This invention relates to improvements in rod gripping tools of the type set forth in co-pending application Serial No. 654,698, filed March 15, 1948, which are employed in suspending sucker rods from rod hangers carried on derricks used in well drilling and pumping operations, and particularly pertains to rod gripping tools embodying a fixed jaw and a clamp shoe constituting a moveable jaw adapted to receive a rod therebetween, and in which clamping engagement between the jaws and the rod is effected through the medium of a lever pivoted to swing in the direction of the length of the rod and in which the gripping action of the jaws is effected by suspending the outer end of the lever from an overhead support; the jaws and lever being mounted and arranged in such fashion that the weight of the rod engaged between the jaws will act in conjunction with the pull on the lever to cause the jaws to grip the rod.

A particular object of the invention is the provision of a tool of the above character which may be readily applied to and removed from a length of rod by moving the rod and tool laterally or sidewise relative to each other in and out of the rod engaging position whereby the tool may be easily attached to the rod at any selected point along the length thereof without shifting the tool or rod with respect to the length of the latter, and in which the tool may be moved forward and back in and out of engagement with a standing rod with the operating lever projecting from the right side of the tool so as to facilitate manipulation of the tool in and out of engagement with the rod.

Another object is to provide a rod gripping tool in which application of the tool to a rod and the gripping action thereof may be quickly effected, and release of the grip and disengagement of the tool speedily accomplished, all with a minimum of effort, thereby facilitating the work of the operator and economizing the time required in assembling sucker rods in wells and in removing them therefrom.

Another object is to provide a construction in the rod gripping jaws which will insure such positive gripping action thereof as to obviate slippage of a rod engaged and suspended thereby and whereby the tool is rendered especially suitable for use by a novice or person inexperienced in manipulating rod clamps and whereby possibility of injury to workers and property due to faulty functioning of a rod gripping tool is eliminated.

Another object is to provide a mode of mounting the clamp shoe or moveable jaw on an actuating lever whereby a powerful wedge action will be exerted on the shoe when engaged with a rod held between it and a fixed jaw and a lifting thrust imposed on the lever, and whereby the shoe is advanced and retracted at the moment of contacting a rod with a parallel motion.

A further object is to provide the tool with a body portion embodying the fixed jaw which is so formed as to afford a rigid and substantial support for the moveable parts of the tool which is capable of supporting extremely heavy loads without breakage.

A still further and particular object of the invention is to provide a rod gripping tool for suspending sucker rods from hangers in oil well drilling and pumping operation which is so formed and constructed that a single tool of requisite size may be utilized in gripping and supporting sucker rods of the various diameters employed in oil well operations ranging from the smallest to the largest sizes, thereby obviating changing of gripping tools during the pulling and replacing of a string of sucker rods embodying lengths of rods of different diameters whereby such operations are greatly facilitated as compared with the general practice of employing rod gripping tools of various sizes and limited for use in connection with rods of particular diameters.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a plan view of the tool with parts broken away and with the clamp shoe shown in a retracted position in full lines and in its advanced position in dotted lines;

Fig. 2 is a view of the tool in rear elevation with parts broken away and showing the lever and clamp shoe as retracted in full lines and illustrating in dotted lines their mode of operation;

Fig. 3 is a detail in horizontal section as seen on the line 3—3 of Fig. 2;

Fig. 4 is a view in front elevation showing the manner of suspending a length of rod by means of the tool; and

Fig. 5 is an enlarged section and plan view taken on the line 5—5 of Fig. 5 depicting the manner of presenting the tool to a standing rod in applying the tool thereto and removing it therefrom.

Referring to the drawings more specifically A
indicates generally the body of the tool which embodies an elongated flat side wall 6, a flat end wall 7 extending at right angles to the side wall 6, a flat side flange 8 on the end wall 7 extending parallel to the side wall 6 and terminating in a beveled edge 9, and an arcuate end wall 10 extending in continuation of the side wall 6 and terminating in a beveled edge 11 paralleling the beveled edge 9 of the side flange and spaced therefrom to form a gap 12. The edges 9 and 11 are straight throughout the lengths thereof and extend between the upper and lower margins of the apertures 50 to 57 of the body A which margins are straight and are parallel to each other; the gap 12 between the edges 9 and 11 being of a width exceeding the diameter of a rod B to which the tool is to be applied so that the body A may be positioned astride the rod B to dispose the latter against the inner face of the arcuate end wall 10 by passing the rod through the gap 12.

The arcuate end wall 10 constitutes a fixed jaw on the body A and in order to have gripping engagement with a rod B seated thereon under pressure is formed with diverging faces 14 leading diagonally outwardly from the vertical center thereof which faces are knurled or studded throughout with a multiplicity of blunt ended teeth c and d adapted to penetrate wax coatings on the rod and to grip the surface of the rod to afford a non-slip connection therewith; the diverging faces 14 extending at a wide obtuse angle relative to each other to afford a seat for sucker rods of various diameters and having a transverse width sufficient to accommodate the various sizes of sucker rods used in oil well pumping operations.

The end wall 7 is formed with a vertical slot 15 and has a pair of parallel lugs e and f projecting from the inner and outer faces of the wall 7 along the lower marginal portion of the slot 15. The lugs e and f are also formed integral with the side walls 6 and 8 and project from the inner faces of the latter as particularly shown in Fig. 3. A pivot pin 16 extends axially through the lugs e and f across the lower portion of the slot 15; the ends of the pin being carried on the body A partly in the lugs e–f, end wall 7 and side walls 6 and 8 and protected from the strain imposed on the pin 16.

A lever 17 extends through the slot 15 and is fulcrummed to swing vertically on the pivot pin 16 which passes laterally through the lever close to its inner end. Projecting upwardly from the inner end portion of the lever 17 is a pair of parallel lugs g and h arranged to project into and through the slot 15; the lugs being positioned partly within the slot and partly exteriorly thereof when the lever 17 is in its normal or nearly horizontal position as shown in Fig. 2.

Carried by the upper portions of the lugs g–h is a pivot pin 18 which passes through a stem k on a moveable jaw or clamp shoe 19 arranged interiorly of the body A; the clamp shoe being formed in continuation of the side wall 6 and projects with the stem normally extending through the slot 15 between the lugs g and h and with the clamp shoe 19 abutting the inner face of the end wall 7 as shown in Fig. 1. The clamp shoe 19 when abutting the wall 7 is in its retracted position and then serves as a stop to limit downward movement of the lever 17. When in its retracted position the clamp shoe 19 lies wholly between the side walls 6 and 8 clear of the gap 12 whereby it does not obstruct the latter and is protected against impacting a rod B being passed inwardly through the gap when applying the tool. The wall 8 thus serves as a shield for the clamp shoe 19 when retracted.

The outer face of the clamp shoe 19 is formed with a vertically extending V-channel 20 the diverging walls of which, constituting the gripping face of the clamp shoe 19, are knurled or studded throughout with blunt teeth I adapted to grip a rod B with non-slip engagement on being imposed thereon in the direction of the arrow 19. The diverging walls on the outer face of the clamp shoe extend in wide obtuse angular relationship to each other like the diverging faces 14 of the fixed jaw 10 with the diverging walls of the channel 20 opposed to the faces 14 whereby the channel 20 is adapted for engagement with sucker rods of various diameters; the channel 20 having a transverse width substantially corresponding to that of the faces 14 so as to accommodate the channel for engagement with sucker rods of various diameters.

The outer end portion of the lever 17 is formed with an eye 21 adapted to be engaged by a chain or cable 22 whereby the tool may be suspended from any suitable overhead support and whereby on thus suspending the tool the weight of the body A and a load carried thereby will effect upward swinging movement of the lever 17 relative to the body A so as to advance the clamp shoe 19 and hold it in its advanced position.

A feature of the invention resides in mounting the pivot pins 16–18 with the axis of the pivot pin 18 spaced from the outer end of the lever 17 a distance slightly less or approximating the distance between the axis of the pivot pin 16 or fulcrum of the lever 17 from the outer end of the lever whereby when the tool is in use thrusts imposed on the clamp shoe 19 will be directed to the lever 17 intermediate the ends thereof through the lugs g and h as in a lever of the second class as distinguished from a lever of the first class in which the load is on a short arm of the lever extending beyond its fulcrum. The present recited arrangement is advantageous in that it contributes to compactness in the tool and better dictates an extremely strong and substantial support is afforded for the pin, and one which is not liable to break away under strains imposed on the pin 16.

A lever 17 extends through the slot 15 and is fulcrummed to swing vertically on the pivot pin 16 as indicated in Fig. 1; the tool being applied by advancing it while in a horizontal position with the lever 17 extending to the right and with the gap 12 presented toward the rod and away from the operator as indicated in Fig. 5 in which the dotted lines represent the rod as positioned relative to the tool before being engaged thereby. The gap 12 will then extend vertically or in line with the rod in event it be inclined, so that the rod may be passed side-wise through the gap 12 and positioned against the fixed jaw 10. During this operation the lever 17 is disposed in its lower most position in which the clamp shoe 19 is fully retracted out of the path of rod entering the gap 12; the clamp shoe 19 being extended laterally beyond the end walls 6 and 8 and projects to overlie the end wall 7 when the shoe is in its retracted position whereby the end wall 7 will form an abutment for the shoe to limit its retractive movement thereby limiting downward movement of the lever 17 to at least approximately a distance equal to the length of the body A. The end wall 7 also serves when the clamp-shoe is retracted thereagainst to then dispose the shoe perpendicular to the lever 17 behind.
the side flange 8 with the forward edges of the shoe extending parallel with and substantially aligned with the margin of the beveled edge 8 so that the shoulder in the retracted position will offer no obstruction to the passage of a pipe or rod through the gap 12 in positioning the tool astride thereof.

Ordinarily the lever 17 is attached to the chain or cable 22 by which the tool is suspended, and accordingly when such is the case the operator lifts the body A on the tool relative to the lever 17 to relieve the upward pull on the latter through the chain 22; the tool being then lifted by holding the body A in the left hand and holding the lever 17 in the right hand or by lifting the body A with both hands. With the tool so held it is positioned astride the rod as above stated whereupon the lever 17 is swung upwardly in the direction of the length of the rod B with the right hand of the operator while holding the body A with the jaw 10 seated against the rod B with the left hand thereon, thereby bringing the shoe 18 into engagement with the rod B. The chain 22 if not then attached to the lever 17 is connected thereto, or if previously attached, is elevated to remove slack therefrom and to exert an upward pull on the outer end of the lever so as to cause the clamp shoe 18 to grip the rod and clamp it against the jaw 10 as indicated by the dotted lines in Figs. 1 and 2, and in full lines in Fig. 5. On supporting the weight of the rod B on the tool as indicated in Fig. 4, the upward pull imposed on the lever 17 in conjunction with the downward pull imposed on the body A by the load of the rod B then engaged between the clamp shoe 18 and jaw 10 will act to force the clamp shoe 18 against the rod with parallel movement and with a wedge action afforded by the lugs g and h so as to cause the teeth c—d and I on the jaw and clamp shoe to bite into a grease coating on the rod so as to bear against the surface of the rod and thereby securely grip the latter with a positive engagement such as to firmly hold the rod against slipping relative to the tool or vice versa.

Disengagement of the tool and rod is readily effected by releasing the pull of the rod and slackening the chain or cable lever 17 will swing downward under its own weight thereby retracting the clamp shoe 18 free of the rod and into its rearwardmost position against the end wall 7; the clamp shoe 18 in abutting the wall 7 limiting the downward movement of the tool. The tool may then be removed from the rod by passing the latter outwardly through the gap 12, or if desired, on freeing the clamp shoe 18 the tool may be readily shifted to another position longitudinally of the rod while the tool body A is disposed astride thereof and the tool re-engaged with the rod as before described without detaching the tool.

The tool is designed with the diverging faces of the clamp shoe 18 and fixed jaw 10 of such width or spread that a single tool is applicable for use on the various sizes of sucker rods used in oil wells. A number of tools of the type and in the use of rod gripping tools during the pulling or replacing of a string of sucker rods embodying lengths of rods of different diameters.

While I have shown and described a specific embodiment of my invention, I do not limit myself to the exact construction shown, and the invention embraces such changes, modifications and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

I claim: 1. In a rod gripping tool embodying a body including a side wall, an end wall, a fixed jaw extending in continuation of said side wall opposite said end wall terminating in an end edge, and a side flange leading from said end wall parallel with said side wall and terminating in an edge spaced from and parallel to the end edge of the fixed jaw, the spaced edges of said jaw and flange forming a gap whereby the body may be positioned astride a rod laterally thereof, said end wall being formed with a vertical slot; said side wall being flat and laterally elongated and said end wall extending at right angles thereto, a pair of lugs on said end wall projecting from the outer and inner sides thereof on opposite sides of said slot with the portions thereof on the inner side of the end wall formed integral with said side wall and flange, a pivot pin extending axially through said lugs across said slot having its end portions carried in said end wall at its juncture with said side wall and flange, a lever fulcrummed at one end on said pivot pin within said slot and having a free end extending outwardly from said body, upwardly extending lugs on the inner end portion of said lever, a clamp shoe in said body opposed to said jaw, a stem on said clamp shoe, and a pivot pin carried by said upwardly extending lugs connected to said stem; said lever being mounted to swing in the direction of the length of a rod astride of which the body is positioned to move said clamp shoe toward and away from said jaw and operable to clamp a rod between said clamp shoe and jaw on an upward pulling being imposed on said sleeve; and said clamp shoe when in its retracted position abutting said end wall to limit downward movement of said lever to a position at least approximately perpendicular to said body and said end wall when abutted by said clamp shoe disposing the latter parallel therewith behind said side flange and clear of said gap.

2. The structure called for in claim 1 in which the gap is formed on the side of the body presented to a rod to be passed therethrough when the body is positioned with the lever projecting to the right thereof.

3. The structure called for in claim 1 in which the jaw and clamp shoe are each formed with a pair of opposed inclined faces with gripping teeth studding said faces with said opposed inclined faces extending in wide obtuse angular relation to each other.

4. A rod gripping tool comprising a body having a transversely elongated flat side wall, a flat end wall extending at right angles from said side wall, an arcuate fixed jaw extending from said side wall in continuation thereof opposite said end wall and terminating in an end edge, and a side flange leading from said end wall in spaced parallel relation to said side wall and terminating in an end edge spaced from and parallel to the end edge of the fixed jaw, said end wall being formed with a vertical slot, lugs on said end wall, a pivot pin carried by said lugs, a lever fulcrummed on said pivot pin having a stem and a clamp shoe extending within said slot, a clamp shoe in said body opposed to said fixed jaw formed with a channel having diverging walls extending in wide obtuse angular relation to each other, said clamp shoe being pivotally carried on the inner end portion of said lever, and said clamp shoe having parallel side walls extending in wide obtuse angular relation to each other opposite the channel on said clamp shoe.

5. The structure called for in claim 4 in which
the diverging walls of the fixed jaw and of the
channel on said clamp shoe are studded with blunt
teeth.

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