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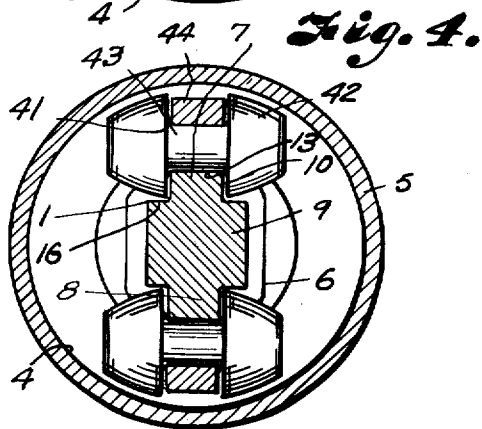
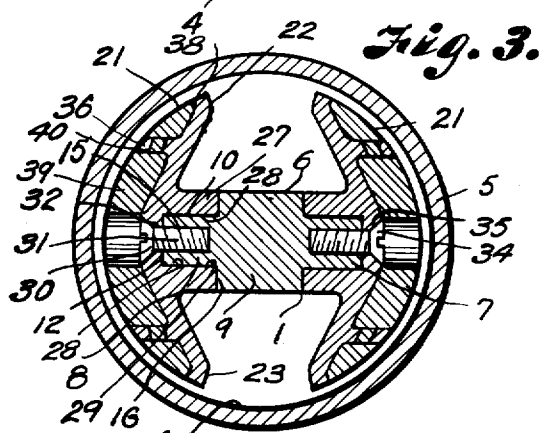
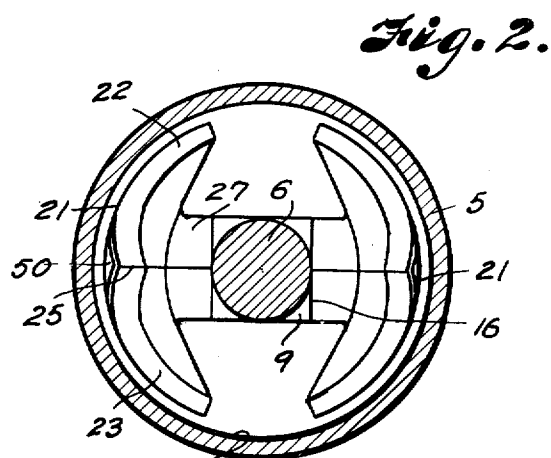
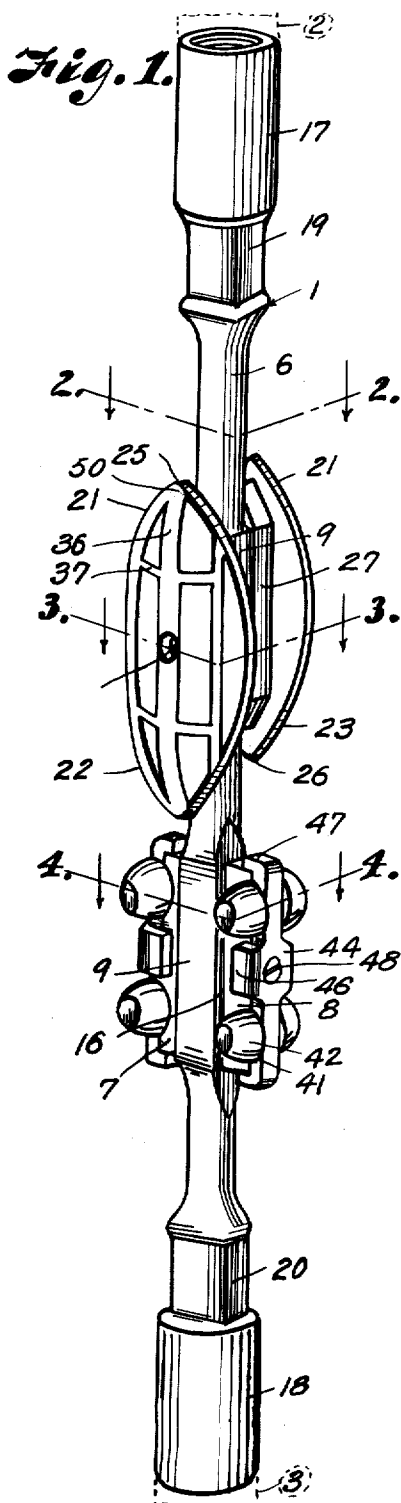
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COMBINATION PARAFFIN SCRAPER AND SUCKER ROD GUIDE

