Nov. 25, 1930. J. S. KNOWLSON 1,782,927

ELECTRIC POWER DEVICE

Filed Oct. 5, 1928 2 Sheets-Sheet 1

Fig. 1

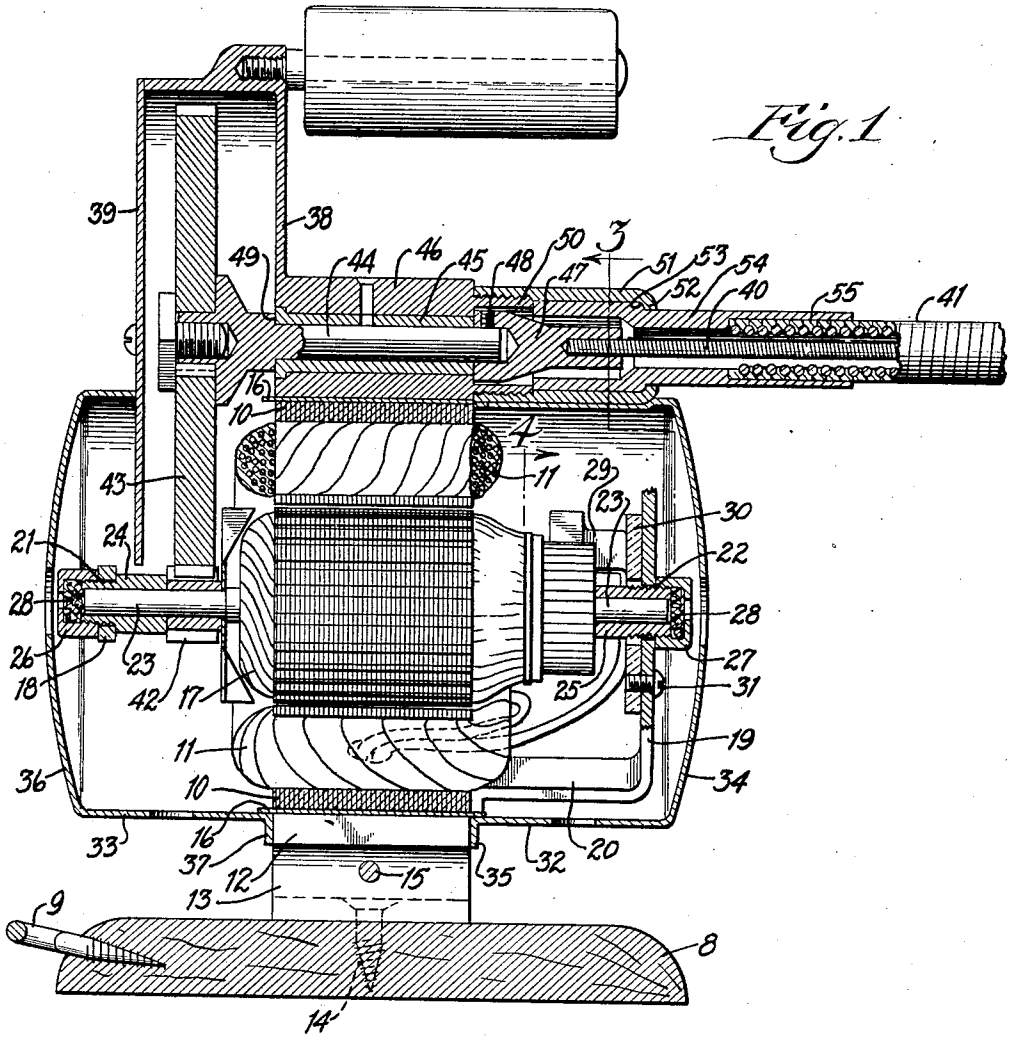
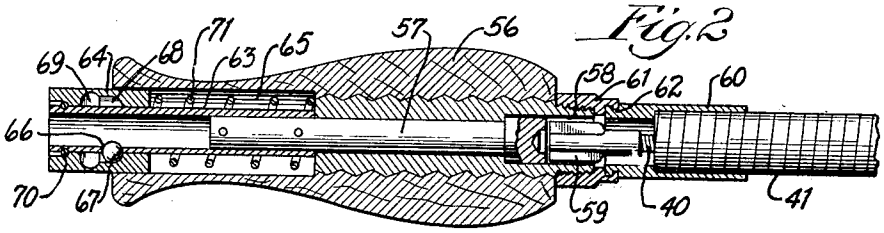


