Nov. 28, 1967 T. E. D. BILDE 3,354,488

SURFACE TREATING APPARATUS

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FIG. 1

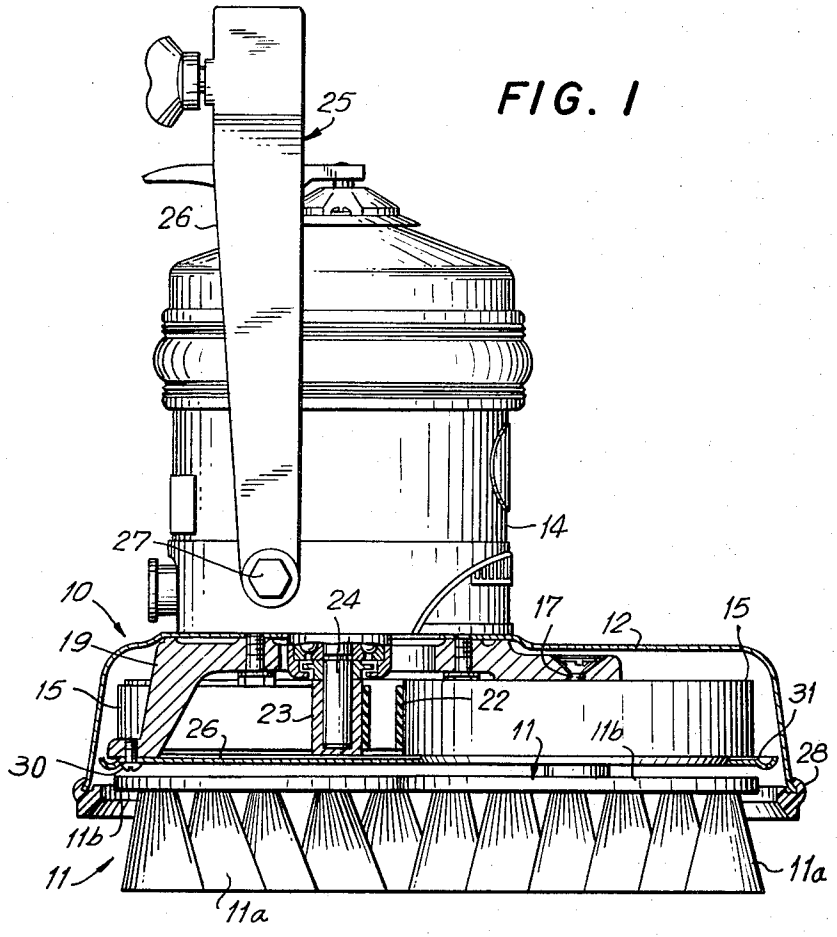
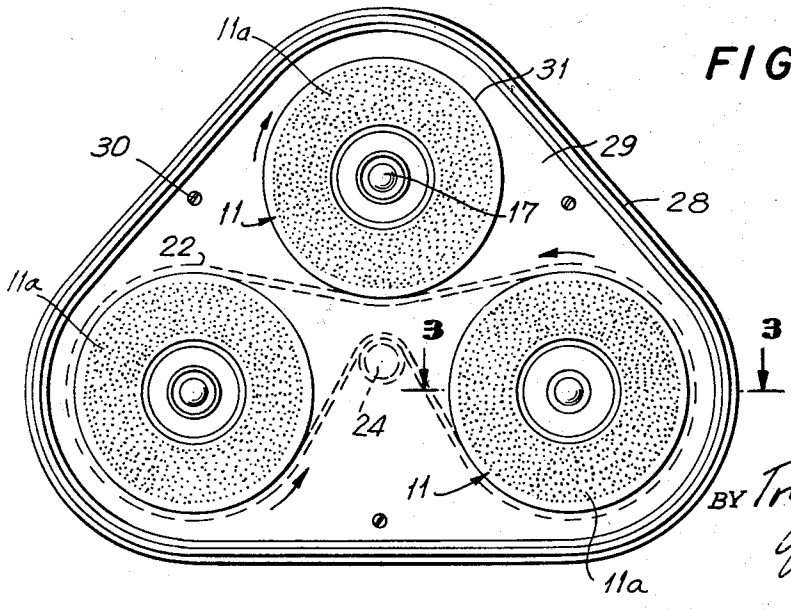


