Dec. 31, 1968 M. I. SHEPS 3,418,761

DUAL-ACTION POWER-OPERATED ABRADING TOOL

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FIG. 1

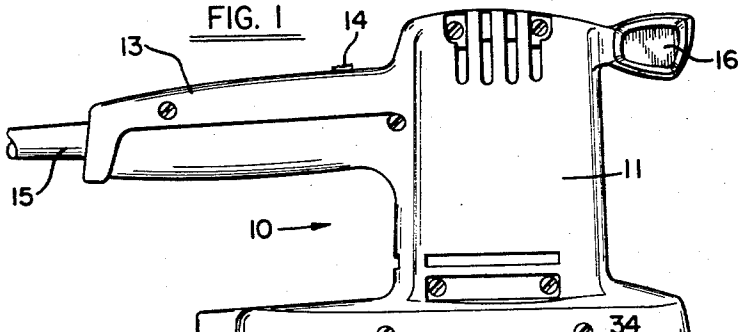


FIG. 2

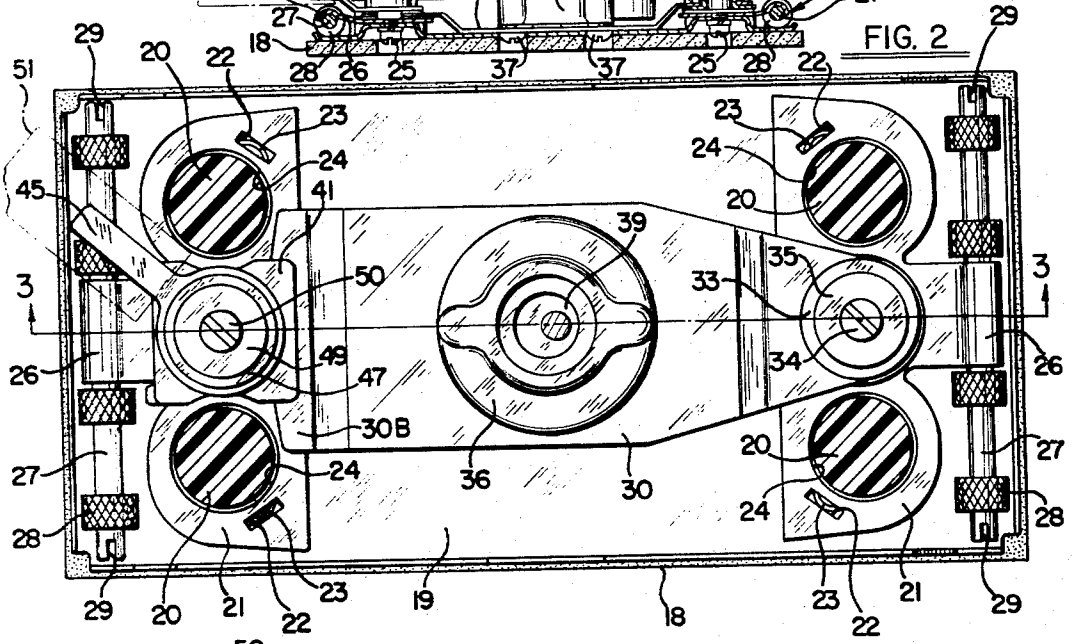
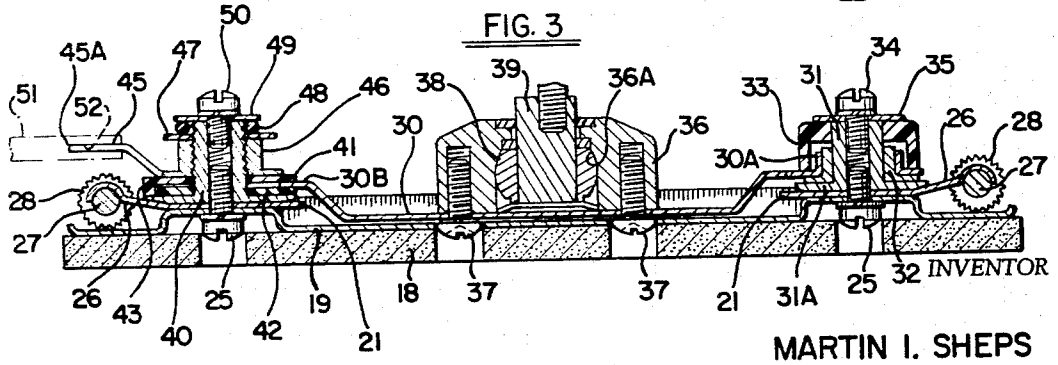


