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RESURFACING AND FINISHING MACHINE

Filed Nov. 5, 1959

2 Sheets-Sheet 1

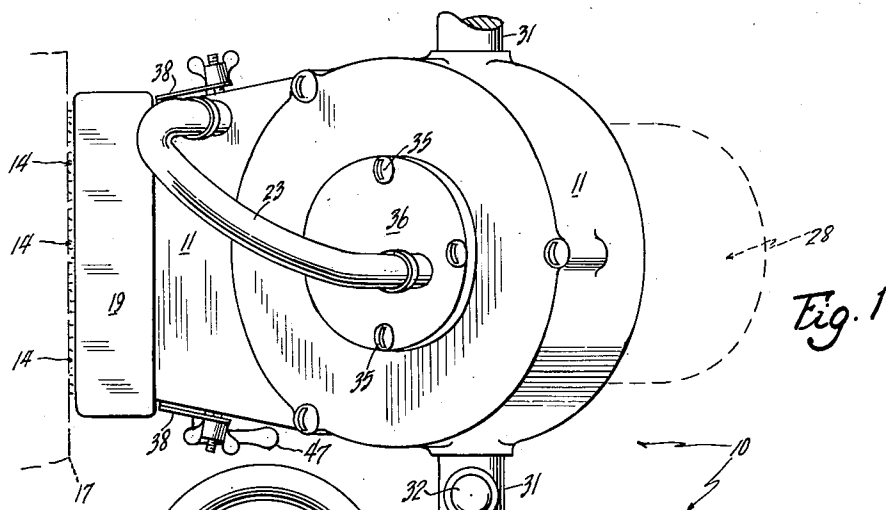


Fig. 1

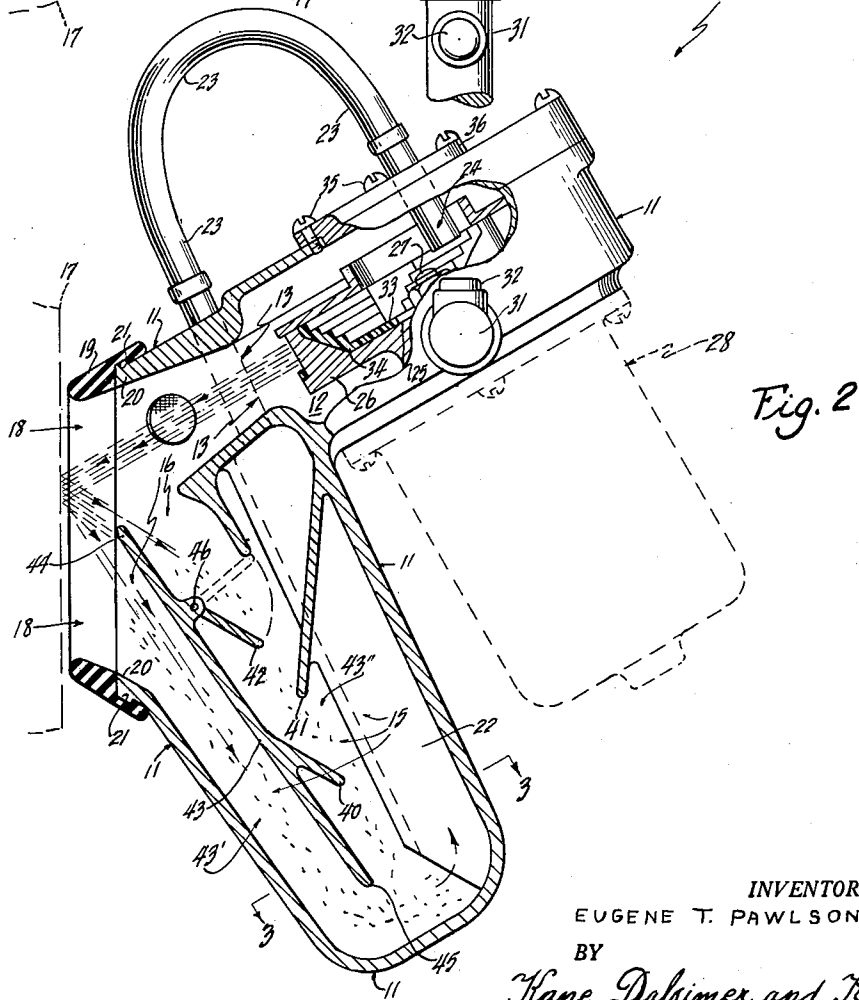


Fig. 2

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2 Sheets-Sheet 2

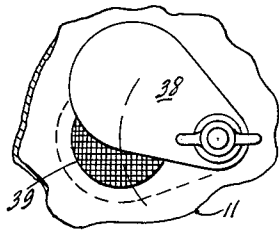


Fig. 6

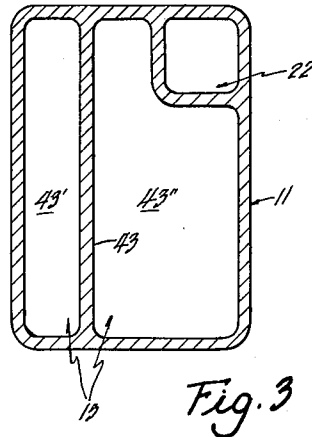


Fig. 3

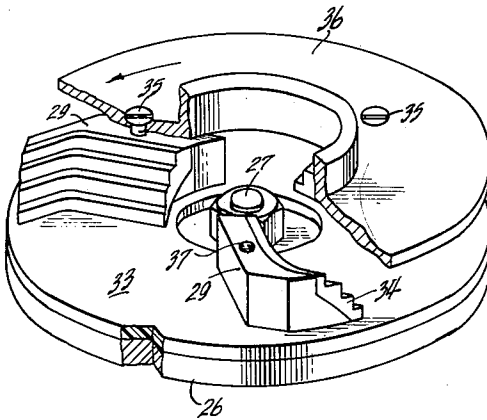


Fig. 4

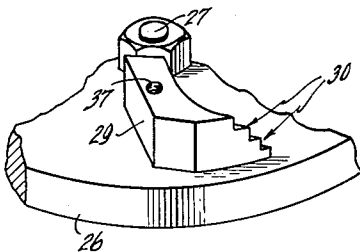


Fig. 5

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RESURFACING AND FINISHING MACHINE
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 8 Claims. (Cl. 51—9)

This invention relates to an improved type of surface finishing or re-finishing device, having particular reference to such a device that is a self-contained unit for treating plane, curved, or even irregular surfaces, whether held substantially horizontally or vertically, by impinging there against and rebounding therefrom abrasive or other particles traveling at high velocity and continuously recovering the particles and recycling the same, and the provision of such a device is the principal object of the invention.

I am well aware that there are many sand-blasting or sand-throwing devices but these are distinguishable in structure and function from the present invention which utilizes a combination and arrangement of parts that has greater universality in accomplishing new and improved results that are unobvious of attainment from previous devices.

Generally, it is an object of the invention to provide such a device that is economic of manufacture, simple, yet sturdy and durable of construction, which will operate with relative freedom from wear and tear or other mechanical difficulties, and that is well suited to the purposes for which it is intended.

