March 17, 1942. A. C. BURLEIGH 2,276,534

ABRADING MACHINE

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Fig.1.

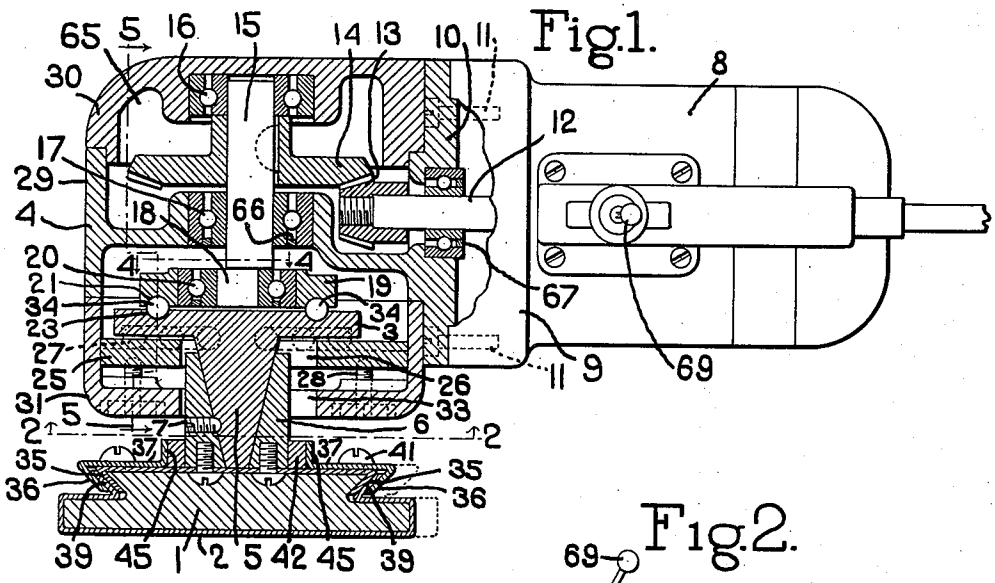


Fig.2.

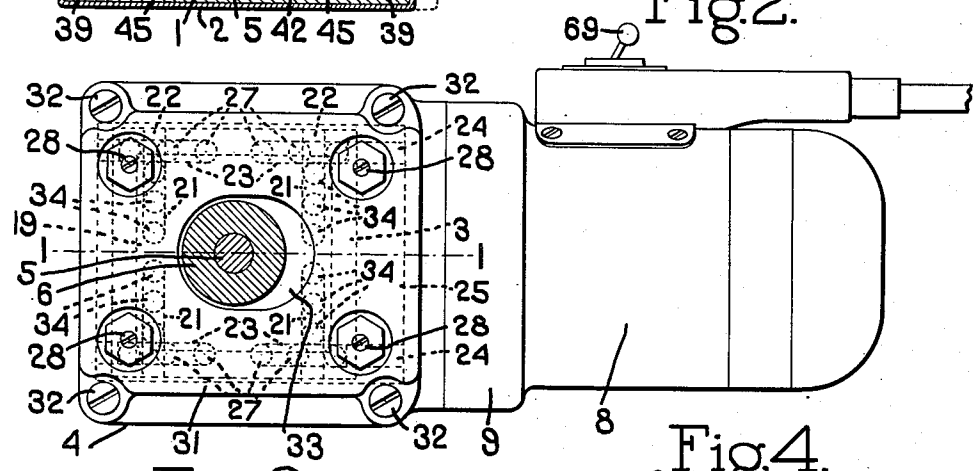


Fig.3.

