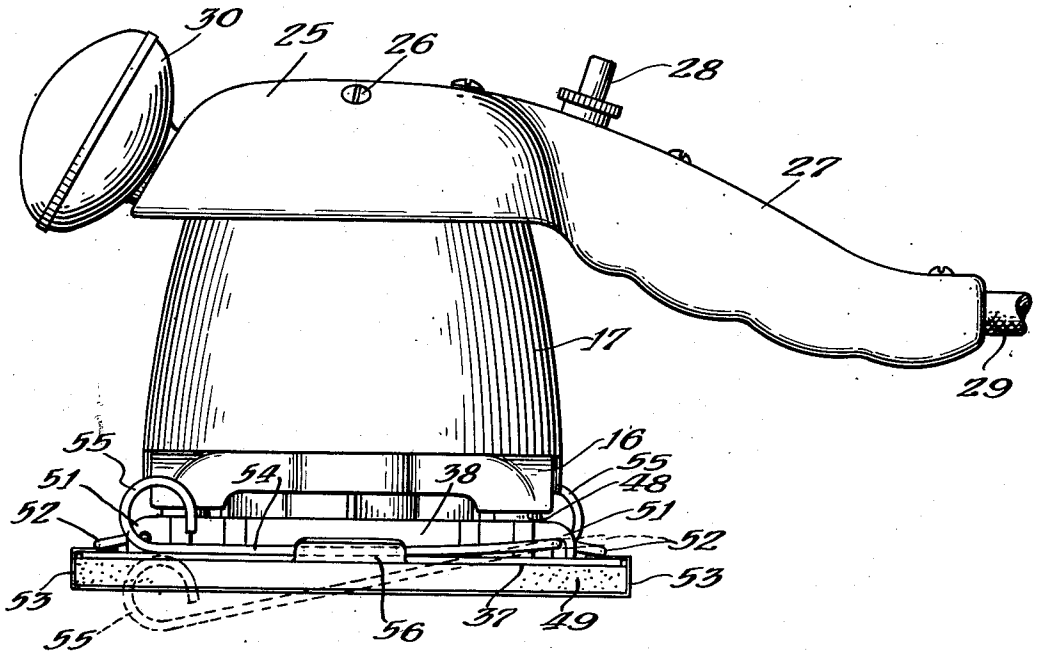
July 13, 1954 S. E. SCACE 2,683,336

RUBBING MACHINE

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FIG. 1



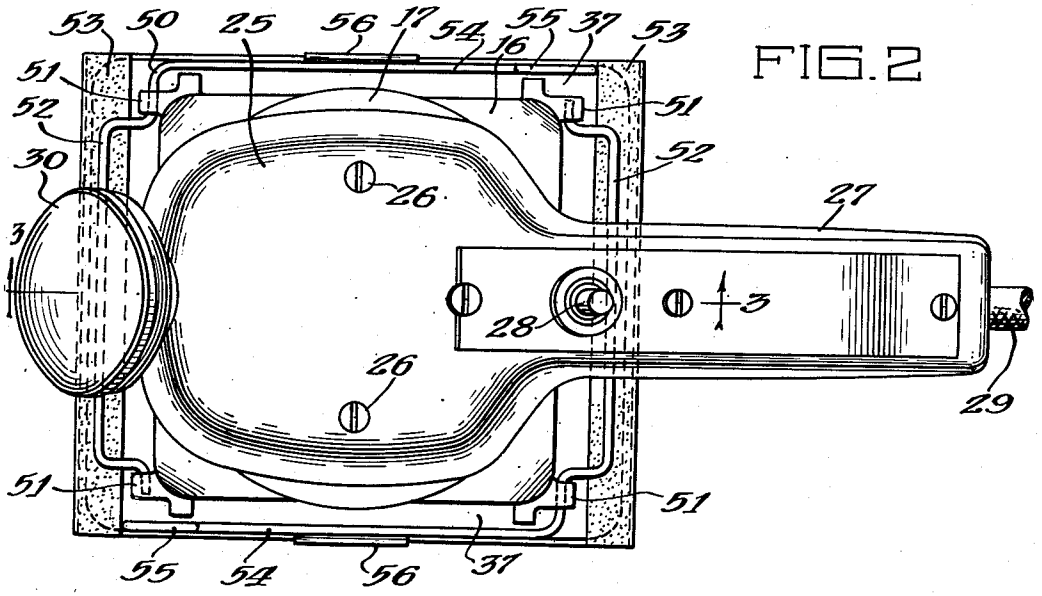


FIG. 2

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RUBBING MACHINE

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FIG. 3