Fig. 2



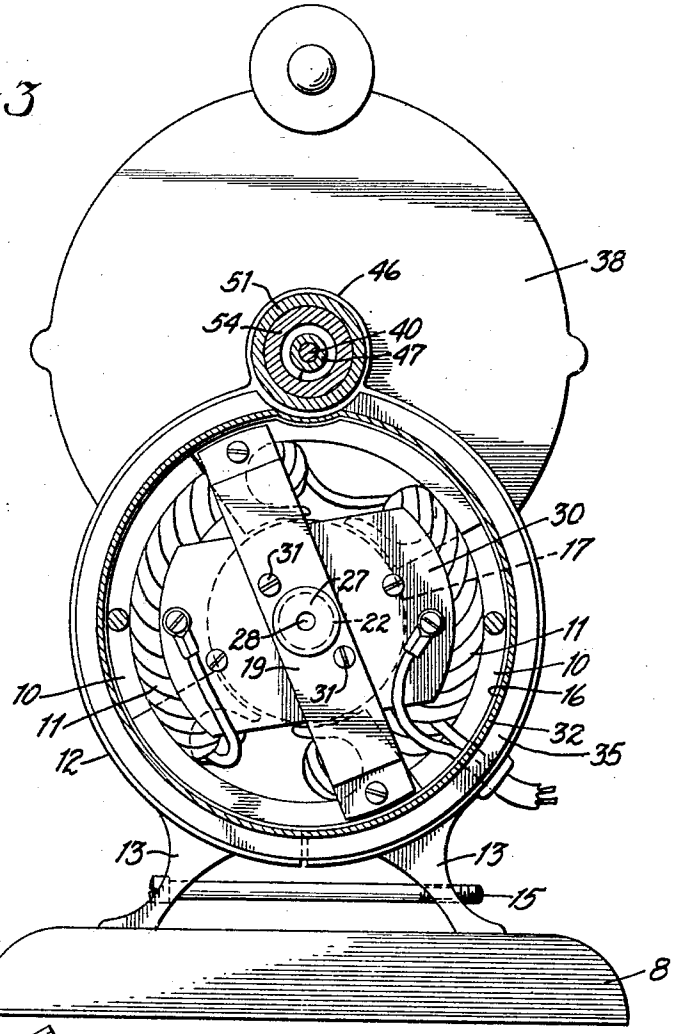
Inventor:
James S. Knowlson,
By Dyer, Holt, Eee, Chrittenden & Wiles,
Attys.

Nov. 25, 1930. J. S. KNOWLSON 1,782,927

ELECTRIC POWER DEVICE

Filed Oct. 5, 1928 2 Sheets-Sheet 2

Fig. 3



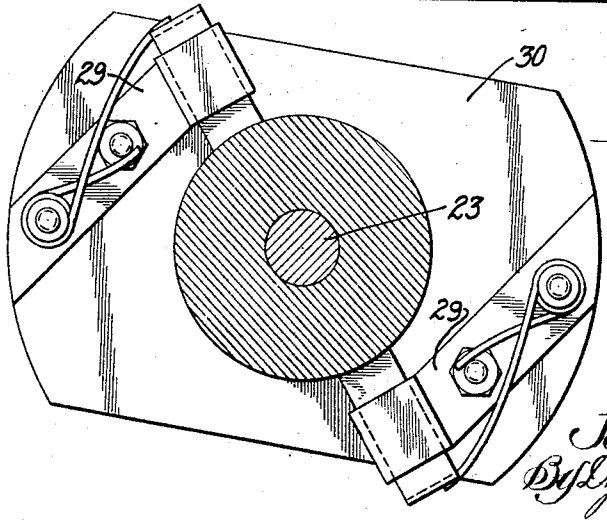


Fig. 4

Inventor:
James S. Knowlson,
By Dyer, Holloway, Kerr, Chittick & Miles,
Attys.

Patented Nov. 25, 1930

1,782,927

UNITED STATES PATENT OFFICE

JAMES S. KNOWLSON, OF HINSDALE, ILLINOIS, ASSIGNOR TO SPEEDWAY MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

ELECTRIC POWER DEVICE

Application filed October 5, 1928. Serial No. 310,664.

My invention relates, as to one phase thereof, to devices of the type comprising an electric motor and a flexible shaft driven thereby and by means of which a device or devices to be operated are actuated; and as to another phase thereof, to electric-motor-driven devices, portions of which are contacted by the user in the use of the device.

