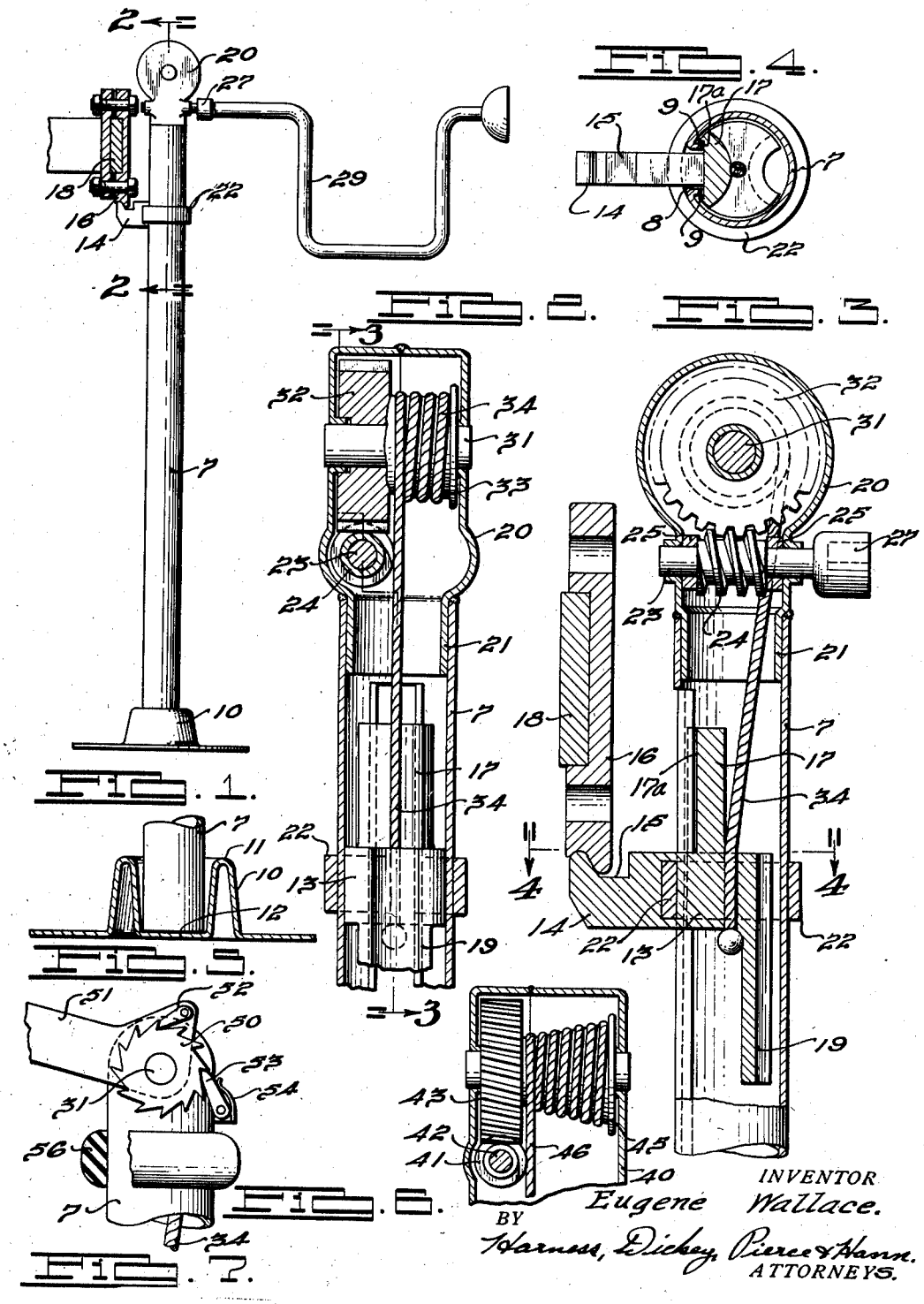
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JACK

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## JACK

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2 Claims. (Cl. 254—150)

The present invention relates to automobile jacks. More particularly it relates to a specific type of jack construction which is primarily adapted for use in effecting an elevation of a portion of an automotive vehicle in order to raise one of the wheels of the vehicle from the surface on which the vehicle rests.

