

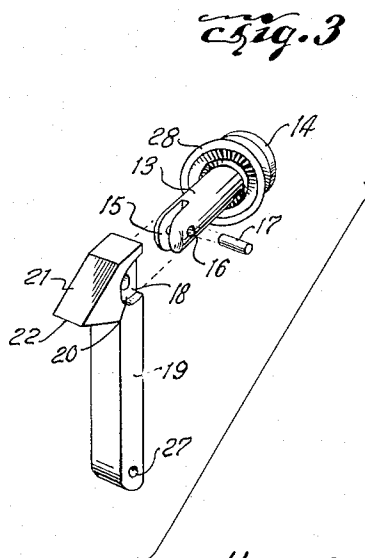
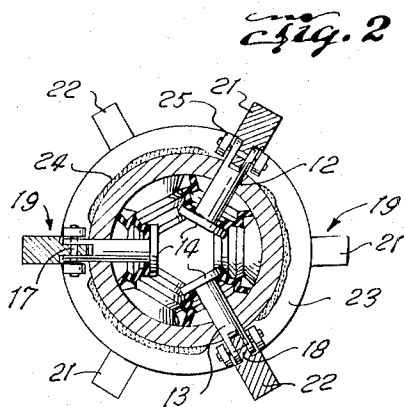
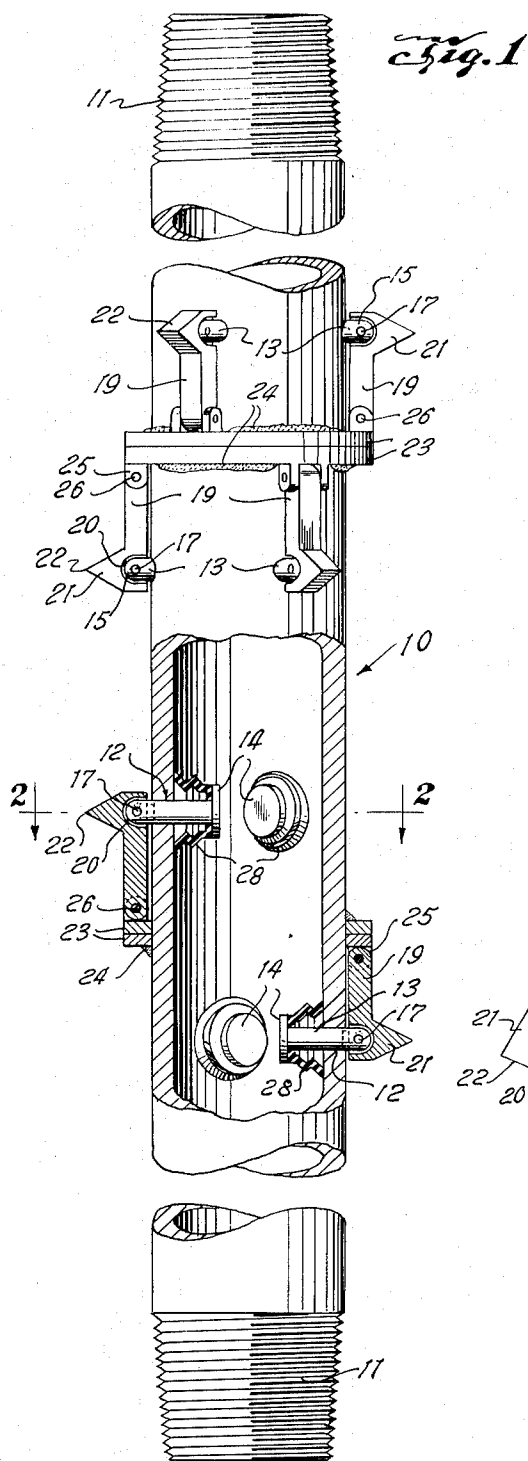
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TUBING ANCHOR

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TUBING ANCHOR

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This invention relates to tubing anchors and more particularly to hold-down anchors for preventing vertical displacement of the tubing in the casing for any reason.

