Oct. 9, 1951 R. H. McCARROLL 2,570,360

AUTOMOBILE JACK

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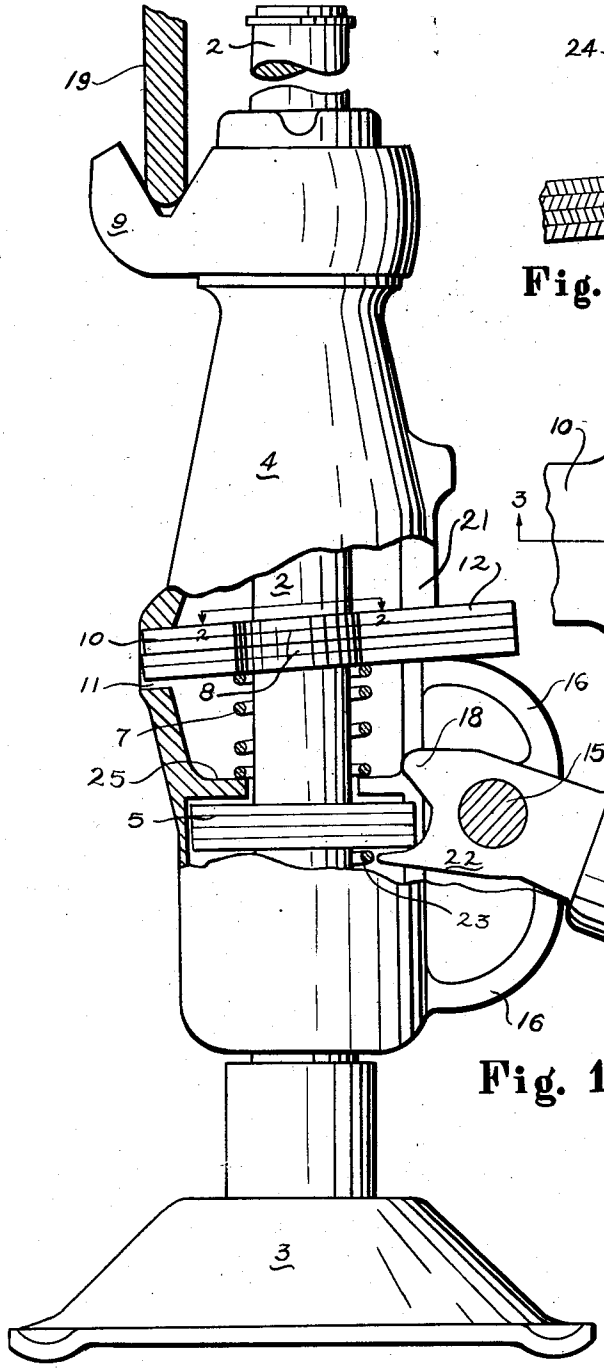


Fig. 1

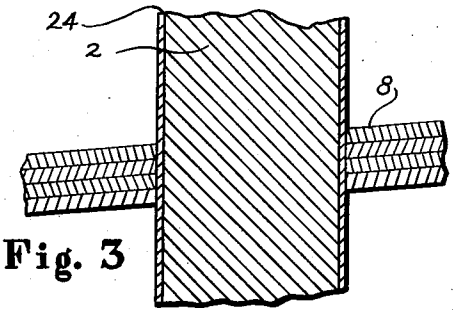


Fig. 3

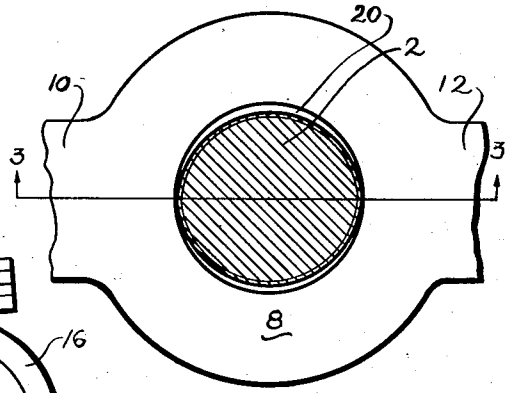


Fig. 2

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AUTOMOBILE JACK

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3 Claims. (Cl. 254—106)

1

This invention relates to automobile jacks; and, more particularly, to manually operated jacks of the friction type.

The object of my invention is to provide a support rod for a friction type jack comprising a steel shaft having a noncorrosive metal sheath or casing autogenously attached to its working surface, this sheath being hard enough to resist indentation under normal use and highly resistant to surface deterioration.

