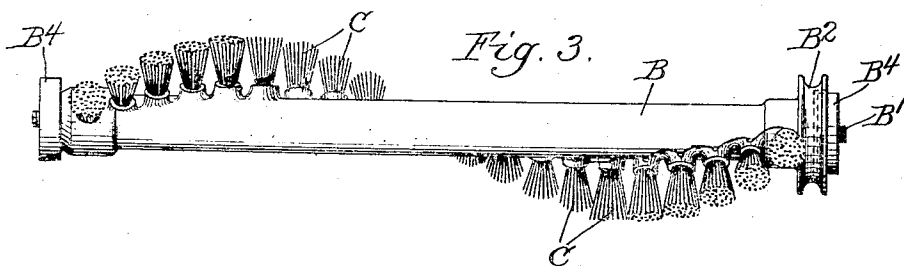
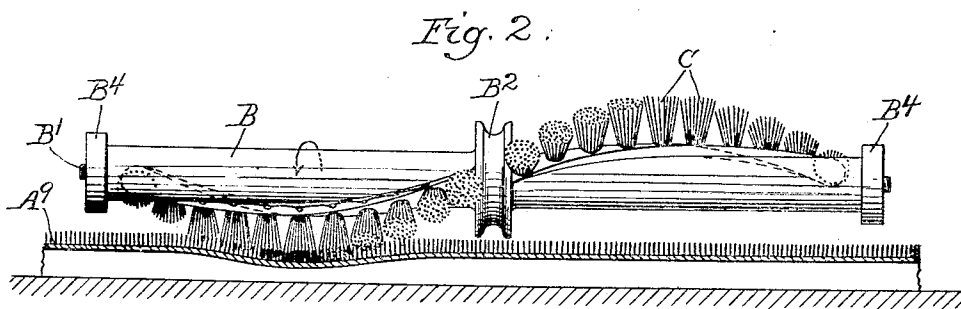
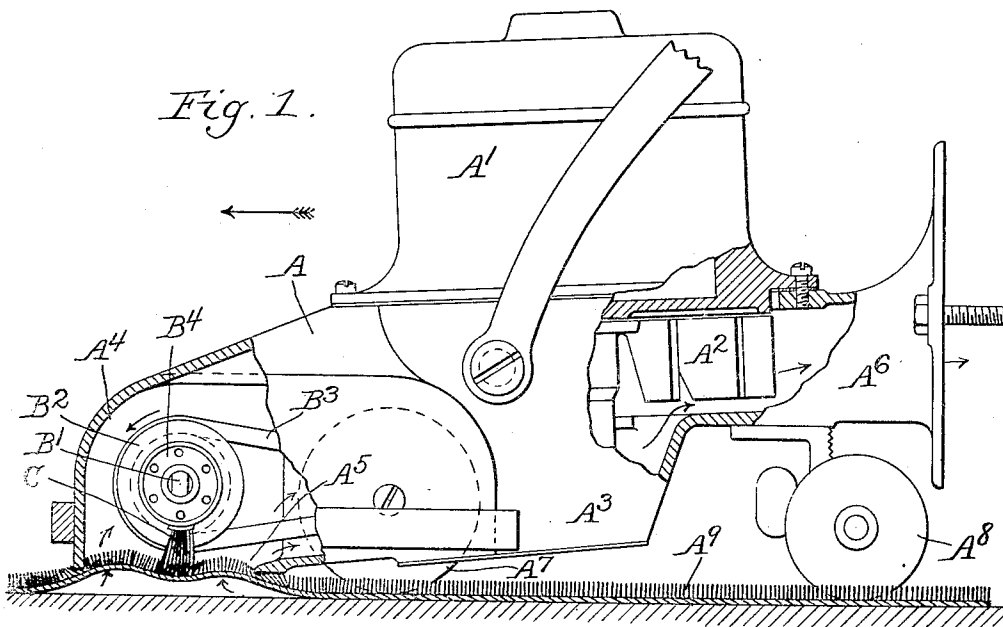


H. E. HOOVER.  
SUCTION SWEEPER.  
APPLICATION FILED APR. 25, 1918.

1,364,554.

