

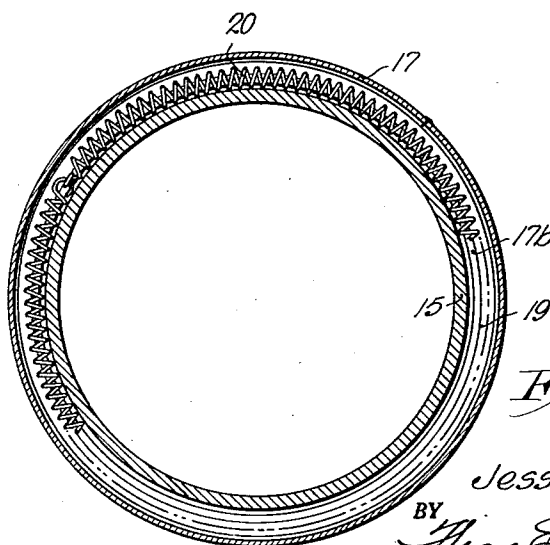
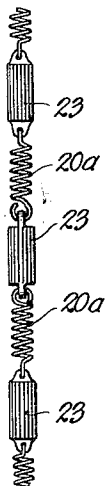
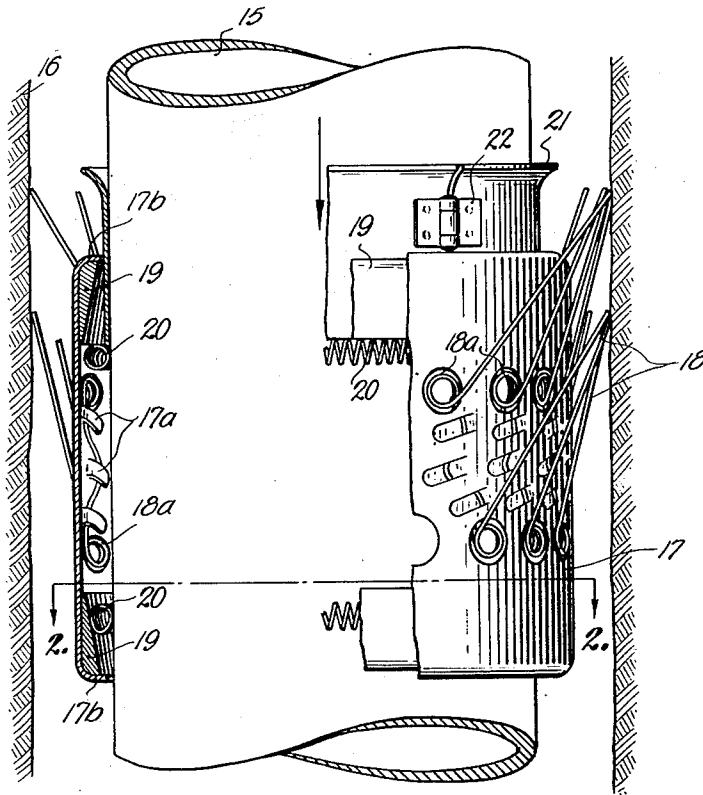
July 2, 1957

J. E. HALL, SR
WELL TOOL MOUNTING

2,797,756

Filed Nov. 14, 1951

6 Sheets-Sheet 1



INVENTOR.
Jesse E. Hall, Sr.,

BY
Thos. E. Scofield
ATTORNEY.

July 2, 1957

J. E. HALL, SR

2,797,756

WELL TOOL MOUNTING

Filed Nov. 14, 1951

6 Sheets-Sheet 2

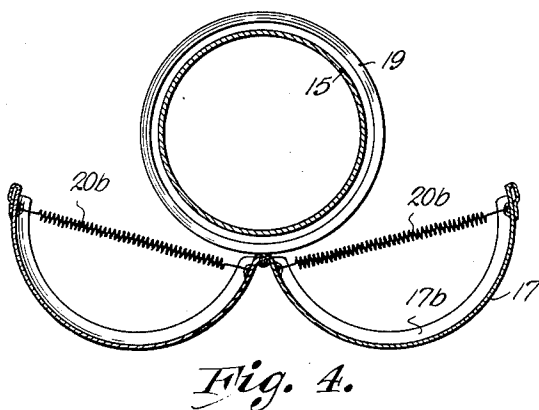


Fig. 4.

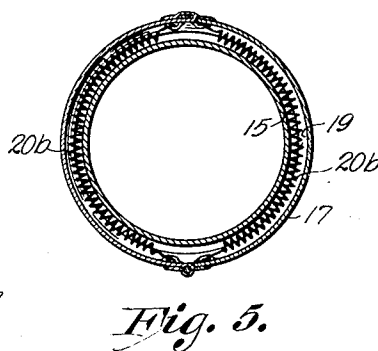


Fig. 5.

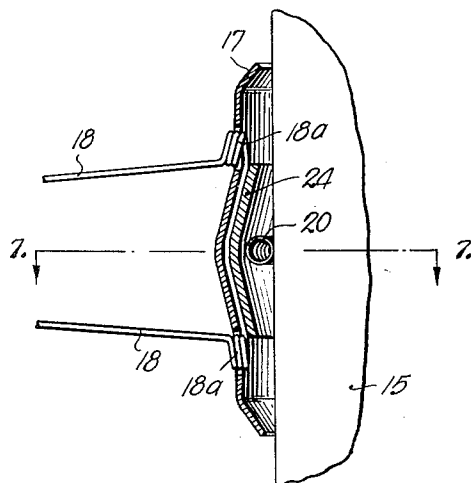


Fig. 6.

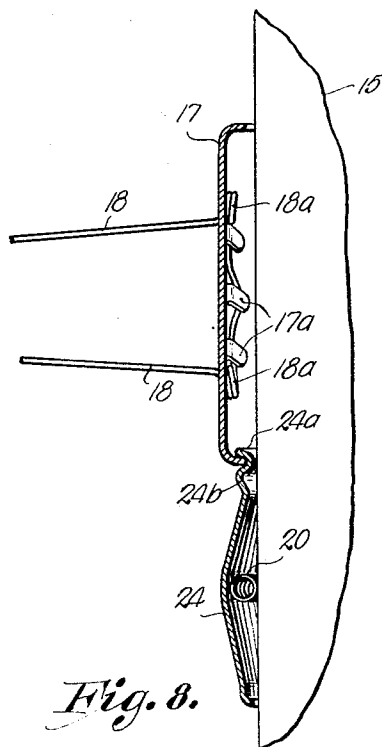


Fig. 8.

