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PUMP ANCHOR MECHANISM

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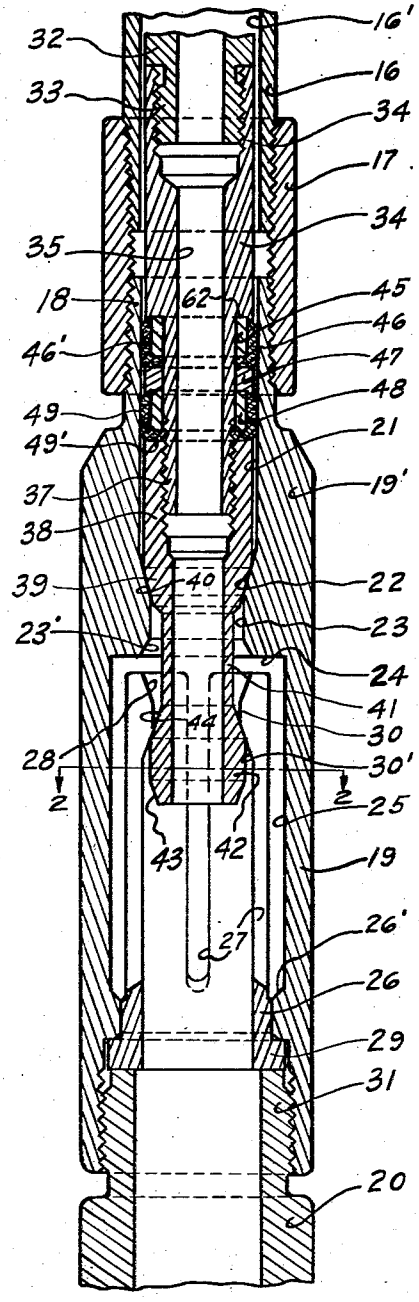


Fig. 1.

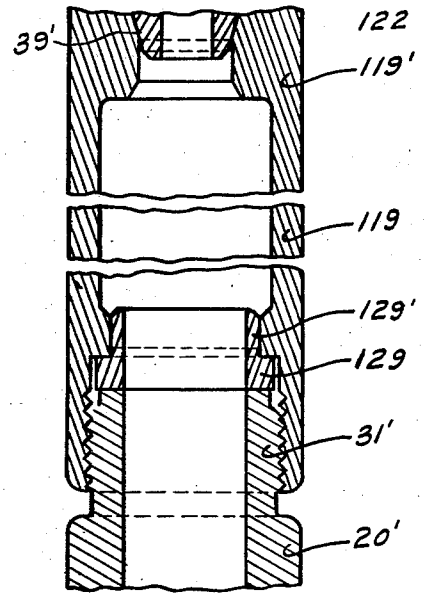


Fig. 3.

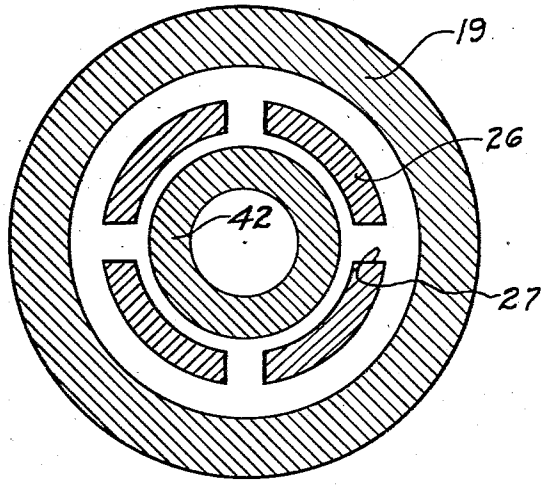


Fig. 2

INVENTOR.
CHALON E. BRIDWELL
BY Thos. J. Donnelly
Attorney

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PUMP ANCHOR MECHANISM

Chalon E. Bridwell, Detroit, Mich.

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3 Claims. (Cl. 103—219)

My invention relates to a new and useful improvement in a pump anchor mechanism adapted for anchoring a pump to the well tubing of a well. The invention is particularly adapted for use on deep wells and especially on oil, gas or water wells.

In such wells it is customary to have a pump inserted in a well tubing and the pump mechanism would involve a pump barrel and a plunger, which are relatively movable. In some types of installations the pump barrel would be stationary and the plunger reciprocated in the pump barrel, while in other types of pumps the plunger would be mounted stationary and the pump barrel would be reciprocated relatively to the plunger. In either type of installation the stationary part must be anchored and this anchorage is generally effected by connection of the same to the well tubing. With present types of connections it is necessary to considerably constrict the passage extending through the connection mechanism, thus reducing the volume of flow of liquid or gas which is permitted to pass upwardly into the pump. It is an object of the present invention to provide a connection in which this passage through the connecting mechanism into the pump may be of maximum cross-sectional area and thus an increased volume of flow made possible.

