Nov. 8, 1938. D. M. DOW 2,135,885

VACUUM CLEANER

Filed Feb. 25, 1936

Fig. 1

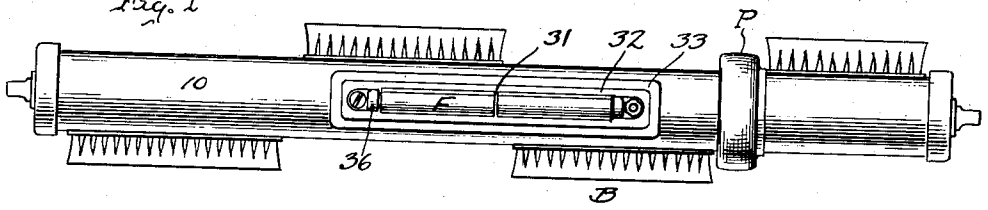


Fig. 2

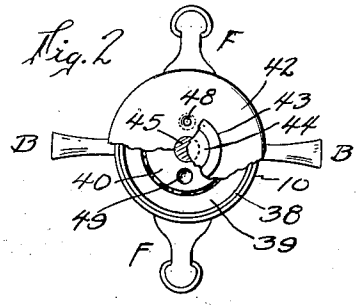


Fig. 3

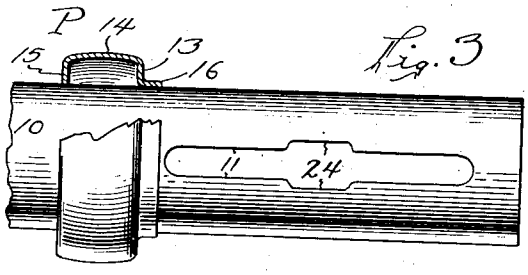


Fig. 5

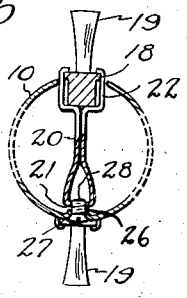


Fig. 4

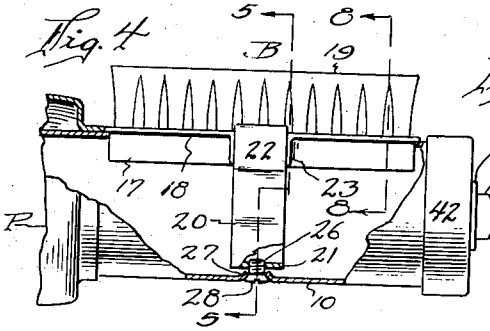


Fig. 10

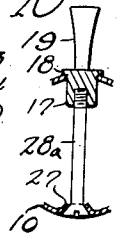


Fig. 7

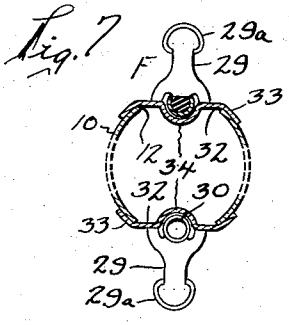


Fig. 6

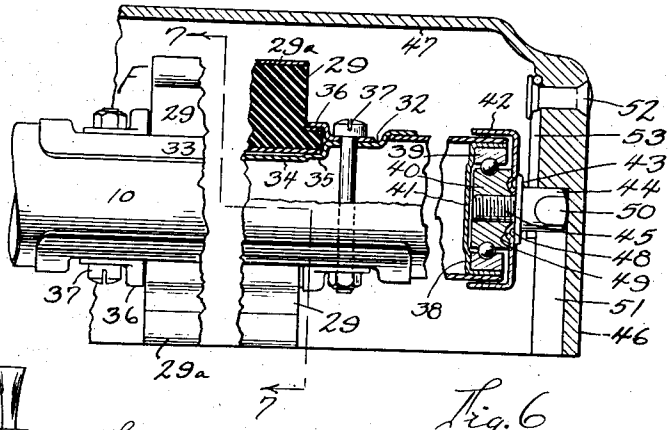


Fig. 8

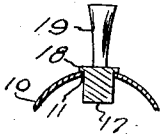
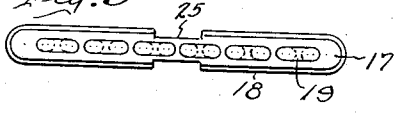


