UNITED STATES PATENT OFFICE

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COMBINED BRUSHING AND VACUUM CLEANING APPARATUS

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2 Claims. (Cl. 15—345)

This invention relates to a sweeper and has relation more particularly to an apparatus or machine of this kind of a vacuum type and it is primarily an object of the invention to provide a structure wherein are employed brushes arranged in a manner to provide a confined space from which dirt, dust and the like is drawn.

It is also an object of the invention to provide an apparatus of this kind wherein dust and the like is withdrawn under the influence of a vacuum together with pneumatic means for causing dust and the like to effectively travel toward the vacuum nozzle.

A still further object of the invention is to provide an apparatus or machine of this kind including brushing members together with vacuum means for withdrawing dirt, dust and the like and wherein such means are so supported as to be adjusted toward or from the surface upon which the machine is working in order to facilitate the operation thereof.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved sweeper whereby certain advantages are attained, as will be hereinafter more fully set forth.

In order that my invention may be better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a view in top plan with a portion broken away of a sweeper constructed in accordance with an embodiment of the invention;

Figure 2 is a view in side elevation of the sweeper as herein embodied with portions broken away and the dust or dirt collecting equipment shown diagrammatically by broken lines;

Figure 3 is a sectional view taken substantially on the line 3—3 of Figure 1;

Figure 4 is a fragmentary view partly in section and partly in elevation illustrating the mounting for one of the ground or surface engaging wheels as herein comprised;

Figure 5 is a fragmentary detailed view taken substantially on the line 5—5 of Figure 2;

Figure 6 is a detailed sectional view taken substantially on the line 6—6 of Figure 1;

Figure 7 is an enlarged fragmentary detailed sectional view taken substantially on the line 7—7 of Figure 2;

Figure 8 is a fragmentary view in side elevation opposite to Figure 2 and particularly illustrating the means for limiting the downward movement of the handle member; and

Figure 9 is a fragmentary view partly in section and partly in elevation illustrating a modified form of invention in connection with a ground engaging supporting wheel.

In the embodiment of the invention as illustrated in the accompanying drawings, P denotes a platform of desired dimensions and which is herein disclosed as substantially square in plan although I do not wish to be understood as limiting myself to any particular size or configuration. This platform may be made of any material desired and it is to be particularly pointed out that such platform is substantially imperforate.

The back edge or end of the platform P at substantially the transverse center thereof has a rearward extension 2. The extension 2 is relatively short but is of sufficient dimensions to allow for the placement thereon of an upstanding bearing sleeve 4 to provide a mounting for the shank or spindle 5 for a caster wheel 6 which underlies the extension 2. The sleeve 4 and shank 5 have associated therewith the conventional type of bearing assembly 7 and it is to be particularly pointed out that the shank 5 is capable of a certain amount of endwise movement through the sleeve 4 so that the wheel 6 may be selectively adjusted toward or from the extension 2. The inner race or ring of each bearing assembly is threaded on the shank as shown, for adjustment.

In order to maintain the desired selective adjustment of the wheel 6, the shank 5 below the portion 2 has threaded thereon a stop member or nut 8 which contacts from below with the extended portion 2. This member or nut 8 is readily adjusted along the shank 5 upon rotation to effect the desired positioning of the wheel 6 with respect to the extended portion 2 when the machine or apparatus is in operation.

The platform P at opposite sides thereof has pivotally connected therewith, upon its undersides, as at 9, the downwardly directed arms 10. The free or lower end portion of each of these arms 10 has operatively engaged therewith, as at 11, the lower extremity of an elongated threaded member or shank 12 which extends through the platform P and is adjustably secured thereto by nuts 13, whereby means is provided for adjusting the angle of the arm 10 with respect to the platform P so that a ground engaging wheel 14, pivoted to the arms as at 14, may be selectively adjusted toward or from the platform P.