In connecting the pump plunger or the pump barrel to the anchor shoe it is customary to do so by the impact method, that is by dropping the pump unit, as a whole, with the sucker rods attached thereto and permitting the connecting mechanisms to inter-engage through contact. Part of the inter-engaging mechanism generally has an inwardly projecting shoulder or boss against which the descending part strikes and behind which the descending part engages. This inwardly projecting portion or boss forms a seat against which an engaging face is adapted to bear in sealing relation. Experience has shown that the face of this inward projection or boss becomes scarred or sometimes deeply grooved or pitted with the result that this sealing engagement of the parts bearing together is not sealed, with leakage around the connection and consequently around the pump mechanism becomes possible. This frequently results in pump failure and it is an object of the present invention to provide a construction in which any failure of the inter-engaging parts which bear against each other to properly seal will be guarded against by an upwardly positioned sealing mechanism.

Another object of the invention is the provision of a tubular member adapted for engaging a collet, the collet being separate from the tubular member and the tubular member being in communication with the interior of the tubular plunger.

Another object of the invention is the provision of a connecting mechanism of this class which will be simple in structure, economical of manufacture, durable, compact, light, one which will readily lend itself to modifications and which may be easily and quickly assembled and disassembled, thus permitting removal and replacement of the parts which may become worn.

Other objects will appear hereinafter. It is recognized that various changes and modifications may be made in the detail of the structure illustrated without departing from the invention and it is intended that such changes shall be embraced within the scope of the claims forming a part hereof.

Forming a part of this specification is a drawing in which:

Fig. 1 is a fragmentary, longitudinal, sectional view of a well installation illustrating the invention in use.

Fig. 2 is an enlarged sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmentary, longitudinal, central, sectional view of a slight modification of the invention.

In the drawing I have illustrated the lower end of a well tubing 16 which is connected by a coupling 17 to the threaded neck 18 of an anchor shoe having a head 19' and a lower tube portion 19. The lower end of this tubular portion 19 is threaded to the gas anchor nipple or intake tube pipe 20. Extending through the neck 18 and the head 19' is a passage or bore 21 tapered to narrower diameter to provide the inner inclined surface 22 which presses to the reduced bore or passage 23 communicating with the enlarged space 25 in the portion 19. An inwardly directed shoulder is thus formed to provide a radially directed face 24. The end of the passage 23 is tapered as at 23' so that the lower end of this passage may be said to be flared. The member 19 is provided, adjacent its threaded end, with the inwardly directed shoulder 26' which snugly engages the non-slitted portion 26 of a tubular collet which is inserted in the portion 19 and provided with the longitudinally directed slits 27 extended inwardly from the inner end. The inner surface of the end of this collet is beveled as at 28. A flange 29 is formed on the lower end and pressed against the outer

face of the shoulder 26' by the threaded portion 31 of the member 20. It will be noted that the inner end of the collet is enlarged to provide the inwardly projecting annular boss 30, the inclined surface 28 being formed on the outer end of the boss 30 and an inclined surface 30' being formed on the outer end or side of the boss 30.

The member 32 illustrated may be either a pump barrel or a tubular pump plunger. This member is provided with the threaded neck 33 onto which is threaded a cup extension 34 provided with the bore or passage 35 extending therethrough and at its lower end provided with the neck 37 which threads into the end of a lock tube 38 formed conical at its lower end to provide a peripheral surface 40 inclined corresponding to the incline of the surface 22 and adapted to engage therewith and bear thereagainst in sealing relation for preventing leakage of gas or liquid. Forming a continuance of the conical portion 39 is the tubular neck 41 carrying at its lower end the head 42 beveled on opposite sides to provide the inclined surfaces 43 and 44.

Embracing the portion 37 is a metal ring 45 which is embraced by the axially directed marginal portion 46 of a leather washer 46' which is positioned in embracing relation on the neck 37. A metal ring 47 serves to retain the metal ring 48 in spaced relation to the leather washer 46', these rings 47 and 48 embracing the neck 37. The marginal edges 49 of a leather washer 49' is turned axially so as to embrace the ring 49. It will be noted that between the member 38 and the inner surface of the bore 21 of the axial shoe there is a space which is in alignment and in communication with the space 16' lying between the well tubing and the member 32. It will be noted that the axially turned marginal portions 46' and 49' bear against the inner surface of the bore 21 and serve to close communication between the spaces 21 and 16'. These parts 45, 46', 47, 48 and 49' are retained in assembled relation by the member 38 threading against the washer 49' in clamping relation so as to force the parts against the shoulder 62 formed on the member 34.

