April 30, 1968 G. A. MABILLE 3,380,196

SURFACE TREATING APPARATUS

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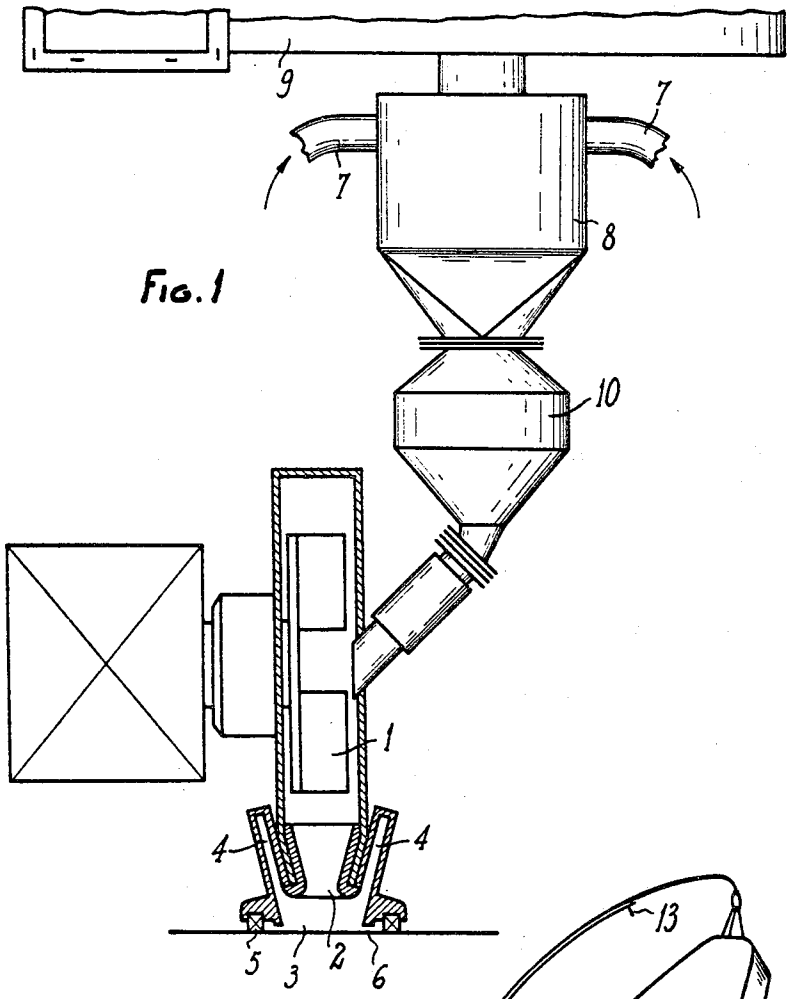


