

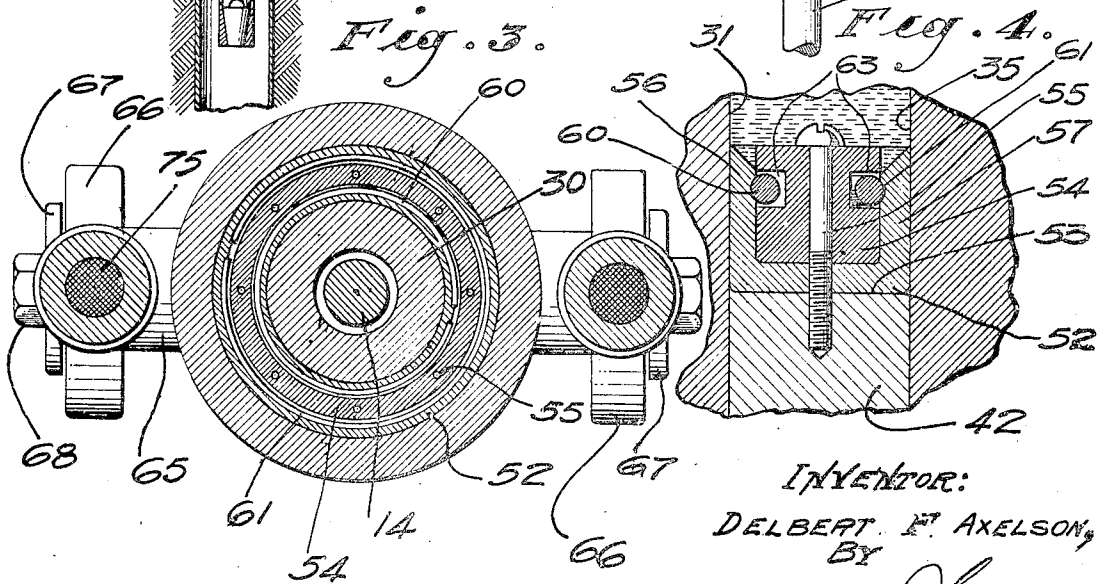
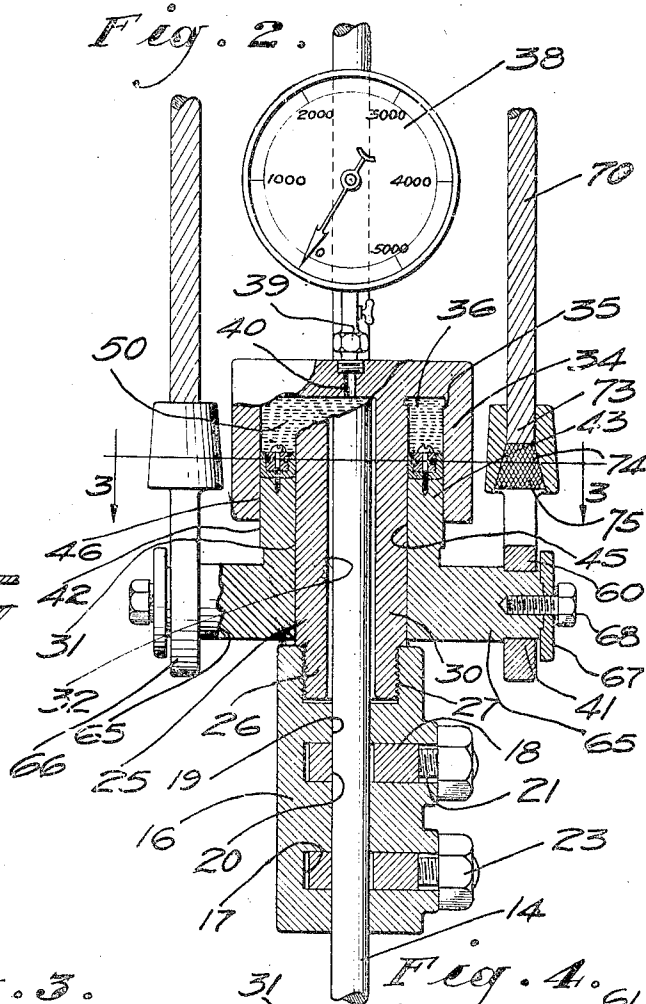
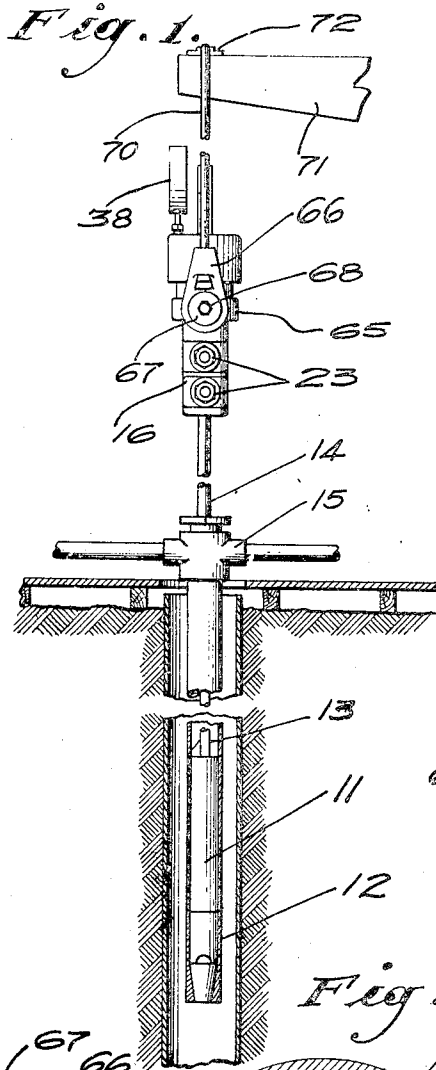
May 25, 1926.

