Jan. 26, 1954 D. F. JORGENSEN 2,667,330

LIFTING DEVICE

Filed Nov. 13, 1950

3 Sheets-Sheet 1

FIG. 1.

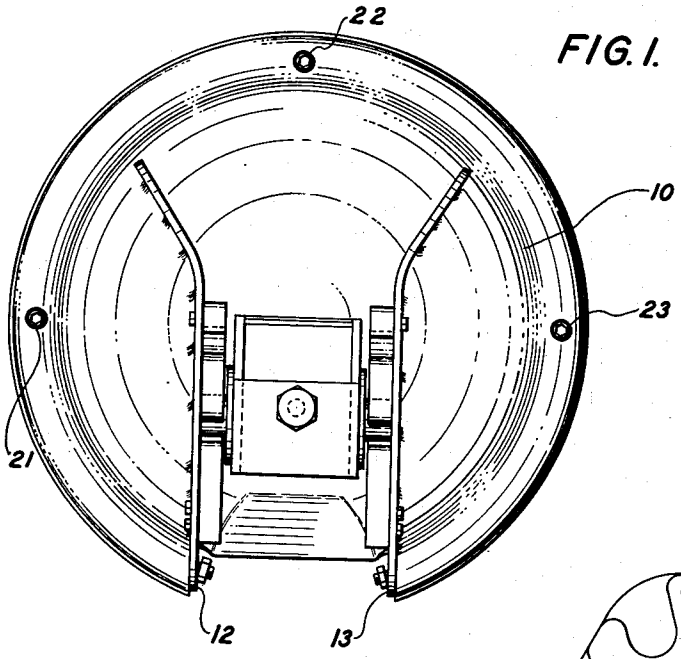

FIG. 5.

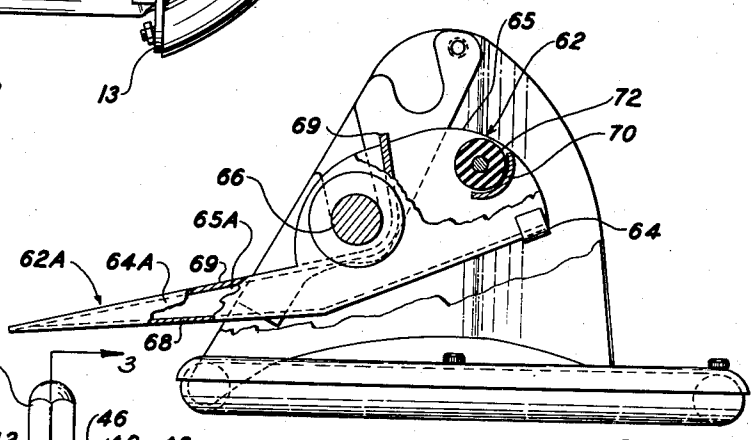

FIG. 2.

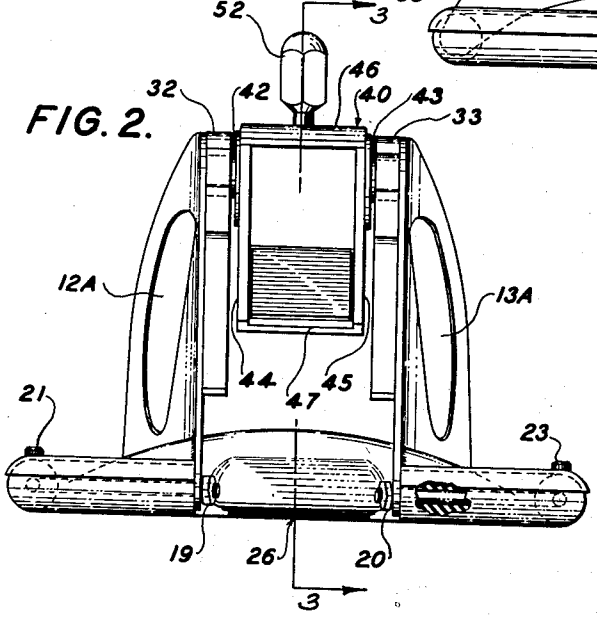

FIG. 6.