FIG. 2



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SURFACE TREATING APPARATUS

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FIG. 3

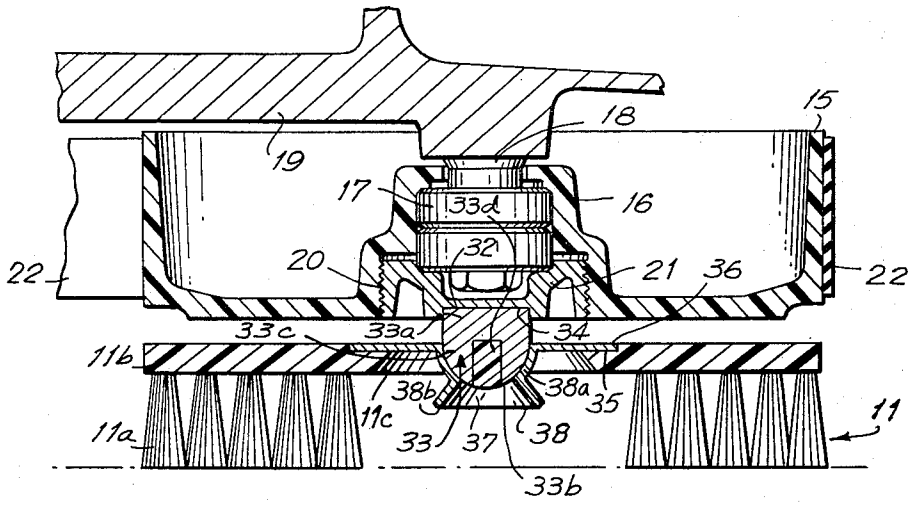
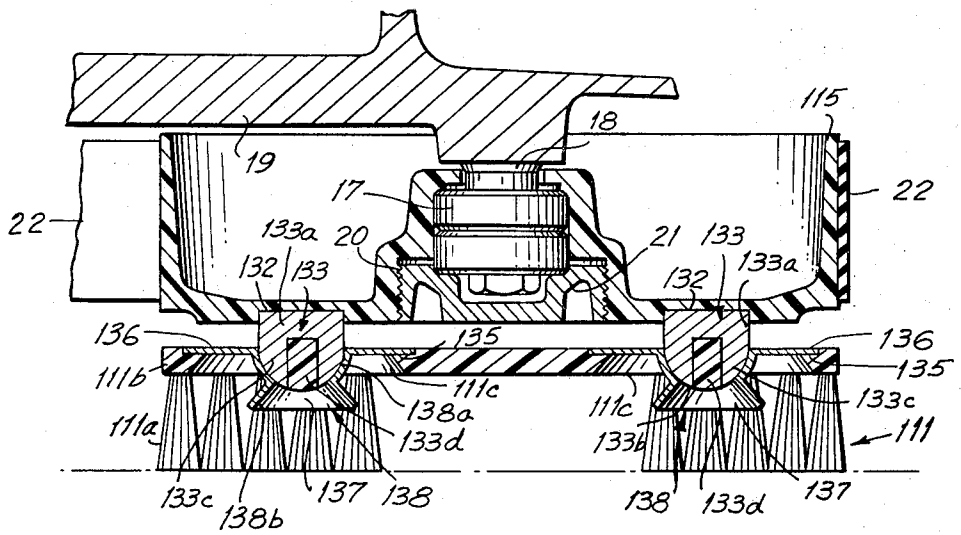


FIG. 4



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SURFACE TREATING APPARATUS

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FIG. 5

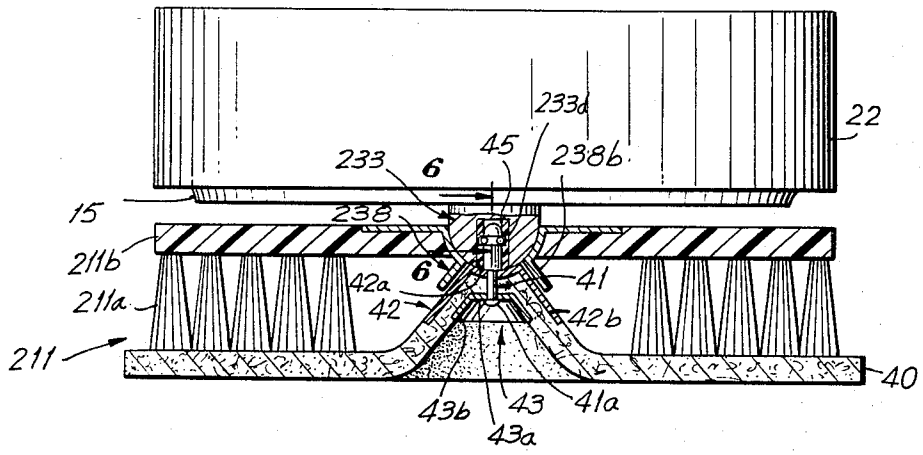


FIG. 6

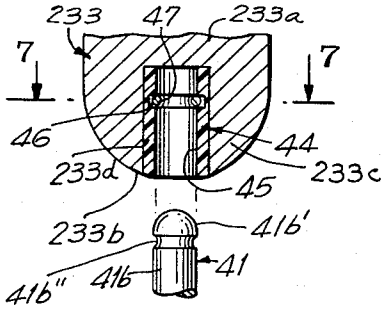


FIG. 8

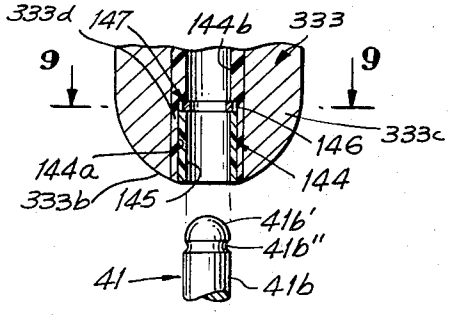


FIG. 7

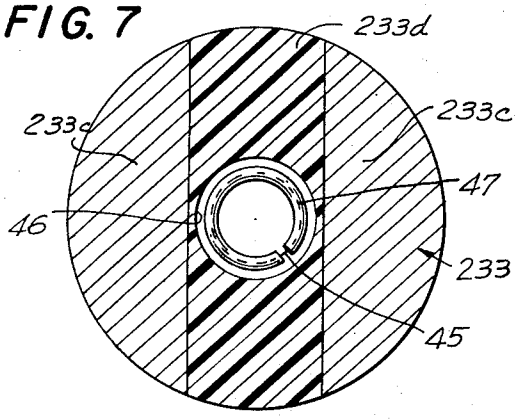
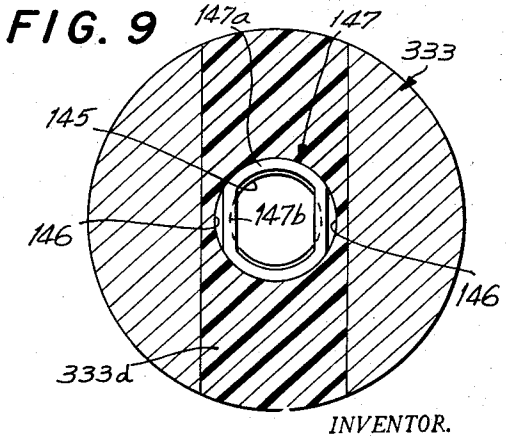