The jack of the present invention includes a generally vertically disposed column which may be of tubular form, and is provided with a vertically extending slot in one side thereof. A lifting lug is mounted in the hollow interior of the column and has a portion thereof projecting through the slot in the side of the column which latter portion is adapted to engage the bumper bar or other convenient portion of a vehicle in order to raise the same. A ring is cast integral with the lifting lug and slidably engages the outer surface of the column to reinforce the column at the region of greatest stress thereon. A lifting head is mounted upon the upper end of the column, which head includes a sheave or drum and gear mechanism for driving the same; a flexible element is wrapped around the drum and passes downwardly through the column having the lower end thereof permanently secured to the lifting lug, whereby rotation of the gear mechanism serves to vary the vertical position of the lifting lug in order to effect elevation of a portion of the vehicle with which the lifting lug may be engaged.

It is a primary object of the present invention to provide a jack mechanism in which a flexible element is utilized for the purpose of transmitting the lifting force to the lifting lug of the jack. In a modified form the invention contemplates the provision of a frusto conical sheave or drum for reeling up the flexible element whereby the mechanical advantage obtained by the gear mechanism is gradually increased as the lifting lug moves upwardly within the column, thus making available a maximum mechanical advantage throughout the zone where maximum lifting is generally required.

Still further the present invention contemplates the provision of a novel jack construction in which worm gearing is utilized for the purpose of effecting the elevation of the lifting lug, to prevent the descent of the lug after it has been raised to a predetermined elevation. In a modification the worm gearing is replaced with a ratchet mechanism for elevating the lifting lug.

Still further, the present invention contemplates the provision of a construction in which the lifting lug interiorly of the column is provided with a pair of substantially parallel recesses or channels which co-operate with a pair of complemental inturned flanges formed integrally with the column at the sides of the vertical slot therein. This construction is particularly advantageous inasmuch as the inturned flanges not only serve to materially strengthen the resistance of the column to the forces of compression imposed on it, but due to their co-operative relation with the lifting lug serve to maintain the marginal edges of the vertical slot in predetermined uniformly spaced parallel relation.

Many other and further objects, advantages and features of the present invention will become more clearly apparent from the following specification when considered in connection with the accompanying drawing forming a part thereof.

In the drawing:

Fig. 1 is a side elevational view of a vehicle jack embodying the improvements of the present invention, illustrating the same disposed in co-operative relation with respect to the bumper of an automotive vehicle.

Fig. 2 is an enlarged, fragmentary, vertical sectional view taken substantially on the line 2—2 of Fig. 1 illustrating in detail the interior construction and arrangement of parts at the upper end of the supporting column of the jack.

Fig. 3 is a fragmentary vertical sectional view taken substantially on the line 3—3 of Fig. 2 illustrating in greater detail the interior construction of the lifting mechanism.

Fig. 4 is a transverse sectional view taken substantially on the line 4—4 of Fig. 3, illustrating in detail the manner in which the lifting lug interlocks with the supporting column to strengthen the column and guide the lug.

Fig. 5 is a fragmentary, vertically sectional view through the base of the improved jack construction, illustrating the manner in which a removable base may be conveniently associated with the column.

Fig. 6 is a fragmentary, vertically sectional view through the lifting head of a jack embodying a modified form of the invention.

Fig. 7 is a fragmentary, elevational view illustrating a modified form of operating mechanism.

With more particular reference to the drawing the specification embodiment of the invention disclosed therein includes a supporting column 7 which is preferably of a generally circular cross sectional configuration and may be conveniently formed from a sheet metal strip of rolled section or from a section of tubular stock. In either event the column is provided with a vertically

extending slot 8 in one wall thereof, which slot preferably extends throughout substantially the entire length of the column. The marginal edges of the walls of the column adjacent the slot 8 are bent inwardly to provide a pair of substantially parallel, vertically extending, inwardly directed flanges 9, one on each side of the slot 8. While it will be readily appreciated that these flanges serve to materially strengthen the resistance of the column as a whole to the forces of compression to which is subjected, a further important function thereof is described in greater detail below.

While any suitable base may be utilized with the jack of the present invention it is preferable that the base be of such construction that it provides a substantial area of surface contact with the ground or other surface upon which it may be disposed during the lifting operation in order that in the event the surface is soft the pressure upon the base will be distributed throughout a substantial area. It is also highly desirable that the base be removably mounted with respect to the supporting column in order that the jack construction as a whole will occupy a relatively small amount of space when not in use. Still further, it is quite important that the base member of the jack be of such construction that some limited angular movement of the column with respect to the base is permitted due to the fact that in jacks of this general character the range of lift is usually quite substantial and consequently such relative angular movement is inherently desirable.