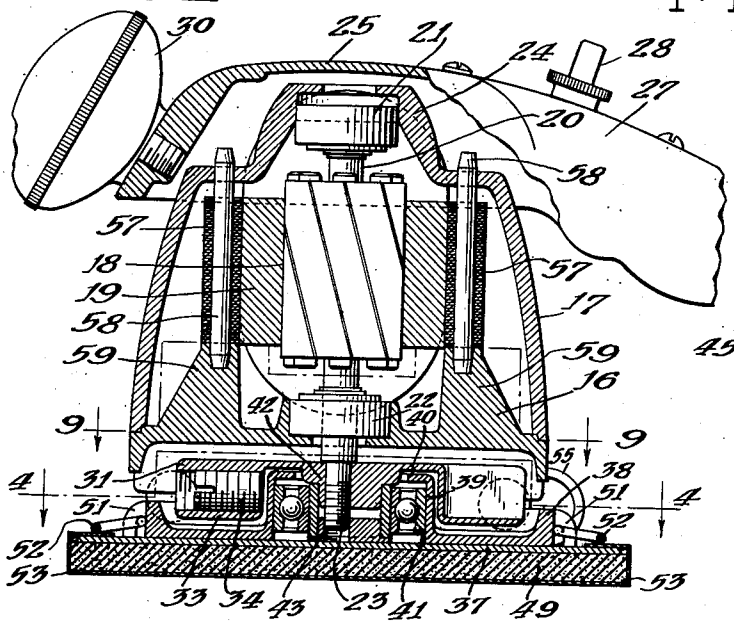


FIG. 6

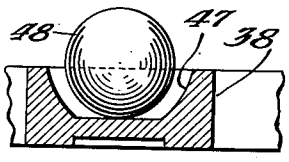


FIG. 7

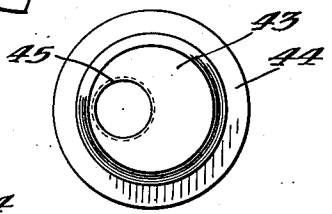


FIG. 8

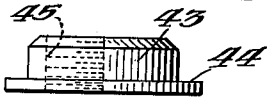


FIG. 4

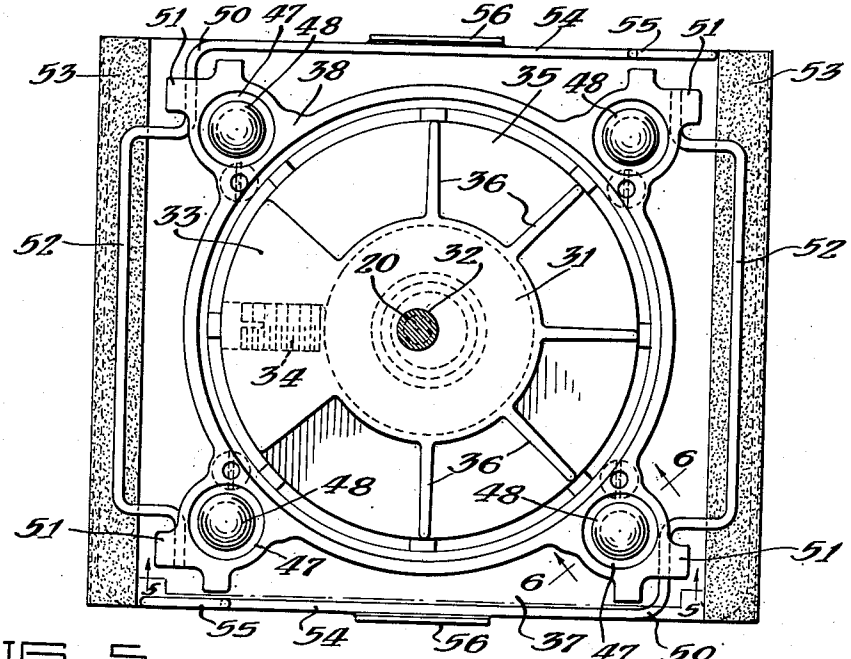
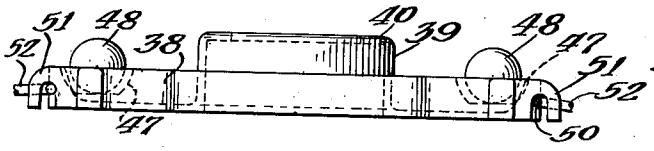