FIG. 9



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SURFACE TREATING APPARATUS

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FIG. 10

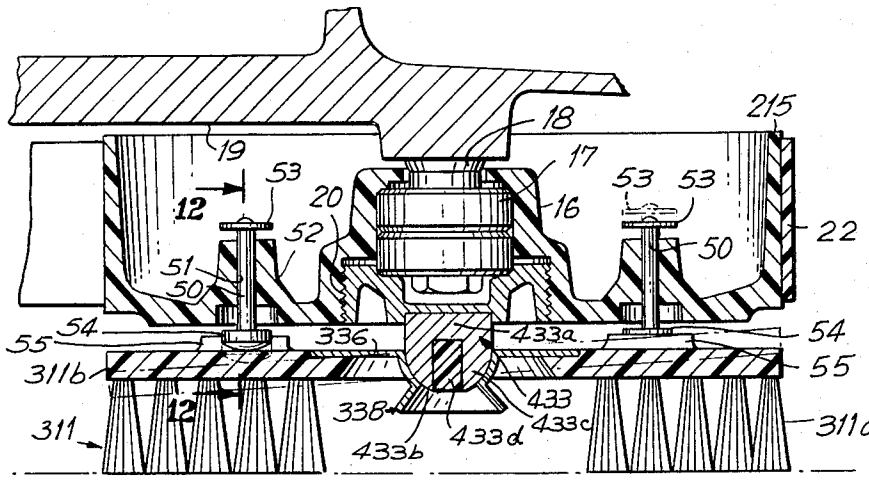


FIG. 11

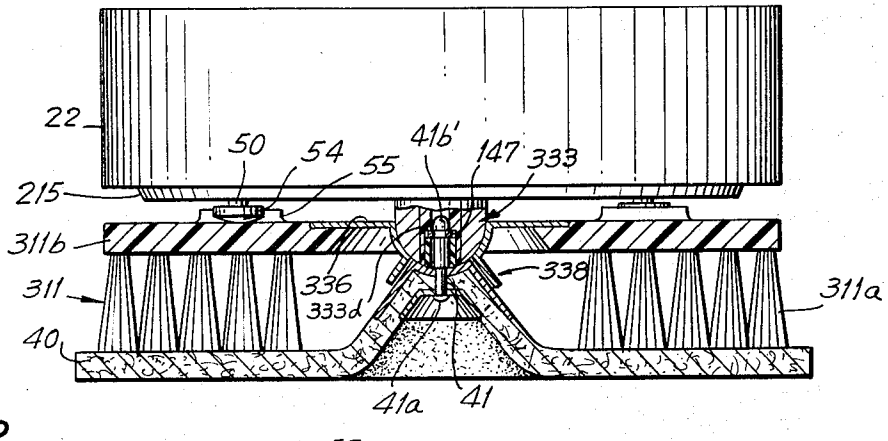


FIG. 12

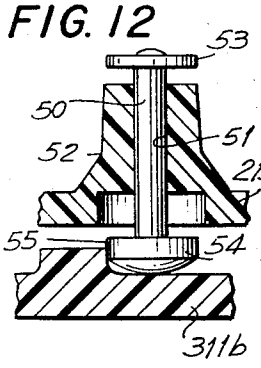
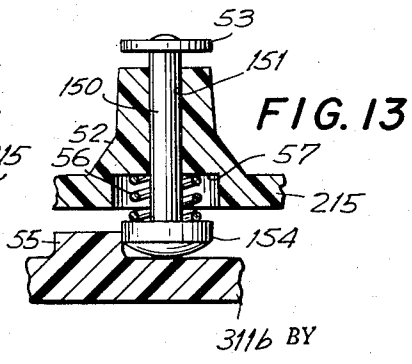


FIG. 13



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FIG. 14

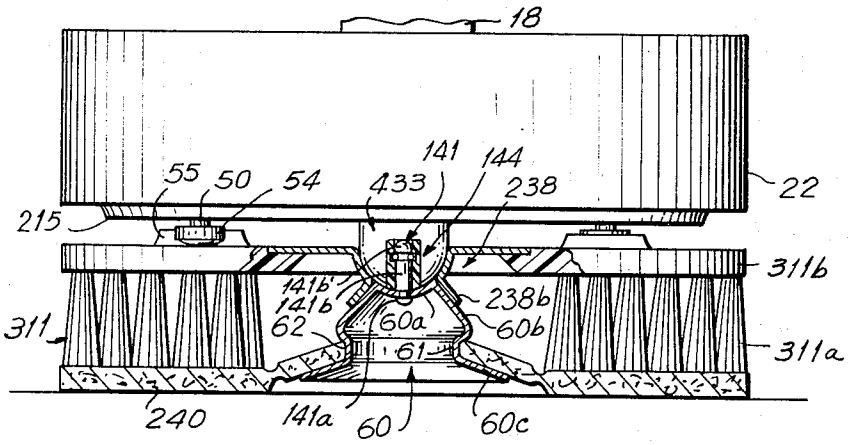
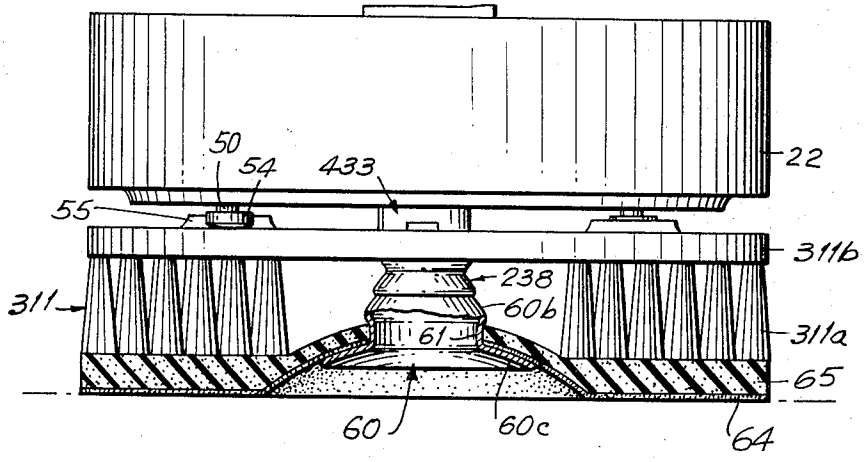