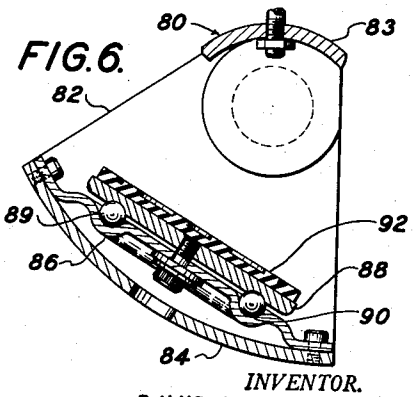

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FIG. 4.

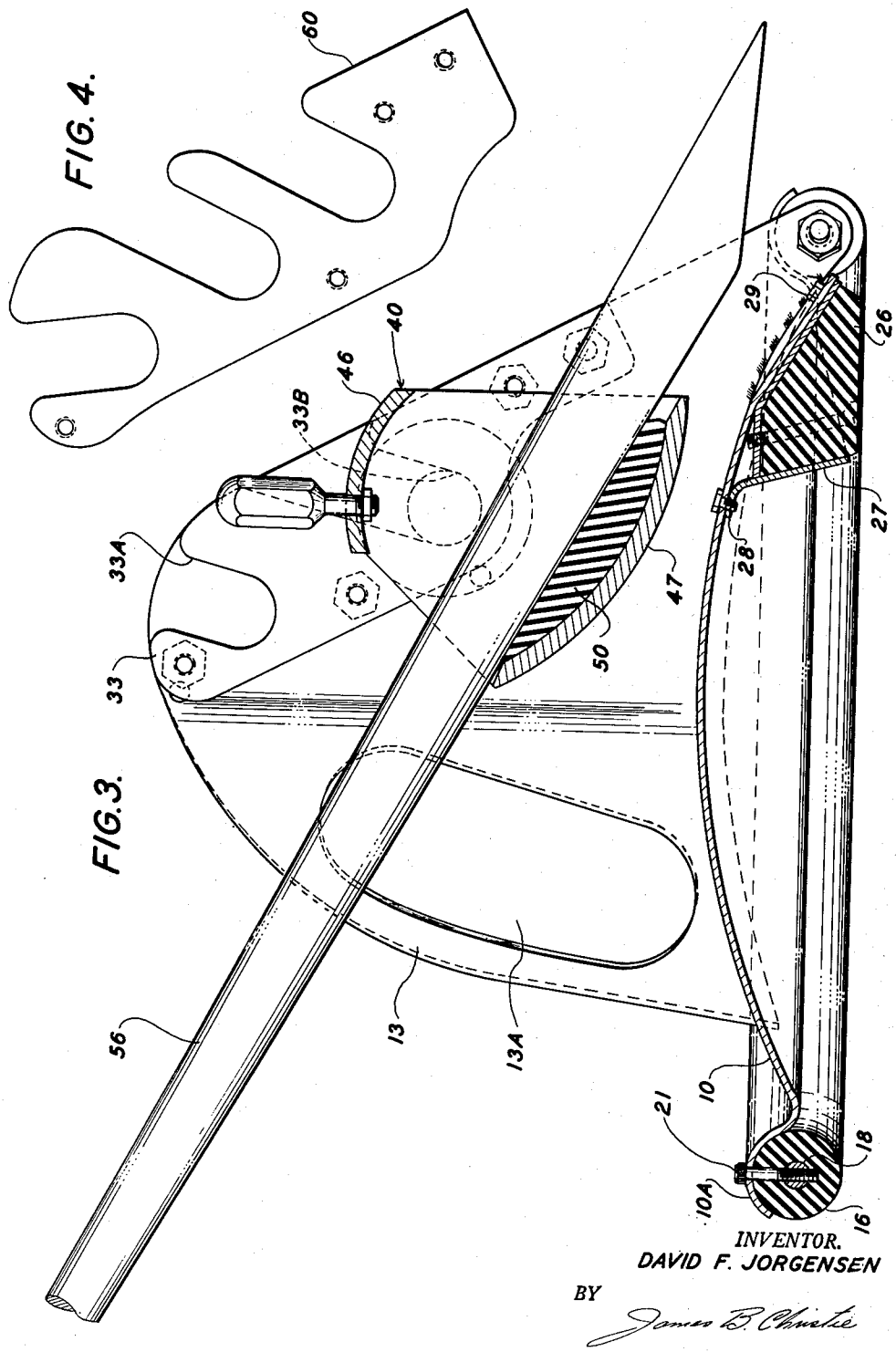

FIG. 3.

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FIG. 7.