Mounted upon the central portion of the platform P is a motor M of an electrical type and
which is adapted to have communication with a suitable source of electrical energy in a conventional manner through the usual type of a flexible conductor. The motor M is of a type, however, to upon the opposite drive shafts 15 and 16, the shaft 15 being rearwardly directed and the shaft 16 being forwardly directed. The shaft 15 extends within the housing 17 of a blower and is fixed to said shaft 15 within the housing 17 and the usual type of blades 18 whereby upon rotation of the blades 18 a blast of air is forced out through the nozzle 19. This nozzle 19 as herein disclosed is arranged at a suitable distance below the platform P in relatively close proximity to the surface over which the machine or apparatus travels when in use to discharge forwardly or in the direction of travel of the machine. The shaft 16 extends within the housing 20 of a vacuum fan structure and the portion of the shaft 16 within the housing 20 has fixed for rotation therewith the usual type of blades 22. When the apparatus or machine is in operation, this vacuum fan operates to draw air up through the nozzle 21 which nozzle 21 extends downwardly and rearwardly on a predetermined curvature and also terminates in close proximity to the surface over which the apparatus or machine traverses when in use. The platform P, of course, is provided with the properly positioned openings 22 and 23 through which the nozzles 19 and 21, respectively, are disposed. These nozzles 19 and 21 effectively seal these openings 22 and 23 in a manner to prevent any passage of air up through the openings 22 and 23 exteriorly of the portions of the nozzles disposed therethrough.

The shaft 15 between the motor M and the housing 17 of the blower has thereon for rotation therewith a pulley 24 around which is disposed a belt 25 which in turn is operatively engaged with a pulley 26 supported above the platform upon a horizontally supported rotatable shaft 28, which carries a second pulley 27 with which is operatively engaged a belt 29. This belt 29 extends downwardly through a suitably positioned slot 31 in the platform P and has operative engagement with a pulley 32 mounted on and for rotation with an end portion of a core or spindle 35 of a brush A. The brush A as herein disclosed is of a length to extend a material distance along a side marginal portion of the platform P and it is to be noted that the bristles 36 of the brush are of such length as to have a wiping contact with the floor surface to assure a most effective brushing action.

The spindle or core 35 of the brush A at its ends is provided with the axial trunnions 38 each of which has fixed thereon for rotation therewith a beveled gear 39 which meshes with a beveled gear 40 fixed on and for rotation with a trunnion 41 extending axially from one of two adjacent ends of a core or spindle 42 of the brushes B. These brushes B are arranged fore and aft of the platform P and extend substantially entirely thereacross.

The opposite end of the spindle 42 of each of the brushes B is provided with the axial trunnion 43 which carries the beveled gear 44 which meshes with the adjacent one of the beveled gears 45 fixed on and for rotation with the axial trunnion 46 at the ends of the spindle or core 47 of a second side brush C. This brush C also extends substantially from one end of the platform to the other and is mounted in substantially the same manner as the brush A.

It is to be pointed out that the brushes A, B and C when applied, provide a relatively large quadrangular chamber whereby the action of the vacuum fan is materially facilitated. It is also to be noted that this chamber is of a size to permit the throwing of dirt, dust and the like thereinto by the brushes A, B and C.

The brushes A, B and C are applied in working position with respect to the platform P as a unit and is believed to be embodied in the assembling of these brushes the trunnions at adjacent ends of the brushes are disposed through the anti-friction bearing assemblies 48 suitably mounted in the perpendicularly related arms 49 of the bearing carriers X. Each of these bearing carriers X is in the form of a right angle bracket and when applied the corners or apices thereof are inwardly disposed. It is also to be pointed out that the various beveled gears are mounted on the trunnions outwardly of the arms 47 and are held against removal by the members or nuts 50 threaded upon the trunnions.

When the rollers are applied the trunnions thereof are inserted into the open slots 51 provided in the arms 47 and which slots, when the bearing carriers are applied, are downwardly directed. The bearing carriers are adapted to be suitably held in applied or working position by the removable bolts 52 which thread within the suitably positioned flanges 53 depending from the platform P at the corner portions thereof and with which the arms 49 contact from without.

The various belt pulleys may be made of such varying radii as to assure the required reduction of speed of the rollers A, B and C with respect to the drive shaft 15 if so desired.

