Nov. 7, 1967 J. T. FERRARIS 3,351,359

ADJUSTABLE LENGTH WAND

Filed Dec. 23, 1964

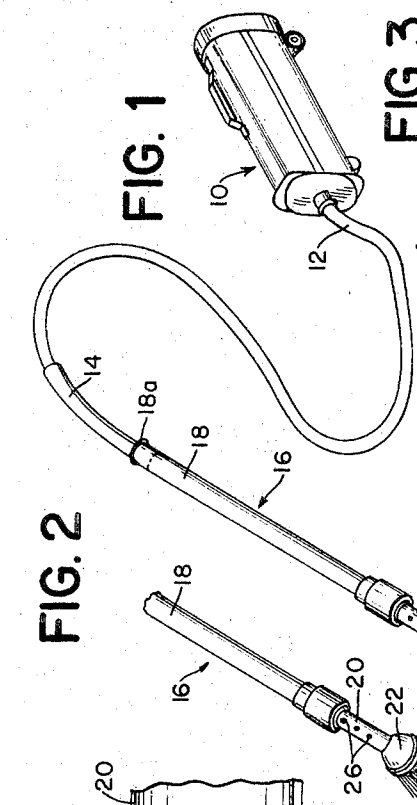


FIG. 1

FIG. 2

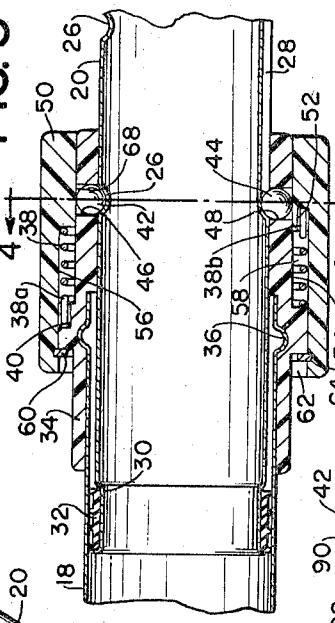


FIG. 3

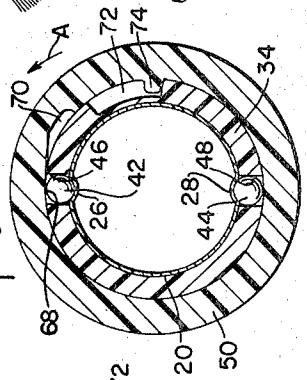


FIG. 4

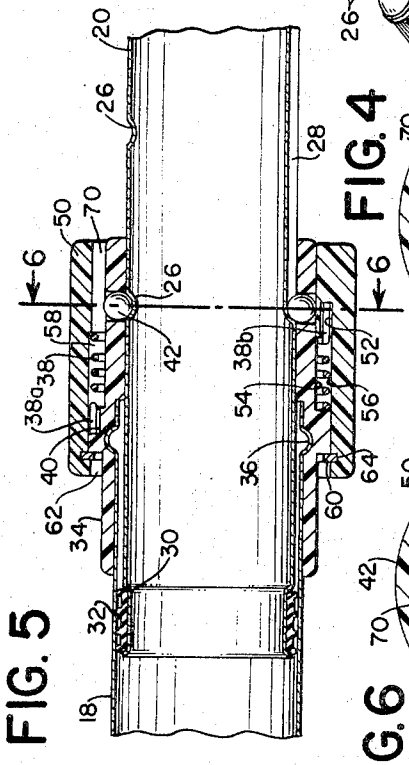


FIG. 5

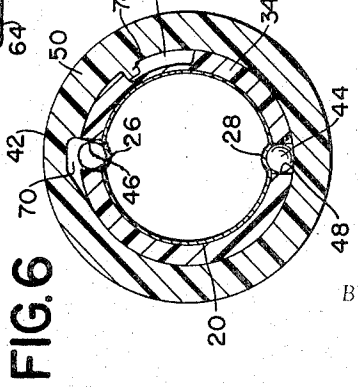


FIG. 6

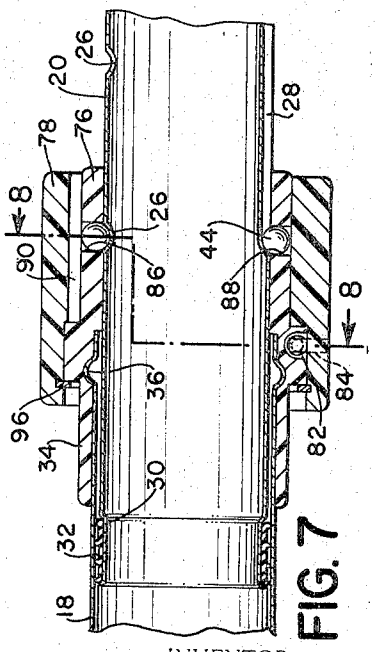


FIG. 7

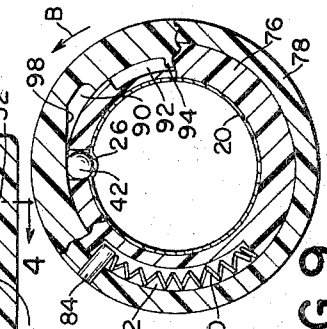


FIG. 9

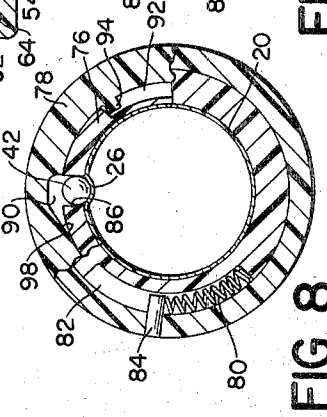


FIG. 8

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ADJUSTABLE LENGTH WAND

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There is provided by my invention a vacuum cleaner wand which may be telescopically adjusted and latched at any one of a number of desired lengths.

When using a tank-type vacuum cleaner a rigid hollow wand is coupled between a suction hose and a suction cleaning nozzle. The wand serves two purposes. It serves as a handle with which the housewife can move the nozzle across the surface to be cleaned and, in addition, it serves as a conduit for conveying dirt-ladened air from the suction nozzle to the hose and thence to the tank unit where the dirt is filtered from the air. Hence, the wand must be able to transmit substantial force applied in a longitudinal direction and, in addition, it must be airtight. The conventional widely-used wand has two wand sections which may be coupled end to end to form a long wand, but if a short length of wand is required, only one section is used. Thus, with such an arrangement the housewife can use either a long wand or a short one, depending on the kind of cleaning task involved. However, she is not able to have a wand of an intermediate length.

There are many occasions when it would be an advantage to be able to adjust the wand to intermediate lengths. Ordinarily, when a rug is being cleaned, one would want to use a long length wand. Heretofore, this was accomplished by coupling the two aforementioned wand sections end to end. But, if the housewife is below average height it would be an advantage to telescope the two wand sections to provide an intermediate length wand. Also, when cleaning objects above the floor, such as drapes, picture frames, moldings and the like, it would be desirable to be able to adjust the wand to various lengths in accordance with the height of the object above the floor.

One object of the present invention is to provide a new and improved vacuum cleaner wand.

Another object of the present invention is to provide a vacuum cleaner wand, the length of which may be adjusted to any one of a plurality of lengths and is positively latched in each such position of adjustment.

Another object of the present invention is to provide a vacuum cleaner wand which, although adjustable as to length, is nevertheless airtight.