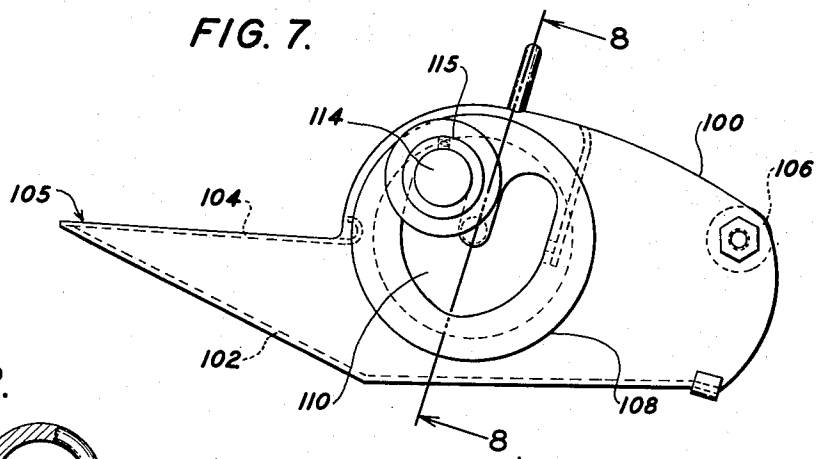


FIG. 8.

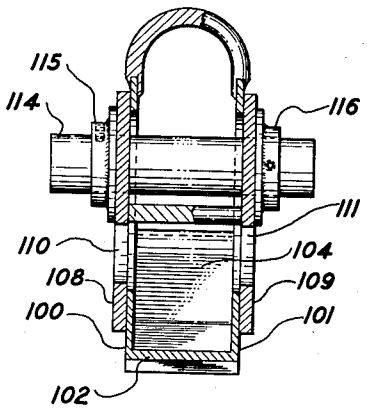


FIG. 9.

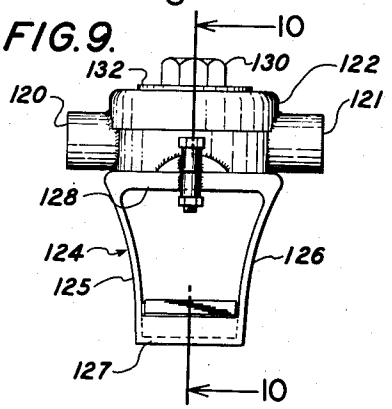
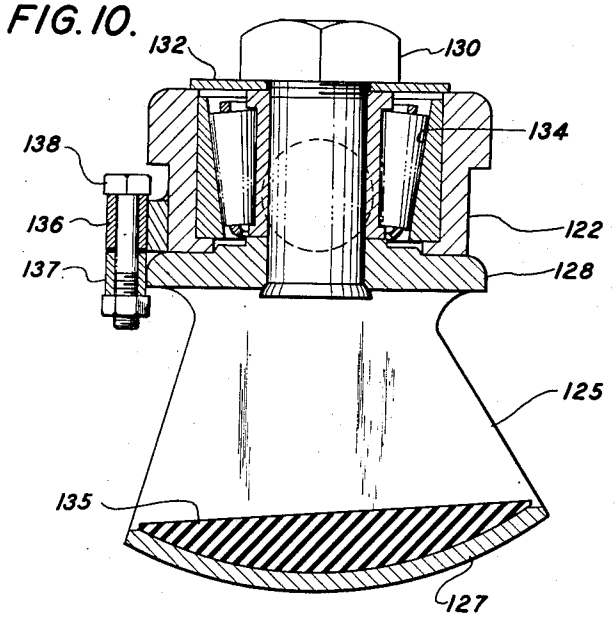


