

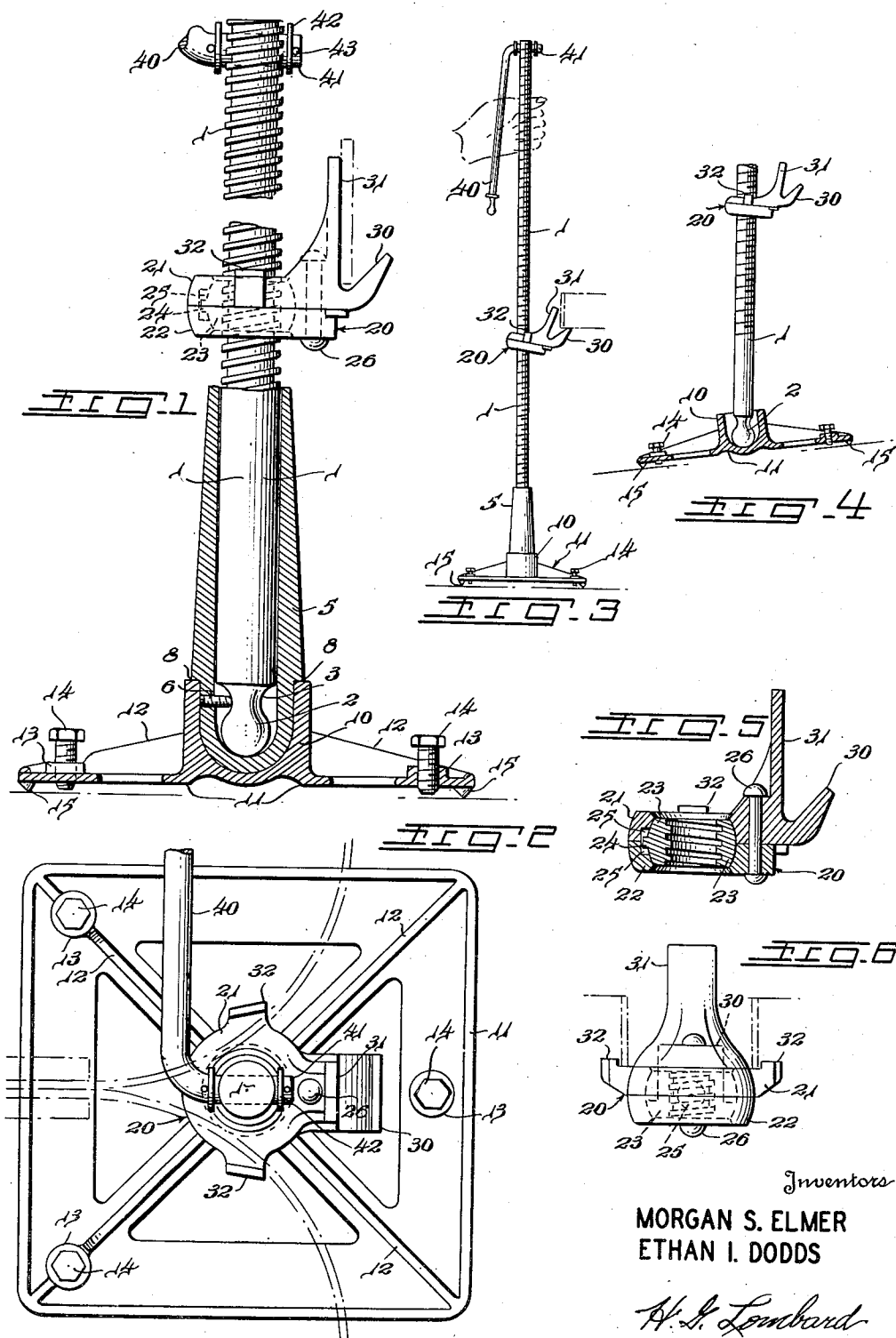
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M. S. ELMER ET AL

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LIFTING JACK

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Inventors

MORGAN S. ELMER
ETHAN I. DODDS

H. J. Lombard
Attorney

UNITED STATES PATENT OFFICE

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LIFTING JACK

Morgan S. Elmer and Ethan I. Dodds,
Central Valley, N. Y.

