Sept. 27, 1938. N. J. QUINN 2,131,143

ABRASIVE PROJECTING APPARATUS

Filed Sept. 23, 1935 2 Sheets-Sheet 1

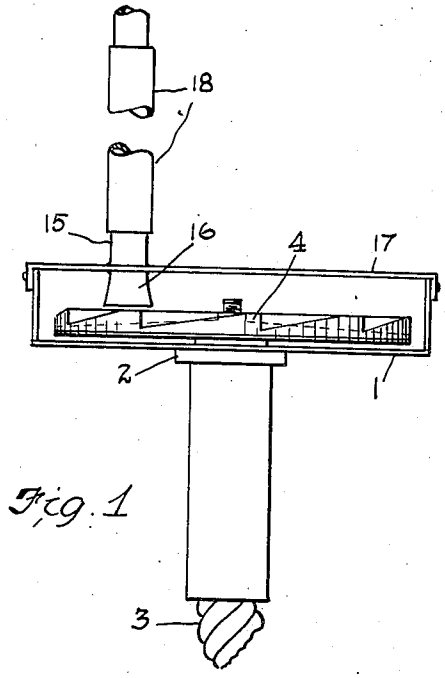


Fig. 1

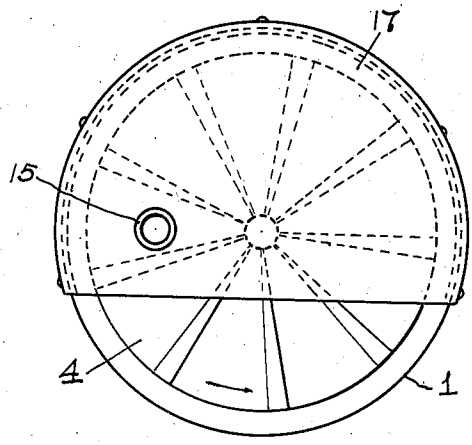


Fig. 2.

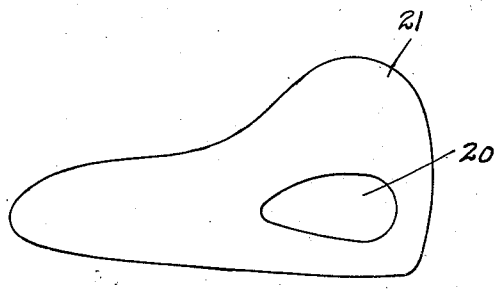


Fig. 3.

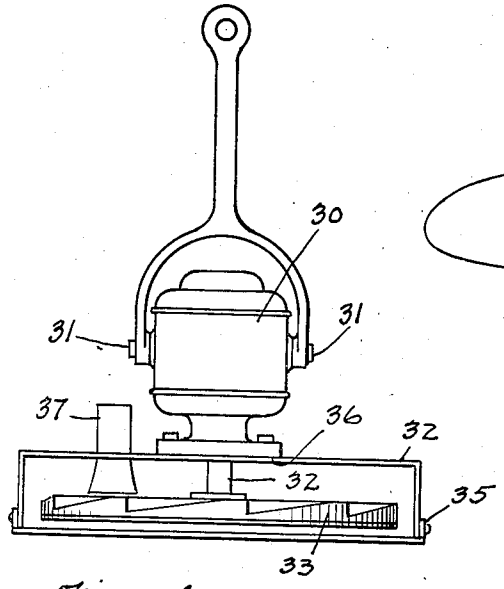


Fig. 4

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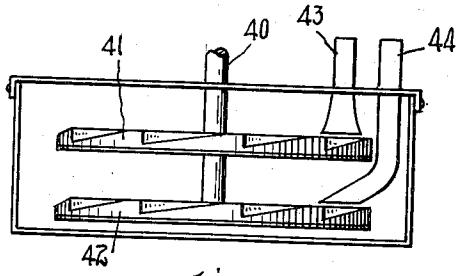


Fig. 5.

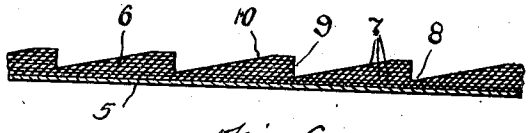


Fig. 6

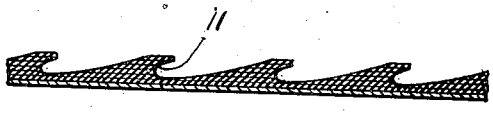


Fig. 7.

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UNITED STATES PATENT OFFICE

2,131,143

ABRASIVE PROJECTING APPARATUS

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Application September 23, 1935, Serial No. 41,653

6 Claims. (Cl. 51—9)

The present invention, relating as indicated to an abrasive projecting apparatus, is directed more particularly to a mechanical abrasive projecting apparatus for use in cleaning or surfacing the vertical sides or walls of such articles as castings, sheets, plates, buildings and the like. The principal object of the invention is the provision of a simple and compact mechanical abrasive apparatus adapted to project abrasive in relatively horizontal planes.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail certain means of carrying out the invention, such disclosed means illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a side elevation of a portable device embodying my invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a front elevation of a sheet abraded by my device showing the pattern or shape of the abraded area;

Fig. 4 is a side elevation of a modification of the device of Fig. 1;

Fig. 5 is a similar view showing a second modification;

Fig. 6 is a partial transverse section of the projecting element of Fig. 1; and

Fig. 7 is a similar view showing a modification of this projecting element.