FIG. 10.



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2,667,330

UNITED STATES PATENT OFFICE

2,667,330

LIFTING DEVICE

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Application November 13, 1950, Serial No. 195,363

7 Claims. (Cl. 254—130)

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This invention relates to materials handling equipment and more particularly to an adjustable fulcrum member for use with a crowbar, etc. to lift and move heavy objects. The apparatus of the invention is referred to throughout the specification and claims as a lifting device, and the term "crowbar" is taken to mean a conventional crowbar, rod, pole, pipe or in general any object suitable for prying or lifting.

Generally, a crowbar is used to lift or move heavy objects in conjunction with a wooden block or timber serving as a fulcrum for the crowbar. This procedure is highly inefficient, such a block being subject to deformation and splintering. Moreover, the block has a tendency to slip on the surface on which it rests and the crowbar has a tendency to slip on the block. Attempts have been made to improve the use of crowbars for lifting and moving which involve providing the crowbar with opposing bosses and providing a support to pivotally receive these bosses. With this arrangement the crowbar pivots on an axis intersecting its longitudinal axis, and its usefulness is limited to the particular leverage established by the placement of the supporting bosses.

The lifting device of the present invention greatly facilitates and expands the usefulness of crowbars for lifting and moving heavy objects and comprises a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one notch in one of its vertical edges with the notches in the two flanges being in horizontal alignment, a cradle adapted to be removably and pivotally supported in aligned pairs of notches and including means disposed below its axis of rotation for supporting a crowbar.

The supporting notches are conveniently formed by separate members affixed to the two flanges adjacent their leading vertical edges and having one or a plurality of notches or sockets formed therein for pivotally supporting the cradle. Preferably the notched members are removably affixed to the flanges in the indicated position so that they are easily replaced with members having differently arranged notches or sockets.

The apparatus described has many features which recommend it for the use for which it was designed. The device is movable with respect to the object to be raised or moved so that it may be placed closely adjacent thereto or some distance therefrom as circumstances dictate. The pivotal cradle supports the crowbar in a manner preventing slippage of the crowbar with respect

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to the axis of rotation, minimizing the danger of losing the load. The cradle may be so constructed that the crowbar is adjustable therein along the longitudinal axis of the crowbar so that the leverage factor may be selected at will in accordance with the weight of the object to be lifted or moved. Additionally, and because of the underslung nature of the cradle, there is imparted to the movement of the crowbar a thrust in the direction of the object engaged, tending to increase the bite of the crowbar as the object is lifted. All of these improved operational features distinguish the invention from presently conventional means of employing crowbars for lifting or moving.

The invention has additional flexibility of use in that several different types of crowbar supporting cradles may be interchangeably employed. In the simplest type of cradle, a flat bed is formed on which the crowbar rests, one end projecting towards the object to be lifted and the other end extending toward the operator. In this embodiment, preferred practice constitutes forming the supporting surface of the bed of a material having a high coefficient of friction with respect to the crowbar, so that with any load applied to the bar it is substantially impossible for the bar to slip in the cradle.

