Sept. 9, 1952 E. ANDERSON 2,609,555

FLOOR POLISHING DEVICE

Filed Sept. 18, 1948

Fig. 1

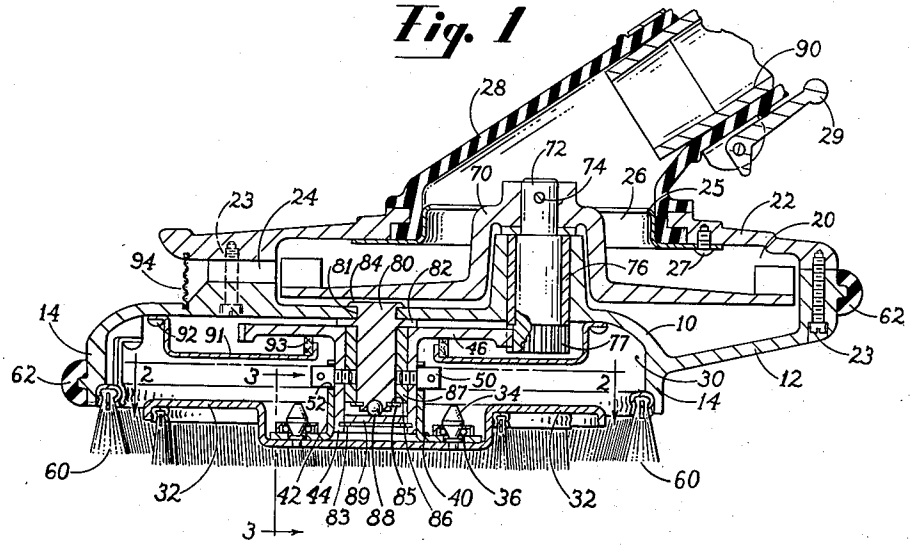


Fig. 2

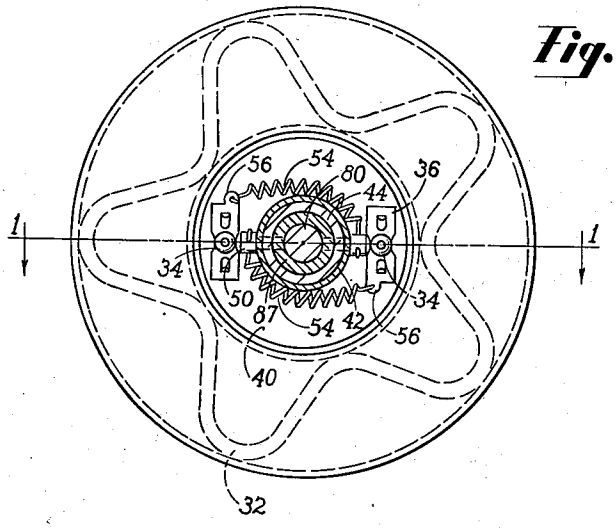
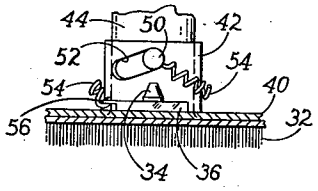


Fig. 3



INVENTOR.
EMIL ANDERSON

BY Frank J. Novotny

ATTORNEY.

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FLOOR POLISHING DEVICE

Emil Anderson, Briarcliff Manor, N. Y., assignor to Electrolux Corporation, Old Greenwich, Conn., a corporation of Delaware

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6 Claims. (Cl. 15—49)

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This invention relates to an apparatus for polishing, brushing, scrubbing and variously otherwise treating surfaces. More particularly, it embraces a readily detachable air driven device adapted for use with a conventional vacuum cleaner hose or wand extension thereof.

