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FLOOR TREATING APPARATUS

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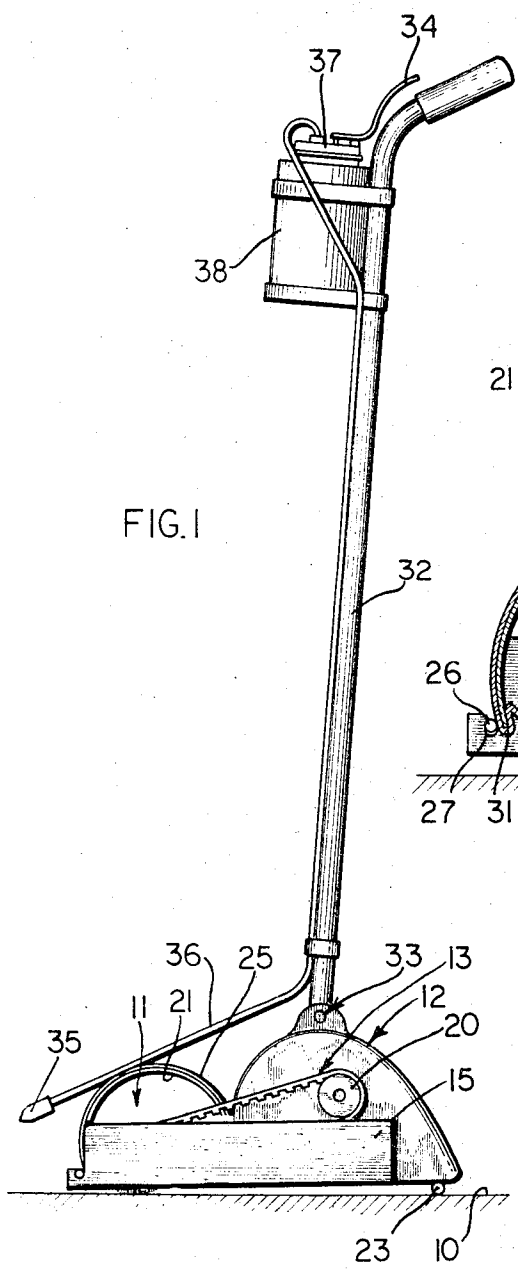