FIG. 3



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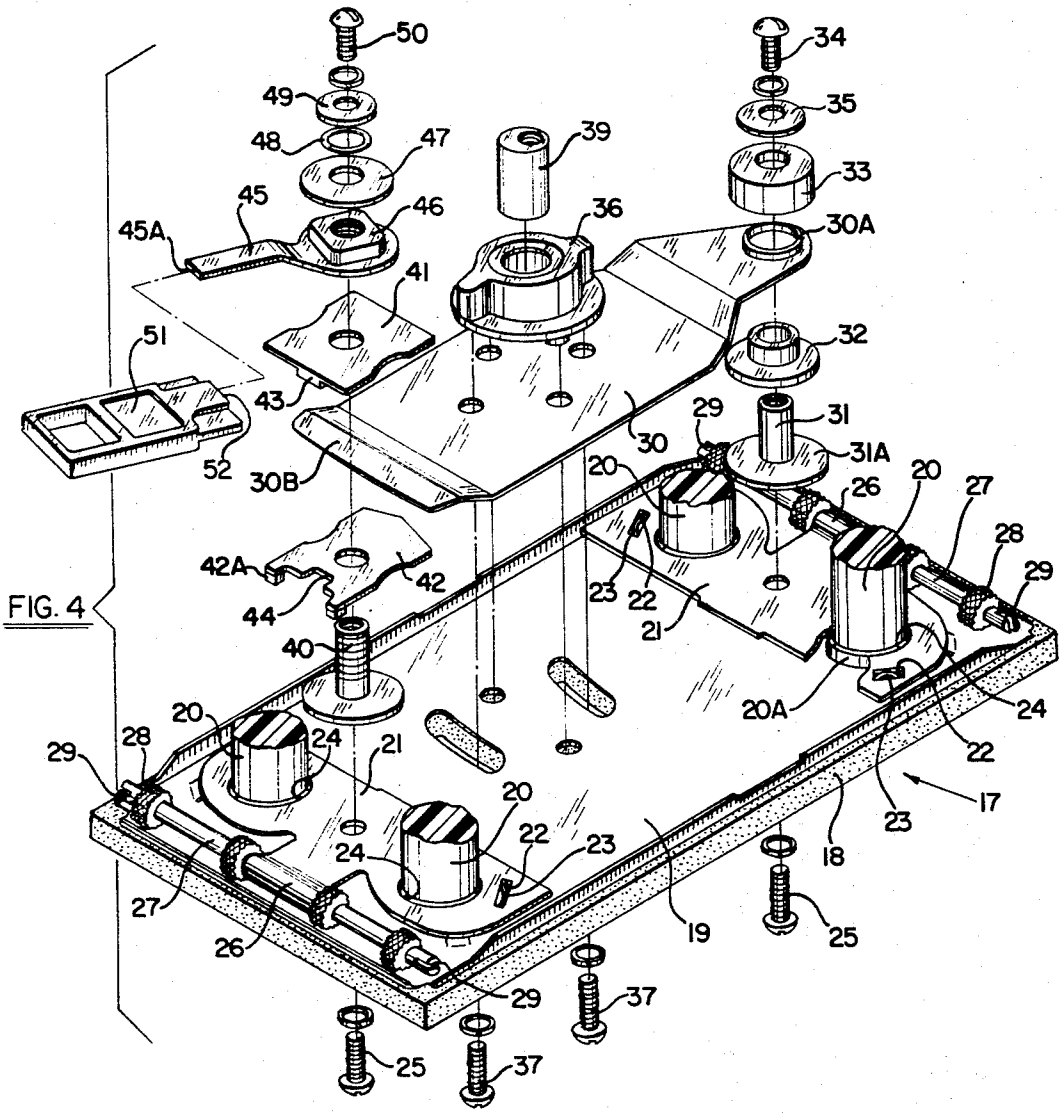

FIG. 4

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DUAL-ACTION POWER-OPERATED ABRADING TOOL

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5 Claims. (Cl. 51—170)

ABSTRACT OF THE DISCLOSURE

A portable power-operated abrading tool has a "dual action" by means of which the platen is adapted for either orbital motion or straight-line reciprocation. The mechanism includes a pivot arm between the housing and the platen, and the driving eccentric is operatively connected to the arm intermediate the ends thereof. One end of the arm is pivotably mounted on the platen, and the other end of the arm is free. A combined guiding and selective clamping means is mounted on the platen, beyond the free end of the pivot arm, for slidably receiving and supporting the arm in its normal unrestrained position. This combined guiding and selective clamping means has a manually-actuated means integrally included therein for selectively clamping the free end of the pivot arm in a vertical plane which is substantially parallel to the vertical axis of the driving eccentric, but offset radially therefrom. In this manner, the free end of the pivot arm may be restrained, thereby selectively converting the straight-line reciprocation of the platen into an orbital-type of reciprocation.

