June 9, 1964 J. C. TULLY ETAL 3,136,099

SANDING MACHINE WITH ORBITAL AND RECIPROCATING MOTIONS

Filed March 29, 1963 2 Sheets-Sheet 1

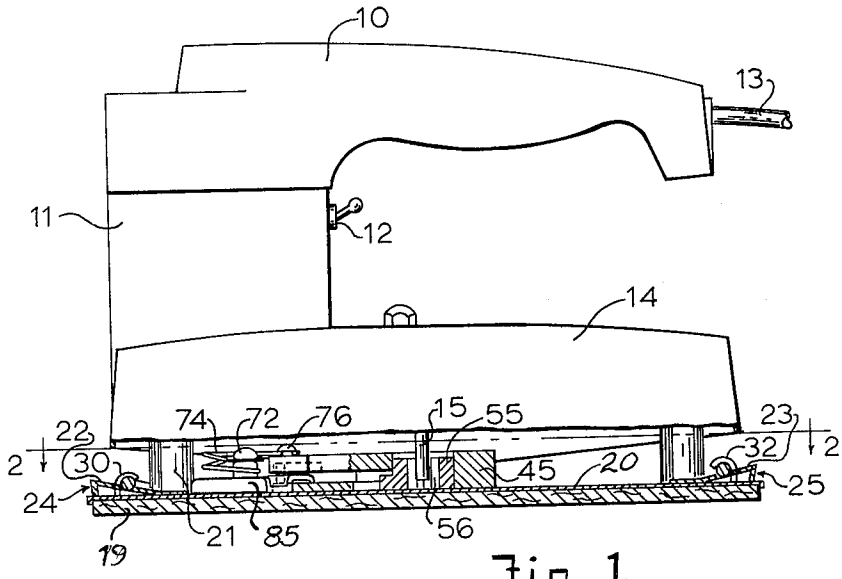


Fig. 1.

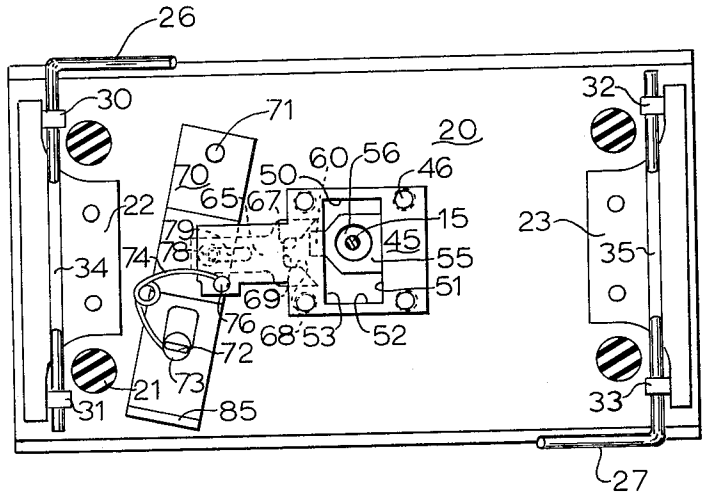


Fig. 2.

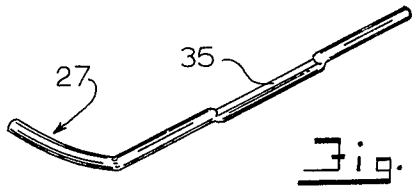


Fig. 5.

INVENTORS
John C. Tully
BY Burton P. Franklin
Leon O. Richardson
B. B. Olive
Attorney

