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N. J. QUINN

2,159,051

SAND BLASTING APPARATUS

Original Filed June 17, 1935

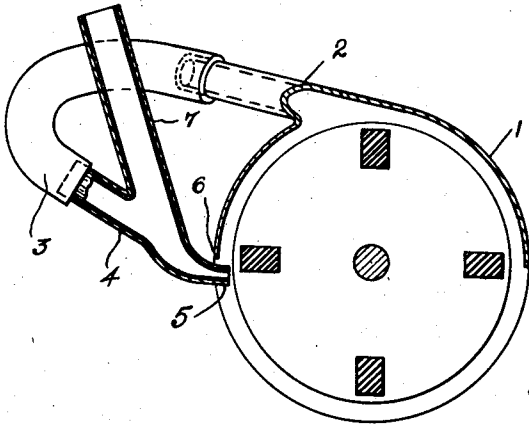


Fig. 1

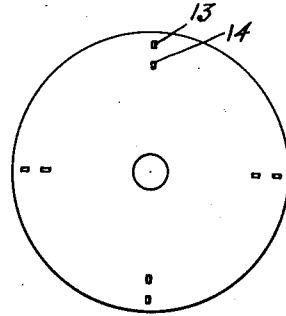


Fig. 4

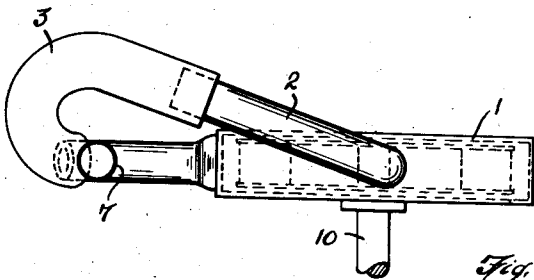


Fig. 2

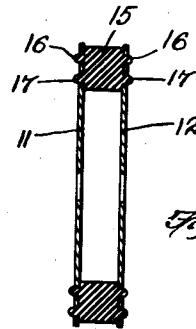


Fig. 3

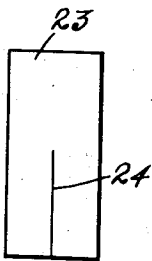


Fig. 5



Fig. 6

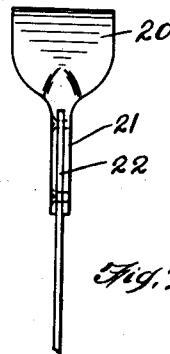


Fig. 7

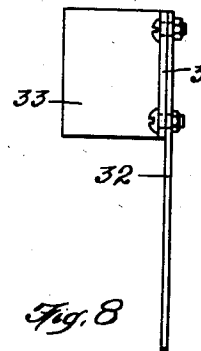


Fig. 8

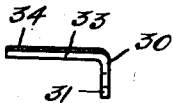


Fig. 9

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UNITED STATES PATENT OFFICE

2,159,051

SAND BLASTING APPARATUS

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6 Claims. (Cl. 51—9)

The present invention, relating as indicated to sand blasting apparatus, is particularly directed to an apparatus for mechanically projecting finely divided bulk material, such as abrasive, for the purpose of cleaning, coating or surfacing articles such as castings, sheets and various types of surfaces which must be cleaned or from which material must be removed rapidly and economically. The principal object of the invention is the provision of a simple apparatus of an impact type for projecting finely divided material, which will be economical to manufacture and to operate and sufficiently simple and light to allow it to be employed in portable form for the surfacing of objects, such for example as railway cars, buildings, castings and the like, where the tool must be taken to the work.

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 drawing and the following description setting forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:

Fig. 1 is a side elevation partially in section of my improved apparatus;

Fig. 2 is a plan view of the same;

Fig. 3 is a transverse central section through one form of projecting means;

Fig. 4 is a side elevation of the means of Fig. 3;

Figs. 5 and 6 are a front and side elevation respectively of another type of projecting means;

Fig. 7 is a front view of the projecting blade formed by the steps shown in Figs. 5 and 6; and Figs. 8 and 9 are a front elevation and a plan view of another type of projecting blade.

