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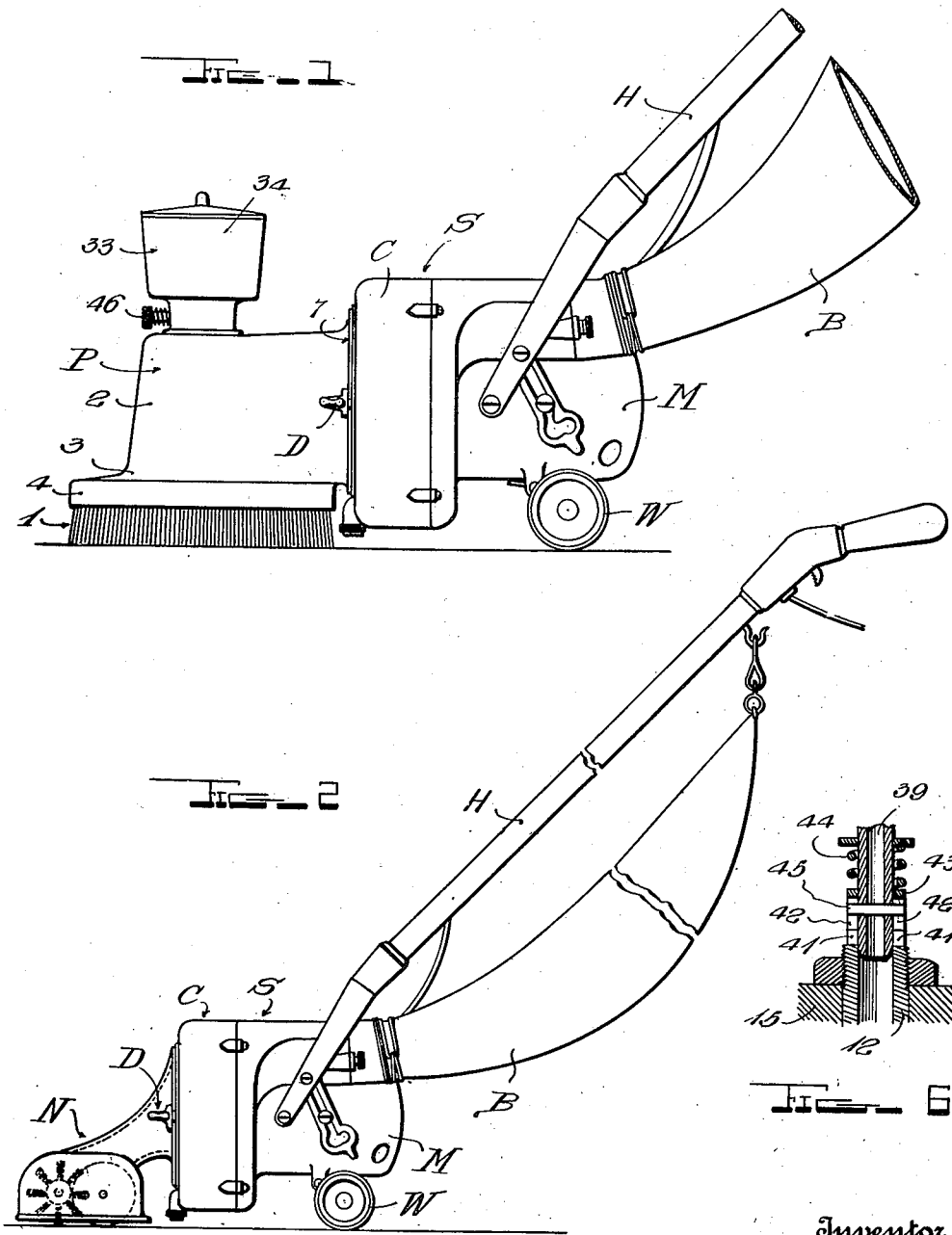
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W. L. KEEFER

