

Jan. 16, 1940.

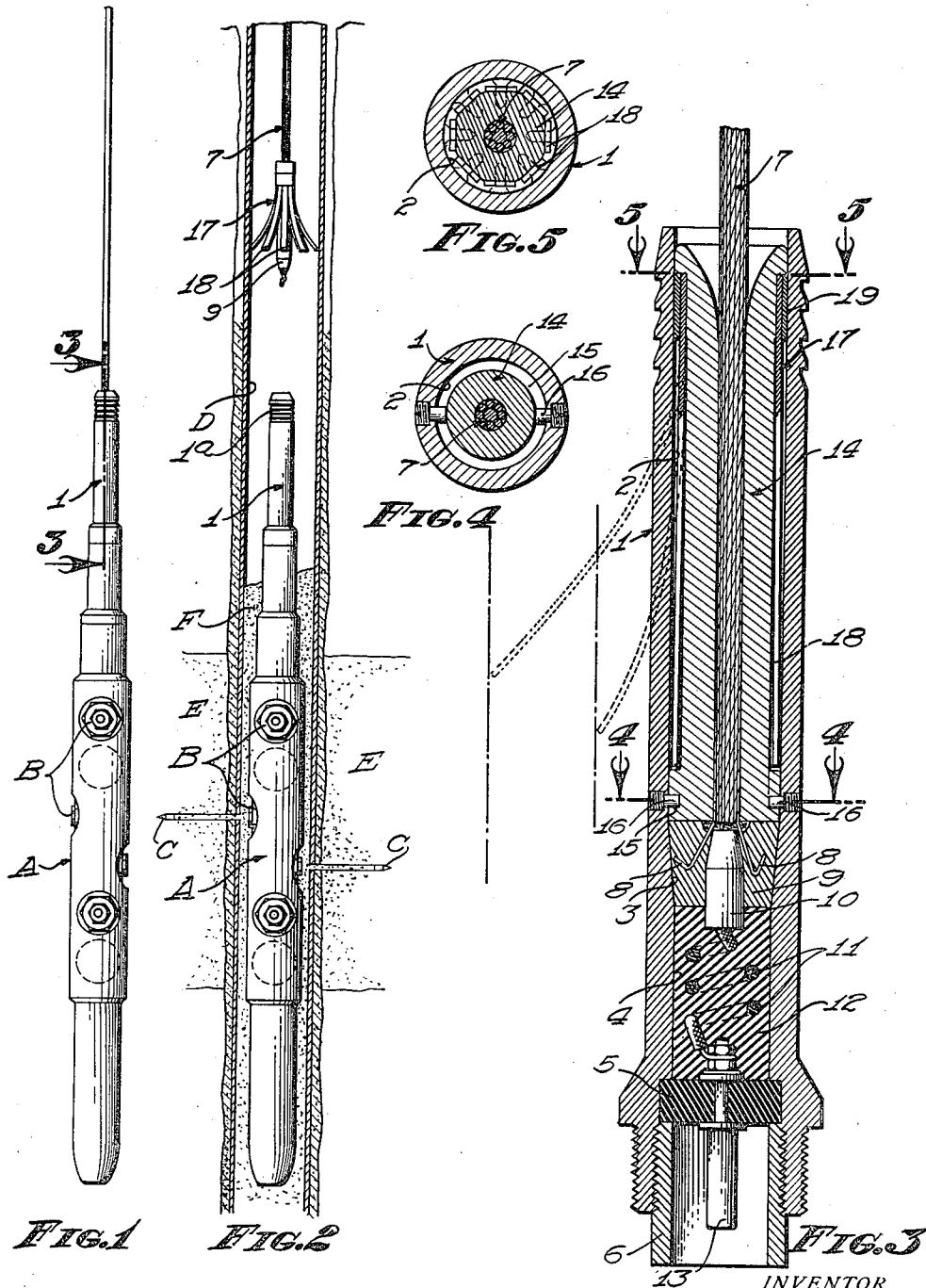
C. H. BARNES

2,187,007

RELEASABLE CABLE HEAD

Filed March 29, 1938

2 Sheets-Sheet 1



INVENTOR
CHARLES H. BARNES
BY Lloyd Spencer.
ATTORNEY

Jan. 16, 1940.