FIG. 1

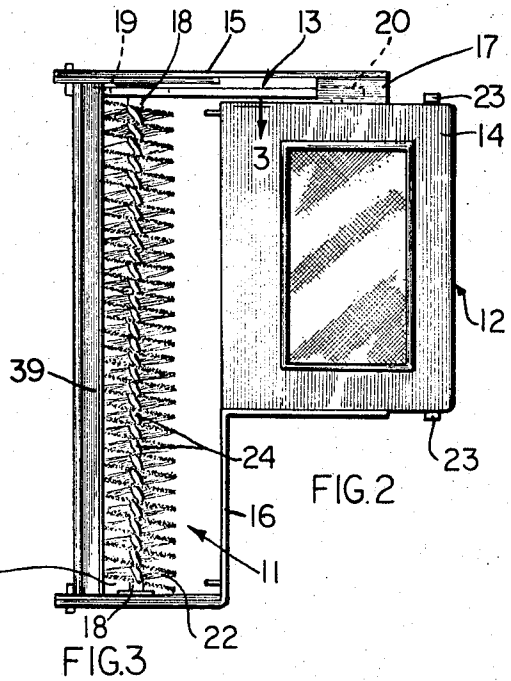


FIG. 2

FIG. 3

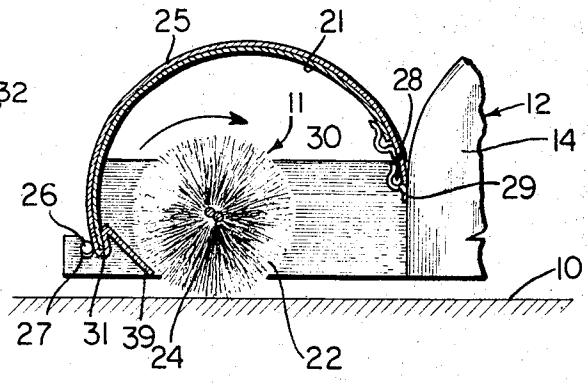
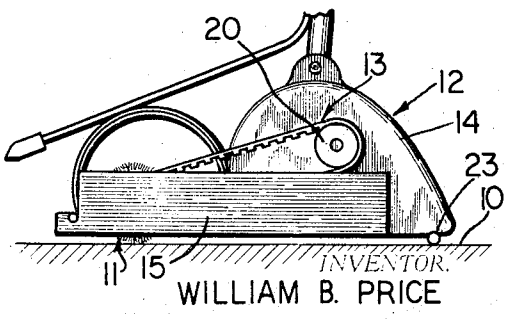


FIG. 4



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FLOOR TREATING APPARATUS

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This invention relates generally to apparatus for treating horizontal surfaces such as floors and, more particularly, to machines of the type having a power driven cylindrical treating element rotatable about an axis parallel to the surface to be treated and engageable with such surface to clean and/or polish the same. In the cleaning of horizontal floor surfaces, it is customary to use liquid agents which are applied to the surface prior to engagement by the treating element.

The primary object of the present invention, is to provide novel surface treating apparatus of the above character which is of simple and inexpensive construction, which is capable of cleaning the surface, removing all liquid used in the cleaning and polishing the surface in a single continuous engagement of the treating element with the surface, which is easy to manipulate, and which is sturdy and durable.

Another object is to provide novel apparatus which is capable of cleaning a surface and removing liquid therefrom without the necessity of complicated suction or wiping devices.

Still another object is to provide novel apparatus in which a single treating element is utilized to perform the functions of cleaning a flat surface, removing a liquid from the surface and buffing or polishing the dried surface.

A further object is to collect the liquid and foreign matter removed by the cleaning element and dispose of the same through the provision of a catcher or collector which is constructed and arranged in a novel manner with respect to the treating element so as to collect the liquid effectively while being easily removed and replaced when full of liquid.

A more detailed object is to collect the liquid on a generally semi-cylindrical member enclosing the cleaning element while being open at the ends to enable the centrifugal action of the element to be utilized to produce a drying air flow across the surface being cleaned.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIGURE 1 is a side elevational view of novel floor treating apparatus embodying the novel features of the present invention;

FIGURE 2 is a bottom plan view;

FIGURE 3 is a fragmentary sectional view taken along the line 3—3 of FIGURE 2; and

FIGURE 4 is a fragmentary view similar to FIGURE 1 showing the apparatus under a different condition.

The apparatus shown in the drawings to illustrate the present invention is especially adapted for cleaning the horizontal exposed surface of a floor **10** or a covering therefor by engagement with such surface as the apparatus is moved across the surface. In general, the apparatus comprises a frame, a surface treating element **11** rotatably mounted on the frame, and an electric motor **12** mounted on the frame and having a driving connection **13** with the element. The element is of the cylindrical type which rotates about its own axis parallel to the surface to be treated when the periphery of the element is engaging the surface.

In the present instance, the frame is made up of a housing **14** for the motor and two bars **15** and **16** secured at one end to the housing and having their other end portions extending in parallel with each other and outwardly in front of the housing. One bar **15** is generally straight and is secured to the housing as by bolts (not shown), a spacer **17** being clamped between the bar and the bolts. The other bar **16** is of generally Z-shape with one end portion bolted directly to the housing and the other portion offset laterally and away from the first bar. Stub shafts **18** projecting from opposite ends of the treating element are journaled in suitable bearings supported by the free end portions of the bars. The driving connection **13** herein is a gear belt extending around a slotted pulley **19** on the stub shaft **18** at one end of the treating element and another slotted pulley **20** on the motor shaft which projects from one side of the housing in parallel with the stub shafts.