The principal object of the invention is to provide a tubing anchor which, by virtue of its improved construction, insures a more positive anchor against frictional pull and downward thrust of the traveling valve in the tubing tending to dislodge the latter than is afforded by conventional tubing anchors, yet enabling the anchor to be automatically and quickly removed from the casing when necessary or desired. Furthermore, the advantages of the invention over conventional anchors which do not firmly grip the casing, lies in the fact that it actually increases the efficiency of the pump by preventing creeping of the tubing which shortens the effective stroke of the traveling valve.

Another object of the invention is to provide an elongate body of upset tubing having groups of circumferentially spaced pistons or plungers reciprocable in lateral bores in the body, held normally retracted by rubber sleeves and extendable by fluid pressure applied internally of the tubing, said plungers being adapted to exert an outward thrust to urge a series of dogs against the inner wall surfaces of the casing to hold the tubing against slippage therein, the dogs being pivoted to the tubular body and present adequate surface exposed to pressures intermediate the casing and tubing which are brought to bear to retract the plungers, aided by the rubber sleeves, to disengage the dogs from the casing.

Other objects will appear as the description proceeds, when considered with the annexed drawing, wherein:

Figure 1 is an elevational view of the invention with parts torn away to disclose internal parts.

Figure 2 is a transverse sectional view taken on line 2—2 of Figure 1, and

Figure 3 is a perspective view of a dog and plunger assembly.

Continuing with a more detailed description of the drawing, reference numeral 10 denotes generally the elongate and upset tubular body of the tubing anchor which is provided at each end with a threaded portion 11 by which it is incorporated in a string of pump tubing, not shown. It is, of course, evident that one or more of the tubing anchors may be employed in spaced relationship in the tubing string as may be considered necessary.

At longitudinally spaced points in the wall of the body, 10 is a plurality of groups of circumferentially spaced bores 12. In each group there is a series of bores spaced longitudinally from a companion series but are annularly staggered in relation to the first series of bores, thus to provide a sufficient number of plungers 13, which are reciprocable in the bores, without crowding within the tubular body nor weakening the walls thereof.

Each of the plungers 13 is provided with a disc-like head 14 and are inserted into the inside of the tubular body 10. Each plunger 13 has a bifurcated end 15 opposite the head 14 which is exteriorly of the body 10 and a bore 16 (Figure 3) is made through the bifurcated end

of the plunger to receive a pin 17 which pivotally connects the end of the plunger with an apertured web 18 defined in one end of a dog 19 by forming recesses 20 on opposite sides of the dog to reduce the thickness thereof. The ends of the dogs to which the outer ends of the plungers 13 are connected are each formed into a head 21 provided with a chisel point 22 adapted to bite into the walls of a well casing in which the tubing string is suspended and thus hold the tubing against vertical displacement.

Each of the dogs in one series of each group is pivotally connected to a ring 23 which surrounds the tubular body 10 and is welded thereto at 24. This ring has a plurality of pairs of ears 25 integral therewith and disposed perpendicularly to the plane of the ring in order to lie parallel with the walls of the body 10. The ears have matching apertures to receive a pin 26 which extends through an aperture 27 in the end of the dog 19 opposite the head 21 thereof and which lies between the ears 25. The rings 23 are disposed in pairs on the body 10 in abutting relationship, with the ears 23 thereof extending in opposite directions, thus to dispose the series of dogs in each group in like positions to function opposite each other. To permit the small amount of arcuate displacement necessary between the plungers 13 and the dogs 19 at their pivotal points 17, the apertures in the webs 18 of each dog is elongated, as shown in dotted lines in Figure 1.

Surrounding each of the plungers 13 within the body 10 is a compressible sleeve 28 of trunco-coniform shape and preferably in bellows form, as shown, for ready collapsibility. The small end of the sleeves engage under the heads 14 of the plungers while the large ends thereof are in sealing engagement with the inner wall surfaces of the body 10. It is evident that due to the naturally resilient characteristic of the sleeves 28, the plungers 13 are held normally retracted thereby.

When it is desired to position the tubing anchor in a casing, fluid under pressure introduced into the tubing will be applied against the heads 14 of the plungers 13, overcoming the resistance of the rubber sleeves 28 and urging the plungers outwardly to rotate the dogs 19 outwardly on their pivots 26, bringing their chisel points 22 into gripping engagement with the casing walls where they are held until pressure within the tubing is relieved, whereupon the rubber sleeves 28 retract the plungers into the tubular body 10.

