March 12, 1940. E. B. GEORGE 2,193,418

SURFACING MACHINE

Filed June 14, 1937

Fig. 1.

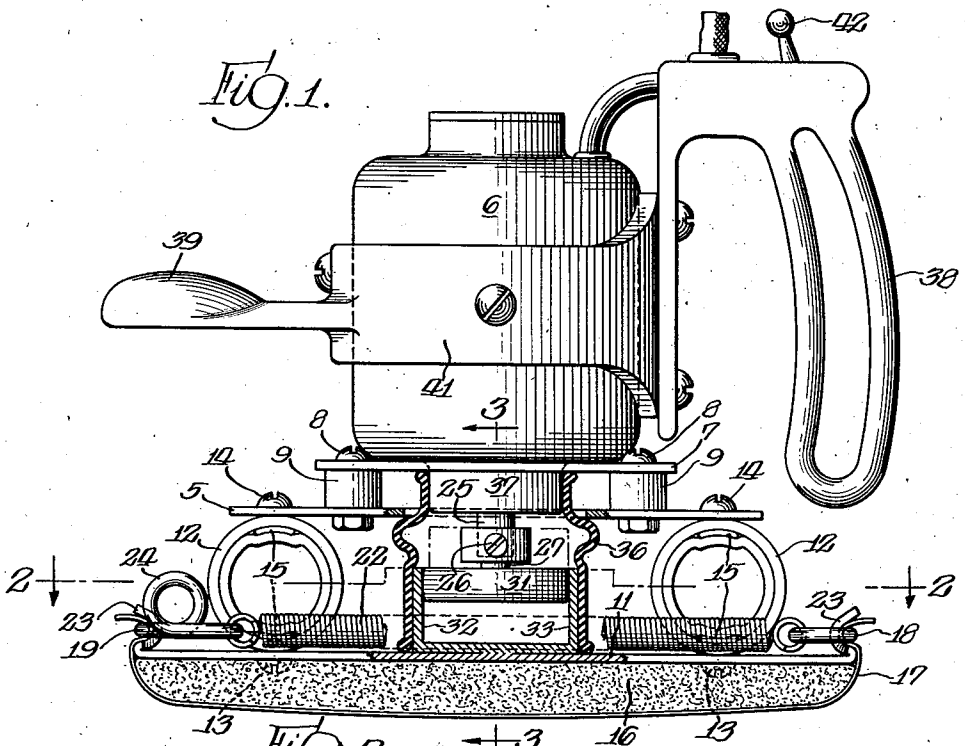


Fig. 2.

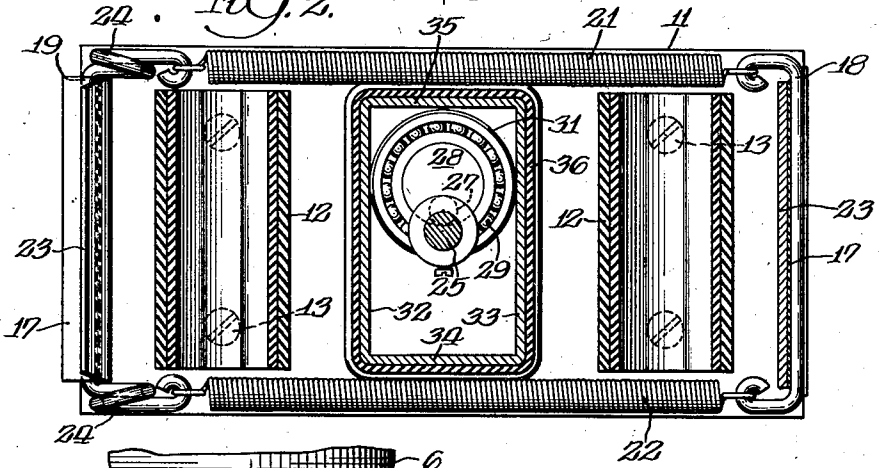
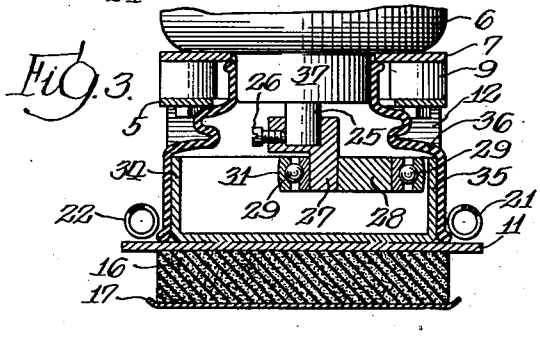


Fig. 3.