In accordance with the present invention, the cleaning element **11** is constructed and arranged in a novel manner with respect to the frame and a collecting member **21** to enable the single element to perform, in a single operation and while remaining in engagement with the surface to be treated, the functions of cleaning the surface **10**, removing the liquid and foreign matter from the surface so as to dry the surface, and buffing the dried surface. To this end, the element is made up of a plurality of individual fiber like members **22** which, during rotation of the element, extend radially and outwardly due to centrifugal force and successively strike the surface being cleaned so as to loosen foreign particles thereon, engage such particles so as to move them along and away from the surface, and dispose of the particles by throwing them upwardly and circumferentially away from the element by centrifugal force. The fiber like members act independently of each other to achieve this result.

The foreign particles and liquid thrown from the cleaning element strike the collector member which extends around the periphery of the element from a point near the floor and adjacent the free ends of the supporting bars **15** and **16** and across the top of the element to a point on the opposite or near side of the element. The collector is radially spaced from the element so as to leave the periphery of the element free of contact with any surface except the surface being cleaned. Such spacing of the collector, from the cleaning element leaves the fiber-like members free to throw off the foreign particles rather than simply push the particles ahead of the members as they move past the collector.

To improve the action of the fiber-like members **22** of the cleaning element **11**, at least a portion of the weight of the apparatus is supported directly by the element. Thus, the element projects beneath the frame of the apparatus so as to be in continuous engagement with the surface being treated and there are no other parts adjacent the element to engage the surface and limit the weight carried by the element. It is preferred, however, to provide at least one other support which is spaced from the cleaning element and projects from the supporting frame to engage the surface being treated and support a portion of the weight of the apparatus. Herein, the additional support is in the form of two small rollers **23** mounted beneath opposite near corners of the motor housing **14** and rotatabe about common axis paralleling and spaced from the axis of rotation of the cleaning element.

While the cleaning element **11** may take various forms, especially satisfactory results including durability have been achieved using a twisted wire brush in which the fiber like members **22** are individual strands of nylon secured between a pair of wires **24** twisted to form helices with the ends of the nylon bristles extending helically around the twisted wire core. With this arrangement, the end portions of substantially all of the bristles are spaced from adjacent bristles so as to act independently thereof and

avoid build-up of foreign matter between the bristles due to surface tension resulting from close contact of one bristle with one or more other bristles.

The collector **21**, for ease of replacement and disposal, preferably is a single rectangular sheet of absorbent material which may be stiff enough to be self-supporting and retain a shape to which it may be bent or which, as in this instance, is backed by the inner side of a cover **25**. This cover is of generally cylindrical contour and of inverted U-shape in cross section and is removably attached to the frame. For this purpose, pins **26** projecting outwardly from the lower front corners of the cover fit into upwardly opening and rearwardly inclined slots **27** on the free ends of the frame bars **15** and **16** and enlarged beads **28** on the rear edge of the cover fit between the legs of upwardly opening U-shaped clips **29** on the front of the housing and the laterally extending intermediate part of the Z-bar.

The absorbent collector sheet **21** lies against the underside of the cover and its rear end fits into clips **30** on the cover. The other end portion of the sheet fits into an upwardly opening recess **31** in the cover on the inner side of the front edge which has been bent reversely and upwardly for this purpose.