Referring now to Fig. 1, the device there shown consist of a casing 1 secured to a hand spindle or handle 2 intended to be held by the operator, through which passes a flexible shaft 3 which may be connected to any suitable source of power. At its upper end the flexible shaft 3 is rotatably fixed in the hand spindle 2, and on the extending end of the flexible shaft is mounted a projecting element in the form of a disk 4. The projecting element 4 consists of a flat circular metal disk 5, to which is securely bonded all over its area a composition disk 6 of rubber or some similar material, reinforced throughout its entire area by various layers of woven reinforcing material 7, such as tough canvas or the like. The composition disk 6 is provided with a series of equidistantly spaced radially extending recesses or notches 8, the recesses being provided with an abrasive projecting face 9 at substantially right angles to the plane of the metal backing 5 and with an inclined surface 10 extending from the right-angled face toward the next radial recess.

A modification of the projecting element shown in Fig. 6 is illustrated in Fig. 7, and the only change consists in the under cutting of the projecting faces 11 so that these are now curved and concave with respect to the direction of motion instead of being flat as in the construction already described. The purpose and advantage of this modification will be referred to hereinafter.

Referring again to Fig. 1, there is mounted above the projecting element 4 a conduit 15 which is preferably of circular cross-section and is provided with an elongated discharge nozzle 16 disposed radially with respect to the element 4 and mounted closely adjacent to the upper surface thereof. This feed conduit 15 is fixed in a removable cover plate 17, which is secured to the casing and it will be understood that a flexible conduit 18 may be secured over the end of conduit 15, and may lead to any suitable reservoir of finely divided abrasive. The casing 1 and cover 17, which jointly constitute the enclosure for the abrasive projecting element, enclose the latter on the bottom and around about two-thirds of the sides and across about two-thirds of the top, leaving an opening, which is shown at 19 in Fig. 2, through which the abrasive may be projected through the abrasive element. In operation the flexible shaft is rotated, the operator holding the device in substantially the position of Fig. 1, that is, with the projecting element substantially horizontal. Abrasive is allowed to flow through the feed conduit, from which it discharges into the notches 8 in the projecting element. At a high speed of rotation the abrasive partially fills the notches, lying principally against the projecting faces 9 in the form shown in Fig. 6, and the face 11 in the form shown in Fig. 7. Angular velocity is imparted to the abrasive particles and they are thrown off tangentially from the disk after being carried through about one quarter of a revolution.

The projecting element should be rotated at a speed which will give an edge speed to the disk, and hence to the particles which are thrown off, of between 10,000 and 15,000 feet per minute for the most severe types of abrading work, although obviously slower speeds may be employed for less severe operations. Of the abrasive projected from the edges of the disk, more than 80% strike a plate held several feet away in a concentrated pattern, indicated by the area 20 in Fig. 3. The

balance of the abrasive scatters somewhat and covers an area which is indicated by the numeral 21 in the same figure, the partly cut or abraded portion being the inner area 20. By employing concave throwing faces, as indicated in Fig. 7, the amount of scattered discharge can be materially reduced and the sharpness of the fully abraded area considerably increased.

In Fig. 4 there is shown a modification of the device of Fig. 1, the modification consisting in the reversal of the relation between the projecting element and the driving unit. In this apparatus a motor 30 is mounted in such a way that it may be pivotally supported from the bearings 31. The motor shaft is mounted vertically, and on the lower end of the shaft 32 is secured the projecting element 33. This element is enclosed within a housing 34 provided with a cover 35, similar in construction and relation to those described in Fig. 1, except that the casing 34 is now bolted to the lower face 36 of the motor housing. A feed pipe 37 projects through casing 34 and is disposed in the same relation to the projecting element as in the preceding type of construction. An apparatus of the type shown in Fig. 4 may be used and is preferred where the relatively higher projecting speeds of between 12,000 and 15,000 feet per minute are required as the projection of any large quantity of abrasive at such speed involves the use of more power than can be conveniently and economically secured through a portable flexible shaft type of machine, such as shown in Fig. 1.

Where it is desired to throw a very large quantity of abrasive, two or even more projecting devices may be employed directly connected to the same shaft and driven at the same speed thereby. In Fig. 5 there is shown a vertically disposed shaft 40, on which are mounted spaced projecting elements 41 and 42, each of which is of the character of the projecting element 4 of Fig. 1. Abrasive material is supplied to the upper projecting element 41 by conduit 43 in the same manner as in the apparatus previously described. To the lower projecting element abrasive is supplied through an angular conduit 44, and in an apparatus of this type it is necessary that the two projecting elements be sufficiently spaced to permit of the conduit 44 being inserted at an angle between the two elements, and the angle must be sufficiently close to the vertical so that finely divided dry abrasive may feed through this conduit.