In one of its broadest aspects, the invention contemplates the embodiment in a floor polishing device of an air current powered unit having a rotary brush operatively connected thereto through a driving element including means capable of maintaining a constant torque and hence a substantially constant speed of rotation of the polishing element. More specifically, the constant torque means illustratively shown comprises a driving element having a pin and a driven element having a receiving slot for the pin which slot is cut at such an incline as to result in relative axial movement of the driven element in response to relative rotary movement between the driving and driven elements, spring biasing means being provided to oppose such relative rotary movement. With this device, the operation of the brush is effected in a total absence of any stalling action due to excessive frictional contact between the brush and polishing surface. This is accomplished by the automatic lifting of the rotating brush decreasing any such excessive frictional load.

It is a major object of this invention to provide a polishing device having a brush adapted to operate at a constant torque regardless of the friction.

It is a further object to provide resilient displacing means for the operating brush so that constant polishing speed is maintained.

Another object is to provide a rotary brush device having no tendency to creep or travel in use in a direction contrary or different from that intended by the operator of the polishing device.

A further object is to provide a brush device for the suction end of a vacuum cleaner.

Still another object is to provide a simple, durable, low cost and highly efficient machine which is light and more easily handled than the usual electrically powered polishing devices.

A further object is to provide a polishing device having a much lower center of gravity and hence a greater stability than the conventional motor driven unit.

These and other objects additional thereto are effected by the particular embodiment herein described in considerable detail and specifically illustrated in the accompanying drawings wherein:

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Figure 1 is a vertical cross-sectional view of the complete floor polishing apparatus, taken on a line corresponding to that shown at 1—1, Fig. 2;

Figure 2 is a top plan view of a portion of the device, taken on line 2—2 of Fig. 1 showing the axial drive, resilient spring retaining means and brush mount; and

Figure 3 is a detail elevational view of the pin and slot mechanism, taken on line 3—3 of Fig. 1.

Referring now more particularly to the drawings, the embodiment of the invention illustrated therein comprises a double chambered housing 10 formed by a casting 12 defining an upper turbine chamber 20 and a lower casting 14 forming a brush chamber 30. The upper chamber 20 is partially sealed by a removable cover 22 secured in place by retaining screws 23 and provides an inlet opening 24 and an outlet opening 26 into which is removably sealed by means of collar 25 and retaining screws 27, a flexible connecting member or outlet conduit adapter 28. A clamping device 29 is provided on adapter 28 to secure the polishing device to the wand or handle of a conventional vacuum cleaner 90. This arrangement functions as a flexible air-tight coupling joint. The lower casting 14 has the shape of a depending circular flange forming an open-bottomed rotary brush chamber 30 in which rotary annular brush 32 is operatively positioned, being held by conventional pins 34 and spring clips 36, the latter gripping the lower conical portions of the heads of pins 34.

Thus, the brush 32 is readily mounted in and removed from the polishing machine, merely snapping it in place by the simple insertion of pins 34 into their proper positions whereupon the brush is securely held in place for use and against the bottom of flange 40 which forms a part of the rotary axially floating sleeve 42.

Sleeve 42 is mounted to move with limited rotational and axial displacement upon the elongated hub 44 of driven gear 46. The degrees of freedom of motion between hub 44 and sleeve 42 are determined by the coacting drive mechanism therebetween comprising radial pins 50 carried by a gear hub 44 and extending through inclined slots 52, cut in sleeve 42, only one of which is shown in Fig. 3. Spring biasing means 54, Fig. 2, are connected between pins 50 and extension lugs 56 of spring clips 36. With this construction, when no driving torque is applied, the springs 54 retain sleeve 42 and hence brush 32 turned relatively to hub 44 of gear 46 in the position shown in Fig. 3, pins 50 occupying the upper ends of slots 52, and therefore urging the rotary brush 32

downwardly against the floor or other surface being polished.

