Dec. 30, 1947. M. G. WARD 2,433,537

LIFTING MECHANISM

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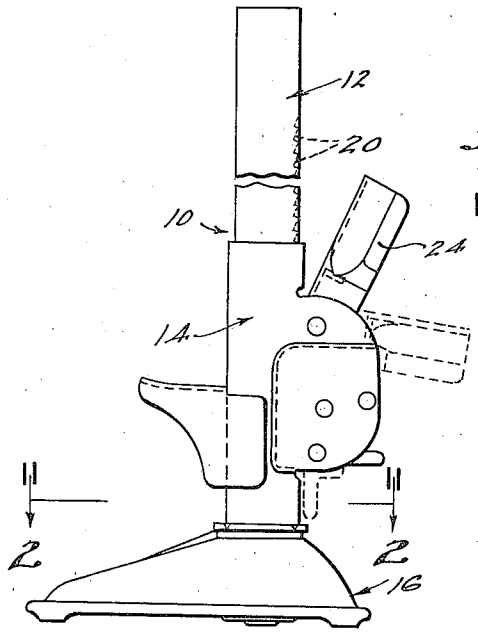


Fig. 1.

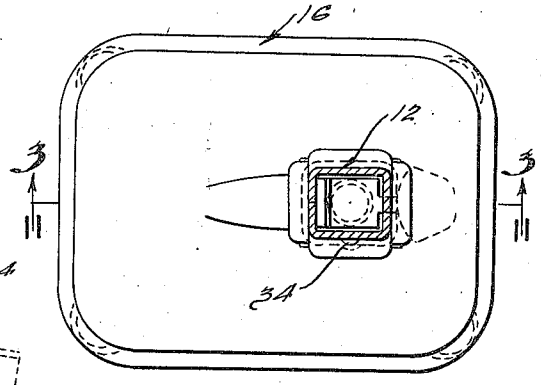


Fig. 2.

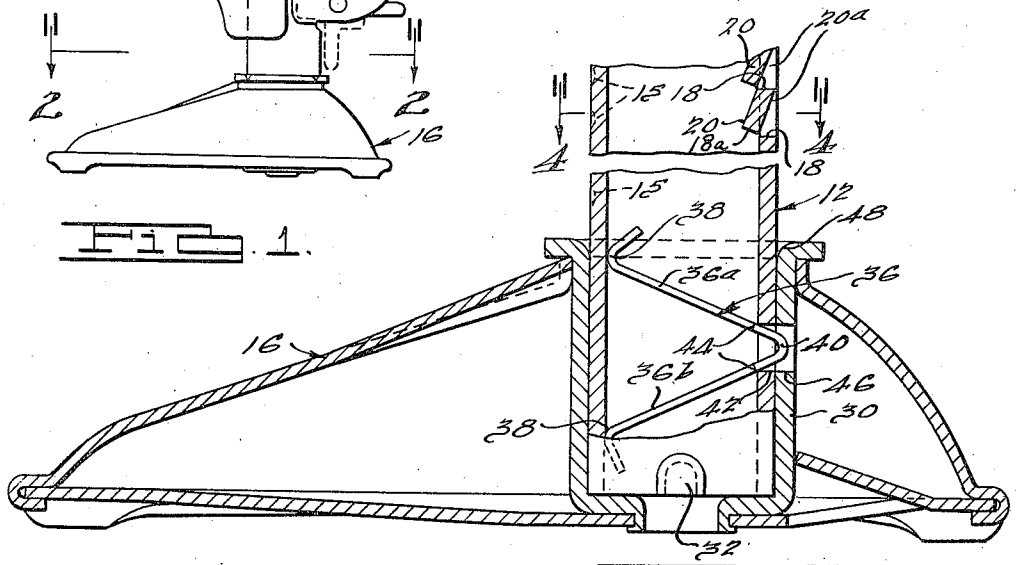


Fig. 3.

