Jan. 26, 1937. C. S. CRICKMER 2,068,659

TUBING CATCHER

Filed May 7, 1934 2 Sheets-Sheet 1

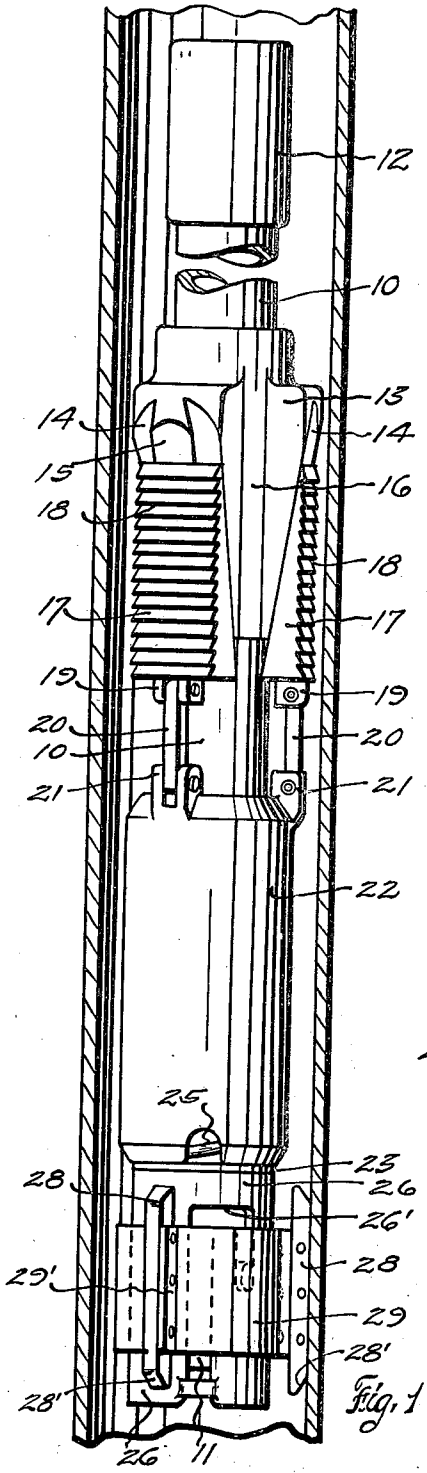


Fig. 1

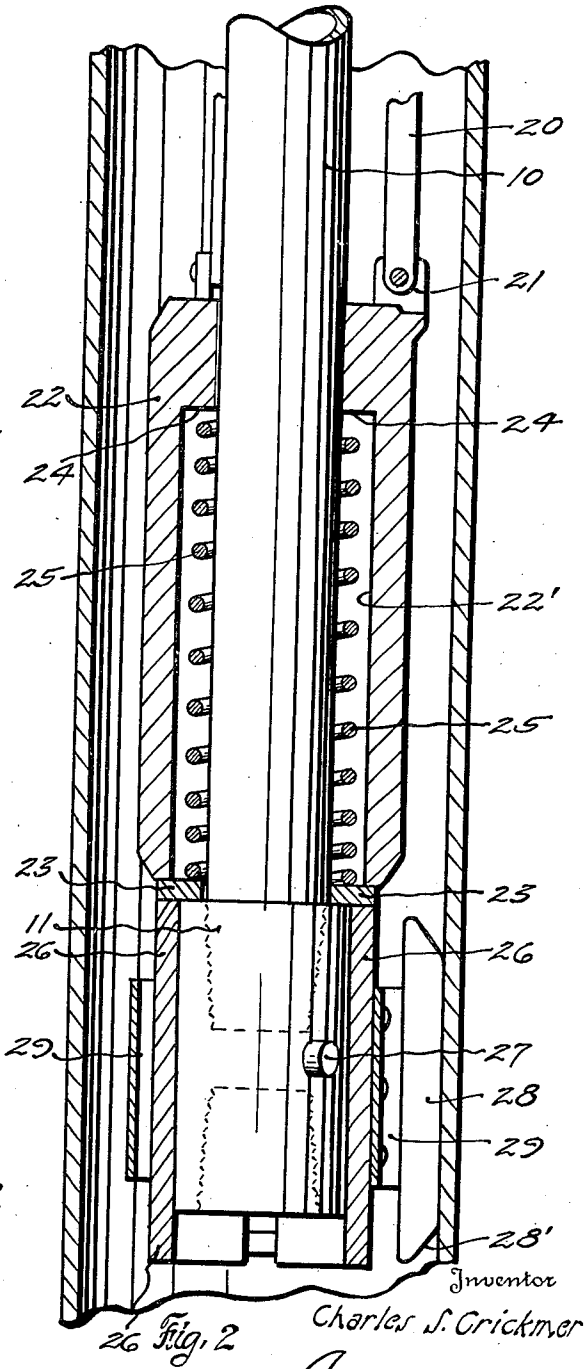


Fig. 2

Inventor
Charles S. Crickmer

By Jack A. Ashley
Attorney

Jan. 26, 1937. C. S. CRICKMER 2,068,659

TUBING CATCHER

Filed May 7, 1934 2 Sheets-Sheet 2

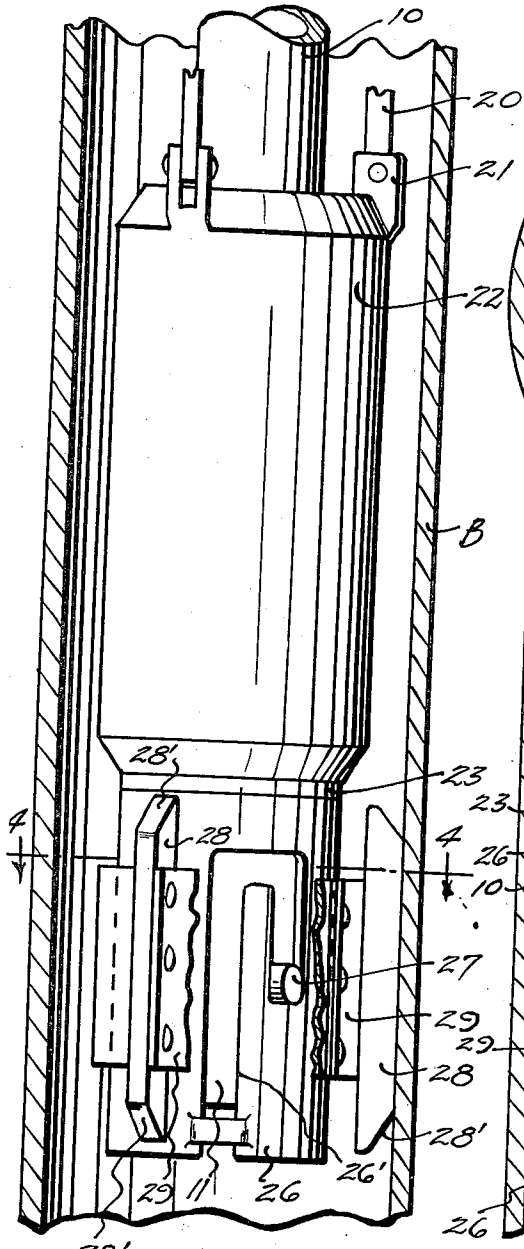


Fig. 3

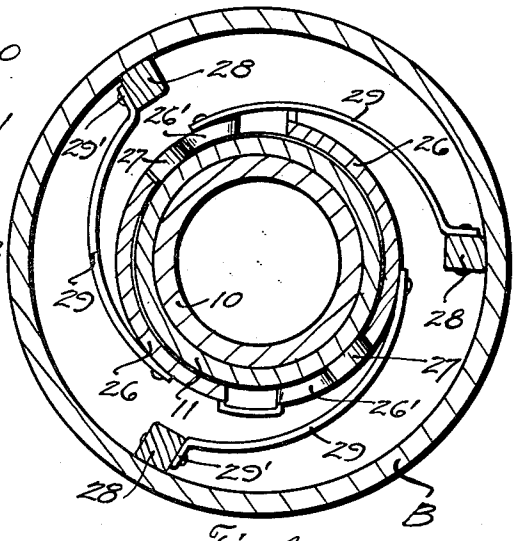


Fig. 4

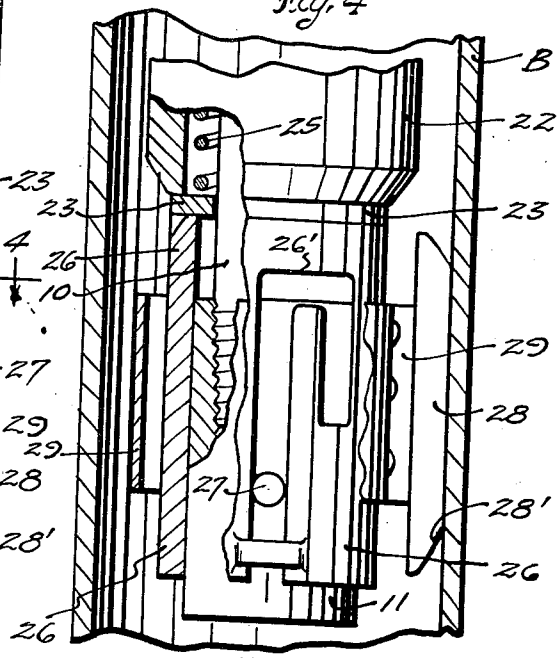


Fig. 5

Inventor
Charles S. Crickmer

By Jacks & Ashley

Attorney

Patented Jan. 26, 1937 2,068,659

UNITED STATES PATENT OFFICE

2,068,659

TUBING CATCHER

Charles S. Crickmer, Dallas, Tex., assignor to The Guiberson Corporation, Dallas, Tex., a corporation of Delaware

Application May 7, 1934, Serial No. 724,375

1 Claim. (Cl. 103—219)

This invention relates to new and useful improvements in tubing catchers.

One object of the invention is to provide an improved tubing catcher which may be used and combined with an improved form of anchor.

