May 31, 1938. N. N. OKUN 2,118,818

FLOOR SANDER

Filed Feb. 13, 1933 4 Sheets-Sheet 1

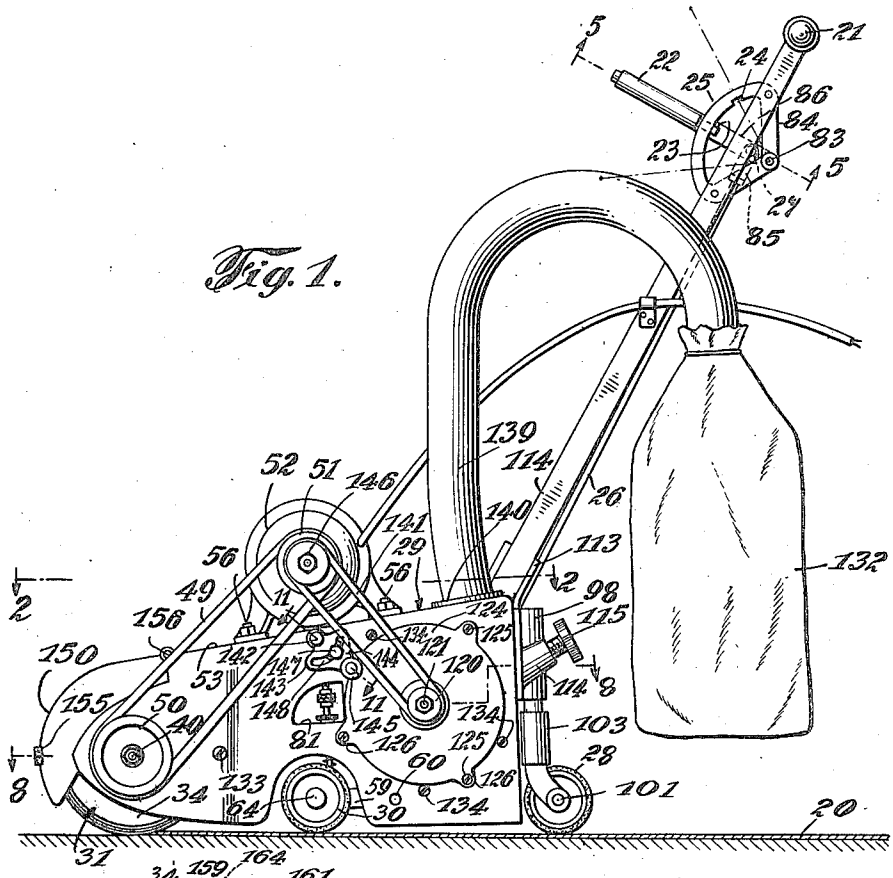


Fig. 1.

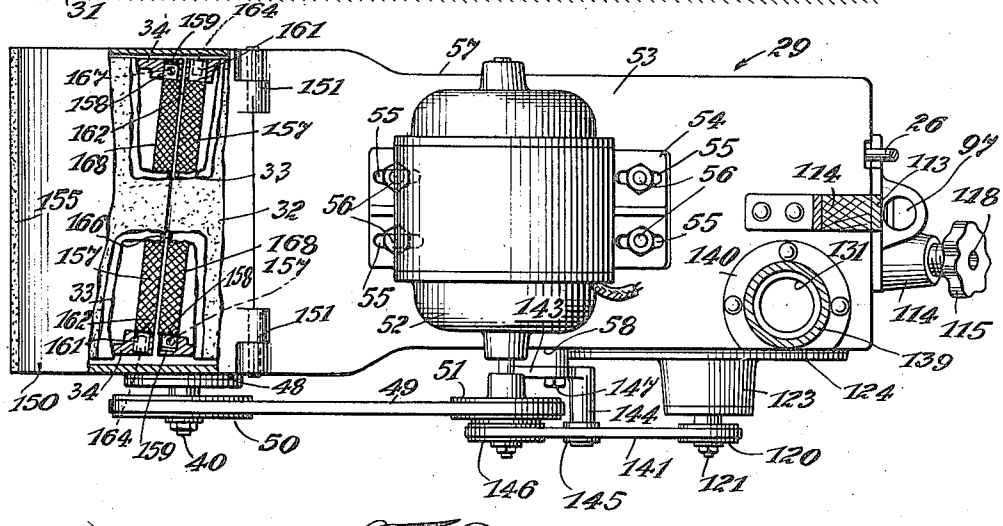


Fig. 2.

