July 29, 1941. L. E. FEENEY 2,250,627

SCREW OPERATED JACK

Filed Dec. 12, 1940 3 Sheets-Sheet 1

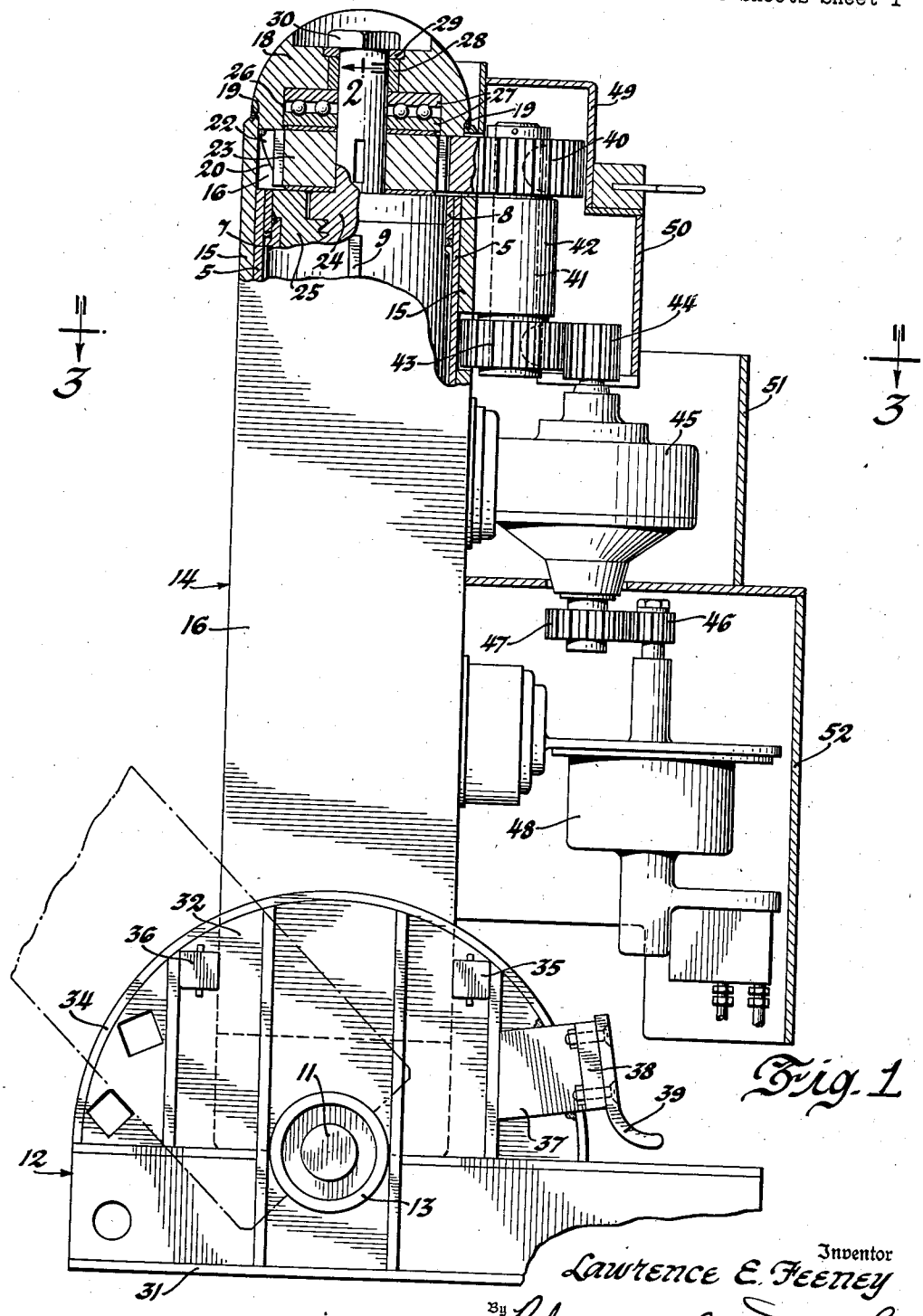