Filed July 24, 1944

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 5

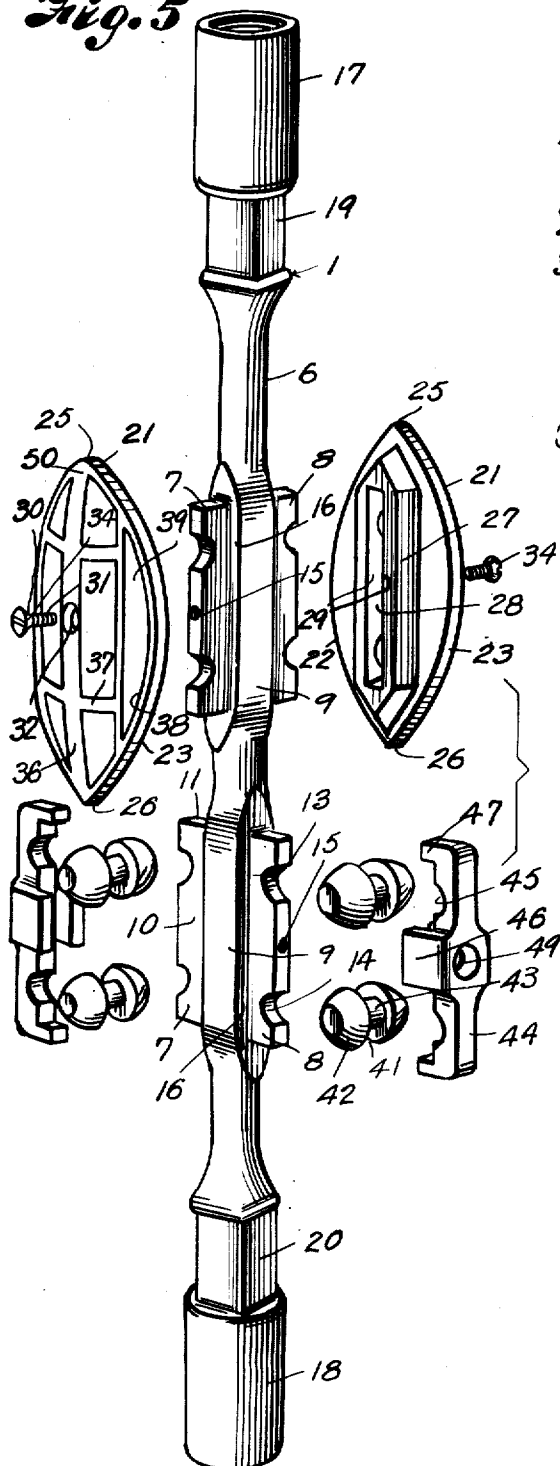
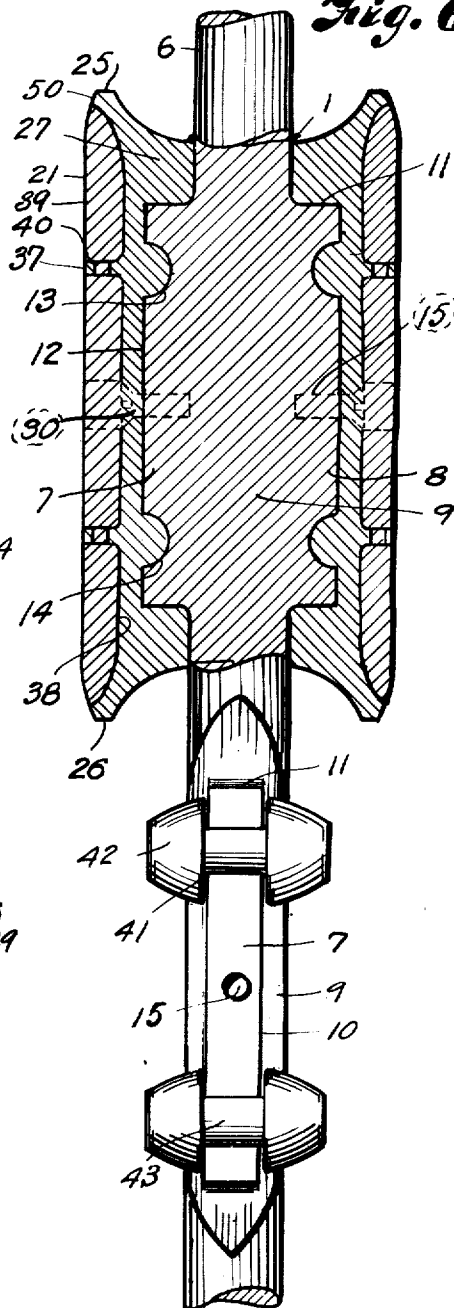


Fig. 6.