C. H. BARNES

2,187,007

RELEASABLE CABLE HEAD

Filed March 29, 1938

2 Sheets-Sheet 2

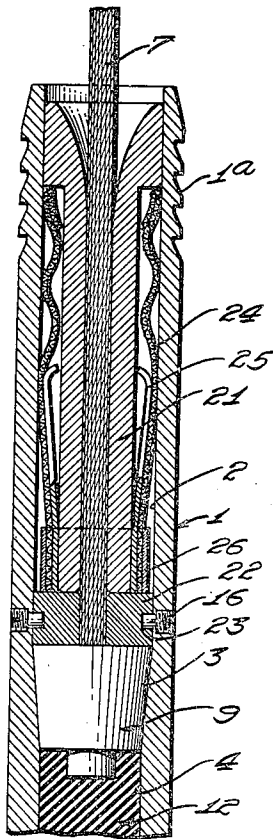


FIG. 6

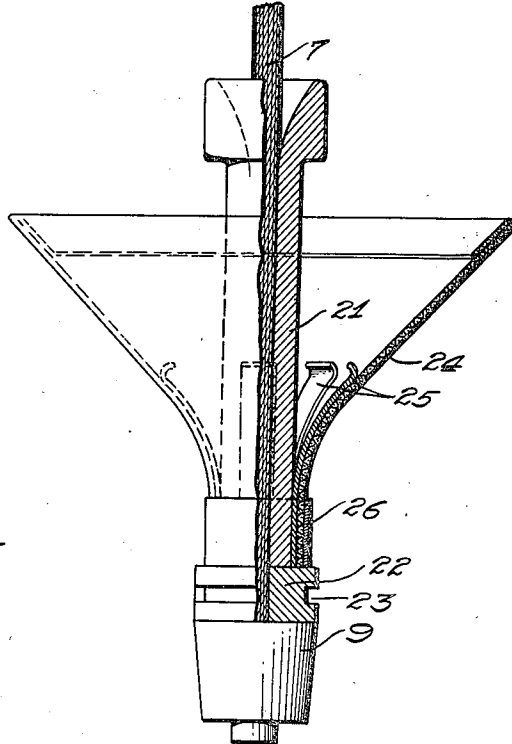


FIG. 7

INVENTOR
CHARLES H. BARNES
BY *David Spencer*
ATTORNEY

UNITED STATES PATENT OFFICE

2,187,007

RELEASABLE CABLE HEAD

Charles H. Barnes, Glendale, Calif., assignor to
Lane-Wells Company, Los Angeles, Calif., a
corporation of Delaware

Application March 29, 1938, Serial No. 198,677

5 Claims. (Cl. 24—115)

My invention relates to releasable cable heads, more particularly to releasable cable heads for oil well tools, and among the objects of my invention are:

5 First, to provide a device of this character which is designed to be interposed between a cable and tool suspended thereon whereby, should the tool become wedged or sanded in a well, the cable may be disconnected from the tool and removed so that a fishing job may be undertaken to retrieve the tool;

10 Second, to provide a device of this class which in no manner interferes with the normal operation of the tool suspended from the cable, or with any electrical connections that may be provided therebetween in the event that the device is associated with an electric cable and electrically responsive well tool;

15 Third to provide a device of this character which is so arranged that danger of accidental operation, and therefore accidental disconnection of the tool from the cable, is avoided, whereby the device may remain inoperative for long periods of time while the tool and cable are used repeatedly;

20 Fourth, to provide a device of this character which is designed to operate, that is, disconnect the cable from the tool upon application of a predetermined tension on the cable, the amount of which may be so determined that at no time can the device be subject to such tension unless the tool is restrained in the well bore;

25 Fifth, to provide a device of this class which is particularly designed to establish an inertia drag on the cable when it parts from the tool, whereby the cable is restrained from suddenly snapping up the casing when freed, thereby avoiding kinking or tangling of the cable so that the cable, except for its extreme end, is in no manner damaged;

30 Sixth, to provide a device of this class which may be employed and relied upon whether the well bore is liquid-filled or dry;

35 Seventh, to provide a device of this character which is particularly compact in design and which may be constructed substantially within the dimensions of a conventional cable head so that it may be substituted in any place a conventional cable head may be employed.