Briefly, in accordance with my invention there is provided a vacuum cleaner wand having inner and outer tubular wand sections which are coaxially arranged so that the inner wand section can be moved, telescopically, within the outer section. In the outer surface of the inner wand section there is formed a series of hemispherical indentations and this series extends for a substantial distance along the length of the inner wand section. In addition, there is formed in the outer surface of the inner wand section a long narrow indentation which also extends for a substantial distance along the length of the wand. At one end of the outer wand section there is connected a latch mechanism which is comprised of two coaxially arranged hollow cylindrical members, i.e., a stationary inner cylindrical member, which is fastened to the outer surface of the outer wand section, and an outer cylindrical member arranged for limited rotation about the inner cylindrical member. The inner wand section coaxially passes through the two hollow cylindrical members into the outer wand section. Between the two coaxially arranged cylindrical members there is provided

a space within which there is seated a spring member which normally biases the outer cylindrical member to assume a predetermined alignment relative to the inner cylindrical member. Two small spheres, such as steel balls, for example, are seated in spaces provided in the inner cylindrical member. The first of these spheres projects into the long narrow indentation on the inner wand section. When the inner wad section is telescopically moved in a longitudinal direction within the outer wand section, this sphere will permit such movement but will prevent the inner wand section from rotating relative the outer wand section. The second sphere is forced into one of the hemispherical indentations in the inner wand section when the spring member is biasing the outer cylindrical member to its normal position because a surface portion of the outer cylindrical member forces this sphere to project into the hemispherical indentation. In this condition the wand sections are securely latched so they cannot be further telescoped. In order to unlatch the wand for the purpose of changing its length (for example, to further telescope the inner wand with the outer wand section) the outer cylindrical member is rotated by hand against the restraining force of the spring member. After a predetermined degree of rotation, another space provided in the outer cylindrical section will arrive adjacent to the second sphere, at which point the inner wand section may be moved longitudinally. As the inner wand section is being moved, the second sphere is moved outwardly into the adjacent space thereby unlatching the two wands. The second sphere will then seat itself in any one of the successively arriving hemispherical indentations at which point the housewife can release her grip on the outer cylindrical member so that the spring action will again cause a latching of the two wand sections.

Further objects and advantages of the invention will be apparent from the following description when considered in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a tank type vacuum cleaner apparatus employing the variable length wand according to a first embodiment of the present invention;

FIG. 2 is a perspective view showing the wand of FIG. 1 adjusted to a relatively short length for cleaning objects above the floor;

FIG. 3 is a longitudinal cross-section of the first embodiment of the wand showing the two wand sections in a latched condition;

FIG. 4 is a cross-section of the wand shown in FIG. 3 as viewed along the section line 4—4 of FIG. 3;

FIG. 5 is a longitudinal section of the wand of FIG. 3 with its wand sections in the unlatched condition;

FIG. 6 is a cross-section of the wand of FIG. 3 as viewed along the section line 6—6 of FIG. 5;

FIG. 7 is a longitudinal cross-section of a second embodiment of the wand according to the invention;

FIG. 8 is a cross-sectional view of the wand of FIG. 7 as viewed along the section line 8—8 on FIG. 7; and

FIG. 9 is a cross-sectional view similar to FIG. 8, except that the wand sections are in their latched condition.

In FIGS. 1 and 2 the reference number **16** designates a wand according to a first embodiment of the invention. In FIG. 1, the wand **16** is shown in a fully extended condition which would normally be required for cleaning a rug on the floor. In this case a relatively larger floor cleaning tool **24**, or suction nozzle, is attached to one end of the wand. In FIG. 2, on the other hand, the wand has been shortened and a cleaning tool **22** suitable for cleaning objects above the floor is coupled to the end of the wand. With the cleaning tool **22** the housewife can clean draperies, table tops, picture frames, moldings, etc.

The wand **16** is comprised of a tubular outer wand section **18** and a tubular inner wand section **20**. These wand sections **18** and **20** are telescopically arranged; i.e., the wand section **20** can be moved longitudinally within the wand section **18**. As shown in FIG. 1 a tank unit **10** of a vacuum cleaner apparatus is provided and within this tank unit **10** there is located a dust bag and a motor-driven suction-producing fan. Coupled to the inlet port of the tank unit **10** is one end of a suction hose **12**. Attached to the other end of the suction hose **12** is the rigid hollow handle **14** which is inserted into the outwardly flanged and tapered end **18***a* of the outer wand section **18**.