Another object of the invention is to provide an improved tubing catcher having amplified slips, whereby greater gripping areas are obtained, and also whereby the slips are supported at their lower end free of the head.

An important object of the invention is to provide an improved tubing catcher which may be combined with an anchor and which is so arranged that the catcher may operate independently of the anchor, or when desired, the anchor may be used to set the slips of the catcher.

A further object of the invention is to provide an improved tubing catcher having radial expanding slip members, said catcher being combined with a friction shoe for well devices having spring pressed runners adapted to engage the inner wall of a well casing or tubing and arranged so as to center the shoe and catcher in said casing or tubing so that when the tubing catcher is operated, the slip members, expanding radially, will equally grip the inner wall of said casing or tubing.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Figure 1 is an elevation of a combined tubing catcher and shoe, constructed in accordance with the invention.

Figure 2 is an enlarged vertical sectional view of the shoe and the weight of the catcher supported thereby.

Figure 3 is an enlarged elevation of the parts shown in Fig. 2, the shoe being in its locked position.

Figure 4 is a horizontal cross sectional view taken on the line 4—4 of Figure 3, and

Figure 5 is a view similar to Figure 3, showing the shoe unlocked.

In the drawings, the numeral 10 designates a tubular mandrel or support which may form a part of the well tubing. The mandrel has a collar 11 at its lower end and a suitable coupling collar 12 screwed onto its upper end for connecting with a string of tubing (not shown). A head 13 is rigidly fastened on the mandrel 10, being preferably made integral therewith.

The head is formed with a plurality of downwardly and inwardly inclined faces 14 which are spaced equally on the side of the head. A dovetailed guide rib 15 extends down the center of each face 14 and between each pair of faces is a vertical channel 16 through which the fluid in the casing passes.