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Fig. 7.

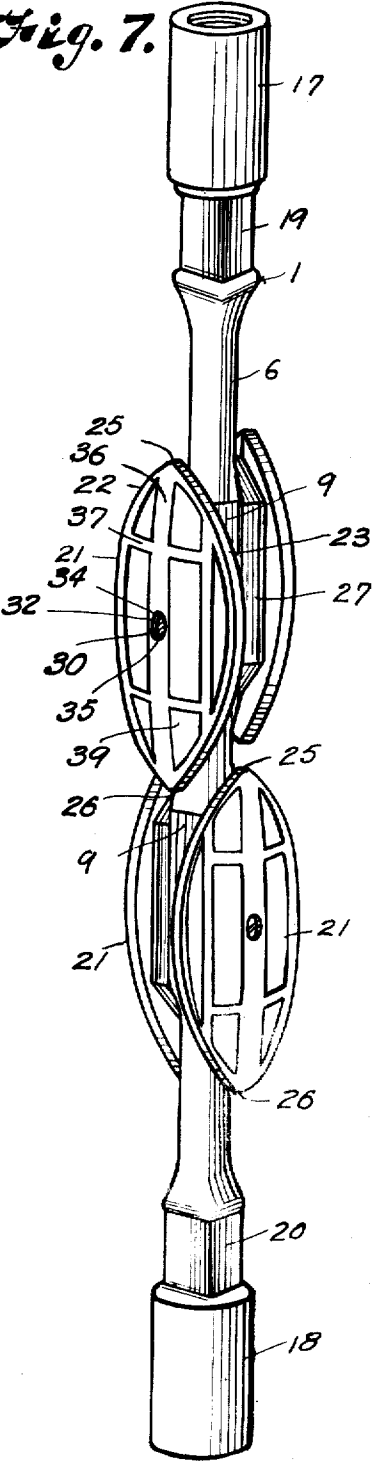
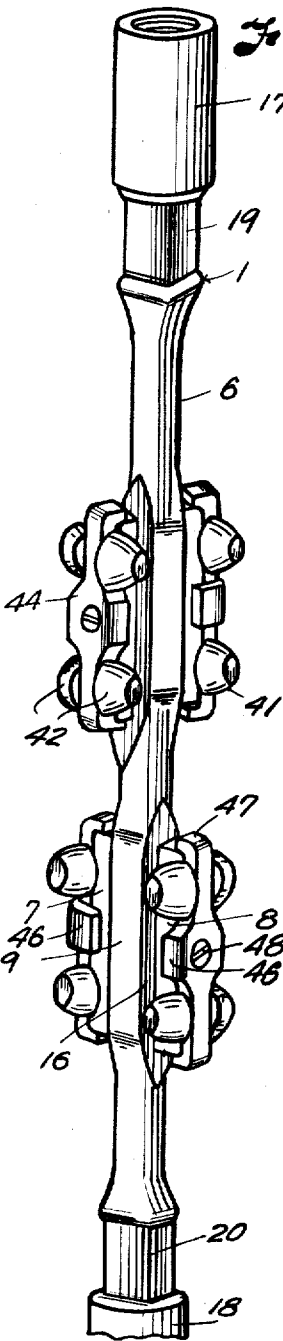


Fig. 8.



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COMBINATION PARAFFIN SCRAPER AND
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6 Claims. (Cl. 166—18)

1

This invention relates to a combination scraper and sucker rod guide and has for its principal object to provide a device of this character adapted for insertion between adjacent sucker rods or at points in a well tubing for removing paraffin which tends to collect and block flow of well fluid therethrough and for guiding the sucker rods in the tubing to reduce wear thereon.

