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2,735,494

HINGE FOR WELL SCRATCHER

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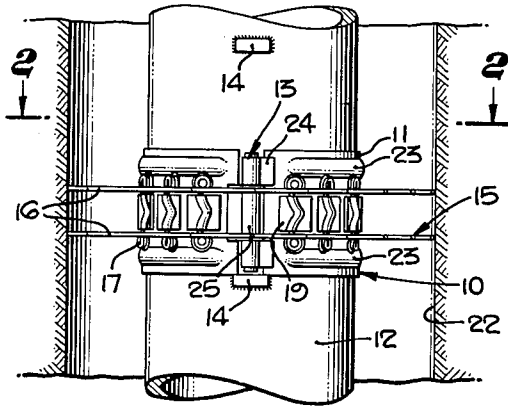


FIG. 1.

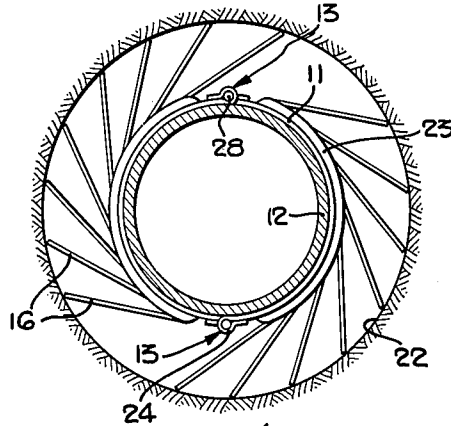


FIG. 2.

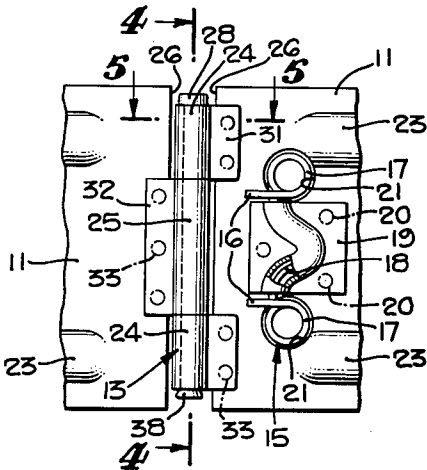


FIG. 3.

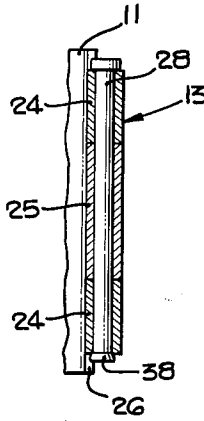


FIG. 4.

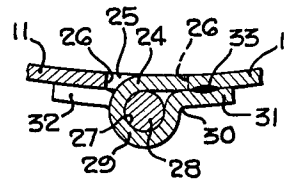


FIG. 5.

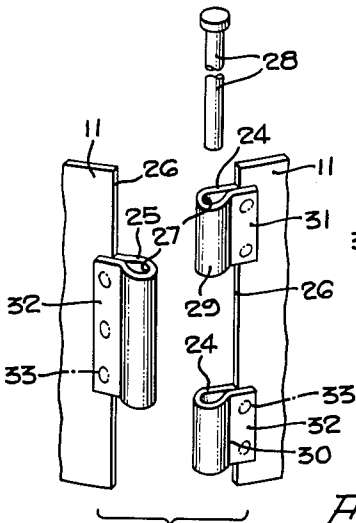


FIG. 6.

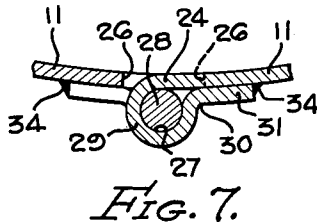


FIG. 7.

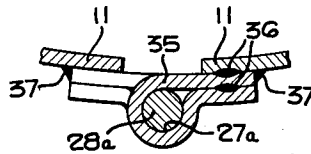


FIG. 8.

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HINGE FOR WELL SCRATCHER

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3 Claims. (Cl. 166—173)

This invention relates to apparatus for use in connection with cementing of wells, and is particularly directed to improvements in the construction of well scratchers.

Scratchers for well pipe may be attached by welding directly to the pipe or may be formed of two complementary halves which cooperate to encircle the pipe, which halves are connected by means of suitable hinges. The use of hinged scratchers greatly facilitates installation in the field since they may be conveniently applied laterally to the pipe. Difficulties have arisen, however, because the hinges employed for connecting adjacent portions of the semi-circular collar portions have been unable to withstand the severe stresses imposed by the handling of the pipe prior to insertion into the well, as well as during the operation of lowering the pipe and scratchers into the well bore. The pipe is ordinarily supported horizontally on racks while the hinged scratchers are applied, and the hinges may be damaged by engagement of the scratcher collar with obstructions when the pipe is moved from the horizontal position on the rack to a vertical position preparatory to connection with the pipe string extending into the well.

Furthermore, it is known that the pipe as supported by the derrick commonly hangs off-center with respect to the well bore. The scratcher collars which encircle the pipe may therefore be subjected to severe blows if they should "hang up" on the upper lip of the conductor casing or blow out preventer as the pipe carrying the scratcher is lowered. Since the upper end of the conductor casing or blow out preventer is located below the level of the derrick floor, it is possible for the scratcher collars to be damaged or even scraped off the well pipe without being noticed by the members of the crew. In order to avoid the possibility of damage or bodily removal of the scratcher collar under such conditions, it is important that the hinges connecting the collar halves be made as strong as possible.

Although it is essential that the hinge be of relatively great strength, a further requirement imposes the limitation that the dimensions of the hinges shall not be greater than the lateral thickness of the collar portions which they connect. If the hinge parts should protrude materially beyond the greatest diameter of the collar halves the hinges would catch upon obstructions both in handling of the pipe in horizontal position and when lowering it into the well bore.

Accordingly, it is the principal object of my invention to provide an improved form of hinge for the halves of a scratcher collar which has relatively great strength and yet which is of minimum radial thickness.

Another object of my invention is to provide an improved form of hinge for sections of a scratcher collar which is formed by integral extensions of the material forming the collar.

Other and more detailed objects and advantages will appear more fully hereinafter.

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In the drawings:

Figure 1 is an elevation view partly broken away showing a hinged scratcher mounted on a well pipe.

Figure 2 is a sectional plan view taken substantially on the lines 2—2 as shown in Figure 1.

Figure 3 is an enlarged plan view partly broken away showing details of the hinge construction.

Figure 4 is a sectional view taken substantially on the lines 4—4 as shown in Figure 3.

Figure 5 is a sectional detail taken substantially on the lines 5—5 as shown in Figure 3.

Figure 6 is a perspective view showing the various parts of the hinge.

Figure 7 is a sectional detail similar to Figure 5 showing a modification.

Figure 8 is a view similar to Figure 7 showing another modification.

Referring to the drawings, the well scratcher generally designated 10 comprises a collar 11 formed of two halves and arranged to encircle a well pipe 12. The collar halves may be identical and are joined at their adjacent ends by means of hinge assemblies generally designated 13. The collar 11 may be welded to the pipe 12 if desired, or, as shown in the drawings, may be loosely mounted on the pipe for rotation and axial movement, and the axial movement may be limited by stop lugs 14 fixed on the pipe 12.

Scratcher finger units 15 are mounted on the outer surface of the collar 11. The construction of these units 15 and the mounting on the collar 11 is described in detail in my copending application, Serial No. 51,237, filed September 25, 1948, now Patent No. 2,506,405 issued May 2, 1950. Each of the units 15 comprises a pair of fingers 16 formed of a single integral length of wire extending from coil spring portions 17 and having a mounting section 18 held against the outer surface of the collar 11 by means of an attachment clip 19. The attachment clip 19 may be anchored in place by spot welding 20. The coil spring portions 17 extend within the apertures 21 formed in the collar 11. These apertures provide clearance for the spring portion 17 so that the springs may flex as the scratcher fingers 16 engage the wall 22 of the well bore. Circumferentially extending ribs 23 which project radially outwardly from the collar 11 serve to protect the coil spring portions 17 against damage by contact with obstructions which may be encountered during preliminary handling of the well pipe or during its insertion or manipulation within the well bore. These circumferentially extending ribs 23 form the extreme outer diameter of the collar 11. The ribs 23 do not extend to the extreme ends of the semicircular sections of the collar, but on the contrary, die out a short distance from the ends of the sections as clearly shown in Figure 3.

In accordance with my invention I provide an improved form of hinge structure 13 for connecting adjacent ends of the halves of the collar 11. The hinge structure 13 lies flush with the inner diameter of the collar 11 and does not project radially outwardly materially beyond the outer diameter of the ribs 23. See Fig. 2. The hinge structure 13 includes a pair of axially spaced projections 24 on one of the collar halves, and these projections are formed integrally with the material of the collar 11. A similarly formed central projection 25 extends from the material of the other half of the collar 11. Each of the projections extends circumferentially for a short distance beyond the end 26 of its respective collar portion, and then curves outwardly to define an eye or socket 27 to receive the hinge pin 28. This curved portion 29 of the projection extends for approximately three-fourths of a revolution and then is provided with a reverse bend 30 and a return

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tab 31. The central projection 25 is formed in the same manner as the projections 24 and is also provided with a return tab 32. The tabs 31 and 32 are secured to the outer surface of the collar halves by any convenient means such as, for example, by spot welding 33. As shown in Figure 7 the tabs may be connected by a weld metal deposit 34 which may either supplement or take the place of the spot welding 33.

As shown in the drawings, the curved portion 29 of each projection 24 extends radially outwardly and cooperates with the ribs 23 to afford protection for the coil springs 17 against contact with obstructions during handling of the well pipe prior to insertion into the hole or during manipulation within the well bore. As shown in the drawings, the coil springs 17 which lie adjacent the ends of the two collar sections are spaced circumferentially a greater distance than the spacing between other adjacent coil springs. It is important, therefore, to protect these particular coil springs from damage since the fingers which project from them are spaced wider apart than the other fingers. Damage to these particular coil springs would render their respective fingers ineffective or inoperative and hence would further increase the spacing of effective spring fingers. The projections 24 cooperating with the ribs 23 afford the protection needed.

In the modified form of the hinge structure shown in Figure 8 the adjacent ends of the halves of the collar 11 are not provided with integrally extending projections, but on the contrary, separate strap elements 35 are formed to provide a socket 27a for the hinge pin 28a. The ends of the strap elements are doubled back into overlapping position and the strap elements may be attached to the collar 11 by means of spot welding 36 or fusion welding deposits 37, or both.

In operation the scratcher 10 may be applied laterally to the well pipe 12 by first removing one of the hinge pins 28. The two halves of the collar 11 are then pivoted about the other hinge pin so that the collar halves may be brought into encircling position around the pipe. The sockets 27 formed by the projections 24 and 25 are then brought into alignment and the hinge pin 28 reinserted. The lower end 38 of the hinge pin 28 may then be deformed to prevent its disassembly. When the collar 11 is thus assembled around the pipe 12 the hinge structures 13 maintain the collar halves securely in position and prevent disassembly even though shock loads of considerable size may be applied to various parts of the scratcher assembly 10 during handling or during insertion or manipulation of the well pipe within the well bore.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A scratcher collar for a well pipe comprising an annular body adapted to encircle the pipe, the body having a pair of axially spaced outwardly projecting ribs formed integrally therewith, a plurality of scratcher fingers, each of said fingers having an attachment portion thereof resting on a surface of the body between said ribs, means for securing said attachment portion of each scratcher finger to the body, the body including substantially semi-circular arcuate sections connected end-to-end, the ribs terminating short of the ends of the body sections, each section being formed of one integral piece of sheet metal having

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flat ends and having integral projections extending from the said ends, said projections being curved radially outwardly for approximately three quarters of a revolution to form sockets, said projections being substantially flush with the inner circumference of the arcuate sections and extending radially outwardly for a distance not substantially exceeding the outer diameter of the ribs, and pins disposed in the sockets connecting the projections on adjacent ends of the sections.

2. A scratcher collar for a well pipe comprising an annular body adapted to encircle the pipe, the body having a pair of axially spaced outwardly projecting ribs formed integrally therewith, a plurality of scratcher fingers, each of said fingers having an attachment portion thereof resting on the outer surface of the body between said ribs, means for securing said attachment portion of each scratcher finger to the body, the body including substantially semi-circular arcuate sections connected end-to-end, the ribs terminating short of the ends of the body sections, each section being formed of one integral piece of sheet metal having flat ends, projections extending from the said ends, said projections being doubled back for approximately three quarters of a revolution to form sockets having integral tabs positioned adjacent the outer surface of the collar sections, weld means attaching the tabs to said surface, said projections being substantially flush with the inner circumference of the arcuate sections and extending radially outwardly for a distance not substantially exceeding the outer diameter of the ribs, and pins disposed in the sockets connecting the projections on adjacent ends of the sections.

3. A scratcher collar for a well pipe comprising an annular body adapted to encircle the pipe, the body having a pair of axially spaced outwardly projecting circumferential ribs formed integrally therewith, a plurality of scratcher fingers, each of said fingers having an attachment portion thereof resting on the outer surface of the body between said ribs, means for securing said attachment portion of each scratcher finger to the body, the body including substantially semi-circular arcuate sections connected end-to-end, the ribs terminating short of the ends of the body section, the body section having substantially flat end socket members each formed of a length of metal doubled back to form an eye, weld means for attaching each socket member to the outer surface of one of the flat ends of the sections to project from the end thereof, said socket members being substantially flush with the inner circumference of the arcuate sections and extending radially outwardly for a distance not substantially exceeding the outer diameter of the ribs, and pins disposed in the eyes connecting the members on adjacent ends of the sections.

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