FIG. 15



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United States Patent Office 3,354,488 Patented Nov. 28, 1967

3,354,488

SURFACE TREATING APPARATUS

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Filed Mar. 31, 1966, Ser. No. 538,997
17 Claims. (Cl. 15—49)

This invention relates to surface treating apparatus having one or more rotatable members adapted to be moved over a surface to be treated, and more particularly to surface treating apparatus of the kind employing a detachably connected surface treating member.

It is an object of this invention to provide in surface treating apparatus of this kind an improvement for detachably connecting a surface treating member magnetically to driven rotatable structure.

Another object is to provide an improvement for detachably connecting a surface treating member magnetically to driven rotatable structure in such manner that the surface treating member is angularly movable on the driven rotatable structure at the region it is magnetically connected thereto.

A further object is to provide such an improvement for detachably connecting a surface treating member magnetically to driven rotatable structure and also provide a loose driving connection in addition to the magnetic connection to transmit movement from the driven rotatable structure to the surface treating member.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevation, partly broken away and in section, of surface treating apparatus embodying the invention;

FIG. 2 is a bottom plan view of the base of the surface treating apparatus shown in FIG. 1;

FIG. 3 is an enlarged fragmentary vertical sectional view taken at line 3—3 of FIG. 2, the bottom plate in FIG. 2 being omitted in FIG. 3 to illustrate details more clearly;

FIG. 4 is an enlarged vertical sectional view similar to FIG. 3 illustrating a modification of the invention;

FIG. 5 is a view, partly in elevation and partly in section, of parts shown in FIG. 3 to illustrate the manner in which surface treating members may be employed to perform different surface treating operations;

FIG. 6 is an enlarged fagmentary vertical sectional view taken at line 6—6 of FIG. 5;

FIG. 7 is an enlarged sectional view taken at line 7—7 of FIG. 6;

FIG. 8 is a fragmentary vertical sectional view similar to FIG. 6 illustrating another modification of the invention;

FIG. 9 is an enlarged sectional view taken at line 9—9 of FIG. 8;

FIG. 10 is a fragmentary vertical sectional view similar to FIG. 3 illustrating a further modification of the invention;

FIG. 11 is a view, partly in elevation and partly in section, of the modification shown in FIG. 10 which also includes parts similar to parts illustrated in FIG. 5;

FIG. 12 is an enlarged vertical sectional view taken at line 12—12 of FIG. 10 to illustrate details more clearly;

FIG. 13 is a vertical sectional view similar to FIG. 12 illustrating a further modification of the invention; and

FIGS. 14 and 15 are views, partly in elevation and partly in section, which are generally like FIG. 11 and illustrate further modifications of the invention.

Referring to the drawing, the invention is shown in connection with surface treating apparatus **10** having three rotatable brushes **11** which project downward beneath a triangular-shaped hood or base **12** and are arranged to be driven by an electric motor (not shown) housed in an upright casing **14** positioned over an opening in the hood. The brushes **11** comprise tufts of bristles **11***a* which are secured to brush backs **11***b*. As will be described hereinafter, the brushes **11** are detachably connected to rotable pulleys **15** having hubs **16** which may be journaled by ball bearings **17** on pins **18** depending downward from and carried by a frame **19** disposed within the hood or base **12**.

As shown in FIG. 3, the hub **16** of each pulley is provided with an internally threaded portion **20** which receives a threaded member **21** that serves as a bottom end cover for the bearing **17**. The rotatable pulleys **15** are driven by an endless belt **22** which may be formed of rubber or other suitable resilient material. The belt **22**, which is under tension, passes over the pulleys **15** and a driving pulley **23** which is fixed to the lower end of the motor shaft **24**. As shown in FIG. 2, the belt **22** is arranged to drive one of the brushes **11** in a clockwise direction and the other two brushes in a counterclockwise direction.

The surface treating apparatus **10** is adapted to be manipulated by an elongated handle (not shown) which includes an inverted U-shaped unit or fork **25** at its lower end having spaced arms **26**, one of which is shown in FIG. 1. The lower ends of the arms **26** are pivotally connected at **27** to diametrically opposite sides of the casing **14**. The triangular-shaped hood or base **12** is provided with an annular member **28** of resilient material like rubber, for example. As shown in FIGS. 1 and 2, the base **12** is provided with a bottom plate **29** with openings **31** to facilitate detachably connecting the brushes **11** to the pulleys **15**.

In accordance with this invention, an improvement is provided in surface treating apparatus of the kind illustrated and just described for detachably connecting the brushes **11** magnetically to the pulleys **15**. As shown in FIG. 3, each of the bottom end covers **21** is provided with a recess **32** in which is disposed a permanent horseshoe magnet **33** formed of suitable magnetic material, such as the magnetic material commercially known as Alnico or the like, for example, and which is of cylindrical form at its upper closed end **33***a* and is round and essentially spherical in shape at its lower end **33***b*. The horeshoe magnet **33** is formed with a gap between its poles **33***c* which extends through the magnet from one side to a diametrically opposite side thereof. A body **33***d* of non-magnetic material, such as plastic, for example, is retained in the gap in any suitable manner. The upper closed end **33***a* of the magnet **33** is firmly anchored and fixed in the recess **32** in any suitable manner and depends downward therefrom. Hence, the horseshoe magnet **33** forms a unitary part of the pulley **15** and is in vertical alignment with the bottom end cover **21** and rotates about the same vertical axis as the axis of the pulley **15**.

