Nov. 4, 1947. W. A. ANDERSON 2,429,974

FLOOR SURFACING MACHINE

Filed Oct. 2, 1943 3 Sheets-Sheet 1

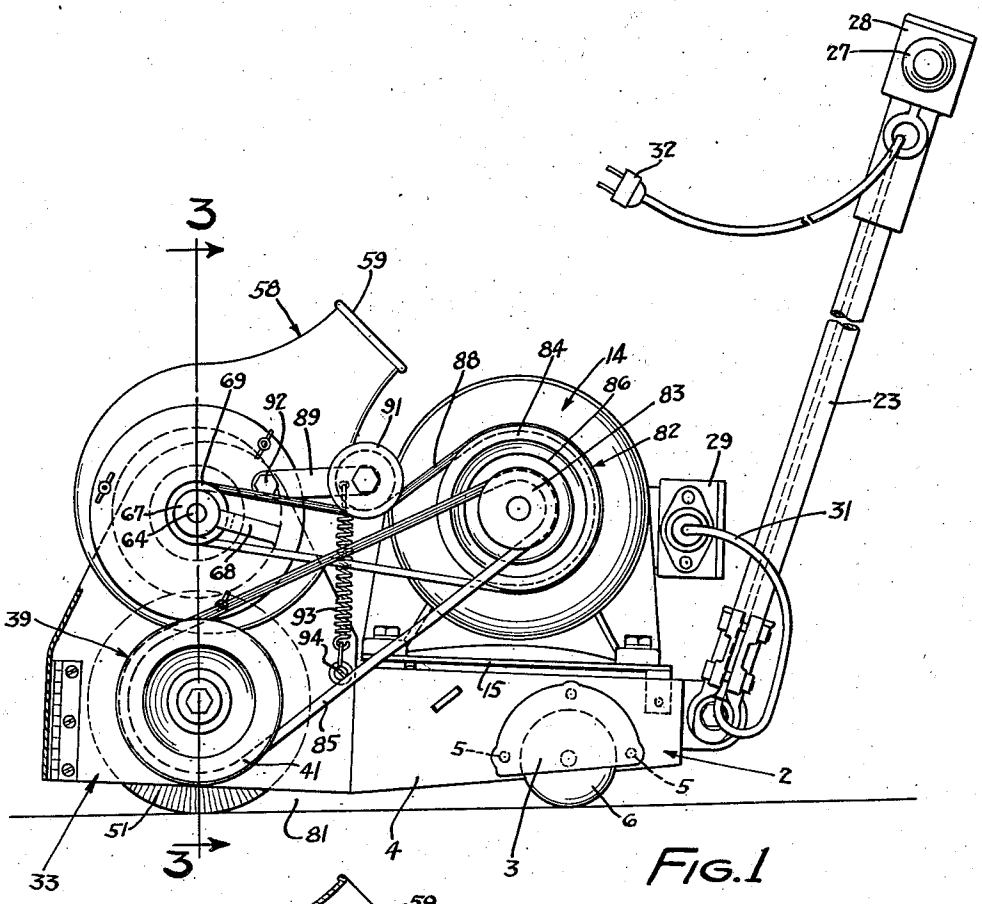


FIG. 1

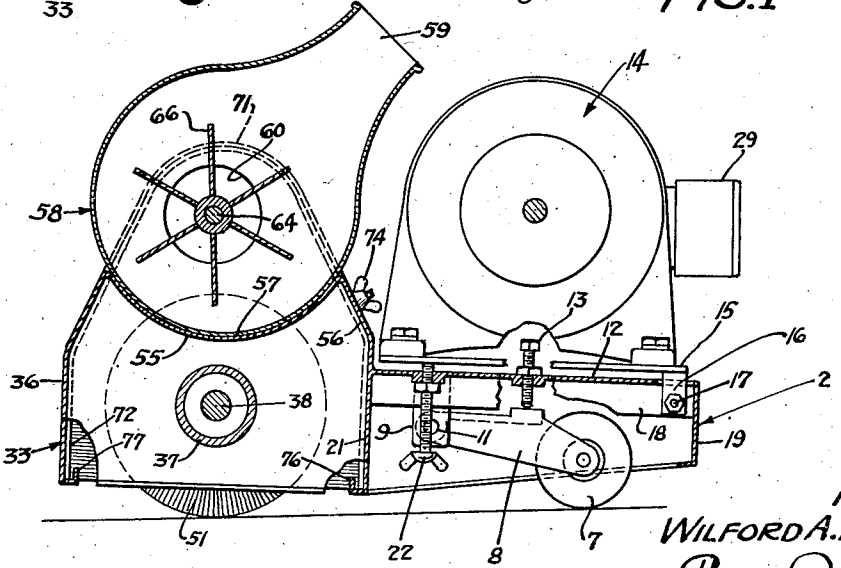


