Dec. 17, 1968 V. E. YOUNG 3,416,177

FLOOR CLEANING MACHINE

Filed April 18, 1966 2 Sheets-Sheet 1

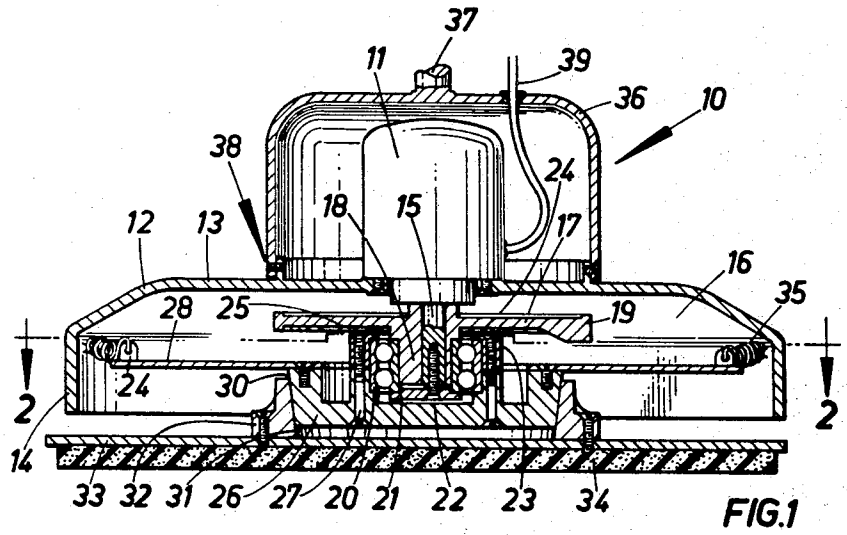


FIG.1

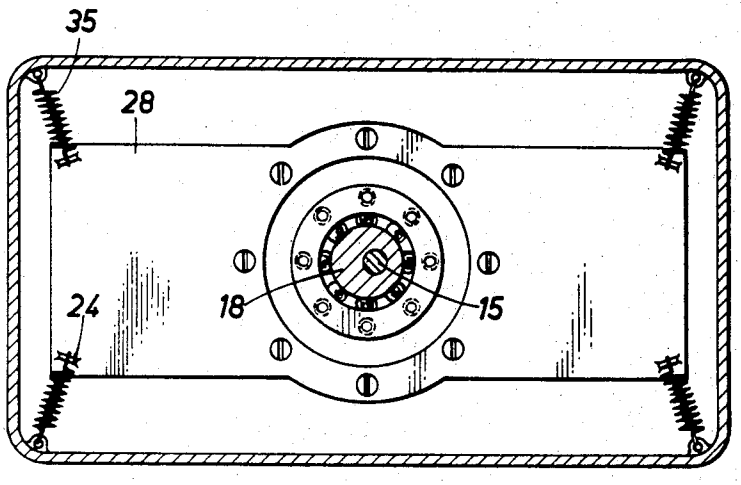


FIG.2

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FLOOR CLEANING MACHINE

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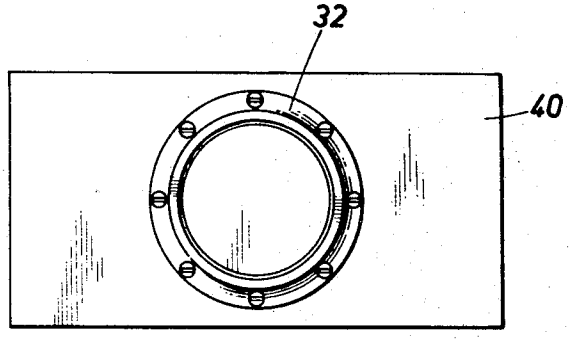