Fig. 9



Inventor

Dewey M. Dow

By

Lyne & Latta Attorney

Patented Nov. 8, 1938

2,135,885

UNITED STATES PATENT OFFICE

2,135,885

VACUUM CLEANER

Dewey M. Dow, Toledo, Ohio, assignor to Air-Way Electric Appliance Corporation, Toledo, Ohio, a corporation of Delaware

Application February 25, 1936, Serial No. 65,626

10 Claims. (Cl. 15—183)

This invention relates to vacuum cleaners and has as its object to provide an improved rotary agitator of the type having a tubular spindle.

One problem in connection with such an agitator is that of mounting the agitating elements to the spindle. The invention, in dealing with this problem, provides an agitating element that is received in a longitudinal slot in the spindle shell and seated against the outer faces of the edge regions of the shell defining said slot, and is held in such seating position by a securing element inserted through the diametrically opposite region of the shell wall.

The invention aims to render the device as easy to manipulate as possible. To this end, the agitating element has an extension which projects diametrically through the shell to a point closely adjacent the opening through which the securing element is extended, and the latter coacts with the end of such extension and is easily attached because of such close proximity.

The invention deals also with providing a flattened depressed region in the shell to which an agitating element can be mounted. It provides such flattened region in the form of a die-formed plate, welded into a slot that has been milled or punched into the shell. The shell is made of tubular stock and retains its true tubular form when worked up in this manner, whereas if it were subjected to a forming operation to impress the depressed region into its own wall, it would be distorted so that it would be practically impossible to secure the proper running balance in the finished spindle.

The invention also deals with the mounting of the spindle in the floor tool, and provides a novel end bearing and bearing guard assembly embodying a ball bearing of relatively inexpensive type and a detachable stub shaft which serves the dual purpose of providing the supporting connection between the floor tool and the agitator, and detachably securing the guard over the end of the spindle and over the bearing. It also provides an arrangement in which the stub shaft is threaded into the inner race of the bearing and in which the guard serves as a means for holding said race against rotation so as to allow unthreading of the stub shaft.

Further objects will appear in the perusal of the following detailed description of the invention in connection with the accompanying drawing, in which:

Fig. 1 is a plan view of a rotatable agitator embodying the invention;

Fig. 2 is an end view of the same, parts being shown in section to better illustrate the construction;

Fig. 3 is a fragmentary view of the spindle illustrating the drive pulley and its attachment to the spindle;

Fig. 4 is a fragmentary view of the spindle illustrating the brush element mounting;

Fig. 5 is a detail sectional view thereof; taken on the line 5—5 of Fig. 4;

Fig. 6 is a sectional view through one end of a vacuum cleaner floor tool and portions of the rotary agitator illustrating its end bearing mounting and the mounting of the flexible beater element; and

Fig. 7 is a transverse sectional view of the agitator taken on the line 7—7 of Fig. 6;

Fig. 8 is a cross section of the brush mounting, taken on the line 8—8 of Fig. 4.

Fig. 9 is a bottom view of a modified form of the brush element; and

Fig. 10 is a sectional view of a modified form of the brush element mounting.

The agitator spindle 10 is formed from cylindrical seamless tube stock, preferably steel, and is cut to the desired length and thence perforated to provide the brush mounting slots 11 (Fig. 3) and the beater mounting slots 12 (Fig. 7).

A drive pulley P is formed of sheet metal, deep drawn to form the crowned rim 14, and thence pressed inwardly to form a flange 15 which is trimmed to snugly receive the spindle 10. The opposite flange 13, forming part of the original sheet, is drawn outwardly to form the hub collar 16 which is spot welded to the spindle.

The brushing element B comprises a back 17 which is freely received in the slot 11 of the spindle, and is formed with integral lateral flanges or wings 18 which rest against the outer faces of the spindle wall at the margins of the slot 11. Bristles 19 are mounted in the back 17.