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This invention relates in general to lifting jacks and deals, more particularly, with certain new features of construction which may be embodied in any jack device to provide an improved mechanism for lifting or raising bodies by a simple combination of mechanical forces making for a greater safety, speed and facility in the operation and use of such devices.

The present invention is disclosed with particular reference to a jack structure applied to automotive vehicles in raising the same above the ground for the purpose of changing tires, etc., but it will be quite apparent that the improved features of construction are not limited to devices of such use and may readily be incorporated in various related structures such as house jacks, hoisting jacks, and the like.

Present day designs of automobile body constructions with overhanging fenders make it a usually difficult problem to employ an ordinary automobile lifting jack under axles or adjacent the wheels to raise the same for the purposes of changing a tire, etc. There has therefore come into use a general form of lifting jack which is adapted to engage the bumper bar, bracket, bumper spring or similar support which is readily accessible for applying the jack thereto in effecting the wheel lifting operation in a minimum of time and effort.

The use of lifting jacks of this character, however, involves a considerable source of danger in that the jack standards must necessarily be quite lengthy and if care is not taken to guard against possible angular displacement and lateral thrust during the lifting operation, there often results a condition wherein the jack post or screw assumes a tilting position which, under the weight of the car body, can easily cause the jack to become displaced to such a degree that the supported portion of the vehicle will fall to its original position and result not only in possible injury to the person changing a tire, but also in considerable damage to the vehicle in the event the wheel is removed and the car body falls on the associated housing structure.

Even where the road or other surface may be level, dangerous tilting of the jack standard in the manner aforesaid can take place if the jack is not accurately and precisely positioned such that the jack screw or post is maintained in a substantially vertical position as the engaging member is moved axially thereof in the lifting operation. Also, if there has been a failure to apply the vehicle brakes, there is of course, a still greater danger in displacement of the jack

incident to any tilting thereof during the lifting operation.

In raising a vehicle for changing a tire, for example, even if the danger of tilting the jack standard in the lifting operation is appreciated, a motorist is usually in such a hurry that little time is taken to properly position the jack in order to anticipate such tilting of the jack standard and remove the attendant danger involved.

The present invention has for one of its primary objects, the provision of lifting jack structure which is designed to minimize and eliminate such dangerous tilting of the jack standard in a lifting operation and otherwise automatically compensate for any reasonable inaccuracy in the positioning of the jack in providing an important measure of safety not only to skilled mechanics, but also, to persons inexperienced in handling such devices or not thoroughly familiar with the proper operation and use thereof.

Another object of the invention is to provide a jack structure comprising means associated with the engaging element or lifting head of the jack adapted to compensate for angular displacement and lateral thrust on the jack standard in a lifting operation to minimize and eliminate the possibility of dangerous tilting thereof.

A further object is to provide such a jack structure in which the engaging element or lifting head of the jack is mounted for universal free movement by a substantial ball-nut and socket construction and thus, also adapted to facilitate the application thereof to a bumper bracket or similar support under difficult or unusual conditions.

Still another object is to provide a jack structure of this character embodying an auxiliary socket or sleeve member adapted under normal conditions to support the jack standard at its lower end in generally vertical position against tilting movement and further, with said sleeve being removable to provide a swivel mounting for the jack standard for use on inclined surfaces in a similar manner wherein the jack standard is disposed in vertical position for safe, most effective operation and use.

Further objects and advantages and other new and useful features in the construction, arrangement and general combination of parts of the invention will be apparent to those skilled in the art as the description thereof proceeds with reference to the accompanying drawing, for purposes of illustration but not of limitation, in which like reference characters designate like parts throughout the same and in which—

Fig. 1 is a longitudinal sectional view through the improved jack structure of the invention with the lifting head thereof shown in elevation and the jack screw partly broken away;

Fig. 2 is a plan view of the jack structure shown in Fig. 1;

Fig. 3 is a vertical elevational view of the improved jack structure showing the application of the movable lifting head thereof to a bumper bracket, or the like;

Fig. 4 is a fragmentary elevational view of the jack structure as employed for use on a surface having a pronounced inclination;

Fig. 5 is a sectional view illustrating the construction of the lifting head shown in Fig. 1; and

Fig. 6 shows the lifting head in elevation as viewed from the left of Figs. 1 and 2 and showing the same in an alternate use as employed to engage a pair of cooperating bumper brackets or bumper springs.

