Jan. 14, 1936. J. N. MARTIN 2,027,783

PUMP ANCHOR

Filed Aug. 27, 1935

FIG. 1.

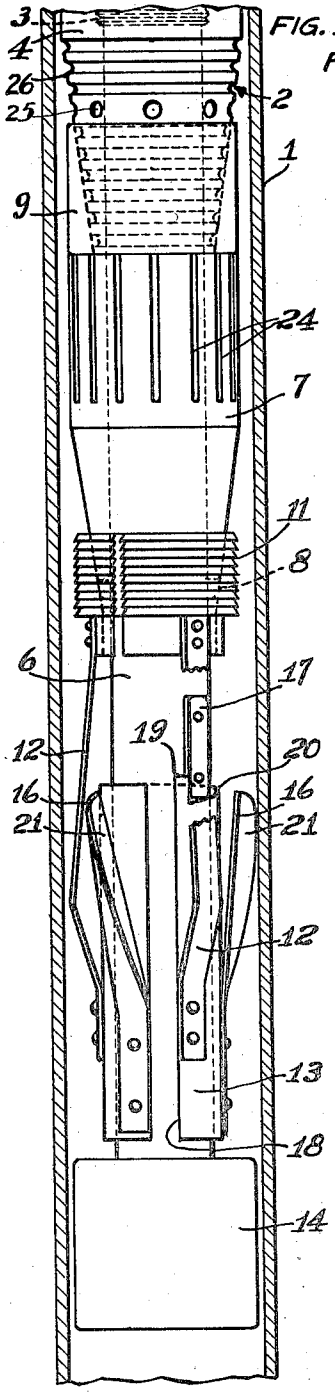


FIG. 2.

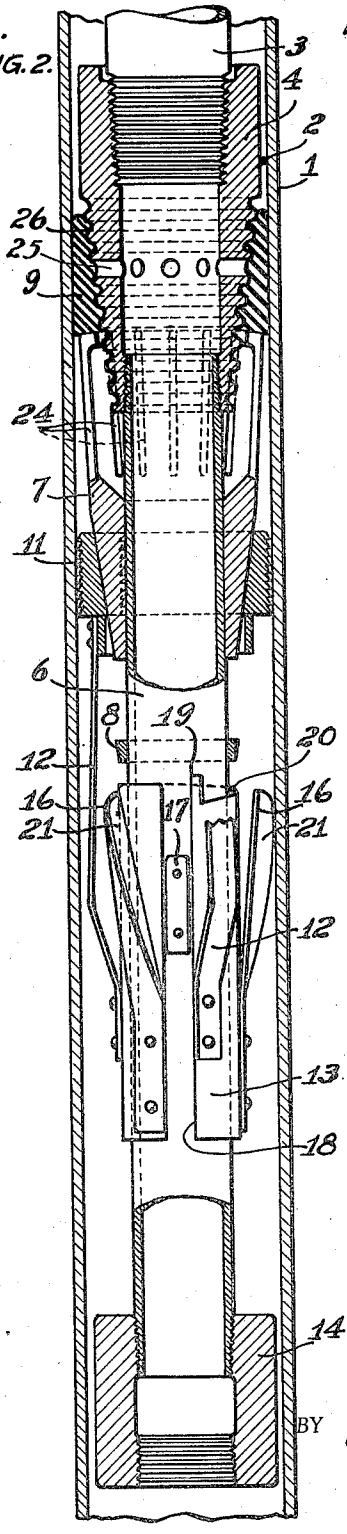
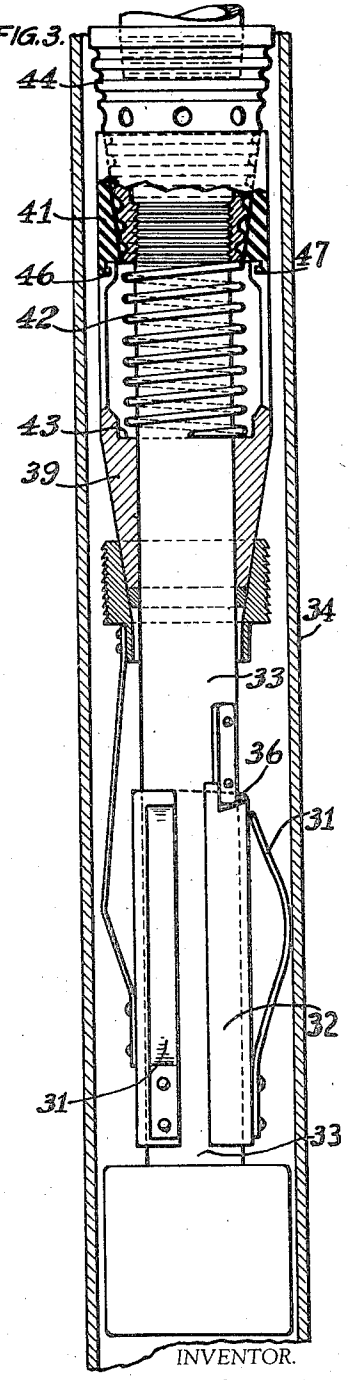