FIG. 5

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FLOOR SURFACING MACHINE

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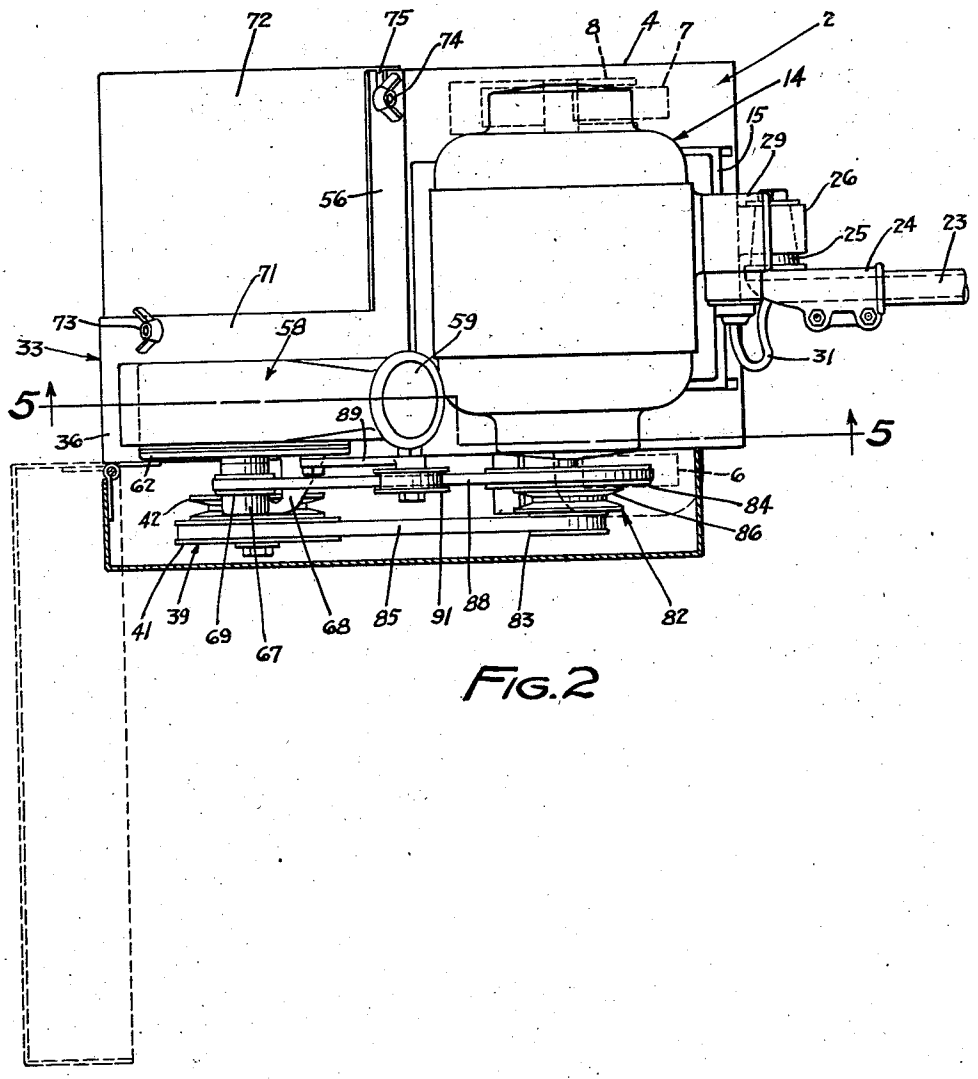