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FLOOR SANDER

Filed Feb. 13, 1933 4 Sheets-Sheet 2

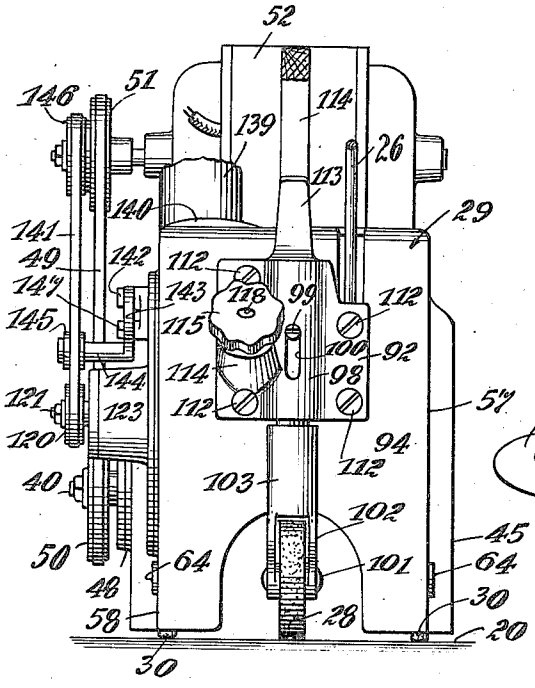


Fig. 3.

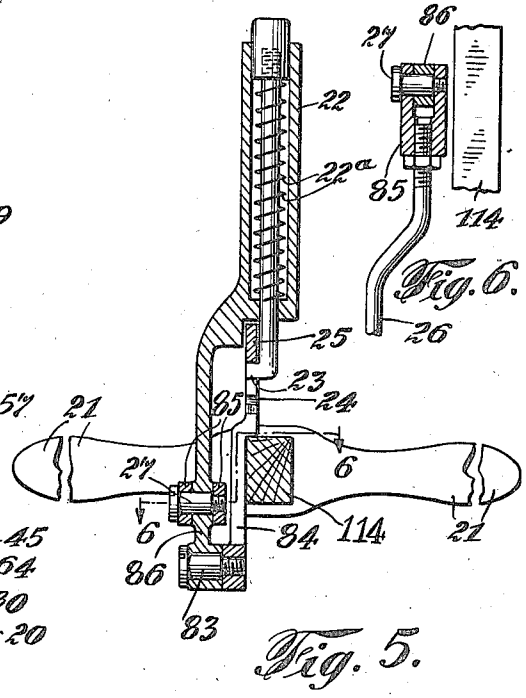


Fig. 5.

Fig. 6.

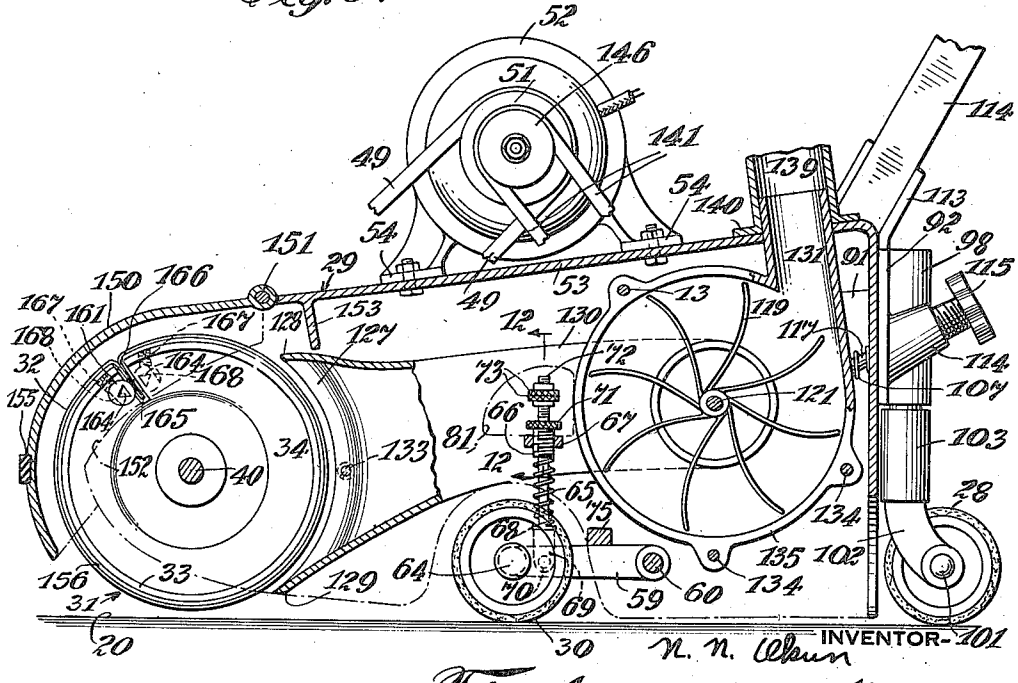


Fig. 4.

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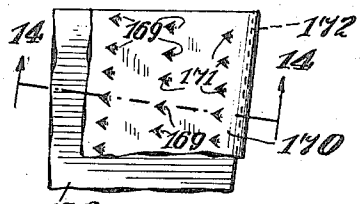


Fig. 13.

