July 10, 1934. W. W. WILLIAMS 1,965,730

WELL CASING PROTECTOR

Filed April 9, 1928

Fig. 1.

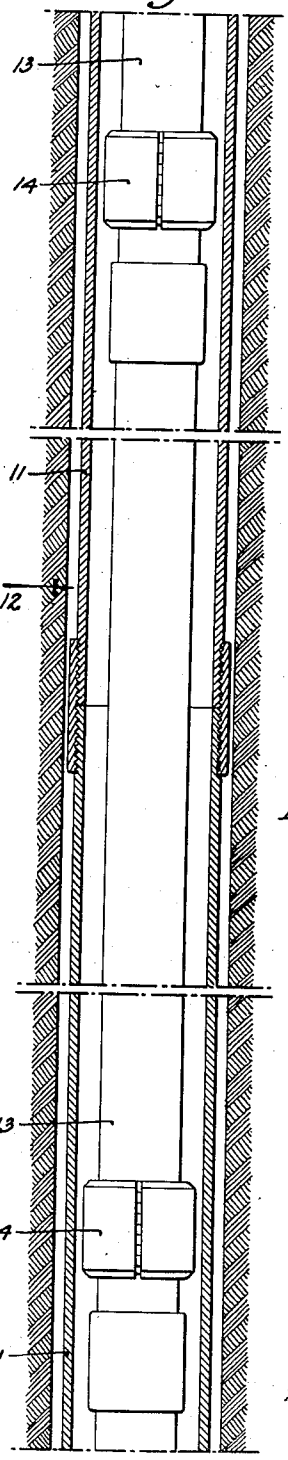


Fig. 2.

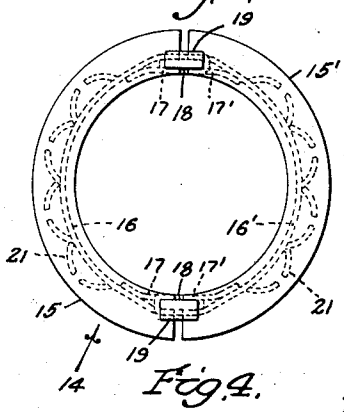


Fig. 3.

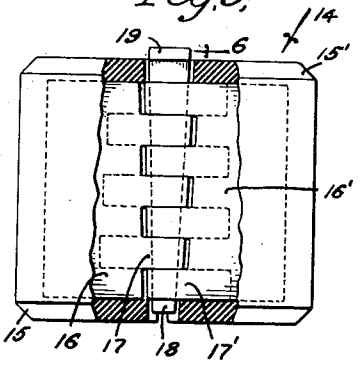


Fig. 4.

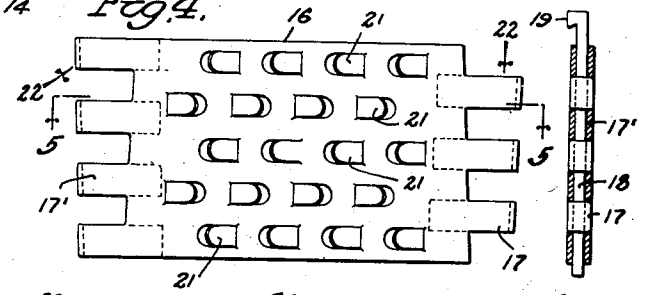


Fig. 5.

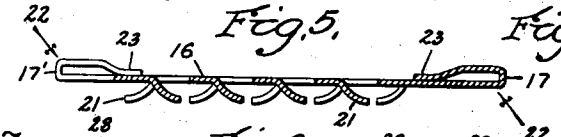


Fig. 6.

Fig. 7.

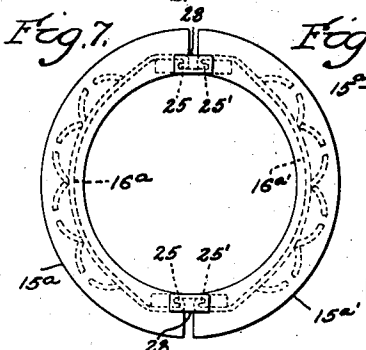
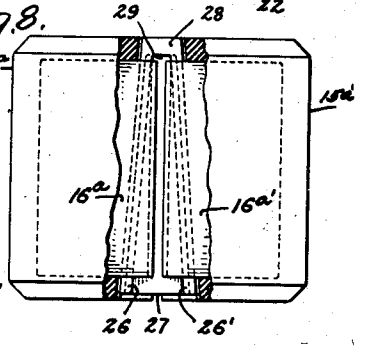


Fig. 8.