FIG. 2

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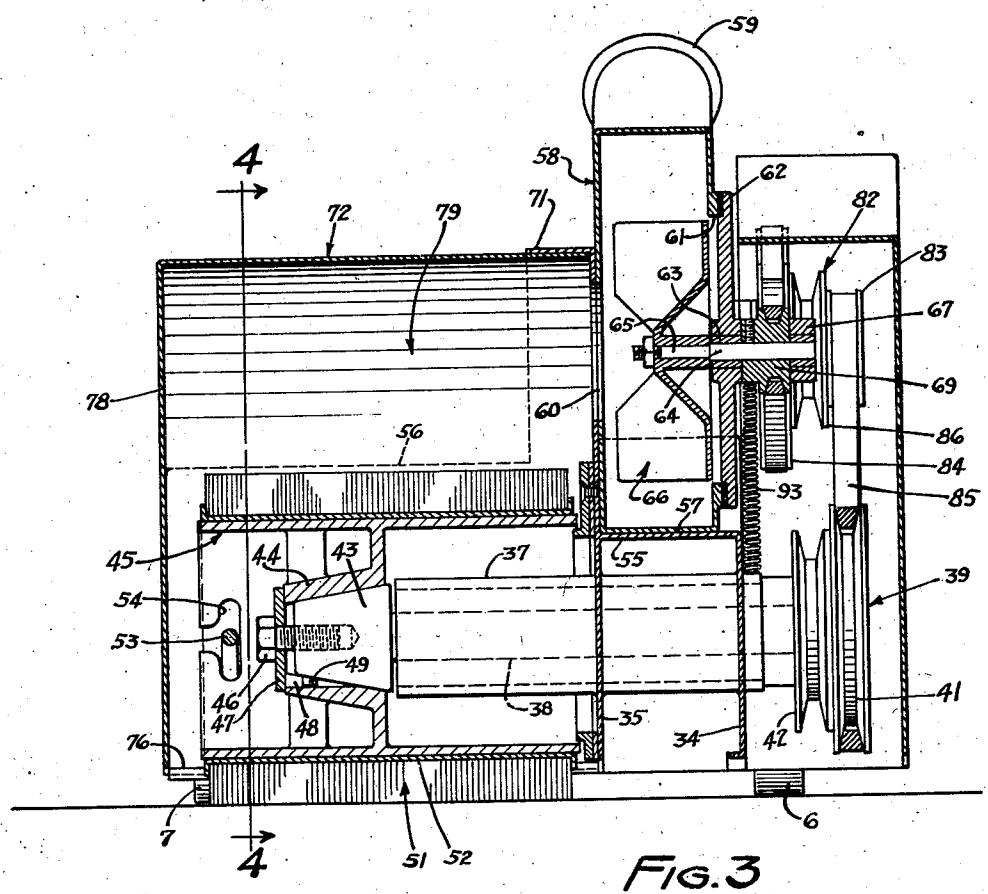


FIG. 3

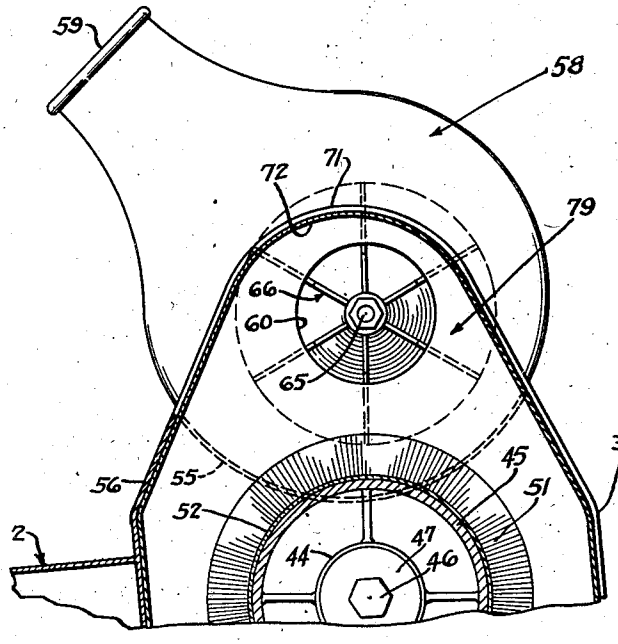


FIG. 4

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UNITED STATES PATENT OFFICE

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FLOOR SURFACING MACHINE

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Application October 2, 1943, Serial No. 504,748

3 Claims. (Cl. 51—176)

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This invention relates to new and useful improvements in surfacing machines and more particularly to such machines adapted for refinishing floors and the like.