The shaft of this type of jack is particularly prone to deterioration through rusting, since any o the common lubricants adversely affect the frictional engagement. Further, in normal use, the jack may be stored for months at a time without being operated in the tool compartment of the vehicle where it will be subjected to moisture, increasing the rate of deterioration.

A further object of this invention is to provide an improved type of automobile jack which affords a definite support without the hazards of slippage or accidental release. A second object is to provide a jack which will be positive and smooth in operation, and which will not stick, jam, or slip, even after the long periods of disuse common with these devices.

The improvements with which this invention is concerned, are directed to the conventional type of bumper jack and, except for the specific formation of the shaft and certain permissible modification in the dogs, the basic structure is that usually found in such jacks.

With these and other objects and improvements in view, the invention consists in the arrangement, construction, and combination of the various parts of my improved device as described in this specification, claimed in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a full-sized elevation of the jack in lowered position with the central portion of the housing cut away.

Figure 2 is a sectional view on an enlarged scale taken as indicated by the lines 2—2 of Figure 1.

Figure 3 is a sectional view taken on the lines 3—3 of Figure 2.

Referring now to Figure 1, the jack consists of three basic units: the shaft 2, foot plate 3 into which the shaft 2 is removably inserted and the housing 4, which is substantially cylindrical in shape containing the lifting and locking mechanism of the jack and arranged for reciprocatory travel on the shaft 2.

The housing 4 has, at one side, two spaced ears 16 between which the lifting lever 6 is pivotally mounted on the pin 15. The inner end of the lever 6 is forked and its two extensions 18 and 22 engage the lifting dogs 5 slidably mounted on the shaft 2 as the lever is moved upwardly (to lift the housing) or downwardly (to reset the lifting dogs), respectively. The dogs 5 are in the form of thin metal discs having a central hole with a diameter slightly larger than that of the shaft 2 upon which they are strung and are normally urged into position, normal to the shaft, against the shoulder 25 by the spring 23.

2

The housing 4 also encloses the locking dogs 8 which are similar to lifting dogs 5, except in having a fulcrum extension 10 seated in the fulcrum recess 11 of the housing 4 and a release extension 12 projecting through the slot 21 which is a continuation of the opening between the ears 16 through which the lever 6 operates. The locking dogs 8 are normally urged to the cocked position shown with the diametrally opposite edges of the holes 20 engaging the shaft 2 (see Figure 2) by the spring 7 seated on the shoulder 25. The upper end of the housing 4 carries a rotatable collar 9 having a notch in which may be seated the bumper bar or bumper bracket 19 of the vehicle to be lifted.

This structure is, it will be recognized, all conventional and is set forth briefly, merely to assist in an understanding of the invention. The operation of the device is also conventional. As the lever 6 (usually operated through an extension lever inserted in the socket 17) begins to move counterclockwise, the extension 18 engages the lifting dogs 5 on one side—cocking them into frictional engagement with the shaft 2 and further rotation of the lever moves the entire housing upwardly along the shaft 2, which slides freely through the locking dogs 8. When the limit of counterclockwise rotation is reached and the lever 6 begins its return to the original position, the initial resultant return movement of the housing 4 cocks the locking dogs 8 into engagement with shaft 2 preventing further downward movement of the housing, and the extension 22 restores the lifting dogs 5 to their original horizontal position. The repetition of this cycle moves the housing intermittently to the desired elevation on the shaft and secures it in the final position attained. The jack is lowered by inserting a lever in the slot 21 above the extensions 12 and forcing them downwardly, restoring the locking dogs 8 to horizontal position and permitting the housing to slide downwardly on the shaft 2. As noted above, this is the usual mode of operation of jacks of this general type.