The first embodiment of the wand is illustrated in greater detail at FIGS. 3 through 6. For a substantial distance along the outer surface of the inner wand section **20** there is formed a series of hemispherical indentations **26—26**. In addition, in the outer surface of the inner wand section **20** there is formed the long narrow indentation **28**, which like the aforementioned series **26—26** also extends for a substantial distance along the wand section **20**. Formed in one end of the inner wand section **20** is the annular groove **30** within which there is placed the annular sealing member **32**. This sealing member, which may be made of rubber or another suitable elastomer, ensures an airtight seal between the outer surface of the inner wand section **20** and the inner surface of the outer wand section **18**.

Fastened to one end of the outer wand section **18** is the hollow cylinder-like member **34**. As shown at FIG. 3, the cylindrical member **34** after it has been fitted over one end of the wand section **18** is positively secured thereto by forming an annular groove **36** on the inner surface of the outer wand section **18**. This may be done with a suitable expanding tool. Thereafter, the inner wand section **20** may be inserted within the outer wand section **18**. According to the orientation shown in FIG. 3 that end of the inner wand section **20** which does not have the sealing member **32** is moved from left to right until it is within the outer wand section **18**. Thereafter, a helical torsion spring **38** is slipped over the outside of the cylindrical member **34** and one of its longitudinally extending ends **38***a* is inserted within a small slot **40** located in the outside surface of the cylindrical member **34**. This slot **40** extends for a short distance longitudinally on the outside surface of the cylindrical member **34**. Two steel balls **42** and **44** may then be inserted within the cylindrical cavities **46** and **48**, respectively, which are provided in the cylindrical member **34**. By moving the inner wand section **20** longitudinally within the outer wand section **18**, one of the indentations **26** may, as shown at FIG. 3, be positioned so that it is adjacent to the cavity **46** at which point the steel ball **42** will become seated in the indentation **26**. The other steel ball **44** will seat itself in the longitudinal indentation **28** as shown in FIG. 3. Thereafter, another hollow cylindrical member **50** may be slipped over the outer surface of the cylindrical member **34**. According to the orientation shown at FIG. 3 the cylindrical member **50** after being slipped over the inner wand section **20** is slipped over the cylindrical member **34**, from the right-hand side of the member **34** toward the left-hand side thereof. Within the cylindrical member **50** there is provided a small cylindrical cavity **52** which is intended to encompass the other end **38***b* of the spring **38** as the cylindrical member **50** is being slipped over the inner cylindrical member **34**. The torsion spring **38** is so constructed that when it is not torsionally stressed its opposite extending ends **38***a* and **38***b* are spaced apart by a predetermined number of degrees, for example 180°, relative to the circular cross-section of the helical spring. By aligning two marks, not shown, which are provided on the outside surface of the cylindrical member **50** and on the outside surface of the cylindrical member **34**, respectively, the member **50** as it is being moved from right to left will cause the cavity

52 to be lined up with the end **38***b* of the spring and thus receive it therein. Hence, the spring couples the rotatable outer cylindrical member **50** with the stationary inner cylindrical member **34**.

As is shown in FIG. 3 the inner cylindrical member **34** has a recessed surface **54** provided on the outside surface thereof and the outer cylindrical member **50** has a recess surface **56** formed on the inside surface thereof. Thus, between these surfaces **54** and **56** there is defined the annular space **58** which receives the spring **38**. To secure the inner and outer cylindrical members **34** and **50** against relative longitudinal motion a split annular retaining ring **60** fashioned from a resilient material, such as spring steel, after being compressed to a small diameter is inserted into the annular space **62** provided between the cylindrical members and when it expands to its normal larger diameter it will seat itself in an annular groove **64**.