As shown in FIG. 3, each of the brush backs **11***b* is formed with a central opening **11***c* and the top of the brush back **11***b* at the region about the central opening therein is recessed at **35**. A metal plate **36** is carried by the brush back **11***b* in the recess **35**. The plate **36** is firmly anchored and fixed in the recess **35** in any suitable manner and forms a unitary part of the brush back **11***b*. The metal plate **36** is formed with a central opening **37** and a flange **38** depending downward therefrom at the opening. The flange **38** includes a top or upper part **38***a*

which is curved and conforms to the shape of the lower spherical part 33*b* of the magnet 33. The flange 38 also includes a bottom or lower part 38*b* which flares outward and is of conical form.

The metal plate 36 serves as an armature element for the magnet 33 and is formed of suitable material, such as soft iron, for example, whereby the plate is firmly held to the magnet, due to the magnetic field produced by the latter, when the brush 11 is positioned at the underside of the pulley 15 with the lower spherical end 33*b* of the magnet 33 snugly fitting in the top or upper part 38*a* of the flange 38.

Since the flange parts 38*a* of the brushes 11 are curved and conform to the shapes of the lower spherical ends 33*b* of the magnets, the brushes 11 can assume different angular positions with respect to the axes of rotation of the pulleys 15, thus enabling the brushes to be in intimate physical contact with surfaces which are not perfectly level. Hence, the brushes 11 are angularly movable with respect to the pulleys 15 at the regions they are magnetically connected thereto.

The magnets 33 and armature elements or plates 36 provide an arrangement for detachably connecting the brushes 11 magnetically to the pulleys 15, and, when it is desired to remove a brush 11 from the pulley 15 to which it is connected, it is only necessary to grasp the brush and exert sufficient force to overcome the magnetic field between the magnet 33 and plate 36 to separate the brush from the magnet. When the brush 11 is being separated from the pulley 15, the flange 38 may be manually grasped to facilitate the removal of the brush. Therefore, the flange 38, which defines the central opening 37 in the plate 36, can function as a finger grip at which region at least a part of the separating force may be produced to overcome the magnetic field between the magnet 33 and plate 36.

FIG. 4 illustrates a modification of the invention which differs from the embodiment just described in that a plurality of magnets 133 like the magnet 33 in FIG. 3 are employed to detachably connect a brush 111 to the pulley 115 in FIG. 4. The parts in FIG. 4 which are similar to those shown in FIG. 3 are designated by the same reference numerals. In FIG. 4 the pulley 115 is formed with a plurality of recesses 132 at diametrically opposite sides of its vertical axis of rotation. The brush 111 includes the tufts of bristles 111*a* and a brush back 111*b* having openings 111*c* at diametrically opposite sides thereof.

The top of the brush back 111*b* is formed with a plurality of recesses 135 at the regions of the openings 111*c* in which are firmly anchored and fixed the plates or armature elements 136. Each of the plates 136 is formed with a central opening 137 defined by a flange 138 having top and bottom parts 138*a* and 138*b*, respectively. Each of the magnets 133 includes top and bottom parts 133*a* and 133*b* and a body 133*d* of non-magnetic material between the poles 133*c*. Each of the plates or armature elements 136 and the flange 138 thereof is like the armature element or plate 36 and flange 38 shown in FIG. 3 and described above.

In view of the foregoing, it will be evident that in the modification of FIG. 4 each of the brushes 111 is detachably connected to a pulley 115 by a pair of magnets 133 which are at diametrically opposite sides of the axis of rotation of the pulley and snugly fit in the upper parts 133*a* of the flanges 138 when the brush 111 is moved to its operative position at the underside of the pulley 115. In FIG. 4 the brush 111 can move angularly with respect to the pulley 115 about a horizontal axis in a vertical plane which intersects the vertical axis of rotation of the pulley 115 and passes through the vertical axes of the magnets 133. When it is desired to remove the brush 111 from the pulley 115, the brush can be grasped, as at the flanges 138 which serve as finger grips, to produce a separating force to overcome the magnetic fields between the magnets 133 and the plates 136.

It is often desirable to attach a pad against a brush to effect a particular surface treatment. For example, it may be desirable to attach pads to brushes of the kind illustrated in FIG. 3 and described above. Such a modification is shown in FIGS. 5, 6 and 7 in which parts like those shown in FIG. 3 are designated by the same reference numerals. In FIG. 5 a felt pad 40, which is of circular form, is positioned against the outer extremities of the tufts of bristles 211*a* when a buffing treatment must be effected. The felt pad 40 is flexible and formed with a raised central part. An upright pin 41 extends vertically through the central part of the pad 40 and is firmly anchored to the pad by ferrules or caps 42 and 43 at the top and bottom sides, respectively, of the pad. The ferrules or caps 42 and 43 respectively have closed ends 42*a* and 43*a* and outwardly flaring walls 42*b* and 43*b* which are of conical form.

The bottom end of the pin 41 is formed with an enlarged head 41*a* which bears against the closed end 43*b* of the bottom ferrule or cap 43. The top part of the pin 41 is of larger cross-sectional area than the bottom part thereof and defines an attachment member 41*b*. The lower end of the attachment member 41*b* bears against the closed end 42*a* of the top ferrule 42 and anchors the pin 41 to the central part of the pad 40. The non-magnetic body 233*d* in the horseshoe magnet 233 in FIGS. 5 and 6 is formed with a vertical opening or passageway 44 which extends upward from the bottom of the spherical portion 233*b* to the upper closed end 233*a* thereof and receives the attachment member 41*b*. As best shown in FIGS. 6 and 7, the wall defining the passageway 44 at a region above its midpoint, is formed with a ring-shaped groove 46 in which an expansible and contractible split resilient ring 47 is disposed. The extreme tip or top end 41*b'* of the attachment member 41*b* is of spherical form and a ring-shaped groove 41*b''* is formed at the bottom of the tip 41*b'*, as shown in FIG. 6.