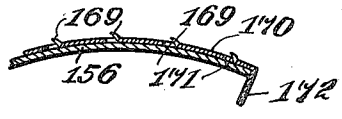


Fig. 14.

Fig. 1.

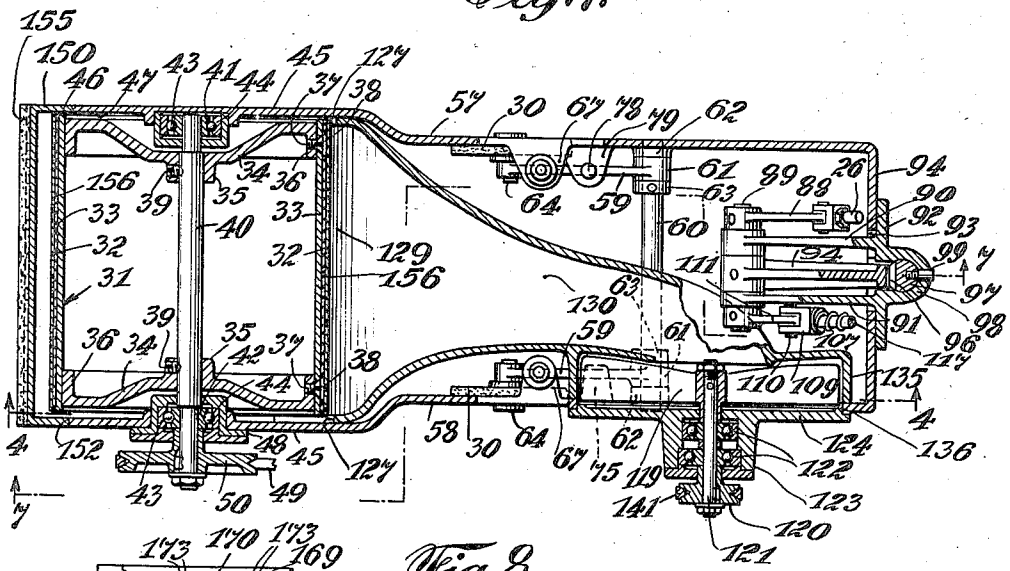


Fig. 8.

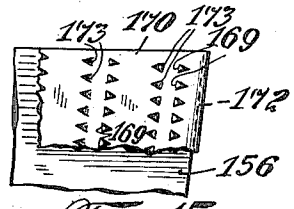


Fig. 15.

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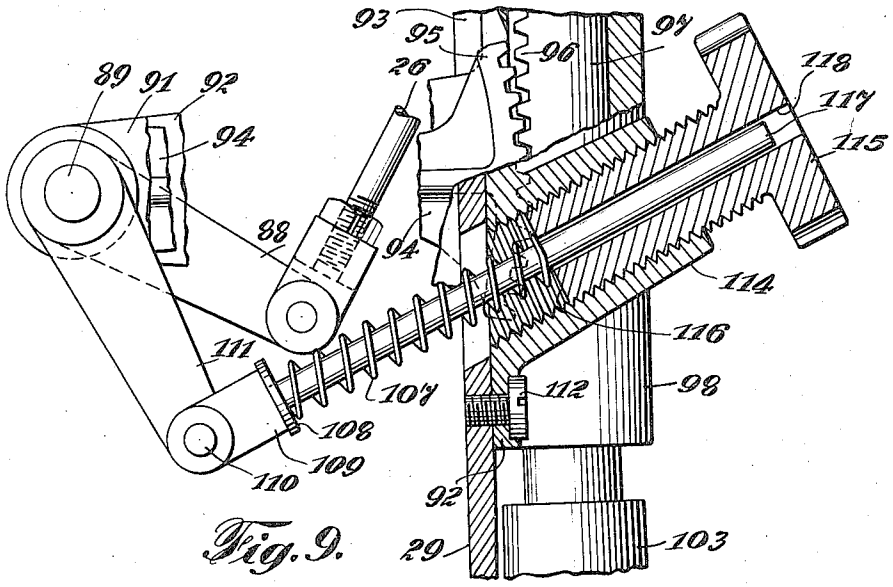


Fig. 9.

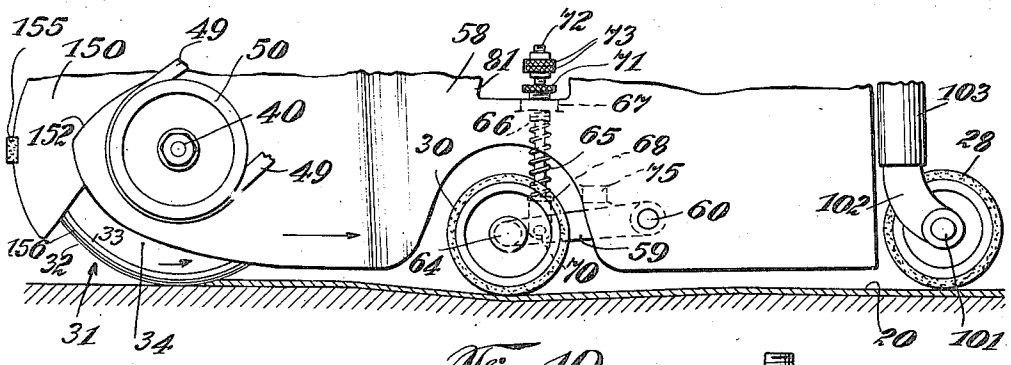


Fig. 10.

