Jan. 4, 1927. 1,613,039

P. McLAREN

DRILL COLLAR PROTECTOR

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Fig. 1.

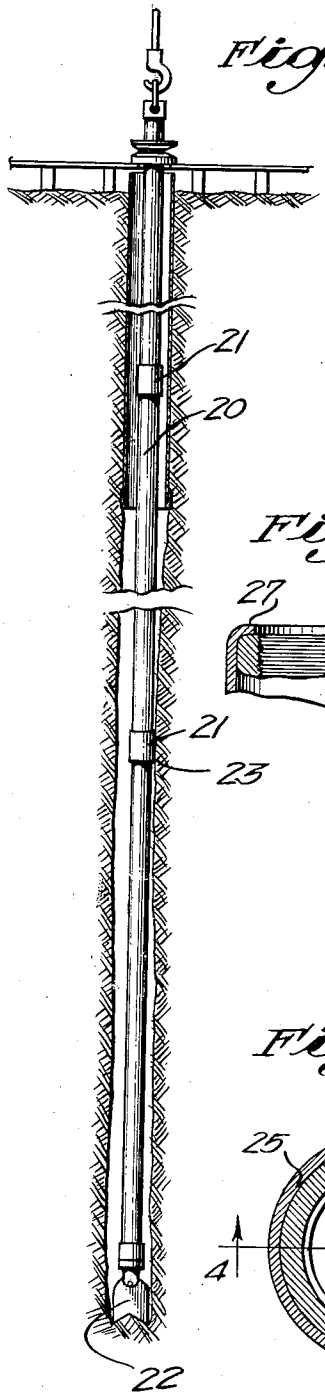


Fig. 4.

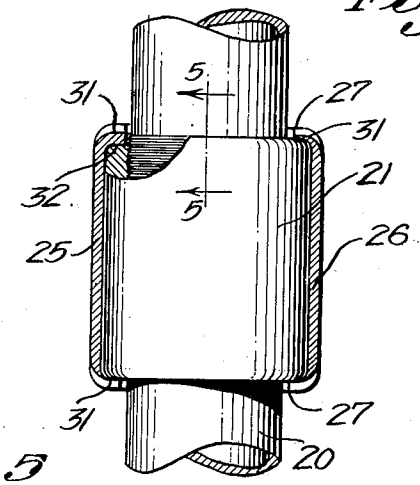


Fig. 5

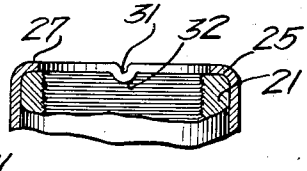


Fig. 2.

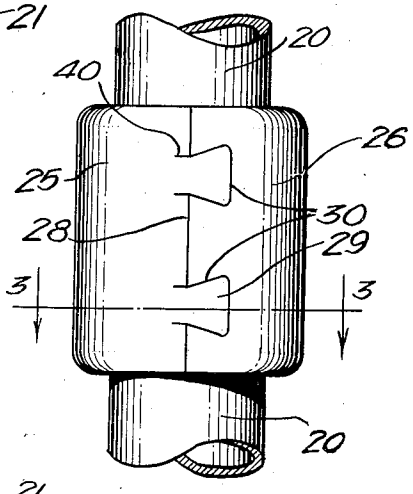
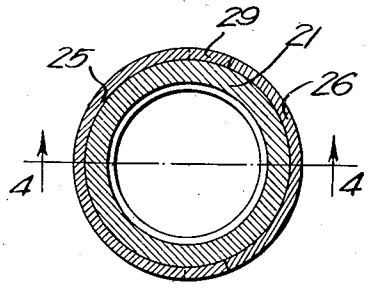


Fig. 3.



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Fig. 6.

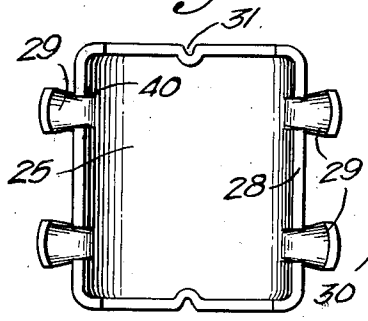


Fig. 7.

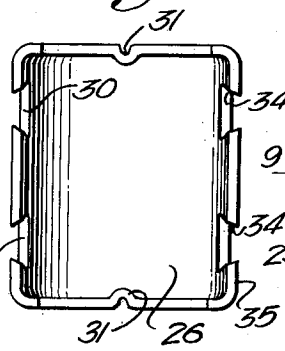


Fig. 8.