Referring now to Figs. 1 and 2, my improved projecting apparatus consists of a casing 1, which is roughly semi-cylindrical in form and is provided with a conduit 2 extending from substantially the central portion of the casing and returning in a rebent portion 3 toward the casing. At the end of the rebent portion 3 is inserted a conduit 4 which terminates in the discharge nozzle 5 adjacent to the forward edge 6 of the casing. The conduit 4 has either inserted therein, or formed as a part thereof, a second conduit 7, through which finely divided material may be supplied to the terminal portion of the conduit 4 adjacent to the nozzle 5.

Mounted centrally of the semi-cylindrical casing 1 is a shaft 10 disposed in suitable bearings formed in the casing. Fixed on the shaft 10 are projecting blades which may take various forms. One form of blade is illustrated in Figs. 3 and 4 and consists of two circular sheet metal

discs 11 and 12 provided with a series of openings 13 and 14, each series of openings being arranged radially and there being a number of such series disposed at equidistant intervals around the disc adjacent its periphery. Mounted between the two discs are projecting blades proper 15, which are merely rectangular strips of metal provided with lugs 16 and 17 at either side which engage and lock in the openings 13 and 14 respectively, in the two discs 11 and 12. These blades lock the two discs together and constitute the abrasive engaging elements which project the abrasive from the casing.

The operation of the device as thus described is quite simple. When the shaft 10 is rotated it carries with it the discs 11 and 12 and the blades 15. These blades move a considerable volume of air around in the casing 1 and a large part of this air is projected tangentially into the conduit 2 and is then returned through the conduit 4 and nozzle 5 to a point directly in the path of the revolving blades. Finely divided material in the form of abrasive or other material is fed through the conduit 7 into the air stream flowing through the conduit 4 and is also projected into the path of the revolving blades where it is picked up, and then struck with a force which depends upon the speed of rotation of the blades, their distance from the center of the shaft and the weight of the particles of material. A 6" to 8" disc of the construction shown, rotated at approximately 10,000 R. P. M. will impart a projection speed to the particles of the material of approximately 15,000 to 20,000 ft., which is substantially the highest speed which is required for the most severe kind of work. Material thrown at this speed will rapidly remove enamel which has been baked on steel, will cut pitted rust from iron and steel, and will cut such materials as marble and granite with a very considerable speed. At projection speeds between 8,000 and 12,000 feet other kinds of work, such as the cleaning of sand from castings, the surfacing of such softer materials as brass, aluminum and the like, can be very effectively carried out.

In the present apparatus there is of course movement of the material over the inner surface of the conduit 7, the nozzle 5 and the forward faces of the blades 15, and in order to increase the life of these parts of the apparatus I coat all of these surfaces with a yieldable or flexible material, such as rubber. This rubber is applied to the metal by the process which is now generally used for bonding rubber to metal and gives a union between the two materials which is very much stronger than that secured by cementing, and which is substantially a permanent union between the rubber and metal.

It will be apparent that other types of projecting blades can be employed instead of the one

already described, and in Figs. 5, 6 and 7 I have shown one modification, and in Figs. 8 and 9 a second modification of this part of the apparatus. Blades of the type shown in Fig. 7 consist of a blade portion 20 provided with a split shank portion 21, the two parts of the shank portion being secured to the spoke 22, which in turn may be secured to the shaft 10. In forming a blade of this type, I start with a rectangular blank 23 of sheet metal, slit the same along the line 24 and then bend back the slit portions to form the two shanks 21, which then fit on either side of the spoke 22. This type of blade may also be faced with a compressible material 26 on its forward surface.

In Figs. 8 and 9 I have shown a blade consisting of a strip of sheet metal 30 bent into angular form, one portion 31 being provided with bolt holes for attachment to the end of a spoke 32 and the other portion 33 being provided with a coating of compressible material, such as rubber, on its forward surface.