A second type of cradle includes a bed disposed beneath the axis of rotation of the cradle in the support and itself rotatable on a perpendicular axis. With this type of cradle, a crowbar may be used not only to lift an object but to pivot it through an angle defined only by the dimensions of the crowbar and cradle.

A third type of cradle includes a projecting pry and two receptacles opposite the pry and opening at substantially right angles to each other for receiving a crowbar. This cradle is particularly adapted for close approach to an object to be lifted where access space is limited. The crowbar may be inserted in this particular cradle in substantially a vertical position with the pry of the cradle engaging under the object in much the same manner that a crowbar is normally engaged under the object.

The foregoing and additional features and modifications of the invention will be more clearly understood by reference to the following detailed description thereof taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a plan view of the apparatus with one of the above mentioned cradles positioned therein;

Fig. 2 is a front elevation of the apparatus of Fig. 1;

Fig. 3 is a sectional elevation taken on the line 3—3 of Fig. 2;

Fig. 4 is an alternative socket member for use in the apparatus of Figs. 1 to 3;

Fig. 5 is an elevation of the apparatus partially cut away to show a different form of cradle:

Fig. 6 is a sectional elevation of a third form of cradle adapted to replace the cradle shown in the apparatus of Figs. 1 to 3;

Fig. 7 is a side elevation of a cradle similar to the cradle of Fig. 5 and with a floating axle;

Fig. 8 is a sectional elevation taken on the line 8—8 of Fig. 7;

Fig. 9 is a front elevation of a cradle adapted to rotation about two mutually perpendicular axes; and

Fig. 10 is a sectional elevation taken on the line 10—10 of Fig. 9.

Referring to Figs. 1 to 3, the embodiment there shown comprises a substantially circular base 10 belled upwardly to increase the strength of the base and provided with an annular curvilinear lip 10A substantially circumscribing the belled portion of the base. A pair of brackets 12, 13 are affixed to the base extending vertically therefrom and being substantially parallel throughout the major portion of their length. The trailing ends of each of the brackets 12 and 13 are bent outwardly toward the periphery of the base and are slotted at 12A, 13A, respectively, to provide hand grips for carrying the device. The forward edges of the brackets abut against the termini of the annular lip and incline rearwardly and upwardly therefrom.

A rubber member 16, in the nature of a tire, having a central metal bead 18 is mounted beneath the lip 10A with the opposite ends thereof being affixed to the lip abutting ends of the brackets 12, 13, as for example by bolts 19, 20. The member 16 is additionally affixed to the lip 10A at spaced intervals by bolts 21, 22, 23. This member provides non-skid contact between the base and surface upon which it is rested, and also extends slightly beyond the annular lip 10A to act as a resilient bumper. An additional resilient support member 26 is mounted underneath the domed base 10 adjacent and between the leading edges of the brackets 12 and 13. The member 26 is housed in a framework 27 which is, in turn, affixed to the underside of the base 10 by means of bolts 28, 29. The arrangement is such that when an object is being lifted by means of a crowbar, mounted as hereinafter described, the downward thrust imparted to the device is substantially localized at the resilient member 26.

Socket members 32, 33 are affixed respectively along the leading inclined edge of the brackets 12, 13. Each of the particular socket members 32, 33 have inclined forwardly opening notches 32A, 32B and 33A, 33B, respectively. The notches 32A and 33A, in the respective members are in horizontal alignment, as are the notches 32B, 33B, each notch being provided with a semi-circular inner end for the purpose hereinafter made apparent.

A cradle member 40 is removably mounted in aligned pairs of notches in the brackets 12 and 13 by means of cylindrical bosses 42, 43 projecting coaxially and in opposite directions therefrom. The cradle 40 includes side members 44, 45 from which the bosses 42, 43 project respectively, an upper cross piece 46 and a lower cross piece 47. The side members 44, 45 are preferably wider at the bottom of the cradle, as shown, so that the lower cross member 47 is considerably longer than the upper cross member 46. The lower cross member 47 is conveniently concave with respect to the cradle to receive a member 50 of a high coefficient of friction which is conveniently glued to the lower cross member 47 and extends from side to side of the cradle to form a bed on which the crowbar is rested. A knob 52 is affixed to and extends upwardly from the upper cross member 46 to facilitate handling of the cradle when it is not in use.