FLOOR POLISHING ATTACHMENT FOR VACUUM CLEANERS

Filed May 28, 1925

3 Sheets-Sheet 1



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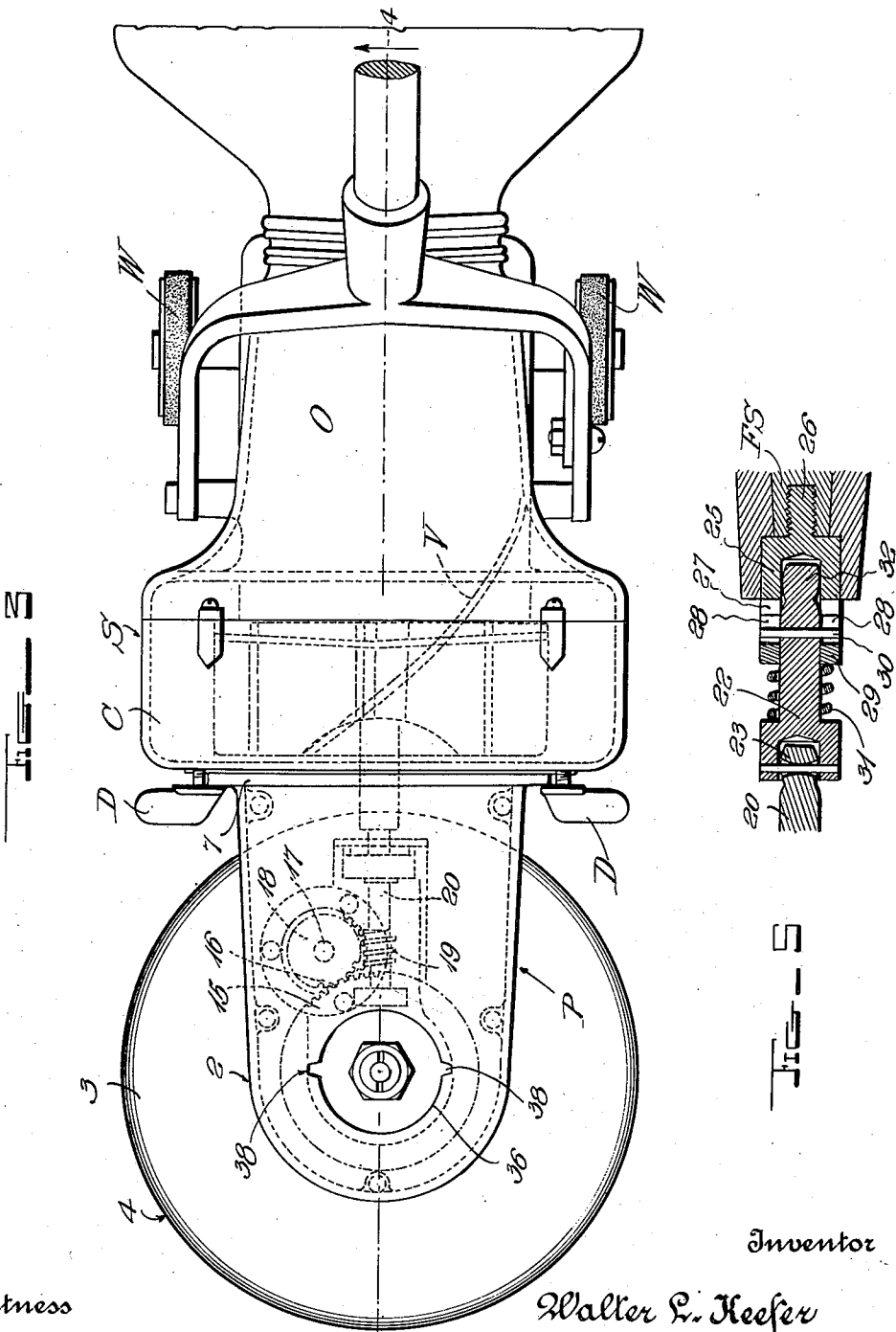
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3 Sheets-Sheet 2