It is believed obvious that when the parts 20, 19, 17 and 16 are connected together as illustrated, a stationary permanent structure is provided in which is positioned the split collet. The parts 32, 34 and 38 are connected together as a unit. In assembling the structure as shown, the member 32 with the parts carried thereby is lowered into the well tubing 16 and allowed to drop with sufficient force so that when the head 42 contacts the inclined surface 28 the collet will be sprung outwardly permitting this head 42 to pass downwardly so that the inclined surface 44 will bear against the inclined surface 30' and thus the mechanism will be locked in position. When this has been effected the conical inclined surface 40 will have come into contact with and bear against the inclined surface 22. This surface 22 may frequently become scarred or pitted or grooved resulting from impact or while foreign bodies are present thereon. Consequently the seal between the conical portion 39 and the head 42 may not be effected and leakage of gas and liquid might result, the leakage of the liquid being primarily from above as the column of liquid positioned above would be in communication with the space 16'. The presence of the sealing washers 46' and 49' will prevent this leakage and thus there is provided a means for securely guarding against any escape of liquid or gas through an unwanted passage.

It will be noted that the member 41 is not provided with any slits, so that the passage therethrough throughout its length will serve as a conduit and a constriction of this is not necessary, inasmuch as the resiliency desired for locking purposes is contained within the separate inserted collet.

It is believed obvious that the removal and replacement of the member 32 with its parts may be easily and quickly effected and experience has shown that a most satisfactory location of these parts, as shown in Fig. 1, is thus accomplished. It is believed obvious also that the entire structure may be easily taken apart and various parts removed and replaced.

In Fig. 3 I have shown a structure in which the collet is dispensed with. The anchor shoe 119 corresponds to the anchor shoe 19 shown in Fig. 1. This anchor shoe is provided with a head 119'. Threaded onto the lower end of the anchor shoe 119 is a gas anchor nipple or intake tube 20' having the threaded neck 31' which threads into the threaded end of the anchor shoe 119 and bears against the flange 129 of the sleeve 129'. In Fig. 3 I have shown the conical portion 39' of the lock tube corresponding to the conical portion 39 in Fig. 1. It will be noted that the neck 41 and its dependent parts are eliminated in the structure shown in Fig. 3. The structure above the member 39' corresponds in every detail to the structure above the conical portion 39 of Fig. 1. In the structure shown in Fig. 3 the pump anchor or standing valve with its attached parts are dropped downwardly and the conical portion 39' rests upon the conical face or seat 122 corresponding to the inclined surface 22 of Fig. 1. Consequently, in the structure in Fig. 3 the securing or locking means in which the collet functions has been dispensed with. The structure illustrated in Fig. 3 makes it possible to adapt the invention to use where a high fluid level is present in the well, thus eliminating the dependent structure and collet so as to render the installation more economical and more efficient because of the reduction in excess parts.

What I claim as new is:

1. In a pump anchor of the class described, a substantially long anchor shoe having a bore formed therethrough, said bore being reduced in diameter intermediate its ends; an elongated slitted collet inserted in said bore below the reduced section; and means threaded in the end of said anchor shoe for securing said collet in said anchor shoe.

2. A pump anchor of the class described, adapted for use with a pump structure insertable in a well tubing comprising: a tubular member mounted on the lower end of a pump structure and projecting downwardly therefrom and in alignment therewith and in communication with the interior thereof; an anchor shoe having a bore formed therethrough and reduced in diameter and tapered adjacent one end to provide a long inclined bearing surface; a sealing member carried by said tubular member above said bearing surface and engaging the inner surface of the bore of said anchor shoe in sealing relation; a second sealing member carried by said tubular member adjacent said first sealing member and engaging the inner surface of said anchor shoe bore in sealing relation; means for maintaining said sealing mem-

bers in spaced relation; means for securing said sealing members in position on said tubular member; and a conical portion on said securing means for engaging said conical portion and forming a seal therewith.

3. A pump anchor of the class described, adapted for use with a pump structure insertable in a well tubing comprising: a tubular member mounted on the lower end of a pump structure and projecting downwardly therefrom and in alignment therewith and in communication with the interior thereof; an anchor shoe having a bore formed therethrough and reduced in diameter and tapered adjacent one end to provide an inclined bearing surface; a sealing member carried by said tubular member and engaging the inner surface of the bore of said anchor shoe in sealing relation; a second sealing member carried by said tubular member adjacent said first sealing member and engaging the inner surface of said anchor shoe bore in sealing relation; means for maintaining said sealing members in spaced relation; means for securing said sealing members in position on said tubular member; a conical portion on said securing means for engaging said conical portion and forming a seal therewith; a tubular neck projecting downwardly from said conical portion; a head on the end of said neck; and means in said anchor shoe and mounted below said head and engageable with said head for normally resisting withdrawal of said tubular neck from said anchor shoe.

CHALON E. BRIDWELL.