June 6, 1933. G. C. BERRYMAN 1,913,018

WEAR PREVENTER

Filed Jan. 13, 1930

Fig. 1.

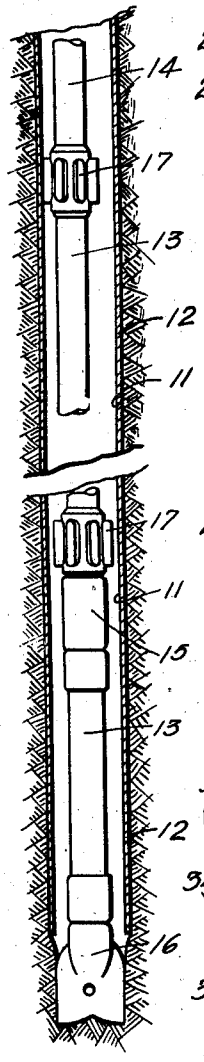


Fig. 2.

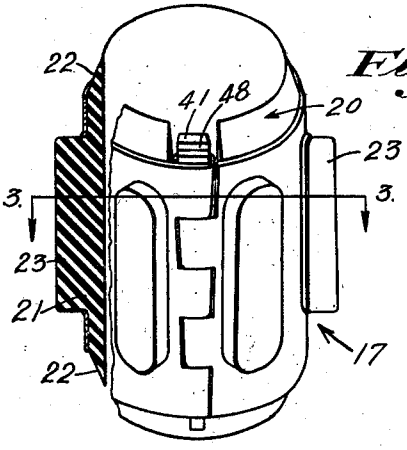


Fig. 3.

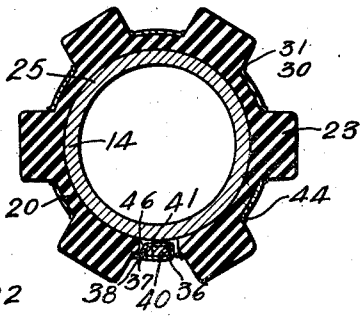


Fig. 4.

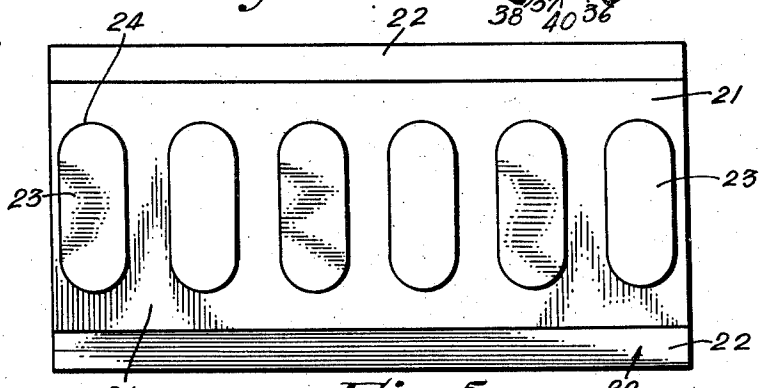
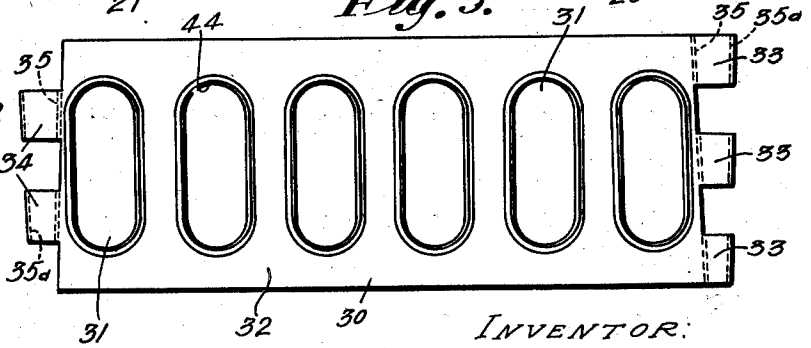


Fig. 5.



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Patented June 6, 1933 1,913,018

UNITED STATES PATENT OFFICE

GROVER C. BERRYMAN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO E. M. SMITH COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA, ONE-THIRD TO WILLIAM L. McLAINE AND ONE-THIRD TO RICHARD A. SPERRY, BOTH OF LOS ANGELES, CALIFORNIA

WEAR PREVENTER

Application filed January 13, 1930. Serial No. 420,484.

My invention relates to a simple form of device for preventing wear between the joints and couplings of a string of drill pipe and the casing or wall of a well in which such drill pipe is being operated.

In the rotary system of well drilling, the well is bored by use of a drilling bit secured on the lower end of and rotated by means of a shaft member in the form of a string of drill pipe which extends up through the bore of the well to the surface of the ground, where power for rotation is applied thereto. The string of drill pipe consists of separate lengths of pipe secured together by couplings and by tool joints which, owing to the fact that they project from the cylindrical face of the pipe, often rotate in engagement with a casing set in the well or with the bare wall of the well below the casing. This results in very rapid wear of the couplings and tool joints and often wears holes in the casing of the well through which water may leak, which holes are very difficult to locate and cement-off.

It is an object of my invention to provide a wear preventer which may be mounted on a string of drill pipe and which has projecting engagement portions extending beyond the circumference of the tool joints or couplings of the drill pipe so that in event the drill pipe should be eccentric within the well the engagement portions of the wear preventer will engage the well casing or the bare wall of the well in a manner to hold the drill pipe, its couplings, and tool joints from wearing engagement with the casing or bare wall of the well. The engagement portions of this wear preventer are constructed of a resilient material especially adapted for relatively non-frictional engagement with the well casing or wall of the well, thus reducing to a minimum the wear on the well casing resulting from the operation of a string of drill pipe therein.

It is a further object of the invention to make a wear preventer of extremely simple construction which may be very economically manufactured and readily installed on a string of drill pipe. This simple form of wear preventer has resilient engagement portions formed in conjunction with a replaceable member and is provided with a securing means from which the replaceable member may be detached so that this securing means may be employed with numerous other replaceable members and need not be discarded with the wear receiving parts of the wear preventer.

A further object of the invention is to provide a wear preventer in which the securing means is of such form that it may be stamped from sheet metal and which has a simple device formed in conjunction therewith for reducing its effective circumferential length so as to securely clamp the entire wear preventer structure on a string of drill pipe.

A further object of the invention is to provide a wear preventer having radially projecting, vertically elongated engagement portions, between which engagement portions vertical channels exist through which drilling mud within the well may freely circulate.

A further object of the invention is to provide, in a wear preventer of the above character, a replaceable element consisting of a relatively thin, flat, rectangular body of resilient wear-resisting material, such as rubber or rubber compounds, this body having engagement portions projecting outwardly therefrom so that when the body is curved around the exterior of a drill pipe, the engagement portions will project radially beyond the circumference of an adjacent tool joint or coupling member.

Further objects and advantages of the invention will be made evident throughout the following part of the specification.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a fragmentary sectional elevation showing a wear preventer embodying my invention in use on a string of drill pipe in a well.

Fig. 2 is a partly sectioned perspective elevation showing the wear preventer on enlarged scale.

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

Fig. 4 is a plan view of the replaceable body forming part of the wear preventer.

Fig. 5 is a view showing a stamped plate from which the securing means of the wear preventer is made.

In Fig. 1 of the drawing 11 indicates a well having a casing 12 therein through which a string of drill pipe 13 is extended. This drill pipe 13 consists of separate lengths of pipe 14 joined together by tool joints or by couplings, such as indicated at 15, and has a rotary drilling bit 16 secured to its lower end for the purpose of penetrating the formation in which the well is being formed. On the string of drill pipe 13 adjacent to a coupling 15 I have mounted my wear preventer 17 so that when the drill pipe 13 is rotating eccentrically within the well 11, the wear preventer 17 will engage the casing 12, thus holding the drill pipe 13 and the coupling 15 from wearing engagement therewith, the result being that the drill pipe and its connections are conserved and liability of the casing being injured is reduced to a minimum. As shown in Figs. 2 to 4, my invention includes a resilient body 20 having a relatively thin wall portion 21. This body 20 is preferably molded from rubber or rubber compound in flat rectangular form, as shown in Fig. 4, the longitudinal edges 22 thereof being chamfered or beveled off in the manner shown in Fig. 2. The body 20 includes projecting engagement portions 23 which consist of projecting bodies of resilient material molded in rectangular prismoidal form but with the upper and lower ends thereof rounded off, as indicated at 24. The engagement portions 23 extend laterally or crosswise with respect to the length of the body 20 so that when the body 20 is curved into cylindrical form, as indicated in Fig. 2, or around the cylindrical outer face 25 of a cylindrical member, such as the pipe 14 indicated in Fig. 3, the engagement portions 23 will project radially outwardly and will extend vertically or longitudinally with respect to the cylindrical axis of the wear preventer and the drill pipe on which the wear preventer is mounted. Although it is preferable to mold the body 20 in flat form, it will be perceived that the same may be molded in cylindrical form and then split down one side, but this practice would be more expensive than molding the device in flat form and would be of no material benefit to the construction or operation of the wear preventer. The body 20 is secured and compressed on a cylindrical member, such as the pipe 14, by a securing means 30 which is adapted to surround the flat wall portion 21 of the body 20 and is adapted to compress same tightly against the pipe, there being spaces or apertures 31 in the securing means 30 through which the engagement portions 23 radially project in the manners shown in Figs. 2 and 3. As shown in Fig. 5, the securing means 30 is made from a flat plate 32 of resilient metal having a width slightly less than the body 20, having elongated openings 31 therein which are properly spaced to correspond with the positions of the engagement portions 23 of the body 20, and having primary and secondary tongues 33 and 34 extending respectively from the rightward and leftward ends thereof. The tongues 33 and 34 are positioned so as to overlap, in the manner shown in Fig. 2, and are bent rearwardly along inclined lines 35 and are then further bent toward each other along lines 35*a* to form primary and secondary loops, as indicated at 36 in Fig. 3, the extreme ends 37 of each tongue being preferably secured to the plate 32 by welding 38 or other suitable means. Each tongue 33 and 34 being bent to form a loop, in the manner described, provides a channel or opening 40 into which a tapered pin or wedge 41 may be driven, in the manner shown in Fig. 2, so as to pull the cooperating ends of the plate 32 relatively together and to thereby reduce the circumference of the cylinder formed by the plate 32, whereby to compress the body 20 tightly against the pipe 14. As will be seen in Fig. 2, the loops formed by the primary and secondary tongues 33 and 34 are reduced in size or tapered downwardly so as to conform to the shape of the wedge member 41.

As shown in Fig. 3, the edge portions 44 of the plate 32 defining the openings 31 are turned outwardly, so that sharp edges which might cut into the sides of the engagement portions 23 are avoided. As will be further noted in Figs. 2 and 3, a space 46 is left between the ends of the body 20, in which space the loops formed on the tongues 33 and 34 are received, with the result that a substantially unbroken cylindrical contour is presented by the outer face of the plate 32. To enable ready removal of the wedge member 41 when it is desired to remove the wear preventer or to replace the body 20 thereof, I provide a lateral groove or notch 48 near the upper end thereof, which may be engaged by a chisel or similar instrument through which the blows of a hammer mallet may be imparted in a direction to withdraw the wedge member.

The body 20 and the securing means 30 are both of very simple form and may be economically manufactured, but the simplicity of construction does not detract from the effectiveness of the wear preventer. When secured on a pipe and constricted by use of the wedge device hereinbefore described, the wear preventer holds the wall portion 21 of the body 20 tightly against the surface of the pipe so that movement of the wear preventer on the pipe is very ef-

fectively resisted. From the foregoing description it has been made evident that when the engagement portions 23 have become worn, the body 20 may be quickly replaced, without necessity of discarding the frame structure by which the body 20 is held in operative position on a drill pipe.

I claim as my invention:

1. A protector of the character described, including: a substantially flat body of resilient wear-resisting material having engagement portions projecting from its outer face, said body being adapted for bending around the circumference of a cylindrical member; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being securing devices operative between the abutting ends of said plate for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

2. A protector of the character described, including: a substantially flat body of resilient wear-resisting material having engagement portions projecting from its outer face, said body being adapted for bending around the circumference of a cylindrical member; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being overlapping parts formed on the abutting ends of said plate adapted to receive a tapered member for securing same in cylindrical form.

3. A protector of the character described, including: a substantially flat body of resilient wear-resisting material having engagement portions projecting from its outer face, said body being adapted for bending around the circumference of a cylindrical member; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being overlapping parts formed on the abutting ends of said plate adapted to receive a tapered member for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

4. A protector of the character described, including: a substantially flat body of resilient wear-resisting material having engagement portions projecting from its outer face, said body being adapted for bending around the circumference of a cylindrical member; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being overlapping tongues projecting from the cooperating ends of said plate, such tongues being bent to form cooperating channels adapted to receive a tapered member for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

5. A protector of the character described, including: a substantially flat body of resilient wear-resisting material having engagement portions projecting from its outer face, said body being adapted for bending around the circumference of a cylindrical member; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being overlapping tongues projecting from the cooperating ends of said plate, such tongues being bent inwardly to form tubular cooperating channels adapted to receive a tapered member for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

6. A protector of the character described, including: a cylindrically curved body of resilient wear-resisting material adapted for placement around a cylindrical member to be protected, said body having engagement portions projecting therefrom; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being securing devices operative between the abutting ends of said plate for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

7. A protector of the character described, including: a cylindrically curved body of resilient wear-resisting material adapted for placement around a cylindrical member to be protected, said body having engagement portions projecting therefrom; and retaining means for holding said body on a pipe, said retaining means comprising a metal plate adapted to be curved into cylindrical form and having apertures therein for projection of said engagement portions, there being overlapping tongues projecting from the cooperating ends of said plate, such tongues being bent inwardly to form tubular cooperating channels adapted to receive

a tapered member for drawing said ends relatively together so as to reduce the circumference of said retaining means whereby to compress said body against said cylindrical member.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 7th day of January, 1930.

GROVER C. BERRYMAN.