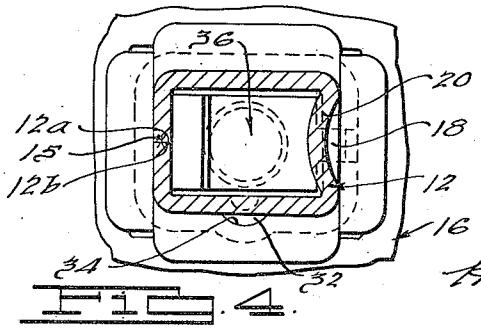


Fig. 4.

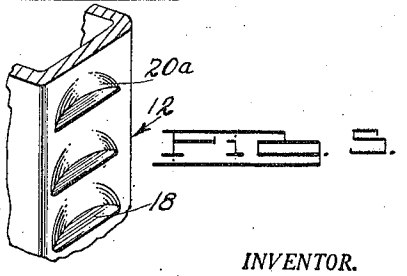


Fig. 5.

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LIFTING MECHANISM

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3 Claims. (Cl. 254—1)

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The present invention relates to lifting mechanisms, and is particularly directed to the provision of an improved ratchet type jack, of the type known in the automotive trade as a bumper jack.

Principal objects of the present invention are to provide a lifting mechanism of the above type embodying an improved construction of rack bar; to provide such a construction wherein the rack bar comprises a tubular member having rack teeth formed by a forming operation, which includes a shearing step; to provide such a construction wherein the tubular rack bar is rolled from initially flat stock, by cold forming operations; to provide an improved method for manufacturing a rack bar of the aforesaid type; and to provide an improved releasable connection between a tubular rack bar and a supporting base structure.

With the above as well as other and more detailed objects in view, which appear in the following description and in the appended claims, a preferred but illustrative embodiment of the invention is shown in the accompanying drawing; throughout the several views of which corresponding reference characters are used to designate corresponding parts and in which:

Figure 1 is a view in side elevation of the improved structure;

Figure 2 is a view in horizontal section, taken along the line 2—2 of Figure 1;

Figure 3 is a view in vertical section, taken along the line 3—3 of Figure 2;

Figure 4 is a view in horizontal section, taken along the line 4—4 of Figure 3; and,

Figure 5 is an elevational perspective view of several of the rack teeth.

It will be appreciated from a complete understanding of the present invention that, in a generic sense, the improvements thereof may be embodied in a wide variety of different jack structures, specifically designed for a correspondingly wide variety of different uses. The illustrated construction is particularly designed for use in connection with automotive vehicles, particularly as a so-called bumper jack. Jacks of this general type are produced in very large quantity, under mass production conditions and the present improvements are of particular importance in respect to economy of manufacture as well as reliability and efficiency in operation.

In the drawings, the illustrative jack 10 comprises the hereinafter described rack bar 12, a usual ratchet type lifting head 14, and a base structure 16, to which the bar 12 is releasably

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secured in the hereinafter described manner. The lifting head 14 may be of conventional construction, and the illustrated base 16 embodies certain improvements which are described and claimed in a copending application of Benjamin F. Johnson, Serial No. 573,895, filed January 22, 1945, now Patent No. 2,400,235, issued May 14, 1946.

The present rack bar 12 is formed, in accordance with the present invention, from an initially flat strip of usual metallic stock, such as cold rolled steel. In its finished form, this flat strip is formed, by usual cold forming operations into tubular form, with the marginal edges 12*a* and 12*b* in abutting relationship. These edges may be and preferably are joined together by welding; either a continuous seam or a succession of short welded sections being satisfactory. In Figure 3, a succession of short welded spots 15 are indicated. In order to prevent relative rotation between the rack bar and the jack base, a non-circular cross section for the bar 12 is preferred and further, in order to accommodate it to conventionally formed lifting heads 14, the illustrated rectangular form is preferred.

Along one face, rack bar 12 is provided with a series of rack teeth, each of which has a substantially horizontal load sustaining surface 18 and a gradually inclined companion face 20*a*, it being understood that the lifting head 14 is provided with one or more elements adapted to seat upon the surface 18 to hold the head at a desired elevation, and which can be freely ratcheted past the inclined tooth surfaces 20*a* as the head is elevated, all in accordance with conventional practice.