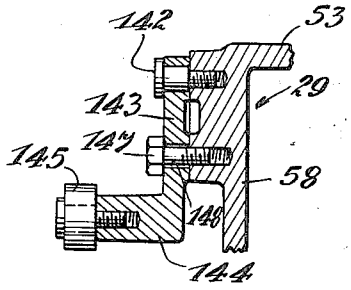


Fig. 11.

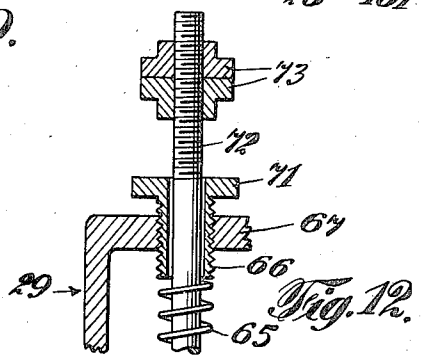


Fig. 12.

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Patented May 31, 1938 2,118,818

UNITED STATES PATENT OFFICE

2,118,818

FLOOR SANDER

Nathaniel N. Okun, New York, N. Y., assignor to Atlas Floor Surfacing Machinery Corp., New York, N. Y., a corporation of New York

Application February 13, 1933, Serial No. 656,392

14 Claims. (Cl. 51—176)

The present invention is a floor sanding machine and an object thereof is to provide an improved sanding machine characterized in that the frame thereof pivotally carries intermediate wheels which serve as fulcrum means continuously held in contact with the surface to be treated by controllable resilient means. The invention has as a further object the provision of a sanding machine in which conveniently adjustable means is provided for shifting the rear end of the frame to permit the latter to bodily tilt about the intermediate wheels. The invention has as a further object the provision of a sanding machine having means adjustable for setting the rear portion of the frame to permit the surface treating member thereof to effect predetermined cuts on the surface to be conditioned without resorting to manual tilting of the machine and without the need of or depending upon the skill of the operator to manually hold the machine by its handle at certain degrees of inclination. Other objects, features and advantages of the invention are in part obvious and in part hereinafter more fully pointed out and for a clearer understanding of the principles underlying the scope thereof attention is directed to the accompanying drawings in which:

Fig. 1 is a side view of the sanding machine according to my invention.

Figure 2 is a plan view taken along the line 2—2 of Figure 1.

Figure 3 is a rear view showing the handle cut off.

Figure 4 is a sectional side view on the line 4—4 of Figure 8 showing the parts with the sanding drum lifted clear of the floor.

Figure 5 is a sectional view on the line 5—5 of Figure 1.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is a view, partly in section, on the line 7—7 of Figure 8 on a large scale, similar to Figure 1, but with certain parts broken away and showing the drum making a deep cut.

Figure 8 is a view on the line 8—8 of Figure 1, showing the parts in the same position as in Figure 1.

Figure 9 is a sectional view of the adjusting mechanism shown in Figure 3, the parts, however, being positioned as in Figure 8.

Figure 10 is a side view of certain of the parts when the machine is being pulled backward, the parts being in the position of Figure 8.

Figure 11 is a sectional view on the line 11—11 of Figure 1.

Figure 12 is a section on the line 12—12 of Figure 4.

Figures 13, 14 and 15 are drawings showing fragmentarily rasp-like cutting devices adapted to replace the usual sand-paper.

The operator who is intending to "sand" or grind down a floor 20, takes hold of the machine by the handle 21 and shifts the handpiece 22 away from the handle 21 by pushing a lug 23, against the tension of a spring 22a, out of a notch 24 in a guide quadrant thus shifting a connecting rod 26, pivotally attached at 27 to the handpiece 22, so that it thrusts down a rear swivelled wheel 28, to effect cutting as described below. When shifted in the opposite direction it permits the operator to tilt the frame or casing 29 of the sanding machine backward around central wheels 30 so as to lift the sanding drum 31 away from the floor to the position shown in Figure 4. The operator then wheels the machine to working position.

To start cutting, the operator shifts the handpiece 22 to the position seen on the upper part of Figure 1 thus thrusting the swivelled or rear trailing wheel 28 downwardly with the result that the sanding drum 31 takes the position shown in Figure 1 in which the drum cuts into the floor 20 to make a reasonably shallow cut as illustrated in said Figure 1.