The specific improvement here involved is best shown in Figures 2 and 3 and comprises the use of a thin exterior layer 24 of noncorrosive yet relatively hard material autogenously secured on the exterior of the shaft 2. Of course, the desirability of preventing corrosion of the shaft has long been recognized and in an attempt to prevent such deterioration, various expedients have been proposed and—to some extent—used. These proposals have included electroplating with a relatively noncorrosive metal, such as copper or cadmium. Neither has been satisfactory, because the fundamental requirements for proper operation have been overlooked. If the jack is to operate smoothly and easily, the main reliance in lifting and locking must be put on the frictional engagement between the dogs and shaft rather than on actual physical interlocking, due to surface deformation. It is true that if the shaft were quite soft, and the dogs relatively harder, the jack might be operated purely through successive deformation rather than frictional engagement—at least for a time. But this results in pronounced corrugation of the shaft and it is soon found that the dogs will not engage and disengage smoothly and—much more to the point—the corrugations will shear off under load, releasing the jack when least expected. Actually, there is bound to be at least a transitory deformation in the area of contact between the dog and shaft, but by keeping the surface layer hard enough, permanent deformation can be avoided. Such hardness could not, however, be obtained in the plated layers of the ordinarily available metals heretofore used, since both copper and cadmium are very soft when so applied and cannot be hardened perceptibly by available heat treatments. Even more disadvantageous was the tendency of the plated coat to strip off in use. While the bond between the plated layer and the base metal may be sufficiently strong for many purposes, here there is a constant succession of forces of considerable magnitude imposed on relatively small areas resulting in transitory, if not permanent relative deformation of the plated layer and the base. Under such service, the bond soon fails and the entire outer layer strips away.

I therefore sought a noncorrosive covering for the shaft which would be very hard, have as high a coefficient of friction as possible, and would have a bond with the shaft which would not fail under load short of failure of the layer itself. This combination was found to exist uniquely in a shaft prepared by fusing a layer of a copper-base alloy having high hardness characteristics to the outer surface of a steel ingot and subsequently drawing this composite structure down to a bar of the desired diameter for the shaft in which the thickness of the alloy layer was about 0.010 inch or less. This process is, of course, currently used under several trade names to fabricate copper-clad steel articles, such as bus bars, electrical cables, and the like.

The advantage of such a structure in this combination will be at once apparent. The bond between the casing and shaft is very strong after the initial fusing or welding and is not deteriorated in the drawing steps. Almost any desired copper-base alloy may be used to obtain a hard casing (which is not, of course, practicable with plating methods) and this physical characteristic is increased by the working incident to the drawing operation. I do not undertake to specify any particular alloy as most suitable, since the list of copper-base alloys is readily available and the physical properties fully catalogued. For the present purpose, any of the harder brasses or bronzes are sufficiently noncorrosive. Since hardness of the coating in the drawn rod is probably the prime consideration, attention is directed to the manganese bronzes (e. g. Cu 68.5%, Al 4%, Zn 22%, Mn 3% and Fe 2.5%), aluminum bronzes (e. g. Cu 90% and Al 10%), silicon bronzes (e. g. Cu 81.5%, Zn 4% and Si 4.5%) or the standard Phosphor bronzes. While a Brinell hardness in excess of 200 would be most desirable, it may be somewhat lower and the softer alloys may also be used.

A further means of preventing surface deformation is by reducing the unit loads existing between the frictionally engaging members. This may best be done by increasing the number of individual discs, making up each of the locking and lifting dogs—four being shown in use in the drawings. This is very effective in reducing deformation and provides an additional safety factor in use.

Some changes may be made in the arrangement, construction, and combination of the various parts of the improved device without departing from the spirit of the invention and it is the intention to cover by the claims such changes as may be reasonably included in the scope thereof.

I claim as my invention:

1. In combination, in a friction-type vehicle lifting jack, a housing, a central supporting shaft having a steel core extending through said housing, said steel core having secured thereto a relatively hard exterior layer of non-corrosive metal, a lifting mechanism, and a locking mechanism successively and selectively frictionally engaging said exterior layer, said exterior layer exhibiting a thickness less than 0.01'' and a Brinell hardness in excess of 200.

2. In combination, in a friction-type vehicle lifting jack, a housing, a central supporting shaft having a steel core extending through said housing, said steel core having secured thereto a relatively hard exterior layer of non-corrosive metal, a lifting mechanism, and a locking mechanism successively and selectively frictionally engaging said exterior layer, said exterior layer comprising a copper base alloy less than 0.01'' thick having a hardness in excess of 200 Brinell and said mechanisms each comprise a plurality of disks surrounding said shaft.

3. In combination, a friction-type vehicle lifting jack, a housing, a central supporting shaft having a steel core extending through said housing, said steel core having secured thereto a relatively hard exterior layer of non-corrosive metal, a lifting mechanism, and a locking mechanism successively and selectively frictionally engaging said exterior layer, said exterior layer being a copper base alloy having a Brinell hardness in excess of 200.

RUSSELL H McCARROLL.

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