Other objects of the invention are to incorporate scraper and guide elements in a pony rod such as used in connecting sections of sucker rods; to provide a scraper device having plow-like cutters which are readily removed and replaced when worn; to provide scraper elements arranged to form channel-like passageways through which paraffin removed from the tubing is adapted to fall to the bottom of the well and which provide ample flow passageways for the well fluid; to provide the cutter elements with metal inserts higher in the electrochemical series of metals than the metals from which the sucker rods and tubings are formed for protecting the sucker rods and tubing from electrolytic decomposition; and to provide a sucker rod connector on which the scraper elements are readily applied or interchanged with roller elements according to the conditions in the well tubing through which sucker rods operate.

It is also an object to provide a sucker rod device with rollers to reduce stress, prevent sucker rods from wearing, the tubing from cutting, and which will require less power on the pump operated by the rods.

Further objects of the invention are to provide a combination scraper and sucker rod guide that is of simple, inexpensive construction, efficient in operation, and which will readily take the bends of the tubing in a crooked bore-hole.

In accomplishing these and other objects of the invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view of a combination scraper and sucker rod guide embodying the features of the present invention and adapted to be connected into a string of sucker rods and inserted in a well tubing.

Fig. 2 is a horizontal section through the well tubing in which the sucker rods operate, the section being taken through combination scraper and sucker rod guide on the line 2—2 of Fig. 1.

Fig. 3 is a similar section taken through the combination scraper and sucker rod guide on the line 3—3 of Fig. 1, particularly illustrating mounting of the scraper elements.

2

Fig. 4 is a cross section taken through the combination scraper and sucker rod guide on the line 4—4 of Fig. 1, particularly illustrating mounting of the guide roller.

Fig. 5 is a perspective view of the device with parts shown in disassembled spaced relation to better illustrate the construction thereof.

Fig. 6 is an enlarged side view of the device with the scraper element shown in section and the retaining plate for the guide rollers removed to better illustrate mounting of the scraper elements and guide rollers.

Fig. 7 is a perspective view similar to Fig. 1 but showing the guide rollers replaced with scraper elements.

Fig. 8 is a similar view showing the scraper elements replaced with guide rollers.

Referring more in detail to the drawings:

1 designates a device constructed in accordance with the present invention and which is adapted for insertion between selected sections of sucker rods (shown in dotted lines) 2 and 3, Fig. 1, in place of the usual rod coupling, the device being adapted to remove paraffin and other accumulations from the inner surface 4 of a well tubing or casing 5 in which the sucker rods are inserted as in conventional practice. The device is also adapted for retaining the sucker rods substantially coaxially of the well tubing and prevent a rubbing thereof on the tubing when the sucker rods are operated.

The device includes a generally cylindrical rod-like body 6 similar to a pony rod and is provided with a plurality of pairs of wings or flanges 7 and 8, the pairs of wings being arranged in longitudinal series along the rod-like body and the wings of each pair project in opposite directions from substantially squared upsets 9 on the body 6. The wings have relatively flat sides 10 and ends 11, but the outer edge faces 12 are provided with semi-circular notches 13 and 14 at opposite sides of internally threaded sockets 15 formed substantially midway of the length of the wings. The upset portions have flat faces surrounding the wings to provide seats 16 for seating the scraper elements later described. The ends of the body 6 have the usual internally threaded boxes 17 and 18 to engage the threaded pins on the ends of the sucker rod sections 2 and 3. The ends of the rods also have polygonal-shaped portions 19 and 20 to receive a wrench (not shown) by which the rod-like body 6 is coupled with the sections of the sucker rod. The rod-like body 6 is designed that no part thereof has a smaller cross section than that of the corresponding size sucker rods

3

and all corners are filleted, particularly the juncture of the wings with the seats 16 so as to avoid any defined lines on which fractures might occur. The wings are spaced a suitable distance from the ends of the body to allow engagement of a slip socket in case of rod breakage or failure of the rod connection.

Any number of pairs of wings may be employed, but in the present invention two pairs of wings are shown with the wings of one pair arranged in right angular relation with the wings of the other pair so that the scraper elements are staggered with respect to the guide elements as shown in Fig. 1.