To facilitate manipulation of the apparatus with respect to the surface **10** being treated, an upright handle **32** preferably is pivotally connected at its lower end to the frame. To enable a downward force on the handle to increase the downward force exerted on the cleaning brush **11**, the pivotal connection **33** is located on the housing **14** and horizontally between the axis of the supporting rollers **23** and the brush. Also, means is provided for applying cleaning liquid to the surface including a manipulatable member **34** on the upper end portion of the handle for actuating the liquid applicator. In the present instance, the liquid applicator takes the form of a spray nozzle **35** carried by the lower end of a section **36** of flexible tubing mounted on the handle and connected to the outlet of a manually operable pumping device **37** which is connected to a suitable liquid reservoir **38**. The pumping device has a suitable connection with the manipulatable member which, herein, is shown as a lever fulcrumed on the handle. When the lever is rocked about its fulcrum, liquid is pumped to the nozzle and dispensed as a spray, the nozzle herein being located above and forwardly from the edge of the cover. A suitable cord and switch means are provided for the motor.

When the motor **12** is deenergized and the apparatus is resting on the supporting rollers **23** and the brush **11**, the bristles **22** will be bent and the forward ends of the bars **15** and **16** will be lower than the rear ends as shown in FIG. 1. The spacing of the front edges of the cover **25** and the collector sheet **21** from the floor **10** at this time is very close and depends on the size and strength of the bristles. When the motor is energized and the brush is rotated clockwise as indicated by the arrow in FIG. 3, the front edges of the cover and the collector sheet and the front ends of the bars **15** and **16** will be raised approximately to the position shown in FIGS. 2 and 3 due to centrifugal force in the engagement of the bristles with the floor. The front edge of the collector sheet in this condition preferably is as close as possible to the floor to prevent foreign particles from passing between the sheet and the floor as they are thrown from the periphery of the brush while still avoiding contact of the sheet with the floor.

Each bristle **22** remains substantially straight and disposed in a radial position throughout substantially all of that portion of each revolution when the bristle is not engaging the floor **10**. When it first engages the floor, the bristle is bent rearwardly from the radial position and tends to engage the floor with a flailing action. As rotation of the brush continues, the bristle scrapes along the floor and tends to remain in its rearwardly bent position until it moves out of contact with the floor, foreign particles being loosened and carried along with the bristles during the scraping action. As the bristle moves out of contact with the floor, it resumes its radial position with a snap action causing the foreign particles to be thrown ahead of the bristle and circumferentially away from the periphery of the brush. Any foreign particles or droplets of liquid remaining on the bristle tend to be thrown by centrifugal force away from the brush and into the collector **21** during continued rotation of the bristle through the remainder of the revolution and back into engagement with the floor.

To avoid the collection of droplets of liquid on the lower front edge of the collector **21**, it is prefered to provide an additional collector bar **39** which is positioned between the floor and this collector edge and closely adjacent the outer ends of the bristles. The bristles thus tend to prevent accumulation of liquid into large drops. Herein, the auxiliary bar is a flat strip secured to and extending along the upwardly and rearwardly bent lower front edge of the cover and lies at a 45 degree angle with respect to the horizontal and the vertical, the lower edge of the bar being closest to the bristles.

Due to the openings at the ends of the collector, the rotation of the brush tends to produce a flow of air not only across the bristles and across the inner surface of the collector, but also, across the floor surface beneath the collector. This air flow is believed to be due to centrifugal action resulting from rotation of the brush and prevents air from flowing forwardly beneath the collector sheet.

The improved brush and collector make it possible to utilize the brush not only to loosen foreign particles from the floor and transfer them to the collector along with the liquid cleaner, but also, to buff or polish the floor after the liquid and foreign matter are removed. Because the cleaning action of the brush in loosening the foreign particles is so effective, only a small quantity of cleaning liquid is required for a large area of floor and such liquid may be collected on a single absorbent member without complicated suction or storage devices. The efficiency of the brush in effecting the drying action is improved by maintaining the collector sheet out of contact with the periphery of the brush before the brush engages the floor.