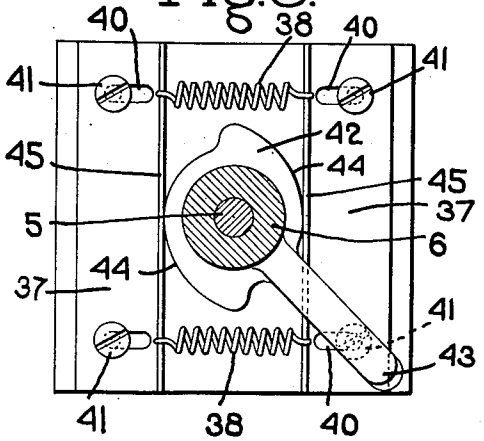
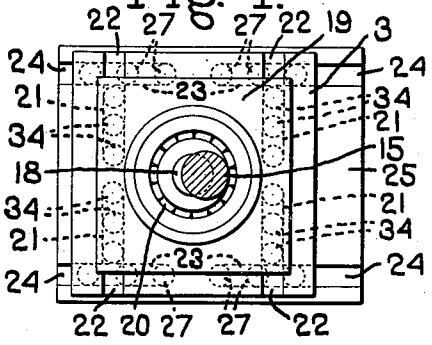


Fig.4.



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Fig.5.

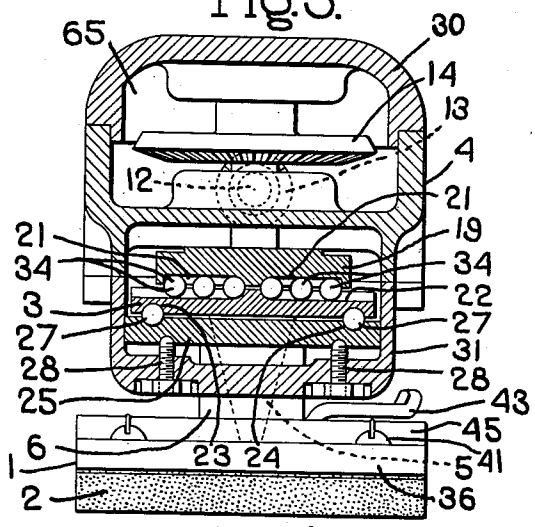


Fig.9.

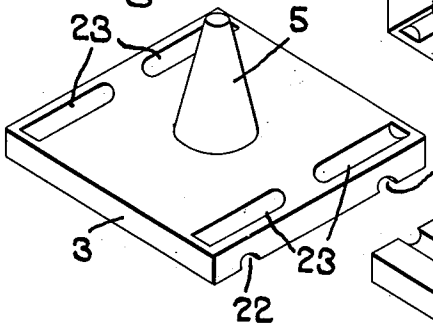


Fig.6.

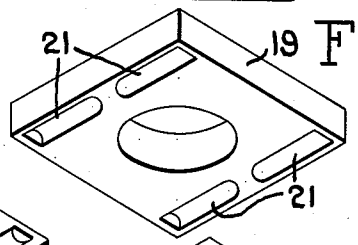


Fig.7.

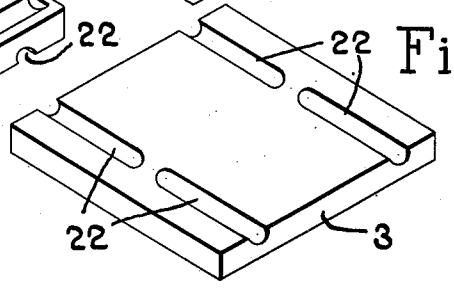
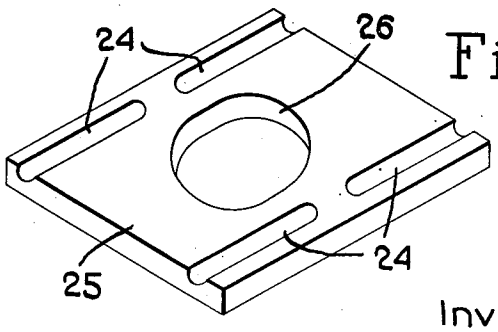


Fig.8.



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UNITED STATES PATENT OFFICE

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ABRADING MACHINE

Arthur C. Burleigh, Wellesley, Mass.

Application November 2, 1940, Serial No. 363,983

5 Claims. (Cl. 51—170)

This invention relates to abrading machines of the type which includes a reciprocating abrading pad. Machines of this type may be used either for sanding or polishing surfaces, depending upon the character of the abrading pad which is used.