Machines of the type herein disclosed are usually utilized for scouring floors. When scouring and cleaning a floor surface preparatory to polishing it, an abrading device capable of producing a scouring action on the floor, such as steel wool, is commonly used. In the operation of scouring the floor, it is frequently necessary to apply considerable downward pressure on the abrading device or roll in order to obtain the desired scouring action. Such downward pressure may readily be obtained by driving the abrading device in a rearward direction, or in a direction which tends to propel the machine in a direction towards the operator, whereby the operator must apply a relatively greater pressure upon the operating handle of the machine to propel it in a forward direction in order to counteract such rearward propelling force, which obviously results in a relatively greater downward pressure being exerted on the abrading device than would occur if the abrading device were driven in a direction tending to propel the machine in a forward direction, as will be readily understood by reference to Figure 1 of the drawings.

Conversely, when a sanding roll is utilized to prepare a floor for finishing or refinishing, preparatory to receiving a seal, waxing or other finishing such sanding roll must be so operated over the surface of the floor as to engage the floor with a relatively light contact, thereby to prevent the sanding roll from "digging" into the surface of the floor and marring or otherwise damaging the surface of the floor.

To obtain the desired contact of the sanding roll with the floor, the sanding roll is usually rotated in a forward direction, or in a direction which will tend to propel the machine in a forward direction, whereby the operator may frequently have to exert a slight backward pull on the operating handle to prevent the machine from "running away" from him, which obviously tends to relieve the pressure of the sanding roll upon the floor. The pressure of the sanding roll on the floor may also be conveniently controlled by relatively adjusting the position of the abrading handle upon the machine. If a sanding roll is to engage the floor with a relatively light contact the abrading handle may be positioned in substantially an upright or vertical position whereby the forward propelling action of the sanding roll with the floor will cause the operator to "hold

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back" on the abrading handle, whereby the pressure of the roll with the floor is relieved as above stated. If the sanding roll is to engage the floor with relatively greater pressure the abrading handle may be swung rearwardly to an inclined position whereby the operator may, if he deems it necessary, exert a slight upward pull on the handle which will tend to transfer a portion or all of the weight of the machine onto the sanding roll depending upon the amount of upward pressure exerted on the handle.

Regardless of the direction of rotation of the abrading device, a suction fan must be utilized for removing dirt, lint, and other foreign matter from the machine hood.

Floor surfacing machines have heretofore been made with reversible motors for driving the abrading rolls, but to the best of my knowledge no one has heretofore used a reversible fan in such a machine, and as conventional suction fans are adapted for rotation in one direction only, machines designed to drive the abrading device in either direction have usually been provided with a separate motor for operating the fan, thereby making it necessary to equip each such machine with two independent motors, one for driving the abrading device and the other the suction fan.

In the novel machine herein described, I employ a reversible fan which will operate equally well in either direction, whereby it may be driven from the reversible motor provided for operating the abrading device. Thus by using a reversible fan and motor, the abrading device may be driven in either direction by the simple manipulation of a single motor control switch, which simplifies the construction and cost of the machine in that but one motor is required, and it also simplifies the operation thereof.

The novel floor finishing machine herein disclosed comprises but a single motor which operates both the fan and the abrading roll. To accomplish this, a reversible motor is employed and the fan is designed for rotation in either direction. Because of the reversibility of the fan, it operates equally well to pick up dust, dirt, and other foreign matter delivered thereto from the abrading roll, regardless of the direction of rotation of the abrading roll or the direction of movement of the machine over the floor. By thus utilizing a single motor and a reversible fan the machine may be greatly simplified and its cost reduced.