In accordance with the present invention the rack teeth are formed, preferably before the rack bar is formed into tubular form, by making a plurality of substantially horizontal shear cuts through the stock. Each shear cut, of course, defines a pair of opposed surfaces such as 18 and 18*a* one of which (in this case, 18) forms a load supporting surface. Either following or as an incident to the making of each shear cut, the stock 20 between successive cuts is displaced from the plane of the sheet, thereby exposing the sheared faces such as 18 and 18*a*. Since, in this case, it is desired to use the sheared edges 18 for load supporting surfaces, the intervening stock is displaced inwardly of the bar.

The resultant tooth structure is very effective and efficient in service and eliminates difficulties heretofore encountered in attempting to form rack bars from initially flat stock. In a repre-

sentative such prior arrangement, the rack teeth were rolled into the sheet, and proved unsatisfactory in that it was not possible to provide sufficiently sharp shoulders or load engaging faces on the bar.

The illustrated base 16 defines a generally rectangular rack bar receiving socket 30. In order to insure that the bar 12 is inserted in the base in the proper rotative position, a guiding connection is preferably provided between the bar and the socket. As shown, the bar is provided adjacent its lower end, and at one side, with an outwardly struck nubbin or boss 32, which is received in a corresponding groove 34 provided therefor in the wall of the socket 30.

In order to releasably retain the bar 12 in the socket 30, an improved detent connection is provided. As shown, this connection comprises a flat generally V-shaped spring 36, the ends 38 whereof freely and slidably abut the inner surface of one wall of the bar 12. Adjacent the bight thereof, the spring 36 is narrowed, to define a portion 40 which is continuously received in an opening 42 provided in the corresponding face of the rack bar. The shoulders 44 which join the narrow portion 40 to the wider leg portions of the spring, serve to prevent the portion 40 from projecting outwardly through the opening 42 more than a predetermined distance. As will be evident, spring 36 may be introduced into the rack bar, through the open end thereof, by spreading the legs 36*a* and 36*b*, following which it may be advanced along the bar until the portion 40 encounters and is enabled to snap into the opening 42 under the influence of the tension in the spring. This snapping movement urges portion 40 to a position in which it projects outwardly from the corresponding face of the rack bar.

For interlocking connection with the portion 40 of the spring, the socket 30 is provided with an opening 46. As will be understood, in introducing the rack bar into the socket, the rounded upper socket surface 48 cams the portion 40 inwardly, enabling it to ride along the wall of the socket until the opening 46 is reached. In withdrawing the bar from the socket further, the upper marginal edge of the opening 46 serves to cam the spring inwardly.

Although only a single specific embodiment of the invention has been described in detail, it will be appreciated that various modifications in the form, number, and arrangement of the parts may

be made without departing from the spirit and scope of the invention.

What is claimed is:

1. An elongated rack bar for use as part of a jack structure in such relation as to be loaded in lengthwise compression by loads applied to the jack, comprising a strip of metallic stock, said strip having a plurality of substantially parallel slit-like openings therethrough and extending laterally thereacross with their ends spaced inwardly from the lateral edges of said strip, the metal along one side of each opening occupying a position which is displaced from the plane of said strip so that one side of each opening forms one side of a rack tooth, the amount of said displacement increasing progressively from each said end of each opening toward the center thereof.

2. An elongated rack bar for use as part of a jack structure in such relation as to be loaded in lengthwise compression by loads applied to the jack, comprising a single length of metallic stock having at least three angularly related faces, the intermediate one of said faces having a plurality of substantially parallel openings therethrough and extending laterally thereacross, the metal along one side of each opening occupying a position which is displaced from the plane of said one face so that the other side of each opening is exposed and forms one side of a rack tooth, the amount of said displacement increasing progressively from each end of each opening toward the center thereof.

3. The structure of claim 2 wherein the sides of each said opening are substantially rectilinear and said one face is substantially planar.

MELVIN G. WARD.

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