The prior art

In the prior art, there exists various types of "dual action" portable electric sanders or related abrading-type tools. These tools usually employ a generally rectangular platen which is disposed below the tool housing and is resiliently mounted thereto. Some "dual-action" tools employ a pivot arm between the housing and the platen. This pivot arm has a pair of ends, one of which is pivotably mounted to the platen, and the other of which is free. A bearing may be mounted on the pivot arm intermediate its ends, and a driving eccentric journaled in the bearing along a vertical axis. Accordingly, the pivot arm oscillates in a horizontal plane above the platen, and thereby functions as an intermediate driving member, with the platen experiencing a substantially straight-line reciprocation. If the free end of the pivot arm is clamped or restrained against further movement or oscillation, then the straight-line reciprocation of the platen is converted to an orbital reciprocation. Accordingly, one of the prior art concepts employs resilient restraint for the free end of the pivot arm. This resilient restraint is provided by a coil spring piloted on a rod and seated between axially-spaced washers, one of which is secured on the rod. One end of the rod carries a resilient pad received within a socket formed in the free end of the pivot arm. The spring-loaded rod restrains the free end of the pivot arm, and as a result, the platen has a substantially orbital reciprocation. The other end of the rod is provided with a hook to facilitate retraction of the rod away from the pivot arm. In this position, the pivot arm is unrestrained, and the platen has a substantially straight-line reciprocation. One other prior art concept employs a tapered socket on the free end of the pivot arm and a correspondingly tapered locking member screw-threaded into a bracket mounted on top of the platen. The locking member may then be turned by means of a key for the purpose of engaging the socket and thereby restraining the free end of the pivot arm. In each of these prior art designs, however, the clamping force is directed along a substantially horizontal direction, normal to the eccentric axis, and no means is provided in the clamping mechanism for slidably guiding the free end of the oscillating pivot arm in its unrestrained position.

Objects of the present invention

Accordingly, it is an object of the present invention to provide an improved "dual-action" abrading tool having, first, a means for slidably guiding the free end of the pivot arm in its unrestrained position, and second, a means for clamping the free end of the pivot arm along a vertical plane which is substantially parallel to the vertical axis of the driving eccentric.

In accordance with a more specific object of the present invention, the improved structure comprises a threaded stud secured on the platen; and projecting vertically therefrom; a pair of clamping washers piloted on the stud and straddling the free end of the pivot arm; and a lever having a threaded portion engaging the stud above the clamp washers. Preferably, the clamping washers are formed of an anti-friction material and are keyed together against relative rotation; moreover, the lever is engaged by a separable wrench, preferably molded of a plastic material, and having a recess which engages the end of the lever.

These and other objects of the present invention will become apparent from a reading of the following specification, taken in conjunction with the enclosed drawings, in which:

Description of the drawings

FIGURE 1 is a side elevation of a typical portable power-operated abrading tool with which the teachings of the present invention may find particular utility, the molded plastic wrench being shown in broken lines;

FIGURE 2 is an enlarged top plan view of the platen assembly, with the conventional rubber posts to resiliently mount the platen to the housing of the tool being shown in section;

FIGURE 3 is a longitudinal section, taken along the lines 3—3 of FIGURE 2, the rubber posts being omitted for clarity of illustration; and

FIGURE 4 is an exploded perspective of the platen assembly of FIGURE 2, showing the oscillating pivot arm, the manner in which one end of the arm is pivotably mounted to the platen, and the improved structure of the present invention for slidably guiding and selectively restraining the free end of the pivot arm.

Detailed description

With reference to FIGURE 1, the typical portable power-operated abrading tool **10** comprises a motor housing **11**, a lower housing or skirt **12**, a rear handle **13** provided with an electric switch **14** for energization of the tool from a line cord **15**, a front control handle **16**, and a platen assembly, the latter being disposed below the skirt **12** and being indicated generally as at **17**.