An object of the present invention therefore is to provide a relatively simple, light weight surfacing machine which readily lends itself for

use in the treatment of floors, and which may be operated with a minimum of power and effort.

A further and more specific object of the invention is to provide a floor finishing machine comprising a wheeled frame having a reversible motor mounted thereon for driving a spindle, preferably located at the forward end of the machine and adapted to removably support a suitable abrading device, and a housing enclosing the abrading device and having a suction fan connected thereto for receiving dust and other foreign matter removed from the floor by the abrading device, when the machine is in operation, said fan being driven from the same motor and operable to pick up dust, etc., in either direction of rotation.

A further object is to provide a machine of the class described comprising a housing normally enclosing the abrading device and having an enlarged chamber in the upper portion thereof over the abrading device to which the intake of a reversible fan is connected, said reversible fan permitting the machine to be operated in a fore-and-aft direction without in any way impairing the operation thereof.

A further object is to provide a floor surfacing machine comprising a novel housing for enclosing the abrading roll, said housing having an enlarged suction chamber therein which is so designed and shaped as to prevent undue turbulence of the air in the housing as a result of the rapidly revolving abrading roll therein, and whereby a constant suction may be maintained through the gap provided between the bottom edge of the housing and the floor surface when the machine in is operation, whereby all dust and other material removed from the floor surface is drawn upwardly into the upper enlarged chamber in the housing and into the suction fan to which the housing is directly connected, whereby a floor or other surface within a building may be refinished and polished substantially without raising any dust within the building, which is a very desirable feature in a floor finishing machine.

Other objects of the invention reside in the novel driving means provided between the motor and the abrading device and suction fan; in the simplified construction of the suction fan and its connection with the upper portion of the housing enclosing the abrading device; and in the provision of a floor finishing machine which is largely constructed of sheet metal whereby a very rigid structure is provided which has great strength and is extremely light in weight, a highly desirable feature in power device surfacing machines of this general type.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a side elevation of my improved machine showing the drives for the abrading device and fan, the hinged cover for said drives being removed;

Figure 2 is a plan view of Figure 1, partially in section;

Figure 3 is a sectional view on the line 3—3 of Figure 1 showing the connection between the dust collecting housing and the fan housing;

Figure 4 is a detail sectional view on the line 4—4 of Figure 3 with some of the parts omitted; and

Figure 5 is a vertical sectional view substantially on the line 5—5 of Figure 2 showing the means for adjusting the motor to tension the drive belt for the abrading device, and also showing the means for leveling the machine with respect to the floor.

The novel floor surfacing machine herein disclosed is shown comprising a box-like supporting frame, generally designated by the numeral 2, a bracket 3 is shown secured to one of its side walls 4 by suitable bolts 5. Within the bracket 3 is mounted a suitable wheel or roller 6 which supports one side of the frame 2, as will be understood by reference to Figures 1 and 3.

The opposite side of the frame is supported on a similar wheel 7 mounted at the rear end of an arm 8 having its forward end pivoted to a bracket 9 by a pivot 11 as clearly illustrated in Figure 5. The bracket 9 is secured to the top wall 12 of the frame 2. An adjusting screw 13 is received in threaded engagement with the top wall 12 and has its lower end engaging the arm 8 whereby rotation of the screw 13 will relatively change the position of the wheel 7 with respect to the frame 2, thereby to align the abrading device, subsequently to be described, with the frame.

A suitable reversible motor 14 is mounted upon a plate 15 shown provided with depending lugs 16 which have their lower portions supported on pivots 17 secured in suitable angle bars 18 which may be welded or otherwise fixed to the top wall 12. The rear ends of the angle bars 18 may be welded to the rear wall 19 of the frame 2 and their forward ends to the front wall 21 thereof.

Another adjusting screw 22 is received in threaded engagement with the top wall 12 forwardly thereof and has its upper end engaging the bottom of the plate 15. Thus when the screw 22 is relatively rotated in the wall 12, the plate 15 carrying the motor 14 may be oscillated about the aligned axes of the pivots 17, as will readily be understood.

