Oct. 27, 1931. E. S. ERICKSON 1,829,440

PORTABLE GRINDING AND POLISHING DEVICE

Filed Sept. 14, 1929 2 Sheets-Sheet 1

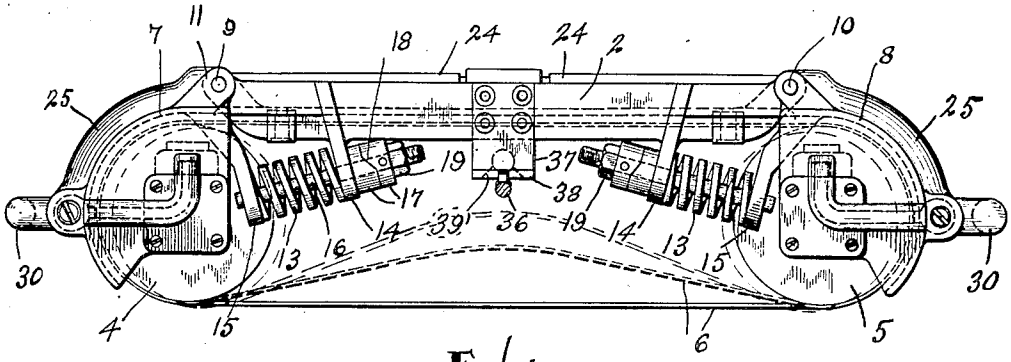


Fig. 1.

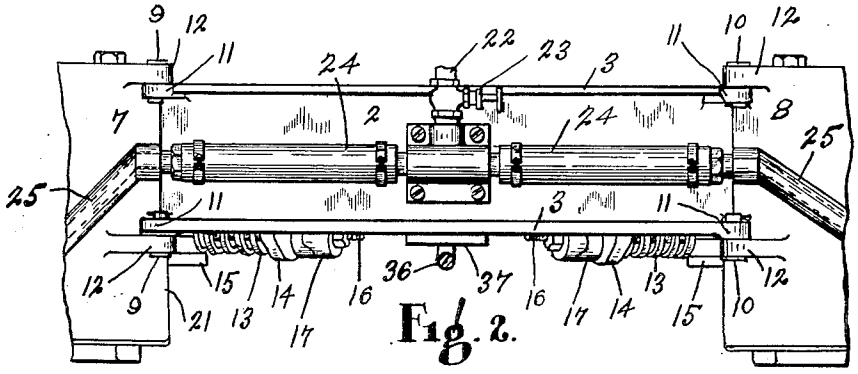


Fig. 2.

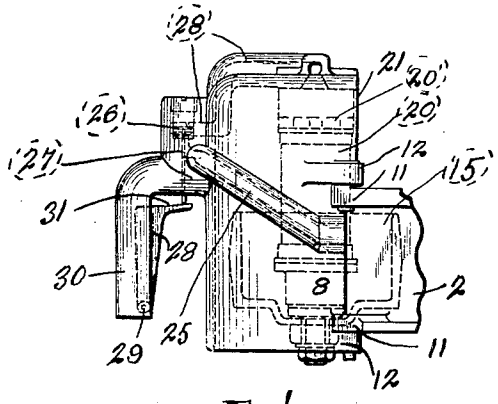


Fig. 3.

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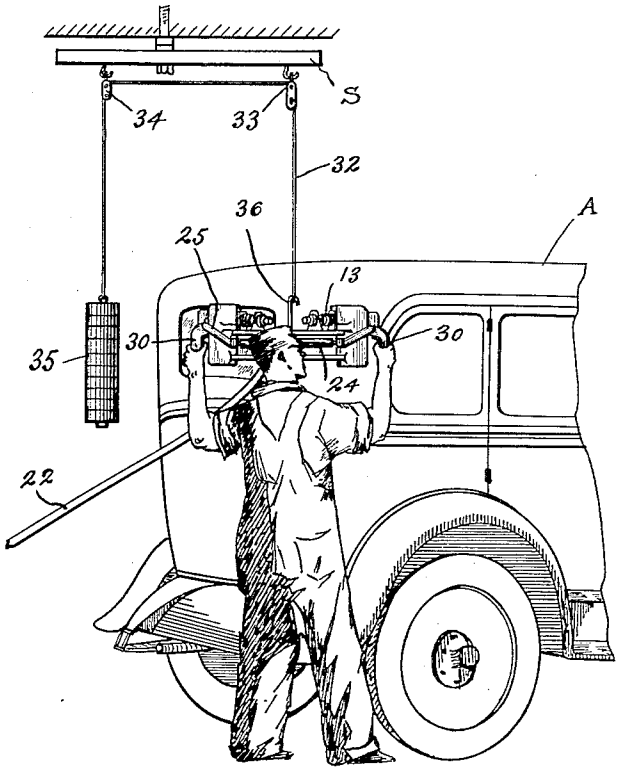


Fig. 4.