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE

2,027,783

PUMP ANCHOR

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17 Claims. (Cl. 166—12)

This invention relates to pump anchors for anchoring pumps in oil wells, and more particularly to anchors suitable for use with insert pumps in well tubing.

Insert pumps are widely used throughout the world for pumping oil wells. An insert pump, as its name implies, is inserted in the well tubing by running it in on the lower end of the sucker rods, but before it can be operated it must be anchored in the tubing so that the entire pump will not reciprocate with the rods. The general practice has been to secure anchoring or seating means on the bottom of the string of well tubing before it is lowered into the well. However, in oil fields where flowing wells have ceased flowing so that it becomes necessary to pump them, it often happens that no provision has been made for pump seats in the tubing, and before the wells can be pumped the entire string of tubing must be pulled, provided with seating means, and run back into the well. This is an expensive and time-consuming operation, especially when the tubing extends several thousand feet into the ground. In both of the situations mentioned the seating means is at the bottom of the tubing, which is often at the bottom of the well, and the insert pump can not be seated above that point.

It is often desirable to pump wells at levels above the bottom of the tubing, such as when the oil level in the casing is high so that the expense of long sucker rods can be saved by pumping at the high level. Likewise, the higher the level at which a well is pumped, the lighter the load on the entire pumping equipment, thereby giving it longer life with fewer breakdowns and making it possible to use smaller and less expensive pumping apparatus. It may also be found desirable to pump the same well at different times at different levels. However, as far as I know, no practicable anchor for anchoring insert pumps at different levels in a well has ever been put on the market.

It is among the objects of this invention to provide a pump anchor which is small and compact and complete in itself, which can be set and reset at any level in the well tubing without pulling the tubing or removing the anchor from the tubing, which securely holds down the pump when set, in which accidentally setting while being raised or lowered is substantially eliminated and which is manipulated entirely by the sucker rods from the derrick floor.

The invention is illustrated in the accompanying drawing in which Fig. 1 is a side view of one embodiment with the parts in the relative positions they occupy while the anchor is being lowered in well tubing; Fig. 2 is a side view, partly in section, showing the anchor seated in the well tubing; and Fig. 3 is a side view, partly in section, of a modified form of the anchor.

Referring to Figs. 1 and 2 of the drawings there is shown a section of a string of well tubing 1 which is run into a well casing (not shown) in the usual manner. It is up through this tubing that oil is pumped by an insert pump secured to a pump anchor 2 seated in the tubing. The pump anchor is lowered and raised in the well tubing, and the reciprocating member of the pump is reciprocated, by sucker rods (not shown). The reciprocating member slides within predetermined limits on a plunger 3 (Fig. 2) threaded in the upper end of a tubular head 4, the lower portion of which is tapered downwardly. This head forms the upper end of the pump anchor.