Fig. 1

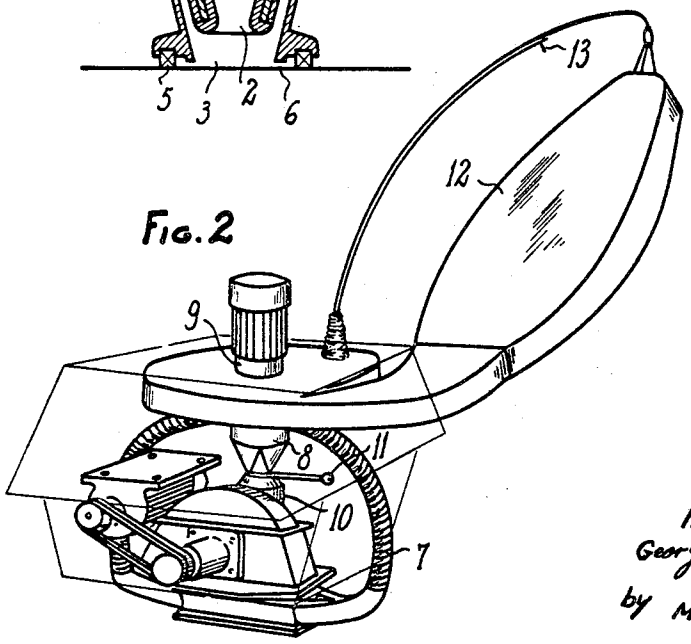


Fig. 2

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FIG. 3

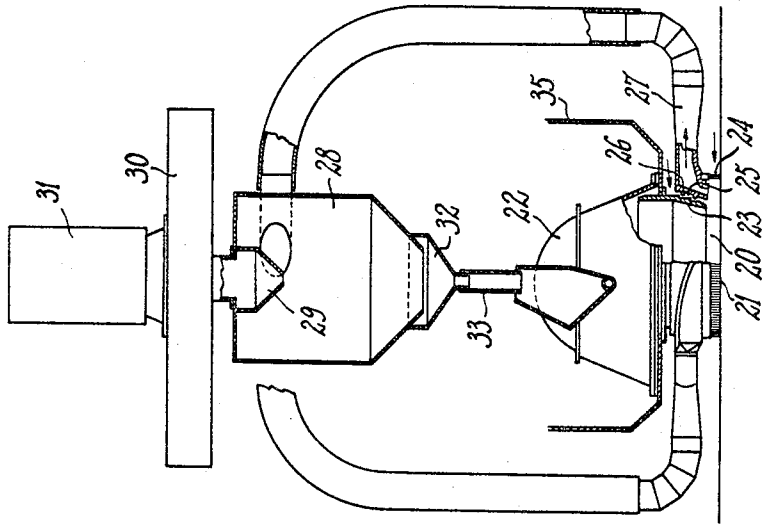
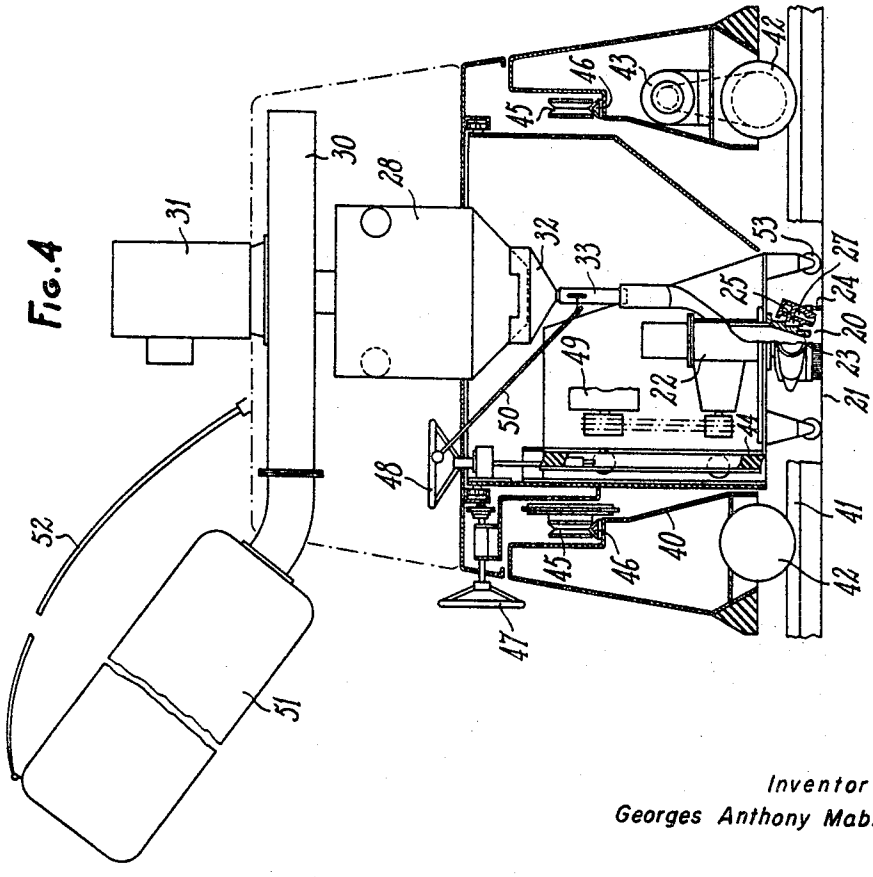


FIG. 4



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3,380,196

SURFACE TREATING APPARATUS

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6 Claims. (Cl. 51—9)

ABSTRACT OF THE DISCLOSURE

A mobile surface treating apparatus including centrifugal impeller means for impelling a concentrated stream of particulated material against a surface to be treated, and means for collecting the particulate material after the same has impinged on the surface and for feeding the material back to the centrifugal impeller means by suction.