Secured to the back 17 is a clip or post 20 formed of a strip of metal, centrally bent to form an end web 21, its intermediate regions brought together and spot welded, and its ends formed with claws 22 engaging between them the back 17.

The post 20 may be secured to the back 17 so as to form a permanent part thereof, or may be detachable by sliding the back longitudinally between the claws 22. If permanently secured, it may be held in place by clamping action of the claws 22, particularly where the form shown in Fig. 9 is employed, or the claws may be welded to the back 17. If detachable, the arms of the clip are not welded together, and the claws are held

in engaging relation by the edges of the slot 11.

The central region of the back 17 may be thickened as at 23 to the width of wings 18, in which case the slot 11 is centrally widened at 24 to receive the claws 22, or the back may be recessed as at 25 in Fig. 9, to receive the claws 22, in which case the slot 11 may be of uniform width throughout.

In the web 21 is a threaded opening 26. In the wall of the shell 10, diametrically opposite the slot 11, is a hole 27 defined in a countersunk region of the shell wall. The hole 27 registers with the opening 26 when the back 17 is in proper position with the wings 18 contacting the spindle all around the slot 11. A short screw 28 may then be slipped through the hole 27 and readily threaded into the opening 26 without difficulty.

In a modified form of the invention shown in Fig. 10, the screw 28a is long enough to extend across the space within the spindle, and the post 20 is not employed, the screw being threaded directly into the back 17. The preferred form is, however, that shown in Fig. 5, which has the advantage over the other form in that it eliminates feeling for the threaded opening with the screw.

The flexible beater F comprises dual blocks of soft rubber 29 integrally moulded in a metal tube 30 but separated by a slot 31 so as to be separately flexible. The blocks 29 are provided with metal tips 29a. The projecting ends of the tube 30 form trunnions which are journalled in the spindle 10. A flat plate 32 is formed with flanges 33 to fit the contour of the spindle 10, and welded thereto. Centrally of the plate is a depressed channel 34, the end portions of which are raised at 35 to form in conjunction with detachable bearing caps 36 the aforesaid bearings for the trunnions on the ends of tube 30.

The caps 36 are secured in place by bolts 37. A bolt 37 extends entirely through the spindle and secures two caps, one on one side and the other on the other side.

Two of these double beaters are employed diametrically opposite each other on opposite sides of the spindle, and one bolt is employed at each end of a beater. The head of one bolt is disposed on the opposite side of the spindle from the head of the other bolt. Thus one bolt balances the other.

The rotary agitator is mounted on ball bearings, one at each end of the spindle. A cup 38 is pressed into each end of the spindle. The bearing has an outer race 39 seated in the cup and an inner race 40 which is spaced from the embossed portion 41 of the end wall of the cup 38. The inner race 40 projects axially beyond the race 39 and beyond the end of the spindle. A guard cup 42 is secured against the projecting end of the inner race by means of the shoulder 43 on the stub shaft 44, which has a threaded stud 45 projecting through a central aperture in the guard cup 42 and threaded into the inner race 40. The stud at one end of the spindle has a left hand thread, and the other has a right hand thread. The two are arranged relative to the direction of rotation of the agitator so that any rotative force that might happen to be transmitted to the inner race, would only tend to screw the stud into the race. Otherwise, a stub shaft might be driven through the end wall 46 of the floor tool 47.

A pair of dimples 48 in the guard 42 are seated in depressions 49 (Fig. 2) in the inner race, to give a non-rotatable connection between guard and inner race when the stud 45 is tightly in place. This allows the operator to employ the guard 42 as a means to hold the inner race against rotating while the stud 45 is being unthreaded to permit of cleaning and greasing the bearing.

The stub shaft 44 has a flattened end 50 engageable in a groove 51 in the end wall 46. A hair pin shaped spring 53 secured to the end wall by a rivet 52, embraces and clasps the stub shaft so as to support the agitator in the floor tool 47.

The present invention includes as one of its objects, arranging the brushing and beating elements for maximum cleaning efficiency in this type of agitator; i. e., one employing elongated flexible beaters parallel to the axis of rotation. We find that maximum efficiency is obtained by the use of two double beaters disposed midway between the ends of the spindle, and diametrically opposed so as to be dynamically and statically balanced. The brush elements are disposed in a single plane at right angles to the plane of the beaters, and alternately on opposite sides of the spindle from one end thereof to the other. Their paths of rotation just meet each other, end to end, to completely cover the spindle from one end to the other.