Rigidly connected to the lower end of the head is an anchor tube 6 on which is slidably mounted an expander sleeve 7 having a cylindrical upper portion and a downwardly tapered lower portion. This sleeve is supported on the anchor tube, when the anchor is not set by an annular shoulder formed on the tube, such as by a collar 8 welded or otherwise rigidly secured to the tube. The upper end of the sleeve is substantially on a level with the lower end of head 4. Surrounding the tapered portion of the head and engaging the upper end of the sleeve is a resilient packing member 9, preferably made of a compound that does not swell in oil. This packing is adapted to be expanded outwardly into sealing engagement with well tubing 1 by the wedge effect produced when the head moves down into the expander sleeve, as will be set forth in detail hereinafter.

For anchoring the pump anchor in the well tubing a plurality of conventional type expansible toothed slips 11 are maintained in sliding engagement with the tapered portion of the expander sleeve by resilient metal strips 12 that are connected at their lower ends to a carrier sleeve 13 slidably mounted on the anchor tube below collar 8. The carrier sleeve is prevented from sliding off the bottom of the anchor tube by a bottom collar 14 to the lower end of which a gas anchor can be connected if necessary, or an insert pump can be secured if it is desired to pump close to the well bottom instead of above the anchor.

To hold the slips stationary in the well tubing so that the expander sleeve can slide downward in them and force them radially outward into gripping engagement with the tubing, as shown in

Fig. 2, a plurality of drag springs 16 are attached at their lower ends to the carrier sleeve 13 from which they extend upwardly and outwardly to frictionally engage the well tubing and tend to prevent the carrier sleeve and slips from moving downwardly therein. However, it will be understood that except when the anchor has reached a level in the tubing where it is desired to set the anchor, the carrier sleeve and slips must move downwardly with the rest of the anchor so that the slips will not be expanded and stop the anchor. Accordingly, a key 17 is rigidly mounted on the anchor tube in such position that it normally engages the top of the carrier sleeve and moves it downward with the anchor tube and expander sleeve. To permit the anchor tube to slide down in the carrier sleeve when it is desired that sleeve 7 should expand the slips to set the anchor, the carrier sleeve is provided with a longitudinal slot 18 for slidably but snugly receiving the key (Fig. 2) when the anchor tube is turned by the sucker rods to bring the key to the top of the slot.

The sucker rods, by which a pump anchor is lowered, are generally lowered into the well tubing by a cable. Due to the tendency of cables to twist as they are let out, it frequently happens that the anchor is rotated as it is lowered in the tubing, but as ordinary drag springs on a carrier sleeve tend to restrain the latter from all movements in the tubing, the anchor tube would be rotated in the carrier sleeve. As soon as this rotation reached the point where the key registered with the upper end of the carrier sleeve slot, the key and tube with the expander sleeve would drop down, expand the slips and set the anchor.

It is a feature of this invention that means have been provided for preventing such accidental setting or tripping of the anchor to a large extent. Accordingly, carrier sleeve 13 is provided at one side of slot 18 with an upwardly projecting lug 19 which, when engaged on the side farthest from the slot by key 17 on the rotating anchor tube, causes the carrier sleeve to be carried around with the tube so that there is no relative movement between them. This prevents the key from accidentally reaching the top of the slot from one side, as shown in Fig. 1, but not from the opposite side which is kept open to allow the key to enter the slot when the anchor is to be set.

To keep the key from working around the top of the carrier sleeve in the opposite direction and accidentally tripping the anchor, the upper end of the carrier sleeve is provided with a notch 20 into which key 17 projects. The side of this notch farthest from the slot in the carrier sleeve is inclined so that the key can be turned around the top of the sleeve to the slot by merely turning the anchor tube, and without first lifting it to release the key from the notch, which is one of the features of this invention. The inclination of the side of the notch is sufficient to prevent the key from moving up out of the notch of its own accord while the anchor is descending.