Fig. 1

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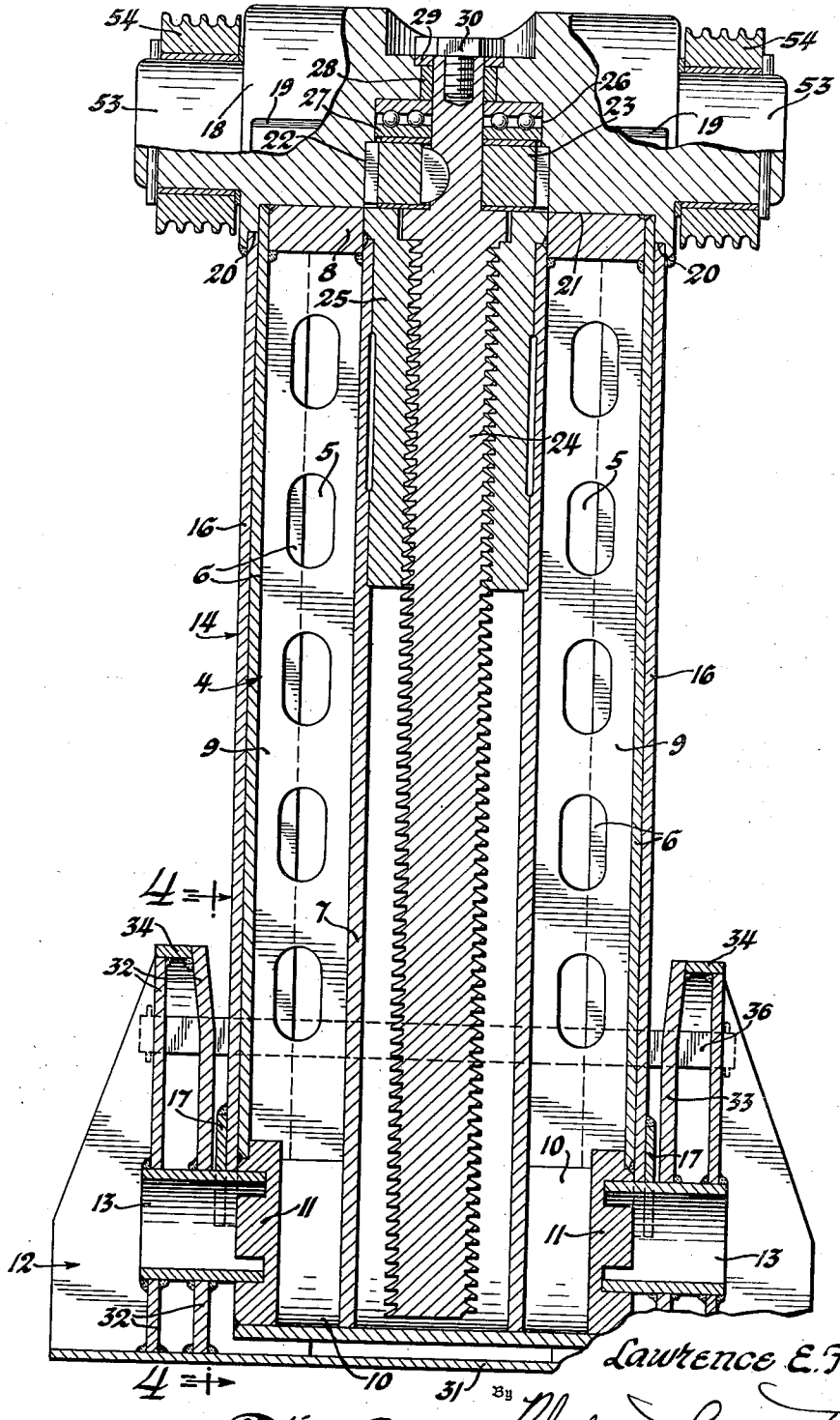