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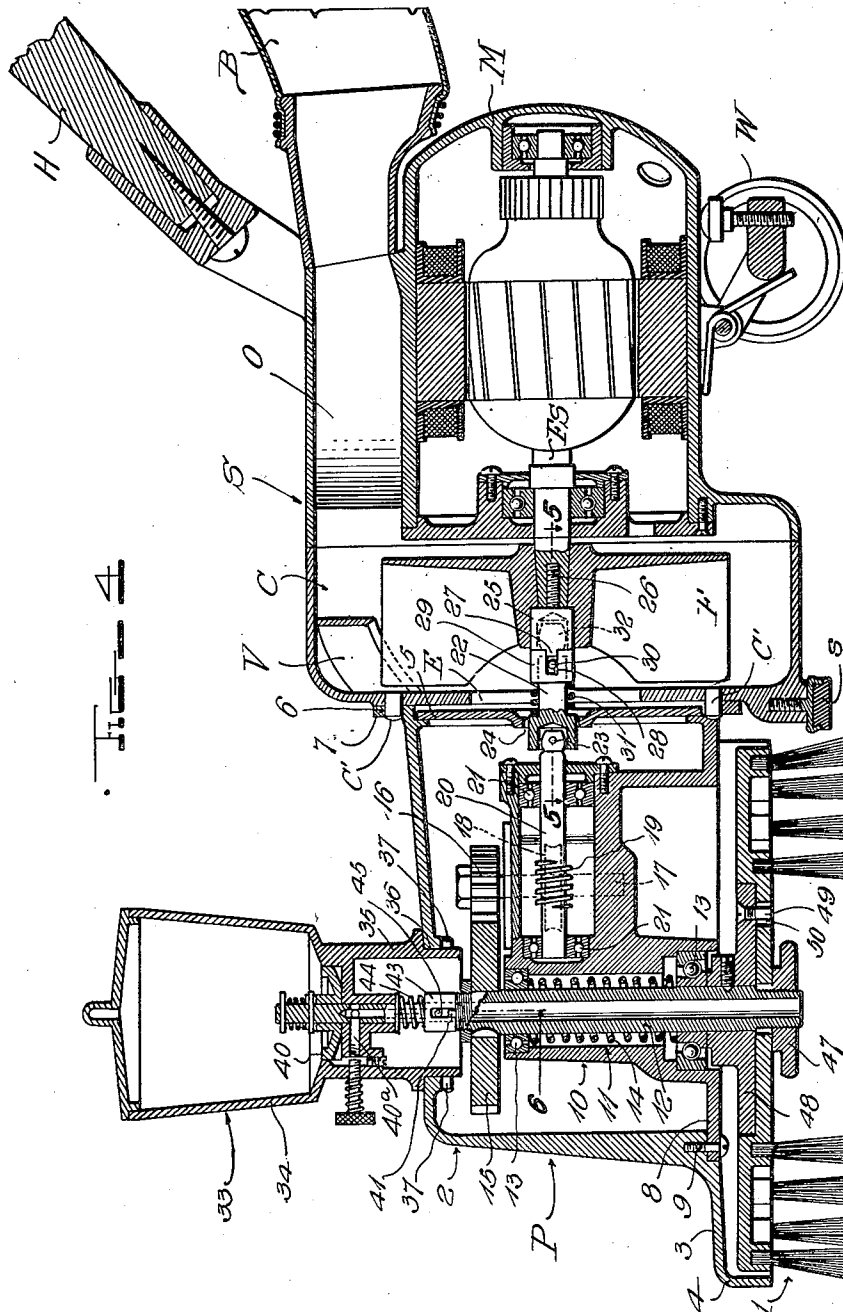
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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FLOOR-POLISHING ATTACHMENT FOR VACUUM CLEANERS.

Application filed May 28, 1925. Serial No. 33,480.

