June 24, 1969 L. P. SCOTT 3,451,655

MOTORIZED JACK

Filed Oct. 9, 1967 Sheet 1 of 2

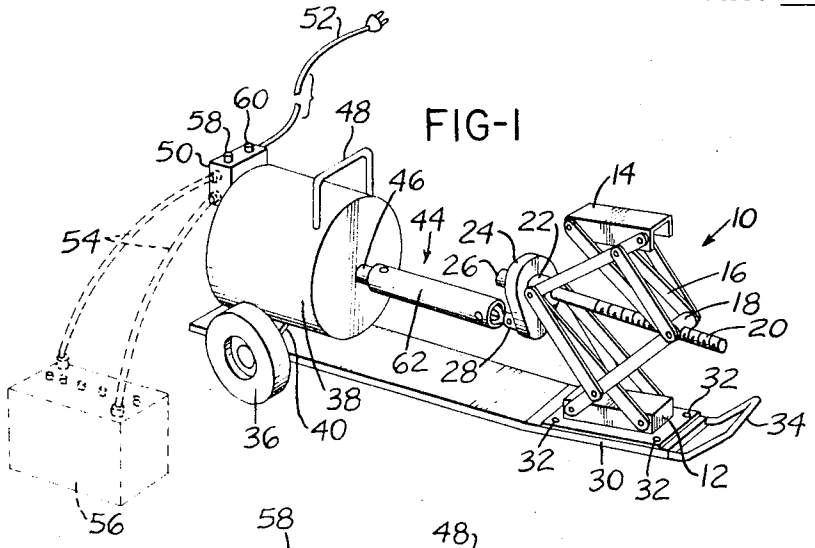


FIG-1

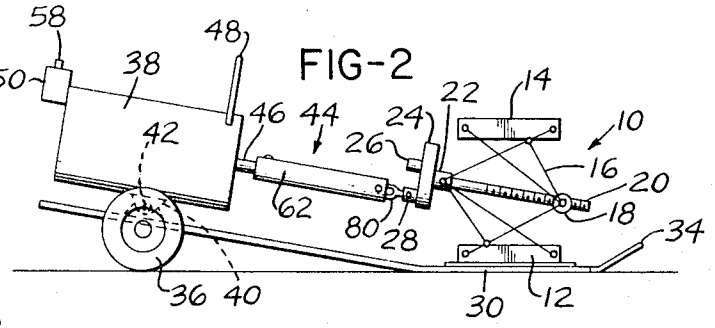


FIG-2

FIG-4

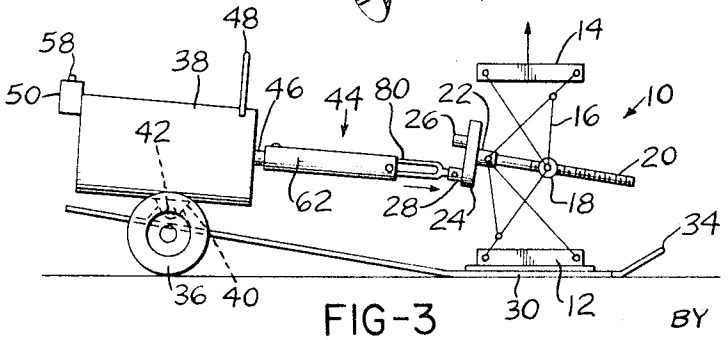


FIG-3

INVENTOR
LAWRENCE P. SCOTT

BY

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FIG-5

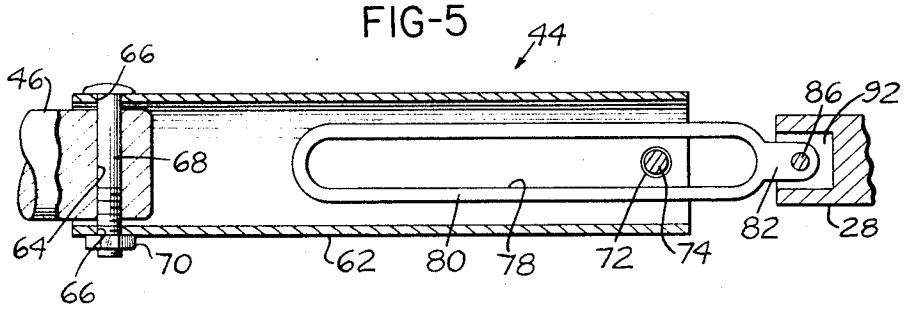


FIG-7

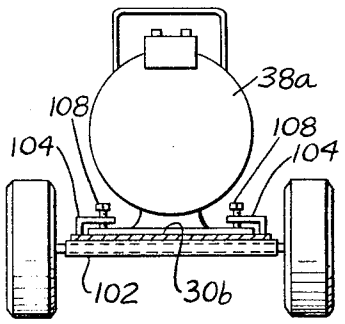
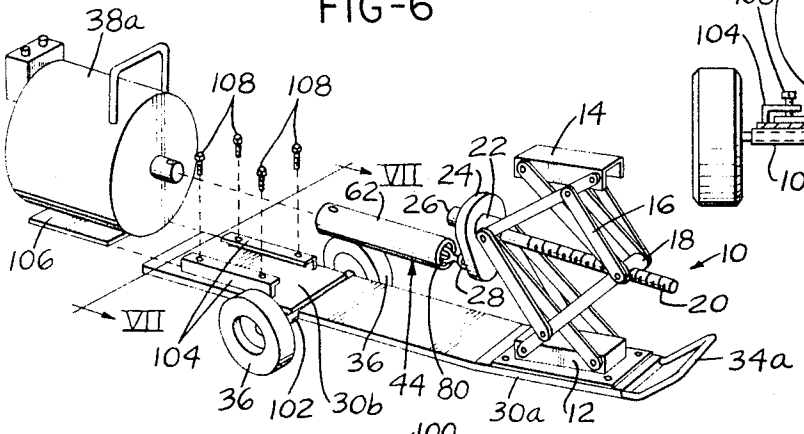


FIG-6



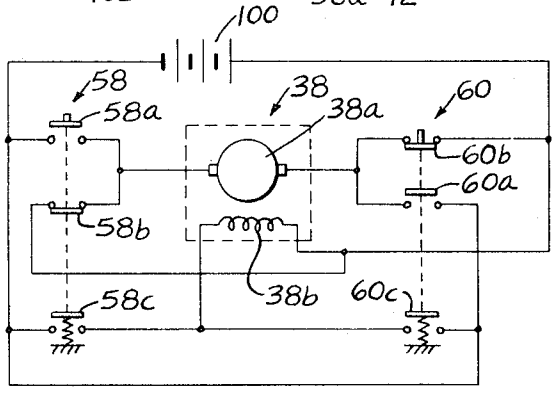


FIG-8

INVENTOR
LAWRENCE P. SCOTT

BY

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3,451,655

MOTORIZED JACK

Lawrence P. Scott, 830 Bellaire Ave.,
Dayton, Ohio 45420

Continuation-in-part of application Ser. No. 596,503, Nov. 23, 1966. This application Oct. 9, 1967, Ser. No. 673,877
Int. Cl. B66f 3/22, 3/44
U.S. Cl. 254—7 8 Claims

ABSTRACT OF THE DISCLOSURE

Motorized jack structure comprising a platform having wheels near one end, a drive motor on the platform above the wheels, a screw operated jack structure on the other end of the platform, and a flexible drive coupling connecting the motor shaft with the screw of the jack structure.

Related application

This application is a continuation-in-part application of Lawrence P. Scott application, Ser. No. 596,503, filed Nov. 23, 1966, now abandoned, and entitled "Motorized Jack."

The present invention relates to jacks, particularly to jacks for use in connection with automobiles and, more particularly still, is concerned with an electric motor drive arrangement for a jack of the nature referred to.