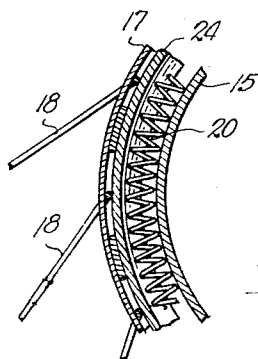


Fig. 7.

INVENTOR.
Jesse E. Hall, Sr.,
BY
Thor. E. Scofield
ATTORNEY.

July 2, 1957

J. E. HALL, SR
WELL TOOL MOUNTING

2,797,756

Filed Nov. 14, 1951

6 Sheets-Sheet 3

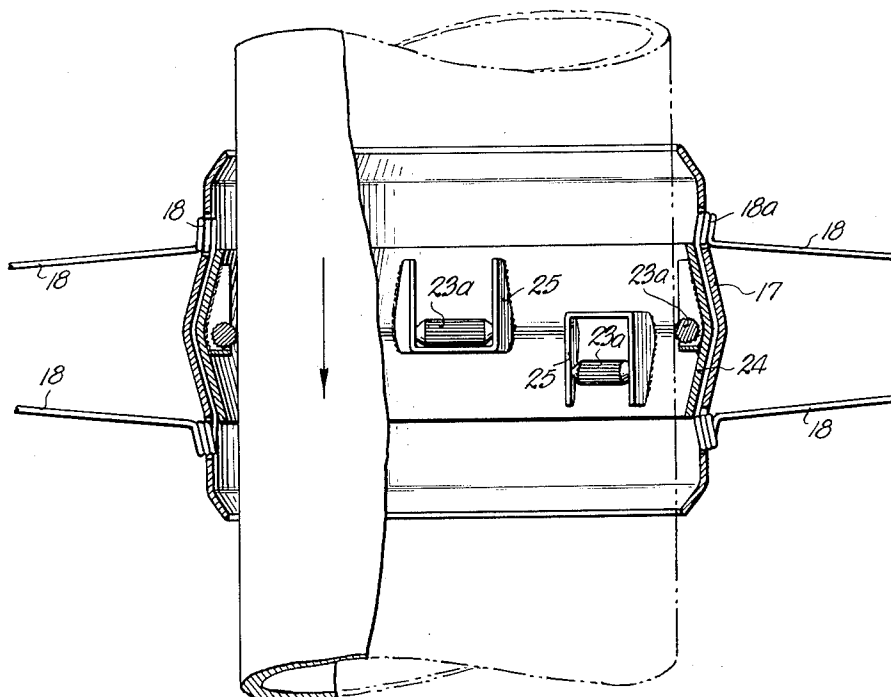


Fig. 9.

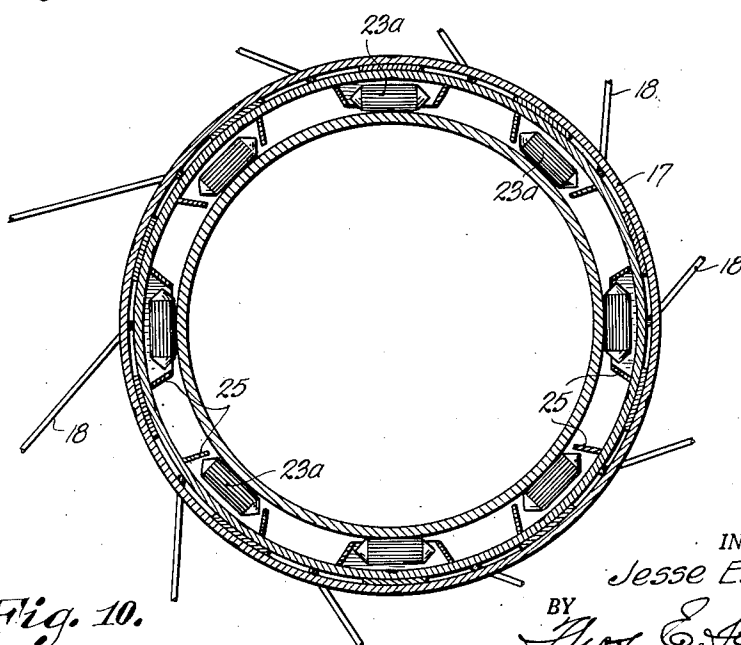


Fig. 10.

INVENTOR.
Jesse E. Hall, Sr.,
BY
Thos. E. Seefield
ATTORNEY.

July 2, 1957

J. E. HALL, SR
WELL TOOL MOUNTING

2,797,756

Filed Nov. 14, 1951

6 Sheets-Sheet 4

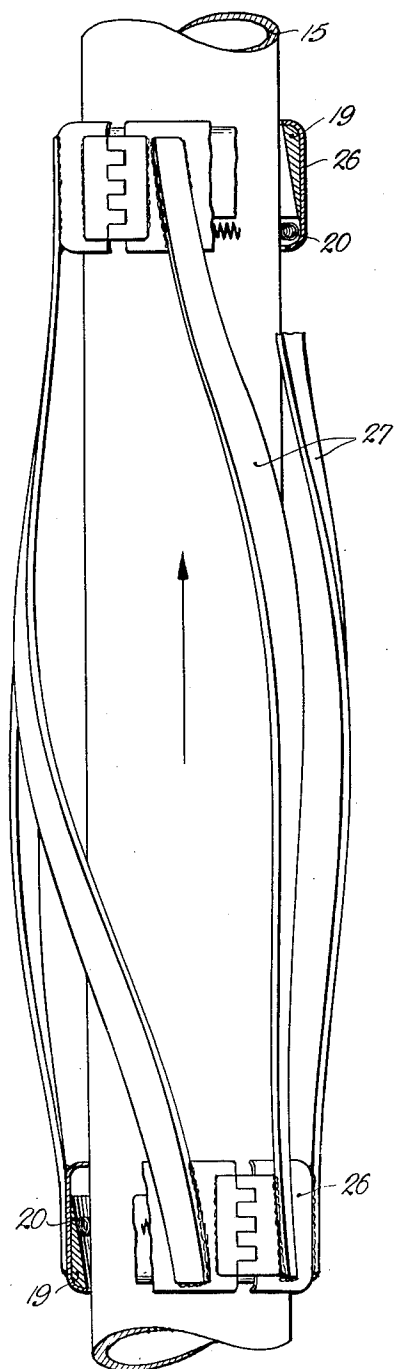


Fig. 11.