A suitable operating handle 23 has its lower end received in a suitable bracket 24 provided with a lateral tapered extension 25 received in a correspondingly tapered bore provided in a bracket 26 secured to the rear wall 19 of the frame 2. Suitable handle grips 27 are provided at the upper end of the handle, and for the sake of convenience, a switch box 28 is also mounted at the upper end of the handle which carries a switch, not shown, for controlling the operation of the motor 14.

A suitable junction box 29 is shown provided on the motor 14 to which one end of a suitable conductor cable 31 is connected. The cable 31 is provided at its opposite end with a plug 32 adapted for insertion in an electric outlet, as is well known.

The frame 2 of the machine is shown provided at its left side with a forward extension 33 comprising spaced parallel walls 34 and 35 formed of sheet metal and having their rear edges suitably secured to the front wall 21 of the main frame by such means as welding, whereby the walls 34 and 35 become in effect an integral part of the main frame 2. The forwardly extending walls 34 and 35 are tied together at their forward ends by a cross wall 36.

A suitable bearing sleeve 37 is shown fixedly secured to the walls 34 and 35, and supports a

shaft 38 mounted in suitable bearings (not shown), provided within the sleeve 37. A stepped pulley, generally designated by the numeral 39, is secured to the outer end of the shaft 38 and comprises V-pulleys 41 and 42.

A tapered head 43 is secured to the opposite end of the shaft 38 adapted to receive the hub 44 of a drum 45. A suitable screw 46 is received in threaded engagement with the end of the head 43 and supports a washer 47 which bears against the end of the hub 44 of the drum, as clearly illustrated in Figure 3. The screw 46 thus serves to demountably secure the drum 45 to the spindle or shaft head 43. To prevent relative rotation of the drum on the head 43, a key-way 48 may be cut in the bore of the hub 44 adapted to receive a key or pin 49 secured in the head 43, as best shown in Figure 3.

The drum 45 provides a support for a suitable abrading device, generally designated by the numeral 51, comprising a cylindrical shell 52 whose interior diameter is such that the shell may be readily fitted onto the drum 45, as shown in Figure 3. The abrading material of the abrading device 51 may be in the form of steel wool, or any other material applicable for the particular type of job to be done. In some instances a wire brush may be fitted on the drum 45, or a sanding or polishing drum may be mounted thereon.

To prevent relative rotation of the abrading device upon the drum 45 a cross pin 53 has its terminals suitably secured in the shell 52 of the abrading device and is receivable in T-slots 54 provided in the wall of the outer end of the drum 45. Thus when the abrading device is fitted onto the drum 45 with its drive pin received in the T-slots 54, the abrading device may be driven in either direction, as will readily be understood by reference to Figure 3.

The forward extension 33 of the frame 2 has its front wall 36 extending upwardly and inwardly and terminating in a downwardly curved wall portion 55 whose rear edge is secured to the upper end of a flange 56, which preferably is a continuation of the front wall 21 of the frame 2. The downwardly curved or arcuately formed wall portion 55 forms a seat 57 for a fan housing 58 which is fixedly secured to said wall by suitable means such as welding.

The fan housing has an exhaust opening 59 to which a suitable dust receiving bag, not shown, may be secured in the usual manner. An intake opening 60 is provided in one of the side walls of the fan housing and a relatively larger opening 61 is provided in the opposite wall. A circular plate 62 is secured to the wall of the housing and provides a closure for the opening 61. The plate 62 has a suitable bearing 63 therein adapted to rotatably receive a shaft 64 having a reduced extension 65 to which a fan 66 is secured, as shown in Figure 3.

The opposite end of the shaft 64 is supported in a bearing 67 provided in a bracket 68 which may be integrally formed or cast with the closure plate 62, or otherwise secured thereto. A suitable V-pulley 69 is secured to the shaft 64 between the bearings 63 and 67.

The front wall 36 of the frame extension 33 and the flange 56 are relatively wider than the fan housing 58, and portions thereof extend upwardly and over the shaft 64 of the fan and are united to provide a flange 71 extending laterally from the right hand wall of the fan housing, when viewing the machine from the operator's position back of the operating handle 23. It will also be noted by reference to Figure 2, that the flange 56 extends from the flange 71 to the opposite side wall 4 of the machine frame.