Automobile jacks are, of course, well known and can take many different forms. One popular type of jack is the scissors type because it can be collapsed to quite a low height and can be elevated to a substantial height. Such jacks are also relatively economical to make and are not difficult to operate. Any jack utilized for lifting a motor vehicle, however, requires certain amount of effort for its operation and the required effort is often more than a woman, for example, cares to put forth and, furthermore, a person working in a filling station or other establishment where tires are changed for the public, can become quite tired from manipulating a jack throughout the day even if the jack is relatively easy to operate.

It is also the case that many times the position of a jack under a vehicle is such that a certain hazard exists because of the possibility of the jack tilting and dropping the vehicle.

Power operated vehicle jacks are also known but these ordinarily take the form of large complex and expensive devices suitable only for use in larger filling stations and tire sales depots.

With the foregoing in mind, it it is a primary object of the present invention to provide a relatively inexpensive motorized jack for vehicles and the like.

A further object of this invention is the provision of a motorized jack which is convenient to use.

Still another object of the present invention is the provision of a motorized jack which employs substantially conventional components so that the jack can be constructed relative inexpensively.

It is also an object of this invention to provide a motorized jack of the nature referred to which is adapted for use with motors of different voltage ratings.

Still another object is the provision of a motorized jack of the nature referred to which is readily portable and which can easily be inserted into the proper position beneath a vehicle to be lifted thereby but which, nevertheless, has extremely firm support beneath the vehicle to inhibit tilting of the jack when loaded.

The foregoing objects of the present invention, as well as still other objects and advantages thereof, will become

more apparent upon reference to the following detailed specification taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of one embodiment of the present invention;

FIGURE 2 is a side elevational view of the motorized jack showing the jack in a lower position;

FIGURE 3 is a view like FIGURE 2 showing the jack in an elevated position;

FIGURE 4 is an exploded perspective view showing an important portion of the present invention and which consists of a coupling interposed between the drive motor shaft and the screw forming a part of the jack structure;

FIGURE 5 is a longitudinal section through the coupling of FIGURE 4 as it appears when it is assembled between the motor shaft and the input member of the jack;

FIGURE 6 is a perspective view similar to FIGURE 1, but showing a modified construction;

FIGURE 7 is a sectional view indicated by line VII—VII on FIGURE 6, but with the motor mounted on the supporting platform therefor; and

FIGURE 8 is a schematic representation of one form which the electric control circuit for the jack drive motor can take.

Referring to the drawings somewhat more in detail, numeral **10** generally represents a scissors type jack of known construction. The jack has a base portion **12** for resting on the surface on which the car to be lifted rests, for example, a roadway or a garage floor. The jack structure also comprises an upper portion **14** which engages a suitable portion on the underside of the vehicle to be lifted. Scissors like linkage means **16** connects upper and lower portions **14** and **12**, and includes a nut at **18** forming one of the pivotal connections for the links and also threadedly receiving the jack operating screw **20**. Screw **20** at its end opposite nut **18** rotatably extends through a member **22** which forms another pivot point for the linkage **16**.

Attached to member **22** is a gear box **24** and the end of screw **20** extends out the front side of the gear box to form a connecting element **26** to which a jack handle or other operating device can be connected. Within gear box **24** is a larger gear fixed to screw **20** and a smaller gear meshing therewith which also has an input member **28** extending out the front side of the gear box. The gears referred to are not shown, but it will be understood that rotation of element **26** will drive screw **20** at one speed while the rotation of element **28** at the same speed will drive screw **20** at a lower speed. The gear box thus provides for high and low speed operation of the jack **10**.

Jack **10** has its lower member **12** resting on a platform member **30** and attached thereto as by screws or rivets **32**. Platform member **30** on one side of jack **10** has a handle **34** by means of which the jack structure can be manipulated while, on the opposite side of the jack, platform **30** is bent upwardly somewhat and carries a set of wheels **36** at the opposite end. It will be evident that the entire structure can easily be moved about by availing of handle **34** while, at the same time, when the jack end of the platform is lowered, it will be permanently supported on the surface beneath.

In the region of the wheels **36** and, preferably positioned over the wheels so as to be supported thereby is an electric motor **38**. Motor **38** is pivotally supported on platform **30** so as to be tiltable in a vertical longitudinal plane and, to this end, may have journal means **40** carried on the lower side thereof through which axle **42** pertaining to wheels **36** passes. Axle **42** is, of course, also supported in journals fixed to platform **30** but not shown.