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SURFACING MACHINE

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4 Claims. (Cl. 51—170)

This invention relates to surfacing machines of the general type adapted for the smoothing and finishing of flat surfaces of metal, wood, or other composition.

Machines for this general purpose, both pneumatically and electrically driven, are common, but one of the objections to their use resides in the fact that the position of the surfacing pad relatively to the surface being worked is dependent to a large degree upon the position in which the body of the tool is held by the operator, and if it be tilted in one direction or the other, the surfacing pad is likewise tilted so as to operate more rapidly at one edge than the other, producing resultant unevenness in the surface being finished.

One of the primary purposes of my present invention is to provide for such an extent of flexibility between the body of the tool and the surfacing pad that the pad will rest evenly and operate uniformly upon the surface being worked, regardless of any tilting within reasonable limits of the body of the machine.

Another purpose of the invention is to provide a driving connection between the motor on the body and the surfacing pad of such flexibility that it will not be affected nor its operation impaired or restricted by any relative tilting movements between the body and the pad.

Another purpose is to provide a driving connection for the pad which will be substantially frictionless and which will be capable of operating for prolonged periods without appreciable wear.

Another feature of the invention resides in the connection between the working pad and the body of the machine which is designed to absorb the reciprocatory and vibratory movements of the pad so that they are not transmitted to the body of the tool, and consequently the operator who grasps or holds the body is not subjected to these annoying movements.

Other objects and advantageous features of my invention will be later apparent as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawing.

Referring to the drawing,

Fig. 1 is a side elevation of a machine embodying the principles of my invention, the lower central portion being shown in section;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1; and

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Referring to the drawing more in detail, reference character 5 indicates the motor base of the machine which in the present instance consists of a flat metal plate, although in heavier machines than that here illustrated the base would be of more substantial construction. The electric motor 6 is mounted upon this base through the intermediary of a bed plate 7 secured to the base 5 by the bolts 8 and cushioned relatively to the base by tubular cushion blocks 9 of rubber or other resilient material surrounding the bolts 8 between the base 5 and the base plate 7.

A metal pad plate 11 is connected to the base 5 by a pair of tubular connecting elements 12 also made of rubber or similar resilient material, the tubes being anchored to the top of the pad plate 11 by screws 13 and to the bottom of the base 5 by similar screws 14, metal inserts 15 being embedded in the tubes 12 at top and bottom for the reception and anchorage of the screws 13 and 14.

A resilient rubbing pad 16 of sponge rubber or other suitable material is disposed beneath the pad plate 11 and has its lower face, which is slightly arcuate as shown, covered by a sheet 17 of abrasive material the character of which depends upon the material of the surface to be finished and the fineness of the finish desired. This abrasive sheet is fastened to the pad plate 11 by a pair of cross bars 18 and 19, respectively, yieldably connected by coiled tension springs 21 and 22 which cause the abrasive sheet to be clamped between the cross bars and the upwardly curved ends 23 of the pad plate. The connection between the cross bar 19 and the ends of the springs 21 and 22 includes a loop 24 serving as a grip which can be engaged by the thumb and fingers of the operator to pull the bar 19 to the left (viewing Figs. 1 and 2) so as to free it from the groove of the pad plate, thereby releasing the abrasive sheet.

The depending lower end 25 of the vertical motor has fixed thereto by a set screw 26, or otherwise, a downwardly projecting stud 27 which has a driving fit in a circular eccentric member 28 having its periphery grooved to form the inner race of a ball bearing including the balls 29 retained between the inner race and an outer race 31. It will be apparent that since the eccentric member 28 is rigidly connected to the shaft 25, it will revolve about the axis of the shaft as a center when the motor is set in operation.

A guideway fixed to the pad plate and straddling the outer race member 31 affords a driving connection between the motor and the pad plate which causes this plate to reciprocate longitudinally of the motor base under the influence of the rotating motor shaft. This guideway comprises the transverse upstanding walls 32 and 33 spaced apart a distance equal to the external diameter of the outer ball race member 31, as will be apparent from Figs. 1 and 2, and this member, as will be seen from Figs. 1 and 3, is slightly arcuate vertically on its outer surface so that a substantially line contact and theoret-

ically a point contact is established between this raceway and the guideway members 32 and 33. For purposes of strength and rigidity the ends of the guides 32 and 33 are connected by end walls 34 and 35.