An additional precaution against accidental tripping of the anchor may be provided by bending a portion of each drag spring to cause it to extend diagonally or spirally part way around well tubing 1. A drag spring of the type of springs 16 is provided with an outwardly bent portion 21 extending from a corner of its free end diagonally across the spring to its opposite side near its base. It is the edge of this diagonal portion only that engages the well tubing, the edge being suitably curved to conform to the curvature of the tubing. The diagonal portions of the drag springs all extend in the same direction around the carrier sleeve which, due to the springs engaging the well tubing at an angle to the vertical, is caused to rotate as it is lowered and to thereby hold lug 19 against the key on the side farthest from the slot. In some cases these drag springs may be sufficient to prevent accidental tripping, without the use of notch 20.

The diameters of bottom collar 14 and the cylindrical portion of head 4 are substantially the same and are slightly greater than those of packing 9 and the cylindrical portion of the expander sleeve. The reason for this is to allow for some stretching of the packing in use without its projecting outwardly beyond the head where it might drag against the well tubing as the anchor is lowered and be pushed up on the head. When paraffine conditions exist in the tubing the enlarged bottom collar serves to clean out the tubing in front of the packing and expander sleeve.

The manner in which the pump anchor described above is used will now be described in more detail.

When a well is to be pumped by means of an insert pump, the pump is attached to the upper end of the anchor and both are lowered into the well tubing by sucker rods until the pump has reached the pumping level, whereupon the anchor is set in order to anchor the pump in that position. As the anchor is lowered in the well tubing the parts are in the position shown in Fig. 1 with key 17 engaging carrier sleeve 13 in notch 20 so that expander sleeve 7 can not expand the slips against the tubing, and head 4 can not expand the resilient packing.

If the anchor tube rotates clockwise, as seen from above, while it is being lowered, the key strikes against lug 19 which prevents it from entering the slot in the carrier sleeve. On the other hand, if the anchor tube rotates in the opposite direction the carrier sleeve again rotates with it because the key engages the inclined side of notch 20, and because diagonal portions 21 of the drag springs which engage the well tubing turn the sleeve in a counterclockwise direction, as it descends in the tubing. Thus, whichever way the anchor tube rotates, the lug 19 and the key are held in contact with each other and the possibility of the key working around the top of the sleeve to the slot and accidentally tripping the anchor before it should be set is very remote.

When the pumping level is reached the sucker rods are turned counterclockwise to move the key around the top of the carrier sleeve to the top of slot 18. This is done without requiring the anchor tube and key to be raised to release the key from notch 20, which would make setting of the anchor in a predetermined position very difficult. As soon as the key registers with the slot there is nothing to push the carrier sleeve further down in the well tubing against the resistance offered by the frictional engagement of the drag springs with the tubing, but the anchor tube continues to move downwardly in the stationary carrier sleeve. The expander sleeve likewise continues to descend relative to the carrier sleeve until it has expanded or wedged the slips radially outward into gripping engagement with the well tubing, as shown in Fig. 2. The setting of the slips halts further movement of the expander sleeve, but the weight of the pump and sucker rods on head 4 continues

to move it downwardly towards the two sleeves, both of which are now stationary, until the tapered portion of the head has expanded the resilient packing into sealing engagement with the inner face of the well tubing. The pump anchor is now properly seated in the tubing.

Due to variations in the internal diameter of well tubing it may happen that in order for packing 9 to be pressed tightly against the tubing the tapered portion of the head must move downwardly in the expander sleeve for a greater distance at one time than at another. Therefore, to prevent the downward movement of the tapered portion of the head in the expander sleeve from being prematurely limited by engagement with the inside of the cylindrical portion of the sleeve, the latter is provided with a plurality of longitudinal slots 24 extending downwardly from its upper end. Thus, as shown in Fig. 2, if the tapered portion of the head engages the expander sleeve before the packing has been sufficiently expanded, the upper portion of the expander sleeve is also expanded by the head.

