July 20, 1954 F. N. OSMUN 2,684,118

SAFETY SUPPORT FOR LINE-SUSPENDED WELL EQUIPMENT

Filed Oct. 12, 1951

3 Sheets-Sheet 1

Fig. 1

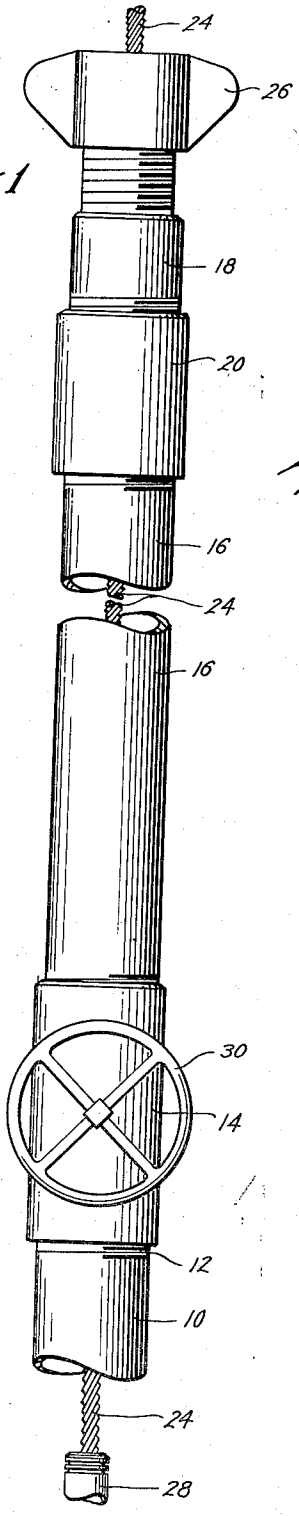
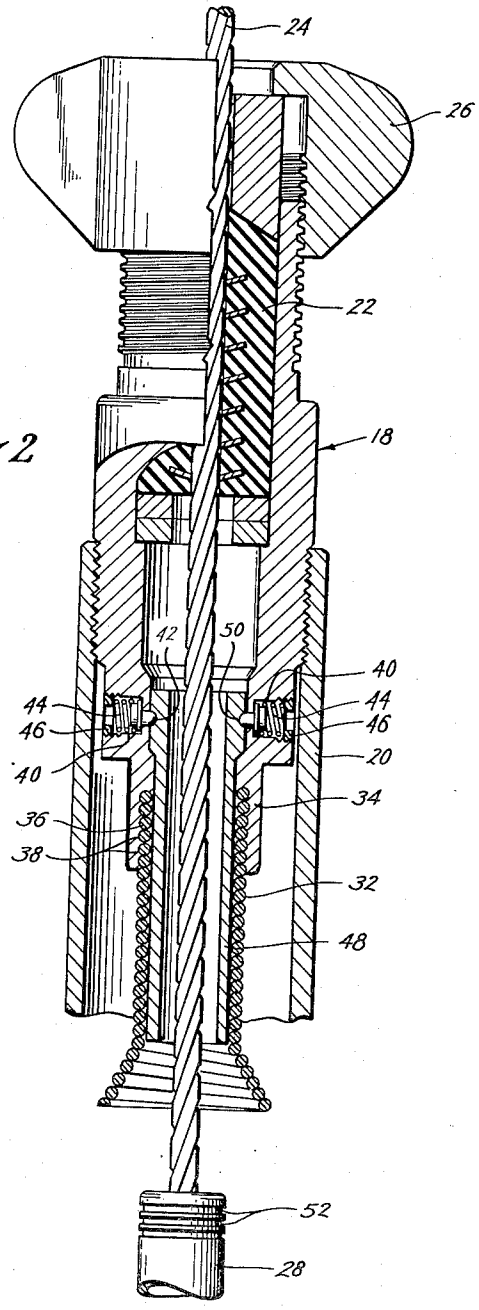