One of the objects of the invention is to provide a novel machine of this type which is simple in construction and inexpensive to manufacture, and in which the moving parts are well protected from any dust or grit which may be developed by the operation of the machine.

A further object of the invention is to provide a machine of this type in which the various parts are so disposed that the center of gravity of the machine is relatively low, thereby providing a machine which is easy to handle and which will be relatively steady in operation, as compared with an abrading machine in which the center of gravity is located relatively high.

A still further object of the invention is to provide a machine in which the weight of the motor by which the machine is operated is so disposed as to absorb to a considerable extent the vibration caused by the rapid vibratory movement of the pad member, thereby further increasing the stability of the machine when in operation.

A further object of the invention is to provide a machine of this type in which the driving gears are operating in a sealed grease chamber.

Still further objects of the invention are to improve generally abrading machines of this type as will be more fully hereinafter set forth.

In order to give an understanding of the invention, I have illustrated in the drawings a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

In the drawings:

Fig. 1 is a side view partially in section showing an apparatus embodying my invention.

Fig. 2 is a section on the line 2—2, Fig. 1, looking upwardly.

Fig. 3 is a section on the line 2—2, looking downwardly.

Fig. 4 is a section on the line 4—4, Fig. 1.

Fig. 5 is a section on the line 5—5, Fig. 1.

Fig. 6 is an underside perspective view of the driving plate.

Fig. 7 is a perspective view of the pad-carrying member.

Fig. 8 is a perspective view of the supporting plate on which the pad-carrying member is mounted.

Fig. 9 is an underside perspective view of the pad-carrying member.

In the drawings, 1 indicates the abrading pad which is provided with a facing 2, the latter being sandpaper or other suitable material, if the device is to be used for sanding purposes, or being of some soft material if the device is used for polishing purposes.

The pad member 1 is mounted on and carried by a reciprocating pad-carrying member 3 that is located within the housing 4, said pad-carrying member being provided with a tapered stem 5 which is received in a tapered socket formed in the hub member 6 of the pad member 1. The hub 6 is detachably secured to the stem 5 by means of a set screw 7.

The pad 1 derives its reciprocating motion from a power shaft 12 by driving connections presently to be described. This driving shaft 12 is shown as extending horizontally, and power may be applied to the power shaft by any suitable means. In the construction herein shown, this power shaft 12 is driven by a suitable motor 8 which is shown as secured to the side wall 10 of the housing 4 by means of attaching screws 11. This motor 8 may have any suitable construction and may be either in the nature of an air motor or an electric motor. That shown in the drawings is an electric motor which is provided with a control switch 69 by which the motor may be started and stopped.

The power shaft 12 is provided with a beveled pinion 13 which meshes with a beveled gear 14 carried by a vertical shaft 15 that is mounted in suitable bearings 16 and 17 carried by the housing 4, said gears operating in a chamber 65 which may be filled with a suitable lubricant. The bearings 17 are sealed, as shown at 66, to prevent the lubricant working through them.

The lower end of the vertical shaft 15 has an eccentric portion 18 on which is mounted a driving plate 19, there being a ball bearing 20 between the eccentric portion 18 of the shaft and the plate 19.

The driving plate 19 is situated directly above the pad-carrying member 3, and said plate 19 has on its under face parallel grooves 21 which mate corresponding grooves 22 formed in the upper face of the pad-carrying member 3. A plurality of steel balls 34 are located within the mating grooves and serve to transmit motion from the driving plate 19 to the pad-carrier 3.

The pad-carrying member 3 has on its under face ball-receiving grooves 23 which extend at right angles to the grooves 22 formed in the up-

per face thereof. These grooves 23 on the under side of the pad-carrying member 3 mate corresponding grooves 24 formed in the upper face of a supporting plate 25 that is provided with a central opening 26 through which the stem 5 of the pad-carrying member extends. A series of balls 27 are located in the mating grooves 23, 24.

The eccentric portion 18 of the shaft 15 gives the driving plate 19 an orbital movement, but as said plate is connected to the pad-carrying member 3 through the balls 34, said plate is prevented from rotating with the shaft.

