

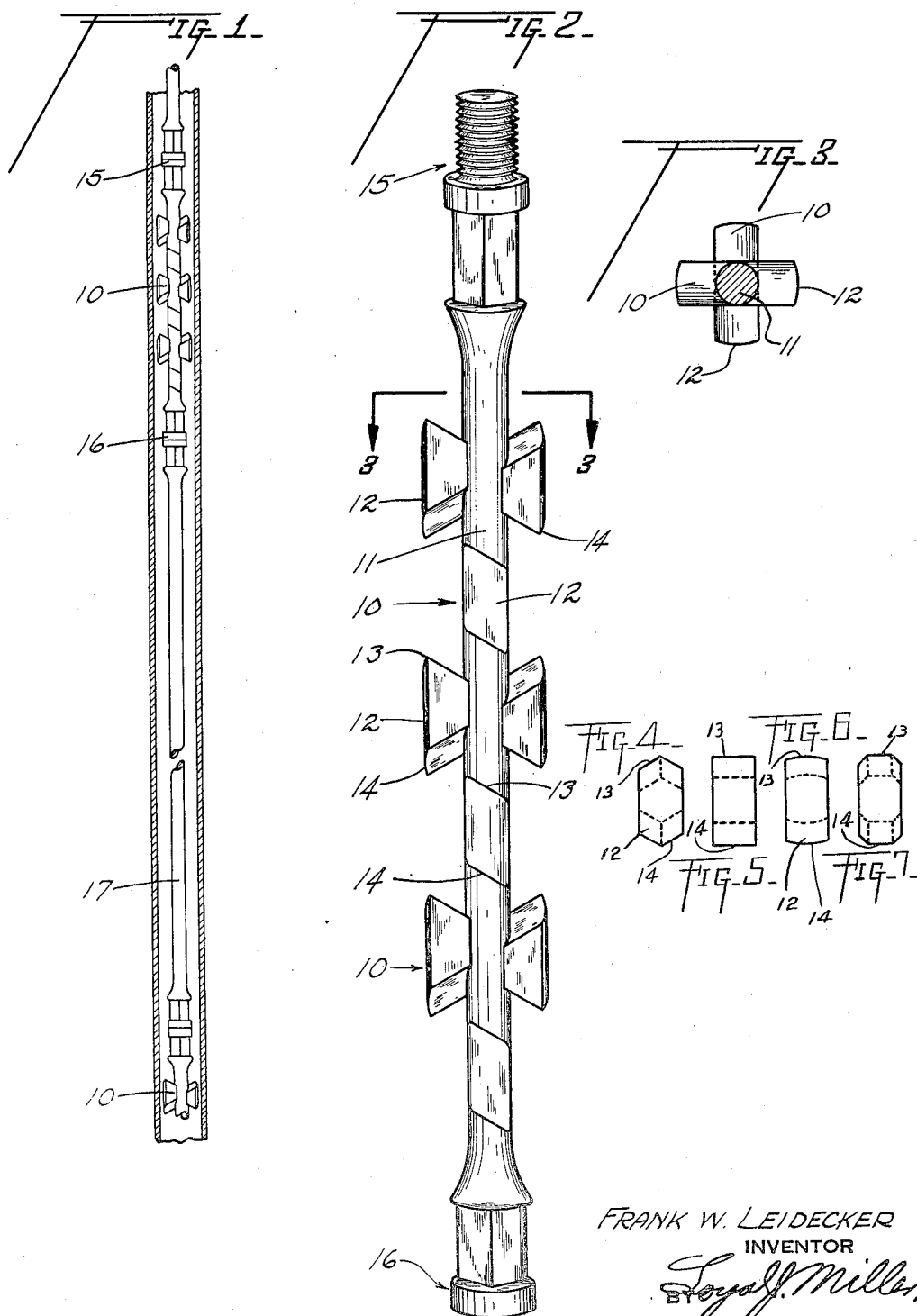
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PARAFFIN CUTTER

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PARAFFIN CUTTER

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This invention relates to a device for cutting paraffin and the like from the inner surface of well tubing or casing.

