This invention relates to floor-maintenance machines by which is meant machines for scrubbing, polishing, sanding and similarly treating floors of offices, warehouses, factories and so on.

According to this invention a floor-maintenance machine comprises a casing, an electric motor carried by the casing, a vertical shaft driven by the motor, an eccentric secured to the shaft and a carrier for a floor-maintenance element, mounted on the eccentric for free rotation thereabout. With this arrangement the carrier (and the floor-maintenance element—e.g. an abrasive disc, polishing pad, scrubbing brush—on the carrier) performs a circular movement which is selected to be of quite small radius with the result that, without toothed or similar gearing between the motor and the carrier, the power required to drive the carrier during cleaning is greatly reduced compared with known cleaners having non-eccentric, rotary cleaning elements. Thus, a machine according to this invention is of simple construction and of small weight.

The invention may be performed in various ways and the construction of one machine according to the invention will now be described, merely by way of example. The description is made with reference to the accompanying drawings whereof:

FIG. 1 is a sectional elevation of the machine,
FIG. 2 is a plan view of the machine of FIG. 1,
FIG. 3 is an inverted plan view of the machine of FIG. 1, showing only certain parts of the machine,
FIG. 4 is a perspective view of the machine of FIG. 1, and
FIG. 5 is a view similar to FIG. 4, showing a modification.

Referring to the drawings: the machine comprises a casing, generally indicated at 10, an electric motor 11 within a housing carried by the casing and a vertical shaft 12 driven by the motor. The motor housing is upstanding from the casing 10 and provides a marginal ledge 9. A handle 13 is pivotally attached to the casing so that the machine may be moved across the floor for cleaning.

The shaft 12 is supported in ball bearings 14, 15 and the lower end of the shaft projects through an end 16 of a housing 17 of the motor. A fan rotor 18 carrying fan blades 18a is secured to the projecting end of the shaft for rotation within a fan housing 19 having an outlet 20 which receives a removable dust bag 21 in known manner. As shown in the drawing, the fan rotor 18 is of dish shape and of smaller diameter than the housing 19.

The housing 19 has a lower wall 22 of conical shape spaced from the fan rotor 18 and providing a lower housing wall for the fan blades 18a and having a central opening 23 through which shaft 12 extends. Air is drawn through opening 23 from a space 24 (defined by skirt 25 of casing 10) and is discharged through outlet 20 in known manner. It will be noted that the fan blades operate within an annular duct formed between the fan rotor 18 and the conical wall 22 to drive the air into an annular space surrounding the fan and from which it is discharged into bag 21 through opening 26.

The fan rotor 18 is concentric upon shaft 12 and a circular boss 26 projects from the lower face of the fan rotor, the boss 26 being eccentric with respect to shaft 12. A ball bearing 27 is carried by boss 26 and a carrier 28 is mounted for free rotation on bearing 27. Thus, the carrier 28 is eccentric, and freely rotatable, on shaft 12.

A floor-maintenance element (e.g. the brush 29 shown in FIG. 4) is removably attached to the carrier 28, for instance, the brush bristles are secured to a bristle holder having a tapering hole so that the holder is a push fit on the tapering face 30. A weight 31 is secured to the fan rotor 18 to counterbalance the eccentric carrier 28 and the brush 29 or other element.

The casing 10 comprises a generally flat top portion 50 and the skirt portion 55 which depends from the top. The motor 11 comprises a housing 51 having a part 52 integral with top portion 50 and upstanding therefrom and a part 53 secured to part 52 and depending from top 50 so that about one-half of the motor is contained within the skirt portion of casing 10.

The fan rotor 18 extends in greater part axially along the depending part 53 of the motor housing 51 while the annular wall 22 is downwardly directed from skirt 25 to extend in part axially of the fan rotor 18.