In FIGS. 3 and 4 the two wand sections **18** and **20** are in their latched condition; that is, they cannot be moved longitudinally with respect to each other. The latching is accomplished by the steel ball **42** which is forced into a seated position in the indentation **26** due to the force applied thereto by an inside wall surface **68** of the outer cylindrical member **50**. The torsion spring **38** normally biases the rotatable cylindrical member **50** to the position shown in FIG. 4 such that the wall surface **68** abuts the surface of the steel ball **42**. Since the ball **42** is forced into the indentation **26**, it is not possible to move the inner wand section **20** in a longitudinal direction relative to the outer wand section **18**.

However, the two wand sections can be unlatched by manually rotating the outer cylindrical member **50** in the direction indicated by the arrow A in FIG. 4 so that a space **70** formed in the inside wall of the outer cylindrcal member **50** arrives adjacent to the ball **42** as shown in FIG. 6. When this is done the inner wand section **20** can be longitudinally extended from or pushed further into the outer wand section **18**. When the inner wand section is longitudinally moved the ball **42** is unseated and moves upwardly through the cavity **46** partially into the space **70** and it will roll along the non-indented surface of the inner wand section **20**. As long as the housewife maintains her rotative grip on the outer cylindrical member **50** so as to keep the space **70** adjacent to the ball **42**, the inner wand section can be moved longitudinally so that any number of its serially arranged indentations **26** can pass underneath the steel ball **42**. When a selected indentation **26**, corresponding to the desired wand length, is about to arrive underneath the ball **42**, the person's grip on the outer cylindrical member **50** is released and when the inner wand section **20** has moved a little further, until the selected indentation arrives underneath the ball **42**, the torsion spring will rotate the cylindrical member **50** so that the inside wall surface **68** again abuts against the ball **42** forcing it to become seated in the selected indentations (see FIG. 4). Hence, an important feature of the invention is that after the grip on the cylindrical member **50** has been released, the torsion spring **38** will automatically seat the ball **42** in the next indentation **26**.

To limit the rotation of the cylindrical member **50** to a small angle, an arcuate space **72** is formed in the outer surface of the inner cylindrical member **34**. In addition, a projecting tab **74** formed on the inside surface of the cylindrical member **50** is arranged to travel arcuately with the rotation of the cylindrical member **50** in the space **72**. This projecting tab **74** will abut one side wall of the cylindrical member **34** when the wand sections are latched, as shown in FIG. 4, and the projecting tab **74** will come into abutment with an opposite side wall of the cylindrical member **34** when the wand sections are not latched, as shown in FIG. 6.

Since the steel ball **44** can only move longitudinally in the long narrow indentation **28**, rotative movement of the inner wand section in the outer wand section is prevented so that as the inner wand section is longitudinally moved,

each of the indentations 26 successively moves underneath the ball 42.

In FIGS. 7 through 9 there is illustrated a second embodiment of the invention, the construction of the inner and outer wand sections 18 and 20 is the same as for the first embodiment; that is, the inner wand section has the series of hemispherical indentations 26 formed therein as well as a long narrow indentation 28. In addition, the steel ball 42 and the steel ball 44 are employed as in the first embodiment. However, the inner and outer cylindrical members 76 and 78, respectively, are modified and a compression spring 80 is used instead of a torsion spring. A stationary, inner cylindrical member 76 is fastened to one end of the outer wand section in the same manner as hereinbefore described with reference to the first embodiment.