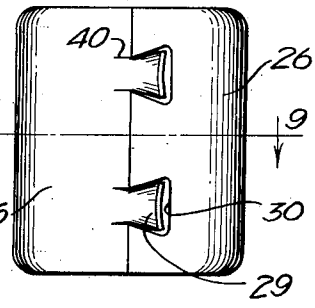


Fig. 12.

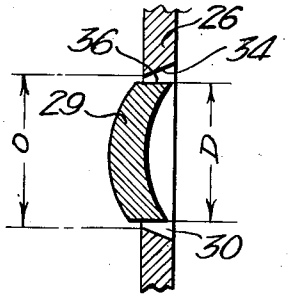


Fig. 13.

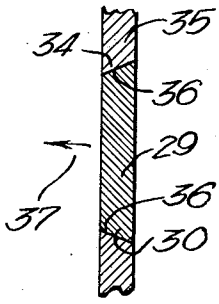


Fig. 9.

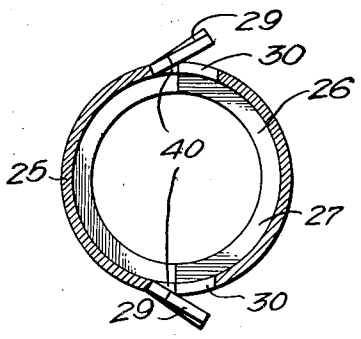


Fig. 14.

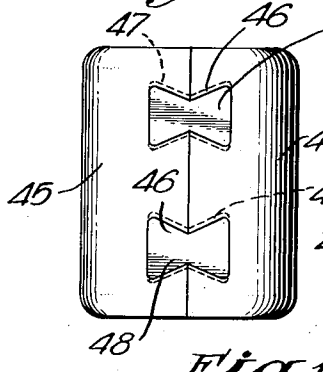


Fig. 11.

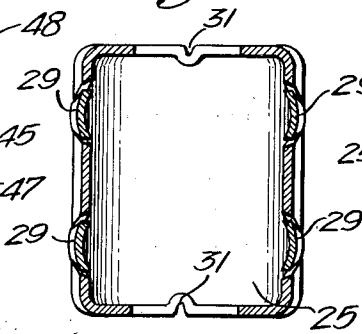


Fig. 10.

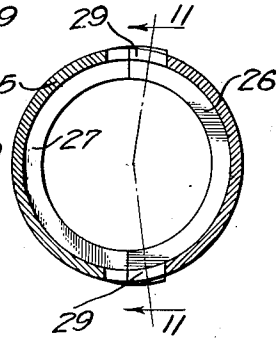
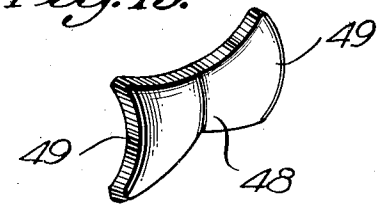


Fig. 15.



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Patented Jan. 4, 1927. 1,613,039

UNITED STATES PATENT OFFICE.

PETER McLAREN, OF WHITTIER, CALIFORNIA, ASSIGNOR TO McLAREN AUTOMOBILE SIGNAL COMPANY, A CORPORATION OF CALIFORNIA.

DRILL-COLLAR PROTECTOR.

Application filed June 19, 1923. Serial No. 646,348.

This invention relates to well drilling equipment and apparatus and relates particularly to a protector or guard which will prevent the destruction, due to wear, of the drill collars employed for connecting up the separate members constituting the string of drill pipe.

In the drilling of deep wells, the collars or couplings employed to attach the lengths of drill pipe together are often rotated in contact with the walls of the hole, due either to the fact that the hole is not straight, or due to the bending of the string of drill pipe out of true alignment so that contact thereof is made with the wall of the hole. Due to the destructive abrasive action upon the drill collars caused by their contact with the sides of the hole, these collars are rapidly worn away, necessitating their frequent replacement. In a well of 4,000 feet depth, the drill collars must be renewed every two weeks, whereas in the drilling of wells of 6,000 feet depth, this renewal is often necessary every week, thus constituting a considerable expense owing to the great number of collars used and the comparatively high cost thereof.

It is an object of my invention to provide a protector for a member such as a drill collar or tool joint employed in the connecting up of a string of drill pipe, which connecting devices are necessarily of greater diameter than the pipe and are, therefore, subject to excessive wear. The protector preferably consists of a pair of cooperating semi-cylindrical steel members having inwardly turned lips at the upper and lower ends thereof and means for securing the semi-cylindrical members together in such a manner that they will cooperate in enclosing a drill collar or similar connecting device.

The especial advantages and further objects of my invention will be plainly understood from the descriptions of the two embodiments hereinafter described.

Referring to the drawings which are for illlustrative purposes only:

Fig. 1 is a somewhat diagrammatic view showing the manner in which a drill stem may become bowed within the well in such a manner that the collars therein are rotated in contact with the walls of the hole.

Fig. 2 is an enlarged view showing a preferred form of protector embodying the features of my invention, mounted upon a drill collar.

Fig. 3 is a section taken on a plane represented by the line 3—3 of Fig. 2.

Fig. 4 is a section taken on a plane represented by the line 4—4 of Fig. 3.

Fig. 5 is a fragmentary section taken as indicated by the line 5—5 of Fig. 4, with the drill pipe removed from the collar in order that the feature of the protecting device may be shown.

Fig. 6 is an inside face view of the male cylindrical half of the protector.

Fig. 7 is an inside face view of the cooperating female cylindrical half.

Fig. 8 is an elevation showing the cooperating members placed together before being locked.

Fig. 9 is a section taken on a plane represented by the line 9—9 of Fig. 8.

Fig. 10 is a section similar to Fig. 9, but showing the locking tongues depressed.

Fig. 11 is a section taken as indicated by the line 11 of Fig. 10.

Fig. 12 is an enlarged fragmentary sectional view showing the locking tongue preliminary to its being flattened into engagement with the side walls of the cooperating notch.

Fig. 13 is a view showing the locking structure attained when the tongue shown in Fig. 12 is flattened.

Fig. 14 is an elevational view showing an alternative form of the invention embodying a pair of cooperating semi-cylindrical members having dovetailed or other suitable notches formed therein.

Fig. 15 is a perspective view of the locking member employed for locking together the cooperating members shown in Fig. 14.

In the diagrammatic view, Fig. 1, 20 indicates a string of drill pipe secured together by collars 21 and having a cutting bit 22 situated at the lower end thereof. It generally occurs in the drilling of a deep well that the drill pipe due to the superimposed weight thereof will bow laterally, thus bringing the pipe and the collars into contact with the wall of the hole, as indicated at 23 in Fig. 1. The excessive wear due to the rotation of the collars 21 against the sides of the hole causes them to be rapidly

worn away, with the result that their replacement is necessary at frequent intervals.

My invention as shown in Figs. 2 and 3 provides a pair of cooperating semi-cylindrical shell members 25 and 26 which are of internal diameter corresponding to the exterior diameter of the collar 21 upon which they are mounted, and which have inwardly turned flanges or lips 27 at the ends thereof which turn inwardly over the ends of the collar 21. The member 25 is provided along the abutment edges 28 thereof with projecting dovetail tongues 29 which are received in cooperating dovetail notches 30 formed in the abutment edges of the member 26, the interlocking of the dovetail tongues with the cooperating slots effectively securing the members 25 and 26 together. To prevent rotation of the protector upon the collar, a downwardly depressed hump 31 is formed in the upper and lower edges of each member 25 and 26, which humps are arranged to engage notches 32 formed in the upper and lower edges of the collars 21 as shown in Figs. 4 and 5.

As shown in Figs. 7 and 13, the side walls 34 of the dovetail notches 30 diverge as they progress inwardly from the outer face 35 of the member 26, and as further shown in Fig. 13, the side walls 36 of the tongues 29 are correspondingly diverged as they progress inwardly so that the outward movement, or in other words the movement in a direction of the arrow 37, of the tongue can not occur, thus providing between the members 25 and 26 a compound locking arrangement which prevents the tongues 29 from moving relatively outwardly as indicated by the arrow 37 in Fig. 13 and prevents the cooperating members 25 and 26 being separated.

In the stamping of the male member 25, the tongues 29 are cut inwardly from the edges 28, as indicated at 40 in Figs. 2, 6, 8 and 9, and are bent outwardly in the manner shown in Figs. 6 and 9 so that when the members 25 and 26 are initially placed together upon a collar 21, the tongues 29 will lie angularly in positions above the notches 30 and from these positions may be bent inwardly by use of a hammer or sledge. In order that the tongues, which, it will be remembered, are provided with diverging side walls 36, may enter laterally into the notches as must occur when the tongues are driven inwardly from the position shown in Figs. 8 and 9, the tongues are curved in the manner shown in Fig. 12, this curvature being just sufficient to bring the distance "D" between its edges to a magnitude which will permit the tongue to pass through the opening defined by the outer edges of the notches, or the opening indicated as the distance "O" in Fig. 12.