With the described disposition of casing 10, motor 11, fan rotor 18 and wall 22 the motor is placed very low in relation to the casing despite the provision of the fan rotor 18—which tends to increase the height of the motor. The motor (as is well known) is a very heavy body and by arranging the weight of the motor to be low in relation to the casing the stability of the apparatus in use is enhanced.

The polishing or other floor-maintenance element carried by carrier 28 is in part within chamber 24 i.e. can be alongside wall 22 further assisting in height reduction.

In use: having secured the brush 29 to carrier 28, the brush 29 projecting below skirt 25, the motor 11 when energized will drive shaft 12 and carrier 28 therefore has imparted to it by shaft 12 (due to the eccentric mounting 26, 27) a rotary movement of radius of FIG. 3—the radius of eccentricity of boss 26. Thus, the brush 29 will rotate at the same speed as motor 11 but each part of the brush will perform a circular path of radius r. As the radius is small the motor 11 can be of small horse power while the brush may be driven at a relatively high speed.

The weight 31 is removable and replaceable by a larger or smaller weight. In this way floor-maintenance elements of different size and weight and of different materials may be appropriately counter-balanced. Instead of or in addition to, replacement of the weight 31 the latter may be adjustable to vary its radius of action.

For light operations on the floor (e.g. polishing) the weight of the machine described is sufficient to apply the polishing brush or pad to the floor with the required pressure. For heavy operations (e.g. scrubbing, abrading or sanding) the weight of the machine alone may not be sufficient. Additional weight is provided by a member 32 which is secured to casing 10, the weight 32 resting on ledge 9 and straddling the housing of motor 11. Casing 10 has a recessed platform 33 (FIGS. 1 and 4) which receives a projection 34 (FIG. 1) of member 32. The end of member 32 has a screw 35 to engage casing 10 and thereby secure the member rigidly to the casing. The member 32 is, for example, of metal and relatively heavy. The member 32 is readily attached to, and removed from, casing 10.

When floor scrubbing extra weight is required and at the same time water (with or without soap or detergent) is also required. These two requirements are met in the manner of FIG. 5. A water tank 36 has a skirt 37 provided with a projection and a screw as described.
for the member 33. The tank may thus be mounted securely upon casing 10, to rest on the marginal ledge 9 and straddle the housing of motor 11; the weight of the tank, and its contents, applying the scrubbing brushes to the floor with additional pressure. A hose 38 carries the water on to the floor. A tap 39 controls the flow of water.

The weight 32 is in greater part around the upstanding part 52 so that when the weight is fitted the height of the mass is not greatly increased so that the stability of the apparatus referred to above is not impaired. This is also so in the main when using tank 36 because the greatest volume of water (and therefore the greatest weight) is around the motor housing part 52.

The wheels 40 enable the machine to be wheeled over the floor when not in use.

Obviously a space is provided between the periphery of the brush 29 or other element and the inside of skirt 25 to permit the eccentric rotary movement of the brush without engagement of the brush with the skirt.

I claim:

A floor maintenance machine comprising in combination: a casing having a generally flat annular top portion and a peripheral skirt portion depending from said top portion; a generally cylindrical motor housing disposed about a vertical axis at the center of said top portion, said motor housing having an upstanding part extending above said top portion and a depending part extending below said top portion, said upstanding and depending parts being substantially equal in size; an electric motor having a vertical shaft; an annular wall portion directed inwardly of said skirt portion, said wall portion being spaced below said top portion to define with said top portion, said skirt portion and said motor housing depending part, a chamber having a circular air inlet; a suction fan rotor carried at the lower end of said motor shaft immediately below said depending part, said fan rotor being cup shaped and at least partially enclosing the depending part of said cylindrical motor housing; an eccentric boss formed on the underside of said rotor; a carrier for a floor-maintenance element mounted on said boss for free rotation thereof; and a detachable weight resting symmetrically on said annular top portion of the casing at positions laterally of said upstanding part of the motor housing, the gravity center of the motor and of the detachable weight thereby being low in relation to the floor-maintenance element carrier.

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