Fig. 2

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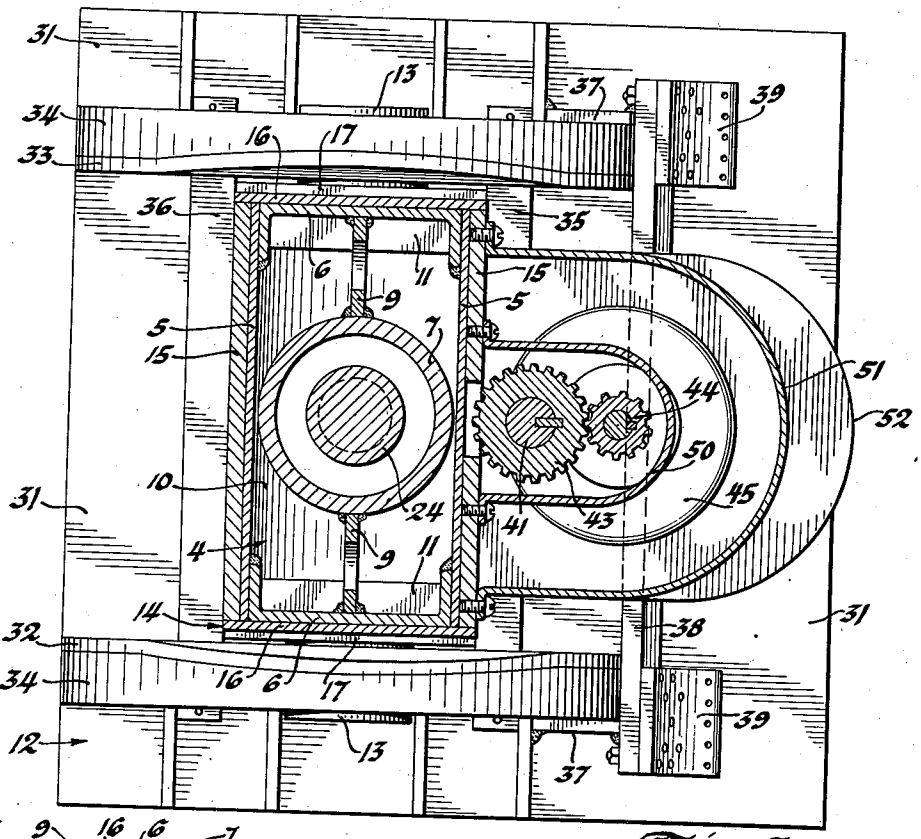


Fig. 3

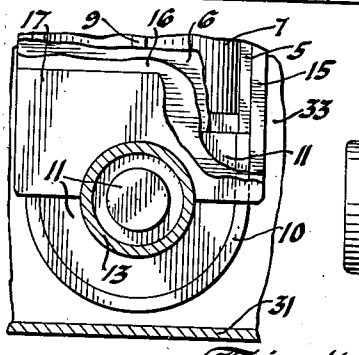


Fig. 4

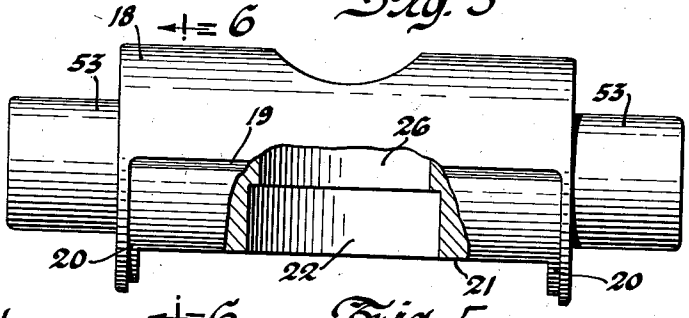


Fig. 5

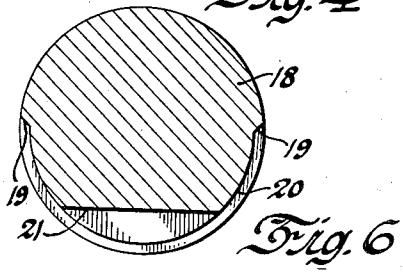


Fig. 6

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Patented July 29, 1941 2,250,627