My invention relates to improvements in machines for polishing floors, and the present disclosure thereof is directed to one which produces the polishing action by applying fluid wax to the floor by means of a rotating brush.

It is the primary object of the invention to provide a simple and compact attachment for the suction head of a vacuum cleaner, said attachment comprising a polishing head adapted to be detachably secured to said suction head when the ordinary suction nozzle has been removed therefrom, said polishing head having a floor polisher provided with driving means for detachable engagement with a driven part on the suction head, said driven part being preferably the fan shaft.

Another object of the invention is to provide a floor polishing head of the character set forth, in which the driving means for the floor polisher includes a driving element located within the confines of a coupling portion of the head, which coupling portion is adapted to be secured to the suction head of the vacuum cleaner, in place of the removed suction nozzle, said driving element then detachably engaging a driven part on said suction head.

A further object is to provide a floor polishing attachment applicable to a suction head in which the fan shaft is exposed at the eye of the fan casing, and to operatively connect the driving means for the polisher with said fan shaft, by passing an element of said driving means through said eye.

A still further object of the invention is to provide means for closing the eye of the fan casing when the polishing attachment is applied, thus permitting the fan of the suction head to spin idly with practically no resistance in said fan casing, so that the usual driving motor will not be overloaded.

Yet another object is to provide unique inter-engaging coupling members for connecting the driving means of the floor polisher with the fan shaft or the like, said coupling members being brought into co-operative relation by attachment of the polishing head to the suction head, novel provision being made whereby these coupling members will properly inter-engage with each other upon relative turning, should they not completely engage when applying the polishing head to the suction head.

In the preferred form of construction, the floor polishing member is carried by a tubu-

lar driven shaft, and fluid wax or oil is supplied to this shaft by a tubular discharge shaft of a cup which is detachably mounted on the polishing head, and a further object is to make unique provision for operatively connecting the two tubular shafts when the cup is attached to the head.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a side elevation of the polishing head attached to the suction head of a vacuum cleaner in place of the removed suction nozzle.

Figure 2 is a side elevation of the vacuum cleaner with the suction nozzle attached.

Figure 3 is a top plan view of the suction head and the polishing head operatively connected with each other, the wax or oil cup being removed.

Figure 4 is a central vertical longitudinal sectional view as indicated by line 4—4 of Fig. 3.

Figure 5 is a detail longitudinal sectional view through the driving connection between the fan shaft and the driving means for the floor polisher, as indicated by line 5—5 of Fig. 4.

Figure 6 is a similar view through the connecting means between the tubular discharge shaft of the oil or wax cup and the tubular carrying shaft of the floor polisher, taken on line 6—6 of Fig. 4.

In the drawings above briefly described, S designates the suction head of a vacuum cleaner, and N has reference to a suction nozzle detachably coupled to said suction head, while P indicates a polishing head adapted to be detachably coupled to said suction head when said nozzle is removed. The present invention resides in the polishing head and its association with the suction head, and while a suction head of one particular type has been shown, and the details of the polishing head designed accordingly, it is to be understood that the invention is not restricted to use in connection with any particular form of suction head, as it may be made to co-operate effectively with suction heads of numerous constructions.

The suction head herein shown, comprises a vertically disposed fan casing C having an eye E in its front side and provided with a rearwardly extending outlet O discharging

into a dust bag B, said outlet being disposed over an electric motor M which is directly coupled to the fan shaft FS. The suction head is provided with an appropriate handle H and supporting wheels W, and at its front end, it is preferably equipped with an adjustable shoe s to support said front end when interchanging the polishing head and the nozzle. The part designated V in Figs. 3 and 4 is a curved vane from the fan casing C into the outlet O to assist in directing dust and the like from the former into the latter.