The scraper elements 21 are of substantially shield shape and are curved transversely on a radius slightly smaller than the radius of the inner face of the tubing. The sides 22 and 23 of the cutter elements are sufficiently thin to form cutting edges rounding upwardly and downwardly toward the longitudinal median lines of the scraper elements to terminate in plow-like points 25 and 26 which act in the manner of a plow in effecting dislodgment of paraffin or other accumulations on the interior of the tubing. The underside of the cutting elements curve inwardly from the outer edges and connect with longitudinal bosses 27 arranged longitudinally on the median lines of the elements and having inwardly extending slot-like sockets 28 conforming with the shape of the wings so that when the scraper elements are mounted on the wings, the side faces 29 of the slot-like sockets closely engage the side faces of the wings and the end faces of the sockets closely engage the ends of the wings to prevent relative movement of the cutter elements with respect to the rod-like body. The inner faces of the bosses, and the sides and ends of the slot-like socket are shaped to engage the seat 16 and the ends of the socket are streamlined in the longitudinal direction of the rod-like body to facilitate movement of the well fluid and engagement of the scrapers with any paraffin or other material tending to collect on the inner face of the tubing. The scraper elements are removably retained on the wings by fastening devices such as screws 30 having threaded shanks 31 extending through openings 32 in the body portions of the scraper elements and into threaded sockets 33 formed in the edge faces of the wings as best shown in Figs. 3 and 5. The screws have heads 34 counter-sunk in the scraper elements as indicated at 35.

It is well known that sucker rods and well tubing are subject to corrosion and pitting when operated in wells containing electrolytic fluids and that such corrosion and pitting may be prevented by providing sufficient quantities of a metal higher in the electrolytic chemical series than the metals from which the sucker rods and tubing are formed, the protective metal being decomposed by the electrolytic action rather than the other metals. I, therefore, provide the outer faces of the shear members with longitudinal and transverse ribs 36 and 37 forming recesses 38 therebetween in which is cast the protective metal 39; for example, zinc or lead. In order to anchor the metal, the ribs may be provided with openings 40 extending therethrough and through which portions of the protective metal flow when the metal is cast in the recesses. The ribs provide sufficient wearing surface to prevent wearing of the protective metal, however, the protective metal is exposed sufficiently so that it is kept clean of corrosion and the like as I find that

4

the protective metal to be efficient must have the surfaces thereof free of corrosion and other coatings tending to interfere with flow of electric current.

In order that the device may also be used as a guide, I provide roller bearings 41, wheels 42 connected by an integral axle 43 and having the peripheries thereof shaped to conform to the inner radius of the tubing so that they may roll thereagainst upon reciprocation of the sucker rods. The roller bearings are adapted to be mounted on the wings by inserting the axle portions 43 in the notches 13 and 14 as shown in Figs. 4 and 6. The axles are retained in position by plates 44 adapted to engage the outer edge faces of the wings and having semi-circular notches 45 corresponding with the notches 13 and 14. The sides and ends of the keeper plate may be provided with fingers 46 and 47 for engaging the sides and ends of the wings and prevent lateral shifting movement thereof and for relieving shear on the fastening device 48 which is projected through an opening 49 in the keeper plate and into the threaded socket 15 of the wings.

The invention, therefore, contemplates a pony rod equipped with a pair of scraper elements and pairs of roller bearings as shown in Fig. 1, or the roller bearings may be removed and scraper elements applied to the lower wings as shown in Fig. 7. Also, if desired, the scraper elements may be removed and replaced with roller bearing elements as shown in Fig. 8. Thus, the scraper elements may be mounted on selected pony rods where the paraffin or the like tends to collect and roller bearings may be mounted on other pony rods to prevent rubbing of the sucker rods against the wall of the tubing. In the instance illustrated in Fig. 1, the roller bearings also act in conjunction with the scraper elements to keep the tubing clear of paraffin and the like. In order to prevent the ends of the scraper from catching on the ends of the tubing or coupling, the tubing engaging faces are preferably tapered at the end thereof as indicated at 50.

In using the form of invention shown in Fig. 1, the sucker rods are connected with boxes 17 and 18 so that scraping elements cooperate with the guide wheels to retain the sucker rod in substantially coaxial relation with the casing or tubing and to effect removal of paraffin tending to collect on the inner faces thereof. The devices may be located along the length of the string of sucker rods where necessary or they may be used as couplings for connecting all of the rods. If the stroke of the rod is not sufficient for the scraper elements to completely traverse the tubing, the paraffin collected on the tubing wall between the limits of movement of the scraper elements is readily removed by disconnecting the string of sucker rods from the pumping apparatus and raising and lowering the rods in the well several times which is sufficient to clear the tubing of any paraffin blocking the flow therethrough. The paraffin may gravitate to the bottom of the well through the spaces provided between the scraping elements or it may be carried to the top of the well by the well flow.