1,585,634

D. F. AXELSON

LOAD INDICATOR

Filed Oct. 13, 1924



INVENTOR:
DELBERT F. AXELSON,
BY

Ed. M. Davis
ATTORNEY.

UNITED STATES PATENT OFFICE.

DELBERT F. AXELSON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO AXELSON MACHINE COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

LOAD INDICATOR.

Application filed October 13, 1924. Serial No. 743,311.

This invention relates to the oil producing industry and is particularly applicable to apparatus employed for the purpose of pumping oil from a well, although it has many other uses.

Oil is ordinarily pumped from a pump barrel situated at or near the bottom of a well, in which a pump plunger is reciprocated by means of a walking beam mounted at the surface of the well. The plunger is connected to the walking beam through a string of sucker rods, there being a polish rod attached to the upper end of the sucker rod string which extends through a stuffing box in the casing head of the well. The upper end of the polish rod is pivoted by a stirrup on one end of the walking beam.

It oftentimes occurs that during the operation of the pump, sand will lodge between the barrel and the plunger, causing an attrition of these parts. The wearing away of these parts induces a leakage therebetween, which, if appreciable, will noticeably reduce the efficiency of the pump.

Another detrimental circumstance encountered in pumping is the freezing of the plunger in the barrel, which may damage various parts and which causes considerable delay because of the necessity of freeing the plunger before the operation of the pump may again be commenced, this generally meaning the elevating of the pump to the surface. A frequent cause of this freezing is due to an amount of sand being lodged between the plunger and the barrel, sufficient to frictionally prevent relative movement therebetween.

It is an object of this invention to provide a means which will make evident any abnormal sand or load condition of the pump. By providing a device having this feature, it is possible to immediately discern any leakage of the pump, and to perceive any indications of sanding-up or freezing of the plunger. This will permit shutting down of the apparatus before a great deal of damage is done. My invention may be in the form of a means arranged for disposal between the polish rod and the walking beam of the well and comprises a means for indicating the pressure exerted on the plunger by the oil being pumped. Under favorable conditions the pressure indicated by the device is known to be a certain

amount. If the pressure indicated by the device reduces below this certain amount, it is known that some leakage occurs at the bottom of the well. If the indicated pressure increases above this certain amount, it indicates that additional friction is present between the pump plunger and the barrel, which is generally due to sand being lodged therebetween.

Other objects of the invention and the especial advantages thereof will be made evident hereinafter.

Referring to the drawings which are for illustrative purposes only,

Fig. 1 is a diagrammatic view showing my invention in use.

Fig. 2 is a partially sectioned view of my device on a slightly enlarged scale.

Fig. 3 is a section taken substantially as indicated by the line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary sectional view showing a cup leather and the means employed for retaining the lips thereof in engagement with side walls of a fluid-containing channel.

As shown diagrammatically in Fig. 1, represents a pump plunger which is reciprocated in a pump barrel 12 by means of a string of sucker rods 13. Secured to the upper end of the sucker rod string 13 is a polish rod 14, which extends through a casing head 15. Secured to the polish rod 14 a distance above the casing head 15 is a polish rod clamp 16 having slots 17 in which clamping members 18 reside. The clamp 16 provides a central passage 19, and the clamping members 18 provide passages 20, through which passages the polish rod 14 extends. On the threaded pins 21 of the clamping members 18, nuts 23 are screwed for the purpose of forcibly offsetting the passages 20 of the members 18, and the passages 19 of the body 16, in a manner to retain the clamp rigidly in place by the polish rod 14. The clamp may be of any efficacious design, the one shown being very favorable.