In order to assist in preventing head 4 from being raised in the packing by the up-stroke of the insert pump and thereby releasing the packing and slips, the tapered portion of the head is preferably provided with a plurality of circumferential grooves 26 with which the resilient packing interlocks. The frictional engagement of the packing with the well tubing and with the tapered portion of the head together with the gripping effect produced by the grooves is sufficient to hold down the anchor against the upward pull exerted on the head on each up-stroke of the pump. As will be seen in Fig. 2, the packing is tightly compressed between the metal head, the top of sleeve 7 and the wall of the well tubing. The narrow top of the packing is under the pressure of the column of fluid above it. The top of the expander sleeve forms a rigid support for nearly the entire packing. This construction permits the head to pack down solidly so that there is substantially no relative movement between the head and packing and between the packing and tubing which would rapidly wear away and break down the packing.

Head 4 may be provided with a plurality of radial openings 25 that are covered by the packing when the anchor is set, but which are disposed above the packing when the head is raised to release the packing, whereby fluid above the packing is permitted to drain through the head and the anchor tube when pulling the pump and anchor from the well for repairs.

The anchor is released by merely pulling up on the sucker rods which raise the head sufficiently to release the packing from the tubing and to pull the expander sleeve up in the slips to likewise release them from the tubing, whereby the entire anchor can then be raised or lowered and reset at any other level in the tubing. When the key is pulled out of the top of the slot in the carrier sleeve on releasing the anchor, the rods are turned to move the key around the sleeve to notch 20.

A pump anchor constructed in accordance with this invention can be set and reset at any desired levels in the well tubing without the use of an anchor pipe extending to the bottom of the well and without pulling the tubing. This results in a great saving in time and money. The anchor is small, compact and inexpensive. It securely supports and holds down an insert pump, but it can be quickly released from the well tubing and set at another level therein. While it is being shifted from one position to another in the tubing the possibility of its being accidentally tripped is very small.

In the modification shown in Fig. 3 the drag springs 31 are the conventional bow type without diagonal portions engaging the well tubing. To cause carrier sleeve 32 to rotate with anchor tube 33 as the pump anchor is lowered in tubing 34, the upper end of the sleeve is provided with a key-receiving notch 36 of the same form as notch 20 in Figs. 1 and 2.

One type of positive means for holding down expander sleeve 39 and packing member 41 to prevent them from working up on the head while the anchor is being lowered is also shown in Fig. 3. This consists of a coil spring 42 encircling the anchor tube between a shoulder 43 in the expander sleeve and the lower end of head 44. This spring biases the head and expander sleeve away from each other, and as the upper end of the sleeve is provided with a circumferential groove 46 into which a lip 47 on the lower end of the packing projects, the packing is likewise biased downwardly away from the head. Of course, when the anchor is set the coil spring is compressed.

Head 44 is frusto-conical throughout the major portion of its length, thereby leaving but little space between its upper end and the well tubing into which sand can pack. This embodiment is set and reset in the well tubing in the same manner as the embodiment first described.

According to the provisions of the patent statutes, I have explained the construction and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, and a sleeve slidably mounted on said tube with its upper end engaging the packing and adapted to be held stationary in the well tubing while said head moves downwardly relative thereto to expand said packing into frictional engagement with said tubing, said tapered head being provided with a plurality of circumferential grooves into which portions of the expanded packing are compressed to aid in restraining upward movement of the head in the packing.

2. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, and a sleeve slidably mounted on said tube with its upper end engaging the packing and adapted to be held stationary in the well tubing while said head moves downwardly relative thereto to expand said packing into frictional engagement with said tubing, said sleeve being provided with a plurality of slots extending downwardly from its upper end whereby the sleeve is expansible.

3. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, and a sleeve slidably mounted on said tube with its upper end engaging the packing and adapted to be held stationary in the well tubing while said head

moves downwardly relative thereto to expand said packing into frictional engagement with said tubing, said sleeve being provided with a plurality of slots extending downwardly from its upper end whereby the sleeve is expansible, said tapered head being provided with a plurality of circumferential grooves into which portions of the expanded packing are compressed to aid in restraining upward movement of the head in the packing.

4. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, a sleeve slidably mounted on said tube with its upper end engaging the packing, and means for halting downward movement of said sleeve in the well tubing whereby to permit said head to move downwardly relative thereto to expand said packing into frictional engagement with said tubing, said tapered head being provided with a plurality of circumferential grooves into which portions of the expanded packing are compressed to aid in restraining upward movement of the head in the packing.

5. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, a sleeve slidably mounted on said tube with its upper end engaging the packing, and means for halting downward movement of said sleeve in the well tubing whereby to permit said head to move downwardly relative thereto to expand said packing into frictional engagement with said tubing, said means being rendered operable by turning said anchor tube without lifting it.

6. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, and a sleeve slidably mounted on said tube with its upper end engaging the packing and adapted to be held stationary in the well tubing while said head moves downwardly relative thereto to expand said packing into frictional engagement with said tubing, said tapered head being provided with a plurality of radial drain openings therethrough above the packing, said openings being covered by said packing when the packing is in expanded position.

7. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end thereof, a resilient packing surrounding said head, a downwardly tapered expander sleeve slidably mounted on said tube with its upper end engaging the packing, a carrier sleeve slidably mounted on the tube below said expander sleeve, a plurality of expansible slips slidably disposed on said expander sleeve and connected to said carrier sleeve, means connected to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for causing the carrier sleeve to rotate with the tube as the pump anchor is lowered in said well tubing.

8. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end of the tube, a collar secured to the lower end of the tube, a resilient packing surrounding said head and having an outer diameter less than that of said collar and head, a downwardly tapered expander sleeve slidably mounted on said tube with its upper end engaging the packing, expansible slips slidably disposed on said sleeve, a carrier sleeve slidably mounted on the tube below said expander sleeve, resilient members connecting the slips to the carrier sleeve and biasing them radially inward, means secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for causing the carrier sleeve to rotate with the tube as the pump anchor is lowered in said well tubing.

9. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end of the tube, a resilient packing surrounding said head, an expander sleeve slidably mounted on said tube and having an upper cylindrical portion engaging said packing and a downwardly tapered lower portion, said cylindrical portion being provided with a plurality of slots extending downwardly from its upper end, expansible slips slidably disposed on the tapered portion of said sleeve, a carrier sleeve slidably mounted on the tube below said expander sleeve, resilient members connecting the slips to the carrier sleeve and biasing them radially inward, means secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for causing the carrier sleeve to rotate with the tube as the pump anchor is lowered in said well tubing.

10. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end of the tube and provided with a plurality of circumferential grooves, a resilient packing surrounding said head, a downwardly tapered expander sleeve slidably mounted on said tube with its upper end engaging the packing, expansible slips slidably mounted on said sleeve, a carrier sleeve slidably disposed on the tube below said expander sleeve, resilient members connecting the slips to the carrier sleeve and biasing them radially inward, means secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for rotating the carrier sleeve with the tube as the pump anchor is lowered in said well tubing.

11. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly taperd tubular head secured to the upper end thereof, a resilient packing surrounding said head, a downwardly tapered expander sleeve slidably mounted on said tube with its upper end engaging the packing, a carrier sleeve slidably mounted on the tube below said expander sleeve, a plurality of expansible slips slidably disposed on said expander sleeve and connected to said carrier sleeve, means

connected to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, means for rotating the expander sleeve with the tube as the pump is lowered into said well tubing, and means for positively holding said packing on the lower portion of said head during said lowering of the pump.

12. A pump anchor for use in well tubing, comprising an anchor tube, a downwardly tapered tubular head secured to the upper end of the tube, a resilient packing surrounding said head, a downwardly tapered expander sleeve slidably mounted on said tube and being provided with an internal shoulder, the upper end of said sleeve and the lower end of the packing being formed for interlocking engagement, a coil spring encircling said tube in said sleeve and compressed between the lower end of said head and said shoulder, expansible slips slidably disposed on said sleeve, a carrier sleeve slidably mounted on the tube below said expander sleeve, resilient members connecting the slips to the carrier sleeve and biasing them radially inward, means secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for rotating the carrier sleeve with the tube as the pump anchor is lowered in said well tubing.