June 9, 1964 J. C. TULLY ETAL 3,136,099

SANDING MACHINE WITH ORBITAL AND RECIPROCATING MOTIONS

Filed March 29, 1963 2 Sheets-Sheet 2

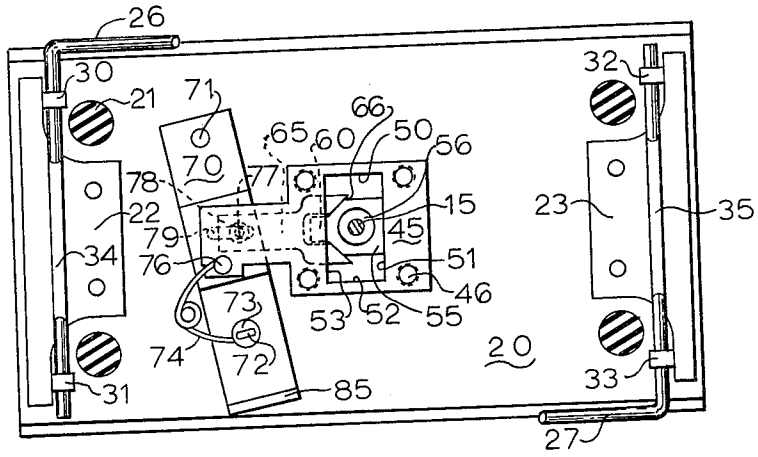


Fig. 3.

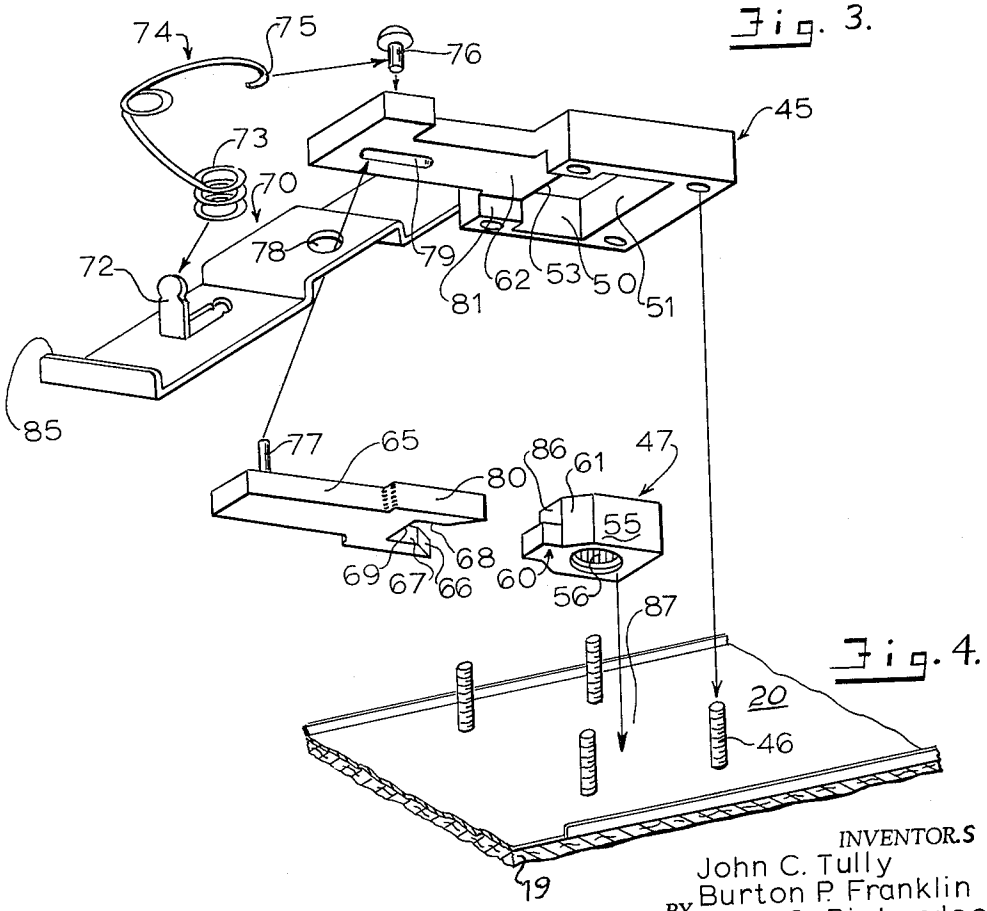


Fig. 4.

INVENTORS
John C. Tully
Burton P. Franklin
Leon O. Richardson
BY
B. B. Olive
Attorney

United States Patent Office

3,136,099

Patented June 9, 1964

3,136,099

SANDING MACHINE WITH ORBITAL AND RECIPROCATING MOTIONS

John C. Tully, Burton P. Franklin, and Leon O. Richardson, Danville, Va., assignors to H. K. Porter Company (Delaware), Danville, Va., a corporation of Delaware

Filed Mar. 29, 1963, Ser. No. 269,071
2 Claims. (Cl. 51—170)

This invention relates to sanding machines of the type which allow selection between orbital and reciprocating straight line motions and more particularly to an improved mechanism for obtaining such motions in portable type sanding machines.