After fastening the inner cylindrical member 76 to the end of the outer wand section 18, the inner wand section 20 may be inserted through the cylindrical member 76 and into the outer wand section 20. Then, the two steel balls 42 and 44 can be inserted into the small cylindrical cavities 86 and 88, respectively, provided in the cylindrical member 76. By moving the inner wand section 20 longitudinally within the outer wand section 18, one of the indentations 26 may be positioned, as indicated at FIG. 7, underneath the cavity 86 at which point the steel ball 42 will become seated in this indentation. The other steel ball 44 seats itself in the longitudinal indentation 28. In the outer surface of the inner cylindrical member 76 there is formed an arcuate recess 82 within which the compression spring 80 is inserted. Thereafter, a hollow, outer cylindrical member 78 is slipped over the inner cylindrical member 76 concealing the compression spring 80 and holding it in the arcuate condition shown in FIG. 9. The spring 80 extends from one end of the arcuate recess 82 to nearly the other end thereof when not under compression, there being a small space left between one end of the spring 80 and a side wall of the inner cylindrical member 76 adjacent to the arcuate recess. Through the outer surface of the outer cylindrical member 78 there is provided a hole into which a peg 84 is wedged so that it can fill the space between the end of the spring 80 and the side wall of the recess. In order to complete the assembly, an annular split ring 96 of steel may be compressed to a small diameter and inserted into the space between the cylindrical members 76 and 78 and allowed to expand into an annular groove located on the inside surface of the outer cylindrical member 78. Thus, the cylindrical member 78 which is rotatable may not be moved longitudinally with respect to the inner cylindrical member 76. Normally, the spring 80 by its abutment against the peg 84 maintains the outer cylindrical member 78 in the condition shown in FIG. 9, such that an internal wall surface 98 of the outer cylindrical member forces the ball 42 to become seated in an indentation 26 thus positively locking the two wand sections so that they cannot be moved longitudinally relative to each other. By rotating the outer cylindrical member in the direction indicated by the arrow B, the space 90 provided on the interior of the outer cylindrical member can be moved adjacent to the steel ball as shown in FIG. 8. This rotation compresses the spring 80 as shown in FIG. 8. Thereafter, the wand may be extended to any desired length by moving the inner wand section 20 longitudinally relative to the outer wand section and the steel ball 42, in the same way as in the first embodiment, will automatically be forced into the selected indentation 26, corresponding to the desired wand length after the outer cylindrical member has been released.

As in the first embodiment, the inner cylindrical member 76 has a recess 92 formed therein and the outer cylindrical member has the projecting tab 94. These are for limiting the rotation of the outer cylindrical member with respect to the inner cylindrical member.

While I have shown two more or less specific embodiments of my invention, it is to be understood that this has been done for the purposes of illustration only and that the scope of my invention is not to be limited thereby, but is to be determined from the appended claims.

What is claimed is:

1. An adjustable length wand comprising an outer wand adapted to receive an inner wand for telescopic movement within said outer wand, said inner wand having a plurality of indentations serially arranged in a line parallel to the axes of said wands, a first member fixed against longitudinal and angular movement on one end of said outer wand, said first member having a portion extending axially beyond said outer wand, said axially extending portion of the first member defining a bearing portion for snugly receiving said inner wand and maintaining substantial axial alignment between said inner and outer wands, an opening extending transversely through said bearing portion communicating with the outside surface of said inner wand, a ball radially movable within said opening for engagement in one of said indentations, a second member rotatably connected on said first member, means for preventing relative axial movement between said first and second members, complementary annular recesses on said first and second members defining an annular space therebetween, a helical spring means having each of its ends connected with said first and second members, respectively, for normally biasing said second member into a predetermined position relative to said first member, a discrete arcuate recess in the outside surface of said first member remote from said bearing portion, a tab connected with said second member for projecting into said discrete arcuate recess for limiting the relative rotational movement of said first and second members, said second member having a radially outwardly extending recess therein for releasing said ball from an associated indentation upon movement of said second member from said predetermined position on the surface of said second member adjoining said recess engaging said ball positioned in an indentation in the predetermined position of said second member; whereby movement of said inner wand within said outer wand is effected by grasping said second member in one hand and said inner wand in the other hand and twisting the grasped parts followed by pushing or pulling said inner wand; and an axially extending continuous groove in said inner wand diametrically opposite said indentations and substantially coextensive with said indentations, a second transverse opening in said bearing portion, a second ball in said opening, said ball extending into said groove, said second member having an inner surface for engaging said second ball for continuously maintaining it in said groove.

2. An adjustable length wand according to claim 1 with the addition of an annular member fixed on the inner end of said inner wand, said member slidably bearing against the adjacent inside surface of said outer wand in sealing relation therewith and cooperating with said first mentioned bearing portion for maintaining said wands in axial alignment.

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