FIG. 5



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RUBBING MACHINE

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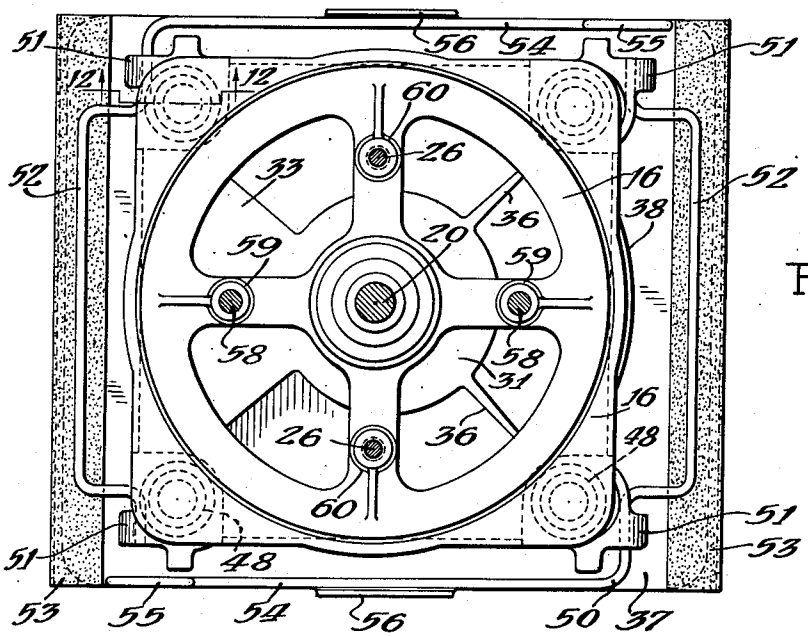
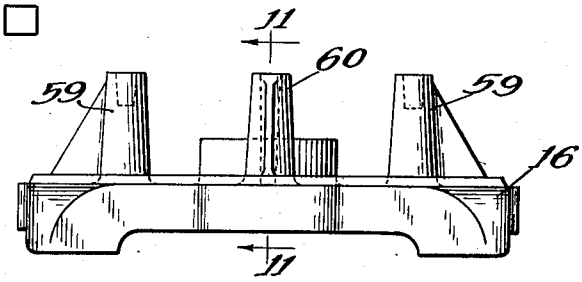