When the attachment member 41*b* is moved upward within the passageway 44 in the non-magnetic body 233*d*, the tip 41*b'* engages and causes the resilient ring 47 to expand. After the tip 41*b'* moves past the ring 47, the ring contracts and snugly fits in the groove 41*b''* to detachably hold the pad 40 in the position illustrated in FIG. 5. With this construction the attachment member 41*b* can be readily connected to and disconnected from the magnet 233, it only being necessary to grasp the pad and exert sufficient force to move the tip 41*b'* of the attachment member 41*b* downward past the resilient ring 47. It will be seen that the closed end 42*b* of the top cap 42 is curved and conforms to the shape of the lower spherical end 233*b* of the magnet 233 when the pad 40 is attached to the magnet 233. In such attached position the outwardly flaring wall 42*b* of the top cap 42 snugly fits within the bottom conical-shaped part 238*b* of the flange 238.

FIGS. 8 and 9 illustrate another form of detachable connection for the pad 40. In FIG. 8 the non-magnetic body 333*d* in the magnet 333 is formed with a passageway 144 which extends vertically upward from the bottom spherical part 333*b* of the magnet to the upper closed end thereof. The passageway 144 includes a wide bottom part 144*a* and a narrower upper part 144*b*. Within the passageway 144 is fixed a non-magnetic hollow sleeve 145 formed of plastic, for example, the upper end of which is spaced from the bottom of the narrower upper part 144*b* of the passageway to form a ring-shaped groove 146 within which is disposed an expansible and contractible ring 147 of the shape shown in FIG. 9. The ring 147 includes diametrically opposed curved ends 147*a* connected by parallel straight sides 147*b* which are spaced apart a distance less than the diameter of the wide lower part 144*a* of the passageway 144. The attachment

member 41*b* in FIG. 8 is like the similarly numbered attachment member 41*b* shown in FIG. 6 and described above.

When the attachment member 41*b* in FIG. 8 is moved upward within the non-magnetic sleeve 145 in the magnet 333, the tip 41*b'* engages and causes the straight parallel sides 147*b* of the ring 147 to expand. After the tip 41*b'* moves past the ring 147, the ring contracts and snugly fits in the groove 41*b''* of the attachment member 41*b* to detachably hold the pad 40 in the position illustrated in FIG. 5. Since the modification of FIGS. 8 and 9 is similar to the embodiment of FIGS. 6 and 7, it will be readily understood that the attachment member 41*b* can readily be connected to and disconnected from the magnet member 333.

FIG. 10 illustrates a modification which is like the embodiment shown in FIG. 3 and further includes a loose driving connection in addition to the magnetic connection to transmit movement from the driven rotatable pulley 215 to the brush 311. The parts shown in FIG. 10 which are similar to the parts illustrated in FIG. 3 are designated by the same reference numerals. In FIG. 10, as in the embodiment of FIG. 3, the brush back 311*b* is provided with a metal plate 336 which functions as an armature element and in the ring-shaped flange 338 of which the horseshoe magnet 433 is seated and anchored to transmit movement from the pulley 215 to the brush 311. As explained above, the magnetic connection functions to transmit movement from the pulley 215 to the brush 311 at a region which is substantially at the vertical axis about which the pulley 215 and brush 311 rotate.

In addition, motion is transmitted from the pulley 215 to the brush 311 by pins 50 which are vertically movable in passageways 51 of hollow sleeves 52 forming integral parts of the pulley 215. The hollow sleeves 52 are located at regions radially removed from the axis about which the pulley 215 rotates and at diametrically opposite sides of the pulley. The upper ends of the pins 50 are provided with flanges 53 to retain the pins on the pulley 215 when the brush 311 is removed therefrom. The lower ends of the pins 50 are provided with enlarged driving heads 54 which rest by gravity on the top surface of the brush back 311*b*. When the pulley 215 is driven by the belt 22, the pins 50 rotate with the pulley and the driving heads 54 bear against the top surface of the brush back 311*b*.

The top surface of the brush back 311*b* is provided with bosses or protuberant parts 55 which are in the path of movement of the driving heads 54, as shown in FIGS. 10 and 12. The bosses 55 are at diametrically opposite sides of the brush back 311*b* and so positioned that when one of the driving heads 54 engages one of the bosses 55, the other driving head engages the other boss 55. With this construction, the pulley 215 and brush 311 are mechanically interlocked, whereby positive driving movement will be imparted to the brush back 311*b* to the pulley 215.

The bosses 55 and pins 50 provide a loose driving connection which enables the brush 311 to move angularly with respect to the pulley 215 about the vertical axis about which the pulley and brush rotate. When the brush back 311*b* in FIG. 10 moves from its solid line horizontal position to a position inclined to the horizontal, as indicated in dotted lines, the driving head 54 at the left moves downward to a lower position illustrated in dotted lines and the driving head 54 at the right moves upward to a higher position indicated by the raised dotted line position of the flange 53. Hence, irrespective of the position the brush 311 assumes with respect to the pulley 215 when the brush is moved over a surface to be treated, the pins 50 can move vertically responsive to the inclination of the brush back 311*b* from its horizontal position and the driving heads 54 always will remain in intimate contact with the top surface of the brush back 311*b* and bear against the bosses 55.