More specifically, it is an object of the invention to provide such a device in the form of a self-contained unit, which comprises a housing having a first chamber with an outlet for expelling abrasive or other particles therefrom, a second chamber connected to the first chamber which has an inlet that is angularly disposed adjacent to such outlet for recovering the particles therein, an outlet-inlet opening in the housing in common communication with the outlet and inlet of both said chambers through which such particles are ejected from the first chamber to be impinged against such surface and rebounded by deflection into the second chamber, a return passage for the particles from the second to the first chamber, and rotary means within the first chamber to eject the particles therefrom, and simultaneously to recycle rebounded particles thereto from the second chamber by means of such passage.

Another object of the invention is to provide the second chamber with a plurality of baffles extending transversely of its walls to collect and maintain the rebounded particles in the bottom of the chamber.

A further object is to provide a transverse partition between the side walls of the second chamber but spaced from the bottom thereof to form an inner and outer passage for directing rebounding particles to the chamber bottom when the outlet-inlet opening is held at a substantially angular position from the horizontal.

Yet another object is to provide such a partition with a hinged baffle on its inner side, intermediate its ends, to close off the inner passage when the outlet-inlet opening is tilted to a substantially horizontal position.

Another specific object is to provide a return passage for such particles in the form of a conduit extending from adjacent the bottom of the second chamber which terminates at its opposite end within the first chamber with its axis substantially normal to and offset from the center of the rotary means.

A further specific object is the provision of a rotary means comprising a disk and a plurality of radially disposed particle throwing sweeps mounted on its upper surface.

It is also an object to provide sweeps that are curved at their outer ends in the direction of the ejecting outlet,

the sweeps preferably being radially grooved or rearwardly stepped along their throwing surfaces.