For the purpose of protecting the moving parts of the ball bearing from the injurious effect of dust and abrasive material produced by operation of the tool, a flexible tubular housing 36 embraces at its lower end the guideways and at its upper end the collar 37 of the motor housing. Obviously this flexible protector does not interfere with the relative tilting movements between the pad plate and the motor base.

It should be manifest that the flexible tubular connections 12 between the motor base and the pad plate yieldingly support the weight of the motor upon the pad plate and yieldingly transmit to the pad plate downward pressure exerted upon the motor. The vertical movements of the motor relatively to the pad plate being slight, such relative vertical movements do not interfere with the driving connection between the motor and the pad since the race member 31 and the parts by which it is carried simply move up and down in the pad plate guideway. The flexible tubular connections 12 furthermore permit longitudinal reciprocatory movements of the pad plate without transmitting these movements to the motor. The ultimate and desirable result is that the pad plate may be very rapidly reciprocated longitudinally and more or less pressure may be applied thereto by the operator, as desired, without the transmission of any appreciable amount of either the vibratory or reciprocatory movements of the plate to the motor which is manually manipulated and moved about by the operator. For convenience the motor is equipped with suitable handles to be grasped by the operator. The curved handle 38 and the straight handle 39 being both attached to a yoke 41 secured to the motor. Other means of attaching the handles may obviously be resorted to. Handle 38 also carries in convenient position a switch lever or button 42 of an electric switch by manipulation of which the motor may be started and stopped at will.

Tilting movements of the motor in any direction occasioned by the operator in his handling of the tool do not interfere in any respect with the operation or driving of the surfacing pad, because the vertical curvature of the outer face of the race member 31 enables this member to tilt in any direction between the guideways 32 and 33 without binding and without disturbing the line contact drive between this member 31 and the guide members 32 and 33.

My invention provides a surfacing machine possessing extreme flexibility and permitting the application of varying degrees of pressure to the surfacing pad without restricting the operation of the pad or transmitting any of its reciprocatory or vibratory movements to the motor and thence to the hands of the operator.

While I have illustrated and described a preferred embodiment of my invention, obviously the structural details may be varied within wide limits without departing from the essence of the invention as defined in the following claims.

I claim:

1. In a surfacing machine, the combination of a vertically disposed electric motor provided with a base plate, a surfacing pad, a plurality of flexible members extending transversely of the pad and connected therewith and to said base plate, said members affording a flexible connection between the motor and the pad permitting relative movements between the motor and pad, an upwardly opening guideway secured to the upper face of said pad, an eccentric fixed to the motor shaft and disposed in said guideway, the eccentric being vertically movable in said guideway and exteriorly curved to permit lateral tilting movements of the motor relatively to the pad without disturbing the driving relation, and a boot surrounding said driving connection and connected at one end to the motor and at the other end to the pad.

2. In a surfacing machine, the combination of a surfacing pad, a transversely extending guideway comprising parallel walls projecting upwardly from said pad, a pair of transversely disposed, flexible members secured to said pad, a motor including a base plate, means for securely attaching said base plate to the tops of said flexible members, an eccentric carried by the motor shaft and projecting into said guideway, said eccentric being exteriorly curved in vertical plane to permit tilting movements of the motor relatively to the pad, said eccentric in conjunction with said guideway being adapted to impart longitudinal reciprocatory movements to the pad relatively to the motor, said flexible connecting members being adapted to permit such reciprocatory movements while preventing transverse movements of the pad and serving to absorb vibration between the pad and the motor, and said driving connection permitting vertical and angular movements of the motor relatively to the pad without disturbing the driving relation.

3. In a surfacing machine, the combination of a vertically disposed electric motor, a surfacing pad, connections between the ends of the pad and the base of the motor, including flexible members extending transversely of the pad and means for securing said members to the pad and to said motor base whereby the pad is held against lateral movement but is permitted to reciprocate longitudinally and to move vertically relative to the motor, and driving connections between the motor shaft and said pad, said connections being telescopic to permit relative vertical movements between the motor and pad and also being universally flexible to permit tilting movements of the motor relatively to the pad in any direction without disturbing the driving relation.

4. In a surfacing machine, the combination of a vertically disposed electric motor provided with a base, a surfacing pad, a plurality of flexible members extending transversely of the pad and connected therewith and to said base to provide a flexible vibration absorbing connection between the motor and the pad permitting relative movements between the motor and pad, an open top guideway secured to the upper face of said pad, an eccentric driven by the motor and disposed in said guideway, said eccentric being vertically movable in said guideway and exteriorly curved to permit lateral tilting movements of the motor relatively to the pad without disturbing the driving relation, and a boot enclosing said driving connection.

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