Patented Jan. 4, 1921.

3 SHEETS—SHEET 1.



Witness.  
Edward T. Wray.

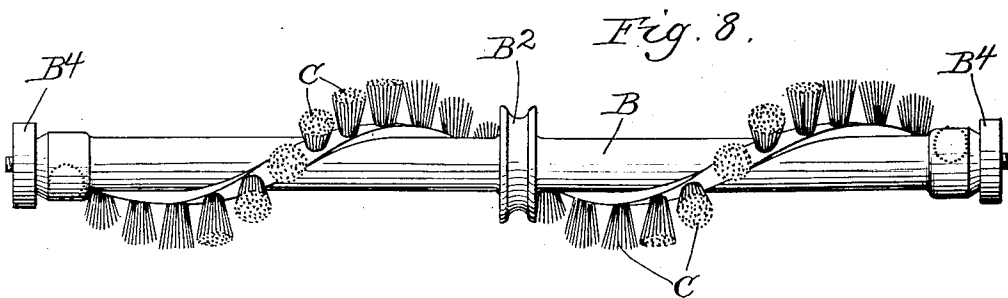
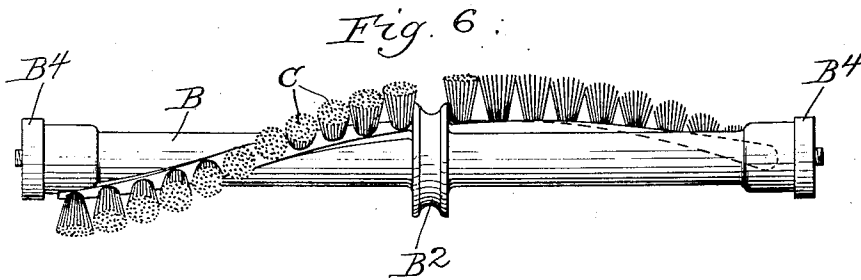
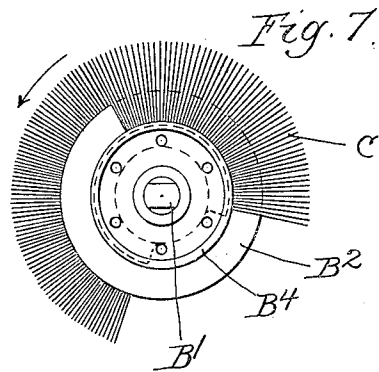
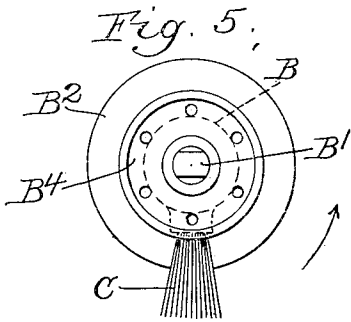
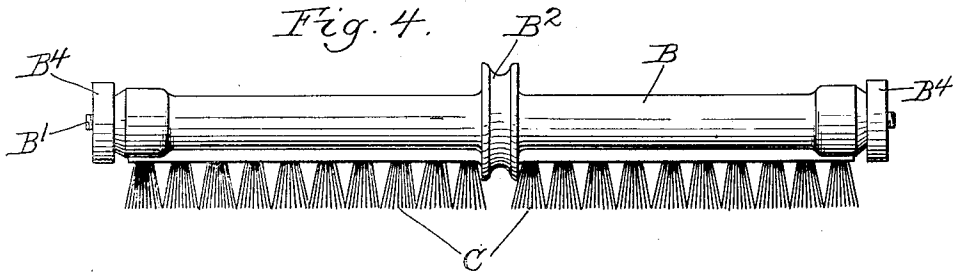
Inventor.  
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3 SHEETS—SHEET 2.



Witness,

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Inventor,  
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Attorneys.

