Feb. 18, 1969 R. A. REDMAN 3,427,757

MINIATURE BELT GRINDER

Filed Feb. 17, 1967 Sheet 1 of 2

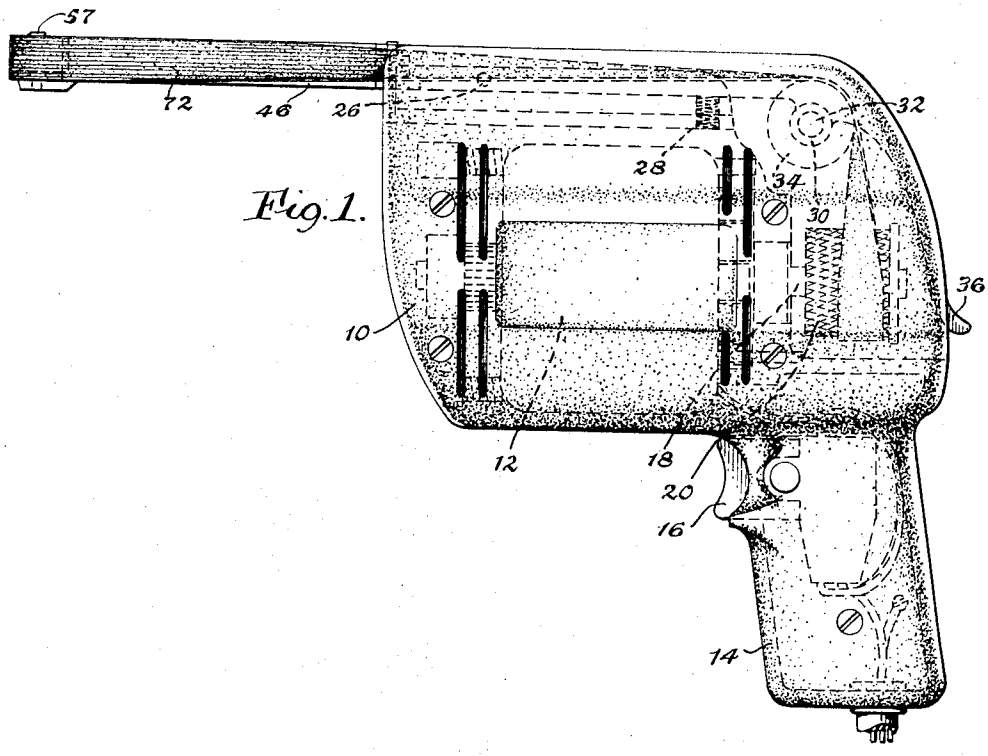
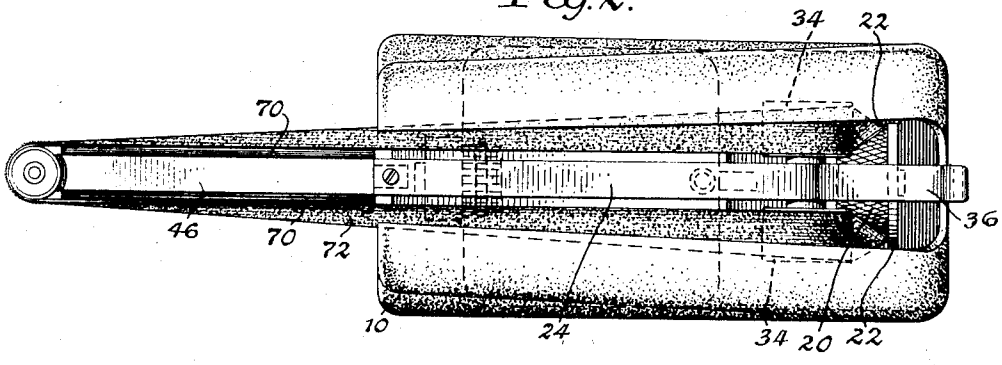


Fig. 1.