13. A pump anchor for use in well tubing, comprising an anchor tube, a carrier sleeve slidably mounted thereon, a plurality of expansible slips surrounding the tube and connected to the carrier sleeve, means secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, means for expanding said slips into gripping engagement with the well tubing when said tube moves downwardly in the sleeve, and means for causing the carrier sleeve to rotate with the tube as the pump anchor is lowered in said well tubing.

14. A pump anchor for use in well tubing, comprising an anchor tube, a carrier sleeve slidably mounted thereon, a plurality of expansible slips surrounding the tube and connected to the carrier sleeve, means secured to the carrier sleeve for frictionally engaging the well tubing, a key projecting from said tube above the carrier sleeve for normally limiting downward movement of the tube relative to said sleeve, the carrier sleeve being provided with a longitudinal slot for receiving said key when the tube is turned in said sleeve to bring the key into registry with the slot whereby the tube and key are permitted to move downwardly in the carrier sleeve, a resilient packing, means for expanding said slips and packing into sealing engagement with the well tubing when said tube moves downwardly in the sleeve, and means for causing the carrier sleeve to rotate with the tube as the pump anchor is lowered in said well tubing.

15. A pump anchor for use in well tubing, comprising an anchor tube, a carrier sleeve slidably mounted thereon, a plurality of expansible slips surrounding the tube and connected to the carrier sleeve, a plurality of drag springs secured to the carrier sleeve for frictionally engaging the well tubing, means for normally limiting downward movement of the tube relative to the carrier sleeve, the carrier sleeve being provided with a longitudinal slot for permitting said means and tube to move downwardly in the sleeve after the tube is turned therein to bring said means into registry with the slot, and means for expanding said slips into gripping engagement with the well tubing when said tube moves downwardly in the sleeve, the tubing-engaging portions of said drag springs extending diagonally of the anchor tube whereby the carrier sleeve is caused to rotate in the well tubing with said anchor tube in one direction as the pump anchor is lowered in the tubing, and the carrier sleeve being provided with an upwardly projecting portion adapted to be engaged by said means to thereby cause the carrier sleeve to rotate with the anchor tube in the other direction.

16. A pump anchor for use in well tubing, comprising an anchor tube, a carrier sleeve slidably mounted thereon, a plurality of expansible slips surrounding the tube and connected to the carrier sleeve, a plurality of drag springs secured to the carrier sleeve for frictionally engaging the well tubing, a key projecting from said tube above the carrier sleeve for limiting downward movement of the tube relative to said sleeve, the carrier sleeve being provided with a longitudinal slot for receiving said key when the tube is turned in said sleeve to bring the key into registry with the slot to thereby permit the tube and key to move downwardly in the carrier sleeve, and means for expanding said slips into gripping engagement with the well tubing when said tube moves downwardly in the sleeve, the upper end of the carrier sleeve being provided with a notch adapted to receive said key whereby to cause the carrier sleeve to rotate with the anchor tube as they are lowered in the well tubing.

17. A pump anchor for use in well tubing, comprising an anchor tube, a carrier sleeve slidably mounted thereon, a plurality of expansible slips surrounding the tube and connected to the carrier sleeve, a plurality of drag springs secured to the carrier sleeve for frictionally engaging the well tubing, a key projecting from said tube above the carrier sleeve for limiting downward movement of the tube relative to said sleeve, the carrier sleeve being provided with a longitudinal slot for receiving said key when the tube is turned in said sleeve to bring the key into registry with the slot to thereby permit the tube and key to move downwardly in the carrier sleeve, and means for expanding said slips into gripping engagement with the well tubing when said tube moves downwardly in the sleeve, the upper end of the carrier sleeve being provided with a notch adapted to receive said key whereby to cause the carrier sleeve to rotate with the anchor tube as they are lowered in the well tubing, and one side of said notch extending spirally upward to the top of the carrier sleeve.

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