UNITED STATES PATENT OFFICE

2,250,627

SCREW OPERATED JACK

Lawrence E. Feeney, Detroit, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Application December 12, 1940, Serial No. 369,841

8 Claims. (Cl. 254—103)

My invention relates to lifting jacks of the type wherein a rotating screw driven by a suitable motor is used, the motor and the driving mechanism for the screw being carried by and partaking of the up and down movement of an external outer shell which slides upon an inner guide member which encloses the screw, and has a non-rotatable nut at its upper end with which the screw is in threaded engagement; said screw being driven by a suitable gear which is driven by the motor and which also moves with the guide member, and said guide member being supported from a suitable base by trunnions; so that the jack may be used in an upright vertical position or in an inclined position relative to the base and to the floor or ground upon which the jack rests. My improved screw operated jack is adapted for maneuvering heavy objects as by pushing against them, as well as by lifting the objects bodily, and by lifting the object or device from the floor or from a level below that upon which the jack rests; and, although capable of general usage, my improved screw operated jack is especially adapted for moving, erecting, and placing large and heavy metal working presses without disassembling them, and without removing building roof trusses to secure head room for suitable lifting mechanism; as has heretofore been necessary when such presses have had to be taken down, moved and re-erected in a new position.

In the drawings accompanying and forming a part of this application, and wherein the preferred form of my invention is illustrated:

Figure 1 is a view showing my invention in end elevation for the most part, but broken away in part to show a section upon a vertically extending central plane.

Figure 2 is a view showing a section upon a vertically extending plane indicated by the line 2—2, Figure 1, looking toward the left.

Figure 3 is a view showing a section upon a transverse horizontal plane indicated by the line 3—3, Figure 1, looking down.

Figure 4 is a fragmentary view showing the lower end of an inner guide member of my improved screw operated jack in elevation, and with parts broken away.

Figure 5 is a view showing a head part of my device in side elevation, as seen from a position in front of the plane of Figure 2.

Figure 6 is a view showing a section of said head part upon a plane indicated by the line 6—6, Figure 5, looking toward the left.

Referring now to the drawings, my improved screw operated jack has an inner hollow guide member 4 of rectangular form in cross section, and comprising oppositely disposed side plates 5—5 connected together at their vertically extending edges by end channel members 6—6; and the numeral 7 designates a tubular lifting screw housing within and extending longitudinally of the guide member 4, and which housing is somewhat longer than the side plates 5—5. The upper end of the housing tube 7 extends into a hole in a connecting plate 8, see Figures 1 and 2, which connecting plate lies between the upper extremities of the side plates 5—5 and extends to the channel members 6—6; and internal spacing webs 9—9 are disposed between the end channel members 6—6 and the housing 7. The side plates, the end channel members, the lifting screw housing, the connecting plate and the spacing webs are welded together where they contact with one another as indicated. The lower ends of the side plates 5—5 and of the housing 7 are connected together by a semi-cylindrical member 10, see Figures 2 and 4 and which member encloses the lower end of the housing 7 as shown, and bearings 11—11 against which the lower ends of the channel members 6—6 abut are held in place between the lower edges of the side plates 5—5 and the member 10 as shown in Figures 2 and 4; these last mentioned parts being likewise welded together so that the guide member made up of the parts thus far enumerated is a single unitary structure. The guide member 4 is supported from a suitable base 12 by two oppositely disposed tubular trunnions 13—13 which are welded in place in circular openings provided in the base and which trunnions enter into circular seats in the bearing members 11—11, as shown in Figure 2, so that the device as a whole may be arranged in a vertical or in an inclined position as indicated in Figure 1.

Enclosing and slidable vertically upon the inner guide member 4 is an outer shell 14 which is likewise rectangular in cross section, and which is guided in its up and down movements by the guide member 4. This member 14 is made up of side plates 15—15, and end plates 16—16, which are welded together along their meeting edges; and strengthening plates 17—17 are shown as welded to the lower ends of the end plates 16—16. The end and strengthening plates have registering semi-circular recesses, see Figures 2 and 4 which fit about the trunnions 13—13 when the shell member 14 is in its lowermost position.