A supported member 25 provides a threaded projection 26 which is screwed into the threaded bore 27 of the clamp 16. The threaded projection 26 is formed on the lower end of a cylindrical portion 30, which provides a cylindrical outer face 31, there being a central opening 32 through the supported member 25, through which the upper

end of the polish rod 14 extends. Projecting downwardly and to the exterior of the cylindrical face 31 is a downwardly projecting lip 34 having a cylindrical inner face 35, this lip 34 cooperating with the tubular portion 30 to provide an annular channel 36, which is open at the bottom end thereof. In communication with the annular channel 36 is a pressure indicating gauge 38 having a nipple 39 which threads into an opening 40 provided at the upper end of the supported member 25. Slidably disposed on the tubular portion 30 of the supported member 25 is a supporting member 41 which provides an annular projection 42, the upper end 43 of which extends into the lower end of the annular channel 36 in a manner to close the mouth thereof, this tubular projection having an inner face 45 which engages the cylindrical face 35 of the lip 34.

The weight of the sucker rods and the weight of the oil carried by the plunger is transferred from the supported member 25 to the supporting member by means of an intervening medium in the form of a liquid 50, such as glycerine or any other viscous fluid, situated in the upper portion of the annular channel 36. The weight placed on the supported member through the sucker rod exerts a pressure on the liquid 50 which actuates the mechanism of the gauge 38 and thereby causes the pointer of the gauge to indicate the magnitude of this weight in pounds pressure. In order to prevent the liquid 50 from leaking from the annular channel 36, I provide a cup leather 52, as clearly shown in Fig. 4. This cup leather 52 is secured against the upper face 53 of the annular projection 42 by means of a circular ring 54, which is in turn secured in place by screws 55 which thread into the projection 42. In order to insure engagement between the lips 56 and 57, of the cup leather 52, with the cylindrical faces 31 and 35 respectively, I provide spreader rings 60 and 61, which are retained in place by being located in the channels 63 provided by the retaining member 54. These spreader members 60 and 61 may be made from spring steel, the tendency of the inner spreader member 60 being to constrict and the tendency of the outer spreader member 61 being to expand. In this manner I have provided a simple and effective means for always retaining the lips 56 and 57 in place, and have thereby reduced the tendency of a leakage of the liquid 50 to a minimum.

On the extensions 65 of the supporting member I pivotally secure arms 66 by means of washers 67 and nuts 68, as shown in Figs. 2 and 3. Reins or suspension members 70, which extend over the walking beam 71, being supported by a bracket 72, are secured to the arms 66, as shown in Fig. 2. The ends 73 of the reins 70 extend into the bores

74 provided by the arms 66, the strands thereof being segregated and babbitt poured therearound, as indicated at 75 in this figure.

For a practical example of the operation of this device, let us consider that the weight of the sucker rods, plunger and the oil above the plunger causes the gauge to indicate a pressure of 4000 pounds. If during the operation of the pump, this pressure should drop to a point noticeably below the 4000-pound area, the driller will know that a decrease in weight upon the plunger has occurred; which is generally traced to a leakage either of the valves or a leakage between the plunger and the barrel.

Again, if the gauge 38 indicates a pressure which noticeably exceeds the 4000-pound mark, the driller will know that additional resistance is present in the well. This is generally traced to sand lodging between the plunger and the barrel, this lodging of the sand resulting either in an excessive leakage of the pump or to a freezing of the plunger. By being previously warned of what may take place at the bottom of the well, considerable damage, expense and time may be obviated. By the use of my invention the exact condition of the pumping equipment at the bottom of the well is known at all times.

The device presented by my invention is simple and durable, being comprised essentially of two main parts. The novel means of retaining the lips of the cup leather in engagement with the side walls reduces the possibility of leakage to a minimum and assures a reliable reading at all times. By supporting the supporting member by the pivoted arms, a skewing of the parts will never occur. This arrangement also conduces to reducing the lateral movement in the polish rod.

I claim as my invention:

1. In combination: a pump having a plunger; means for reciprocating said plunger; and means associated with said pump plunger for indicating the weight on said plunger.
2. In combination: a pump having a plunger; means for reciprocating said plunger; and means associated with said pump plunger for visually indicating the weight on said plunger.
3. In combination: a pump having a plunger; means for reciprocating said plunger; and means disposed between said reciprocating means and said pump plunger for indicating the weight on said plunger.
4. In combination: a pump having a plunger; means for reciprocating said plunger; and means disposed between said reciprocating means and said pump plunger for visually indicating the weight on said plunger.
5. In combination: a pump plunger hav-

ing a string of sucker rods attached thereto; means for reciprocating said plunger through said sucker rods; and means connected between said reciprocating means and said sucker rod string for indicating the weight on said plunger.