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1,829,440

UNITED STATES PATENT OFFICE

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PORTABLE GRINDING AND POLISHING DEVICE

Application filed September 14, 1929. Serial No. 392,630.

This invention relates to grinding and polishing, and more particularly to portable abrading and polishing devices; and it is among the objects of the invention to provide a portable tool for abrading and polishing, capable of convenient hand manipulation in application to work of irregular shape. A further object is the provision of a portable tool of such character driven by compact motive means. Another object is the provision of the abrading or polishing element in the form of an endless belt with a mounting readily capable of flexible contouring about irregular and convexed surfaces to be treated, allowing an improved procedure in accomplishment of a uniform and efficient abrading and polishing action. Another object is the provision of a pulley mounting for a flexible abrading belt such as to permit a yieldable compensative relative approach of the pulleys as occasioned by the contour requirements of the work to which the belt is applied. A further object is the provision of supporting means allowing tools of this general character to be readily swung into any position and angle of approach required. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain structure embodying the invention, this being illustrative however of but one of the various ways in which the principle of the invention may be employed.

In said annexed drawings:—

Fig. 1 is a plan view of an embodiment of the invention; Figs. 2 and 3 are side elevational views of details, parts being broken away; and Fig. 4 is a perspective view showing the device in use.

In the form illustrated, there is shown a portable frame 2, as an elongated plate-like member having flanges 3 projecting therealong, and carrying a pair of pulleys 4, 5, over which an abrasive or polishing belt 6 runs. Such belt may be of material as required in accordance with particular exigencies, but will ordinarily be of canvas or woven textile, although for light installations suitably resistant paper belts may be employed. Depending upon the particular character of the work, the belt may be faced with coarse, medium or fine abrasive material adherent thereto by suitable adhesive means, or the facing may be of smooth polishing character, the entire range of such being contemplated in the scope of usage herein. The pulleys carrying the belt are so mounted with respect to the frame as to allow of relative movement in approach. Various detail means may be employed for effecting such mounting, the pulleys being bodily slidable or swingable with respect to each other. A desirable form may comprise brackets 7, 8, pivoted to the frame as by pivot-pins 9, 10, these taking through suitable ears 11, 12, on the frame and on the brackets respectively. With such arrangement, the bracket arms 7, 8, are thus capable of an arcuate or swing movement with respect to the frame and with respect to each other, affording a range of approach and recession such that the belt 6 may be bowed in to whatever extent it may be necessary in following the contour of convexed or irregular work. Opposing the inward swing of the respective bracket arms is a suitable means tending to resiliently force the arms and their appendant pulleys outwardly, and whether by weight means or by springs, a resilient counter-thrust is had; for instance as in Fig. 1, the compression springs 13 seating between lugs 14 and 15 on the frame and on the bracket arm respectively may advantageously afford such thrust. The bolts 16 carrying the respective springs are desirably provided with collars 17 having mating inclined surfaces 18, and lock nuts 19 may complete the equipment for the bolts.

For driving the belt, any suitable motive means, electric or fluid pressure, etc., may be employed. Most advantageously the motor is incorporated directly with the pulley, and preferably therein, and thus within the housing extension of the general bracket-arm structure. In preferred arrangement, a

direct connected air motor is had, and such air motor is in the form of a compact rotary driver 20, having its rotor shaft secured to the pulley and having a speed governor 20′, the precise further detail being immaterial to the present description and needing no further reference. An air pressure supply line, as a hose 22 provided with a cut off valve 23, leads to a distributing head from which branches 24 proceed to the respective motors. These branches are desirably in the form of flexible hose connections with sufficient slack to allow of the excursions of movement to which the bracket assemblages carrying the motors and pulleys may be subjected. With substantially equal branches to the motors and one main control valve, the motors may be readily controlled in balance. Or with individual valves and speed governors, control in balance may also readily be had. In each bracket housing 21, a duct 25 leads to a control valve 26, which is conveniently actuable by the operator, and may comprise a valve disk on a stem 27, spring supported to normally maintain the valve shut. The valve 26 controls a port leading to duct 28 and to the rotor of the motive device. The stem 27 of the valve may be conveniently and easily operated by a lever 29 pivoted as at 29′ in the handle 30, the lever having a cam end 31 such that on the operator's pressing the lever 29 inwardly of the handle, the cam 31 rides against the valve stem shoving it lengthwise and opening the valve. On release of the hand pressure against the lever 28, the spring returns the valve and lever to normal or closed position.