Prior art sanding machine mechanisms of the type having orbital and straight line motions have been subject to substantial chattering and excessive vibrations particularly when in orbital motion. Some of these undesired characteristics may be traced to the difficulty of obtaining accurate alignment of the moving parts and to excessive friction. In order to compensate for the inherent friction in some of the prior art mechanisms, it has in fact been necessary to orient the slider part of the mechanism at an angle of about ten degrees relative to the platen or shoe in order to obtain an acceptable straight line motion. Supplementary structure between the shoe and the slider part has been required in order to provide a sliding surface and to mount the slider part at the required angle.

An object of the present invention, therefore, is to provide an improved portable sanding machine having selective orbital and straight line motions but without the undesirable characteristics mentioned above.

A more specific object is to provide a sanding machine mechanism having selective orbital and straight line motions with a miniumum of chattering and excessive vibrations and particularly when in orbital motion.

Another object is to provide a sanding machine mechanism having selective orbital and stratight line motions in which the major components of the mechanism may be assembled and accurately aligned as a unit.

Another object is to provide a sanding machine mechanism having selective orbital and straight line motions in which the upper surface of the platen or shoe may be employed both as a support and sliding surface for the slider part.

Another object is to provide a sanding machine mechanism having selective orbital and straight line motions in which the sliding components are adapted to utilize the self-lubricating characteristic of powdered metal construction.

For an understanding of the present invention and to make clear the above and other objects of the invention, reference is now made to the following description and drawings, in which:

FIGURE 1 is a cross sectional cut-away view of a portable sanding machine embodying the present invention.

FIGURE 2 is a secional view taken genterally along line 2—2 of FIGURE 1 illustrating the mechanism of the invention arranged for straight line motion.

FIGURE 3 is a sectional view taken generally along the same line 2—2 of FIGURE 1 illustrating the mechanism of the invention arranged for orbital motion.

FIGURE 4 is an exploded perspective view illustrating assembly of the components of the mechanism of the invention.

FIGURE 5 is a perspective view of one of the handles employed to hold and release the disposable sand paper.

In the art of portable sanding machines it is well known to provide an eccentric mounted stub shaft driven by the motor preferably through a belt drive as for example in Patent 2,893,175. The stub shaft in turn is employed to drive the follower mechanism which is mounted on the shoe or platen and which carries the disposable sanding sheets. By appropriate adjustment of the particular follower mechanism employed, the orbital motion of the stub shaft can be caused to drive the shoe and thus the sandpaper either in an orbital motion or in a straight line motion. With this in mind it is noted that the present invention is primarily concerned with the mechanism driven by the stub shaft and is not directly concerned with the motor or with the drive between the stub shaft and the motor. The description to follow deals primarily therefore with a follower mechanism of the type that is found mounted on the shoe and that is driven by the stub shaft. It will of course be understood that the follower mechanism of the invention may be employed with any suitable form of orbital moving member such as the conventional belt driven orbital moving stub shaft.

Referring particularly to FIGURE 1, there is represented a portable sanding machine which includes a handle 10 to which is secured a motor housing 11 that encloses the electric motor driving mechanism not shown. A manually operable switch 12 is mounted on the side of motor housing 11 and a suitable power supply cord 13 extends from handle 10. Secured to the motor housing 11 is a base housing 14 which encloses a suitable drive mechanism not shown but preferably of the gear-belt type and which is employed to drive in orbital motion a crank stub shaft 15.