A particular feature of the present invention is in a special universal coupling **44** which connects output shaft

46 of motor 38 with one or the other of input elements 26, 28 of gear box 24. Coupling 44 transmits torque from motor shaft 46 to the input element to which the coupling is connected while at the same time the coupling is sufficiently flexible to prevent binding in any part thereof and also permits the jack to raise and lower. As will be seen, upon reference to FIGURES 2 and 3, when the jack is in a lowered position, coupling 44 is collapsed while, when the jack is raised to an elevated position coupling 44 is extended.

Motor 38 preferably includes an upstanding handle portion 48 by means of which the jack can be manipulated when it is beneath a vehicle and by means of which it can readily be withdrawn from beneath the vehicle. The motor includes a terminal box 50 into which may lead a cable 52 adapted for being plugged into an electrical outlet. Alternatively, cables 54 may lead from terminal box 50 to the terminals of a battery 56 when motor 38 is adapted for that voltage. Terminal box 50 can be availed of for supporting switches 58 and 60 which selectively energize motor 38 to rotate in respectively opposite directions for raising and lowering the jack 10.

Turning now to FIGURES 4 and 5, the coupling 44 is shown in detail. The coupling is advantageously formed of a section of tube or pipe 62 which at one end loosely receives the motor output shaft 46. A hole 64 in shaft 46 is adapted to register with holes 66 in section 62 so that a bolt 68 having a nut 70 can be passed through the holes and thereby drivingly connect shaft 46 with section 62.

At its opposite end, section 62 has holes 72 therein on an axis at right angles to the axis of holes 66. A bolt 74 having a nut 76 passes through holes 72 and the bolt also passes loosely through slot 78 in a member 80 which is freely reciprocable in tube or pipe section 62. The outer end of member 80 is squared as at 82 or otherwise suitably shaped for being received in one or the other of elements 26, 28 for driving the said element. Advantageously, portion 82 has a hole 84 for receiving a bolt 86 having a nut 88 and which bolt is adapted for passing through holes 90 provided in the input members 26, 28.

The coupling is shown in perspective in FIGURE 4 and in assembled relation in FIGURE 5. It will be noted in FIGURE 5 that at least member 80 is quite loose in the tube or pipe section 62 and fits quite loose around bolt 74 and that end 82 is a loose fit in the socket 92 provided therefor in the elements 26, 28 to which it is connected. By the provision of the loose fits it is prevented that the coupling will ever bind while at the same time member 80 is quite freely reciprocable in tube or pipe section 62.

FIGURE 8 shows an electric circuit for reversible motor 38. In FIGURE 8 a source of electric power, which may be a battery or a conventional source of alternating current, is indicated at 100.

Switch 58 has a normally open blade 58*a*, a normally nected in circuit between the source of electric power and electric motor 38. For the sake of convenience, motor 38 has been illustrated as having an armature 38*a* and a shunt field winding 38*b* so that by maintaining the current through the shunt field winding in the same direction at all times, the motor can be reversely operated, by reversing the direction of current through armature 38*a*.

Switch 58 has a normally open blade 58*a*, a normally closed blade 58*b*, and a normally open blade 58*c*. Switch 60 also has a normally open blade 60*a*, a normally closed blade 60*b*, and a normally open blade 60*c*. When switch 58 is closed current flows through blade 58*a* thereof, through armature 38*a* in one direction and through blade 60*b* of switch 60. When switch 60 is operated current flows through blade 60*a* thereof through armature 38*a* in the opposite direction and then through blade 58*b*. Closing of either switches 58 or 60 will close the blades 58*c*, 60*c* thereof, respectively, and in either case the current will flow through shunt winding 38*b* of motor 38 in the same direction. Blade 58*b* of switch 58 prevents a short circuit across armature 38*a* and blade 60*b* of switch

60 performs a similar function. Also, by the provision of blades 58*b* and 60*b*, both of switches 58 and 60 can be closed at one time without having any effect on motor 38.