For detachably connecting the nozzle N to the casing C, the front side of this casing has been provided with forwardly projecting studs C' for reception in openings in the rear end of the nozzle, and suitable clamping devices D are shown for holding the nozzle in place. These same clamping devices and studs are utilized in connecting the polishing head P with the suction head of the cleaner, when the nozzle N is removed, as will hereinafter become apparent, and the driving means for the floor polishing member of said polishing head, is then operatively engaged with the fan shaft FS, to be driven by the latter, said polishing member being indicated at 1 in the drawings and being preferably in the form of a soft brush.

The polishing head P, in the construction shown, comprises a hollow body portion 2 enlarged at its lower end as indicated at 3 and provided with a downwardly projecting skirt 4 which surrounds the polishing member 1, the rear end of said hollow body 2 being closed, in the present showing, by a plate 5 which closes the eye E against entrance of air when the head P is applied to the suction head S. The rear end of the body 2 is formed with openings 6 to receive the studs C', and is provided with a flange or other desired means 7 to co-operate with the clamping devices D, so that the polishing head may be quickly and easily applied to the suction head, in place of the suction nozzle N.

The body 2 is by preference provided with a removable bottom plate 8 secured in place by screws or the like 9 and carrying an upward projection 10 which is disposed within said body 2. This projection 10 is vertically bored as at 11 to receive a tubular shaft 12 whose lower end carries the polishing member 1, said shaft being mounted in appropriate ball bearings or the like 13, and if desired a coiled spring 14 may be provided to exert a yieldable adjusting pressure on the bearings. It is through the tubular shaft 12 that the fluid wax or oil to be applied to the floor, is fed, as will be hereinafter explained, and this shaft is also rotated to drive the polishing member 1. In the present showing, a gear 15 is keyed to the shaft 12 and meshes with a pinion 16 on a short vertical shaft 17 which is appropriately mounted in bearings carried by the projection 10. This shaft 17 is pro-

vided, in the present disclosure, with a worm wheel 18, meshing with a worm 19 on a horizontal shaft 20 which is rotatably mounted in ball bearings 21, within the projection 10. Preferably, the shaft 20 terminates in a rear section 22 universally connected to the major portion of said shaft as indicated at 23, said section 22 passing through an opening 24 in the plate 5. Novel means are provided on the rear end of the shaft section 22 and the front end of the fan shaft FS for operatively connecting them without trouble, when the polishing head P is applied to the suction head S. This construction is disclosed in Figs. 4 and 5 and is described below.

A coupling socket 25 is carried by the fan shaft FS and is preferably provided with a shank 26 threaded into said shaft, as shown, the socket serving to secure the hub of the fan F on said shaft. This socket is provided on its side wall with longitudinally projecting driving lugs 27 which are adapted for reception in longitudinal slots 28 formed in a coupling sleeve 29 which is slidable upon the shaft section 22. Preferably, a pin 30 passes through this shaft section and has its ends received in the slots 28 to establish a driving connection between the sleeve 29 and said shaft section and to limit the outward projection of the sleeve 29, under the influence of a coiled compression spring 31 when the polishing head is detached from the suction head. Preferably, the rear end of the shaft section 22 is shaped about as shown at 32 in Fig. 5, for reception in the socket 25, and said shaft portion 32 projects beyond the rear end of the sleeve 29, so that when the polishing head is applied to the suction head, it will be immediately received in the above-named socket 25. When this takes place, the lugs 27 may engage only the rear edge of the sleeve 29, instead of seating in the slots 28 thereof, and if this is the case, the sleeve 29 will be forwardly shifted against the spring 31, when the attaching means of the polishing head are applied. However, as soon as the fan shaft and socket 25 turn with respect to the shaft section 22, when the machine is started, the lugs 27 slide upon the sleeve 29 until they are in alinement with the slots 28, whereupon said sleeve is forced rearwardly under the action of the spring 31 and the shafts of the polishing head and the suction head are operatively connected. Thus, the motor M serves to drive the shaft 20 and through the instrumentality of the gearing above described, it also rotates the tubular shaft 12, to drive the polishing member 1, to which fluid wax or oil may be supplied. In the present showing, the polishing fluid is fed to the shaft 12 from a feeding device 33 whose internal construction constitutes no part of the present invention. It is connected however with the body 2, in a unique manner described below, and is also operatively con-

connected with the shaft 12, to feed the polishing fluid to the latter.

