April 4, 1939. A. ARUTUNOFF 2,153,494

JOINT

Filed Nov. 4, 1937

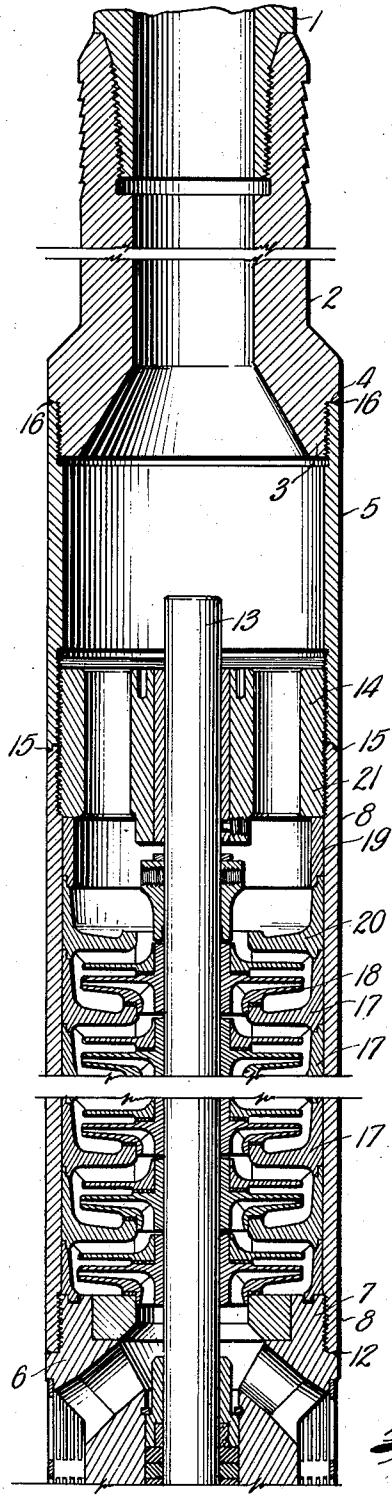


Fig. 1.

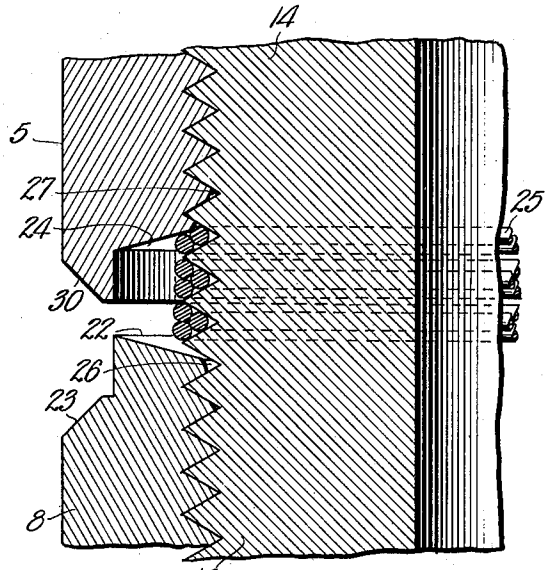


Fig. 2.

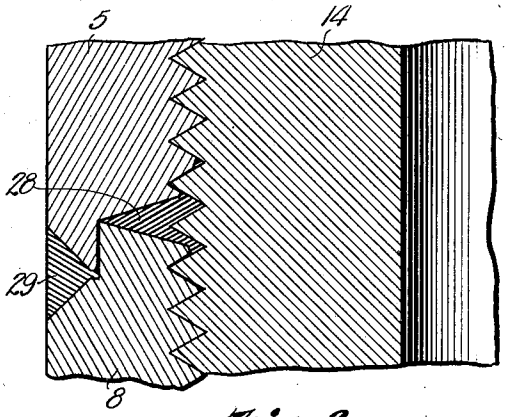


Fig. 3.