The present invention is directed to various improved features of construction which may be embodied in various forms of jack devices for any particular purpose and use, and therefore, while the invention is disclosed in connection with automobile lifting jacks, the invention is not to be considered as limited thereby but rather, as equally adaptable to various other purposes and uses in similar and related forms of jack structures.

In the present illustration, though the jack standard, designated generally 1, is shown to be screw threaded, other forms of such standards may be employed without departing from the spirit of the invention. The lower end of the standard 1 terminates in a ball head 2 adjacent a peripheral groove 3 on a preferably unthreaded portion of the standard which is removably received in a hollow supporting sleeve element 5, or the like.

Said supporting sleeve 5 is retained in removable assembled relation with the lower end of the standard by a set screw 6 threaded through an opening in the wall thereof to engage in said groove 3 adjacent the ball head 2 of the standard. The lower end of said sleeve 5 assumes the form of a substantial ball-shape having lateral shoulders or flange means 8 adapted to engage the abutment defined by the open end of a hub 10 provided on the base 11 of the jack.

As shown in Fig. 1, the said ball-shaped lower end of the sleeve 5, is designed to be snugly received in said hub 10 with the lateral shoulders 8 thereof resting on the free end of said hub in a manner whereby the base and standard are rigidly arranged with respect to each other. Said base may be provided in any suitable form as in the manner of a generally rectangular plate having central cutout portions to reduce the weight thereof together with strengthening ribs 12 extending radially from said hub 10. On the upper face of the base interiorly threaded bosses 13 are provided at suitable points for receiving one or more levelling screws 14 which extend through the base to provide for firm, rigid setting thereof when the same must be placed on an uneven surface. On the under face of said base there are provided calks 15, spikes, or the like, capable of gripping engagement on a slippery, icy or inclined surface to prevent displacement of the base from any applied position thereof under such conditions.

In the event a surface has a pronounced inclination as represented in Fig. 4, for example, the standard 1 is employed in a manner to have a

swivel mounting in the hub 10 of the base and capable of rocking with respect thereto such that in the proper position of said base 11 on such an inclined surface, the jack standard extends vertically for most effective operation and use. The swivel mounting of the jack standard for this purpose is provided by withdrawing the assembled standard and sleeve 5, illustrated in Fig. 1, from the hub 10 of the base, and loosening the set screw 6 sufficiently to disengage from the groove 3 in the standard in order that said sleeve may be removed therefrom. The standard 1 may then be employed with a swivel mounting on the base as illustrated in Fig. 4, by seating the ball-head 2 thereof directly in the hub 10 of said base to be vertically disposed regardless of the angular disposition of the base with respect thereto as necessary to accommodate the jack to safe, most effective operation and use on such an inclined surface.

Mounted on the standard 1 for axial travel thereon, is a lifting head, designated generally 20, in the form of a housing provided by cooperating socket members 21, 22, having complementary spherical bearing surfaces to accommodate a nut 23 having spherical-shaped faces corresponding thereto. The arrangement may be considered as essentially a ball-nut and socket construction in which the nut is threaded onto the standard 1 with the socket members 21, 22 mounted for universal movement relative thereto as necessary or desirable.

As illustrated in Fig. 5, in order to limit such relative movement to practical requirements, said nut 23 may be formed with a stop provided by a lug 24 received in a recess 25 defined by adjacent cavities in the complementary socket members 21, 22. Said stop 24 is thus adapted to engage the end walls of said recess 25 to limit the movement of said socket members 21, 22 relative to said nut 23 as mounted on the standard, and also to maintain said nut in operative assembled relation with said socket members.

The said socket members 21, 22 are secured together in any suitable way as by one or more rivets 26, bolts, or equivalent welding means to complete the housing for the nut 23 and provide the general lifting head structure 20, shown in Fig. 5. In this respect, either of said socket members 21, 22, preferably upper member 21, is provided at one end with a substantial hook or like engaging element 30 spaced from a substantially vertical wall element 31 in a manner to define an angular shaped supporting bight therebetween. The shape, form and size of said bight is such as to readily receive the lower edge of a bumper spring or bracket or the bumper bar itself, while the inner face of said hook element 30 is preferably inclined in a manner to receive bumper springs and brackets of various thicknesses and shapes in a substantial wedging action between the hook 30 and the cooperating vertical wall element 31. Preferably such vertical wall element 31 is somewhat elongated to a height approximating the width of the usual bumper bracket or spring to provide a broad bearing surface for evenly and uniformly engaging the same, as shown in dotted lines in Fig. 1, in a manner which minimizes possibility of bending or other distortion thereof.