By means of the illustrated circuit, motor 38 can be operated in one direction or the other, or can be halted by releasing the depressed switch.

In the modification described, motor 38 is tiltably supported on platform 30 but it will be evident that other means of mounting the motor can be provided. The motor illustrated in the first described modification requires a journalling member on the underneath side thereof to effect the tiltable support thereof.

FIGURES 6 and 7 show a modification in which a standard motor can be employed while still retaining some flexibility of the motor support. In FIGURES 6 and 7 the platform indicated at 30*a*, has the portion thereof 30*b* which supports the motor pivoted to the other portion of the platform as at 102. Portion 30*b* supports a more or less conventional motor 38*a* and it will be evident, due to the pivotal connection at 102, that motor 38*a* can tilt relative to the remainder of the platform. Platform portion 30*b* may be provided with guide means 104 for receiving the base 106 of the motor and screws or the like as at 108 can be provided for fixedly clamping the motor in place in the guideways.

While both of the described modifications show ways in which the motor can be supported so as to tilt relative to the portion of the platform on which jack 10 is mounted, it will be evident that the novel coupling assembly generally indicated at 44 can have sufficient freedom of movement that it can, itself, take care of any misalignment which occurs between the axis of the motor and the axis of screw 20 as the jack structure is elevated. This is particularly true when the connection of tube or pipe section 62 to motor shaft 46 is loosely effected so that some pivotal movement of section 62 relative to motor shaft 46 can take place. In any event, as the jack elevates and gear box 24 moves away from the drive motor, the member 80 will be withdrawn from tube or pipe section 62 and will thus have ever greater freedom of lateral movement therein. Thus, in an extreme elevated position of the jack the member 80 could have a substantially degree of angularity relative to the axis of section 62 while the motor shaft will still be drivingly connected with screw 20 of the jack.

It is, of course, to be understood that the present invention is, by no means, limited to the particular method and arrangement as set forth above but also comprises any modifications within the scope of the appended claims.

1. In combination: a platform, a jack having rotary input means and being mounted on said platform near one end thereof, support wheels on said platform near the other end thereof, a motor, means holding said motor stationary on said platform near said wheels and having an output shaft, extensible and contractible coupling means connecting said output shaft of said motor with the said input means of said jack, and means for reversibly energizing said motor.

2. A motorized jack assembly which includes: motor means having output shaft means, a scissor-type jack having rotary input means and also having an actuating screw connected to said input means, means holding said motor means stationary with regard to said jack, longitudinally extensible and contractible coupling means connecting said output shaft means of said motor means to said input means for compensating for changes in the relative position of said screw and said motor means as said jack is raised and lowered, said motor means being reversible.

3. A motorized jack according to claim 2, in which said input means includes a power transmission comprising drive means with different driving ratios and being provided with a pair of input members selectively connectable with said coupling means and drivingly connected to said screw by said drive means.

4. A motorized jack according to claim 1 in which said platform is angular so the end on which the jack rests is coplanar with the surface engaging portion of said wheels.

5. A motorized jack according to claim 1 in which said motor is tiltably supported on said platform.

6. A motorized jack according to claim 2, in which said coupling means comprises a first tubular member connected at one end to the output shaft means of the motor means to be driven thereby, a slotted second member having one end extending into the other end of said first tubular member, means on said first tubular member engaging the slot in said second member so as to drivingly interconnect said first tubular member and said slotted second member while permitting relative axial movement thereof, and driver means on the other end of said second member for detachable connection thereof to said input means of said jack.

7. A motorized jack according to claim 6 in which said second member is a loose fit in said first member and said driver means is a loose fit in said slot whereby the said coupling is laterally flexible and longitudinally extensible.

8. A motorized jack according to claim 7 in which said first member is connected to said motor output shaft by a bolt extending diametrally through said first member and motor output shaft, and in which said driver member is also a bolt extending diametrally through said first member but on an axis displaced 90° from the axis of the first mentioned said bolt.

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OTHELL M. SIMPSON, *Primary Examiner.*

U.S. Cl. X.R.

254—122, 126