FIG. 3

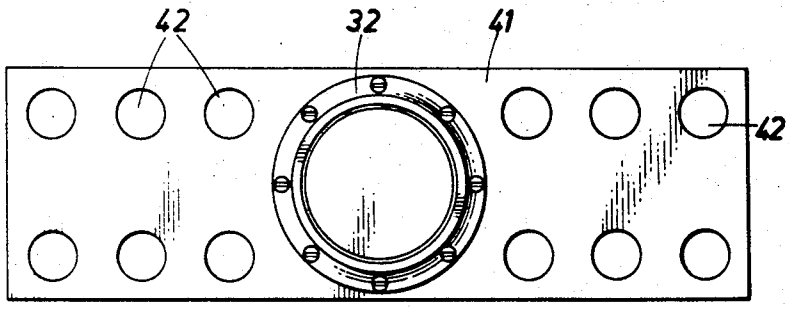


FIG. 4

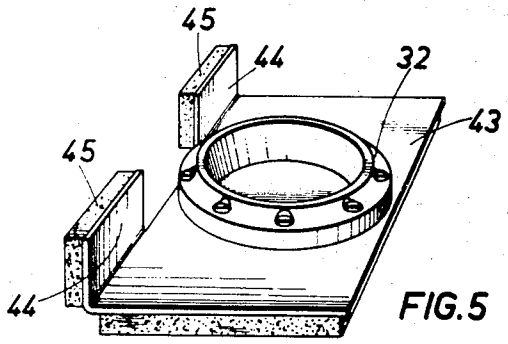


FIG. 5

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FLOOR CLEANING MACHINE

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Claims priority, application Canada, June 17, 1965, 933,613
9 Claims. (Cl. 15—98)

ABSTRACT OF THE DISCLOSURE

The disclosure describes a surface (e.g. floor) treating machine using an eccentric drive to an intermediate oscillatory plate, which is supported for oscillatory non-rotating motion, and to which surface-treating plates having optionally a wide variety of dimensions, which can be larger than the dimensions of the driving mechanism, can be coupled for oscillatory drive. The machine has a housing supporting a motor for the eccentric drive, and the intermediate plate is supported in the housing by springs which allow it to oscillate but not to rotate. Surface-treating plates are coupled to the intermediate plate, and can extend beyond the housing, since they are not attached to it. Surface-treating plates having mass within prescribed limits, but a wide variety of dimensions, can be counterbalanced while driven.

This invention relates generally to floor cleaning equipment and more particularly to improvements in equipment adapted for use in cleaning comparatively large floor areas within a comparatively short time.

Various appliances are available today for cleaning of floors, most of these however having a variety of disadvantages, particularly with regard to complexity of construction and therefrom insuring high original cost. Most of the prior devices utilize rotating cleaning means that do not lend themselves to a very stable cleaning operation and are particularly unsuited for rapid cleaning of large surfaces, a further disadvantage of such devices being that they normally do not have any provision for simultaneous cleaning of baseboards along the edge of a floor.

It is the object of this invention to provide a floor cleaning machine that utilizes an oscillating motion to oscillate a cleaning plate on the underside of which a suitable cleaning sponse is fastened, the cleaning plate being suspended by a plurality of springs within an apron of the cleaning machine, the springs permitting sufficient flexibility of the cleaning plate to conform with the oscillating action of a crank on a rotating spindle, yet provide sufficient control of torque on the plate to provide smooth cleaning action on a floor or the like.

It is a further object of this invention to provide a floor cleaning machine that incorporates very simple attachment and detachment means of the sponge carrying portion of the cleaning plate to permit rapid attachment or detachment of this cleaning plate from the main oscillating means of the machine.

It is a still further object of this invention to provide a floor cleaning machine that permits inclusion of a special sponge plate having provision on one side for baseboard cleaning plates located substantially perpendicularly to the sponge plate, to particularly facilitate cleaning baseboards along the edge of a floor.

It is another object of this invention to provide a floor cleaning machine that is able to utilize cleaning plates of up to three feet in length or more, such large cleaning plates being supplied with a plurality of holes for the purpose of lightening the plate, these holes at the same time being located in such a manner as to provide perfect balance of the plate during use.

These and other objects and features of this invention will become apparent when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a mid-vertical sectional side view of a floor cleaning machine embodying this invention.

FIG. 2 is an inverted planned view, partly in section, taken on the line 2—2 in FIG. 1, showing particularly the method of suspending the cleaning plate embodied in this invention.

FIG. 3 is a planned view one type of sponge plate adapted for use in conjunction with the present invention.

FIG. 4 is a planned view of a second type of sponge plate adapted for use in conjunction with the present invention, showing particularly methods of locating lightening and balancing holes in the plate for use in plates of up to three feet or larger length.

FIG. 5 is a perspective view of a sponge plate having provision at one side for baseboard cleaning means, adapted for use in conjunction with the present invention.