To cause the sanding drum 31 to effect this cutting, the drum, as best seen in Figure 8, is covered with sand paper 32 lying on a resilient rubber mat vulcanized to the drum on its broad face plate 33. The face plate 33 is supported by plates or arms 34 extending from hubs 35 to flanges 36 which fit closely the back of the face plate 33. The face plate 33 is held to the flanges 36 by screws 37 threaded into the face plates so that their countersunk hubs 38 lie flush with the surface of the drum. The hubs 35 are held fast by set screws 39 to a transverse axle 40 provided with ball races 41 and 42 at its ends, forming parts of ball-bearings 43 which also include races 44 mounted in the wall or side plates 45 of the sander frame 29.

The ball-bearings 43 are adapted to hold the drum 31 against side motion between the walls 45, thus enabling the drum to run with its right hand edge 46 just clear of the inside 47 of the right hand side plate 45, with the result that the sandpaper 32 will sand a floor up to within less than an inch of the outside of the right hand side plate 45. To enable this to be done, the right hand ball-bearing 43 lies entirely within the plate 45 and the plate or arms 34 bend inwardly to the

hub 35. The left hand hub 35 may be identical with the right hand hub 35, but the ball-bearing 42 may be carried in a cup 48 extending through the left hand wall plate 45, thus giving a firmer bearing for the balls 43 to enable them to withstand the tension of the driving belt 49 which passes around a pulley 50, fast on the left hand end of the shaft 40, the belt 49 being driven by a pulley 51 on the shaft of a motor 52.

The motor 52 is shown as mounted nearly centrally on the top plate 53 of the sander body, on lugs 54 which extend outwardly from it, and are provided with slots 55 through which pass bolts 56 which may be loosened so that the motor is adjustable along the top 53 to vary the tension on the belt 49.

The motor is a heavy part of the mechanism and is shown as mounted nearly vertically over the intermediate wheels 30. In the form shown, the wheels 30 run within inwardly bent rearward extensions 57 and 58 of the right and left hand side plates 45 respectively. To cause the wheels 30 to tend to guide the sanding machine straight forward and back they are shown as independently mounted upon swinging or pivoted arms 59 journalled to swing freely around a transverse shaft 60, the swinging arms 59 being provided with hubs 61 which ride between internal projections 62 of the side plates 57 and 58 and collars 63 fast on the transverse shaft 60. Each wheel 30 is shown as journalled in a short stub shaft 64 projecting outwardly from its swinging arm 59.

The wheels 30 are each shown normally held downward against the floor by a spring 65 bearing against an adjustable abutment 66 threaded into an internal ear 67 projecting from the adjacent side plate. Each spring 65 is shown as bearing against an abutment 68 on a presser rod 69 journalled at 70 on the rock arm 59 and riding freely up and down in a central hollow of the thumb screw 71 which adjusts the abutment 66.

To prevent the springs 65 from over-throwing the wheels 30 each presser rod 69 is threaded at its upper end 72 and provided with lock nuts 73 above the thumb screws 71 so that if the wheel 30 is pressed too far out by its spring the lock nuts 73 will be stopped by the thumb nut 71. The springs 65 are not strong enough to carry the whole weight of the sanding machine, but carry a substantial fraction of its weight.

In order to enable the wheels 30 to accurately control the maximum cut of the sanding drum 31, they are provided with stops 75 and 76. The stop 75 on the left hand side plate extension 58 may be formed as a lug cast on that plate but at least one of the stops 75 and 76 is ordinarily intended to be adjustable.

The right hand stop 76 is herein shown as the head 77 of a bolt 78 threaded into a lug 79 on the right hand side plate extension 57 and locked in position by a lock nut 80.

As a result of the foregoing structure, the operator can accurately know in advance the depth of cut which will be produced by the sanding drum 31 at any given position of the handle 22. When the wheels 30 are on a normal floor run their rock arms 59 are in contact with their stops 75 and 76, but when the machine reaches a hollow in the floor either wheel 30 which is not in actual contact with the floor is immediately pushed down by its spring 65 until the wheel bears upon the floor with sufficient weight to cause it to serve as a steadying guide for the workman pushing the sanding drum 31 across the floor.

In the form of the device herein shown, the side plate extensions 57 and 58 are provided with openings 81 so that the thumb screws 71 and nuts 73 are easily accessible. The wheels 30 run in cutaway portions 82 of the side plates so that the stop 76 is also easily accessible.

The connections by which the fingerpiece 22 pushes the rod 26 to move the wheel 28 include a pivot 83 and a backward extension 84 of the segment 25. The push rod 26 itself is provided with an upward extension 85 engaging the stem 86 of the fingerpiece 22 by the pivot 27.