With reference to the remaining drawings, the platen assembly **17** includes a platen member or pad **18**, which is provided with a sheet metal backing **19**. The platen assembly is resiliently mounted to the tool by means of four rubber posts **20**. Each post has a lower flanged collar **20A** trapped against the pad by means of a bracket **21**. One bracket is provided for each pair of posts. The bracket **21** has slotted openings **22** receiving lanced-out raised tabs **23** to position or locate the bracket on the pad. The bracket **21** is further provided with circular openings **24** receiving the respective posts **20**, and the bracket is secured to the pad by means which includes a screw **25**. In this manner, each bracket **21** traps the respective flanged collars **20A** of a pair of rubber posts **20**. More-

over, each bracket has a curved extending portion **26** which journals a cylindrical rod **27**. The rod **27** has a plurality of spaced-apart knurled sections **28** and a screwdriver slot or kerf **29** at either end thereof. This construction provides a convenient clamp for the typical abrasive paper used in conjunction with a tool of this type. The function of the rubber posts, the manner in which they are trapped against the pad **18** by means of the bracket **21**, the manner in which the upper portions of the posts are secured to the housing of the tool, and the formation of the paper clamp subassembly, comprises no part of the present application, but rather is described more particularly in the co-pending Enders application, Ser. No. 348,124, filed Feb. 28, 1964, entitled "Oscillating Platen for Abrading Tool," and assigned to the assignee of the present invention, now Patent No. 3,336,702, dated Aug. 22, 1967.

In accordance with the teachings of the present invention, an oscillating pivot arm **30** is disposed between the housing and the pad **18**. One end of the pivot arm **30** is pivotably mounted on the pad; the intermediate portion of the pivot arm carries a bearing for journaling a driving eccentric; and the free end of the pivot arm is slidably guided and selectively restrained for converting the straight-line reciprocation of the pad into an orbital reciprocation.

With particular reference to FIGURES 3 and 4, one of the screws **25** (for the respective bracket **21**) secures an internally-threaded stud **31** to the pad. The stud **31** has a flanged portion **31A** supporting a bushing **32**. Preferably, the bushing **32** is molded from a suitable anti-friction plastic material. The end of the pivot arm **30** has a collar portion **30A** supported on the bushing **32**. A retainer washer **33**, which also may be made of a suitable anti-friction plastic material, is mounted above the collar **30A** on the pivot arm. The structure is prevented from disassembly by means of a screw **34** and washer **35**, the screw **34** being received within the remaining portion of the threaded stud **31**. In this manner, the front end of the pivot arm **20** is journaled for pivotal movement relative to the pad the platen assembly.

Any suitable means may be provided for driving the pivot arm **30**. However, in the preferred embodiment, a bearing retainer **36** is secured to the pivot arm **30**, intermediately its ends, by means of screws **37**. The bearing retainer **36**, see FIGURE 3, has a seat **36A** for a spherical bearing **38**. The bearing **38** journals a driving eccentric **39** along a substantially vertical axis. As a result, the pivot arm **30** oscillates in a substantially horizontal plane above the pad **18**, and the pad **18** has a substantially straight-line reciprocation. The driving eccentric means described herein forms no part of the present invention, but rather, is described in detail in the Enders Patent 3,199,251 entitled "Driving Mechanism for Abrading Tool," issued on Aug. 10, 1965, and assigned to the assignee of the present invention.

The improved structure of the present invention for slidably guiding the free end of the pivot arm **30** and for selectively restraining the free end by means of a clamping force exerted along a vertical plane (or direction) which is parallel to the vertical axis of the driving eccentric, is as follows: A threaded stud **40** is secured to the pad by means of one of the screws **25**. A pair of clamp washers (comprising a top clamp washer **41** and a bottom clamp washer **42**) are piloted on the unthreaded portion of the stud **40**. The clamp washers are made of an anti-friction material, such as a suitable molded plastic, and are adapted to straddle the raised lip portion **30B** formed on the free end of the pivot arm **30**. The top clamp washer **41** has a tongue **43** received within a recess **44** formed in the bottom clamp washer **42**. As a result, the clamp washers are keyed together against relative rotation. Moreover, the bottom clamp washer **42** has ears **42A** which straddle the bracket **21**, thereby preventing rotation of the clamp washers relative to the bracket and hence to the stud **40**. A lever **45** has a threaded portion **46**, such as a weld nut, for engaging the stud **40** above the clamp washers. Completing the assembly, a washer **47**, O-ring **48**, washer **49**, and screw **50**, the latter being threaded into the stud **40**, retain the clamp washers and the lever against disassembly from the stud **40**.