Fig. 2



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Fig. 3

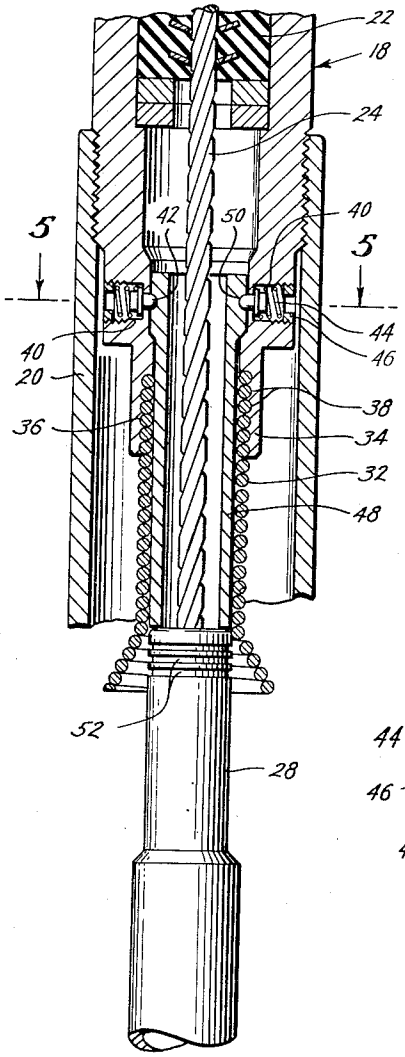
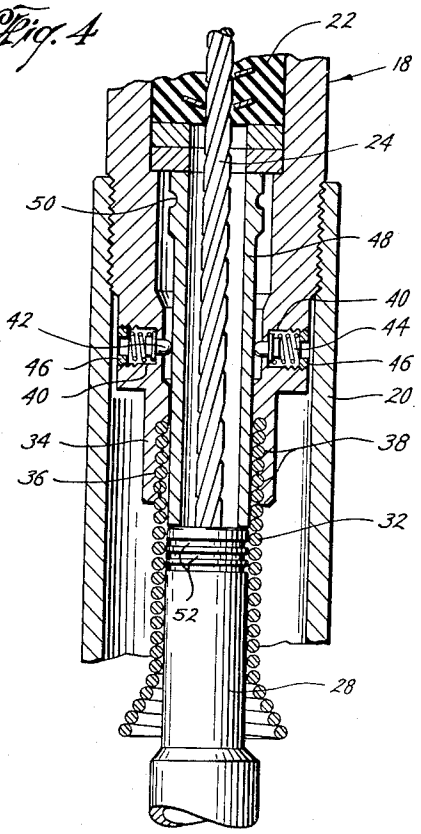


Fig. 4



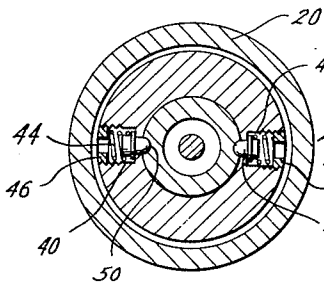


Fig. 5

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Fig. 6

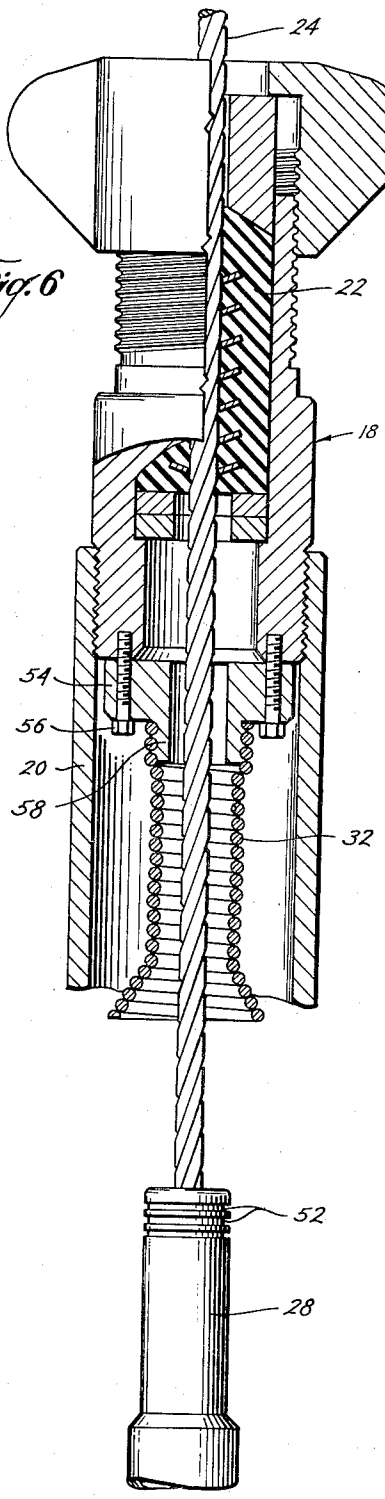
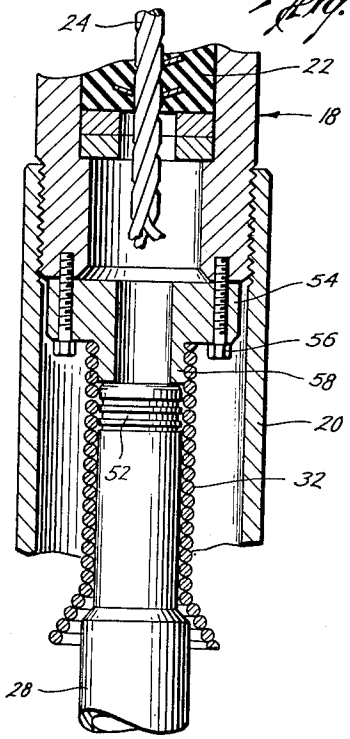


Fig. 7



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2,684,118

SAFETY SUPPORT FOR LINE-SUSPENDED WELL EQUIPMENT

Fred N. Osmun, Houston, Tex.

Application October 12, 1951, Serial No. 251,045

7 Claims. (Cl. 166—70)

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This invention relates to a safety support for line-suspended well equipment, and more particularly to a device for use in connection with line-suspended tools and the like, to catch and hold such tools upon withdrawal of the same from a well, whereby accidental loss of the equipment is prevented.

In carrying out operations in wells, and particularly in oil wells, it is often necessary to make use of line-suspended well equipment of various kinds, such equipment being lowered into the well, either in the open hole, or while the well is under pressure. The line by which such equipment is suspended usually takes the form of a cable or wire, and is customarily marked in some manner, to indicate to the operator when the equipment is about to reach the well head apparatus, so that the withdrawal of the equipment may be stopped, before the same forcibly engages the well head apparatus, which would result in breakage or detachment of the cable or wire, and loss of the equipment in the well. In the event of obliteration of the marking on the cable or wire, however, the operator has no way of knowing when the equipment reaches the well head, and is therefore unable to prevent the damage or loss referred to, which may be caused by overwinding the line.

The present invention contemplates the provision of supporting means which is engageable by line-suspended well equipment, upon withdrawal of the same from a well, and which is adapted to grip and hold such equipment to prevent the same from falling in the well, in the event of accidental detachment from the line.

The invention has for an important object the provision of gripping means incorporated in well head apparatus and adapted to receive and grippingly support equipment attached to a line, upon withdrawal of the equipment from the well, whereby the loss of the equipment in the well by accidental detachment of the line therefrom, is prevented.

Another object of the invention is the provision of a safety support of the character referred to, which includes means for preventing the support, under normal conditions of use, from gripping the line-suspended well equipment, but which is effected by overwinding of the line to permit the support to grip and hold the equipment to prevent the same from falling in the well.

A further object of the invention is to provide a safety support in the form of a coil spring, which is attached to the well head apparatus in position to receive and grip the upper end of a rope socket, upon withdrawal of line-suspended well equipment, to effectively hold such equipment against downward displacement.

A still further object of the invention is the provision of a safety support, which includes a coil spring which is attached to well head apparatus, and is adapted to receive and grip the upper end of a rope socket, said support having means associated therewith to prevent the entrance of the rope socket therein, under normal conditions of use of the apparatus, but which may be engaged by the rope socket and moved to an inoperative position upon abnormal movement of the equipment in withdrawing the same from a well, whereby the rope socket may enter the coil spring and be gripped thereby and held against downward displacement.

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The above and other objects and advantages of the invention are more fully explained in the following description, which constitutes a specification of the invention, when taken in conjunction with the annexed drawings, wherein—

Figure 1 is an assembly view, showing the invention applied to one form of well head apparatus with which it is adapted to be used;

Figure 2 is a side-elevational view, on a somewhat enlarged scale, partly broken away and partly in cross-section, illustrating a preferred form of the invention;

Figure 3 is a fragmentary vertical cross-sectional view, similar to that of Figure 2, showing the invention at the beginning of a movement of the well equipment by which the invention is caused to operate;

Figure 4 is a cross-sectional view similar to that of Figure 3, showing the invention in operation, in gripping engagement with the equipment, and supporting the same;

Figure 5 is a cross-sectional view taken along the line of 5—5 of Figure 3, looking in the direction indicated by the arrows;

Figure 6 is a fragmentary cross-sectional view similar to that of Figure 2, illustrating a somewhat modified form of the invention; and

Figure 7 is a fragmentary cross-sectional view similar to that of Figure 6, showing the form of the invention illustrated therein in operation, in gripping engagement with the well equipment and supporting the same.

The invention is illustrated herein as applied to well head apparatus of the character commonly called a well lubricator, but it will be understood that the safety support can be used with equally satisfactory results on numerous types of well head apparatus whether applied to an open well or to a well which is under pressure.

Such a lubricator assembly is illustrated in Figure 1 of the drawings, wherein the upper end of a string of well tubing is indicated at 10, which is provided with an externally threaded portion 12, for the attachment thereto of a master valve 14. One or more joints of pipe 16, suitably connected together, are threadably attached to the upper end of the master valve, and a line wiper

18, of conventional construction is attached to the uppermost joint of pipe by means of a threaded collar 20.

As best seen in Figures 2 and 6 of the drawings, the line wiper 20 is provided with internal packing 22, of suitable character, adapted to sealingly engage the line 24 by which the well equipment is suspended. Suitable means, which may include a packing nut 26 threadably carried by the upper end of the line-wiper, may be provided, for tightening the packing 22 into engagement with the line. Such well head apparatus forms no part of the present invention, and is illustrated herein merely for the purpose of showing the application of the invention.

The implement or implements which it is desired to lower into the well are attached to the lower end of the line 24 by means of a rope socket 28, or equivalent means. In making use of the well head apparatus described above, the master valve 14 is closed by operation of the hand wheel 30 thereof, and the collar 20 is disconnected from the upper joint of pipe 16, whereupon the line-suspended equipment can be inserted in the lubricator above the valve, and the line wiper replaced by replacement of the collar 20 on the pipe 16. Thereafter, the valve 14 may be opened, and the equipment lowered into the well.

Upon withdrawal of the equipment from the well, by winding up the line 24, it will be readily seen that the equipment is drawn into the lubricator, and in the event that the withdrawal is not stopped at the proper point, the rope socket 28 may be brought into forcible contact with the well head apparatus, and the line thereby broken or pulled out of the socket, resulting in the equipment dropping back into the well. The safety support of the present invention is provided for the purpose of preventing such loss of the equipment by accidental detachment from the line.

As seen in Figures 2 to 5, inclusive, of the drawings, the invention comprises a support in the form of a tightly coiled spring 32, which is conveniently attached to the lower end of the line wiper 18, and extends downwardly therebeneath, to receive the upper end of the rope socket 28. In the present illustration, the line wiper has a lower end portion 34, of somewhat reduced diameter, which is provided with a counter bore 36, into which the upper end of the coil spring 32 extends. The counterbore may be provided with internal grooves or threads 38, for cooperation with the turns of the spring 32, to effectively retain the spring in the counter bore, the external diameter of the spring preferably being such that it fits the counter bore tightly. The coil spring 32 is also of smaller internal diameter than the external diameter of the upper end of the rope socket 28, and may be flared outwardly at its lower end, for the purpose of guiding the rope socket into the support.

Above the reduced end portion 34 of the line wiper the same is provided with oppositely disposed recesses 40, in communication with the inside of the linewiper, and in which plungers 42 are movably disposed, which plungers project inwardly into the interior of the line wiper. The plungers 42 are urged inwardly by coil springs 44, disposed in the recesses outwardly of the plungers, and retained therein by screw plugs 46, or other suitable means

A sleeve or liner member 48 extends into the support 32, and is formed at its upper end with an annular groove 50, into which the inner ends

of the plungers 42 extend, to retain the sleeve in active position in the support. The sleeve 48 is slidable within the line wiper, and in its active position is restrained against such sliding movement by the plungers 42 extending into the annular groove 50. In its active position, the sleeve extends into the support a sufficient distance to form a stop to prevent the entrance of the upper end of the rope socket 28 into the support under ordinary conditions of use of the line-suspended equipment. Upon engagement of the sleeve by the rope socket with sufficient force to overcome the restraining action of the plungers 42, however, the plungers will be pressed outwardly against the springs 44, which permit the sleeve to move upwardly to allow the rope socket to enter the support.

In the use of the invention, as described above, the sleeve is placed in its operative position, and upon withdrawal movement of the line-suspended equipment into the lubricator, the same will be stopped by engagement of the rope socket with the lower end of the sleeve. The line-suspended equipment may then be again lowered into the well and withdrawn as often as may be desired, without becoming stuck in the support 32. In the event, however, that the withdrawal of the equipment is not stopped at the proper point, and the equipment is accidentally brought into forcible contact with the well head apparatus, the upper end of the rope socket 28 engages the sleeve 48 and moves the same upwardly, the upper end portion of the socket entering the support 32, and being gripped thereby, so that upon breaking of the line 24, or the detachment of the same from the rope socket, the equipment cannot fall back into the well.

The upper end portion of the rope socket 28 may be formed with grooves 52, or other means, when desired, to further assure a firm gripping contact between the support 32 and the rope socket.

A somewhat modified form of the invention is illustrated in Figures 6 and 7 of the drawings. The arrangement of the parts of the well head apparatus in this form of the invention is the same as that previously described, but in this case the support 32 is attached to the line wiper in a slightly different manner, and the sleeve 48 is omitted.

In this form of the invention, a connector member 54 is provided, which may be attached to the lower end of the line wiper 18 in any suitable manner, as by means of bolts 56, or the connector member 54 may be cast or otherwise formed as an integral part of the line wiper. The connector member is formed with an annular flange 58 about which the upper end of the coil spring 32 is grippingly engaged, to maintain the support connected to the line wiper. The support 32 may be flared at its lower end in the same manner as previously described, to guide the upper end of the rope socket 28 into the support.

The turns of the coil spring 32 are preferably of a diameter smaller than the external diameter of the flange 58, and also smaller than the external diameter of the upper end portion of the rope socket, so that the support firmly grips the flange, and also grippingly engages the rope socket when the same enters the support, to support the equipment and prevent the same from falling into the well.

The operation of the form of the invention illustrated in Figures 6 and 7 is substantially the

same as that previously described, the rope socket being adapted to enter the support upon upward movement of the equipment to an extent which might result in breaking of the line 24, or detachment of the same from the rope socket, so that the equipment is supported and prevented from being lost in the well.

From the above description of the construction and manner of operation of the invention, it will be seen that the same provides a simple and effective safety support for line-suspended well equipment, which may be applied to numerous different types of well head apparatus, and by which loss of any tools or equipment by accidental breaking of the line, upon withdrawal of the same from the well will be prevented.

The invention has been disclosed in connection with certain specific embodiments of the same, but it will be understood that this is intended by way of illustration only, and that numerous modifications can be made in the construction of the various parts, as well as the arrangement of the same, without departing from the spirit of the invention or the scope of the appended claims.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing, an expansible member in the form of a helical coil carried by said housing in surrounding relation to a line passing therethrough, said coil having a portion whose turns are of smaller internal diameter than the external diameter of said equipment and being positioned to receive and grippingly engage well equipment carried by said line beneath said member upon upward movement of said line.

2. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing, a member of generally cylindrical shape in the form of a helical coil attached at its upper end to said housing in surrounding relation to a line passing therethrough, said member having an expansible portion positioned to receive and grippingly engage well equipment whose turns are of smaller internal diameter than the external diameter of said equipment and positioned to receive and grippingly engage well equipment carried by said line beneath said member upon upward movement of said line.

3. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing, a member of generally cylindrical shape in the form of a helical coil attached at its upper end to said housing in surrounding relation to a line passing therethrough, said member having a flared lower end positioned to engage and guide well equipment carried by said line into said member upon upward movement of said line, and an expansible portion above said lower end whose turns are of smaller internal diameter than the external diameter of said equipment positioned to receive and grippingly engage said equipment.

4. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing an expansible member carried by said housing in surrounding relation to a line passing therethrough, said member having a portion in the form of a helical coil whose turns are of a smaller internal diameter than the external diameter of said equipment and positioned to be expanded by and grippingly engage well equipment carried by said line beneath said member upon upward movement of said line, longitudinally movable means in said member and engageable with said equipment for upward displacement thereby upon movement of said equipment into said member, and yieldable means positioned to coact with said housing and said movable means to resist movement of said equipment into said member.

5. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing an elongated member having expansible helical turns of smaller internal diameter than the external diameter of said equipment and attached at its upper end to said housing in surrounding relation to a line passing therethrough, said member being positioned to be engaged by well equipment carried by said line beneath said member upon upward movement of said line to expand said turns to receive and grippingly engage said equipment, a sleeve-like element in said member and longitudinally displaceable therein by engagement with said equipment upon said upward movement of the line, and yieldable means carried by said housing and engageable with said housing and element to yieldingly resist displacement of said element.

6. In well head apparatus, a safety device for line-suspended well equipment comprising a tubular housing a member of generally cylindrical shape having expansible helical turns of smaller internal diameter than the external diameter of said equipment and attached at its upper end to said housing in surrounding relation to a line passing therethrough, said member being positioned for engagement with well equipment carried by said line beneath said member upon upward movement of said line to expand said turns to receive and grippingly engage said well equipment, a sleeve-like element in said member and longitudinally displaceable therein by said equipment upon movement of said equipment into said member, said element extending upwardly beyond said member and having an external annular groove above the member, and means yieldably mounted on the housing and extending into said groove to yieldingly resist longitudinal displacement of said element.

7. In well head apparatus, a safety support for line-suspended well equipment comprising a tubular housing, an expansible member carried by said housing in surrounding relation to a line passing therethrough, said member having a portion in the form of a helical coil whose turns are of smaller internal diameter than the external diameter of said equipment and positioned to be expanded by and grippingly engage well equipment carried by said line beneath said member upon upward movement of said line, longitudinally movable means in said member positioned for engagement with said equipment, and yieldable means positioned to coact with said housing and said longitudinally movable means to cause said longitudinally movable means to be moved upwardly with said equipment upon movement of said equipment into said member.

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