When the fingerpiece 22 is pushed down the push rod 26 is thrust down and carries down (see Fig. 9) a rock arm 88 fast on a transverse rock shaft 89 which is journalled in two brackets 90 and 91, projecting inwardly from an outside plate 92 which lies against and overlaps the sides of an opening 93 at the back 94 of the machine frame.

When the push rod 26 is depressed it rotates the shaft 89 thereby rotating a rock arm 94, also fast on the shaft, with the result that a spur gear 95 swings downwardly and carries downwardly a rack 96, forming part of a slidable post or extension 97, which slides up and down in a hollow vertical extension or sleeve 98 of the plate 92. To keep the post or shaft 97 from rotating in the hollow extension 98, the shaft 97 is provided with a set screw 99 which rides up and down in an open slot 100 at the back of the projection 98.

The trailing wheel 28 is swivelled on the shaft 97 by being journalled on a short axle 101 on a rearward extension 102 of a cup 103 provided with upper and lower ball-bearings 104 and 105 so that bearings 104 and 105 rotate freely on suitable ball races 106 on the shaft 97.

To nearly balance the pressure of the wheel 28 against the fingerpiece 22 there is provided a spring 107 (see Fig. 9) which bears against an abutment 108 on a thrust bar 109 pivoted at 110 to a rock arm 111 fast on the shaft 89.

It will be observed that the plate 92 is held to the body 29 of the machine by four screws 112 so that the structure which controls the controlling wheel 28 is easily removable, practically as a unit. The plate 92 also carries an upper socket 113 in which the handle post 114 is mounted thus rendering the structure very simple to assemble.

The pressure on the spring 107 is easily adjusted by a finger screw 115 threaded into a socket 114 also forming part of the plate 92, the opposite end 116 of the finger screw 115 forming an abutment for the spring while the thrust bar 117 which carries the abutment 108 rides loosely in an opening 118 in the stem of the finger screw 115.

To withdraw the dirt and refuse from around the drum 31, there is provided a fan 119 having an outside pulley 120, both fast to a shaft 121. The shaft 121 is provided with suitable ball bearings 122 in a boss 123 forming part of a plate 124 so that the plate 124, being slightly larger than the fan, may be held against the rearward side extension 58 by screws 125 threaded into the side 58 through lugs 126 in the plate. The fan and its mounting are therefore removable as a unit.

There is also provided a dust collecting funnel shown in Figures 8 and 4, which has a forward curved end 127 and transverse closed top 128

and bottom 129 which lie close to the surface of the sanding drum 31, so that when the fan is rotating it draws air through the opening formed by the curved sides 127 and top 128 and bottom 129 through the constricted portion 130 of the funnel and discharges it tangentially through a channel 131 into a bag 132.

The funnel 131 is held in place by front screws 133 near the front edge 127 and by rearward screws 134 threaded through the side 58 into a flange 135 which lies around the opening 136 through which the fan 119 is inserted.

The passageway 131 as is most clearly seen in Figure 4 up to the top 29 of the machine, may be formed as an extension of the flange 135 which forms a fan-housing and delivers the air into a pipe 139 having flanges 140 which hold it to the top 29 of the machine.

As has been heretofore mentioned, the motor is adjustable on the top of the machine to adjust the belt 49. To enable the belt 141 which drives the fan 119 by the pulley 120 to be adjusted, there is provided a post 142 on the side 58 on which is pivoted a segment 143 carrying, on an extension 144, an idler pulley 145 which bears against the belt 141 between the pulley 120 and the pulley 146. The idler pulley 145 may be adjusted by loosening a screw 147 which passes through a slot 148 in the segment and then adjusting the segment to position the pulley to the desired point and then tightening up the screw.

In order to guide refuse effectively into the funnel 130, a front hood 150 is pivoted above the drum 31 at 151 somewhat behind the shaft 40, so as to overlie the front of the sides 45. The hood guides the refuse sucked back by the air suction into the funnel 130 until it comes to the edge 128 and then the refuse is sucked down past the edge 128 because a short transverse partition 153 just above and behind the edge 128 limits the area from which air is drawn.

The front of the hood 150 is shown as carrying a rubber buffer 155 adapted to arrest the machine without damage when it strikes a wall.

The most satisfactory mat 156 is found to be a sheet of fine textured sponge rubber, about an eighth of an inch thick, having continuous outer faces and vulcanized to an outer thin canvas sheet.

For drawing the sand paper tight over this mat 155 two circular clamps have been found satisfactory each consisting of a knurled rod 157 (see Figure 2) journalled at one shouldered smoothed end 158 in a socket 159 in the end plate 34 at the very end of the drum, and journalled at the other smooth shouldered end 161 in an opening 162 extending through the opposite end plate 34 so that the rod may be turned by inserting a triangular key in a small triangular socket 164 in the end of the rod 157. Preferably the socket 159 for one rod 157 is at one side of the drum and the socket 159 for the other rod 157 at the other side of the drum, so the triangular sockets 164 are at opposite ends of the drum, but the rods are set at an angle to the axis of the drum.