A suitable hood 72 is adapted to be fitted between the wall portions 21 and 56 with one end disposed beneath the flange 71, as best shown in Figure 2. The adjacent end of the hood 72 may be detachably secured to the front wall 36 of the forward extension of the frame by a suitable clamping element 73. The outer end portion of the housing may be similarly secured to the flange 56 by a clamping device 74. The clamping devices 73 and 74 are preferably similar in construction and each comprises a wing nut and bolt, as will readily be understood by reference to Figure 2. The clamping device 73 is preferably inseparably secured to the wall 56, and the clamping device 74 is preferably inseparably secured to the hood 72, its bolt or screw being receivable in a slot 75 provided in the end of the flange 56, as shown.

To facilitate fitting the hood 72 into or under the flanges 71 and 56 and securing it thereto by the clamping devices 73 and 74, the bottom edge of the front wall 21 of the machine frame is preferably formed with an up-turned flange 76, and the lower edge of the front wall 36 of the forward extension is provided with a similar up-turned flange 77, as indicated in Figure 5. The flanges 76 and 77 serve to provide seats for receiving the lower edges of the hood 72, when the latter is fitted into the flanges 56 and 71 and secured thereto by the clamping devices 73 and 74, as will readily be understood by reference to Figure 2. The hood 72 is open at its inner end and has its opposite end closed by a suitable end wall 78, as best shown in Figure 3.

The hood 72 completely encloses the abrading device, and its upper enlarged portion forms a chamber 79 which is in direct communication with the fan housing 58 through the intake opening 60 of the fan. The lower edges of the walls of the forward frame extension 33 and also the lower edge of the walls of the hood 72 are so related with respect to the diameter of the abrading device 51 as to provide a suction gap 81 between the lower edges of said walls, as will readily be understood by reference to Figure 1.

The enlarged chamber 79 above the abrading device is of utmost importance. This chamber is so proportioned that the suction created therein by the fan will draw dust, dirt and other foreign matter removed from the floor by the abrading device, upwardly into the chamber 79 from whence it is drawn through the intake 60 and into the fan housing for delivery into the receiving means attached to the discharge end 59 of the fan. The unique shape of the enlarged air chamber 79 and its relationship to the abrading device 51 and the fan intake 60 is such as to reduce air turbulence within the housing to a minimum, whereby a relatively strong suction is created through the air intake gap 81 and upwardly through the gap 81 provided below the machine frame and through the hood or housing 72 by the fan 66, whereby all dust and foreign matter removed from the surface being treated is readily drawn into the fan when the machine is in operation. Such free upward air circulation through the chamber 79 in the hood without excessive air turbulence, prevents the occasional discharge of dust through the gap 81 to the atmosphere, which is highly desirable in an apparatus of this type.

From the foregoing it will be noted that the main supporting frame of the machine which in-

cludes the means for supporting the suction fan housing 58 and the hood 72, is made of sheet metal which is relatively inexpensive and may readily be shaped as desired with a minimum of labor. Also by utilizing sheet metal in the construction of the machine frame, the machine may be made comparatively light in weight, which is particularly desirable in a machine of this general type which must be manually propelled about upon the floor or surfaces to be treated.

Another feature resides in the novel drives provided for driving the abrading device and suction fan. As best shown in Figure 1, a suitable V-pulley, designated by the numeral 82, is secured to the shaft of the motor 14 for direct rotation therewith. This pulley comprises an outer sheave 83 and a relatively larger inner sheave 84. The smaller sheave 83 has a V-belt 85 operatively connecting it to a V-pulley 41 secured to the shaft 38 of the abrading device, whereby when the motor is operated, the abrading device is simultaneously driven as a result of its driving connection therewith through the belt 85. The V-pulley 82 secured to the motor shaft is shown comprising 3 pulleys of varying diameters. The outer pulley 83, an intermediate pulley 86, and the inner pulley 84. The intermediate pulley 86 of the stepped pulley 82 is aligned with the inner pulley 42 of the stepped V-pulley 39 secured to the abrading device shaft 38, and provides means whereby the speed of the abrading device may be varied by simply shifting the V-belt 85 from one set of aligned pulleys to the other, as will readily be understood by reference to Figures 1 and 3.