The supporting plate 25 fits the interior of the housing and thus is stationary, and the mating grooves 23, 24, together with the balls 27 therein, permit a reciprocating movement only of the pad-carrying member 3 relative to the supporting plate 25 in a direction from right to left in Fig. 1, or in the direction of the grooves 23, 24.

The balls 34 operating in the mating grooves 21 and 22, allow the driving plate 19 to move relative to the pad-carrying member 3 in the direction of the grooves 21, 22 only, and as a result, the component of the orbital movement of the plate 19 in a direction at right angles to said grooves is transmitted to the pad-carrying member 3.

The rotary motion of the shaft 15 is thus converted into a reciprocating motion of the pad-carrying member 3, and thereby the pad 1 is given its operative reciprocating movement. In the construction herein illustrated, the pressure against the pad 1 when the machine is operating is transferred through the pad-carrying member 3 and the driving plate to the shaft 15, and thence to the bearings 16 and 17 for said shaft. The pad-carrying member 3 is guided in its reciprocating movement solely by the balls 27 in the mating grooves 23, 24, and said pad-carrying member 3 does not have frictional engagement with the walls of the housing. This is an advantage as the entire pressure on the pad during the operation of the device is transmitted to and carried by the ball bearings, thus reducing the friction.

Suitable means are provided for supporting the plate 25, and in the illustrated embodiment of the invention, this is done by adjusting screws 28 that are carried by the floor of the housing 4, such adjusting screws serving to maintain the supporting plate 25, the pad-carrying member 3 and the driving plate 19 in their proper operative relation.

For convenience in manufacturing and assembling the parts, the housing 4 is shown as formed in three sections, the center section 29 having the side wall 10 to which the motor 8 is secured, and which carries the sealed bearing 17, the cap section 30 which carries the upper bearing 16 for the shaft 15, and which is detachably secured to the body section 29 in some suitable way, and the bottom section 31 which is secured to the center section 29 by means of screws 32. The lubricant-containing chamber 65 is formed partially in the cap section 30 and partially in the center section 29. The supporting screws 28 and the supporting plate 25 are carried in the bottom section 31, and the latter is formed with an opening 33 through which the hub 6 of the pad extends, said opening being elongated sufficiently to permit the reciprocating movement of the pad, the extent of which is indicated by the full and dotted lines in Fig. 1.

The pad 1 is made on opposite sides with the under cut shoulders 35 against which the edges of the facing 2 are clamped by means of clamping jaws 36. Each jaw 36 has a body portion 37 resting on the upper face of the pad, said body portions being connected together by springs 38 which tend normally to hold the clamping jaws 36 in clamping engagement with the edges 39 of the facing 2. The body 37 of each clamping jaw is provided with slots 40 which receive guiding screws 41 that are screwed into the upper surface of the pad. The jaws are separated for unclamping the edges 39 of the facing 2 by means of a cam member 42 which is mounted for turning movement on the hub 6, said cam having a handle or stem 43 by which it may be turned, and also having cam faces 44 to engage upstanding flanges 45 with which the body portions 37 of the jaws are provided. By turning the cam clockwise in Fig. 3, the jaws will be forced outwardly against the action of the springs 38, thereby releasing the edges 39 of the facing 2, so that it can be removed. When a new facing is to be applied, the clamping jaws will be separated, as above described, and the edges of the facing placed between the jaws and the shoulders 35, after which the cam will be returned to the position shown in Fig. 3, thus allowing the spring 38 to move the jaws 36 into their operative positions to clamp the edges 39 of the facing to the shoulders 35.

It will be noted that in the device herein illustrated, the motor is secured to the side of the housing 4 rather than to the top thereof. This has the important advantage that thereby the center of gravity of the machine as a unit is considerably lower than would be the case if the motor were mounted on top of the casing 4. A machine of this type having a relatively low center of gravity is more steady in its operation than one with the center of gravity relatively high. A machine with a considerable vertical dimension and a correspondingly high center of gravity is much more top heavy than a machine with a low center of gravity, and by placing the motor 8 on the side of the housing, the center of gravity of the machine is lowered, and the steadiness of operation is thereby increased. It will be further noted that the motor 8 is so disposed that the dimension thereof at right angles to the side of the housing to which it is attached is parallel to the direction of reciprocating movement of the pad. In other words, the motor is mounted on that side of the housing which stands at right angles to the direction of the reciprocatory movement of the pad.