In the modification just described and shown in FIGS. 10 and 12, the pins 50 move downward by gravity to maintain the driving heads 54 in their functioning position to impart rotating movement to the brush 311. In FIG. 13 a modification is illustrated in which the driving heads 154 of one of the pins 150 is biased downward by resilient means to its functioning position to impart movement to the brush 311. In FIG. 13 a helical spring 56 is maintained under compression about the pin 150 between the driving heads 154 and a shoulder 57 formed in the passageway 151 by a recess 158 at the bottom of the hollow sleeve 152. With this arrangement the driving heads 154 are resiliently biased downward by the springs 56 whereby the driving heads 154 will remain in intimate contact with the top surface of the brush back 311*b* while the brush 311 is being driven by the pulley 215.

FIG. 11 illustrates a modification of the invention in which a loose driving connection like that shown in FIGS. 10 and 12 and described above is provided in the form of the invention shown in FIG. 5 and includes the detachable pad connecting means illustrated in FIGS. 8 and 9 and described above. Parts in FIG. 11 which are similar to the parts shown in FIGS. 5, 8 to 10 and 12 are designated by the same reference numerals. Since the operation of the modification of FIG. 11 will be readily apparent from the foregoing description, it will not be repeated here.

FIGS. 14 and 15 illustrate further modifications of the invention in each of which a loose driving connection like that shown in FIGS. 10 and 12 is provided. In the modification of FIG. 14 a ferrule or cap 60 is employed which is like the top ferrule or cap 42 in the embodiment of FIG. 5. The ferrule 60 in vertical section includes a closed end 60*a* which is curved and conforms to the shape of the spherical lower end portion of the magnet 433 and a first annular-shaped portion 60*b* of conical form which flares outward and snugly fits within the bottom portion 238*b* of the flange 238.

The ferrule or cap 60 also includes a reentrant portion 61 defined by the first annular-shaped portion 60*b* and a second annular-shaped portion 60*c* of conical form which flares radially outward beyond the bottom of the first annular-shaped portion 60*b*. A pin 141 extends upward through an opening in the closed end 60*a* in the ferrule or cap 60. The pin 141 is firmly fixed to the cap 60 by an enlarged head 141*a* at the lower end thereof which bears against the bottom surface of the cap and an enlarged section which functions as an attachment member 141*b*. The lower end of the enlarged section 141*b* bears against the top surface of the cap 60. The attachment member 141*b* and detachable connecting means provided therefor on the magnet 433 are like the attachment member 41*a* and detachable connecting means in FIGS. 5, 6 and 7 and described above. The parts of the detachable connecting means in FIG. 14 which are similar to the parts shown in FIGS. 5, 6 and 7 are designated by the same reference numerals. In the modification of FIG. 14 the flexible felt pad 240 is circular and formed with a central opening 62. The inner peripheral edge of the pad defines the central opening 62 and snugly fits in the reentrant portion 61 of the ferrule or cap 60.

The modification of FIG. 15 is like the modification of FIG. 14 and differs therefrom in that the ferrule or cap 60 is employed to detachably connect to the magnet 433 a sheet 64 of abrasive material instead of the felt pad 240. The top surface of the sheet 64 may be fixed to a soft cushion 65 which may be formed of foamed plastic, for example, which in turn bears against the ends of the tufts of bristles 311*a*.

In view of the foregoing, it will now be understood that an improvement has been provided in a domestic appliance of the class described for detachably connecting a brush magnetically to rotatable means whereby the latter can impart rotating movement to the brush. The means connecting the brush to the rotatable means includes a magnet element and an armature element, one of the elements being fixed to the rotatable means and

radially immovable thereon and the other of the elements being fixed to the brush back and radially immovable thereon.

The magnet element and armature element function to connect the brush to the rotatable means under the influence of the magnetic field in the magnet element, whereby the rotatable means imparts movement to the brush. The magnet element and armature element have surfaces in contact with one another when the brush is connected to the rotatable means, the contact surface of the magnet element being curved. The surfaces of the magnet element and the armature element in contact with one another are shaped and formed to enable the brush to move angularly with respect to the rotatable means.

When the top ferrules or caps **42** in FIGS. 5 and 11 and the ferrule or cap **60** in FIGS. 14 and 15 are formed of soft iron or the like, it will be evident that the closed ends **42***a* and **60***a* thereof, which conform to the curved shape of the bottom of the horseshoe magnet, serve as armature elements and are held against the bottom of the magnet under the influence of the magnetic field of the magnet.

While the invention has been shown and described in considerable detail, it is not desired to be limited to the exact arrangements shown, but to seek to cover in the following claims all those modifications that fall within the true spirit and scope of the invention.

What is claimed is:

1. The combination with a domestic appliance of the class described, of

structure including rotatable means adapted to be positioned over a surface for rotation about a vertical axis and be moved over the surface,

a brush having a back and tufts projecting therefrom,

means for connecting said brush to said rotatable means whereby the latter imparts rotating movement to said brush, said connecting means including a magnet element and an armature element,

one of said elements being fixed to said rotatable means and radially immovable thereon and the other of said elements being fixed to said brush back and radially immovable thereon,

said magnet element and said armature element functioning to connect said brush to said rotatable means under the influence of the magnetic field in said magnet element, whereby said rotatable means imparts rotating movement to said brush,

said magnet element and armature element having surfaces in contact with one another when said brush is connected to said rotatable means, the last-mentioned contact surface of said magnet element being curved,

and the surfaces of said magnet element and said armature element in contact with one another being shaped and formed to enable said brush to move angularly with respect to said rotatable means.

2. A domestic appliance as set forth in claim **1** in which said magnet element comprises a permanent magnet having a curved semi-spherical surface, said curved semi-spherical surfaces serving as the curved contact surface of said magnet element.

3. A domestic appliance as set forth in claim **2** in which said magnet element is disposed at the axis about which said brush rotates.