Another object of the invention is the provision of such rotary means wherein the upper side of the disk and the forward side of the sweeps are faced with a plastic material, preferably in the form of a removable plastic disk having upstanding plastic sweeps conforming in configuration to the first sweeps, with openings in the plastic disk to receive the same in order that such plastic disk can be fitted into face-to-face relation with the underlying disk and sweeps as protection against the abrasive particles.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts that will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a top view of an embodiment of the device tilted into operative position;

FIG. 2 is an elevational view, with parts broken away and partly in section, of FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 and looking in the direction of the arrows;

FIG. 4 is a perspective view, with parts broken away and partly in section, illustrating a partially plastic faced rotary means;

FIG. 5 is a perspective view of a fragmentary portion of such a rotary member without the plastic facing; and

FIG. 6 is an elevational view of a fragmentary portion of the housing illustrating a form of air valve to regulate the volume of air being recycled with such particles.

Referring now more particularly to the drawings, there is indicated generally at 10 such a device which constitutes a self-contained unit.

Such a unit includes a housing indicated generally at 11, having a first chamber 12 with an outlet indicated generally at 13 for expelling abrasive or other particles tangentially therefrom, as indicated by the arrows in FIG. 2, in a sweeping pattern across a surface 17 as shown generally at 14 in FIG. 1.

The housing 11 is provided with a second chamber indicated generally at 15 that is connected to the first chamber 12 as part of the housing 11. This second chamber has an inlet opening indicated generally at 16 that is angularly disposed adjacent the outlet 13 for recovering the particles passing there-through, after they have been rebounded from the surface 17 and deflected downwardly, into the chamber 16, also as indicated by the arrows in FIG. 2.

An outlet-inlet opening, indicated generally at 18, in the housing 11 is in common communication with the outlet 13 of the chamber 12, and the inlet 16 of the chamber 15. It is of particular importance to note that the outlet-inlet 18 is angularly disposed with respect to the chamber 12 and 15 so that the device should be operated in a tilted position, as shown in FIG. 2, in order that the rebounding particles properly will be deflected to be captured by the second chamber 15 and fall to the bottom thereof. This will be possible since such particles must pass through the outlet-inlet opening 18 to be ejected from the first chamber outlet 13 and be impinged against the surface 17, whether or not the latter be plane, curved or irregular, and the particles will be rebounded properly and deflected into the second chamber.

In order that the outlet-inlet opening 18 may enhance

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the efficacy of the operation, it should be provided with a soft, resilient shroud or grommet 19, made of rubber or other suitable material, which readily can be replaced by other similar shrouds of different configuration by slipping the same over the end portion 20 of the housing 11 to be engaged by the lip 21 peripherally surrounding such end portion. With such an arrangement the shroud can be held closely adjacent to surface 17 or placed directly in contact therewith.

In order to return the particles from the bottom of the inner chamber 15, where they in part will have settled and in part will be in a swirling condition, there is provided a passage-way in the form of a conduit 22 which preferably is rigid and made integral with the chamber 15 along one corner thereof to terminate in an opening adjacent the bottom. The remaining portion of the conduit may consist of a resilient pipe, or rubber hose connection 23, that extends from the portion 22 upwardly and out of the top of the housing and downwardly to penetrate the chamber 12, as indicated generally at 24. It will be observed that this end of the hose has its axis substantially perpendicular to a rotary means indicated generally at 25 in the chamber 12. Of particular importance is the fact that the end of the hose 24 is off-set from the center of the rotary means to provide a maximum sweep and throwing effect for the particles as will more fully appear hereinafter.

The rotary means 25 comprises a disk 26 mounted to rotate with a shaft 27 that may constitute the shaft of any suitable low horsepower motor 28 indicated in dotted line position. On the upper surface of the disk 26 there is provided a plurality of radially disposed particle throwing sweeps 29 which preferably are curved at their outer ends in the direction of the ejecting outlet 13 as shown in drawing. Preferably, also, these sweeps on their forward faces are radially grooved, or stepped, as indicated generally at 30. The offset position of the end of the conduit 24, above mentioned, it will be observed, is such that it falls in approximately the 3rd quadrant overlying the sweeps, i.e., in such a position as to feed the particles to the sweeps in a manner such that the particles will be swept outwardly towards the ends thereof, after the particles have passed through an arc within a range of approximately 180° to 270° tangentially to be ejected or sprayed in a swept pattern from the outlet 13, and, consequently, through the outlet-inlet 18 across the surface 17, as above indicated.

The above described device, being readily portable and self-contained, may be provided with dual handles oppositely disposed on the housing, such as those indicated at 31, one of which may be provided with a push button switch 32 to start and stop the motor 28.