The fan 66 is driven by a V-belt 88 having a running connection with the pulley 69 on the fan shaft and the inner relatively larger sheave 84 of the stepped pulley 82. A suitable spring-actuated belt tightener is provided for maintaining the fan belt 88 under tension. This belt tightener comprises an arm 89 and a sheave 91 which engages the belt 88, as shown in Figure 1. The arm 89 is pivoted at 92 and has one end of a suitable spring 93 connected thereto whose opposite end is attached to the side wall 34 of the forward frame extension 33, as indicated at 94 in Figure 1. The novel drives above described are extremely simple and inexpensive, and provide very efficient drives for operating the fan and abrading device.

Also because of the fan housing 58 being symmetrical about a center line drawn through its exhaust opening 59 and the axis of the fan shaft, the fan may be rotated in either direction whereby the abrading device may be driven in either direction with equal efficiency.

Because the fan is thus capable of operation in either direction, the latter readily lends itself for use on an abrading machine of this general type as it makes it possible to drive the abrading device in either direction of rotation depending upon the type of work to be performed.

The novel machine herein described is extremely light in weight as compared to other machines of this general type of a given size. This resides primarily because of the single motor used for driving the fan and abrading device, and because of the main supporting frame of the machine being made of a sheet metal. The box-like construction of the frame provides a very rugged and substantial supporting frame of light weight which has proven very practical in actual service.

The simple drives provided for driving the abrading device and fan from the single motor

are also of importance in that they greatly simplify the machine and provide drives which are extremely efficient and practical in operation.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

I claim as my invention:

1. In an apparatus of the class described a frame provided at its forward end with an enlarged hood, an abrading device mounted for rotary movement in the lower portion of said hood, a suction fan in communication with the upper portion of the hood, said fan having its exhaust symmetrically disposed with respect to the fan blades whereby it will exhaust foreign material from the hood when rotated either clockwise or counter-clockwise, a plate mounted for movement on the frame relatively thereto and having means for retaining it in adjusted position, a reversible motor mounted on said plate and provided with a dual drive pulley, a belt providing a driving connection between the motor drive pulley and the abrading device, said movable plate providing means for tensioning said belt, a second belt operatively connecting the motor drive pulley to the fan and whereby the fan is always rotated in the same direction as the abrading device, regardless of the traveling movement of the apparatus, the reversibility of the fan permitting the abrading device to be operated in either direction of rotation with equal results.

2. In an apparatus of the class described, a main supporting frame including front and rear walls and a top wall, a frame member extending forwardly from said front wall adjacent to one side of the main frame, a second frame member extending forwardly from the front wall and spaced inwardly from the first frame member, a bearing mounted in said forwardly extending frame members, a spindle mounted for rotation in said bearing, a suction fan comprising a housing mounted on said forwardly extending frame members over the bearing, an abrading device detachably secured to one end of said spindle, a hood demountably secured to the front wall of the supporting frame and to one of said forwardly extending frame members and enclosing the abrading device, said hood having an enlarged chamber in its upper portion, and means establishing direct communication between said chamber and the suction fan whereby dirt and foreign matter removed from the surface being treated may be drawn upwardly through the hood and into the suction fan.

3. In an apparatus of the class described, a main supporting frame including front and rear walls and a top wall, a frame portion secured to and extending forwardly from the front wall of the main supporting frame with one side thereof substantially aligned with one of the side walls of the main frame, a bearing supported in said forwardly extending frame portion in parallel relation to the floor, a spindle mounted for rotation in said bearing and having means at one end for demountably supporting an abrading device, a reversible suction fan comprising a housing

mounted on said forwardly extending frame over said bearing, said fan having its exhaust symmetrically disposed with respect to the fan blades whereby it will exhaust foreign material from the hood when rotated either clockwise or counterclockwise, a hood detachably secured to the machine frame and enclosing the abrading device, said hood having an enlarged chamber in its upper portion in direct communication with the suction fan, a plate mounted for movement on the main frame relatively thereto, a single reversible motor mounted on said movable plate and having independent belt drives with the spindle and suction fan, and means for retaining said movable plate in adjusted position to tension one of said belts.

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