Fig. 2.



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Fig. 3.

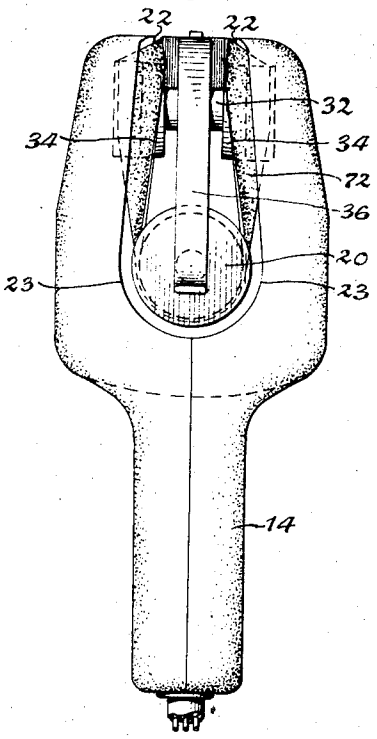


Fig. 4.

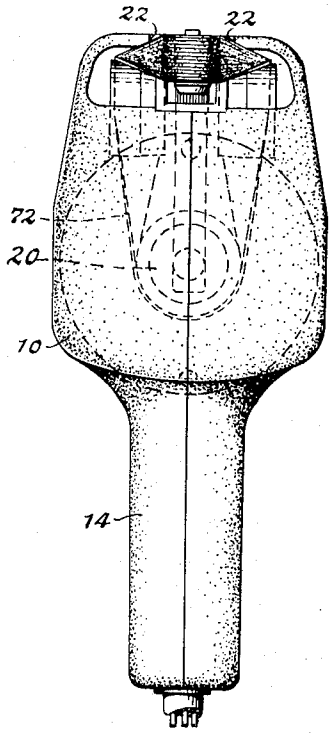


Fig. 5.

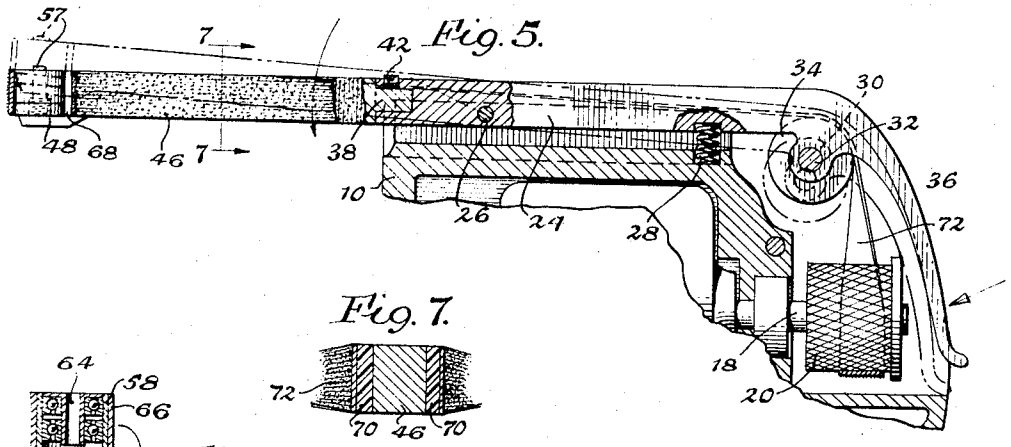


Fig. 7.

Fig. 6.

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MINIATURE BELT GRINDER

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Int. Cl. B24b 23/00, 21/00

ABSTRACT OF THE DISCLOSURE

A hand tool grinder having an endless belt entrained over pulleys having three non-parallel axes, with the belt having a narrow extended grinding area and being under constant tension and being readily replaceable by a pivotal movement of a belt carrying arm.

Brief summary and background of the invention

The invention is of the hand tool type of grinders and is particularly adapted for use in connection with small cavities or restricted openings in sheet metal, castings, forgings and the like for deburring and smooth finishing.