On each face 14 is mounted a slip 17 having its inner side or back flat so as to be against and slide upon the guide face 14. The outer side or front of each slip is curved transversely in an arc substantially concentric to the mandrel 10 and is provided with the usual gripper teeth 18. Each slip is also given a wedge shape being reduced from its bottom to its top. It is preferable to give the back of each slip the same angle of inclination as its correlated face 14 and to make the front of the slip on the same radius throughout thereby positioning the teeth parallel to the inner wall of the casing at all elevations of adjustment.

Each slip is formed with a dovetailed recess in its inner side and this recess is complementary to and receives the guide rib 15. By this arrangement each slip is free to slide vertically on its guide face, but is held against relative outward and circumferential displacement; the equal spacing of the slips is also maintained. When the slips are in their lowermost position on the head, the lower end of said slips extend downwardly below the lower end of the head 13. This permits making the slips longer so as to provide a greater gripping area without changing the angle of inclination of the faces 14. The angle of said faces must be such that only a short displacement of the head downwardly will expand the slips radially to grip the inner wall of the casing and by extending the slips downwardly below the lower ends of the faces, an amplified gripping surface is obtained without sacrificing any other advantages, such as quick action. This is an important feature of the invention. Each slip has a pair of spaced ears 19 on its bottom, which receive and are pivoted to the upper ends of links 20. The lower ends of the links are pivoted between ears 21 of a cylindrical weight member 22, which is freely slidable on the mandrel 10.

The lower end of the weight member rests on and is supported by a washer 23 which in turn, is supported on the upper end of the collar 11. The weight member is provided with a counterbore 22′ extending upwardly from its lower end

and terminating in an annular shoulder 24. A coiled spring 25 surrounding the mandrel is positioned in the bore 22 being partially compressed between the shoulder 24 and the washer 23. The weight having a solid foundation on the washer firmly supports the slips by means of the links 20. The spring is held under such tension as to make the catcher very quick acting.

It is pointed out that when the weight is resting on the washer, the slips are in their retracted or inactive position. By this arrangement the catcher may be freely raised or lowered in the casing when the parts are inactive. The weight resting on a solid support prevents any shimmying or jiggling while the catcher is being raised or lowered in the well. Further, the weight supports the slips by means of the links 20 and thereby eliminates the abutting shoulders common to other catcher at the bottom of the guide faces 14. By eliminating these shoulders, the slips may be extended below the lower ends of the faces, whereby the slips have a greater gripping area.

In using the catcher it is connected in the well tubing by means of the collars 11 and 12. So long as the tubing is raised or lowered under normal conditions in the well casing B the parts remain inactive. Should the tubing be dropped or break at any point above the catcher, the latter will automatically set the slips 17 and quickly catch the tubing without damage or a dangerous fall.

When the tubing falls, the weight 22 owing to its inertia and the tendency of the spring 25 to expand remains relatively stationary to the mandrel 10 which falls faster than said weight. The slips 17 being supported by the weight will be spread by the head 13 which falls with the mandrel. The inclined faces 14 cause the slips to expand radially, whereby their teeth 19 grip the casing. The action takes place so rapidly that the catch is made within a few inches.

As has just been explained, the catcher serves to prevent the fall of the tubing when breakage occurs, and it has been found that the catcher may be readily combined with a friction shoe whereby the slips may be set at any desired point in the casing. The friction shoe is mounted beneath the catcher and includes a cylindrical sleeve 26 which has a free sliding fit on the collar 11 secured to the lower end of the mandrel 10. The collar is provided with diametrically opposite lugs 27 which engage in inverted J-slots 26' being very common in the well art. Normally the lugs engage in the short legs of the slot as is shown in the Figures 1 and 3, the lugs being held in this position by vertical runners 28, which are secured to the sleeve 26 by curved leaf springs or arms 29. The runners frictionally engage the inner-wall of the casing, and serve to hold the sleeve 26 stationary with relation to the collar 11, whereby the upper end of the collar engages the underside of the periphery of the washer 23 (Fig. 2). The inner-ends of the curved leaf springs or arms 29 are riveted, or otherwise fastened to the outer surface of the sleeve at equi-distant points. The arms extend horizontally or transversely in volute curves with relation to the center of said sleeve. These arms may be made of flat spring steel or other metal of such width as is desired under the necessary spring tension. The runners 28 may be secured to the arms 29 in any suitable manner and have their upper and lower ends bevelled at 28' so as to ride over joints and the like in the casing B of the well. While runners may be attached in any suitable way I have shown each arm with a narrow upright flange 29' to which each runner is riveted. This leaves the outer faces or the runner free to travel on the inner-surface of the casing B.