What is claimed is:

1. In apparatus for treating a horizontal floor surface, the combination of a frame, a cylindrical surface treating element mounted on said frame to engage said surface and to rotate about a horizontal axis paralleling the surface while the periphery of the element engages the surface, a motor mounted on said frame and connected to said treating element to rotate the same about said axis at a speed sufficient that liquid on the periphery of the element is thrown by centrifugal force from the element, an elongated disposable collector member extending substantially throughout the length of said surface treating element and above and about the upper portion of the element from a position adjacent said surface to receive and retain substantially all liquid and other material picked up from the surface and thrown by centrifugal force from the element during rotation of the same. said collector member being spaced at all points from said surface treating element and being adapted for and capable of retaining said liquid and other material thrown from the element, and means releasably supporting said collector member on said frame while permitting easy removal and replacement of the member.

2. The combination of claim **1** in which said surface treating element is a twisted wire brush with a core formed of wires twisted helically together and securing between them a plurality of individual bristles radiating from the wires and spaced from each other at the periphery of the element.

3. The combination of claim **1** in which a housing is mounted on said frame and encloses said upper portion

of said element and said collector member provides a downwardly facing lining for the inner side of the housing.

4. In apparatus for treating a horizontal floor surface, the combination of a frame, a cylindrical surface treating element mounted on said frame to engage said surface and to rotate about a horizontal axis paralleling the surface while the periphery of the element engages the surface, a motor mounted on said frame and connected to said treating element to rotate the same about said axis at a speed sufficient that liquid on the periphery of the element is thrown by centrifugal force from the element, an elongated disposable collector member extending substantially throughout the length of said surface treating element and above and about the upper portion of the element from a position adjacent said surface to receive material picked up from the surface and thrown by centrifugal force from the element during rotation of the same, said collector member being spaced at all points from said surface treating element, means releasably supporting said collector member on said frame while permitting easy removal and replacement of the member, and an elongated liquid dispersing element extending throughout the length of said treating element and closely adjacent the latter at a point around its periphery from said surface in the direction of rotation of the treating element and between the surface and said collector member whereby droplets of liquid tending to accumulate on the dispersing element are engaged and dispersed by the periphery of said treating element and are transferred thereby to the collector member.

5. In apparatus for treating a horizontal floor surface, the combination of a frame, a cylindrical surface treating element mounted on said frame to rotate about a horizontal axis paralleling said surface when the treating element engages the surface, a motor mounted on said frame and connected to said treating element to rotate the same about said axis at a speed sufficient to throw liquid and other matter from the periphery of the element by centrifugal force, said surface treating element comprising a plurality of individual bristles spaced from each other at the periphery of the element and radiating from a central core member, and a disposable collector member replaceably mounted on said frame and extending throughout the length of the element and upwardly from a position adjacent said surface and about the periphery of the element and then downwardly along the opposite side of the element to receive and retain substantially all liquid and other material picked up from the surface and thrown by centrifugal force from the element during rotation of the same, said collector member being adapted for and capable of retaining said liquid and other material received from said element and said collector member being spaced at all points from said surface treating element and having open ends permitting an outward flow of air from such ends during rotation of the element.

6. In apparatus for treating a horizontal surface, the combination of a frame, at least one supporting element mounted on said frame for engagement with said surface to be treated and adapted to support the weight of a portion of said apparatus, a cylindrical surface treating element mounted on said frame to rotate about an axis spaced from said supporting element and paralleling said surface when the treating element and supporting element engage the surface, a motor mounted on said frame and connected to said treating element to rotate the same about said axis, said surface treating element comprising a plurality of individual bristles spaced from each other at the periphery of the element and radiating from a central core member, a collector member of absorbent material and generally cylindrical shape supported on said frame in coaxial relation with said surface treating element and extending from a position adjacent said surface upwardly and around the element and then downwardly along the opposite side of the element to receive material picked up from the surface and thrown by centrifugal force from the element during rotation of the same, said collector member being spaced at all points from said surface treating element and having open ends permitting and outward flow of air from such ends during rotation of the element and liquid applying means mounted on said frame and including a nozzle for spraying a liquid on to said surface adjacent the outer side of said collector member, said supporting element and said surface treating element cooperating to support the entire weight of the apparatus.

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