The feeding device 33 comprises a cup 34 to contain fluid wax or oil, this cup having any suitable detachable connection with the top of the body 2. In the present showing, this cup is provided with a downwardly projecting neck 35, a portion of which passes through an opening 36 in the top of the body 2, said neck being provided with outwardly projecting studs 37 to underlie said top, the latter preferably having cam surfaces to engage said studs. The edge wall of the opening 36 is of course formed with notches 38 through which these studs may pass when aligned therewith, and after inserting the neck with its studs 37 passing through said notches, turning of the cup 34 will tightly bind it in place.

The feeder 33 includes a tubular, downwardly projecting shaft 39 through which small quantities of the polishing fluid are successively discharged when said shaft is rotated. The means for producing this discharge of fluid is claimed in my co-pending application Serial No. 21,395, filed April 7, 1925, and constitutes no part of the present invention, but is indicated in a general way in Fig. 4. In this view, 40 denotes a rotary feed device on the tubular shaft 39 for feeding the polishing fluid through a port 40^a into said tubular shaft. The lower end of the shaft 39 is adapted for reception in the upper end of the tubular shaft 12, as disclosed most clearly in Fig. 6, and self-engaging coupling means are provided on these two shafts, similar to the coupling means above described for connecting the fan shaft FS with the shaft section 22. The details of these coupling means are shown most clearly in Figs. 4 and 6 and they are described below.

A pair of driving lugs 41, on the upper end of the shaft 12, are adapted for reception in slots 42 formed in a sleeve 43 which is slidable upon the shaft 39 and is pressed downwardly by a coiled spring 44, a pin 45 being passed through said shaft 39 with its ends received in the slots 42. When the lugs 41 are properly seated in the slots 42, they serve to drive the sleeve 43 and the latter in turn drives the shaft 39 through the instrumentality of the pin 45. When the feeder 33 is applied to the body 2, if the lugs 41 are not immediately received in the slots 42, said slots and lugs will properly interengage with each other as soon as the machine is started and slight rotation of shaft 12 takes place, with respect to the shaft 39.

The feeder 33 preferably includes a control valve 46 (Figs. 1 and 4), whereby the discharge of wax, oil, or other polish, may be controlled and entirely cut off if desired.

It will be seen from the foregoing that I have produced a rather simple and inexpensive floor polishing attachment which may be easily applied to or removed from the suction head of a vacuum cleaner, so as to utilize the

motor of the latter for driving the polishing means, and while such polishing means is preferably in the form of a rotary brush, it might well be of other form. When a brush is used, as in the present disclosure, it is preferably held detachably upon the lower end of the shaft 12, by a thumb nut 47, and said shaft may well be provided with a driving disk 48 having a stud 49 receivable in an opening 50 in the brush back, as shown in Fig. 4. This arrangement permits the brush to be readily detached or attached, as occasion may demand.

During the operation of the machine with the polishing head P attached, said machine is of course rolled to and fro along the floor, by means of the handle H, and during this manipulation, wax or any other desired polishing medium may be fed down the tubular shaft 6. This shaft preferably runs at a speed of about 490 revolutions per minute, which speed is sufficient to cause the polishing agent to be thrown out by centrifugal force from the lower end of said shaft, and it will be seen that the polishing material thus thrown, is caught by the rotary brush and is by the latter applied directly to the floor. By having the brush mounted upon a vertical axis, the entire floor-engaging area of said brush is at all times in contact with the floor so that no portion of such area is at any time idle, as would necessarily follow if the brush were mounted upon a horizontal axis. Moreover, I have found that with brushes mounted to rotate upon horizontal axes, the effective polishing which I obtain, cannot be attained.