Although a construction of this character can be made quite light, ordinarily it is desirable to mount the entire device on a support carrying the weight and allowing angular movement in various meridians and bodily translational movement. With a flexible connection or a freely swiveling arm, as a universal joint connection, the tool may be swung thereabout as center, and if this be near the center of gravity but slight effort is required to turn the device in whatsoever direction desired. A cable and spring or gravity controlled counter-thrust or run-out particularly if suspended from a swing arm above, may further facilitate general movement of the device; as for instance in Fig. 4, the tool being suspended from a cord or cable 32 running over sheaves 33, 34, to a counterweight 35. With a swingable support S, an amply wide range of movement may be had. An overhead suspension movable in suitable range is in fact desirable also in cases with the motor drive separate from the tool and connected by flexible shaft. Connection to the tool may be made by a universal joint allowing the tool to be easily turned to all angles. For instance, an arm 36 which may have an enlarged or ball-head secured in a lug 37 by a closure plate 38, the latter having cut-out clearance as at 39 to allow ample range of movement.

In sanding or polishing an article, for example in sanding an automobile body A, the operator grasps the tool by the two handles 30, and with the valve 23 opened, then controls the valves to the rotors by pressing the levers 29, and with the belt 6 in operation, brings the tool against the body, the belt 6 as a rapidly moving flexible surface contouring thereagainst and following the varying form of the object. By pressing upon the handles, the springs 13 yield, allowing the belt 6 to lap evenly against the convex surface of the body while under uniform tension. In such manner, the tool is moved along over the surface to be treated, and the flexible tension character of the abrading element is thus seen to peculiarly well follow the varying contour of the rounded type of structure now common and ordinarily presenting much difficulty for proper treatment in the usual manner.

With speed governors on the motors, these may be set so that irrespective of inaccuracy of local valve control, a uniform pull by the motors is had, and the belt is capable of readily adapting itself to whatever change of form is required by the work.

It will be noticed that a very large working surface can be applied to the article being treated, and with an evenness of application, so that a striking uniformity of result is had; and with a driving speed rate of 4,000–12,000, preferably 8,000–10,000, feet per minute for the belt, a superior product results with superior efficiency.

In accordance with the precise character of the surface of the belt employed, coarse grinding or abrading, medium and fine or smooth polishing may be accomplished, the flexible and tensioned character of the belt element providing effective application following the contour of the surface treated, and the amount of pressure in any instance being simply and conveniently controlled by the operator as he advances the tool over the surface.

Other modes of applying the principle of the invention may be employed, change being made as regards the details disclosed, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, a portable rigid longitudinal frame, spaced pulleys carried thereby movable relative to the frame and movable toward and away from each other, elements on said frame movably supporting said pulleys, an abrasive belt on said pulleys having a freely unbacked run therebetween, yieldable means for tensioning

the belt, and manually controlled means for moving the pulleys relative to the frame and toward each other.

2. In a device of the character described, a portable rigid longitudinal frame, means supporting said frame to be freely orientable in all directions without imposing its entire weight on the operator, supporting elements movably connected to said frame, pulleys carried by said supporting elements, an abrasive belt on said pulleys having an unbacked run therebetween, and manually controlled means in common for steering the device against the work and also varying the arc of such unbacked run to follow the contour of the work being treated.

3. Means for smoothing the sides and top of automobile bodies and the like, comprising an abrasive belt having a freely unbacked run adapted to present its working face in a working plane, a portable frame, supporting elements freely movable relative to the frame and to and from each other, pulleys carried by said supporting elements, said belt being carried by said pulleys, yieldable means for tensioning the belt, manually controlled means for moving the pulleys toward each other for varying the arc of the unbacked run of the belt to follow the contour of the work being treated, and means supporting said frame freely orientable and movable up and down in all directions without imposing its entire weight on the operator.

4. In a device of the character described, a portable rigid frame, supporting elements movably connected to said frame, spaced pulleys carried by said supporting elements, an abrasive belt on said pulleys having a freely unbacked run therebetween, a fluid pressure motor direct-connected to one of the pulleys, and manually controlled means for moving the pulleys relative to the frame and toward each other to carry the belt coincident with the contour of the work being treated.

5. In a device of the character described, a portable rigid frame, spaced pulleys carried by said frame, elements carried by said frame movably supporting said pulleys, an abrasive belt on said pulleys having a freely unbacked run therebetween, a driving motor connected to each said pulley, and manually controlled means for moving the pulleys relative to the frame and toward each other to carry the belt coincident with the contour of the work being treated.

6. In a device of the character described, a portable rigid frame, spaced pulleys carried by said frame elements carried by said frame movably supporting said pulleys, an abrasive belt on said pulleys having a freely unbacked run therebetween, a fluid pressure motor direct-connected to each pulley, and manually controlled means for moving the pulleys relative to the frame and toward each other to carry the belt coincident with the contour of the work being treated.

Signed by me this 9th day of September, 1929.

EDWARD S. ERICKSON.