When, however, torque is applied through the rotation of gear **46**, the friction between the bristles of brush **32** and the floor causes the brush **32** and hence sleeve **42** to lag slightly behind the rotation of gear **46** and its hub **44**. Then the pins **50** in their forward motion travel to the left of center as shown in Fig. 3, overcome the tension applied by springs **54** and therefore pins **50** ride the inclined slots so as to raise brush **32** from and lessen frictional contact with the floor. This permits part of the weight of the polishing device to be supported by the stationary bristles **60** which form an annular ring around the lower end of brush housing **14**. This lifting action is of a continuous hunting type and in use effects a continuous and uniform torque transmission which prevents stalling of brush **32** because of any undue or momentarily excessive frictional contact between brush **32** and the floor, the brush moving upwards and downwards slightly to compensate for variations in such frictional resistance.

The upper casting **12** forming part of the turbine chamber **20** partially encloses the turbine wheel **70** which is fixed to shaft **72** by pin **74**. Shaft **72** is rotatably mounted in bearing member **76** which is carried by housing **10**. The lower end of shaft **72** carries a pinion **77** which meshes with gear **46** rotatably mounted on stud **80** inserted into an opening **81** in housing **10**; a shoulder **82** formed on stud **80** presses against the bottom surface of housing **10** while upper edge **84** is spun over the upper surface and edge of opening **81** in housing **10**. Washer **85** fitted into a groove **86** cut in stud **80** serves to hold gear **46** and bearing **87** in place on stud **80** while any end play is taken up by thrust bearing **88** which rides on cap **89**, shown held in the open end of hub **44** by split spring washer **83**.

In operation, flexible adapter **28** is mounted on the end of a conventional vacuum cleaner wand **90**, cam actuating clamp **29** encircling the terminal end of adapter **28** is snapped into sealing position and the vacuum cleaner motor started. The turbine wheel **70** then starts rotating due to the flow of air over its blades, the air entering through opening **24** at the front of the polishing device, then passing over the turbine blades, through the turbine chamber **20**, opening **26** and out through the flexible rubber connector or adapter **28**, to the wand and hose of the vacuum cleaner. The rotation imparted to the turbine wheel is transmitted through drive shaft **72**, gear or pinion **77**, gear **46** to sleeve **42**, and finally to brush **32**. The actuation of sleeve **42** and hence brush **32** by way of the pins **50**, slots **52** and tensioning springs **54** provides the above described substantially uniform torque which is maintained without any possibility of stalling either the brush or the turbine wheel. Any excessive brush loads result in the lifting of the brush and the maintenance of a substantially constant brush speed and torque transmission by the resiliently maintained slot and pin mechanism which effects a relative axial movement of the sleeve **42** and shaft **44** upon relative rotation of these elements, respectively.

It is to be noted that an improvement herein greatly facilitating both the operation and the construction of the unit shown lies in the axial mountings of elements **72** and **80**, both rotating parts being mounted in bearings riding in the same casting **10**. Consequently it is not necessary that these two axial members **80** and **72** be carefully lined up in order to obtain the proper distances between axle centers.

A number of accessory structures both improve the performance of the polishing device and greatly facilitate its use. Thus, a rubber ring **62** secured to the outer rim of lower casting **14** serves as a bumper or buffer to prevent scratching and other damage to furniture. Gear cover **91** secured to housing **10** by screws **92** and provided with a felt sealing ring **93** protects the operator against injury while changing brushes and also keeps oil from falling on the polishing brush surface. A screen **94** over the inlet opening **24** prevents the entry of foreign substance, paper, and the like into the air suction stream.

It is to be understood that various changes may be made in construction and that the embodiment of the invention herein described is merely illustrative and not limitative thereof, its scope being determined solely by the following claims.

What I claim is:

1. In a floor polisher, the combination comprising a rotatable brush mechanism having a brush mounted thereon in contact with the floor, a vertical driving shaft means, means for supporting said driving shaft means from the floor, a driven sleeve means mounted on said shaft means, said rotatable brush mechanism being affixed to said sleeve, guide means comprising a spiral groove in one of said shaft and sleeve means and a pin in said other shaft and sleeve means engaging said groove for operatively maintaining the shaft and sleeve in said mounted relationship and for causing relative axial movement of said shaft and sleeve upon relative rotation thereof, whereby excessive brush loads result in the lifting of the brush from contact with the load to maintain substantially constant the torque transmitted between said shaft and sleeve.