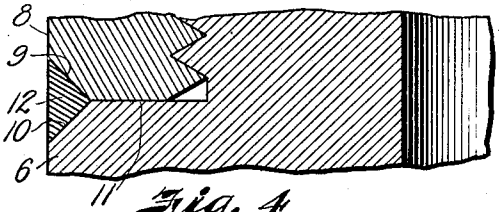


Fig. 4

INVENTOR
Armais Arutunoff
BY Thos. E. Hefield
ATTORNEY

Patented Apr. 4, 1939 2,153,494

UNITED STATES PATENT OFFICE

2,153,494

JOINT

Armais Arutunoff, Bartlesville, Okla., assignor to Reda Pump Company, Bartlesville, Okla., a corporation of Delaware

Application November 4, 1937, Serial No. 172,759

4 Claims. (Cl. 285—146)

My invention relates to joints and more particularly to water tight joints for submergible housings and the like.

In submergible deep well pumps, a unit is employed which is adapted to fit within the well casing. A well for example may be 5,000 feet in depth and be provided with a casing seven inches in diameter. When the gas pressure of the formation is such that it no longer forces the oil to the surface, it is necessary to pump the well. I have developed a deep well pump adapted to fit within the casing of an oil well and be submerged in the pool of oil at the bottom thereof. The pump is driven by an electric motor and provides an efficient and convenient manner of recovering oil.

The pump assembly is lowered to the bottom of the well and is there subjected to heavy pressure. It is important that the housing, especially for the motor unit, be water tight as the seepage of fluids into the motor would cause it to fail to operate. It is also important that none of the joints of the assembly become loosened and back off, as the dropping of the pump assembly at the bottom of the well without any means for withdrawing it might entail the loss of the well as well as causing considerable inconvenience and expense.

From time to time it is necessary to withdraw the assembly from the well and break the joints to make repairs and the like. The joint therefore must not only be water tight and secure, but must be such that, in the event of necessity, it may be broken for access to the interior of the housing. The vibration occasioned by the pumping operation is such that set screws are substantially valueless.

One object of my invention is to provide a simple and convenient method of locking a screw threaded joint.

Another object of my invention is to provide a water tight and oil tight joint.

Another object of my invention is to provide a joint which may be easily unjointed in event it becomes necessary to have access to the interior of the housing.

Other and further objects of my invention will appear from the following description.

In the accompanying drawing which forms part of the instant specification and is to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views;

Figure 1 is a longitudinal section of the pump housing of my assembly showing the use of joints of my invention.

Figure 2 is a fragmentary sectional view on an enlarged scale showing one of the joints of my invention in the process of being made.

Figure 3 is a sectional view similar to Figure 2 showing the joint being formed in Figure 2, completed.

Figure 4 is a view of another joint showing another embodiment of my invention.

In general, my invention contemplates the providing of a rabbet or groove by beveling the outer abutting edges of complementary screw threaded portions and the filling of this groove with solder. The solder not only provides a water tight joint but acts as a locking means preventing the unthreading of the members comprising the joint.

More particularly referring now to the drawing, the eduction tube 1 through which the oil, or other liquid such as water in the case of a water well, flows to the surface, is secured to the closure fitting 2 of the pump housing by screw threads or any other suitable means. The closure fitting 2 is provided with a reduced end portion 3 forming a shoulder 4, the width of the shoulder being the thickness of the housing wall 5. The reduced end portion is externally threaded and the upper end of the housing 5 is internally threaded. The lower closure fitting 6 of the pump housing is similarly formed with a reduced end portion 7 externally threaded for insertion into the internally threaded lower end of the housing 8.

Referring now to Figure 4 which shows an enlarged view of a section of the lower end of the housing joint, it will be observed that housing 8 is provided with an externally beveled surface 9, while the upper edge of the lower closure fitting 6 is provided with an oppositely beveled edge 10 so that, when housing 8 is seated upon the flange 11 formed in the member 6, the two beveled edges come together and form a V-like groove. The V-like groove is filled with solder 12. The ring of solder 12 not only forms a water tight joint but also provides locking means preventing the housing 8 from unscrewing from the closure fitting 6. The joint between the closure fitting 2 and the upper end of the housing 5 is identical to the joint just described, the ring of solder 16 forming the sealing and locking means.