The sand paper 32 is stretched around the mat 156 by carrying its ends 165 down through a diagonal slot 166 in the face plate 33 and then between the rods 157, (shown on an enlarged scale in Figure 2) which for this purpose are provided with flat cutaway faces 168, and then turning the rods by keys in their sockets 164. The sand paper is thus held out to its edges, or at least to the inside edge of the end plate 34, thus giving uniform tension and ample grip.

The rods 157 may be locked by set screws 167, and if desired may be journalled in brass or iron bushings (not shown). The frame is preferably aluminum, but the bearing shaft 60, the outside plate 92, the ball bearings, and the bearings on the plate 92 are preferably of steel or brass as the case may be, thus producing a machine light enough to be carried easily and yet having no soft aluminum wearing parts.

The device has so far been described as a sanding machine, but it is well adapted to be used for removing a surface by the aid of a rasp face instead of a sand paper face, on the drum 31, thus working more effectively on rough surfaces. Such a cutting face is provided by stretching around the blanket or mat 156, a rasp face made by punching up projecting points 169, from the back of a sheet of spring steel 170.

For one depth of cut the points project about a sixteenth of an inch from openings 171 an eighth of an inch wide in a sheet ten one-thousandths of an inch thick. The points, as clearly appears in Figure 13, are offset from each other along the axis of the drum so that successive points 169 cut to one side or the other of the center of the cut of the preceding points 169. Such a rasp face on a resilient mounting equal to the blanket or mat 156 provides a rasp cutting surface free from the objections found in using a rigidly mounted rasp face.

The steel plate 170 is held in place by its two turned down smooth ends 172 which project into the opening between the rods 157, so that the rods can be rotated to lock it down on its resilient backing mat 156.

For some purposes it is desirable to have a rasp face which need not be cleaned from clogging refuse or detritus. To attain this end the sheet steel plate 170 may be provided with oppositely faced alternate rows of teeth or points 169 and 173 as shown in Figure 15, with the result that the plate may be used to cut first with the teeth 169 until clogged, then removed, and used to cut with the teeth 173, or vice versa, incidently partly or largely cleaning the clogged teeth when reversed.

The structure of Figure 15 simplifies the equipment which a workman needs to take to a new job, especially for use on old floors.

Having thus described certain embodiments of the invention what is claimed is:

1. In a floor surfacing machine, the combination of, a frame having a rotatable drum normally disposed above a surface to be conditioned, guide wheels continuously in rolling contact with said surface and swingably connected to intermediate parts of the sides of said frame, spring means for holding said guide wheels in contact with said surface, a rear trailing wheel continuously in rolling contact with said surface and a connection controlled from separate sources for controlling the elevation of the rear portion of said frame relative to said trailing wheel for bodily tilting said frame about said guide wheels to move said drum towards or away from said surface.

2. In a surfacing machine, the combination of, a frame having a rotatable drum normally disposed above a surface to be conditioned, a rear trailing wheel continuously in rolling contact with said surface, a swingable arm carried by each side of said frame, a rotatable guide wheel sustained by each of said arms, adjustably controlled spring means acting on said arms to hold a respective guide wheel in rolling contact with said surface, stop means to limit retraction of

said arms, and a connection operatively associated with said frame and cooperating to bodily raise or lower the latter relative to said trailing wheel for tilting said frame bodily about said guide wheels and control the displacement of said drum respectively towards or away from said surface.

3. In a surfacing machine, the combination of, a frame having a drum normally above a surface to be conditioned, yieldingly controlled and intermediately arranged spaced guide wheels operatively connected to said frame, a trailing wheel continuously in rolling contact with said surface, a post associated with said trailing wheel and comprising a rack, a sleeve carried by said frame and slidably guiding said rack, a segment in mesh with said rack, and adjustable means for actuating said segment and rack to elevate the rear portion of said frame to bodily tilt the latter about said guide wheels concomitantly lowering said drum towards and against said surface.

4. In a surfacing machine, the combination of, a frame having a drum normally above the elevation of a surface to be conditioned, yieldably controlled spaced guide wheels continuously in rolling contact with said surface, a trailer wheel having a swivel connection, a sleeve carried by said frame, said connection comprising a rack guided in said sleeve, a gear in mesh with said rack, and actuating means for displacing said gear to shift said sleeve relative to said rack to bodily lift or lower the rear portion of said frame and tilt the latter about said guide wheels to lower or raise said drum towards and against said surface or away from the latter respectively.

5. The surfacing machine according to claim 4 in which a rotatable manipulator is carried by said frame and said actuating means comprises a spring controlled by said manipulator for variably adjusting the pressure imparted by said drum against said surface.