As to the first-referred-to phase of my invention, my object is to provide a construction of flexibile-shaft-driven electric-power device which shall be of novel, simple and inexpensive construction, of light weight and which shall be particularly adapted for the actuation of devices preferably of varying kinds as for example, and more particularly, power-operated devices used in households, such as egg and cream beaters, other mixing devices, carving tools, screw-drivers and the like and laundry appliances, such as washing machines.

In this connection it may be stated that power devices of the general character above referred to as commonly provided are heavy, cumbersome and expensive as they comprise low speed motors, this condition greatly militating against the general adoption of such devices particularly for use in the household, both from the standpoint of weight and cost.

As to the other phase of my invention, my object is to provide improvements in electric-motor-driven devices and particularly those having portions, such as sheathed flexible shafts or tools, which the users are required to handle in the use of the devices, to the end that the parts of the devices contacted by the user will be insulated from the current supplied to the device and thus possibility of shocking the user will be avoided which is of special advantage where the devices are used under such conditions that the parts contacted by the user become moist or wet as, for example, in the use thereof in kitchens or in connection with washing machines.

Referring to the accompanying drawings:—

Figure 1 is a view in sectional elevation of a device constructed in accordance with my invention, the device shown comprising a sheathed flexible driven shaft, a portion only of which is illustrated;

Figure 2 is a similar view of the end of the sheathed flexible shaft at which it connects with the spindle of a device to be operated thereby;

Figure 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow; and

Figure 4, a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow.

The particular illustrated embodiment of my invention comprises a base 8 at which the device may rest on any suitable support, or at which it may be hung from a support, as for example, at an eye 9 thereon.

The device also comprises an electric motor which may be, and preferably is, of the series type, the field core of which represented at 10 and having the usual windings 11, is rigidly held on the base by a split clamping band 12 having legs 13 at which this band is secured to the base 8 as by screws one only of which is illustrated at 14, the band being clamped in place about the field core by means of a screw 15 engaging the legs 13.

The field core 10 is insulated from the band 12 as by interposing between these parts a band 16 of any suitable current-insulating material, such as insulating fibre.

The armature of the motor, represented at 17, is rotatably mounted in supports at opposite ends thereof and connected with, and supported by, the core 10. These supports represented at 18 and 19 are in the form of stirrups connected at their legs to the core 10 as shown of the stirrup 19, one of the legs of which is represented at 20. The stirrups 18 and 19 contain openings 21 and 22, respectively, in alinement with the shaft 23 of the armature, and in which tubular shaft bearings 24 and 25, surrounding this shaft, are screwed, the outer ends of the bearings 24 and 25 having caps 26 and 27, respectively, with packing 28 interposed between these caps and the ends of the armature shaft.

The device also comprises a flexible shaft

40 housed in a flexible sheath 41 and driven from the motor. The shaft 40 is operated at low speed compared with the speed of rotation of the motor by back-gearing the shaft 40 to the motor. By way of example of such relative speeds of rotation, the flexible shaft 40 may be, and preferably is, operated at about from 2,000 to 3,000 revolutions per minute at no-load speed with the gearing referred to so constructed as to provide a speed reduction between the armature and the flexible shaft 40 of about 6½ or 7 to 1, the motor operating at approximately 12,000 to 20,000 revolutions per minute.

The gearing referred to comprises a pinion 42 rigid on the armature shaft 23 and meshing with a gear 43 rigid on a shaft 44 journalled in a bearing sleeve 45 secured in a box 46 provided on the band 10, either or both of these gears, preferably the gear 43 only, being of current-insulating material, such as for example bakelite to prevent the possibility of current passing from the armature shaft to the casing structure.

The shaft 44 extends beyond the bearing 45 and telescopes with a head 47 rigid with the inner end of the flexible shaft 40 and secured to the shaft 44 by a set-screw 48, the shaft 44 being confined against longitudinal displacement by a shoulder 49 on this shaft and the head 47, opposing opposite ends of the bearing sleeve 45 and the adjacent end of the boss 46.

The boss 46 is formed with an externally threaded tubular extension 50 on which a sleeve 51, having an inwardly extending flange 52 at its outer end, is screwed, the flange 52 engaging a shoulder 53 on a tubular fitting 54 surrounding the flexible shaft 40 and rigidly clamping this fitting in place against the outer end of the boss-extension 50. The fitting 54 is recessed at 55 and receives one end of the sheathing 41 which is rigidly secured thereto in any desirable manner.