Preferably, the floor to be polished is first coated and partly polished by means of the improved mechanism and then the supply of wax or the like is cut off and the mere rotation of the brush used to effect the final polishing operation. The direct action of the motor in driving this brush is not impaired at all by the presence of the fan F, as the eye E of the fan casing is closed against entrance of air by the plate 5, so that the fan merely rotates in a void or "air hole", instead of performing work and overloading the motor. By relieving the motor of the load of the fan, its direct efficiency is utilized to drive the rotary polishing brush, but as the speed of said motor is approximately 9,000 revolutions per minute, it would be impractical to drive the brush at the same speed. Hence, speed-reducing gearing has been interposed between the shafts 20 and 6, reducing the speed of the latter and the brush to approximately 490 revolutions per minute, which speed is sufficient to obtain the desired result.

While I have shown and described the machine as adapted for applying wax, oil or other polishing material and treating the floor to create a polished surface, it will of course be understood that water or a cleansing fluid may be supplied through the hollow shaft to

the brush for scrubbing or otherwise treating the floor or other surface.

Excellent results are obtainable from the general construction disclosed, and it is therefore preferably followed, but within the scope of the invention as claimed, numerous modifications may be made, and as above stated, the polishing attachment may be made to cooperate with suction heads of vacuum cleaners, other than the particular style herein disclosed.

I claim:—

1. Floor treating equipment for a vacuum cleaner body, comprising a head having means whereby it may be detachably coupled to the cleaner body, both supply means and spreading means for a floor treating liquid carried by said head, and driving means for both said supply means and said spreading means, said driving means having a portion whereby it may be detachably coupled to a driven part of the cleaner body.

2. Floor treating equipment for a vacuum cleaner, comprising a head having means whereby it may be coupled to the cleaner body, a hollow vertical shaft in said head, a flat liquid spreading brush fixed to the lower end of said shaft and receiving liquid therefrom, liquid supply means discharging into the upper end of said shaft and actuated by the latter, and driving means for said shaft, said driving means having a portion whereby it may be detachably coupled to a driven part of the cleaner body.

3. In combination with the motor part of a vacuum cleaner having a detachable suction nozzle; a floor waxing device substituted for said suction nozzle and detachably secured in place, said device embodying both wax-feeding means and wax-spreading means driven by the motor of said vacuum cleaner.

4. A floor treating attachment for application to the suction head of a vacuum cleaner when the suction nozzle thereof is removed; said attachment comprising a head provided

with a coupling portion for connection with the part of the suction head previously connected to the removed suction nozzle, said head having a floor engaging brush mounted for rotation about a vertical axis, and driving means for said brush having a coupling member substantially surrounded by said coupling portion of said head and adapted for detachable engagement with a driven part of the vacuum cleaner suction head, said driving means including a tubular shaft carrying said brush and disposed at the axis thereof, and means carried by said head and communicating with said tubular shaft for supplying a floor treating fluid to the interior of said tubular shaft to be conducted by the latter to said brush.

5. A floor polishing attachment for application to the suction head of a vacuum cleaner when the suction nozzle of the latter is removed, said attachment comprising a hollow head provided with a rearwardly exposed coupling portion for detachable connection with the part of the suction head previously connected to the removed suction nozzle, a horizontal shaft rotatably mounted in said hollow head and having its rear end portion surrounded by said coupling portion thereof, said rear end portion of said shaft having coupling means instrumental in connecting it with the driven fan shaft of the vacuum cleaner suction head, a tubular vertical shaft rotatably mounted in said hollow head and having a floor polishing brush at its lower end, reducing gearing in said hollow head for driving the tubular vertical shaft from the horizontal shaft, and means carried by said hollow head for feeding a floor polishing fluid to the interior of said tubular vertical shaft to be conducted by the latter to said brush.

In testimony whereof I have hereunto affixed my signature.

WALTER L. KEEFER.