In operation, the cradle is mounted in one or the other of the aligned pairs of sockets 32A, 33A or 32B, 33B and because of the cylindrical nature of the bosses 42, 43 and the semi-circular configuration of the inner ends of the notches, the cradle is freely pivotal therein. A crowbar, as for example a crowbar 56 in Fig. 3, is inserted through the cradle resting on the bed 50, the extension of the crowbar from the forward edge of the support device being a matter of choice depending upon the weight to be lifted, the distance it is to be raised and the space available. When the forward end of a crowbar is engaged under an object to be lifted, the opposite end is pushed downwardly in the conventional manner. The crowbar, however, does not pivot on a stationary axis but swings with the bed 50 on the radius of rotation of the cradle. In this manner, for any given angular inclination of the crowbar the engaging point thereof, is, upon rotation of the crowbar, thrust in the direction of the work to a greater extent than if the crowbar is pivoted on a stationary axis. This has the advantage of preventing the work from slipping off the crowbar, and the additional advantage of giving a deeper bite so as to more effectively support the weight of the object. Depending upon the lift desired, the cradle 40 may be placed in the aligned sockets 32B, 33B or in the higher aligned sockets 32A, 33A. For a greater flexibility, a socket member 60, as shown in Fig. 4, may replace the socket members 32, 33. The only difference in the socket member 60 is that it is provided with three receptacles. The device when fitted with socket members of this character permits placement of the cradle and three different levels as desired.

In many instances it is desirable to lift or move an object in cramped quarters precluding the ordinary use of a crowbar. I have designed a special cradle for this purpose, interchangeable with the cradle 40, and illustrated in Fig. 5. The support device, as shown in Fig. 5, is identical to that heretofore described, and one bracket thereof is cut away to show a cradle 62. The cradle 62 includes two side members 64, 65, the former being partially cut away in the drawing. As in the cradle 40, each of the side members is provided with a projecting cylindrical boss, boss 66 being shown in the drawing as projecting from the side 64. The bosses are adapted to engage in the sockets in the support device and allow rotation of the cradle therein in the same manner as illustrated and described with relation to cradle 40 (Figs. 1 to 3). The side members 64, 65 extend forwardly of the supporting bosses in wedge-shaped extensions 64A, 65A which are reinforced by a bottom member 68 extending from the forward projection of the side members to the rear thereof, and a top member 69 extending from the forward projection of the side members back and around the axis of rotation of the cradle about the supporting bosses. The elongated forward extension of the sides together with the bottom

and top cross members 68, 69 forms a wedge-shaped pry 62A similar in configuration to a conventional crowbar.

An additional cross member 70 connects the two side members 64, 65 adjacent their trailing edges, and a resilient bumper 72 is likewise mounted between the side members directly above the cross member 70. In using the cradle 62, as illustrated in Fig. 5, for close approach to an object to be lifted, a crowbar is inserted in the opening defined by the bumper 72, the trailing end of the top cross member 69 and the side members so that the crowbar extends substantially vertically from the lifting device. Displacement of the extending end of the crowbar in either direction rotates the cradle about the axis of the supporting bosses thereby swinging the extending pry 62A in much the same path followed by the crowbar 56 in the apparatus of Fig. 3. Alternatively, and if more space is available, the crowbar may be inserted between the cross member 70 and the bottom cross member 64, in which position it extends into the pry 62A and functions in substantially the same manner as described with relation to Fig. 3.