It will be understood that the high velocity of the abrasive particles, when such are used, might readily tend to wear down the sweeps, especially at their ends, and to avoid this such sweeps should be made of any suitable hard metal that would be unaffected by such action of the particles. However, in certain cases where such hard metal might prove to be too expensive, I propose to face or coat the leading surfaces of the sweeps with a suitable plastic material. Preferably, I do this by providing a readily removable or replaceable plastic disk 33, i.e. of the same diameter as the metal disk 26. Radially disposed on the plastic disk, preferably integral therewith and upstanding therefrom are a plurality of plastic sweeps 34 that conform in configuration to the stepped surfaces 30 of the sweeps 29. The disk 33, behind the plastic sweeps 34 is provided with openings to the rear thereof that conform in configuration to the base of such sweep 29 so that the plastic disk can be placed over the metal disk 26. The sweeps 29 will penetrate said openings so that the stepped plastic surfaces 34 will be brought into face-to-face relation with the sweeps 29 and the bottom of the plastic disk 32 will come to rest in face-to-

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face relation on its bottom side with the upper surface of the disk 26.

Such plastic disks are readily replaceable by merely removing screws 35 that pass through a cover plate 36 to enter the threaded openings 37 in the metal sweeps 29.

Since the rotary means 25 creates a vacuum by sucking air as well as particles through the conduit 22, to distribute such particles off center of the rotary means, it is desirable to be able to control the volume of such air being circulated. This is readily done by an adjustable cover plate or plates 38 covering the screened opening 39 at one or both sides of the housing 11 as shown in FIG. 6.

As above indicated the device is intended to be tilted when in operation as shown in FIG. 2. That is to say, it is tilted with respect to the outlet-inlet opening 18 so that the particles are angularly deflected into the return chamber 15.

As shown in FIG. 2, the device is held against a vertical surface but it can be held against any surface that is angularly disposed to the horizontal. However, when the face of the outlet-inlet opening 18 is held against a surface that is substantially horizontal, there is some danger that the accumulated particles in the chamber 15 may fall out of the outlet-inlet opening 18. To prevent this, the chamber 15 has been suitably provided with baffles. Let it be noted that, regardless of the position of the device, whether being used vertically or angularly with respect to the horizontal, there is provided a plurality of downwardly sloped baffles 40, 41 and 42 that extend transversely of the side walls of the chamber 12. Two of these baffles, namely, 40 and 42 are connected to a transverse partition or wall 43 that extends from a line approximately midway of the outlet-inlet opening 18, as at 44, to terminate short of the bottom of the chamber as at 45, thereby forming a double passage indicated generally at 43' and 43'' that are in communication at the bottom of the chamber 15 adjacent the opening of the conduit portion 42.

It will also be observed that the baffle portion 42 is hinged to the transverse partition, as at 46, so that the latter can be turned to the dotted line position by means of a handle 47 (see FIG. 1) to close off the chamber 43'' when the device is so tilted with the outlet-inlet opening 18 against a surface that is substantially horizontal. This will prevent such particles from falling out of the outlet-inlet; and those already collected in the chamber 15 will be prevented from falling from that chamber section 43' by the rebounding particles being deflected therein and the increased suction pulling them through the recycling conduit.

Such a device has many advantages and improvements and provides a substantial number of new results. The particles are constantly re-used by being rebounded from the surface being treated and recovered by the trap or chamber 15 and so are readily subjected to recycling for re-use. This makes for economy because such a particle suction or recycling system provides a light and well-diffused supply of such particles to the throw-blades or sweeps 29. Also, the removable or replaceable plastic plates are for "throw-away" or disposable purposes. This provides an advantageous element of economy. Various sweeps of varying design may be used and the rubber work shield or shroud 19 may be curved or so configured as to substantially encompass irregular or circular pieces to be treated. The device may be so held that the particles can be thrown horizontally, vertically or at any angle to achieve the desired result. The portability of the device provides for various uses in workshops or homes, for finishing masonry, woodwork or metal, including use in foundries, as well as auto body shops and the like. In place of abrasive particles, metallic shot may be used for peening or antiquing purposes and the like; and surfaces that are old and rusted, such as gas and oil storage tanks, may be cleaned for subsequent paint applications.