The grinders in use are ordinarily of relatively massive construction, whereas the present invention has a thin, elongated grinding area which enables it to get into tiny or confined spaces and successfully finish or polish surfaces where only a restricted access opening is available.

The grinding is accomplished, either where the belt passes over a small pulley, or along the sides of a thin arm by an endless belt which is automatically kept in a tensioned state by means which also cooperates in permitting a ready change of belts to permit utilization of belts of varying lengths and varied abrasive surfaces. A safety factor in the event of belt breakage is provided along with many other features not present in the prior art.

In the drawing:

FIG. 1 is a side view of the tool;

FIG. 2 is a top view;

FIG. 3 is a front view;

FIG. 4 is a rear view;

FIG. 5 is a partial side section of the abrasive belt, and its mounting structure;

FIG. 6 is an exploded side section of a belt mounting arm extension, its connection to the main arm and its pulley and support for the pulley; and

FIG. 7 is a view partly in section taken on line 7—7 of FIG. 6.

Referring now to the drawings in greater detail, the tool has a casing **10** in which is mounted a suitable electric motor **12**; the casing having a pistol type grip portion **14** and a trigger type electrical switch **16**. Conventional wiring connects the tool to an electrical power source and the trigger switch to the motor whereby contraction of the operator's finger on trigger **16** will complete an electrical circuit and operate the motor.

Motor **12** has shaft **18** on the end of which is fixedly mounted a belt driving pulley **20**, which pulley has a longitudinal axis of rotation.

The top of casing **10** is provided with an opening having edges **22** which taper providing a smaller opening at the top front than at the top rear. The edges **22** continue downward at the rear edges **23** and widen out to permit access at the rear of the casing.

An elongate arm **24** is positioned in the casing beneath the opening defined by the edges **22**, and is supported therein by a pivot pin **26** which has its ends mounted in lugs which are part of the casing. The rear end of arm **24** is continually urged upwardly by a spring such as coil spring **28** which is suitably mounted between the bottom of the arm and a portion of the casing. Near the rear of

arm **24** it is provided with an opening **30** to support a transversely disposed axle **32** which carries a pair of idler belt supporting pulleys **34**, one pulley being mounted on each side of arm **24**. The rear end of arm **24** terminates in a hand or thumb press lever extension **36**.

As most clearly shown in FIGS. 5 and 6, the front end of arm **24** is provided with an opening **38**, a screw threaded hole **40** and a set screw **42**. Opening **38** is intended to detachably receive the shank **44** of an elongated grinding arm extension **46** which would be held in place by the set screw **42**. The free end of arm extension **46** has extending from its lower side a pulley supporting portion **48** having beveled bottom edges **50**. A boss **52** formed on the upper side of portion **48** is internally threaded to receive the enlarged threaded end **54** of a vertically disposed pulley axle **56**.

An idler belt supporting pulley **58**, having suitable bearings **60** is provided with a bottom opening **62** of sufficient diameter to freely slide over boss **52** with a hub opening **64** fitting over axle **56**. The top of axle **56** may be headed at **57** to retain the pulley at its axle, and the bottom of the axle may be slotted to permit tightening and loosening the same. Pulley **58** may be rubber covered as shown at **66** if desired, and sufficient space **68** is provided between the periphery of pulley **58** and the adjacent end of extension arm **46** so that pulleys of different diameter may be used.

Platen strips **70** may be secured by adhesive or other suitable means to each side of extension arm **46**.