The eduction pressure in lifting a column of oil a distance of a mile or more is extremely high and it is especially important that any joint subjected to the eduction pressure does not leak. If leakage has once started, the joint will soon

cut away, due to the fact that the oil frequently carries fine particles of sand and other grit. It will be observed that the upper end 13 of the pump shaft is supported by a bearing ring 14 and that the upper end of the housing 5 and the lower end of the housing 8 are joined by joint 15.

My pump assembly is such that a plurality of diffuser housings 17 and a plurality of impellers 18 are assembled in nested relation within the housing. Above the uppermost diffuser housing 17 I position an adapter 20. Above the adapter, I position a spacing ring 19. The assembly is locked by a combined bearing ring and locking nut 21, as will readily be seen by reference to Figure 1. The position of the locking nut 21 may vary, depending upon the number of diffuser housings and the variations which may be occasioned in their manufacture. In making the assembly, it is necessary and important to secure the lower end of the housing 5 to the upper portion of the housing 8 by a water tight joint which will withstand the full eduction pressure of the outgoing liquid and which will not back off due to vibration in operation. This type of combined joint and sealing arrangement may be used at any point along the threaded nipple without relying upon or the necessity of abutting shoulders.

Referring now to Figure 2, the locking nut 14 has been screwed downwardly in housing 8 to lock the assembly of diffuser rings in place. The upper end of the housing is formed with a seat 22 and a beveled edge 23. The upper housing member 5 is likewise formed with a seat 24 and is internally threaded as can readily be seen by reference to Figure 2. Lead wire 25 is wrapped around the threads of member 14 adjacent the seat 22. The upper housing member is then screwed downwardly. It will be noted that the uppermost portion 26 of the internal thread of the housing member 8 is beveled to provide a pocket or space. Similarly, the lowermost portion 27 of the internal thread of housing 5 is beveled to provide a pocket. As the housing member 5 is rotated to seat it as is known in the art, lead will flow under a pressure of 10,000 pounds per square inch. The lead flows to form a high compression seal as can readily be seen by reference to Figure 3 in which the trapped lead is indicated by the reference numeral 28. Portions of the lead will be trapped between the interface of the screw threads and will prevent leakage of fluid from the well into the housing. An annular ring of solder 29, similar to ring 12, is then placed in the groove formed by the beveled edge 23 of the lower housing 8 and the beveled edge 30 of the upper housing 5.

The joints thus described are breakable and the parts remain in excellent condition. Vibration will not affect the seal as it does with set screws. Not only is the locking function performed, but sealing is provided.

The seal of lead 28 between the parts is not directly subjected to full pump pressure as would a gasketed joint because of the beneficial effect of the screw threads also sealed with lead and positioned between the pump and the trapped lead seal; thus a joint capable of withstanding the full bursting pressure of the steel housing is obtained.

It will be observed that I have accomplished the objects of my invention and have provided a water tight, threaded joint in which the sealing means may act as means for preventing the threaded joint from unscrewing.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, what I claim is:

1. In a threaded joint, a nipple, a pair of cylindrical members threaded on said nipple from opposite sides thereof, one of said cylindrical members being formed with a projecting portion and the other of said cylindrical members being formed with a reentrant portion, said reentrant and projecting portions being formed with respective, oppositely inclined annular seats, said seats forming an annular pocket having a substantially V-shaped cross section, sealing means positioned in said V-shaped pocket, the outer adjacent edges of said cylindrical members being provided with oppositely beveled surfaces forming an annular groove, and solder positioned in said groove.

2. A joint as in claim 1 in which said sealing means comprises lead.

3. A joint as in claim 1 in which the apexes of the threads of said respective cylindrical members adjacent said pocket are removed to form auxiliary pockets into which said sealing means may flow.

4. In a threaded joint, a nipple, a pair of cylindrical members threaded on said nipple and forming a V-shaped external groove and a V-shaped internal pocket at their adjoining ends, solder positioned in the V-shaped external groove and sealing means in the internal pocket and extending into a plurality of the adjoining threads of the internal pocket.

ARMAIS ARUTUNOFF.