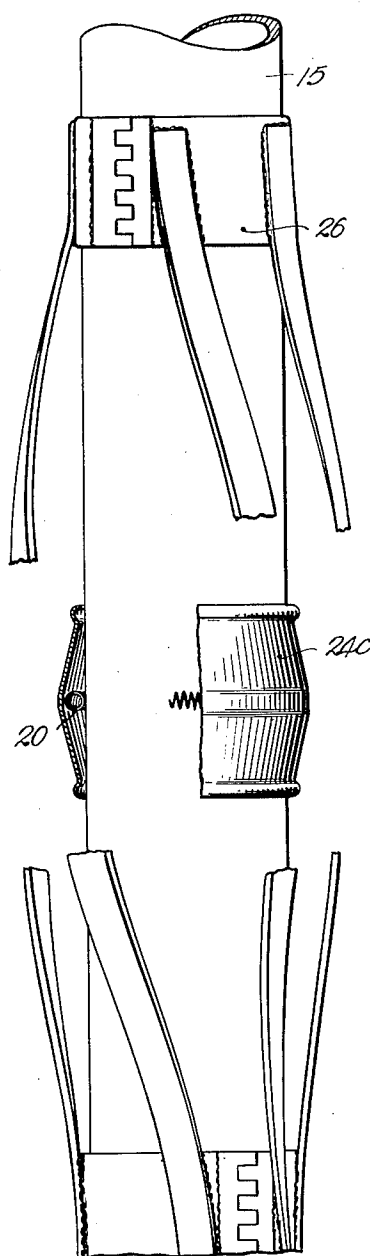


Fig. 12.

INVENTOR.

Jesse E. Hall, Sr.,

BY

Thos. E. Seafeld.

ATTORNEY.

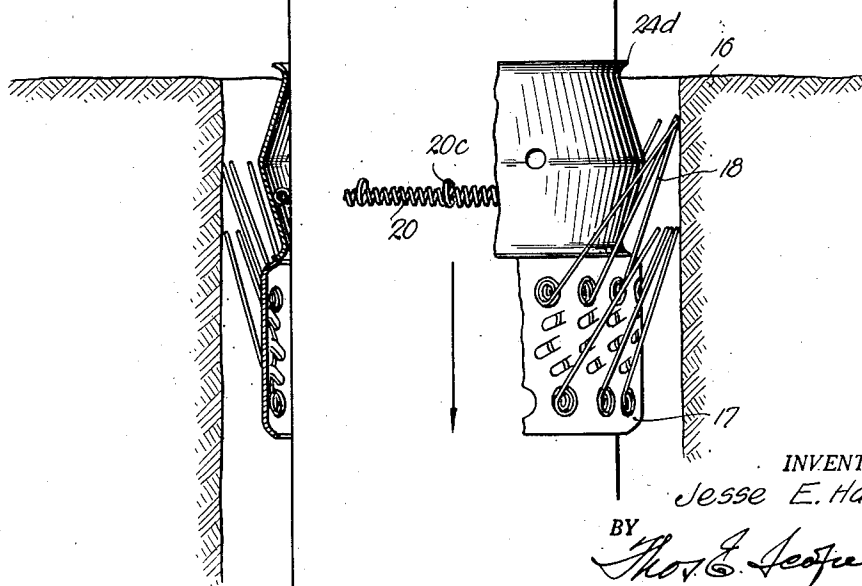
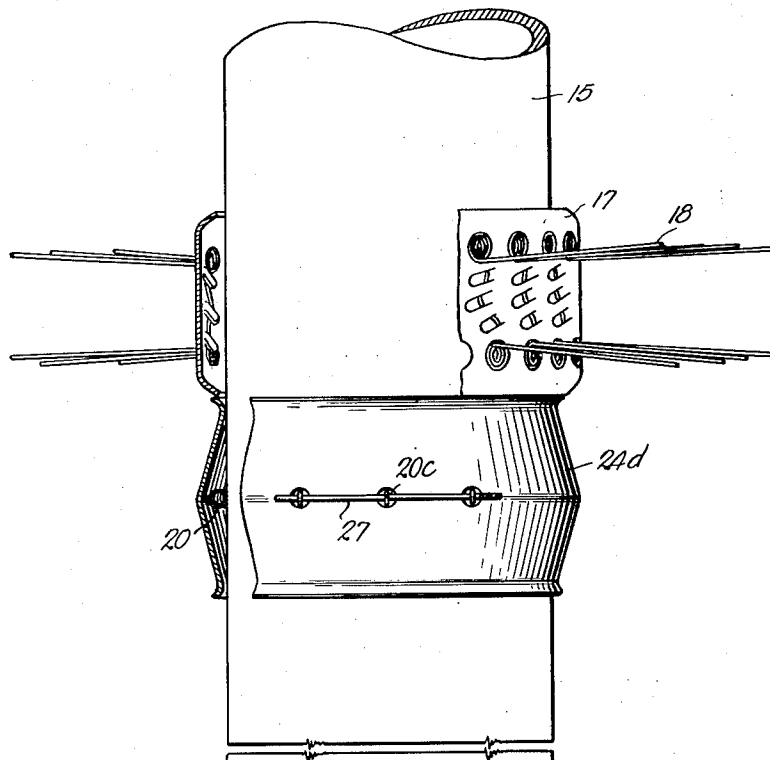
July 2, 1957