The invention relates to means for the projection of solid particles for the mechanical treatment of plane or flat surfaces for the purpose of modifying their physical or mechanical characteristics, or their surface finish, or their shape.

The systems presently known can be classified under two groups.

In the first group can be classified those stationary-type of machines in which the surface to be treated is in relative motion with regard to the flow of particles in order to bring the entire surface within the sphere of action of the machine.

As such machines must be tight as regards the abrasive particles used, and as regards the dust produced, they must operate in closed circuit, which means that the surface under treatment must be entirely enclosed.

When the parts to be treated are long and thin, these machines are generally shaped like a tunnel, a relative imperviousness being obtained by means of chambers called sluices or lock-chambers situated fore and aft of the treatment chamber. When the parts to be treated are both long and large, as in the case of metal in sheet-form, for example, these three chambers take on very large dimensions, so that means are required for collecting the projected particles spread over a large surface and that a large volume of air is required for collecting the dust.

Moreover, when the part under treatment comprises horizontal surfaces, a certain quantity of particles remain on the part and the expulsion of these particles requires the use of auxiliary means such as a blower or cyclone, for example.

Again, transfer of the part under treatment requires an area fore and aft of the lock-chamber at least twice as large as that of the part itself. In this area are generally found various fixed handling devices, usually cumbersome and costly.

Belonging to the second group are various devices, mobile in respect of the part to be treated, which is generally fixed. These devices may or may not carry their own systems for the recuperation and dedusting of the particles utilized during the treatment.

The invention relates more particularly to devices of the second group equipped with a turbine for the projection of solid particles.

The object of the invention is the treatment of plane or flat surfaces, whatever their position in space (in particular the invention makes possible the treatment of the top part of horizontal surfaces) in a continuous manner, projection, recuperation and dedusting of the particles utilized for the treatment being continuous.

An improvement, according to the invention, consists in submitting the flow of particles, before its impact on

the part to a device for increasing the concentration of the particles in the form of a nozzle projecting the particles in lamellated formation of a given size.

The improvement confers on the products obtained a uniform treatment, the intensity of the bombardment being generally uniform over the whole surface. It also limits the self-destruction of the system resulting from the rebound of the particles.

The device for increasing the concentration of the particles may take on different shapes in harmony with the section of the part to be treated.

One of the direct applications of the invention is shot-peening for descaling and cleaning large size sheets.

The invention also covers the mechanical treatment, by means of the projection of particles, of plane surfaces which cannot be displaced, such as floor coverings, for example.

Other characteristics and advantages will now be made clear by the following description of an embodiment of the invention of a non-restrictive character.

Referring to the accompanying drawings:

FIG. 1 is a partially sectional side elevation of this embodiment of the invention;

FIG. 2 is a perspective view;

FIG. 3 is a partly sectional view and an elevation of a modified form of the embodiment;

FIG. 4 is a partly sectional view and an elevation of another form of construction.

In the embodiment under consideration, the unit is carried by a frame, mobile relatively to the surface to be treated, such frame or other carrying system remaining outside the scope of the invention.

In this form of the invention, the flow of particles generated by the turbine **1** is concentrated by the nozzle **2** and entering the chamber **3** accomplishes the required treatment.

After their impact on the part under treatment, the particles in suspense in chamber **3** are drawn by the suction of the dedusting space **4**, the chamber **3** finding its limits in a sealing ring **5** in contact with the surface **6** under treatment so as to avoid the projection of particles and dust towards the exterior.

The sealing ring is pervious to the air, and atmospheric air is drawn in at a rapid speed into chamber **3**, the ring acting as a screen for stray particles.

The dedusting space **4** of chamber **3** is connected by ducts **7** to an expansion chamber **8** on which is directly mounted the dedusting ventilator **9**.

The particles retained in the expansion chamber **8** fall into a reservoir tank **10** which feeds the turbine **1** by gravity, the flow being controlled by a diaphragm adjusted by means of a handle **11**.

The expansion chamber **8** is set so as to retain only the quantity of particles, in proportion to the flow of air sucked in, sufficient to carry out the required treatment.

According to the invention, the level of the particles in the reservoir **10** remains generally constant since the circulation is continuous.