In order to accomplish the desired results enumerated above, the present invention contemplates the provision of a base member 10, preferably formed from a sheet metal stamping which has the center portion thereof preformed to provide an annular ridge 11, which serves to define a socket 12, in the center portion of the base, which socket has slightly conical walls and is sufficiently large to conveniently receive the lower end of column 7. This structure is clearly seen in Fig. 5.

The column is provided interiorly thereof with a lifting lug designated as 13, which lug may be formed from a casting and which has a projection 14 of a configuration adapted to extend through the slot 8 of the column. This projection 14 has a transversely extending recess 15 formed in the upper surface thereof which recess is adapted to engage a complemental projection formed on a bumper bar clamp 16 which, as is conventional in the art, is bolted directly to the bumper bar 17 of a vehicle and aids in mounting the bumper bar with respect to the vehicle frame.

The engagement of this lifting lug 14 with the bumper bar clamp 16 is shown in the drawing merely by way of illustration and it is of course contemplated that the lifting lug may conveniently engage any suitable portion of an automotive vehicle or other structure as may be desired.

The body portion of the lifting lug 13 interiorly of column 6 includes an integrally formed upwardly extending guide lug 17 which guide lug is provided with a pair of vertically extending channels or recesses 17*a* in the front face thereof, which channels are adapted to receive the inturned flanges 9 of the column. It will be appreciated that the channels serve to aid in guiding the lifting lug during vertical movement and at the same time serve to maintain the flanges in parallel spaced relation and inherently strengthen the column structure as a whole. The exterior configuration of the surface of the lug 17 is preferably such that it is adapted to engage a maximum of the interior cylindrical surface of the column in order to provide a substantial area of bearing surface, insuring smoothness of operation of the apparatus as a whole.

The lifting lug is also provided with a downwardly extending projection 19 which has a recess in the face thereof in order that a substantial area of surface contact will be available on each side of that portion of the column on the diametrically opposite side thereof from that in which the slot is disposed. This construction has been found to eliminate the zone of maximum surface pressure usually found on the diametrically opposite side of the lug from that on which the projection 14 is formed and serves to distribute the lifting forces throughout a substantial surface area on the interior of the column.

A metal ring member 22 of substantial width is cast integral with the lifting lug 14 and is adapted to slidably embrace the outer surface of the column 7 with the axis of the ring member in substantial alignment with the axis of the column. The ring member engages a substantial area of the outer surface of the column, and as the lug is moved, the column is substantially reinforced at the region of greatest stress.

From the foregoing it will be appreciated that the novel lifting lug structure provides a smooth surface contact with the interior and exterior of the column throughout a relatively large range of movement and serves to strengthen the column structure as a whole. The upwardly extending projection 17, the downwardly extending projection 19, and the ring member 22, together with the body portion of the lug, serve to maintain the same in a predetermined position within the interior of the column.

A lifting head is mounted upon the upper end of the column, which lifting head serves to effect vertical movement of the lifting lug interiorly of the column. This lifting head preferably includes a sheet metal enclosing housing 20, which is provided with a substantially cylindrical extension 21, adapted to telescope within the upper end of the column 7. This housing may preferably be formed of a pair of sheet metal stampings welded together, and the housing as a whole is preferably welded in a fixed position in the upper end of the column. This housing 20 serves to provide bearings for a transversely extending operating shaft 23 which has secured thereto a worm 24 which worm is disposed between a pair of thrust washers 25, surrounding shaft 23 interiorly of the housing and serving to limit axial movement of the worm and shaft. While as is illustrated in the drawing, the outer end of the shaft may be preformed to provide a polygonal socket 27 adapted to be engaged by a complemental wrench, the outer end of this shaft may, if desired, be conveniently provided with a polygonal external surface adapted to be engaged by a socket wrench of a size and configuration substantially identical with the configuration of the hub bolts on the vehicle with which the jack is adapted to be used in order that the conventional hub wrench may be utilized to operate the jack. A wrench member 29 of substantially conventional construction is shown in Fig. 2 in position for effecting rotary movement of the shaft 23 to actuate the lifting mechanism. The housing 20 serves to provide means for journaling a second shaft 31 therein on which shaft is rotatably mounted on a worm wheel 32 adapted to

mesh with the worm 24 in driving relation therewith.