6. In combination: a pump plunger; a means for reciprocating said plunger; a supported member connected with said plunger; a supporting member connected with said reciprocating means; and means associated with said supported and supporting members for indicating the weight on said plunger.

7. In combination: a pump plunger; a means for reciprocating said plunger; a supported member connected with said plunger; a supporting member connected with said reciprocating means, said supporting means being arranged to support said supported member; a fluid situated between said supported and supporting members, said fluid being arranged to transfer weight from said supported member to said supporting member; and means actuated by said fluid for indicating the weight on said plunger.

8. In combination: a pump plunger; a walking beam; a supported member connected with said plunger; a supporting member connected with said walking beam; and means associated with said supported and supporting members for indicating the weight on said plunger.

9. In combination: a pump plunger; a walking beam; a supported member connected with said plunger; a supporting member connected with said walking beam, said supporting means being arranged to support said supported member; a fluid situated between said supported and supporting members, said fluid being arranged to transfer weight from said supported member to said supporting member; and means actuated by said fluid for indicating the weight on said plunger.

10. A combination as in claim 1 in which said means for indicating the condition of said pump includes: a supporting member having an annular projection; a supported member having an annular channel into which said annular projection extends; a liquid in said annular channel, said liquid transferring the weight from said supported member to said supporting member; and means communicating with said liquid for indicating the weight transferred by said liquid.

11. In a load indicating device of the class described the combination of: a supporting member comprising an annular projection and means whereby said supporting member may be carried; a supported member comprising a cylindrical portion extending through said annular projection,

and an annular lip extending around a portion of said cylindrical portion, thus forming an annular channel, said annular projection extending into said annular channel; a liquid disposed in the part of said channel not occupied by said annular projection; and a pressure gauge connected to the portion of said annular channel in which said liquid is situated.

12. In a load indicating device of the class described the combination of: a supporting member comprising an annular projection and means whereby said supporting member may be carried; a supported member comprising a cylindrical portion extending through said annular projection, and an annular lip extending around a portion of said cylindrical portion, thus forming an annular channel, said annular projection extending into said annular channel; a liquid disposed in the part of said channel not occupied by said annular projection; a pressure gauge connected to the portion of said annular channel in which said liquid is situated; and means for preventing said liquid from leaking from said annular channel.

13. In a load indicating device of the class described the combination of: a supporting member comprising an annular projection and means whereby said supporting member may be carried; a supported member comprising a cylindrical portion extending through said annular projection, and an annular lip extending around a portion of said cylindrical portion, thus forming an annular channel, said annular projection extending into said annular channel; a liquid disposed in the part of said channel not occupied by said annular projection; a pressure gauge connected to the portion of said annular channel in which said liquid is situated; a cup leather disposed in said annular channel, having inner and outer lips adapted to respectively engage inner and outer walls of said annular channel; a circular member whereby said cup leather is secured to an end face of said annular projection; and means for forcibly retaining said inner and outer lips in engagement with said inner and outer walls of said annular channel.

14. In a load indicating device of the class described the combination of: a supporting member comprising an annular projection and means whereby said supporting member may be carried; a supported member comprising a cylindrical portion extending through said annular projection, and an annular lip extending around a portion of said cylindrical portion, thus forming an annular channel, said annular projection extending into said annular channel; a liquid disposed in the part of said channel not occupied by said annular projection; a pressure gauge connected to the portion of

said annular channel in which said liquid is situated; a cup leather disposed in said annular channel, having inner and outer lips adapted to respectively engage inner and outer walls of said annular channel; a circular member whereby said cup leather is secured to an end face of said annular projection; and means for forcibly retaining said inner and outer lips in engagement with said inner and outer walls of said annular channel, said means comprising an inner spreader member carried in an inner channel of said circular member and adapted to engage said inner lip, and an outer spreader member carried in an outer channel of said circular member and adapted to engage said outer lip.

15. In a load indicating device of the class described the combination of: a supporting member comprising an annular projection

and means whereby said supporting member may be carried; a supported member comprising a cylindrical portion extending through said annular projection, and an annular lip extending around a portion of said cylindrical portion, thus forming an annular channel, said annular projection extending into said annular channel; a clamp secured to the lower end of said cylindrical portion of said supported member; a liquid disposed in the part of said channel not occupied by said annular projection; and a pressure gauge connected to the portion of said annular channel in which said liquid is situated.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 6 day of October, 1924..

DELBERT F. AXELSON.