J. E. HALL, SR
WELL TOOL MOUNTING

2,797,756

Filed Nov. 14, 1951

6 Sheets-Sheet 5



July 2, 1957

J. E. HALL, SR
WELL TOOL MOUNTING

2,797,756

Filed Nov. 14, 1951

6 Sheets-Sheet 6

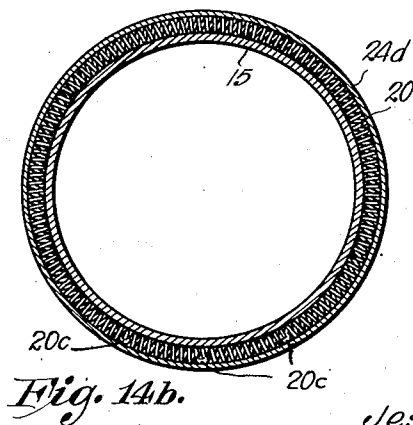
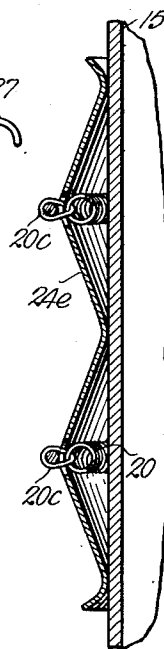
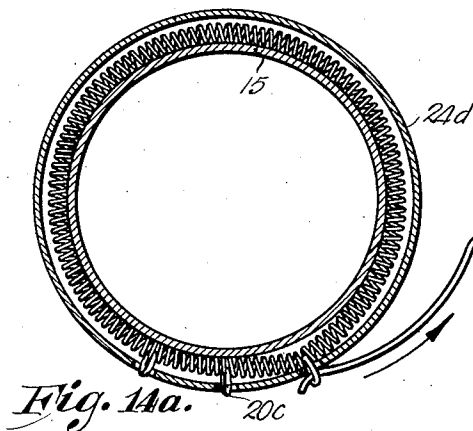
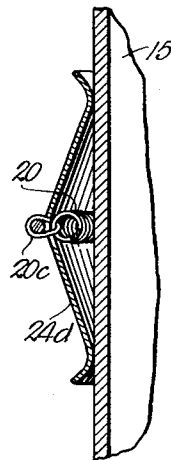
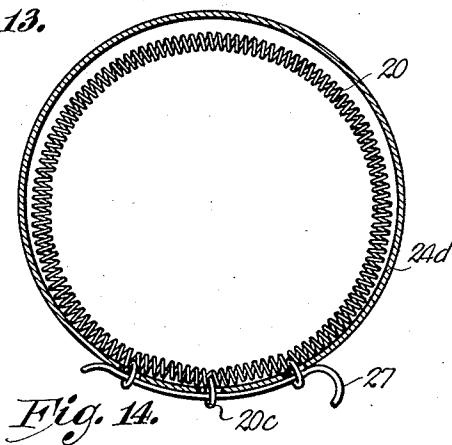
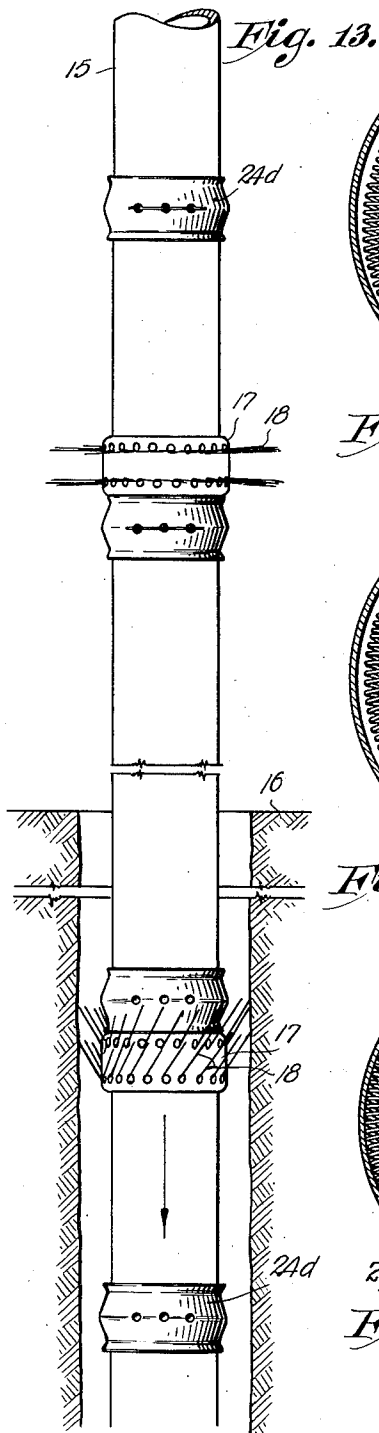


Fig. 14d.

INVENTOR.

Jesse E. Hall, Sr.

BY *Thos. E. Seaford*
ATTORNEY.

1

2

2,797,756

WELL TOOL MOUNTING

Jesse E. Hall, Sr., Weatherford, Tex.

Application November 14, 1951, Serial No. 256,194

15 Claims. (Cl. 166—173)

This invention relates to improvements in a mounting for oil and water well tools, and refers more particularly to a tapered race and wedge assembly adapted to be used with well tools which are applied to the exterior of well casing, tubing, or drill pipe, and rendering the tools more easily mountable on or demountable from the casing.

It has been common practice heretofore in applying well tools to the exterior of pipe or casing, to weld the tools directly to the pipe or, where it is desired to have the tool rotatable on the pipe, to weld lugs or stops to the pipe above and below or between the collars of the tool as abutments to restrict its longitudinal movement along the pipe within definite limits. As an example, in mounting centralizers upon casing, a circular stop in the form of a ring, band or collar may be fixedly welded to the exterior of the casing between the collars of the centralizers, or one collar of the centralizers may be fixed by welding with the other slidable longitudinally within limits to permit spreading and constriction of the springs or blades. In the application of scratchers utilizing circular sleeves, bands or collar supports for the abrading wires, circumferentially spaced lugs are usually welded above and below the scratcher collar to permit free rotation and limited longitudinal movement.

In the application of such tools, therefore, it is necessary to have at the well site welding equipment when the tools are to be applied, and considerable time is consumed, to say nothing of the expense and possible harm to the pipe or casing resulting from such welding operations.

An object, therefore, of the instant invention is to provide a simple and effective arrangement by means of which well tools of this type may be applied to the exterior surface of pipe as the pipe is run into the well.