A pad 19 of felt or like material is attached to the platen or shoe 20 which in turn is secured to the base housing 14 by means of a plurality of posts 21 located at the corners of the shoe and preferably made of rubber or other resilient material. The usual sheet of sandpaper not shown extends beneath the pad 19 and is held at each end of the shoe 20 by a pair of releasable clamping jaws 22, 23, formed as cantilevered spring members riveted or otherwise secured to the top of shoe 20. The edges of jaws 22, 23 are turned down as at 24, 25 (FIGURE 1) to facilitate gripping of the paper. Manipulation of the jaws is effected by a pair of stiff bent wire handles 26, 27 mounted for rotation respectively in pivot mounts 30, 31 and 32, 33. As best illustrated by FIGURE 5, each of the handles medial portions 34, 35 are given sufficient curvature such that when the handles are down as in FIGURES 2 and 3, the respective medial portions of the handles force the respective jaws downwardly and tightly agains thet shoe.

Referring now to the mechanism with which the invention is primarily concerned, there is included a fixed guide block 45 secured to the shoe 20 by means of suitable screws 46. An open slot defined by the side surfaces 50, 51, 52 and 53 extends transverse of the shoe and through the body of the fixed guide block 45 and in this slot is located the follower 55. Follower 55 in turn includes a suitable bearing 56 sized to fit the drive end of the crank stub shaft 15. Thus the orbital motion of shaft 15 is transferred to follower 55 through bearing 56.

Follower 55 includes a relatively narrow and low rectangular tongue portion 60 extending in front of two inwardly angled faces, preferably angled at forty-five degrees, such as indicated at 61. This tongue portion serves two purposes one of which is to act as a means for limiting the vertical travel of follower 55. In assembly the follower 55 is located in the previously mentioned slot and the mentioned tongue portion of follower 55 extends outside the boundaries of the slot and resides immediately below the underside surface 62 of guide block 45. Any tendency for follower 55 to rise is thus prevented by reason of surface 62 bearing on the subject tongue portion of follower 55.

The mechanism being described further includes means to lock follower 55 such that it in effect becomes integral with shoe 20. That is, follower 55 may be arranged as in FIGURE 2 so that it is free to move transverse of the shoe and back and forth in the slot of guide block 45 and thereby produce a straight line motion in the shoe. Alternatively, follower 55 may be arranged as in FIGURE 3 so that it is not free to move transverse of the shoe which arrangement produces an orbital motion in the shoe. To accomplish these arrangements, the mechanism includes a locking fork 65 having a pair of outwardly angled faces such as indicated at 66 to match the inwardly angled faces of the tongue portion of follower 55 as previously referred to at 61. The outwardly angled faces of fork 65 converge into the three faces 67, 68 and 69 which in turn form a square cornered female receptacle for the rectangular male tongue portion 60 of follower 55. Thus as fork 65 is moved inwardly the outwardly angled faces of the fork engage the inwardly angled faces of follower 55 forcing the follower 55 into the exact center of the fixed guide block 45 and in this position the rectangular section 60 of the follower tongue portion is solidly engaged by the square cornered section of the fork. It is in this manner of obtaining such a positive and true centered lock that much of the chattering and vibration previously encountered, particularly in orbital motion, have been eliminated.

The upper surface of fork 65 is substantially covered by the lower surface 62 of block 45. Control of fork 62 is obtained by means of a lever 70 pivoted on a suitable pin 71. Lever 70 includes an upturned stub portion 72 on which is mounted a coiled end 73 of a snap tension spring 74. The opposite end 75 of spring 74 is secured to a suitable pin 76 fixedly secured to guide block 45. The motion of lever 70 is transmitted to fork 65 by means of a pin 77 which is secured to fork 65 and which passes through a hole 78 in lever 70 and resides in an elongated slot 79 cut into the underside surface 62 of block 45. Thus, as lever 70 is moved back and forth against the tension of spring 74, pin 77 is engaged by lever 70 and moves back and forth in slot 79. As fork 65 moves back and forth it is guided both by reason of pin 77 being confined to slot 79 and also by reason of the front side surfaces such as that indicated at 80 of fork 65 engaging a mating pair of guide surfaces on fixed guide block 45 such as that indicated at 81.