Referring to FIGURES 1 and 2, a floor cleaning machine embodying this invention is shown at **10** showing an electric motor **11** located vertically and substantially centrally of a housing **12** having an upper plate **13** surrounded by a downwardly extending skirt **14**.

Motor **11** has a spindle **15** protruding inwards and downwards into chamber **16** of housing **12**, spindle **15** carrying a fly wheel **17** that carries an integral eccentric **18** on its lower surface. A counterweight **19** is supplied on fly wheel **17** directly opposite eccentric **18** to compensate for side weight of eccentric **18** and the mass of a cleaning plate driven therethrough as herein shown and described, and provide dynamic balance of the machine in operation during rotation of fly wheel **17**.

A ball bearing **20** is nested on eccentric **18** and maintained firmly in place thereon by washer **21** and screw **22** that is threaded into extreme end of spindle **15**. A ring **23** is located around bearing **20** and supplied with a collar **24** that extends inward behind bearing **20**, ring **23** being supplied with a plurality of vertically situated threaded holes **25**, a clamping ring **26** being adapted to clamp firmly onto outer bearing race of bearing **20** by means of a plurality of screws **27** that are threadably receivable in threaded holes **25**.

Clamping ring **26** is supplied with a suspension plate **28** on its upper side, suspension plate **28** carrying a plurality of eyes **29**, each eye being supplied with a spring, the other end of each spring being attached to housing **12**, thereby suspending plate **28** within housing **12** and holding plate **28** against rotational torque, yet permitting sufficient movement of plate **28** to accommodate rotation of eccentric **18** within bearing **20** thereby permitting eccentric **18** to impart to plate **28** and clamping ring **26** a rotating oscillating movement. Clamping rings **26** is supplied with an inwardly and downwardly tapered edge **30** on which a correspondingly tapered mating hole **31** on a sponge plate ring **32** may be frictionally located and retained thereon by virtue of the tapered surfaces, sponge plate ring **32** being attached for instance by a screw means to a horizontal sponge plate **33** supplied on its under surface with a suitable sponge **34** that is adapted

to contact the floor surface during cleaning operation. The plate **28** is thus an oscillatory drive member for the sponge plate **33**.

I have found that an angle of 7° on tapered surfaces **30** and **31** has been most suitable for the purpose and that no further fastening means is required, the sponge plate **33** retaining its original position during the cleaning operation without showing any tendency to rotate on tapered surface **30**. However, anti-rotation means (not shown) may be added if desired.

I have found that four springs **35** are sufficient to provide flexibility of plate **28** combined with smooth retaining action and control of twist during the cleaning operation.

A handle yoke **36** carrying a handle **37** may be pivotably attached to upper plate **13** of housing **12** as shown at **38** and an electrical cord **39** is adapted to supply power to motor **11** through connection to a conventional power outlet.

My floor cleaning machine adapts itself easily to utilization of a variety of interchangeable sponge plates of varying sizes to suit various applications, a comparatively small sponge plate being shown in FIG. 3 comprising a sponge plate ring **32** fastened onto a thin sponge plate **40** that may have a length of, for instance, up to 18 inches.

Referring to FIG. 4 a sponge plate of substantially greater length is shown comprising a sponge plate ring **32** fastened onto a sponge plate **41** that may have a length of three feet or more, a plurality of lightening holes **42** being located in surface of sponge plate **41** partly to lighten sponge plate **41** but also to permit perfect dynamic balancing of sponge plate **41** and thereby provide smooth operation of the floor washing machine during utilization of such large sponge plates. The mass of the sponge plate **40** or **41** with its ring **32** is added to the mass of the clamping ring **26**, suspension plate **28** and eccentric **18** of the fly wheel **17**, all drivenoff-center with respect to the spindle **15**. The counterweight **19** serves the function of providing an opposing dynamic balancing force when the machine is operated. Therefore, since the sponge plates **40** and **41** are the only interchangeable elements, they are designed to have approximately the same mass, that is, mass within prescribed upper and lower limits, in order to preserve the dynamic balance of the machine. This is accomplished with the holes **42** as shown in FIG. 4, or by altering the thickness of the material (density) of the plate, or a combination of these techniques.

Referring to FIG. 5, a special sponge plate adapted to be utilized in cleaning along baseboards is shown comprising a sponge plate ring **32** located on a horizontal sponge plate **43** having at one side two vertically upward extending side plates **44** each carrying a sponge **45** on its outer surface, sponge **45** contacting baseboards along the side of a floor during cleaning operation of the floor portion directly adjacent such baseboards thereby permitting simultaneous cleaning of the floor edge portion and baseboards adjoining thereto. Clearly, a plate according to FIG. 5 can have its mass adjusted to a standard mass for the machine, as described above.