Another object is to provide a well tool mounting which eliminates the welding operations previously required.

Still another object is to provide a well tool mounting which permits removal of the tool and avoids the necessity of welding equipment for burning off the lugs or holding stops from the pipe should it be desired to remove the tools for later use.

A further object is to provide a mounting which considerably reduces the expense of applying tools of this type to pipe.

Other and further objects and advantages will appear from the description which follows.

In the accompanying drawings which form a part of the instant specification and are to be read in conjunction therewith, and in which like reference numerals indicate like parts in the various views:

Fig. 1 is a side elevation of a scratcher mounted on a casing with the mounting shown in section and indicating the use of the neutralizer sleeve employed in the application and removal of the tool from the pipe.

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1, in the direction of the arrows.

Fig. 3 shows a modified construction for the wedge member.

Fig. 4 is a sectional view of a hinged scratcher ready to be applied to a casing showing the wedge member in two parts, with the scratcher in open position.

Fig. 5 shows the device of Fig. 4 in closed position surrounding the casing.

Fig. 6 is another modification of the mounting located within the collar of a scratcher.

Fig. 7 is a sectional view taken along the line 7—7 in Fig. 6.

Fig. 8 is a modification similar to that shown in Fig. 6, with the mounting separate from the scratcher but with a rim of the mounting hooked beneath an edge of the scratcher collar.

Fig. 9 shows a scratcher mounted on a casing with portions of the casing removed to reveal the details of the mounting and in which rollers are used as the wedge members.

Fig. 10 is a horizontal section taken through the scratcher shown in Fig. 9.

Fig. 11 shows an embodiment of the mounting as applied to the collars of a centralizer.

Fig. 12 is a modified type of mounting for centralizers located between the collars.

Fig. 13 is a diagrammatic view taken through the top of an oil well showing the casing being run into the well with scratchers applied between two sets of tool mountings.

Fig. 13a is an enlarged view similar to the showing in Fig. 13 with parts in section to show the functioning of the scratcher mountings.

Fig. 14 is a horizontal central sectional view through the midsection of one of the mounting units prior to being applied to the casing with the holding pin inserted to hold the wedge spring in neutral position.

Fig. 14a is a sectional view similar to that shown in Fig. 14 with the mounting applied to the casing and the holding pin partially removed.

Fig. 14b is a view similar to that shown in 14a with the holding pin wholly removed.

Fig. 14c is a vertical section of a mounting applied to the casing with the holding pin threaded through the loops of the spring as in Fig. 14.

Fig. 14d is a vertical section as in 14c through a double mounting adapted for use between the collars of a centralizer.

Referring to the drawings, and particularly to the construction shown in Figs. 1 and 2, at 15 is shown diagrammatically a short length of casing positioned within the well bore 16. Upon the exterior of the casing is mounted a scratcher comprising a collar 17, from which extend abrading wires or whiskers 18. The principal function of the abrading wires is to scrape the accumulated layer of mud from the well bore during well conditioning operations preliminary to the cementing of the well. The scratcher shown is of conventional design, having the abrading wires 18 which are affixed or anchored to the collar by tongues 17a stamped from the collar and pressed over loops of the wires within the collar. Coils 18a formed in the wires between their anchored and free ends, or substantially where the wires pass through apertures in the collar, give the wires greater resiliency and flexibility, as well as longer life to withstand the twisting and bending stress imposed upon them when the pipe is reciprocated in the well conditioning operation.

The edges of the scratcher collar are bent inwardly toward the pipe, as shown at 17b, giving the collar the form of a circular channel, and in the space between the collar and pipe within the bent edges thereof are positioned tapered circular races 19. Each of the races has its thickest portion at the outside edge of the collar,

3

with an internal tapered surface extending from the collar rim toward the inner surface thereof. The outer surface of each tapered race conforms to the inside contour of a turned-in edge of the collar, so as to fit snugly within said flanged edge of the collar. Beneath the scratcher collar, and between the tapered inner surface of each race and the outer surface of the pipe are wedge members 20, which in the embodiment shown in Figs. 1 and 2 are coil springs.

Beneath the upper edge of the scratcher collar shown in Fig. 1 is a neutralizer sleeve 21 formed in two parts, each part having the shape of a semicylindrical sleeve with one flared edge, said parts hinged together as shown at 22. The function of this sleeve, obvious from the drawing, is to hold wedge member 20 in a neutral position when the scratcher is slipped along the casing to the desired location in mounting it on the pipe, or when removing the scratcher therefrom.

In Fig. 3 there is shown a wedge member assembly which may be substituted for the coil spring 20 shown in the previous figures. Instead of the single coil spring, the wedge member is here constructed of an interrupted coil spring 20a with the hooked ends engaging the eyes at both ends of rollers 23. The outside surface of the rollers is preferably ridged, crinkled, knurled, or denticulated to give a roughened surface in order that the interrupted spring roller assembly will produce a more positive wedging action against the outside surface of the pipe and the tapered surface of races 19. Also, it is preferable to have the short lengths of coil springs 20a of somewhat smaller diameter than the rollers 23 in order that the solid rollers receive the wedging or squeezing action of the tapered surfaces of the races.

Instead of one piece integral collars for the scratchers and for the collars of the centralizers, these circular bands which furnish a support for the scratcher wires and attachments for the centralizer blades are sometimes hinged to facilitate application of the tool of the casing. Such construction is shown in Figs. 4 and 5, and where the tool collar is hinged the coil spring employed as a wedging member should be formed in two parts, indicated at 20b, attached at their ends near the outer edges of the halves of the collar by hooks, loops, or eyes. When the tool collar is closed about the pipe, as shown in Fig. 5, the two springs conform to the circular periphery of the pipe and give the effect of a single spring shown in Figs. 1 and 2. It will be understood that the end portions of springs 20b must remain relatively fixed by virtue of their attachment to the two hinged collar sections 17; however, the medial portion of each spring still is free to shift up or down and wedge in the tapered races as described. While the wedging action is localized rather than being distributed uniformly about the entire circumference of the well casing, it nevertheless is effective to produce the requisite locking of the collar.