The platform P at its central portion and at the opposite sides thereof is provided with the upstanding posts 54, to the upper extremities of which are pivotally connected at as 55 the extremities of a fork P which straddles the blower 17 and rear end portion of the motor M. This fork P is rearwardly directed and carries a central shank 56 operatively engaged with an elongated handle member H whereby the device can be readily moved over the surface to be cleaned. One side portion of the platform P directly below an arm 57 of the fork P is provided with an upstanding stop post 58 with which said arm 57 contacts from above in order to limit the downward swinging movement of the fork toward the platform P so that said fork will not interfere with the belt 28.

By having the several supporting wheels for the platform mounted in a manner to allow said wheels to be selectively adjusted toward or from the platform, it is possible to regulate the spacing of the nozzles from the surface which the machine traverses as may be best for the most efficient operation of the machine.

It is believed to be obvious that the mounting of the supporting wheels, and particularly those at the rear, may be varied as such does not form any particularly essential part of the invention.

However, under some conditions it may be of advantage that these rear wheels be supported directly below the platform and accordingly a modified embodiment wherein such platform or body plate is designated Z, and wherein said plate Z at predetermined points at opposite sides thereof and inwardly of a side margin is provided with an upwardly projecting covering portion 59 to shield and allow for the necessary up and down movement of the ground contact supporting wheel 60 of desired dimen-
sions, which is rotatably carried by an arm 61 or the like. This arm 61 has one end portion hingedly connected as at 62 to the under face of the body plate Z. The arm 61 carries a rearwardly directed elongated arm 63 with which contacts from above a regulating member 64 threaded through the body plate Z whereby the extent of upward movement of the wheel 65 is limited. By proper manipulation of the member 64 the wheel 65 may be caused to effect a predetermined elevation of the body plate Z with respect to the surface which the apparatus traverses.

The arm 63 is normally and yieldingly held in contact with the lower end of the member 66 by a contractile spring 68 of desired tension having one end portion coupled to the outer or free extremity of the arm 63 and its opposite end portion suitably secured to the body plate Z.

Secured to the under side of the platform P adjacent to the front of the apparatus, is a forwardly and downwardly curving shield 75 which terminates in close proximity to the floor directly behind the front brush B. As shown in Figure 2 the intake nozzle 21 is directed rearwardly through the lower part of this shield and the air discharge nozzle 19 is directed forwardly so that material picked up from the surface of the floor by air ejected from the nozzle 19 will be discharged forwardly toward the shield 75 which will intercept it and cause it to drop into a position where it can be readily picked up by the nozzle 21.

From the foregoing description it is thought to be obvious that a sweeper constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated.

I claim:

1. A surface sweeping apparatus comprising a flat platform, supporting wheels thereon, a plurality of angular bracket members secured in spaced relation to the under side of the platform and each positioned as a corner of a quadrangle, a portion of each bracket being in spaced relation with a corresponding portion of another bracket, a relatively long brush rotatably supported between each two spaced bracket portions, the brushes forming the sides of the said quadrangle and defining an enclosed dirt receiving chamber beneath the platform, gear means connecting adjacent ends of the brushes, a motor mounted upon the top of the platform, a driving connection between the motor and one of said brushes, said brushes all rotating in a direction to sweep into the chamber, suction means for removing sweepings from within said chamber, and a handle means connected with the top of the platform facilitating movement of the same over a supporting surface.

2. A surface sweeping apparatus of the character described in claim 1 wherein said suction means includes a nozzle extending into the chamber immediately adjacent to one of the brushes, said nozzle being directed downwardly and away from said adjacent brush, a shield element secured to the under side of the platform adjacent to the said one of the brushes and directed downwardly and terminating at its lower edge in close proximity to the supporting surface, said nozzle having its inlet at the side of the shield away from the said one of the brushes, a blower operated by the motor, and a nozzle connected with the blower and disposed in the said chamber adjacent to the side thereof farthest from the shield and directed toward said suction nozzle.

ARTHUR J. BECKETT.

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