4. A domestic appliance as set forth in claim **3** in which said magnet element is fixed to said rotatable means and said armature element is fixed to said brush back.

5. A domestic appliance as set forth in claim **1** in which said magnet element comprises a horseshoe magnet having a closed end and a pair of poles which extend therefrom and have a gap therebetween, said poles at their ends defining at least in part a semi-spherical surface serving as the curved contact surface of said magnet element.

6. A domestic appliance as set forth in claim **5** in which a body of non-magnetic material is retained in said gap and substantially fills the latter, said body bridging said gap between said poles and defining in part said semi-spherical surface.

7. A domestic appliance as set forth in claim **1** in which said magnet element is fixed to said rotatable means at the vicinity of its axis of rotation and depends downward therefrom, said magnet element comprising a permanent magnet having an upper cylindrical part and a bottom part which is semi-spherical, at least a portion of said semi-spherical bottom part serving as the contact surface of said magnet element, said armature element comprising a member which is fixed to said brush and includes a curved portion defining a cavity at the vicinity of the axis about which said brush rotates, said cavity providing a seat to receive said semi-spherical part of said permanent magnet, and the curved portion of said member and the semi-spherical surface of said permanent magnet serving as the contact surfaces of said armature element and said magnet element, respectively.

8. A domestic appliance as set forth in claim **1** in which said magnet element and said armature element form a first pair of elements and said connecting means comprises said first pair of elements and a second pair of elements including a second magnet element and a second armature element, each of said magnet elements being fixed to said rotatable means at opposing sides of its axis of rotation and substantially diametrically opposite one another and being radially immovable thereon, each of said armature elements being fixed to said brush back at opposing sides of its axis of rotation and substantially diametrically opposite one another and being radially immovable thereon, each pair of magnet and armature elements functioning to connect said brush to said rotatable means under the influence of the magnetic field in each of said magnet elements, each pair of magnet and armature elements having surfaces in contact with one another when said brushes are connected to said rotatable means, the last-mentioned contact surfaces of each said magnet elements being curved, and the surfaces of each pair of said magnet and armature elements in contact with one another being shaped and formed to enable said brush to move angularly with respect to said rotatable means.

9. A domestic appliance as set forth in claim **1** in which said connecting means also includes a pin, means for mounting said pin on said rotatable means for vertical axial movement on said rotatable means at a region which is radially removed from its axis of rotation, the lower end of said pin riding on the top surface of said brush back, and said brush back having an upward extending proturberance at a region radially removed from its axis of rotation and in the path of movement of the lower end of said pin when rotating movement is imparted to said rotatable means.

10. A domestic appliance as set forth in claim **9** in which said pin and said protuberance comprise a first set of members for mechanically interlocking said rotatable means and said brush and a second set of members including a second pin and a second protuberance, means for mounting said second pin on said rotatable means for vertical axial movement thereon at a region radially removed from its axis of rotation, the lower end of said second pin riding on the top surface of said brush back and said second protuberance extending upward from said brush back at a region radially removed from its axis of rotation and in the path of movement of the lower end of said second pin when rotating movement is imparted to said rotatable means, the vertical axis of rotation of said brush coinciding with the vertical axis of rotation of said rotatable means, and said first and second sets of members being respectively fixed to said rotatable means and said brush back at opposing sides of their same axis of rotation and substantially diametrically opposite one another.

11. A domestic appliance as set forth in claim **9** in which said pin is biased downward by gravity on said

mounting means to urge the lower end of said pin to ride on the top surface of said brush back when rotating movement is imparted to said rotatable means.

12. A domestic appliance as set forth in claim 9 which includes means for resiliently biasing said pin downward on said mounting means to urge the lower end of said pin to ride on the top surface of said brush back when rotating movement is imparted to said rotatable means.

13. A domestic appliance as set forth in claim 1 in which said magnet element comprises a permanent magnet fixed to said rotatable means and having a downwardly directed curved semi-spherical surface, said curved semi-spherical surface serving as the curved contact surface of said magnet element, said brush back having an opening extending therethrough, said armature element comprising a sleeve-like member which is fixed to said brush back and extends downward in the opening in said brush back, said sleeve-like member including a top part having a curved surface conforming at least in part to the shape of said curved semi-spherical surface of said permanent magnet and serving as the contact surface of said armature element.

14. A domestic appliance as set forth in claim 13 in which said sleeve-like member includes a bottom part which is accessible at the underside of said brush back and functions as a finger grip to separate said brush from said permanent magnet by manual force sufficient to overcome the magnetic field between said magnet element and said armature element.

15. A domestic appliance as set forth in claim 14 which includes a surface treating member which is in the form of a disk and positioned to bear against the outer ends of the tufts of bristles, means for detachably connecting the central part of said disk to said magnet element, said last-mentioned connecting means including a ferrule, and the bottom part of said hollow sleeve forming

guide means to position said ferrule at the immediate vicinity of a part of the curved semi-spherical surface of said permanent magnet.

16. A domestic appliance as set forth in claim 15 in which said ferrule includes an end wall and a side wall which flares outward from and axially with respect to said end wall, said end wall being curved and conforming to the shape of at least the part of said semi-spherical surface of said permanent magnet at which it is positioned.

17. A domestic appliance as set forth in claim 16 in which said permanent magnet comprises a horseshoe magnet having a closed end and a pair of poles which extend therefrom and have a gap therebetween, a body of non-magnetic material, said body being retained in said gap between said poles, said poles at their ends and said body defining at least in part the semi-spherical surface of said permanent magnet, said non-magnetic body having a passageway extending upward from said semi-spherical surface, an elongated member, said elongated member being fixed to said ferrule and including a part projecting therefrom, said passageway being adapted to receive the projecting part of said elongated member, and said detachable connecting means including means to detachably hold the projecting part of said elongated member in said passageway.

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