Secured to the upper end of the shell 14 is a head 18 of cylindrical form and having oppositely disposed longitudinally extending straight seats 19—19 at its sides, see Figures 5 and 6, within which the upper ends of the side plates 15—15 lie; and circumferentially extending semi-circular seats 20—20 adjacent its ends within which the upper ends of the end plates 16—16 lie; the plates being welded to the head as indicated. The upper end of the guide member 4 extends upward into the head and to a level indicated by the line 21, Figure 2, which corresponds with the level of the upper side of the connecting plate 8; and above the connecting plate 8 is a recess 22 which houses a rotatable gear 23 which is keyed to the upper end of a lifting screw 24 which is in threaded engagement with a non-rotatable nut 25 secured in place within the upper end of the lifting screw housing tube 7; so that when the screw 24 is rotated the head 18 is moved upward and away from the plate 8 upon which it rests when the head is in its lowermost position shown in Figure 2; movement of the outer shell 14 which moves with the head being guided by the inner stationary guide member 4. Within the head and at a higher level than the screw driving gear chamber 22 is a second chamber 26 within which a thrust bearing 27 is located; and guide bushings 28, 29 and a cap screw 30 are provided at the upper extremity of the lifting screw 24.

The base 12 is built up from plates welded together to form an integral structure and comprises a horizontal base plate 31, and two pairs of vertically disposed semi-circular end plates 32—32 and 33—33, connected together by semi-circular bands 34—34, and which form pedestals for supporting the trunnions 13—13; the pedestals being strengthened by ribs as may be deemed necessary, and having aligned holes for receiving the ends of stop bars 35, 36 for holding the jack in an upright position or, by shifting the bar 36, permitting it to assume an inclined position, as indicated in Figure 2. The numerals 37—37 designate arms carried by the pedestals and which support a bar 38, which carries cable clamps 39 for anchoring a wire cable made use of in certain uses of the jack.

The gear 23 is driven to rotate the screw 24 and elevate the head 18 and the outer shell member 14 depending therefrom by a pinion 40 which meshes therewith, and which is carried by a vertical shaft 41 supported by a bearing 42 which is secured to the right hand side plate 15, see Figure 1, and which shaft has a gear 43 at its lower end; and the gear 43 is driven by a pinion 44 of a speed reducing device 45 of any suitable form and construction which is also supported by the side plate 15 above mentioned; and this speed reducing mechanism is in turn driven through gearing 46, 47 by an air or equivalent motor 48 also supported by the right hand side plate 15; so that the whole driving mechanism for the lifting screw 24 is supported from the outer shell member 14 and moves upward and downward therewith. Guards 49, 50, 51 and 52 also secured to the outer shell 14 serve to protect the driving mechanism above described for the lifting screw 24.

The head 18 is provided with trunnions 53—53, and the numerals 54—54 designate grooved guides carried by said trunnions and shown as rotatable thereupon and over which wire cables anchored by the cable clamps 39 extend when the jack is to be used to lift an object which lies upon the floor, or is located upon a lower level than the base 12 of the jack; and at such times, and particularly when the jack is used in an inclined position as illustrated by dotted lines in Figure 1, the base 12 will be anchored to the floor or ground so that the jack will not slip.

Having thus described and explained my invention I claim and desire to secure by Letters Patent:

1. In a screw operated jack, a suitable base; an inner hollow guide member supported by said base and extending upwardly therefrom; a lifting screw housing within said guide member and extending longitudinally thereof; a non-rotatable nut secured in place within the upper end of said housing; a screw within said lifting screw housing and in threaded engagement with said nut; means whereby the upper end of said housing is connected with the upper end of said guide member; a vertically movable outer shell slidable upon said inner guide member; a head secured to the upper end of said outer shell and movable therewith; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

2. In a screw operated jack, a suitable base; an inner hollow guide member supported by said base and extending upwardly therefrom; a lifting screw housing within said guide member and extending longitudinally thereof; a connecting plate extending between the upper end of said guide member the upper end of said lifting screw housing, and having a hole into which the upper end of said housing extends; a non-rotatable nut secured in place within the upper end of said housing; a screw within said housing and in threaded engagement with said nut; a vertically movable outer shell slidable upon said inner guide member; a head secured to the upper end of said outer shell and movable therewith; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and moving therewith for driving said pinion.