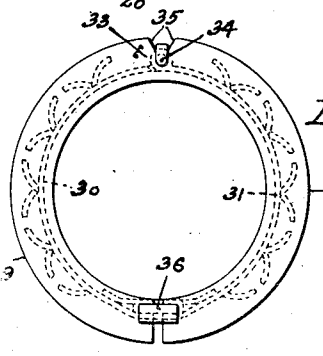


Fig. 10.



Fig. 9.

INVENTOR
WILLIS WAUGH WILLIAMS
By Frank Raymond
ATTORNEY

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WELL CASING PROTECTOR

Willis Waugh Williams, Glendale, Calif., assignor of two-thirds to John B. Elliott and one-third to Richard Young, both of Los Angeles, Calif.

Application April 9, 1928, Serial No. 268,746

18 Claims. (Cl. 308—4)

This invention relates to a device for use in connection with oil wells, and is more particularly a protector or guard element adapted to be placed upon a drill string for the purpose of protecting the casing and the drill string from undue wear resulting from engagement therebetween.

It is a well known fact among those familiar with the art to which this invention relates that oil wells or wells of any nature, due to the variations in the formations through which they penetrate, do not follow a vertical course, but have a tendency to deviate from the vertical, making many curves and irregularities in the path which the casing follows. Due to this fact, the drill string which operates within the casing is necessarily brought into engagement with the inner surface of the casing at various irregular points, and due to its constant rotation and oscillation thereagainst has a tendency to wear and weaken the casing, in many cases resulting in the perforation or collapse of the casing at these points.

I am aware of the fact that various types of protectors and guides have been developed for the purpose of obviating the wear between these elements, and this particular invention relates to an improved protector for this purpose.

It is a principal object of this invention to develop a casing protector of the class herein described, which is of a non-metallic substance, preferably rubber, provided with metal reinforcements, and is formed in a manner which renders the same adaptable to a rapid placement upon the drill string at any desired point.

It is a further object of this invention to provide a protecting collar with clamping means having a wedge action, such action being effective to hold the collar in rigid engagement with the casing in the position at which it is originally placed.

It is well known to those familiar with the art that the ordinary protector of this type depends upon engagement with the drill string collars or connecting joints to prevent its lateral movement upon the drill string. Such a form obviously has a tendency to slide upon the drill string and to permit the string to engage the casing at the point at which protection is most needed.

Other objects and advantageous structural features of my invention, including a novel type of reinforcement and various forms of wedge clamps, will be better understood from the following description of the accompanying drawing, in which

Fig. 1 is a sectional view, showing part of an oil well containing a casing and drill string and illustrating one embodiment of my invention as being mounted upon the drill string.

Fig. 2 is a plan view, showing one embodiment of my invention.

Fig. 3 is an elevational view, partly broken away, corresponding to the form of my invention shown in Fig. 2.

Fig. 4 may be considered as a plan view, showing a developed reinforcing member, such as is used in the form of my invention shown in Figs. 2 and 3.

Fig. 5 is a sectional view, taken substantially along the line 5—5 of Fig. 4.

Fig. 6 is a partial elevational section, taken substantially as indicated by the arrow 6 in Fig. 3.

Fig. 7 is a plan view, similar to the view shown in Fig. 1, but illustrating a modified form of clamping mechanism.

Fig. 8 is an elevational view, partly broken away, showing the embodiment of my invention illustrated in Fig. 7.

Fig. 9 is a partial plan section, enlarged, of the clamping mechanism shown in Fig. 8, and

Fig. 10 is a plan view illustrating a second modified form of my invention.

Referring to the above designated drawing, in which similar parts are indicated by the same reference numeral, and more particularly describing my invention as herein illustrated, reference numeral 11 indicates a well casing contained within a well indicated at 12. A drill string 13 is illustrated as being suspended within the casing 11, and has casing protecting collars 14 mounted thereon. The casing protecting collars 14 are illustrated in detail in Figs. 2 to 6, inclusive, as comprising two semi-cylindrical segments 15 and 15′, which are preferably composed of rubber which is moulded about reinforcing segments 16 and 16′, the outer ends of these segments 16 and 16′ being provided with tapered dove-tail clamping fingers or loops indicated at 17 and 17′, such loops being provided with a laterally extending passage adapted to receive a cooperatively tapered pin 18.

It will be understood that the insertion of the pin 18 into the dove-tail clamping organization tends to draw the two sections 16 and 16′ toward one another, and it serves to effect a positive engagement between an inner surface of the collar and the outer surface of the drill string. This is an important feature in the invention, in that the collars may be positively placed in any position upon the drill string, thus preventing a slip-

ping of the collar from the place in which it is most needed and permitting the placement of the collars in a position upon the drill string which may be of decreased diameter due to a drawing action resulting from the great weight of drill string below such point at which the collar may be placed.

In order that the pins 18 may be easily placed in position and may be readily removed without burring the lower end thereof, the upper end of the pin is provided with a flanged or overlapping head 19, beneath which a chisel or other suitable engaging instrument may be placed for forcing the pin from the clamp.

It will be understood that the reinforcing members used in this invention may be of any desired form, a preferred construction being illustrated in Figs. 4 and 5. In this form of reinforcement, the member may be stamped or otherwise cut from a single metal sheet, and a plurality of extending tongues 21 are cut and stamped therefrom to give added strength to the member after the rubber has been moulded thereon, as will be apparent from the dotted line position which these tongues take when the plate is bent to the semi-cylindrical form, as shown in Fig. 2.

The dove-tailed clamping organization is illustrated as being formed by stamping the cooperative projections indicated at 22, and bending these projections back upon the metal, as indicated at 23 in Fig. 5, fastening the inner ends in any preferred manner, such as by means of spot welding.

The form of my invention illustrated in Figs. 7 and 8 is the same in principle and construction as that described above in connection with Figs. 2 to 6, inclusive, with the exception of the clamping mechanism, which comprises oppositely formed and tapered flanged elements indicated at 25 and 25′ on the reinforcing members 16*a* and 16*a*′ of the non-metallic segments 15*a* and 15*a*′. These elements are adapted to receive correspondingly flanged projections 26 and 26′ upon a flat "wedge plate" 27, as is perhaps best illustrated in Fig. 9.

The upper end of the plate 27 is provided with a substantially solid head member 28 or cross plate, by means of which the plate may be removed for an unclamping of the collar by driving a chisel or other suitable instrument against a lower surface 29 thereof.

In the two forms of my invention described above, it will be understood that the collars are to be made in two separate semi-cylindrical segments, and in the third advantageous form of the invention illustrated in Fig. 10, the collar is adapted to be made in the single segment 29. The reinforcing elements 30 and 31 are adapted to be hinged at one intersecting point 33, the hinge being in the form of a dove-tail clamping joint similar to that described in connection with Figs. 2 and 3, except that the passage between the elements thereof is substantially cylindrical rather than wedge-shaped, and the pin 34 is round and may be moulded within the rubber of the collar at the time the element is formed. In order that this form of collar may be easily expanded or opened for its placement upon a drill string, a V-shaped slot indicated at 35 may be cut from the rubber or the collar may be moulded with this slot formed therein.

The clamp 36 used in this form of the invention may be of either of the above described forms, but is illustrated as comprising a wedge pin and dove-tail clamping mechanism, such as is described in connection with Figs. 2 to 6, inclusive.

As has been previously pointed out, this casing protector has the advantage of being adaptable to placement at any point upon the drill string and will remain in positive engagement with the drill string in the position in which it is originally placed.

While I have herein described and illustrated various forms in which this invention may be constructed for effecting the heretofore stated objects, it will be understod that it is not limited to the precise construction set forth, but includes any changes which might fairly come within the spirit and scope of the appended claims.

I claim as my invention:

1. A casing protector comprising: an internally reinforced non-metallic split collar adapted to surround a drill string and provided with wedge clamping means extending along the split in said collar for retaining said collar upon said drill string.

2. A casing protector comprising: an internally reinforced non-metallic split collar adapted to surround a drill string and provided with wedge clamping means extending along the split in said collar for retaining said collar upon said drill string, said collar being reinforced with metal segments.

3. A casing protector comprising: an internally reinforced non-metallic collar adapted to surround a drill string and provided with wedge clamping means adapted to retain said collar upon said drill string, said collar being reinforced with metal segments provided with projecting tongues.

4. A casing protector comprising: an internally reinforced non-metallic collar adapted to surround a drill string and provided with wedge clamping means adapted to retain said collar upon said drill string, said collar being reinforced with metal segments provided with projecting tongues, said collar being formed of rubber and said segments being moulded within said rubber.

5. A casing protector comprising: an internally reinforced non-metallic collar adapted to surround a drill string and provided with wedge clamping means adapted to retain said collar upon said drill string, said collar being reinforced with metal segments, and said clamping means being included in said reinforcing members.

6. A casing protector comprising: an internally reinforced non-metallic collar adapted to surround a drill string and provided with wedge clamping means adapted to retain said collar upon said drill string, said collar being reinforced with metal segments having cooperating dove-tail fingers outwardly formed thereon, said fingers being adapted to receive a tapered pin.

7. A casing protector comprising: an internally reinforced non-metallic collar adapted to surround a drill string and provided with wedge clamping means adapted to retain said collar upon said drill string, said collar being reinforced with metal segments having cooperating dove-tail fingers outwardly formed thereon, said fingers being adapted to receive a tapered pin and a tapered pin extending through said fingers.

8. A casing protector, adapted to be mounted upon a drill string, comprising: internally reinforced non-metallic segments and means integral with the reinforcements in said segments for clamping said protector upon said drill string.

9. A casing protector, adapted to be mounted upon a drill string, comprising: non-metallic seg-

ments; cooperative dove-tail clamping means oppositely mounted on said segments, said clamping means comprising fingers provided with a tapered passage adapted to receive a tapered pin.

10. A casing protector, adapted to be mounted upon a drill string, comprising: non-metallic segments; cooperative dove-tail clamping means oppositely mounted on said segments, said clamping means comprising fingers provided with a tapered passage adapted to receive a wedge shaped pin, and a wedge-shaped pin extending through said passage, said pin being provided with means for removing same from said passage.

11. As a new article of manufacture, a friction ring for drill pipes comprising a split ring formed of flexible material, means for securing the ends of said split ring to each other, and a flexible reinforcing member imbedded in the body of said ring and extending throughout the length thereof.

12. As a new article of manufacture, a friction ring for drill pipes comprising a split ring formed of flexible material, means for securing the ends of said split ring to each other, a flexible reinforcing member imbedded in the body of said ring and extending throughout the length thereof, and the ends of said reinforcing member being connected to the securing means in the ends of said ring.

13. As a new article of manufacture, a friction ring for drill pipe comprising a one piece split ring formed of flexible material, and means for securing the ends of said split ring to each other.

14. A combination with a drill pipe provided with the usual joint members of a one piece split ring formed of flexible wear resisting material, which ring is positioned on the drill pipe below the joint members therein, and means for fastening the ends of said split ring to each other.

15. As a new article of manufacture, a wear preventer for drill pipe comprising: a split ring formed of resilient material; reinforcing means embedded in said split ring, and extended throughout the circumference thereof; and securing means for securing said split ring on a pipe.

16. As a new article of manufacture, a wear preventer for drill pipe comprising: a split ring formed of resilient material; reinforcing means embedded in said split ring, and extended throughout the circumference thereof; and securing means for securing together the ends of said reinforcing means, so as to secure said split ring in annular shape.

17. As a new article of manufacture, a wear preventer for drill pipe comprising: a split ring formed of resilient material; reinforcing means embedded in said split ring, and extended throughout the circumference thereof, said reinforcing means including a pair of reinforcing members hinged together; and securing means for securing said split ring on a pipe.

18. As a new article of manufacture, a wear preventer for drill pipe comprising: a split ring formed of resilient material; reinforcing means embedded in said split ring, and extended throughout the circumference thereof, said reinforcing means including a pair of rigid arcuate members hinged together; and securing means for securing said split ring on a pipe.

WILLIS WAUGH WILLIAMS.