Since certain changes may be made in the above construction, and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention what I claim as new, and desire to secure by Letters Patent is:

1. In a device of the character described, for use in treating plane, curved and irregular surfaces by impinging thereagainst and rebounding therefrom abrasive particles traveling at high velocity and continuously recovering the rebounding particles to recycle the same, comprising a self-contained unit, including a housing having a first chamber with an outlet for expelling said particles therefrom, a second chamber connected to said first chamber and having an inlet angularly disposed adjacent said outlet for recovering said particles therein, an outlet-inlet opening in said housing in common communication with the outlet and inlet of said chambers and angularly disposed thereto through which said particles are ejected from said chamber outlet to be impinged against such surfaces and rebounded by deflection into said second chamber, means providing a return passage for said particles from said second to said first chamber, and a disk disposed within said first chamber and rotatably mounted therein with a plurality of radially disposed particle throwing sweeps mounted on the upper surface of said disk, whereby to propel said particles therefrom and simultaneously to create an air flow to move particles from said second chamber through said passage.

2. In a device as set forth in claim 1, and wherein said sweeps are curved at their outer ends in the direction of said first chamber outlet.

3. In a device as set forth in claim 1, and further characterized in that said sweeps are radially grooved on their forward faces.

4. In a device according to claim 3, in which said grooves are rearwardly stepped.

5. In a device as defined in claim 1, and further characterized in that said housing is provided with an air valve to regulate the volume of air being recycled with said particles.

6. In a device of the character described, for use in treating plane, curved and irregular surfaces by impinging thereagainst and rebounding therefrom abrasive particles traveling at high velocity and continuously recovering the rebounding particles to recycle the same, comprising a self-contained unit, including a housing having a first chamber with an outlet for expelling said particles therefrom, a second chamber connected to said first chamber and having an inlet angularly disposed adjacent said outlet for recovering said particles therein, an outlet-inlet opening in said housing in common communication with the outlet and inlet of said chambers and angularly disposed thereto through which said particles are ejected from said chamber outlet to be impinged against such surfaces and rebounded by deflection into said second chamber, means providing a return passage for said particles from said second to said first chamber, a rotary disk within said first chamber to eject said particles therefrom and simultaneously to recycle rebounded particles thereto from said second chamber through said passage, a plurality of radially disposed sweeps mounted on the upper surface of said rotary disk, and a removable plastic disk having upstanding plastic sweeps conforming in configuration to said first sweeps, with openings

in said plastic disk to receive said first named sweeps, whereby said plastic disks and sweeps are fitted into face-to-face relation to provide protective surfaces for said first disk and first named sweeps against said abrasive particles.

7. In a device of the character described, for use in treating plane, curved and irregular surfaces by impinging thereagainst and rebounding therefrom abrasive particles traveling at high velocity and continuously recovering the rebounding particles to recycle the same, comprising a self-contained unit, including a housing having a first chamber with an outlet for expelling said particles therefrom, a second chamber connected to said first chamber and having an inlet angularly disposed adjacent said outlet for recovering said particles therein; an outlet-inlet opening in said housing in common communication with the outlet and inlet of said chambers and angularly disposed thereto through which said particles are ejected from said chamber outlet to be impinged against such surfaces and rebounded by deflection into said second chamber, means providing a return passage for said particles from said second to said first chamber, rotary means within said first chamber to eject said particles therefrom and simultaneously to recycle rebounded particles thereto from said second chamber through said passage, a plurality of baffles in said second chamber extending transversely of its walls to collect and maintain the rebounded particles in the bottom thereof, a baffle of said plurality comprising a transverse partition extending between side walls of said second chamber but spaced from the bottom thereof to provide an inner and an outer passage for directing rebounding particles variously deflected to said bottom when said outlet-inlet opening is held at a substantially angular position from the horizontal and a hinged baffle on the inner side of said partition intermediate its ends whereby to close off said inner passage when said outlet-inlet opening is tilted to a substantially horizontal position.

8. In a device of the character described, for use in treating plane, curved and irregular surfaces by impinging thereagainst and rebounding therefrom abrasive particles traveling at high velocity and continuously recovering the rebounding particles to recycle the same, comprising a self-contained unit, including a housing having a first chamber with an outlet for expelling said particles therefrom, a second chamber connected to said first chamber and having an inlet angularly disposed adjacent said outlet for recovering said particles therein, an outlet-inlet opening in said housing in common communication with the outlet and inlet of said chambers and angularly disposed thereto through which said particles are ejected from said chamber outlet to be impinged against such surfaces and rebounded by deflection into said second chamber, conduit means providing a return passage for said particles from said second to said first chamber, a disk, a plurality of radially disposed sweeps mounted on said disk, means for rotating said disk to propel said particles therefrom and simultaneously to create an air flow to remove particles from said second chamber toward said passage, said disk being wholly disposed within said housing, and a removable protective cover formed to receive said sweeps and to protect the same in operation against abrasive particles.

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