In Fig. 6 is shown a cross sectional view of a scratcher in which a single circular race 24 is used. The largest diameter of the race in this particular modification is midway between its edges, and when placed on the pipe the space between the pipe and the inner surface of the race is therefore greatest at its midsection. The inner surfaces of the race taper inwardly or toward the surface of the pipe so at the rims of the race the space between the race and the pipe is the narrowest. In this modification the race 24 is located within the collar 17 and the wedging member is again shown as a coil spring located in a neutral position. It is important that the distance between the edges of the race and the pipe is always less than the diameter of the wedging member, even in its compressed condition. This is to avoid possibility of the coil spring or wedging member escaping from the space between the race and the pipe. Likewise, in this construction the coil spring shown may be re-

4

placed by the wedge member assembly according to the construction shown in Fig. 3.

In Fig. 8 the race is removed from beneath the collar of the scratcher and is located adjacent one edge of the scratcher with an outwardly turned flange or rim 24a hooked under and engaging an inwardly turned edge or rim of the scratcher collar. A shoulder 24b formed in the race adjacent the lip 24a supplements the lip and serves as an abutment for the edge of the scratcher collar, so the mounting will prevent axial movement of the collar in either direction.

In Figs. 9 and 10, a mounting is shown for scratchers in which the coil spring wedging element is replaced by a plurality of rollers 23a. These rollers are of solid metal with ridged surfaces similar to those described in connection with the interrupted coil spring in Fig. 3, except that in this modification in place of stringing the rollers upon short lengths of coil springs, the rollers are held within U-shaped enclosures or keepers 25. These enclosures are placed at intervals in staggered arrangement within the race member 24, the race being concentrically positioned within a scratcher collar 17. The internal surfaces of the race are tapered with the greatest space between the race and the pipe at its midsection, the outer edges of the race being closest to the pipe. The two legs of the U-shaped enclosures or keepers 25 are likewise tapered, with their greatest height at the midsection of the race and their lesser height toward the rims of the race. The inner edges of the legs of the keepers are sloped to hold the tapered ends of the rollers 23a, permitting free rotation along the surface of the pipe and between the pipe surface and inner tapered surfaces of the race by preventing displacement of the rollers from their individual enclosures or keepers. One set of rollers are so positioned within the race to wedge against one tapered surface while the second set of rollers is positioned to wedge against the opposite tapered surface, thus with axial movement of the pipe in either direction, with respect to the scratcher, or with axial movement of the scratcher in either direction with respect to the pipe, one set of rollers will jam or wedge between the pipe surface and a tapered surface of the race.

In Figs. 11 and 12 the scratcher mounting shown in Fig. 1 is applied to the collars of a centralizer. In other words, the centralizer collars 26 are channel shaped forming an annular space between the casing 15 and the inside surface of the collar. Within the upper collar is a race 19 tapered from the upper rim outwardly to the inner surface of the centralizer collar. Between the race and pipe is a wedge member shown in the form of a coil spring 20. In the same manner but reversed as to position is the race 19 within the lower collar. The wedge member or coil spring 20 in the lower collar is positioned above the race as contrasted with the wedge member in the upper collar, which is below the race. The collars of the centralizer are hinged similarly to the collar of the scratcher shown in Figs. 4 and 5, so the tool may be opened and applied to the surface of the pipe, then closed without the necessity of slipping it along the pipe from an end. The springs used as wedges in the collars of the hinge centralizer would likewise be in two parts as is shown in Figs. 4 and 5. Connecting the collars of the centralizer are spiral blades 27. In Fig. 11 the functioning of the wedge member 20 is indicated when the pipe is moved axially in an upward direction, causing the coil spring to be squeezed into the annular space between the race of the lower collar and the outer surface of the pipe, thereby preventing axial movement of the centralizer along the pipe. In a like manner, the upper wedging member would move into the space between the upper race and pipe and there be compressed to prevent axial movement of the centralizer with downward movement of the pipe.

In Fig. 12 the two races have been combined in a single sleeve 24c, tapered from its midsection inwardly toward

its edges to form an annular space beneath the sleeve, which is of greatest depth midway between the rims of the sleeve and narrowest at the outer edges. Within the annular space between the sleeve and pipe is a single wedge member in the form of a coil spring 20, similar to that shown in Fig. 8. This mounting is positioned on the casing between the collars of the centralizer to give a fixed abutment for either collar, whichever way the casing is longitudinally shifted.

In Figs. 13-14c, inclusive, is shown the preferred type of mounting as used in holding tools onto the exterior of a casing adapted to be run in an oil well. The tool mounting in these figures comprises a sleeve or collar 24d which functions as a race for the wedging element shown as a coil spring 20. The sleeve 24d has its greatest diameter midway between its rims, tapering toward the casing at the rims and forming with the outer surface of the casing a race in which the coil spring 20 is located. In other words, the function of the coil spring is to wedge between the casing and the tapered surfaces of the sleeve in fixing the race rigidly to the outside surface of the casing.

To hold the wedge element 20 in a neutral position while the sleeve is put on the casing, loops of soft metal wire 20c are interposed at intervals along the coil spring as shown best in Figs. 14, 14a and 14c. Small holes or apertures are punched at intervals along a circumferential line midway between the rims of the sleeve and spaced to correspond to the spacing of the loops 20c. The spacing of the holes is such as to slightly stretch the spring between the holes. When the spring is placed within the sleeve or race, loops 20c register with and extend through the holes. In order to hold the wedge member 20 in a neutral position within the sleeve while the race is put onto the casing, pin 27 is threaded through the loops as shown in Fig. 14. The diameter of the circular coil spring is of a size that when the mounting is slid onto the casing, there is sufficient gripping force imposed by the spring upon the casing to hold the race wherever it may be located. This gripping force, however, is insufficient to prevent it from being slipped freely along the pipe to any desired location.