The tongues 29 are first driven down into the slots to the positions indicated in Figs. 10, 11 and 12, and may then be driven flat with a suitable sledge or hammer so that they will completely fill the notches 30, as shown in Fig. 13.

It may be desired to harden the cooperating semi-cylindrical shells, thus greatly increasing the wearing qualities thereof. This hardening, however, would be detrimental to the durability of the tongues 29, owing to the fact that they must be bent through a considerable angle in the locking of the members together.

In Fig. 14, I show a pair of identically formed semi-cylindrical shells 45 which may be hardened and which are provided with cooperating dovetail or other suitable notches 46, these notches 46 having the side walls thereof under cut as indicated by the dotted lines 47 and receiving locking members 48 of the type shown in Fig. 15. These locking members being formed separately from the cooperating shells 45 may be left in soft or malleable condition, so that when the curved formation 49 thereof is flattened out to cause them to become firmly locked in the notches 46, the flattening will not appreciably affect the durability thereof.

The use of a protector of the type which may be preferably formed as herein described, enables the use of the drill collars or other pipe connecting means for an indefinite period of time. The protectors when worn may be discarded and replaced at a cost which is considerably less than one half the replacement cost of collars. A further advantage in the use thereof is that they may be quickly applied, whereas considerable labor is entailed in the replacement of the collars which must be threaded upon the drill pipe.

I claim as my invention:

1. In combination: a shaft consisting of a number of members joined together in consecutive arrangement, said shaft having enlargements of greater diameter than the parts of said shaft adjacent thereto; removable protectors formed of cooperating partic-ylindrical shells arranged to fit closely over said enlargements and having the function of housings for preventing contact of said enlargements with external objects; edge engagement means for securing said shells together upon said enlargements; and formations on said protectors, said formations engaging the ends of said enlargements for preventing relative movement between said protectors and said shaft.

2. In combination: a shaft consisting of a number of members joined together in consecutive arrangement, said shaft having enlargements of greater diameter than the parts of said shaft adjacent thereto; removable protectors formed of cooperating partic-ylindrical shells arranged to fit closely over said enlargements and having the func-

tion of housings for preventing contact of said enlargements with external objects; interlocking means associated with the adjacent edges of said shells for securing said shells together upon said enlargements; and formations on said protectors, said formations engaging the ends of said enlargements for preventing relative movement between said protectors and said shaft.

3. In combination: a shaft consisting of a number of members joined together in consecutive arrangement, said shaft having enlargements of greater diameter than the parts of said shaft adjacent thereto; removble protectors formed of cooperating particylindrical shells having inwardly turned flanges at the ends thereof and arranged to fit closely over said enlargements and having the function of housings for preventing contact of said enlargements with external objects; means engaging between the edges of said shells for securing said shells together upon said enlargements; and formations on said protectors, said formations engaging the ends of said enlargements for preventing relative movement between said protectors and said shaft.

4. In combination: a shaft consisting of a number of members joined together in consecutive arrangement by coupling members of greater diameter than the joined members, said coupling members thus constituting enlargements in said shaft; removable protectors formed of cooperating semi-cylindrical shells arranged to fit closely over said enlargements and having the function of housings for preventing contact of said enlergements with external objects; interlocking means engaging between the edges of said shells for securing said shells together upon said enlargements; and formations on said protectors, said formations engaging the ends of said enlargements for preventing relative movement between said protectors and said shaft.

5. In a protector of the class described, the combination of: cooperating arcuated members arranged to be placed in closely fitting relationship upon a cylindrical member in form of a continuous housing; means engaging between the edges of said cooperating members for holding said cooperating members securely in place upon said cylindrical member; and formations on said protectors, said formations engaging the ends of said enlargements for preventing relative movement between said protectors and said shaft.

6. In a protector of the class described, the combination of: cooperating arcuated members arranged to be placed upon a cylindrical member in form of a continuous housing, certain of the edges of said cooperating members having dovetail notches formed therein; and dovetail extensions on other edges of said cooperating members adapted to engage said dovetail notches in a manner to secure said cooperating members in place upon said cylindrical member, said dovetail extensions being outwardly bent and arranged to be flattened down into place when said cooperating members are placed together.

7. In combination: a string of drill pipe consisting of lengths connected together by couplings of larger diameter than said lengths; a pair of protectors adapted to be placed around each of said couplings in contact therewith; means for securing each of said pairs of protectors together; and means formed on said portectors engaging said couplings for preventing relative rotation between said protectors and said couplings.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 9th day of June, 1923.

PETER McLAREN.