FIG. 9

FIG. 10



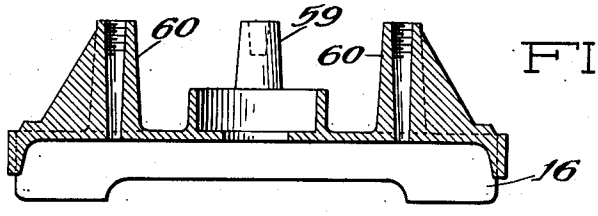


FIG. 11

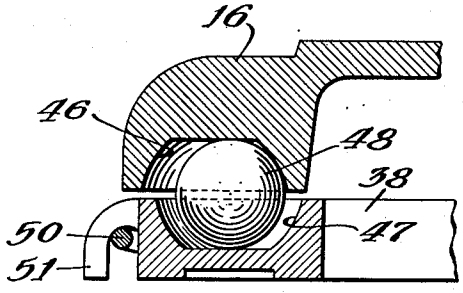


FIG. 12

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RUBBING MACHINE

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FIG. 13

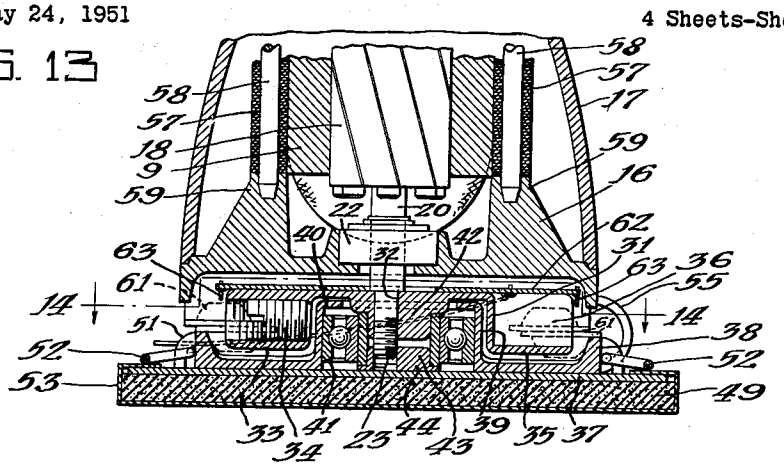


FIG. 14

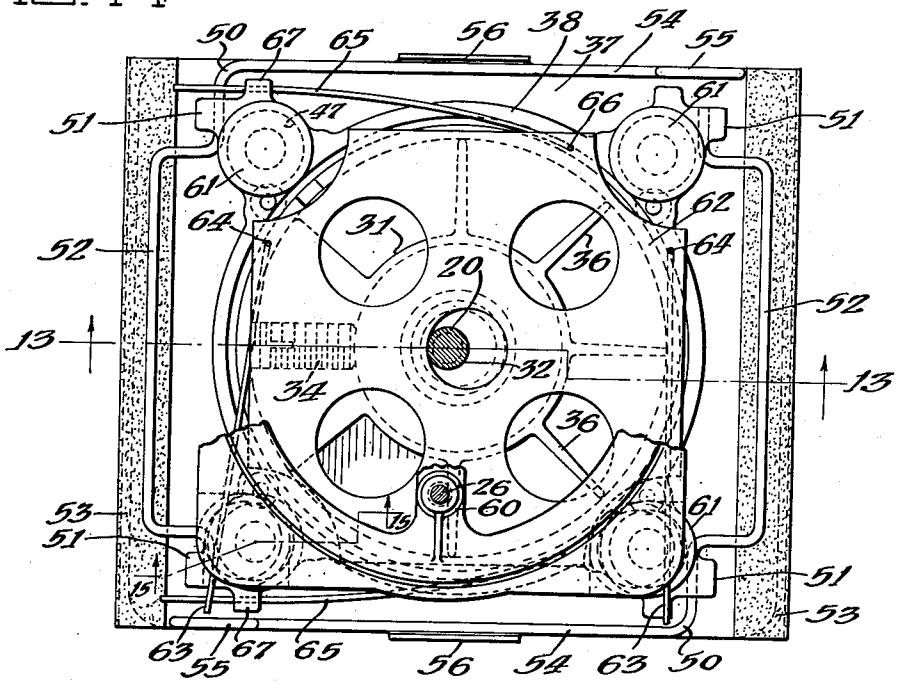
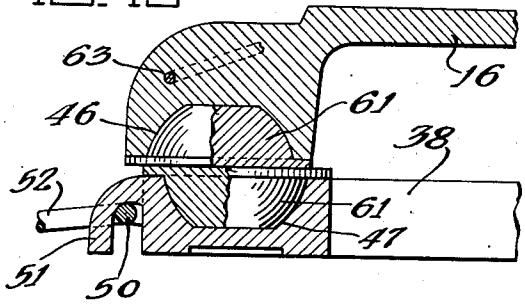


FIG. 15



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UNITED STATES PATENT OFFICE

2,683,336

RUBBING MACHINE

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Application May 24, 1951, Serial No. 228,043

9 Claims. (Cl. 51—170)

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This invention relates to rubbing machines, and more particularly to small, portable, single crank, orbital machines which are adapted for sanding, polishing, massaging, and the like.

The primary object of the invention is to provide a portable rubbing machine wherein a driven head is mounted beneath a housing frame, and is constrained to orbital movement with a minimum of power.

A further object of the invention is to provide a machine in which a single member, which is eccentrically mounted, serves as a counterbalancing flywheel, and also has a fan for drawing the cooling air downwardly through the motor.

Another object of the invention is to provide a bearing which is slidably mounted in the driven head so as to accommodate itself to a slight rocking movement of the housing frame with respect to the head when more pressure is applied to one side than the other, and a slight relative movement is permitted due to the yielding restraining connection between the frame and the head.

Still another object of the invention is to provide a very simple construction in which an eccentric nut holds the driven head, bearing and counterbalancing flywheel together.

A further object of the invention is to provide an improved housing construction with a handle closure member which is mounted to provide an air inlet near the top of the motor.