A third alternative form of cradle is illustrated in sectional elevation in Fig. 6. Cradle 80, there shown, is similar in outward appearance to the cradle 40 of Figs. 1 to 3 and includes side members (side 82 appearing in elevation in Fig. 6), an upper cross member 83 and a lower arcuate cross member 84. The cradle 80 is provided with a support framework 86 mounted on the bottom cross member 84 and adapted to support a rotatable platen 88 on ball bearings 89, 90, etc. The platen 88 is provided with a resilient upper surface 92 to provide a non-slip engagement with the crowbar inserted through the cradle and is rotatable on an axis intersecting the axis of rotation of the cradle, this axis being, as in the foregoing embodiments, determined by the projecting and supporting bosses.

The cradle 80 of Fig. 6 is used in the same manner as cradle 40 in Figs. 1 to 3, the only difference being that the crowbar before or during lifting of an object may be rotated through an angle determined only by the width of the cradle opening, this angle being as large as 45° in some cases. Rotation is accomplished without danger of the crowbar slipping because of the resilient surface 92 on the rotatable platen 88 and may be easily controlled.

The cradle shown in elevation in Fig. 7 and in transverse sectional elevation in Fig. 8 differs from that shown in Fig. 5 in one major respect. Like the cradle of Fig. 5 this embodiment includes sides 100, 101 joined in parallel spaced relationship by a bottom closure member 102 and a partial top closure member 104. The sides are shaped to form with the closure members a protruding hollow wedge 105. Opposite the wedge the cradle is open outwardly and upwardly, the opening being divided by cross member 106 connecting the sides at the upper portion of their trailing edges. The opening, thus divided, provides sockets for insertion of a crowbar into the cradle at two positions of approximately 90° angular divergence. In this embodiment the sides 100, 101 are provided with enlarged cylindrical bosses 108, 109, respectively, in which U-shaped slots 110, 111 are respectively formed. An axle 114 is passed through the slots in the opposing bosses and is cleated by collars 115, 116 mounted adjacent opposite ends of the axle. The outer ends of axle 114 are adapted to seat in the sockets of the supporting framework enabling the cradle to pivot about the axle. By shifting the cradle to engage the axles in one or the other of the arms of the slots, the axis of rotation and hence the leverage of the cradle is accordingly shifted.

Figs. 9 and 10 show in front elevation and longitudinal cross section respectively a cradle adapted for rotation about mutually perpendicular axes. In this embodiment substantially the entire cradle is pivotal about both axes, whereas in the cradle shown in Fig. 6 only the bed or platen is pivotal about an axis perpendicular to the axis of the supporting bosses. Referring to Figs. 9 and 10, supporting bosses 120, 121 are mounted on a collar 122. The collar 122 rotatably supports a body 124 including sides 125, 126 and bottom and top cross members 127, 128, respectively. The body is depended from the collar 122 by a bolt 130 passing through the collar and a retaining washer 132. A roller bearing 134 is interposed between the collar and the joining bolt.

The sides 125, 126 are belled inwardly to increase the angle through which the body can be rotated about the collar as the cradle is pivoted about the axis of the coaxial bosses 120, 121. As the cradle is pivoted to raise a crowbar supported thereby, the sides, shaped as shown, approach parallel relationship to the adjacent flanges of the support structure as the body is pivoted with respect to the collar. A pad 135 having a high coefficient of friction with a crowbar to be rested thereon is bonded to the bottom cross member 127. This pad is conveniently rubber of either synthetic or natural origin.

Under many circumstances there is no need to pivot the crowbar about an approximately vertical axis. Accordingly, the cradle shown in Figs. 9 and 10 includes a simple locking mechanism to prevent relative rotation of the collar and body and to hold the latter with its longitudinal axis normal to the axis of the supporting bosses. The locking mechanism is shown in Fig. 10 and includes sleeves 136, 137 affixed respectively to the collar 122 and body 125 and a bolt 138 removably inserted through the two sleeves. The bolt is easily removed when rotation of the body about the vertical axis is desired.