This accumulation of particles in the reservoir generates a back pressure such that the flow of air from the chamber **3** to the expansion chamber **8** passing through the turbine, that is to say, outside of the suction ducts, can be considered as nil.

The particles which are too small and also the dust carried along with the particles into the dedusting chamber **4** are separated from the suction air by a filtering device **12** functioning according to a separating principle based on the porosity of the walls.

In the embodiment shown in FIG. 2, the filtering element consists of an oblong collector **12**, supported by a flexible pole **13**.

Flexion of this support being proportional to the weight

of dust contained in the collector, discloses, when the machine is stopped, to what extent the dust collector is full.

In the modified form of embodiment shown in FIG. 3, the machine comprises a chamber **20** in contact at its open side with the surface to be treated **21**. The stream of particles thrown out by the turbine **22** is concentrated by the restricted opening of the nozzle **23** before striking the surface **21**. A brush-type seal **24** prevents any leakage between the wall of the chamber and the surface **21**. A conduit **25** puts the inside of the chamber in communication with the atmosphere. Baffles built into the walls of the conduit prevent the particles from straying into the atmosphere.

After striking the surface under treatment, the particles and the air are carried away by the ducts **27** to the upper part of the cylindrical reservoir **28**, the outlet of these ducts being positioned tangentially in respect of the reservoir walls.

A suction nozzle **29** is mounted axially above the reservoir **28** and communicates with a ventilator **30** driven by a motor **31**. The particles retained in the reservoir **28** fall to the bottom of the reservoir and collect in a hopper **32** fed directly by the reservoir. These particles then feed the turbine through pipe **33**, which directs their flow into chamber **20**.

The whole system is mounted on a frame **35** which supports the weight of the system so as to avoid crushing the brush **24**.

In the form of construction shown in FIG. 4, the machine is generally similar to that which has just been described and is carried by a chassis **40** fitted with wheels **42** which can be driven by a motor **43** and which run on rails **41**. The frame **44** which carries the active unit (projecting the abrasive particles) is itself supported on the chassis **40** by rollers **45** running on rails **46** rigidly mounted on the chassis **40**.

Displacement of the active unit is controlled by a hand wheel **47** driving through a gear and chain drive, one of the pairs of rollers **45**. Adjustment of the height of the active unit is obtained by means of a hand wheel **48**. The frame of the active unit is itself supported by rollers **53** in contact with the surface to be treated **21**.

Also visible in FIG. 4 are the motor **49** driving the turbine **22**, a lever **50** for controlling the flow of abrasive particles, and also a dust collector or filtering element **51** communicating with a ventilator **30** and supported at its outer extremity by a flexible pole **52**.

The invention is not limited to the embodiment herein described but to all variations within the scope of the invention.

What I claim is:

1. A mobile surface treating apparatus comprising, in combination, chamber means having an open end adapted to be directed against a surface to be treated; a nozzle located at least in part in said chamber means and having an outlet end directed toward said surface and an inlet end; centrifugal impeller means located above and substantially aligned with said inlet end of said nozzle for impelling particulated material in downward direction through said nozzle against said surface; a reservoir arranged above said impeller means and having an inlet opening and an outlet opening; passage means providing communication between said outlet opening of said reservoir and said centrifugal impeller means; and suction means communicating with said chamber means laterally from said outlet end of said nozzle and with said inlet opening of said reservoir so that particulated material after having impinged on said surface is transported from said surface by suction into said reservoir to be recirculated by said passage means and said impeller means through said apparatus.

2. An apparatus as defined in claim **1**, and including expansion chamber means upstream of and communicating with said inlet opening of said reservoir, said suction means feeding said particulated material from said chamber means into said expansion chamber means.

3. An apparatus as defined in claim **2**, and including filter means communicating with said suction means for separating dust from said particulated material.

4. An apparatus as defined in claim **3**, wherein said filter means comprises a container having porous walls, and an elongated flexible member supporting said container on a free end thereof and being arranged to be flexed to an increasing degree as said container fills up with dust to thus indicate the amount of dust in said container.

5. An apparatus as defined in claim **1**, and including adjustable valve means in said passage means for regulating the amount of particulated material passing from said reservoir into said impeller means.

6. An apparatus as defined in claim **1** and including support means for supporting said chamber means and the other components of said apparatus movable over a substantially horizontal surface to be treated.

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