As indicated previously, when the race and wedge member assembly is applied to the pipe, pin 27 is threaded through loops 20c in the manner shown in Fig. 14, one of these mountings being placed above the scratcher and one below giving the scratcher a limited longitudinal movement along the pipe of from six to twelve inches. In Fig. 13, above the ground level there is shown an assembly of the two races 24d and scratcher 17 with holding pins 27 threaded through the loops of the coil springs. In the same figure below the ground or within the bore hole of the well is shown a scratcher between two of the sleeves with the holding pins 27 removed. The holding pins or wires are removed from the coil spring loops after the scratchers have been properly positioned on the casing and before the casing is run into the hole. The same procedure would be followed in mounting other types of tools on a casing. It will be noted that frictional contact of the wires 18 with the wall of the well has slid the scratcher into abutment with the upper mounting. Removal of holding pin 27 permits the coil spring or sleeve to slide longitudinally along the casing and wedge the spring between the tapered inner surface of the sleeve and casing, either above the center line of the sleeve or below, according to the directional movement of the casing. If the casing is being run into the well, the coil spring will wedge below the center line of the sleeve as shown in Fig. 13a; if the casing is moved upwardly, the coil spring will wedge above the center line.

In reciprocating the pipe, therefore, when the bore hole of the well is being cleaned of mud, on the downward movement of the casing the scratcher will abut

against the upper sleeve which is fixed onto the casing by wedging of the coil in the manner shown in Figs. 13 and 13a. When the direction of the pipe is reversed and the casing is moved upwardly, the scratcher will slide to abutment with the lower sleeve or mounting which is wedged fixedly to the pipe by the coil spring squeezed between the inside tapered surface of the race and the outer surface of the casing above its midsection. After the holding pin 27 has been removed from the loops 20c, the soft metal loops recede through the holes in the sleeve as shown in Fig. 14b.

In Fig. 14d is shown a double sleeve or race of the same type in which two coil springs are used in place of the single spring shown in the previous figures. This holding member is adapted for the heavier tools such as centralizers where greater forces are imposed upon the mounting than is the case with a scratcher.

Removal from the casing or pipe of the mounting shown in Figs. 13-14d would require cutting the sleeve and coil spring or burning them off with a welding torch as distinguished from use of the neutralizing sleeve 21 shown in Figs. 1-12, inclusive.

From the foregoing it will be seen that the tool mounting is adaptable for use with any type of tool employing a collar to be affixed to the exterior of a casing, pipe, or tubing. The mounting is particularly adapted to scratchers and centralizers. In the case of scratchers, the collar automatically is released from the pipe at the end of each stroke during reciprocation, permitting its free rotation and relieving of the bending stress upon the wires caused by reversal of the pipe movement. The mounting as applied to the collars of the centralizer fixes the leading collar whichever way the pipe is axially moved, either in reciprocation of the pipe or when the casing is run into or out of the hole. In the modified forms shown in Figs. 12 and 14d are afforded fixed rings or stops mounted upon the pipe or casing between the centralizer collars, thus providing a rigid abutment for the trailing edge of the leading collar, whichever way the pipe is moved. Thus the centralizer is pulled through the well bore by the leading collar, whichever mounting is employed.

In some cases it may be found advantageous to make the races removable from the collar to facilitate application of the tool to the pipe. Usually, however, where the races are positioned within the collar, whether in the form of a double race located adjacent the lateral edges of the collar, or a single race beneath the midsection, they will be permanent adjuncts fitted therein during manufacture of the tool. Mountings such as shown in Figs. 8, 12 and 13-14d, inclusive, are obviously separate, and are applied to the casing as separate devices.

In connection with the scratchers and centralizers shown in Figs. 6 to 12, it will be understood that a neutralizing sleeve, such as shown at 21 in Fig. 1, can be used in applying these to the pipe. Such obviously is unnecessary, however, in the embodiments employing the split collar arrangement discussed in connection with Figs. 4 and 5 and in the embodiments wherein the coil spring wedge members are held in neutral position by pins 27, as is true in Figs. 13 to 14d.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the invention.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or

shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A mounting for the application of well tools, such as scratchers and centralizers, to the exterior of well casing comprising a race and wedge member assembly positioned on the casing to abut a collar of the tool and operate with longitudinal movement of the casing or tool to squeeze the wedge member against the casing and hold the mounting fixedly thereon; said wedge member comprising an elastic garter band encircling the well casing and tensioned to hug same snugly, said band comprising a series of circumferentially spaced jam rollers with tension springs between adjacent ones of the rollers.

2. A mounting for the application of well tools, such as scratchers and centralizers, to the exterior of well casing comprising a race and wedge member assembly positioned on the casing to abut a collar of the tool and operate with longitudinal movement of the casing or tool to squeeze the wedge member against the casing and hold the mounting fixedly thereon, said wedge member constituting coil spring loops at spaced intervals along the coil spring, apertures in the race circumferentially spaced about its midsection at intervals corresponding to the spacing of the loops in the spring, and a removable pin adapted to be threaded through the loops exteriorly of the race to hold the wedge member spring in a neutral position.

3. Apparatus of the character described, comprising a longitudinally reciprocable well casing, a tool-mounting sleeve loosely encircling the casing, the bore of said sleeve tapering axially from the central section of the sleeve toward both ends, and wedge means within the bore of the sleeve, said means having a normal position midway between the ends of the sleeve but shiftable axially in either direction from said position thereby to wedge between the exterior of the casing and either end portion of the bore, said wedge means comprising an elastic garter band encircling the well casing and tensioned to hug same snugly, said band comprising a series of circumferentially spaced jam rollers with tension springs between adjacent ones of the rollers.

4. Apparatus of the character described comprising a longitudinally reciprocable well casing, a tool-mounting sleeve on said casing having a pair of annular races loosely encircling the casing, the bore of one race tapering axially in one direction and the bore of the other race tapering axially in the opposite direction, each bore having therein an elastic garter band encircling the well casing and tensioned to hug same snugly, each band including a series of circumferentially spaced elements effective to wedge in the associated bore upon axial movement of the sleeve in one direction relative to the casing thereby to limit such movement.

5. A mounting for the application of well tools, such as scratchers and centralizers, to the exterior of a well casing, comprising a sleeve whose bore is tapered axially throughout a portion of its length, the smallest diameter of said bore being appreciably larger than the outside diameter of the casing thereby to permit the sleeve to be advanced axially over the casing to desired position, an elastic annulus for encircling the casing, means maintaining said annulus in said bore at a point remote from the small end of its tapered portion and also holding the annulus expanded to slip easily along the casing during the advance of said sleeve to a desired position, said last means being operable when the sleeve is in desired position to free the annulus from the sleeve and release it from expanded condition whereby the annulus is adapted to contract due to its elastic tension and hug the casing snugly, the outside diameter of said annulus when thus contracted being larger than the diameter of said bore at its smallest point whereby the annulus is adapted to wedge in the tapered portion of the bore upon

subsequent axial shifting of the sleeve in one direction relative to the casing.