The invention is illustrated in its preferred embodiments in the accompanying drawings, in which—

Fig. 1 is a side elevational view of a machine embodying the invention; Fig. 2, a top plan view of the same; Fig. 3, a fragmentary vertical sectional view, taken as indicated at line 3—3 of Fig. 2; Fig. 4, a plan sectional view, taken as indicated at line 4—4 of Fig. 3; Fig. 5, an end elevational view of the driven head; Fig. 6, an enlarged fragmentary sectional view, taken as indicated at line 6—6 of Fig. 4; Fig. 7, a top plan view of the eccentric nut; Fig. 8, a side elevational view of the same; Fig. 9, a plan sectional view, taken as indicated at line 9—9 of Fig. 3; Fig. 10, an elevational view of the lower portion of the housing frame; Fig. 11, a sectional view, taken as indicated at line 11—11 of Fig. 10; Fig. 12, an enlarged fragmentary sectional view, taken as indicated at line 12—12 of Fig. 9; Fig. 13, a fragmentary vertical sectional view, showing a modified spring device for constraining the driven head to orbital movement; Fig. 14, a plan sectional view, taken as indicated at line 14—14 of Fig. 13; and Fig. 15, an enlarged fragmentary

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sectional view, taken as indicated at line 15—15 of Fig. 14.

Orbital sanders are particularly advantageous in producing a smooth surface, because each grain of abrasive on the driven head travels in its own circular path, and this path is crossed by many other grains. This desired movement is obtained in some machines by using two cranks or eccentrics which not only drive the head but also constrain it to orbital movement. In using a single crank, a special constraining means must be provided to prevent the driven head from rotating with respect to the driving mechanism. In the preferred form shown in Figs. 1–12, this is accomplished by a plurality of opposed sockets with a ball in each pair of sockets which permits the head to make its orbital movement with a minimum of friction. If the balls, or seats, are made of rubber they will yield slightly when more hand pressure is applied on one side of the machine than the other.

In the embodiment shown in Figs. 1–12, a supporting plate 16 is surmounted by a bell-shaped housing 17 in which is mounted an electric motor having a rotor 18 and coils 19. The motor has a shaft 20 journalled in a top bearing 21 and a lower bearing 22. It has a shoulder and its lower end is threaded, as indicated at 23.

The top bearing 21 is held in an open spider 24, which is formed integrally with the housing 17 and affords openings through which air may be drawn down by a fan. A closure member 25 overlaps the housing in spaced relation and is secured to the plate 16 by means of a pair of long screws 26. The closure member is provided with a handle 27 having an electric switch 28 for wires 29 leading to the motor. The member 25 is also provided with a front knob 30, to facilitate handling.

As best shown in Figs. 3 and 4, a flywheel 31 has an eccentric opening 32 to receive the motor shaft 20. It has a counterweight 33 whose mass is adjustable radially for different weights of sanding pads by means of a set screw 34 in a tapped opening in the counterweight. The wheel has a closed bottom wall 35 and is provided with blades 36 to draw air down through the motor and housing frame for discharge below the plate 16.

The driven head has a flat metal plate 37 which is screwed to a bearing plate 38. The plate 38 has an upwardly extending sleeve 39 with a flanged top 40. An anti-friction bearing 41 is slidably mounted in the sleeve 39 for limited upward and downward movement.

As best shown in Fig. 3, the flywheel 31 has

a downwardly extending boss 42 which fits snugly into the upper portion of the bearing 41. It is held in the bearing by means of an eccentric nut 43 which has a bottom flange 44. The eccentric opening 45 is tapped to receive the threaded end 23 of the motor shaft 20. Thus, it will be seen that, when the eccentric opening 32 in the flywheel is aligned with the opening 45 in the nut, the motor shaft can be rotated and its threaded connection will draw the stud portion of the flywheel against a shoulder on the shaft 20 and lock the parts together.

In order to distribute the pressure applied by the member 25 over the area of the plate 37, four ball-and-socket thrust bearings are provided. As shown in Fig. 12, each corner of the supporting plate 16 is provided with a socket 46, and similar opposed sockets 47 are provided in the bearing plate 38. A ball 48, preferably made of a yielding rubber-like material is interposed between each opposed pair of sockets. The sockets are large enough that the balls may roll in a small orbit and permit the orbital motion afforded by the eccentricity of the nut 43. If more pressure is applied on one side of the rubbing machine than the other, one pair of balls 48 will be compressed slightly, but the machine can accommodate itself to this slight distortion because of the slidable mounting between the bearing 41 and the sleeve 39.

When the device is used as a sanding machine, a soft rubber pad 49 is provided on the bottom side of the plate 37. A strip of sandpaper may be secured to the head by compressing the pad 49 and folding the ends of the strip upwardly and inwardly over the plate 37. The ends are held by a pair of similar clamping members 50 which are journalled in a pair of downwardly open bearings 51 afforded by the bearing plate 38. Preferably, each clamping member is made of resilient wire and has an offset portion 52, between the bearings 51, which may be turned to gripping engagement with an end of the sandpaper strip 53 by means of a lever arm 54 provided at its end with a finger loop 55. The plate 37 is shown provided with a pair of upwardly turned lips or projections 56 to hold the arm 54 in clamping position. To release one of the clamping devices, it is merely necessary to lift the arm 54 over the projection 56 and permit the offset portion 52 to swing up so as to release the end of the sandpaper strip.