Operation

In operation, the lever **45** and the weld nut **46** carried thereby may be pivoted (preferably through an acute angle) for clamping the washers **41**, **42** against the raised lip **30B** on the pivot arm **30**, as shown in the position of FIGURE 2. As a result, a vertical clamping force is exerted on the free end of the pivot arm **30**; the free end of the arm **30** is restrained against further oscillation in a horizontal plane above the pad; and the substantially straight-line reciprocation of the pad is converted into an orbital reciprocation. Orbital reciprocation of the pad facilitates a relatively higher work removal, while straight-line reciprocation facilitates a smoother finish on the work. When the lever **45** is pivoted in the opposite position, the free end of the pivot arm **30** is unrestrained, yet is slidably guided between the anti-friction material of the pair of clamp washers **41**, **42**.

For operator convenience, the lever **45** may be actuated by means of a wrench **51**. The wrench **51** has a recess **52** which engages the end **45A** of the lever. Preferably, the wrench is economically formed as a molded plastic piece, and may be carried on the line cord for the tool.

Obviously, many modifications may be made without departing from the basic spirit of the present invention; and accordingly, within the scope of the appended claims, the invention may be practiced other than has been specifically described herein.

I claim:

1. In a portable power-operated abrading tool, the combination of a housing, a platen below the housing, means resiliently mounting the platen to the housing, a pivot arm between the housing and the platen, the pivot arm having a pair of ends, one of which is pivotably mounted on the platen and the other of which is free and is normally unrestrained, a driving eccentric disposed along a vertical axis and operatively connected with the pivot arm between the ends of the arm, whereby the pivot arm oscillates in a horizontal plane above the platen, and whereby the platen has a straight-line reciprocation, a combined guiding and selective clamping means mounted on the platen beyond the free end of the pivot arm, said combined guiding and selective clamping means slidably receiving the free end of the pivot arm, thereby supporting the free end of the pivot arm in its unrestrained position, and said combined guiding and selective clamping means having manually-actuated means integrally included therein for selectively vertically clamping the free end of the pivot arm in a plane substantially parallel to the vertical axis of the driving eccentric and offset radially therefrom, whereby the free end of the pivot arm is restrained against further horizontal oscillation, and whereby the straight-line reciprocation of the platen is thereby converted to an orbital reciprocation.

2. In a portable power-operated abrading tool, the combination of a housing, a platen below the housing, means resiliently mounting the platen to the housing, a pivot arm between the housing and the platen, the pivot arm having a pair of ends, one of which is pivotably mounted on the platen and the other of which is free and is normally unrestrained, a driving eccentric disposed along a vertical axis and operatively connected with the pivot arm between the ends of the arm, whereby the pivot arm oscillates in a horizontal plane above the platen, and whereby the platen has a straight-line reciprocation, means slidably guiding the free end of the pivot arm in its unrestrained position, and selective means vertically clamping the free end of the pivot arm in a plane substantially

parallel to the vertical axis of the driving eccentric and offset radially therefrom, whereby the free end of the pivot arm is restrained against further horizontal oscillation, and whereby the straight-line reciprocation of the platen is thereby converted to an orbital reciprocation; said selective means vertically clamping the free end of the pivot arm comprising:

(A) a threaded stud secured on the platen and projecting vertically therefrom;

(B) a pair of clamp washers piloted on the stud and straddling the free end of the pivot arm; and

(C) a lever having a threaded portion engaging the stud above the clamp washers.

3. The combination of claim 2, wherein:

(A) the clamp washers are formed of an antifriction material and are keyed together against relative rotation.

4. The combination of claim 2, wherein:

(A) a molded plastic wrench has a recess engaging the end of the lever.

5. The combination of claim 1, wherein said combined guiding and selective clamping means comprises:

(A) a pair of anti-friction clamping members, keyed together against relative rotation, straddling the free end of the pivot arm and slidably guiding the arm in its unrestrained position;

(B) means including a movable member engaging at least one of the clamp members for bringing the members together in a vertical direction, thereby restraining the arm; and

(C) a manually-manipulatable member, separable from the tool, and selectively engaging at least a portion of the movable member.

References Cited

UNITED STATES PATENTS

2,697,898	12/1954	Osman	51—170
2,775,076	12/1956	Roods	51—170
2,817,192	12/1957	Amsden	51—170
2,885,833	5/1959	Neff	51—170

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