On a lifting head of this character, another form of engaging means may be readily provided by lateral lugs 32, on the sides of the upper socket member 21 for use in an alternate method of procedure. The bumpers in most present day

vehicles are mounted at either side by means of a pair of springs or brackets attached at one end to the vehicle frame and extending outwardly therefrom in generally curved and spaced relation beyond the car body, as illustrated by the broken line showing of Fig. 2, in an arrangement by which the bumper bar is secured thereto at spaced points. Accordingly, the lateral lugs 32, are constructed and arranged for engaging both of any such pair of bumper springs or brackets as illustrated in Fig. 6, and thus greater strength in the support and increased safety in the lifting operation may be obtained.

In the present example, the jack standard 15 comprises a screw rod and a preferred means for rotating the same is shown provided by a handle 40 in the form of a substantial bell-crank having arms of unequal length. The shorter arm 41 is pivotally connected to the screw 20 by being passed through a transverse bore therein and secured by spaced collars or washers 42 retained in assembled relation on said arm on either side of said screw by a rivet, cotter pin or the like, 43. With the shorter arm 41 thus pivotally secured to the screw, the handle 40 may thereby extend downwardly along and generally parallel to the jack standard 15, substantially shown in Fig. 2, to provide a compact storage or packing arrangement. The pivotal connection of the handle with the jack screw permits the same to be moved to any desired angle generally normal or oblique to the screw to exert the necessary leverage for turning the same. At the same time, if in turning the screw in close quarters an obstruction is encountered, the handle may be easily swung downwardly or upwardly to avoid such obstruction and then moved to an opposite side of the screw to complete one or more revolutions thereof as necessary in this manner to effect the lifting operation despite the obstruction.

In view of the foregoing, it will be understood that in applying the jack for operation and use, as shown in Fig. 2, the lifting head 20 is adjusted on the screw to a position in which the hook 30 thereof extends just below the bumper bracket or spring. The jack base 10 is then moved to proper position with respect to the bumper bracket and the hook 30 of the lifting head engaged therewith, this is being facilitated by virtue of the ball-nut and socket mounting thereof by which the lifting head may be canted and thereby easily and quickly applied to the bumper bracket with a simultaneous turning of the jack screw to move the hook 30 into positive engagement with the bumper bracket. In this relation, the jack screw is substantially vertically disposed, with the bumper bracket adapted to wedge into the angular space between the hook 30 and vertical wall element 31 substantially as shown in dotted lines in Fig. 1.

Continued rotation of the screw through handle 40 causes the lifting head to move upwardly on the standard lifting the bumper bracket or spring therewith until the car body and wheel have been raised sufficiently to permit changing of the tire or wheel. During such lifting operation, practically any force which would tend to move the jack standard from its initial vertical position is compensated for by the ball-nut socket arrangement of the lifting head which provides what may be termed a universal mounting of the engaging element 30 permitting any necessary movement thereof relative to the jack screw for this purpose. The advantage and importance of

this will be appreciated when it is considered that in the event of a flat tire or a wheel enters a ditch, the vehicle leans to one side and in lifting the car body in the area of the distressed wheel to a level above that defined by the other 5 wheels, there necessarily takes place an angular displacement and lateral thrust which unless relieved or compensated for, is transmitted to the jack screw or other jack standard to cause a dangerous tilting thereof. However, by the present invention in which the lifting head is mounted for universal movement by the ball-nut and socket construction thereof, there is eliminated the danger of causing a tilting of the jack standard since such angular displacement and lateral 15 thrust is gradually relieved and compensated for throughout the lifting operation, as aforesaid, inasmuch as the engaging element is capable of any necessary angular movement to this end, with the jack screw maintained in desired vertical 20 position at all times without tendency to tilt or otherwise become displaced in a manner which would permit the raised portion of the vehicle to fall.

The function of the lifting head 20 in the 25 manner just described is essentially the same in the alternate uses of the jack, as by employing the lateral engaging lugs 32, described with reference to Figs. 2 and 6, or in using the jack on a surface having a pronounced inclination as represented in Fig. 4, in which event the sleeve element 5 is removed, as aforesaid, to obtain the advantageous swivel mounting of the jack standard on the base 11, under such conditions.