Referring to the operation, it will be noted that the free end 85 of lever 70 is accessible from the edge of the sanding machine and can be shifted manually by reaching into the machine between the shoe 20 and the base housing 14. Assuming a straight line motion is desired, the lever 70 is shifted toward the front of the machine as in FIGURE 2 which causes fork 65 to be retracted. In this position the orbital motion of the crank stub shaft 15 is translated into straight line motion of the shoe 20 due to the lateral or transverse component of the orbital motion of shaft 15 being transferred only to follower 55 since in this position follower 55 is free to move transversely with respect to shoe 20. Of particular significance to the invention so far as straight line motion is concerned is the fact that the described fixed guide block 45 as well as the follower 55 lend themselves to being accurately cast

of powdered metal. By using flat rubbing surfaces, a minimum of levels and the lubricant absorbing characteristic of powdered metal, the rubbing surfaces such as surfaces 51 and 86 for example becoming self-lubricating and exhibit a minimum of operating friction. It will also be noted that such construction enables the follower 55 to slide directly on the surface 87 of shoe 20 thereby eliminating need for an intermediate low friction and supporting surface between the follower and the shoe.

Of particular advantage in the manufacture and assembly of the follower mechanism of the invention is the fact that the follower 55, and in turn the bearing 56, the locking fork 65, and the spring 74 may all be aligned from the fixed guide block 45. In this manner all of the parts of the mechanism that must fit accurately may be assembled as a unit and may be located without machining from the one part, the fixed guide block 45. Rapid and low cost manufacture is thereby achieved.

Having described our invention, what we claim is:

1. In a portable sanding machine having a motor housing, a vibratory rectangular shaped platen supporting the housing and having means for releasably securing sanding sheets, and a driven orbitally moving vertically disposed crank shaft supported from the housing proximate the platen, a guide block centrally located and fixedly secured to the top surface of said platen and including an open rectangular slot disposed below said shaft and with its long axis arranged perpendicular to the long axis of the platen, a follower member slidably supported on said platen surface and mounted for reciprocatory movement in and along the long axis of said slot, a bearing mounted in said follower member and receiving said shaft thereby giving said follower member the orbital motion of said shaft and giving said platen a substantially straight line motion, and means to lock said follower member relative to said platen whereby to give said platen the orbital motion of said shaft, said means comprising an elongated locking member slidably supported on said platen surface and guided for sliding movement by said guide block along an axis parallel to the long axis of said platen whereby to bring one end of said locking member adjacent one side of said follower member, said locking member end and said follower member side being provided with rigid mating and interlocking abutments comprising square cornered block and receptacle portions and mating angled flat faces joined to said block and receptacle portions, lever means pivoted on said platen and connected to said locking member for bringing said portions and faces of said abutments into engagement, and a coiled snap action type wire spring having one end secured to said lever and one end secured to said guide block and being effective to hold and snap said locking member into locking and unlocking positions.

2. In a portable sanding machine having a motor housing, a vibratory rectangular shaped platen supporting the housing and having means for releasably securing sanding sheets, and a driven orbitally moving vertically disposed crank shaft supported from the housing proximate the platen, a guide block centrally located and fixedly secured to the top surface of said platen and including an open rectangular slot disposed below said shaft and with its long axis arranged perpendicular to the long axis of the platen, a follower member slidably supported on said platen surface and mounted for reciprocatory movement in and along the long axis of said slot, a bearing mounted in said follower member and receiving said shaft thereby giving said follower member the orbital motion of said shaft and giving said platen a substantially straight line motion, and means to lock said follower member relative to said platen whereby to give said platen the orbital motion of said shaft, said means comprising an elongated locking member slidably supported on said platen and arranged for travel along an axis parallel to the long axis of said platen, said guide block having underside surfaces in slidable contact with and being effective to align said

locking member and establish said path of travel, manual lever means pivoted on said platen and connected to said locking member enabling one end of said locking member to be brought adjacent one side of said follower member, said locking member end and follower member side having respective angled flat faces and square cornered receptacle and block portions brought into engagement by movement of said lever means, and a coiled snap action type wire spring having one end secured to said lever and one end secured to said guide block and being effective to hold and snap said locking member into locking and unlocking positions.

References Cited in the file of this patent

UNITED STATES PATENTS

2,707,357	Osman	May 3, 1955
2,775,076	Roods	Dec. 25, 1956
2,794,303	Wickes	June 4, 1957
2,817,192	Amsden	Dec. 24, 1957
2,885,833	Neff	May 12, 1959
2,893,177	Bruck	July 7, 1959