By the use of volute arms it is obvious that amplified spring tension can be obtained. By constructing the shoe so that the arms must be sprung inwardly or retracted to a considerable extent to insert them in the casing B, or by making said arms of heavier spring metal so that they need not be retracted to such an extent, more tension can be obtained than is possible with the usual upright spring arms. Further the runners, engaging the casing at equidistant points and owing to their volute curves, will center the sleeve 26 and thus become guides.

When using the friction shoe to set the slips 17, the assembly is lowered in the casing B the lugs 27 on the collar 11 burying in the lower ends of the short legs of the slots 26' will push the sleeve 26 downwardly whereby the runners 28 carried thereby will slide down the inner-surface of the casing. During this movement, the weight 22 is supported on the washer 23 and, due to the length of the connection between the weight and the slip 17, said slips are in their lowermost or retracted positions on the guide faces 14. This permits the catcher and the string of tubing to be freely moved vertically in the casing. If the tubing above the head 13 should break at any point in the string the catcher would automatically set the slips as hereinbefore explained. It is here pointed out that the frictional engagement of the runners 28, although strong enough to hold the sleeve 26 and weight and slips resting on the washer supported by said sleeve substantially stationary in the casing, is insufficient to support the weight of the tubing string, and therefore when the tubing string breaks it will not prevent its falling. The engagement of the runners 28 with the interior of the casing will at all times hold the mandrel 10 centered within said casting so that when the slips 17 are operated they will grasp the casing evenly.

When the point where the slips are to be set is reached, the mandrel 10 is arrested and lifted upwardly, and the frictional engagement of the runners with the casing will hold the sleeve 26 stationary, whereby the lugs 27 will be moved to the top of the slots. With the lugs in this position, the mandrel 10 may be rotated to bring said lugs over the upper ends of the long legs of the said slots whereby the lugs may be lowered in the said long legs (Fig. 5). During this movement, the sleeve 10 will hold the weight 22 in its arrested position while the mandrel 10 is being moved downwardly. This operation provides for the unlatching of the shoe and causes the slips 17 to expand radially as the head 13 moves downwardly there between.

The amplified tension of the arms 29 assure against movement of the shoes during the unlatching operation. They also hold the elements in the center of the casing so that there is no interference between the assembly and the casing during either the running operation or the unlatching operation. The lengthened gripping face of the slips 17 assure a maximum gripping action when said slips are expanded by the head 13 travelling downwardly.

It is obvious that the catcher may be operated entirely independently of the friction shoe and may be used separately therefrom. If desired,

it would be possible to mount any suitable device beneath the catcher, whereby the slips could be set at any desired point in the casing. It is again pointed out that by extending the slips below the inclined faces 14 it is possible to obtain a greater gripping area without changing the angle of inclination of said faces.

What I claim and desire to secure by Letters Patent is:

A tubing catcher comprising, an axial support, a head mounted on the support, radially movable slips mounted on said head normally having their lower ends extending below said head, short links pivoted to the lower ends of said slips and depending therefrom, a weight supported by and slidable on said support and to which the lower ends of said links are pivoted, whereby said slips are supported by the weight, a collar rigidly mounted on the lower end of said support, a washer slidable on said support normally resting on said collar and supporting said weight, a coiled spring surrounding said support within said weight for partially supporting said weight, said spring and weight being carried by said washer, an anchor sleeve slidable on said support and adapted to support said washer when the slips are being set in a casing, and spring pressed shoes carried by said anchor sleeve cooperating with the casing for centering the catcher therein during normal reciprocating movements therein and for effecting an actuation of the slips to grip the casing during abnormal downward movements of the members.

CHARLES S. CRICKMER.