It will be understood that a slight tap on a mounted sponge plate will release the sponge plate from the clamping ring and permit rapid and immediate interchangement of sponge plates for various purposes.

I claim:

1. A machine for driving a surface-treating member having mass between upper and lower limits, but arbitrarily-chosen dimensions, in an oscillatory but non-rotating path in a first plane, comprising rotatable driving means, supporting means for said driving means, as oscillatory drive member supported substantially in a second plane adjacent and parellel to said first plane by resilient connectors to said supporting means, means coupling said drive member to said driving means, for oscillatory motion in a path in said second plane, said resilient connectors inhibting rotation of said drive member in said second plane, said drive member exclusively having attaching means for detachably connecting to said machine a surface treating member and driving same in said path in said first plane, and means to counter-balance the total mass of said drive member and said surface-treating member when attached thereto, during rotation of said driving means .

2. A machine according to claim **1** in which said driving means includes a flywheel having an eccentric member for coupling to said oscillatory member, and said counter-balance means is a mass affixed to said flywheel on the opposite side of the axis of rotation from the eccentric member.

3. A machine according to claim **1** in which said oscillatory drive member incorporates a circular part extending from said drive member to provide an outer surface extending between said first and second planes, the diameter of said circular part being gradually reduced toward said first plane so that said outer surface corresponds to the surface of a truncated cone and provides said attaching means.

4. For use in combination with a machine according to claim **1**, a surface treating member having a support plate of optional size but mass within said prescribed upper and lower limits intended to be disposed in said first plane and having a drive element affixed to a surface of said plate, for coupling with said attaching means, and on another surface of said plate resilient means conformable to irregularities of the surface intended to be treated.

5. In combination with a machine according to claim **1**, a surface-treating member having a support plate intended to be disposed in said first plane and having a drive element affixed to a surface of said plate, said oscillatory drive member incorporating a protuberant part extending therefrom to provide an outer surface extending between said first and second planes,' said drive element having an aperture the inner surface of which mates with said outer surface, so that said drive element and surface-treating may be detachably coupled to said oscillatory drive member exclusively via said protuberant part, there being no other connection between said surface treating member and said machine, whereby said surface treating member can be driven in said oscillatory but non-rotating path in said fisrt plane.

6. A machine according to claim **1** including a surface-treating member located in said first plane and extending in at least one dimension therein several times the distance said oscillatory drive member extends in the corresponding dimension in said second plane, said surface-treating member being apertured at several locations to preserve the counter-balancing effect of said counter-balance means.

7. A floor treating machine comprising a housing having a top plate and a surrounding downwardly extending skirt, a motor mounted substantially centrally in said top plate, said motor having a motor spindle extending vertically downward through said top plate, a flywheel attached to said spindle, said flywheel having an underside supplied with an eccentric, a bearing having an inner race and an outer race, said inner race being clamped firmly onto said eccentric, a suspension plate ring mounted to the outer race and carrying a suspension plate having a plurality of eyes located thereon, a corresponding plurality of springs tensionally located between said eyes and said housing, internally of said skirt of said housing, said suspension plate ring having a downwardly and inwardly truncated outer surface, a sponge plate carrying, on an upper surface, an internally tapered sponge plate ring having a female taper corresponding to the male taper on said suspension plate ring for frictional detachable attachment of said sponge plate to said suspension plate ring, said sponge plate having an under surface supplied with sponge means suitable for treating a floor surface.

8. A floor treating machine as claimed in claim 7 in which said flywheel is supplied with a counter-balance means at a side opposite to said eccentric for counter-balancing off center portions of said eccentric and the portions of said eccentric and the portions of said machine driven therethrough.

9. A floor treating machine as claimed in claim 7 in which said sponge plate extends at least in one of two directions, substantially beyond said skirt of said housing, said sponge plate means being supplied with a plurality of lightening holes, said lightening holes simultaneously providing balancing means for dynamic balancing of said sponge plate.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,416,177 December 17, 196

Vera E. Young

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 70, "as" should read -- an --; line 72, "parellel" should read -- parallel --. Column 4, line 37, "planes,'" should read -- planes --.

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents