will become manifest as the description proceeds taken in connection with the appended drawing wherein:

Figure 1 is a side elevational view of the invention showing the latter attached to a section of casing.

Figure 2 is a vertical cross section of the invention showing the relative positions of the rotors therein.

Figure 3 is a vertical cross sectional view of the invention at right angles to the view in Figure 2.

Figure 4 is a fragmentary cross sectional view showing the driving mechanism, and

Figure 5 is a lateral cross sectional view taken on lines 5—5 of Figure 2.

The peculiar construction of the ordinary type of rotary pumps has prevented their use within the limited confines of an oil well and the present invention is designed to overcome this difficulty and provide a means whereby such pumps may be utilized, affording a high pressure medium through which a constant stream of fluid may be obtained from the deepest wells even though the latter are limited to only a few inches in diameter.

Accordingly the invention comprises a housing consisting of two sections 1 and 2, each section being cast to define half of an annular body of greater length than thickness, and when their faces are placed together and secured by bolts through apertures provided therefor, an annular body is provided as shown in Figure 1.

Each of the sections 1 and 2 are provided with suitable recesses and cylindrical cores to receive a pump mechanism and the power device which will be described presently.

As exemplified in Figure 2 the castings 1 and 2 are threaded at their upper ends into which a section of casing 3 may be threaded after the members 1 and 2 have been assembled. A pipe 4 communicating with the earth's surface is disposed within the casing 3 and threaded into an aperture adjacent the top of the member 2, as shown in Figure 3.

Situated within a recess in the members 1 and 2 are rotors 5 and 6, which latter are disposed vertically with respect to each other and slightly offset as shown in Figure 2, and adapted to rotate in opposite directions as indicated by the arrows in the view just referred to. The rotor 5 is mounted upon a stub shaft 7, while the rotor 6 is rigidly attached to another shaft 9, each of the shafts 7 and 9 being journaled within the housing members 1 and 2, as shown in Figure 3. The rotors 5 and 6, being of a conventional type are provided with teeth 10, which intermesh in the manner illustrated in Figure 2 and which provide a complete seal at the point of engagement with each other as well as around the curved inner surfaces of the recess, in which these members are disposed for rotation.

With reference to Figure 2, it is pointed out that, when the rotors 5 and 6 are in operation, the liquid is drawn into the grooves or recesses between the teeth 10 of the rotors 5 and 6, and after being conducted along the curved inner surfaces of the recess, previously referred to, it is discharged into the passage 11 immediately in front of the rotor 5 and above the rotor 6, as illustrated by Figure 2 in which the arrows indicate the course of travel of the liquid.

As previously stated the rotors 5 and 6 are operated by an air driven impeller, the latter being shown in detail in Figure 4. An annular recess 14 is provided in the member 2 of the housing and is separated from the recess previously mentioned, in which the rotors 5 and 6 are disposed, by a thickness of metal, as shown in Figure 3.

The shaft 9, upon which the rotor 6 is mounted, extends into the recess 14 concentrically and is centered within the latter with respect to its

vertical axis but below its horizontal axis, as illustrated in Figure 4, and upon which a cylindrical member 13 is rigidly mounted for rotation therewith. The member 13, as well as the shaft 9, has a substantially rectangular aperture extending diametrically therethrough to receive a blade 15, which latter is adapted to a free sliding movement therein. This element is shown in Figures 3 and 4.

In operation, therefore, when air or other fluid under pressure, is introduced into the pipe 4, extending down through the casing 3, it will pass into the recess 14 through the port 15, near the bottom of the said recess 14, and impinge the projecting face of the blade 15, forcing the latter around to a point below a port 17, on the opposite side of the recess 14 where the air is discharged into a passage communicating with the top of the invention and the casing 3.

Obviously, as the member 13 is rotated upon its axis, which is concentrically situated within the annular recess 14, the blade 15 will slide back and forth through the member 13 and the shaft 9 and provide two separate compartments in the recess 14 at all times. The direction of rotation of the member 13 is dependent upon which of the compartments the pressure is introduced and the positions of the intake and discharge ports relative to the axis of the member 13. As previously pointed out, the fluid is introduced into the recess 14 through the port 16 which will rotate the member 13 in an anti-clockwise direction.

By reason of its rigid mounting upon the shaft 9, upon which the rotor 6 is also rigidly attached, the operation of the member 13 will transmit a rotary motion to the rotor 6 which in turn, by reason of its engagement with the rotor 5, will rotate the latter, the shaft 7 of which is freely journaled in the housing members 1 and 2.

The rapid rotary movement of the rotors 5 and 6 creates a suction below the latter which draws the liquid upward and with the aid of the air which is discharged into the passage 11 from the recess 14 through the port 17, a continuous column of liquid is carried upward through the casing 3 to a point of discharge upon the surface of the ground. It is found that the use of the discharge of the fluid from the recess 14 contributes very appreciably to the capacity of the pump and increases the volume of the liquid column and aids in lifting the same.

It will be noted that due to the compactness of the structure which, when assembled being cylindrical in form, little space is required for its operation. Such a device is particularly desirable for use in wells which have been bored or drilled and which are necessarily small in diameter such as oil wells or deep water wells. The invention is no larger than the casing of the well and can be constructed so that it can be placed within the casing if desired.

Manifestly the construction shown and described herein may be modified from time to time as may be considered practicable without departing from the spirit or intent of the invention as expressed in the appended claims.

What is claimed is:

1. A rotary pump having a housing consisting of a pair of semi-annular members capable of being bolted together to define an annular body; recesses in each of said semi-annular members to receive rotors and driving mechanism therefor; a pair of rotors of the same size disposed for rotation in one of said recesses, the axis of one of said rotors being slightly offset relative to the axis of the other of said rotors; an air motor disposed for rotation within another of said recesses; means to inject air into said last named recess and means to discharge the said air therefrom into the liquid column to aid in lifting the same.

2. A rotary pump capable of being inserted into a drilled well of small diameter comprising an annular housing consisting of two members; a recess defining arcuate surfaces provided in said housing to receive a pair of rotors, said rotors being super-imposed within said recess, their peripheries conforming to and creating a seal along said arcuate surfaces, a fluid driven motor disposed within an annular recess rigidly attached to the shaft of one of said rotors; means to introduce fluid under pressure into the last named recess to drive the said motor and means to attach the said pump to a well casing.

3. A rotary pump for drilled oil or water wells having an annular housing comprising two sections; suitable recesses arranged within said sections to receive rotors and driving mechanism therefor; a pair of superimposed intermeshing rotors rotatably mounted within one of said recesses, and each of the said rotors affording a seal at their point of engagement and along the curved surfaces on either side of said last named recess and an air driven means for rotating said rotors.

4. A rotary pump capable of insertion into a drilled oil or water well having a housing comprising two sections; recesses defining arcuate surfaces, arranged within said sections wherein are rotatably disposed a pair of intermeshed rotors the periphery of each conforming with the said arcuate surfaces of the said recesses creating a seal therein; fluid driven means for rotating said rotors and means to attach the said housing to a well casing.

5. A subsurface pump for drilled oil or water wells consisiting of an annular housing having two sections capable of securement to a section of casing; a recess defining oppositely curved surfaces in said housing; a pair of rotors of equal size within said recess their peripheries conforming to the said curved surfaces to create a seal and having their axis substantially longitudinal of the said housing; fluid driven means rotatably mounted within another recess in said housing for driving said rotors; means to induct fluid from the ground surface under pressure into the last named recess and means to allow the discharge of the said fluid into the liquid column to assist in raising the said liquid.

6. A rotary pump for subsurface operation in deep oil or water wells of small diameter having an annular housing comprised of two sections; intermeshing toothed rotors disposed for rotation within said housing and arranged one above the other and having their axis slightly offset with respect to the longitudinal axis of the said housing; fluid driven means to operate said rotors; means to supply fluid to the said fluid driven means from the surface of the ground the said fluid being discharged from said driven means into the liquid column to aid the rotors in lifting the said liquid.

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