While the invention has been described in detail with a specific example, such example is intended as an illustration only, since it will be apparent to those skilled in the art that other modifications in the construction, arrangement and general combination of parts thereof may be devised without departing from the spirit and scope of the invention. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims 45 rather than by the foregoing description, with all changes falling within the scope, meaning and range of equivalency of the claims intended to be embraced therein.

What is claimed as new and desired to be secured by United States Letters Patent is:

1. A jack comprising a standard, a lifting head on said standard, said head comprising a body having spherical face portions and mounted for movement axially of said standard, means comprising a socket member associated with said body and having spherical bearing surfaces complementary to the spherical face portions of said body, and an engaging element associated with said means. 60

2. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body provided with spherical face portions, means comprising a substantial socket member having spherical bearing surfaces complementary to the spherical face portions of said body, and an engaging element associated with said means. 65

3. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body provided with spherical face portions, a housing for said body comprising a substantial socket member having spherical bearing surfaces complementary to said spherical 70 75

face portions of the body, and an engaging element associated with said housing.

4. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw provided with spherical face portions, a housing for said nut comprising a substantial socket member having spherical bearing surfaces complementary to said spherical face portions of the nut, and an engaging element associated with said housing.

5. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body having spherical face portions, cooperating socket members having spherical bearing surfaces complementary to the spherical face portions of said nut body, means securing said socket members together to form a housing for said nut, and an engaging element associated with said housing.

6. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body having spherical face portions and a lug projecting therefrom, cooperating socket members having a recess receiving said lug and provided with spherical bearing surfaces complementary to the spherical face portions of said nut body, means securing said socket members together to form a housing for said nut body, and an engaging element associated with said housing.

7. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body having ball-shaped face portions, cooperating socket members having spherical bearing surfaces complementary to the ball-shaped face portions of said nut body, an engaging element associated with one of said socket members, and means securing said socket members together to form a housing adapted for universal movement on said nut body.

8. A jack comprising a rotatable screw, a lifting head comprising a nut threaded on said screw and including a body having ball-shaped face portions and a lug projecting therefrom, cooperating socket members having a recess receiving said lug and provided with spherical bearing surfaces complementary to the ball-shaped face portions of said nut body, an engaging element carried by one of said socket members, and means securing said socket members together to form a housing adapted for universal movement on said nut body with said lug on the nut body engageable with the walls of said recess to limit such movement.

9. A jack comprising a rotatable screw having

a ball shape at one end, a lifting head comprising a nut threaded on said screw and including a body having spherical face portions, cooperating socket members having spherical bearing surfaces complementary to the spherical face portions of said nut body, means securing said socket members together to form a housing for said nut body, an engaging element associated with said housing, and a base provided with a hub adapted for receiving said ball shape end of the screw in various angular positions to said base.

10. A jack comprising a rotatable screw having a ball shaped end, a supporting sleeve assembled onto said ball-shaped end of the screw, a base having a hub receiving said assembled sleeve and screw to maintain said screw in vertical relation to said base, said sleeve being removable for providing a swivel mounting of said ball-shaped end of the screw in said hub of the base in various angular positions other than vertical to said base.

11. A jack comprising a rotatable screw having a ball shape at one end, a lifting head comprising a nut threaded on said screw and including a body having spherical face portions, cooperating socket members having spherical bearing surfaces complementary to the spherical face portions of said nut body, means securing said socket members together to form a housing adapted for universal movement on said nut body, an engaging element associated with said housing, a base and means for maintaining said screw in vertical relation thereto, and a hub on said base for receiving said ball shape end of the screw in various angular positions other than vertical to said base.

12. A jack comprising a rotatable screw having a ball-shaped end, a supporting sleeve assembled onto said ball-shaped end of the screw, a base having a hub receiving said assembled sleeve and screw to maintain said screw in vertical relation to said base, said sleeve being removable for providing a swivel mounting of said ball-shaped end of the screw in said hub of the base in various angular positions other than vertical to said base, a lifting head comprising a nut threaded on said screw and including a body having spherical face portions, cooperating socket members having spherical bearing surfaces complementary to the spherical face portions of said nut body, and means securing said socket members together to form a housing adapted for universal movement on said nut body.

MORGAN S. ELMER.
ETHAN I. DODDS.