The present apparatus may be used either individually for the cleaning of the side walls of a building, the side walls of large castings and the like, or they may be used in pairs to clean both sides of castings or other articles mounted upon a continuing element which successively passes the castings between the two paths of projection of the abrasive from the two units. The projection of abrasive mechanically by the means herein described is very much more economical than the projection of abrasive by air pressure and a much larger volume of material may be thrown from an apparatus of given size. Either natural abrasives, such as sand, or artificial abrasives, such as metallic grit and other artificially produced cutting materials may be used. Furthermore, the term "abrasive" as herein used is intended to include all materials which may be employed in the apparatus described for the surfacing of other materials, either for the removal of material therefrom or for the application of material thereto which is removed from the particles as they strike against the surface operated upon.

Other forms may be employed embodying the features of my invention instead of the one herein explained, change being made as regards the means herein disclosed, provided the elements stated by any of the following claims or the equivalent of such stated elements be employed.

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

1. In sand projecting mechanism of the character described, a rotatable shaft, a disk mounted thereon, a comparatively thick layer of yieldable composition bonded to one surface of said disk and composed of alternate layers of a fibrous web and an amorphous resilient material, radial notches cut in said yieldable layer, a fixed plate mounted parallel with said disk and spaced therefrom on the side carrying the yieldable material, said cover plate covering more than half of the disk and leaving uncovered less than half the disk, a cover portion lying about the periphery of said cover plate and projecting axially of the shaft beyond the metal disk mounted thereon, and an abrasive feed opening in said cover plate eccentrically of the shaft axis and adjacent the region where the rotating disk emerges from beneath said cover plate whereby abrasive fed to said disk is thrown therefrom during passage of the same through the uncovered region in a substantially concentrated pattern.

2. In sand projecting mechanism of the character described, a rotatable shaft, a disk mounted thereon, a comparatively thick layer of yieldable composition bonded to one surface of said disk and composed of alternate layers of a fibrous web and an amorphous resilient material, radial notches cut in said yieldable layer having one side lying in a plane passing through the shaft axis and the other side of the notch lying in a plane intersecting the disk and layer axis of rotation, a fixed plate mounted parallel with said disk and spaced therefrom on the side carrying the yieldable material, said cover plate covering more than half of the disk and leaving uncovered less than half the disk, a cover portion lying about the periphery of said cover plate and projecting axially of the shaft beyond the metal disk mounted thereon, an abrasive feed opening in said cover plate eccentrically of the shaft axis and adjacent the region where the rotating disk emerges from beneath said cover plate whereby abrasive fed to said disk is thrown therefrom during passage of the same through the uncovered region in a substantially concentrated pattern.

3. In sand projecting mechanism of the character described, a rotatable shaft, a disk mounted thereon, a comparatively thick layer of yieldable composition secured to said disk and composed of alternate layers of a fibrous web and an amorphous resilient material, notches cut in said yieldable layer and extending from a region adjacent the shaft to the periphery thereof, means to feed abrasive to said yieldable layer where it will be picked up by said notches and projected at the periphery of the notches upon rotation of the disk.

4. In sand projecting mechanism of the character described, a rotatable shaft, a disk mounted thereon, a comparatively thick layer of yieldable composition bonded to one surface of said disk and composed of alternate layers of a fibrous web and an amorphous resilient material, notches cut in said yieldable layer and extending from a re-

gion adjacent the shaft to the periphery of the layer, a cover fixedly mounted with respect to said disk and spaced therefrom on the side of the same carrying the yieldable material and partially enclosing the disk, an abrasive feed opening in said cover eccentrically of the shaft axis and adjacent the region where the rotating disk is unenclosed by said cover whereby abrasive fed to said disk is discharged during passage of same through the unenclosed region in a substantially concentrated pattern.

5. In sand projecting apparatus of the character described, a shaft, a disk unit mounted thereon and adapted to be normally rotated in one direction, said disk unit including a plurality of throwing faces shaped to comprise radial guideways extending from a region adjacent the axis of the disk to the outer periphery thereof, said guideways each including a throwing face open in the normal direction of the rotation of the shaft, the material directly underlying said faces comprising alternate layers of a fibrous web and an amorphous resilient material, and means to feed abrasive to said disk to be picked up by the said throwing faces and projected at the periphery of the notches upon rotation of the disk.

6. In sand projecting apparatus of the character described, a shaft, a disk mounted thereon and adapted to be normally rotated in one direction, a plurality of notches in said disk extending from a region adjacent the axis of the disk to the outer periphery thereof, said notches including a throwing face open in the normal direction of rotation of the shaft, the material backing said face comprising alternate layers of a fibrous web and an amorphous resilient material and means to feed abrasive to said disk to be picked up by the said throwing surfaces and projected at the periphery of the notches upon rotation of the disk.

NELSON J. QUINN.