3. In a screw operated jack, a suitable base; an inner hollow guide member supported by said base and extending upwardly therefrom, and comprising four plate members secured together at their meeting edges; a lifting screw housing within said guide member and extending longitudinally thereof; a non-rotatable nut secured in place within the upper end of said housing; a screw within said lifting screw housing and in threaded engagement with said nut; means whereby the upper end of said housing is connected with the upper end of said guide member; a vertically movable head having oppositely disposed longitudinally extending straight side seats, and semi-circular end seats connecting the ends of said side seats; four plates the upper ends of which are secured in place in said seats, and the meeting edges of which are secured together to thereby form an outer shell which is movable vertically with said head upon said inner guide

member; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

4. In a screw operated jack, a suitable base; an inner hollow guide member supported by said base and extending upwardly therefrom, and comprising four plate members secured together at their meeting edges; a non-rotatable nut within and connected with the upper end of said guide member; a lifting screw within said guide member and extending longitudinally thereof, and which screw is in threaded engagement with said nut; a vertically movable head having oppositely disposed longitudinally extending straight side seats, and semi-circular end seats connecting the ends of said side seats; four plates the upper ends of which are secured in place in said seats, and the meeting edges of which are secured together to thereby form an outer shell which is movable vertically with said head upon said inner guide member; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

5. In a screw operated jack, a suitable base; an inner hollow guide member supported by said base and extending upwardly therefrom, and comprising four plate members secured together at their meeting edges; a non-rotatable nut within and connected with the upper end of said guide member; a lifting screw within said guide member and extending longitudinally thereof, and which screw is in threaded engagement with said nut; a vertically movable head; four plates the upper ends of which are secured to said head and the meeting edges of which are secured together to thereby form an outer shell which is movable vertically with said head upon said inner guide member; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

6. In a screw operated jack, a suitable base; a cable clamp carried by said base; an inner hollow guide member supported by said base and extending upwardly therefrom; a non-rotatable nut within and connected with the upper end of said guide member; a lifting screw within said guide member and extending longitudinally thereof, and which screw is in threaded engagement with said nut; a vertically movable head; a grooved cable guide carried by and movable with said head; an outer shell secured to said head and depending therefrom, and which outer shell surrounds said inner guide member and is guided in its movements thereby; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

7. In a screw operated jack, a suitable base having two oppositely disposed trunnions; an inner hollow guide member extending upwardly from said base, and which guide member is supported by said trunnions and is movable into various angular positions relative to said base; stop bars carried by said base for positioning the jack in an upright or in an inclined position relative to said base; a non-rotatable nut within and connected with the upper end of said guide member; a lifting screw within said guide member and extending longitudinally thereof, and which screw is in threaded engagement with said nut; a vertically movable head; an outer shell secured to said head and depending therefrom, and which outer shell surrounds said inner guide member and is guided in its movements thereby; a rotatable gear housed within a recess in said head and operatively connected with the upper end of said screw, and which gear acts to lift said head and outer shell as said screw is rotated; a pinion supported by said outer shell member and meshing with said gear to drive the same; and means carried by said outer shell member and movable therewith for driving said pinion.

8. In a screw operated jack, a hollow guide member comprising two side plates, and two end channel members extending between the edges of said side plates; a lifting screw housing within and extending longitudinally of said guide member; a plate extending between the upper end of said lifting screw housing and the upper ends of said side plates and channel members, and having a hole into which the upper end of said housing extends; a non-rotatable nut within the upper end of said housing; a semi-circular member at the lower end of said guide member and extending between the lower ends of said side plates, and which semi-circular member encloses the lower end of said lifting screw housing; and two oppositely disposed bearing members arranged between said semi-circular member, the lower ends of said side plates and the lower ends of said channel members; said several parts being welded together to thereby provide a unitary hollow guide member.

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