6. In a device of the character described, a rigid sleeve whose bore is tapered axially throughout a portion of its length, an elastic annulus substantially concentric with said sleeve and located within the bore at a position spaced axially from the small end of its tapered portion, means attaching said annulus to said sleeve at a plurality of circumferentially spaced points, said annulus being stretched and under tension between adjacent ones of said points, said last means being operable to detach said annulus from said sleeve at said points thereby to permit the stretched portions thereof to contract.

7. A device as in claim 6 wherein said sleeve is apertured at said circumferentially spaced points; said annulus having loops attached thereto at intervals more closely spaced than the distance between said points, said loops projecting outwardly through said apertures and said attachment means comprising an element threaded through said loops exteriorly of the sleeve.

8. A device as in claim 7 wherein said annulus comprises a coiled garter spring.

9. In a device of the character described, a rigid sleeve whose bore tapers axially from the central section of the sleeve toward both ends, an elastic annulus substantially concentric with the sleeve and located within said bore midway between the ends of the sleeve, means attaching said annulus to said sleeve at a plurality of circumferentially spaced points, said annulus being stretched and under tension between adjacent ones of said points, said last means being operable to detach said annulus from the sleeve at said points thereby to permit the stretched portions thereof to contract.

10. In a device of the character described, a well casing, a rigid sleeve encircling said casing, a stretched elastic garter band encircling said sleeve, a second sleeve encircling said garter band, said last sleeve having a bore tapering to a diameter smaller than the outside diameter of the stretched garter band, said first sleeve movable axially relative to said second sleeve to advance the garter band into engagement with the tapered bore of said second sleeve whereby continued axial movement of said first sleeve is effective to withdraw same from within said garter band and permit the latter to contract onto said well casing due to its tension, the outside diameter of said garter band when thus contracted being larger than the diameter of said tapered bore at its smallest point whereby said band is adapted to wedge in said bore upon subsequent axial shifting of said second sleeve in one direction relative to the well casing.

11. A device as in claim 10 wherein said first sleeve is split longitudinally into a plurality of segmental sections to permit separation of the sections when said sleeve is withdrawn from the garter band.

12. A mounting as in claim 5 wherein said elastic annulus comprises a series of circumferentially spaced jam rollers with tension springs between adjacent ones of said rollers.

13. A mounting for the application of well tools, such as scratchers and centralizers, to the exterior of a well casing comprising a sleeve whose bore is largest midway between the ends of the sleeve and tapers axially toward both ends, the bore at the ends of the sleeve being appreciably larger than the outside diameter of the casing thereby to permit the sleeve to be advanced axially over the casing to desired position, an elastic annulus for encircling the casing, means maintaining said annulus in said bore midway between the ends thereof and also holding the annulus expanded to slip easily along the casing during the advance of said sleeve to a desired position; said last means being operable when the sleeve is in desired position to free the annulus from the sleeve and release it from expanded condition whereby the annulus is adapted to contract due to its elastic

tension and hug the casing snugly, the outside diameter of said annulus when thus contracted being appreciably larger than the diameter of said bore at the ends thereof whereby the annulus is adapted to wedge in a tapered portion of the bore upon subsequent axial shifting of the sleeve in either direction relative to the casing.

14. A well casing centralizer of the type having a pair of axially spaced collars adapted to loosely surround said casing and outwardly bowed centralizing elements supported at their ends by and between said collars, said centralizer including an annular race adapted to encircle the casing and rigidly secured to the centralizer, the bore of the race being tapered axially throughout a portion of its length and the smallest diameter of the bore being appreciably larger than the outside diameter of the casing thereby to permit the centralizer to be advanced axially over the casing to a desired position, an elastic annulus within said bore for encircling the casing, means maintaining said annulus in said bore at a point remote from the smallest diameter of its tapered portion and also holding the annulus expanded to slip easily along the casing during the advance of said centralizer to said desired position, said last means being operable when the centralizer is in the desired position to free the annulus from said point and release it from expanded condition whereby the annulus is adapted to contract due to its elastic tension and hug the casing snugly, the outside diameter of said annulus when thus contracted being larger than the smallest diameter of said bore whereby the annulus is adapted to wedge in the tapered portion of the bore between the bore and the casing upon subsequent axial shifting of the centralizer relative to the casing in one direction.

15. A well wall scratcher of the type having an an-

nular collar adapted to loosely surround a well casing and provided with outwardly extending abrading fingers for engaging the well wall, said scratcher including an annular race adapted to encircle said casing and rigidly secured to said collar, the bore of said race tapering axially throughout a portion of its length and the smallest diameter of the bore being appreciably larger than the outside diameter of the casing thereby to permit the scratcher to be advanced axially over the casing to a desired position, an elastic annulus within said bore for encircling the casing, means maintaining said annulus in said bore at a point remote from the smallest diameter of its tapered portion and also holding the annulus expanded to slip easily along the casing during the advance of said centralizer to said desired position, said last means being operable when the scratcher is in desired position to free the annulus from said point and release it from expanded condition whereby the annulus is adapted to contract due to its elastic tension and hug the casing snugly, the outside diameter of said annulus when thus contracted being larger than the smallest diameter of said bore whereby the annulus is adapted to wedge in the tapered portion of the bore between the bore and casing upon subsequent axial shifting of the scratcher relative to the casing in one direction.

References Cited in the file of this patent

UNITED STATES PATENTS

30	1,379,165	Burns et al. -----	May 24, 1921
	1,418,329	Schade -----	June 6, 1922
	1,829,760	Santiago -----	Nov. 3, 1931
	2,184,376	Beyer et al. -----	Dec. 26, 1939
	2,467,833	King -----	Apr. 19, 1949
35	2,569,457	Dale et al. -----	Oct. 2, 1951
	2,628,682	Wright -----	Feb. 17, 1953