Many modifications may be made in the apparatus of the invention without significantly altering its operation. The apparatus has features common to all its embodiments; to wit, the non-slip engagement of the crowbar, the swinging rather than pivoting lifting motion and the adjustability of the crowbar support vertically with respect to the supporting base. Wide variation in the details of construction can be tolerated and are possible without losing these benefits.

I claim:

1. Lifting apparatus for use with a crowbar, comprising a domed base having an arcuate lip extending substantially around the periphery thereof, a rubber tire affixed on the underside of said lip extending from end to end thereof and protruding outwardly therefrom, a pair of spaced flanges affixed to the base and extending upwardly therefrom, each flange projecting at one edge to abut against one end of said arcuate lip and having at least one notch in said edge above the lip with the notches in the two flanges being in horizontal alignment, a cradle adapted to be removably and pivotally supported in aligned pairs of notches and including means disposed

below its axis of rotation for supporting said crowbar.

2. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one socket in one of its vertical edges with the sockets in the two flanges being in horizontal alignment, a cradle adapted to be removably and pivotally supported in aligned pairs of sockets and including a flat bed rotatable within the cradle on an axis perpendicular to the axis of rotation of the cradle.

3. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one notch in one of its vertical edges with the notches in the two flanges being in horizontal alignment, and a cradle adapted to be removably and pivotally supported in aligned pairs of notches to support a crowbar, the cradle having a pair of side members joined together in spaced relationship by upper and lower cross members, each of the side members having a cylindrical boss projecting outwardly therefrom, the two bosses being in coaxial alignment and adapted to engage in said notches, and a flat bed affixed on the lower cross member between the side members and rotatable thereon on an axis transverse to the axis of said bosses.

4. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one notch in one of its vertical edges with the notches in the two flanges being in horizontal alignment, and a cradle adapted to be removably and pivotally supported in aligned pairs of notches to support a crowbar, the cradle comprising a cylindrical collar, a pair of cylindrical bosses projecting diametrically from said collar in coaxial alignment and for engagement in said notches, and a body member depending from said collar and rotatable with respect to said collar on an axis normal to the axis of said bosses, the body member including a flat bed for receiving said crowbar.

5. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one notch in one of its vertical edges with the notches in the two flanges being in horizontal alignment, and a cradle adapted to be removably and pivotally supported in aligned pairs of notches to support a crowbar, the cradle comprising a cylindrical collar, a pair of cylindrical bosses projecting diametrically from said collar in coaxial alignment and for engagement in said notches, and a body member depending from said collar and rotatable with respect to said collar on an axis normal to the axis of said bosses, the body member including a flat bed for receiving said crowbar, and locking means for locking the body and collar against relative rotation.

6. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one notch in one of its vertical edges with the notches in the two flanges being in horizontal alignment, and a cradle adapted to be removably and pivotally supported in aligned pairs of notches to support a crowbar, the cradle comprising a pair of side members joined together in spaced relationship by upper and lower cross members, the side members and cross members forming a hollow wedge-shaped projection open at its larger end, each side member having a U-shaped slot rearwardly of said projection with the slots in the side members aligned, an axle extending through the slots and outwardly from each side member, the axle being movable in the slots perpendicularly to its longitudinal axis, and a third cross member extending between the two side members adjacent the trailing edges thereof and located intermediate the upper and lower cross member.

7. Lifting apparatus for use with a crowbar, comprising a base, a pair of spaced flanges extending upwardly from the base, each flange having at least one socket in one of its vertical edges with the sockets in the two flanges being in horizontal alignment, a cradle adapted to be removably and pivotally supported in aligned pairs of sockets and including a flat bed disposed below its axis of rotation for supporting said crowbar, and also including a body rotatable on an axis normal to the axis of rotation of the cradle, said body carrying said flat bed for supporting a crowbar beneath the axis of rotation of the cradle.

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