The brush-holders of the motor are represented at 29 and are mounted on a disc 30 of insulating material flatwise attached to the stirrup 19 by screws 31.

The device also comprises casing sections 32 and 33, the section 32 being of general cylindrical shape with an end wall 34 and fitting at its open end, flanged at 35, against a face of the band 10 to which it is secured, as for example by screws. The other section 33 of general cylindrical shape and having an end wall 36 fits at its open end, flanged at 37, against the other face of the band 10 to which it is secured, as for example by screws.

The casing of the device which also houses gear mechanism driven by the armature 17 and hereinafter referred to, also comprises a generally circular housing section 38 formed as a part of the band 10 and having an open bottom and side, the latter being closed by a plate 39 which extends at its lower end into the casing section 33 as shown.

From the foregoing description, it will be understood that the parts described are so arranged that all of the parts to which the current for operating the motor passes are insulated from the casing of the device, and which comprises, in the particular construction shown, the sections 32 and 33, the band 10 with its gear-housing portion and the plate 39.

At the outer end of the sheathed flexible shaft 40 is a chuck-head comprising a tubular body member 56 forming a hand-grip and having journalled therein a shaft 57 connected with the shaft 40 by interlocking portions 58 and 59 on the shafts 57 and 40, respectively.

The outer end of the sheath 41 extends into the outer end of a sleeve 60 held to the body member 56 by a sleeve 61 secured upon the member 56 and interlocked with the sleeve 60 by the means shown at 62 permitting relative rotation of the sleeves 60 and 61.

The outer end of the shaft 57 is provided with a tube 63 rigid therewith and on the outer end of which a sleeve 64, extending into a recess 65 in the outer end of the member 56, is slidably mounted. The tube 63 contains an opening 66 for a ball 67 which extends into an annular groove 68 on the inner surface of the sleeve 64 this groove being annularly enlarged at 69. The groove 68 is of such dimensions, as shown, that when the portion thereof of smaller size is in engagement with the ball 67 the ball is forced inwardly into the tube 63 and against the shaft of the device to be actuated and inserted into the tube 63, such shaft preferably containing a recess in its side into which the ball extends, thus chucking the shaft of the device to the flexible shaft 40 for actuation thereby; and when the portion of the groove of larger size engages the ball the latter may extend out of chucking position for releasing the connection between the flexible shaft and the shaft of the device.

The sleeve 64 is retained on the tube 63 against outward displacement by a retaining ring 70 on this tube and is yieldingly pressed into chucking position by a coil-spring 71 located in the recess 65 and surrounding the tube 63 and confined between the sleeve 64 and the end wall of the recess 65.

A power device thus provided may be used in a great many situations and for actuating a large variety of appliances either of the high speed or low speed type, as for example cake mixers and high speed beaters.

It will be understood from the foregoing that by providing a high speed motor as the prime mover of the device and back-gearing it to the flexible shaft 40 provided for connection, selectively, with any of various de-

vices to be driven, a motor of relatively small horse power and of light weight may be used, as such a motor furnishes the necessary torque for overcoming the loads imposed thereon in the use of the power device with the large variety of devices to be operated, such especially as are used in the household.

A power device for such wide use may thus be supplied to a householder at relatively low cost and by reason of its relatively light weight may be moved with relatively slight effort from one location to another as may be desirable or necessary for its use in the driving of remotely located devices.

While I have illustrated and described a particular construction embodying my invention and have shown it for use in connection with only two devices to be operated, I do not wish to be understood as intending to limit it to the particular construction shown nor to its use in connection with the particular devices illustrated.

What I claim as new, and desire to secure by Letters Patent, is:

1. An electric power device comprising a stator and rotor and forming a unit, a casing of current-conducting material for said stator and rotor, means insulating said casing from said stator and rotor, a driven shaft journalled on said casing, and gearing connecting said rotor with said shaft, one of the gears thereof comprising current-insulating material.

2. An electric power device comprising, in combination with an electric motor forming a unit and having a drive shaft, a casing of current-conducting material for said motor, means insulating said casing from said motor, a driven shaft, and gearing journalled in said casing and connecting said shafts together, the one of said gears which is journalled in said casing being insulated from the gear which drives it.

3. An electric power device comprising a stator and a rotor forming a unit, a casing of current-conducting material for said stator and rotor, means insulating said casing from said stator and rotor, a driven shaft journalled on said casing, and intermeshing gears on said rotor and driven shaft, one of said gears comprising insulating material.

JAMES S. KNOWLSON.