The present projecting apparatus is quite simple in construction, requires but few parts and these can all be of relatively light weight, so that it readily adapts itself for use as a portable tool. In this use the shaft 10 may be operated either by a fractional horse power motor, which is secured directly to the casing 1 or by a flexible shaft connected to the shaft 10. For stationary use, where weight is not such an important factor, a number of projecting elements can be assembled together on a shaft, a single casing can be employed to house all of these elements, and either separate nozzles for supplying abrasive to each of the wheels individually can be used, or a common nozzle can be used for each two or three adjacent elements.

The present apparatus, which I have already referred to herein as of the impact type, is thus referred to because I believe that the action which occurs in the machine involves the striking or batting of the particles of abrasive in much the same manner as a bat strikes a ball, as distinguished from the action which occurs in some types of mechanical projecting apparatus in which the abrasive particles are centrifugally thrown off from radially disposed passages in a rotating wheel. The particles of abrasive in the present apparatus are fed directly into the path of the rotating blades and are projected in lines almost directly at right angles to the path or direction of flow of abrasive as it leaves the discharge conduit and passes towards the blades. So far as I have observed the blades are in contact with the material only momentarily, and the action is substantially a striking or batting action. Of course some material will be fed across the blades and will possibly pass into the interior of the projecting elements and will then be discharged at various points. This portion of the discharge may be termed the "wild" discharge, but it represents only a minor part of the real discharge and the great majority of the material applied to the blades is immediately struck and thrown along parallel lines and in the direction above described.

It will be understood that while I have used the term "abrasive" throughout the specification, this term is intended to denote either material such as sand or metallic grit, or other finely divided material which may be employed to

coat, surface, or otherwise treat the article upon which the apparatus is employed.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

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

1. In apparatus of the character described, the combination of a shaft, a plurality of blades operatively mounted thereon, a casing enclosing said shaft and blades for not more than one-half of their circumference, a conduit leading from said casing and terminating closely adjacent the periphery of said blades, said casing and said conduit being adapted to receive and conduct a forced air stream from said blades, and means for feeding abrasive into said conduit.

2. In apparatus of the character described, the combination of a shaft, spaced parallel discs mounted on said shaft, blades secured between said discs, a casing enclosing said shaft and blades for not more than one-half of their circumference, a conduit leading from said casing and terminating closely adjacent the periphery of said blades, and means for feeding abrasive into said conduit.

3. In apparatus of the character described, the combination of a shaft, a plurality of blades operatively mounted thereon, a casing partially enclosing said blades, means for leading a portion of the air blast created by the rotary movement of said blades and directing the same radially inwardly toward said shaft, and means for supplying abrasive to said blast of air.

4. In apparatus of the character described, the combination of a shaft, a plurality of radially disposed blades cooperatively mounted thereon, a casing partially enclosing the said blades, a conduit leading from the periphery of said casing and adapted to direct a portion of the air blast created by the rotation of said blades along a path discharging closely adjacent the outer edges of said blades toward said shaft, and a second conduit extending into said first-named conduit for supplying abrasive to the blast of air passing therethrough.

5. In apparatus of the character described, a shaft, a plurality of blades carried on said shaft, a casing partially enclosing said blades, power operated means to rotate said shaft and blades to create an air blast, a feed pipe for abrasive positioned with an outlet opening adjacent the rotating blades, and means to direct a portion of the blast created by the rotating blades to the feed pipe to feed abrasive therefrom into the path of the blades.

6. In apparatus of the character described, the combination of a shaft, spaced parallel disks mounted on said shaft, blades carried between said disks and rotatable therewith, an abrasive feed nozzle for directing abrasive between the disks and into the path of the rotating blades, a restricted portion and means for utilizing the windage effect of the rotating blades to feed abrasive through the nozzle including a conduit leading from a region adjacent the periphery of the blades to the abrasive feed pipe.

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