40 With these and other objects in view, as may appear hereinafter, reference is made to the accompanying drawings, in which:

45 Figure 1 is an elevational view of my cable head shown in association with an electric conductor cable and a gun perforator;

Figure 2 is a similar elevational view showing the gun perforator sanded within a casing and the cable head separated therefrom;

Figure 3 is an enlarged longitudinal sectional view through the cable head as it appears when

made up for connection to a tool, said section being taken substantially through 3—3 of Figure 1;

Figure 4 is a transverse sectional view through 4—4 of Figure 3 showing particularly the shear 5 pin;

Figure 5 is another transverse sectional view through 5—5 of Figure 3 showing particularly the upper or secured ends of the restraining cage;

10 Figure 6 is a longitudinal sectional view similar to Figure 3, but with the lower portion omitted, illustrating a modified form of my cable head; and

15 Figure 7 is a partial elevational, partial longitudinal sectional view of the modified form of my cable head as it appears when released.

My special cable head is designed particularly for incorporation between an electric conductor cable and a gun perforator employed to fire projectiles through the walls of a well casing; however, it is within the purview of this invention to employ my cable head in conjunction with any cable or wire rope suspended well tool which might, in the course of its operation, become stuck in the well to the extent that the cable 25 cannot withdraw it.

In the drawings there is illustrated a gun perforator A, preferably of the electrically fired type, having a plurality of gun units B adapted to fire bullets C through the casing D to penetrate the formation E, whereby the cognate fluid may enter the casing. Under some conditions, particularly if the pressure within the casing is low due to a low fluid level and the formation pressure high, sand is forced into the perforations with sufficient speed and pressure to pack around the perforator so that it cannot be removed with the cable. It is under such circumstances that my cable head functions by permitting disconnection of the cable so that the cable may be withdrawn and the 40 gun later retrieved with a conventional fishing tool.

My special cable head comprises a case 1 which is threaded at its lower end for connection to the gun perforator. The case 1 is in the form of a 45 tube having an upper cage receiving chamber 2 of slightly larger diameter, a tapered portion 3 merging into a lower or conductor chamber 4 of smaller diameter. The lower end of the conductor chamber 4 is closed by a partition 5 held 50 in place by a ring nut 6 which screw-threads into the lower end of the case 1.

A cable 7 which may be a conventional wire line or, as illustrated in the present case, a special conductor core cable, is frayed at its lower end 55 so that its strands 8 may be molded or anchored within a plug 9 adapted to conform to the tapered portion 3 of the casing. Also embedded in the plug 9, which may be formed of zinc or analogous relatively low melting material, is a protector 10 60

through which extends a conductor 11. An excess length of the conductor 11 is coiled within the conductor chamber 4 and the chamber is filled with an insulation material 12. The lower end of the conductor 11 is attached to a terminal 13 which is mounted in the partition 5 and protrudes therefrom for connection to the electrical parts (not shown) of the gun perforator.

Above the plug 9 the cable 7 receives a sleeve 14 which is provided near its lower end with an annular channel 15. Opposite the channel 15, when the cable plug and sleeve are in position within the case 1, said case is provided with threaded apertures which receive shear screws 16, the inner ends of which extend into the channel 15. The shear screws have a predetermined shearing strength so that when this is exceeded the sleeve 14 and plug 9 are withdrawn with the cable 7 from the case 1, the conductor readily breaking in at such time.

If it were not for the fact that the cable, which is formed of helically wound steel wires, is actually an elongated spring which, when suddenly released by shearing of the screws 16, tends to snap up the casing, no further means would be required. In fact, several hundred feet of the cable may thus be ruined, in addition to a possibility of the cable itself becoming stuck in the well bore.