2. In a floor polisher, the combination comprising a rotatable brush mechanism having a brush mounted thereon in contact with the floor, a vertical driving shaft, means for supporting said driving shaft from the floor, a driven sleeve mounted on said shaft, said rotatable brush mechanism being affixed to said sleeve, guide means comprising a spiral groove in said sleeve and a pin in said shaft engaging said groove for operatively maintaining the shaft and sleeve in said mounted relationship and for causing relative axial movement of said shaft and sleeve upon relative rotation thereof, a resilient means operatively connecting said shaft and sleeve respectively and for transmitting torque therebetween to urge said sleeve through a path determined by said guide means, whereby excessive brush loads result in the lifting of the brush from contact with the floor to maintain substantially constant the torque transmitted between said shaft and sleeve.

3. In a floor polisher, the combination comprising a rotatable brush mechanism, a driving shaft, means for supporting said driving shaft from the floor, a driven sleeve mounted on said shaft, said rotatable brush mechanism being affixed to said sleeve having a brush in contact with the floor, guide means comprising a spiral groove in said sleeve and a pin in said shaft engaging said groove for operatively connecting the shaft and sleeve and for causing relative axial movement of said shaft and sleeve upon relative rotation thereof, a resilient means operatively connecting said shaft and sleeve respectively and for transmitting

a torque therebetween to urge said sleeve through a path determined by said guide means, whereby excessive brush loads result in the lifting of the brush from contact with the floor to maintain substantially constant the torque transmitted between said shaft and sleeve.

4. In a floor polisher, the combination comprising a rotatable brush mechanism, a driving shaft, means for supporting said driving shaft from the floor, a driven sleeve mounted on said shaft, said rotatable brush mechanism being affixed to said sleeve, guide means comprising a spiral groove in said sleeve and a pin in said shaft engaging said groove for operatively connecting the shaft and sleeve and for causing relative axial movement of said shaft and sleeve upon relative rotation thereof, a resilient means operatively connecting said shaft and sleeve respectively and for transmitting a torque therebetween to urge said sleeve through a path determined by said guide means, whereby friction between said brush and floor results in the lifting of the brush from contact with the floor to maintain substantially constant the torque transmitted between said shaft and sleeve.

5. In a floor polisher, the combination comprising a rotatable brush mechanism, means for driving said polisher in a predetermined direction, a driving shaft, means for supporting said driving shaft from the floor, a driven sleeve mounted on said shaft, said rotatable brush mechanism being affixed to said sleeve and having a brush in contact with the floor, a spiral groove means cut in said sleeve, a pin affixed in said shaft and operatively engaging the groove means for causing relative axial movement of said shaft and sleeve upon relative rotation thereof the groove being disposed so as to lift the brush from the floor, a resilient means operatively connecting said shaft and sleeve respectively and for transmitting a torque therebetween to urge said sleeve through a path determined by said guide means, whereby excessive brush loads result in the lifting of the brush from the floor to maintain substantially constant the torque transmitted between said shaft and sleeve.

6. In a floor polisher, the combination comprising a base casting, a rotatable brush mechanism, a driving pinion, a driven gear engaging said pinion and having a driving shaft, both said pinion and said shaft being journalled in said casting, a driven sleeve mounted on said shaft, means for supporting said driving shaft from the floor, said rotatable brush mechanism being affixed to said sleeve and having a brush in contact with the floor, guide means comprising a spiral groove in said sleeve and a pin in said shaft engaging said groove for operatively maintaining the shaft and sleeve in said mounted relationship and for causing relative axial movement of said shaft and sleeve upon relative rotation thereof, a resilient means operatively connecting said shaft and sleeve respectively and for transmitting a torque therebetween to urge said sleeve through a path determined by said guide means, whereby excessive brush loads result in the lifting of the brush from the floor to maintain substantially constant the torque transmitted between said shaft and sleeve.

EMIL ANDERSON.

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