This worm wheel 32 has directly secured thereto or formed integrally therewith a substantially cylindrical sheave or pulley 33 around which is wrapped a flexible cable 34, the extreme end of which is preferably secured directly to the surface of the sheave by any suitable conventional means.

The lower end of the cable 34 is permanently secured to the body portion of the lifting lug 13 in any convenient manner. The cable 34 is preferably of sufficient length so that when it is unreeled from the pulley 33, it will permit the lifting lug to descend to substantially the base of the column 7.

From the foregoing it will be apparent that after the lifting lug is disposed in the base of the column, the wrench 29 may conveniently be engaged with the shaft 23 and utilized for the purpose of rotating the worm 24. Rotation of the worm 24 serves to effect a consequent rotation of the worm wheel 32 and winding of the cable 34 upon the pulley 33. The winding up of this cable serves to effect a vertical movement of the lifting lug within the column and consequent lifting of any element with which the projecting portion 14 of the lifting lug may be engaged. The engaging threads of the worm and worm wheel are preferably constructed to have a sufficiently low helix angle so that downward pressure upon the lifting lug 13 will not effect reverse rotation of the worm 24.

In the modified form of the invention illustrated in Fig. 6, housing 40 is provided for the upper end of a jack construction substantially as has been described above. This housing has mounted therein a worm 41 secured to shaft 42 substantially similar in construction to the worm 24 and shaft 23 described in connection with the preferred embodiment of the invention. This worm 41 meshes with a worm wheel 43 which has secured thereto a frusto-conical sheave or pulley 45. A flexible cable 46 has its one end secured to the surface of the sheave or pulley adjacent the end having the larger diameter, and the surface of this pulley is preferably provided with a helically extending groove in order that the cable will not tend to slip along the surface of the pulley toward the smaller end thereof. It will be appreciated that the mechanical advantage obtained in a jack construction of this general character is due substantially entirely to the ratio of the worm gear and the radius of the pulley which serves to wind up the cable. Inasmuch as the pulley illustrated in the embodiment of the invention shown in Figure 6 is frusto-conical in form, the cable will be wound thereon in such a manner that the effective radius of the pulley will progressively be decreased, thus producing a corresponding increase in the mechanical advantages obtained by the operator. It will be clear that in normal lifting operations this increase in mechanical advantage will normally be obtained at a time when the weight being lifted is at a maximum, and consequently greatly facilitate the lifting operation as a whole. It will be readily appreciated that the specific modifications of the invention disclosed in the drawing and described above are merely illustrative of the generic inventive concept present in this application.

In the modified operating mechanism shown in Fig. 6, the worm and gear operating mechanism of Figs. 1 to 6 is replaced with a ratchet mechanism including a ratchet wheel 50 mounted on the drum shaft 32 exterior of the column 7, and a reciprocating arm 51, having a pawl 52 pivotally mounted thereon for engagement with the ratchet wheel in the usual manner. A pawl 53 is pivotally mounted on the column 7 and is held in engagement with the ratchet wheel 50 by a spring 54 to prevent backward movement of the ratchet wheel 50. A sponge rubber ring member 56 is mounted over the column 7 adjacent the upper end to act as a cushion in case the jack may be tipped over, and thereby prevents damage to the jack.

Many other and further modifications falling within the scope of the invention as defined in the subjoined claims will become clearly apparent to those skilled in the art.

What is claimed is:

1. In a jack, a sheet metal support column having a vertically extending slot therein, a lifting lug mounted for movement within said column and having a portion projecting through said slot, inturned substantially parallel flanges formed on said column at the marginal edges of said slot, said lifting lug having recesses therein adapted to receive said flanges.

2. A jack construction comprising a sheet metal supporting column having a vertically extending slot therein and having portions of said column adjacent said slot turned inwardly to provide a pair of parallel inturned flanges, a lifting lug mounted for vertical movement within said column and having a portion projecting through said slot to engage the work to be lifted, said lifting lug being provided with a pair of parallel channels therein adapted to receive the inturned flanges on said column, and means at the upper end of said column adapted to effect vertical movement of said lug within said column whereby the force of the article being lifted is borne by said column.

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