6. The surfacing machine according to claim 4 characterized in that said frame includes a rearwardly disposed inclined handle, a guide rod disposed alongside of said handle and operatively connected to said actuating means, and lockable lever means for controlling said rod to bodily tilt said frame about said guide wheels whereby the rear portion of the said frame is raised or lowered relative to said rack for displacing said drum towards and against said surface or away therefrom respectively.

7. In a floor surfacing machine, the combination of, a frame having a forwardly disposed rotatable surfacing drum and a rearwardly disposed sleeve, a trailing wheel having means to support the rear end of said frame and comprising an upstanding member slidably guiding said sleeve, spring controlled arms swingably connected to the sides of said frame and each carrying a guide wheel intermediately disposed relative to ends of said frame, a connection associated with said member for elevating the rear end of said frame to pivot the latter about said guide wheels to differentially control the imparted pressure by said drum against a surface to be treated, and a rotatable member extending rearwardly of said frame to actuate said connection.

8. In a floor surfacing machine, the combination of, a frame having a forwardly disposed rotatable drum normally sustained above a surface to be treated, intermediately disposed guide wheels each swingably connected to a side of said frame, spring means for holding said guide wheels continuously in contact with said surface, a trailing wheel having a swivel connection with said frame, a connection for elevating the rear end of said frame relatively to said trailing wheel to tilt said frame about said guide wheels and dispose said drum against said surface, rotatable regulating means cooperating with the last named connection for adjusting the pressure of said drum against said surface, and other regulating means for controlling said last named connection to bodily displace said frame relative to said trailing wheel.

9. In a floor surfacing machine, the combination of, a frame having a forwardly disposed rotatable drum normally sustained above a surface to be treated, spaced guide wheels, spring actuated means rotatably supporting said guide wheels and pivotally connected to the sides of said frame for yieldingly holding said guide wheels in contact with said surface, a trailer wheel, adjustable means for bodily tilting said frame about said guide wheels to dispose said drum against said surface and concomitantly elevate the rear portion of said frame relative to said trailer wheel, and other independent regulating means for controlling the elevation of said rear portion.

10. In a floor surfacing machine, the combination of, a frame having a drum normally disposed above a surface to be treated, guide wheels each swingably carried by a side of said frame, spring means continuously and independently holding said guide wheels in rolling contact with said surface, a rear trailing wheel continuously in rolling contact with said surface, a dust duct disposed within said frame, a fan associated with said duct, driving means carried by said frame and disposed substantially in alinement with said guide wheels and operatively connected to said drum and fan, and means carried by said frame to bodily tilt the latter relative to said trailing wheel about said guide wheels to differentially shift said drum towards or away from said surface.

11. In a floor surfacing machine, the combination of, a frame having a drum normally disposed above a surface to be treated, guide wheels swingably carried by the sides of said frame, spring means for independently holding each of said guide wheels in continuous rolling contact with said surface, a rear trailing wheel continuously in rolling contact with said surface, a dust duct disposed within said frame, a fan associated with said duct, driving means carried by said frame and disposed in alinement with said guide wheels and operatively connected to said drum and fan, means carried by said frame to bodily tilt the later relative to said trailing wheel about said guide wheels to shift said drum towards or away from said surface, a handle carried to said frame, and means controlled adjacent said handle for bodily tilting said frame relative to said trailing wheel.

12. In a surfacing machine, the combination of, a frame having a rotatable drum normally above a surface to be treated, guide wheels swingably carried by the sides of said frame, spring means for independently holding each of said guide wheels continuously in rolling contact with said surface, a trailing wheel continuously in rolling contact with said surface and supporting the load of the rear end of said frame, a fan, means carried by said frame for driving said

drum and fan, and adjustable regulating means carried by said frame for bodily shifting the latter relative to said trailing wheel and about said guide wheels to differentially dispose said drum towards and away from said surface.

13. In a surfacing machine, the combination of, a frame having a rotatable drum normally above a surface to be conditioned thereby, a trailing wheel having means slidably supporting a rear portion of said frame, an arm pivoted to each side of said frame, a guide wheel rotatably carried by each arm, spring means associated with each arm to hold the wheel thereof in yielding and pressural contact with said surface, means for adjusting the height of the rear portion of the frame relative to said trailing wheel, means for regulating the pressure on each of said guide wheels, means to limit retraction of each of the latter, and a handle for guiding said machine.

14. In a surfacing machine, a frame having a rotatable drum adapted to be disposed in contact with a surface to be treated, intermediately disposed guide wheels, means swingably connecting said guide wheels to said frame, spring means cooperating with said swingable means for continuously holding said guide wheels in rolling contact with said surface, a rear trailing wheel for supporting a part of the load of said machine and continuously in rolling contact with said surface, means overhanging the rear part of said frame for guiding displacement of the rear portion of said frame relative to said trailing wheel, driving means for said drum, and regulating means for displacing the rear part of said frame relative to said trailing wheel to tilt said frame about said guide wheels for adjusting the pressure between said drum and surface.

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