Pressure of fluid between the walls of the tubing string and the casing, acting against the exposed surfaces of the dogs 19 in the aggregate, urges the dogs inwardly, which action supplements the force exerted by the sleeves 28 to restore the plungers to their retracted positions.

It is therefore evident that while there is fluid within the tubing, adequate force is applied to the aggregate surfaces of the plunger heads 14 to propel the plungers outwardly and to hold the dogs against the casing with such force as to positively prevent slippage of the tubing string from any position in which it is fixed. This not only prevents damage to the tubing by downward stresses imposed thereon by pump action but also improves the power and efficiency of the pump which results in increased production from a well.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. A tubing anchor adapted for incorporation in a string of tubing in a well casing, and comprising a tubular body having threaded ends and a plurality of longitudinally spaced groups of circumferentially spaced transverse bores in the walls thereof, a longitudinally reciprocable

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plunger in each of said bores and extending through the wall of said body, said plungers each having a substantially flat head on one end interiorly of said body and having a bifurcated opposite end exteriorly of said body, a plurality of pairs of rings embracing said body in longitudinally spaced relationship and affixed thereto, one ring of each pair having annularly spaced and upwardly directed ears, the companion ring of each pair having annularly spaced and downwardly directed ears, a dog pivoted at one end between the ears of each ring and having an integral head defining an outwardly directed chisel point engageable with the walls of said casing, means pivotally connecting the opposite end of said dog with a plunger and elastic means embracing said plunger interiorly of said tubular body for normally holding said plunger in retracted position.

2. A tubing anchor adapted for incorporation in a string of tubing in a well casing, comprising an elongate tubular body having threaded ends and a plurality of groups of longitudinally spaced and annularly arranged cylindrical bores in its walls, a plurality of rings embracing said body, each having a series of pairs of annularly spaced ears thereon, a dog having one end pivoted between said ears and having a head on its opposite end disposed adjacent one of said bores, a plunger reciprocable in said bore and having its outer end pivoted to the head of said dog, a substantially flat head on the inner end of said plunger interiorly of said body, means normally biasing each of said plungers to retracted position and means on the head of each of said dogs for grippingly engaging the walls of said casing under pressure of fluid imposed on the heads of said plungers interiorly of said tubing string and said body.

3. A tubing anchor comprising an elongate tubular body having longitudinally spaced groups of bores in its walls, a plurality of pairs of rings in longitudinally spaced relationship on and affixed to said body, a series of dogs pivoted at one end to the rings of each pair and directed upwardly and downwardly in parallelism with the walls of said body, a head on each dog having an outwardly di-

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rected gripping means thereon, a plunger reciprocable in each of said bores having one end exposed to fluid pressures within said body and its opposite end pivotally connected to one of said dogs to exert an outward thrust on said dog under pressure imposed on its inner end and means embracing each of said plungers resisting said fluid pressures to restore said plungers to retracted positions when extended by said fluid pressures.

4. A tubing anchor as set forth in claim 3, said means for restoring said plungers to retracted positions comprising a rubber sleeve having one end engaging under the head of said plunger and its opposite end in sealing engagement with the inner wall surface of said tubular body.

5. The structure of claim 4, said sleeve being of frusto-coniform shape and in bellows form with its small end engaging said plunger head and its large end in sealing engagement with the inner wall surface of said tubular body.

6. A tubing anchor comprising a tubular body having cylindrical bores in its walls in longitudinally spaced groups, a plunger reciprocable in each bore of said groups, a series of elongate dogs each having its tail portion pivoted to said body exteriorly thereof at a point spaced from one of said bores and its head portion pivoted to the outer end of the plunger reciprocable in said bore, a head on each of said plungers exposed to fluid pressures within said tubular body, and gripping means on the head portion of each of said dogs.

7. The structure of claim 6 and a sleeve of resilient material embracing each of said plungers and effective to normally hold the same withdrawn into said tubular body against fluid pressure internally of said body tending to extend said plungers.

8. The structure of claim 7, said sleeves being of frusto-coniform shape and collapsible.

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