The general object of the invention is to provide such a device which may either be inserted periodically in a well tubing or casing for cleaning them as desired, or which may be used as a part of a pumping rod, remaining in the tubing, reciprocating with the rod, and cutting the paraffin from the tubing at each stroke of the pump, thus keeping the tubing substantially free of paraffin at all times; yet which permits the free flow of fluid through the tubing at all times.

Other objects of the invention are to provide a device of this class which will serve secondarily as a pump rod center guide; and the blades of which will cause much less wear on the sides of the tubing or casing because they present an elongated arcuate surface which conforms to the shape of the tubing and which slides flatly along the tubing wall, as opposed to the blades on various types of paraffin scrapers which are positioned at an angle to the casing wall.

Other objects of the invention will be fully understood from a consideration of the following detailed description when read in connection with the accompanying drawing which forms a part of this application. The drawing is to be considered illustrative and not restrictive.

In the accompanying drawing:

Figure 1 is a side perspective view of one embodiment of the invention in position within a well tubing or casing;

Figure 2 is a side perspective view of the same embodiment shown in Fig. 1;

Figure 3 is a sectional view taken along the line 3—3 of Fig. 2; and,

Figures 4—7 inclusive are plan views of various shaped cutter blades which may be used in connection with my invention.

Like characters of reference designate like parts in all the figures.

The invention consists of a plurality of double edged cutting blades 10 which are suitably secured to or made integral with an elongated central rod or tube 11. I prefer to lend balance to the complete device by arranging the cutter blades 10 in alternate pairs, each pair being positioned at right angles to the pairs above and below it, and each blade in each pair being positioned at an angle of 180° around the rod from the other blade, as clearly shown in Fig. 3. The blades are formed with their outermost elongated

surface 12 convexly curved to conform to the shape of the tubing or casing in which the device is to be used. The blades are of uniform thickness which makes their outer surfaces 12 parallel to the body of the rod 11 and to each other. The opposite ends of each blade taper convergently toward the rod 11, the taper thus forming upper and lower knife like edges 13 and 14 respectively on each blade.

In the embodiment shown in Figs. 1 and 2, the cutting edges of the blades are formed at an angle to the sides of the blades, the edges of each blade being parallel, and the blades in each individual pair being identical. In this embodiment the blades in alternate pairs are identical, their knife like edges 13 sloping to the left, as in the first, third and fifth pairs, counting from the top downward, while the blades of the second, fourth and sixth pairs have their knife like edges sloping to the right. With this arrangement each alternate pair of blades, in cutting, urges the paraffin cut from the tubing in a direction opposite that in which the adjacent pairs of blades urge it. It is therefore desirable, in this embodiment to have an even number of pairs of blades to prevent any tendency of the blades, in cutting, to transmit a twisting movement to the rod.

It will be understood that the vertical spacing between the pairs of blades does not materially affect the inventive idea. Preferably the blades will be spaced with relation to the length of the stroke of the pump rod, if the device is to be used as a part of the pump rod, so that the ends of the paths of travel of alternate pairs of blades will overlap slightly.

In the several embodiments of different types of cutter blades shown in Fig. 4, the necessity for the right and left slope of the cutting edges of alternate pairs of the blades has been eliminated, and theoretically the knife edges 13 and 14 of each of these blades would tend to force half the paraffin removed from the tubing in one direction, and half in the opposite direction, thus eliminating the possible twisting of the rod. The outer elongated surface 12 of all these blades is arcuate, as previously described, and their ends taper convergently inward forming the knife like cutting edges 13 and 14. The cutting edges, however, are simply of different shape. The portion of each blade which is secured to or made integral with the rod 11 is shown in Fig. 4 by the dotted lines near the center of each blade. The taper mentioned is from the cutting edges 13 and

14 to the dotted lines near the center of each blade.

At one or both ends the rod 11 may be provided with suitable means 15 and 16 to facilitate its connection to other such tools, or to sections of ordinary pump rod.

If it is desired to use the device periodically to cut the paraffin from the inside of the tube wall, an ordinary clapper trap (not shown) may be attached to the lower connection 16 and the device lowered in the well tubing or casing on any type of rod. As the device is lowered, the outer elongated surfaces 12 being parallel to the tubing wall, simply slide along the wall with very little consequent tendency to cut or wear the tubing. The knife edges 14 cut the paraffin off the wall, and their tapered sides force the paraffin away from the wall toward the rod 11. When the direction of travel is reversed, the knife edges 13 begin cutting the paraffin from the sides of the tube, the clappers on the trap (not shown) move to a position substantially closing the bore of the tubing, and the paraffin thus removed from the sides of the tubing is brought to the surface by the trap, where it is disposed of. This process is repeated, the cutter being lowered a little farther in the tubing each time, until the tubing is clean, at which time normal production through the tubing is resumed.

If it is desired to use the invention in a pumping well to keep the tubing constantly free of paraffin, a number of my devices may be secured together, end to end, or with sections of pump rod 17 between them as in Fig. 1, thus becoming a part of the pump or sucker rod. For this use, as previously explained, the blades are spaced apart a distance slightly less than the length of the stroke of the rod, and the knife edges 13 and 14 of each blade cut the paraffin from the tubing walls with each upward and downward stroke of the rod. The paraffin thus removed either goes into solution in the fluid flowing through the tubing, or is physically removed from the tubing by the fluid as it is pumped from the well.

By arranging the blades in pairs, relatively positioned as above described, it will be easily seen that free circulation of fluid past the blades is permitted during the time the device is in the tubing or casing.

Another variation within the scope of my inventive idea would be the arrangement of the cutter blades in groups of three instead of in pairs. In such case the blades would be equidistantly spaced about the center rod, and the blades in the alternate groups would be located a distance of 30° about the rod from the blades of the other groups.

While I have described and illustrated several variations of my invention I am aware that it is capable of other embodiments also, and I do not wish to be limited except by the prior art and the scope of the appended claims.

I claim:

1. A device of the class described comprising: a plurality of groups of equidistantly axially spaced cutter blades rigidly secured to a center rod, the respective blades in one set of alternate groups being in vertical alignment, and the respective blades of the other set of alternate

groups also being in vertical alignment, but located a sufficient distance around the rod as to have their center lines fall midway between the center lines of adjacent blades of the first mentioned set of alternate groups; each blade being elongated in form and having two oppositely facing cutting edges, one at each end, the outer sides of each of said cutting edges being coplanar, the plane in which they lie being parallel to said center rod, and the inner sides of said cutting edges tapering convergently toward said center rod.

2. A device of the class described comprising: a plurality of pairs of oppositely positioned cutter blades rigidly secured to a center rod, alternate pairs being in alignment vertically, and the other pairs being aligned vertically with each other but spaced a distance of 90° about the rod from the first mentioned alternate pairs; each of said blades being elongated in form and having a cutting edge at each end; the outer sides of each of said cutting edges being convexly arcuate and parallel to the center rod and to each other, and the inner sides of said cutting edges being concavely arcuate and tapering inwardly toward said center rod and toward each other.

3. A paraffin cutter blade having a short side surface adapted to be welded or otherwise secured to a center rod; having a long side surface parallel to said short side surface; having convergently and similarly tapered end surfaces joining the respective ends of said short and long side surfaces, and forming therewith a cutting edge at each end of said long side surface; and having two parallel side surfaces joining the side edges of both said end surfaces and said short and long side surfaces.

4. A paraffin cutter blade having one side surface longer than any of its other side surfaces, and having a cutting edge at each end of said longer side surface formed by similar end surfaces tapering convergently away from each end of said longer side surface; having one short side surface parallel to said longer side surface; and having a pair of identical side surfaces connecting the side edges of said end surfaces and said short and long side surfaces.

5. A means of cutting paraffin from the inner wall of oil well tubing comprising a plurality of axially and vertically spaced cutter blades having one side welded or otherwise rigidly secured to a sucker or pump rod, adapted to remain on the rod during the pumping operation and to cut the paraffin from the tubing as the pump rod reciprocates within the tubing; said blades being elongated in shape, the outside surface of each blade being in the form of a segment cut from a cylindrical surface and disposed parallel to the axis of the center rod; each blade having two oppositely facing cutting edges, one at each end, the two end surfaces of the blade tapering convergently from the cutting edges toward the center rod.

6. An elongated paraffin cutter blade having two oppositely facing cutting edges, one at each end, the outer sides of each of said cutting edges being coplanar, and the inner sides of each of said cutting edges tapering convergently.

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