While various types of electric motors can be used, it is preferred to use the shaded pole type. In the embodiment illustrated, a laminated rectangular field piece 57 is held by means of a pair of studs 58 which extend through holes in the spider 24 and down through the field piece into openings provided in upwardly extending legs 59 on the supporting plate 16. As shown in Figs. 9–11, another pair of legs 60 in the supporting plate 16 are tapped to receive the lower ends of the screws 26.

In the modification shown in Figs. 13–15, the structure is similar, except for the thrust and restraining means. In this form, bronze thrust pads 61 are inserted in the sockets 46 and 47. As the flat faces of these thrust pads cannot prevent rotation, a spring restraining device is provided. A floating foraminous plate 62 is provided between the flywheel 31 and the supporting plate 16. The plate 62 is yieldingly linked to the supporting plate 16 by means of a pair of arms 63 which are formed of piano wire and secured to the floating plate, as indicated at 64, and extend

through holes provided in the plate 16. Similarly, another pair of spring wire links 65 are secured to the plate 62, as indicated at 66, and their free ends extend through holes provided in the corner portions 67 of the bearing plate. The pairs of springs 63 and 65 prevent the driven head from rotating with respect to the housing frame, but permit orbital movement while the thrust is taken up by the pads 61.

To operate a machine equipped with a shaded pole motor, which has a low starting torque, it is preferred to lift the machine by means of the handle and knob before pressing the switch 28. The motor will operate at about 3450 R. P. M. and the machine is then applied to the work with the desired hand pressure. Initially, a rather coarse grain sandpaper may be used, and then finer grain paper substituted until the desired smoothness is obtained.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. A portable rubbing machine, comprising: a housing frame provided with a driving motor having a downwardly extending shaft journaled in said frame; a driven head mounted beneath the frame for constrained orbital movement; a bearing in said driven head having an opening eccentrically disposed with respect to said shaft; and a nut having a threaded opening and secured to the bearing against movement axially of the shaft, said nut being threadedly secured to the lower end of the shaft and having a surface eccentric with respect to its threaded opening with said surface engaging the bearing throughout its periphery for driving said bearing orbitally and for securing the driven head to the shaft.

2. A device as specified in claim 1, in which a plurality of yielding ball-and-socket supports are provided between the housing frame and driven head.

3. A device as specified in claim 1, in which a plurality of pairs of opposed sockets are provided in the lower face of the housing frame and the upper face of the driven head, and a ball of rubber-like material is interposed between each pair of opposed sockets.

4. A device as specified in claim 1, in which a plurality of metal springs yieldingly link the driven head to the housing frame to constrain the movement of one relative to the other.

5. A device as specified in claim 1, in which a counterbalancing flywheel is eccentrically secured to the motor shaft and extends downwardly about the bearing.

6. A device as specified in claim 1, in which a counterbalancing flywheel has a stud portion extending into the upper end of the bearing and is eccentrically bored for receiving the motor shaft between the housing frame and driven head, and the nut fits into the lower end of said bearing and has a flange to engage the bearing and secure the flywheel against rotation relative to said shaft.

7. A device as specified in claim 1, in which a plurality of yielding ball-and-socket supports are provided between the housing frame and driven head, and the driven head has a retaining boss in which the bearing is slidably mounted for limited upward movement.

8. A portable rubbing machine, comprising: a housing frame provided with a driving motor

having a shaft journaled in said frame; a driven head; a bearing in said head eccentrically disposed with respect to said shaft; an eccentric fixed to the shaft and engaging the bearing for driving the head in an orbital path upon rotation of the shaft; and means for resiliently constraining the head to orbital movement about the shaft including a plurality of pairs of opposed sockets formed in the housing frame and in said head, each socket having a substantially flat base portion parallel to the base portion of the opposed socket and a ball of rubber-like material freely retained in and spacing apart each opposed pair of sockets said ball being free to roll over said base portions upon orbital movement of the head.

9. The rubbing machine of claim 8 in which said driven head is substantially rectangular in shape and four pairs of opposed sockets are provided with each socket being located at a corner of the driven head.

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