An endless abrasive belt **72** is entrained around pulleys **20**, **34** and **58** by placing the belt first around pulley **20** and then over the top of the pair of pulleys **34**. The belt is then strung along toward the front, and on each side, of arm **24** by sliding the belt semi-edgewise down into the space between the sides of arm **24** and the casing top opening edges **22**. By pressing downwardly and inwardly on the thumb extension **36**, the arm **24** and extension **46** can be tilted to the dot-dash line position shown in FIG. 5 with the pulleys **24** being brought closer to pulley **20** permitting the outer end of the belt loop to be slid down over pulley **58**. Upon release of pressure on **36**, spring **28** raises the rear of arm **24** and pulleys **34** and tightens belt **72**. During use, as the belt stretches the spring **28** will continue to raise pulleys **34** and maintain working tension in the belt.

To remove a belt, pressure on the thumb press lever extension **36** will slacken the belt and permit easy removal and replacement.

It will be seen that different lengths of extension arms **46**, and different diameter pulleys **58** can readily be used, whenever the depths and sizes of surfaces to be ground dictate.

It should also be noted that the edges **22** of the casing top opening overhang the belt edges to a slight distance, which acts as a safeguard in the event of a belt break.

The beveled edges **50** of the support for pulley **58** prevent fraying of the lower edge of the belt and also minimize harmful contact with a work piece, while the 90° twisting of the belt assists in proper tracking of the same.

The invention provides a semi-circular grinding surface as the belt passes around the surface of pulley **58** and also flat grinding areas on each side of the arm extension **46**.

While the invention has been described in a certain specific form by way of illustration, the invention is not so limited, as modifications and changes can readily be made therein without departing from the spirit and scope thereof as defined in the appended claims.

What I claim as my invention is:

1. A hand tool grinding device having an endless abrasive surfaced belt powered by an electric motor, a plurality of pulleys for supporting said belt, and a casing including a hand grip and a switch for supporting and en-

closing said motor and a portion of said belt, the improvement consisting of:

a belt driving pulley attached to said motor and having its axis of rotation extending longitudinally in said casing,

a pair of spaced belt supporting pulleys having their axis of rotation extending transversely in said casing,

a belt supporting pulley mounted externally of said casing, with its axis of rotation extending vertically with respect to said casing,

said belt being entrained around all of said pulleys,

and resilient means mounted in said casing for maintaining tension in said belt and permitting easy removal and replacement of said belt.

2. The grinding device of claim **1** wherein an elongate arm pivoted in said casing supports said pair of spaced belt supporting pulleys and said externally mounted pulley.

3. The grinding device of claim **2** wherein said resilient means acts between said casing and said arm.

4. The grinding device of claim **3** wherein the arm at one end terminates in a thumb press extension, whereby manual pressure on said extension decreases the distance between the belt driving pulley and the pair of spaced belt supporting pulleys to permit removal and replacement of a belt.

5. The grinding device of claim **4** wherein said arm is made in sections to permit use of varying length sections to support said externally mounted pulley.

6. The grinding device of claim **5** wherin said arm section supporting the externally mounted pulley is provided on each side with platens for backing up the belt.

7. The grinding device of claim **6** wherein the casing has edges overlying a portion of the side edges of the belt to provide a safeguard in the event of belt breakage.

8. A hand tool grinding device having an endless abrasive surfaced belt powered by an electric motor, a plurality of pulleys for supporting said belt, and a casing including a hand grip and a switch for supporting and enclosing said motor and a portion of said belt, the improvement consisting of:

a belt driving pulley attached to said motor and having its axis of rotation extending longitudinally in said casing,

an elongate arm mounted in said casing and projecting longitudinally from said casing,

a belt supporting pulley mounted on the free end of said arm with its axis of rotation extending vertically with respect to the casing,

pulley means mounted adjacent said belt driving pulley, with its axis of rotation extending transversely of said casing,

said belt being trained about said belt driving pulley and said belt supporting pulley and passing over said pulley means between said belt driving and said belt supporting pulleys to cause said belt to straddle that portion of the arm projecting from said casing,

and resilient means for tensioning said belt.

9. The grinding device of claim **8** wherein said arm is pivotally mounted in said casing, said pulley means being mounted on said arm in said casing, and said resilient means acting between said casing and said arm.

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