This is also of considerable advantage because thereby the weight of the motor functions to absorb to some extent the vibration due to the rapid reciprocatory movement of the pad, and this is a factor in increasing the steadiness of the device when in operation.

While the power shaft 12 is herein illustrated as being operated by a motor 8 which is attached to the housing, and this construction has the advantages above set forth, yet the invention would not be departed from if the power shaft 12 were operated by any other suitable means than by the motor 8. Furthermore, the particular character of the motor 8 when used is not important to the invention, as a motor of any approved construction and type may be used without in any way departing from the invention.

I claim:

1. An abrading machine comprising a vertical-

ly disposed driving shaft having an eccentric portion, a driving plate mounted on said eccentric portion and moved in an orbital path thereby, said plate having parallel ball-receiving grooves in its under face, a pad-carrying member located beneath the driving plate and mounted for reciprocating movement only in a direction at right angles to the ball-receiving grooves, said pad-carrying member having a depending stem and also having parallel grooves in its upper face which mate those of the driving plate, balls occupying said mating grooves, a pad secured to the stem of the pad-carrying member, and means to rotate the shaft.

2. An abrading machine having a vertically disposed driving shaft provided with an eccentric portion, a driving plate mounted on said eccentric portion and moved in an orbital path thereby, said driving plate having parallel ball-receiving grooves in its under face, a pad-carrying member having in its upper face parallel grooves which mate those of the driving plate, balls occupying said mating grooves, said pad-carrying member having in its under face parallel grooves extending at right angles to those in its upper face, a stationary supporting plate having grooves in its upper face which mate those in the under face of the pad-carrying member, balls occupying said last-named mating grooves, a pad carried by said pad-carrying member, and means to rotate said shaft.

3. An abrading machine having a vertically disposed driving shaft provided with an eccentric portion, a driving plate mounted on said eccentric portion and move in an orbital path thereby, said driving plate having parallel ball-receiving grooves in its under face, a pad-carrying member having in its upper face parallel grooves which mate those of the driving plate, balls occupying said mating grooves, said pad-carrying member having in its under face parallel grooves extending at right angles to those in its upper face, a stationary supporting plate having grooves in its upper face which mate those in the under face of the pad-carrying member, balls occupying said last-named mating grooves, said supporting plate having a central aperture, and the pad-carrying member having a stem depending through said aperture, a pad detachably secured to said stem, and means to rotate the driving shaft.

4. An abrading machine comprising a driving shaft having an eccentric portion, a driving plate mounted on said eccentric portion and moved in an orbital path thereby, said plate having parallel ball-receiving grooves in its under face, a pad-carrying member having in its upper face parallel grooves which mate those of the driving plate, balls occupying said mating grooves, said pad-carrying member having on its under side parallel grooves which extend at right angles to those on its upper face, a stationary supporting plate having grooves at its upper face which mate those in the under face of said pad-carrying member, balls in said last-named mating grooves, means for adjustably supporting said supporting plate, a sanding pad secured to said pad-carrying member, and means to rotate said shaft.

5. An abrading machine comprising a housing, a vertically disposed driving shaft therein, said shaft having an eccentric portion, a driving plate mounted on said eccentric portion and moved in an orbital path thereby, said plate having parellel ball-receiving grooves in its under face, a pad-carrying member located within the housing beneath the driving plate, said pad-carrying member having parallel grooves in its upper face mating those of the driving plate and also having a depending stem extending through the bottom of the housing, balls occupying said mating grooves, said pad-carrying member having a reciprocating movement in a direction at right angles to the ball-carrying grooves, means within the housing for guiding the pad-carrying member in its reciprocating movement, a pad secured to said stem and situated below the housing, and means to rotate the driving shaft.

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