I claim as my invention:

1. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back received in said slot, the bristle side of said back being laterally extended to form wings that engage the outer face of said spindle adjacent the margins of said slot, and a securing element rigidly engaging said back and holding it in the slot, said element projecting diametrically across said spindle from the opposite side thereof, engaging the said spindle at said opposite side, and being accessible from said opposite side for detachment.

2. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back received in said slot, the bristle side of said back being provided with means to engage the outer face of said spindle adjacent the margins of said slot, and a securing element engaging said back and holding it in the slot, said element rigidly projecting diametrically across said spindle from the opposite side thereof, engaging the said spindle at said opposite side, and being accessible from said opposite side for detachment.

3. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back receivable in said slot, the bristle side of said back being laterally extended to form wings that engage the outer face of said spindle adjacent the margins of said slot, and a securing element engaging said back and holding it in the slot, said element projecting diametrically across said spindle from the opposite side thereof, engaging the wall of the spindle at said opposite side, and being accessible from said opposite side for detachment, said securing element comprising a post secured at one end to the brush back and removable therewith, the other end of said post projecting close to said opposite side of the spindle, and a short screw extended through said opposite side and threaded into the adjacent end of the post.

4. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back received in said slot, the bristle side of said back being provided with means to engage the outer face of said spindle adjacent the margins of said slot, and a securing element engaging said back and holding

15. BRUSHING, SCRUBBING,
& GENERAL CLEANING,
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Search Room

it in the slot, said element rigidly projecting diametrically across said spindle from the opposite side thereof, engaging the said spindle at said opposite side, and being accessible from said opposite side for detachment, said securing element comprising a long screw extended through said opposite side of the spindle and having a head engaging said opposite side, its other end threaded into said back.

5. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back receivable in said slot, and securing means comprising a clip having at one end claws in which the back of the brush is held, said clip projecting diametrically across the spindle to a point adjacent the opposite side region of the spindle wall, and an attaching element projected through said opposite side region and detachably engaging the adjacent end of said clip.

6. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back received in said slot, and securing means comprising a clip having at one end claws in which the back of the brush is held, and between which said back is longitudinally slidable when removed from the spindle, for attaching or detaching the clip to or from the back, said clip projecting diametrically across the spindle to a point adjacent the opposite side region of the spindle wall, and an attaching element projected through said opposite side region and detachably engaging the adjacent end of said clip.

7. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back receivable in said slot, and securing means comprising a clip formed of a strip of sheet metal bent back upon itself and its ends brought together to form at one end spaced claws in which the back of the brush is held, said clip projecting diametrically across the spindle to a point adjacent the opposite side region of the spindle, and an attaching element projected through said opposite side region and detachably engaging the adjacent end of said clip.

8. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back received in said slot, and securing means comprising a clip formed of a strip of sheet metal bent back upon itself and its ends brought together to form at one end spaced claws in which the back of the brush is held, and at its other end a transverse web portion that has a threaded aperture, and a screw projected through the opposite side region of the spindle and threaded into said aperture.

9. In a vacuum cleaner, a rotatable tubular spindle provided in one side with a longitudinal slot, a demountable brush element having a back received in said slot, the bristle side of said back being laterally extended to form wings that engage the outer face of the wall of said spindle at the margins of said slot, and securing means attached to said back and holding it in the slot, said securing means comprising a post secured at one end to the brush back and removable therewith, said post projecting diametrically across the spindle and its other end extending close to the opposite side of the spindle, and a securing element extended through said opposite side and detachably attached to the adjacent end of the post.

10. In a vacuum cleaner, a rotatable tubular spindle provided with a longitudinal slot, a demountable brush element having a back receivable in said slot, and securing means attached to said back and holding it in the slot, said means comprising a post secured at one end to the brush back and removable therewith, said post projecting diametrically across the spindle and its other end extending close to the opposite side of the spindle, and a securing element extending through said opposite side and detachably engaging said other end of the post.

DEWEY M. DOW.