If electrolytic fluids are present and electric currents are generated, the metal inserts in the scraper elements prevent deterioration of the rods and tubing.

The form of the invention illustrated in Fig. 7 operates in similar manner to that illustrated in Fig. 1 with the exception that the scraper ele-

ments also serve as guide elements and this type may be inserted in those portions of the well string in which the paraffin is more likely to accumulate.

The form of invention shown in Fig. 8 may be inserted in the portions of the rods which show wear on the tubing so as to retain the sucker rod away from the tubing during reciprocation thereof.

From the foregoing it is obvious that I have provided a combination scraper and sucker rod guide of simple and inexpensive construction and which may be inserted between selective sections of sucker rods in the manner of a pony rod and which effectively removes paraffin and other accumulations tending to collect in a well tubing.

It is also obvious that a string of sucker rods when equipped with my invention operate concentrically of the tubing and prevents wearing through of the tubing by the sucker rods.

It is also obvious that the scraper elements provide convenience for mounting the metal inserts necessary to prevent deterioration of the sucker rods and tubing in wells flowing electrolytic fluids.

What I claim and desire to secure by Letters Patent is:

1. A device of the character described including, a cylindrical body adapted for connection in a string of sucker rods, said body having wings provided with notches therein, cutter elements having sockets engaged over said wings and provided with lug portions engaged in said notches, and fastening devices extending through the cutter elements and into the wings to detachably retain said cutter elements.

2. A pony rod having axially spaced upsets intermediate the ends thereof provided with substantially flat outer faces on opposite sides of said upsets, said faces on one upset being staggered from the faces of the other upset, wings projecting from said upsets, scraper elements having socket portions receiving the wings and having portions engaging said faces, fastening devices for securing the scraper elements to said wings, and a supplementary connection between the scraper elements and said wings including a lug on the scraper elements engaging a notch in said wings.

3. A paraffin scraper of the character described including a rod-like body having a longitudinal upset spaced from ends thereof, wings extending longitudinally of said upsets and projecting therefrom, said upset being wider than said wings to provide seating faces on respective sides of the wings, scraper elements having sockets to receive the wings therein and seating faces on the sides of the sockets for engaging said seating faces on the upset, and means for removably retaining the scraper elements on said wings with said seating faces on the scraper elements in engaging contact with the seating faces on said upset.

4. A paraffin scraper of the character described including a rod-like body having a longitudinal upset spaced from ends thereof, wings extending longitudinally of said upset and projecting therefrom, said upset being wider than said wings to provide seating faces on respective sides of the

wings, scraper elements having sockets to receive the wings therein and seating faces on the sides of the sockets for engaging said seating faces on the upset, means for removably retaining the scraper elements on said wings with said seating faces on the scraper elements in engaging contact with the seating faces on said upset, said wings having transverse notches, and said scraper elements having lug portions in said sockets for engaging in said notches.

5. A paraffin scraper of the character described including a rod-like body having a longitudinal upset spaced from ends thereof, wings extending longitudinally of said upsets and projecting therefrom, said upset being wider than said wings to provide seating faces on respective sides of the wings, scraper elements having sockets to receive the wings therein and seating faces on the sides of the sockets for engaging said seating faces on the upset, means for removably retaining the scraper elements on said wings with said seating faces on the scraper elements in engaging contact with the seating faces on said upset, said scraper elements having sides diverging from said sockets, spaced ribs extending from said sides opposite the sockets, and bodies of protective metal anchored between said ribs of higher electrochemical series than the metal from which said body member is formed.

6. A device of the character described including a substantially rod-like body member, substantially shield-shaped scraper elements curved transversely on a radius slightly smaller than the radius of the inner face of a well tubing in which the device is to be inserted and having upper and lower ends curving inwardly to points of said scraper elements, means for removably attaching the scraper elements to said elongated body member, said scraper elements having longitudinal and transverse ribs forming recesses, and metal filling said recesses higher in the electrochemical series of metals than the metal from which the rod-like body member is formed.

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