For this reason, means are incorporated on the sleeve 14 to place a drag on the lower end of the cable so that the snapping movement of the cable is adequately snubbed. As shown best in Figures 2 and 3, this arrangement may take the form of a cage 17 comprising a plurality of leaf springs 18 secured by a retaining collar 19 at their upper end around the sleeve 14. The several leaf springs are designed to fly outwardly against the sides of the casing when free of the case 1, but are adapted when held within the case to occupy a relatively small amount of space, as shown in Figure 3. The leaf springs have sufficient length so that they are capable of spreading into contact with casings of various diameters, as shown by dotted lines in Figure 3, with sufficient force to exert a material drag so that the cable head functions in dry wells as well as those containing liquid. Furthermore, even though the sand may upwell around the top of the gun perforator, the leaf springs, being readily collapsible, are easily withdrawn through the sand, at the same time offering sufficient drag to prevent snapping of the cable.

Reference is now directed to the structures shown in Figures 6 and 7: In place of the sleeve 14 a sleeve 21 and a collar 22 are substituted. The collar 22 is provided with a channel 23 to receive the shear screws 16. The sleeve 21 and collar 22 together form a structure similar to the sleeve 14, except that the space between the sleeve and the walls of the case 1 is larger than the space provided in the first described structure. Secured to the lower end of the sleeve 21 is a conical shaped basket 24 formed of heavy fabric or analogous flexible material. Within the basket 24 is positioned a plurality of leaf springs 25 which tend to assume a flared position so as to force the basket 24 into an open position. The leaf springs and basket are held around the sleeve 21 by a retaining band 26. The basket 24 and leaf springs 25 are adapted to fit within the space between the sleeve 21 and the case 1, but upon shearing of the screws 16 and separation of the two parts to spread out, as shown in Figure 7,

so that the fluid within the well bore tends to fill into the basket and retard upward movement of the cable. When the shear screws give way and the parts of the cable head separate, the basket 24 spreads out as shown in Figure 7, creating a substantial drag on the cable, particularly if submerged in liquid. It is intended that the basket give way and invert itself should the strain thereon become excessive, and the spreading springs 25 are short enough that they may double backward should they engage the walls of the casing.

With either construction, after the cable is removed, a conventional fishing tool may be lowered to retrieve the gun perforator. To facilitate such fishing operations wickers 1a may be provided on the case 1 and said case made strong enough to withstand the jarring and pulling action of the fishing tool.

Though I have shown and described certain embodiments of my invention, I do not wish to be limited thereto, but desire to include in the scope of my invention the constructions, combinations and arrangements substantially as embraced in the appended claims.

I claim:

1. In a cable head adapted to connect a cable with a well tool; a case adapted to be secured to the well tool; an enlargement at the end of the cable fitting in said case; means releasable upon exerting a predetermined tension between said cable and case to permit separation of the cable and case; and drag means retained on said cable for retarding movement thereof upon being released.

2. In a cable head adapted to connect a cable with a well tool: a case adapted to be secured to the well tool; a connecting means between said cable and case adapted to give way upon exertion of a predetermined tensional strain therebetween; and an expansible drag means attached to said cable and initially contained within said case, said drag means adapted to expand upon separation of the cable from the case to limit the rate of movement of the cable.

3. In a cable head adapted to connect a cable with a well tool: a case adapted to be secured to the well tool; a plurality of expansible spring elements attached to said cable and initially restrained by said case, said spring elements adapted, upon separation of said cable and case, to expand to form a cage offering substantial impedance to movement of the cable; and connection means between said cable and case releasable upon exertion of a predetermined tension on the cable.

4. In a cable head adapted to connect a cable with a well tool: a case adapted to be secured to the well tool; and a plurality of spring elements attached by their upper ends to said cable, their lower ends being free to expand to form a drag for retarding movement of the cable, said spring elements initially fitting in said case.

5. In a cable head adapted to connect a cable with a well tool: a case adapted to be secured to the well tool; and a plurality of spring elements carried by said cable and initially fitting in said case, said spring elements being attached at their upper ends and free at their lower ends to constrict when drawn through a restraining material, such as sand, and otherwise to expand and retard movement of the cable.

CHARLES H. BARNES.