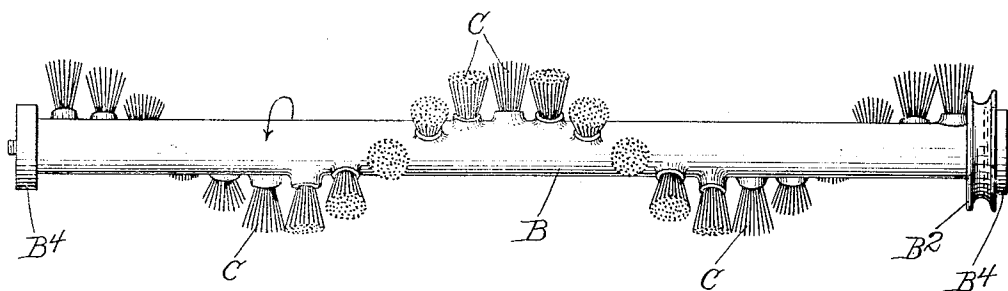
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3 SHEETS—SHEET 3.

Fig. 9



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Attorneys.

# UNITED STATES PATENT OFFICE.

HOWARD EARL HOOVER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HOOVER SUCTION SWEEPER COMPANY, OF NEW BERLIN, OHIO, A CORPORATION OF OHIO.

## SUCTION-SWEEPER.

1,364,554.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Application filed April 25, 1918. Serial No. 230,691.

*To all whom it may concern:*

Be it known that I, HOWARD EARL HOOVER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Suction-Sweepers, of which the following is a specification.

My invention relates to improvements in suction sweepers and has for one object to provide a new and improved form of power driven brush for such machines. Another object is to provide a power driven brush for suction sweepers which will be always in contact with the surface being cleaned at one point only. Another object is to provide a brush which comes in contact with the surface being cleaned once during each revolution at any point along the brush, that is to say, I provide a brush which strikes each part of the carpet beneath the axis of the brush once each revolution thus giving time for the suction to draw the carpet up between beating strokes of the brush. Another object is to provide a brush which can be driven at relatively high speeds by high speed motor without striking the carpet too often and too rapidly.

It is understood that a carpet or floor covering which has to be cleaned by a suction sweeper must have three separate and distinct things done to it. It must first be beaten just as you would beat a rug hanging on a line using a hand carpet beater. It must also be swept by brush bristles which pass across the surface and scrape up and sweep up the dust released by the beating and it must also be subjected to a blast of air which cleans both by bringing dust and dirt particles out from the nap of the carpet and by carrying off those particles which are beaten out and which are swept loose.

In early days carpets were cleaned by beating them in a wind, the hand beater doing the beating and the wind furnishing the air current. Later the carpet was also brushed. Then came the suction sweeper which only sucked air through the carpet or over the carpet. This dislodged the fine surface dirt. It did not touch lint, thread, cotton fibers and the like which must be swept loose. It did not take up heavy sharp

particles embedded and caught down deep in the rug. My device brushes the rug because the brush rotates and the separate brush bristles brush the rug. It beats the rug because the suction draws it up toward the center of rotation of the brush and each separate bristle as it rotates strikes the rug at that point and beats it away.

A light high speed motor will drive the suction fan just as well as a heavier lower speed motor and do as good or better work, but, when a brush which is arranged so that it beats the carpet twice during each revolution at every point along the brush, is used, difficulty is had in that the beating strokes on the carpet are so frequent that the carpet does not have time to come back toward the center of the brush under the influence of the suction of the air between strokes and therefore the carpet is not properly beaten. In actual practice it is difficult to reduce the speed between fan and brush sufficiently to avoid the disadvantage of too rapid a succession of beating strokes on the carpet because there is very little room in the apparatus for the introduction of a satisfactory speed reducing transmission. One way to avoid the difficulty is to cut in half the number of beating strokes applied to the brush during any given time interval and this can only be done by so arranging the brush that it strikes the rug or carpet once during each revolution instead of twice, and I therefore provide a brush having either a single row of bristles or a plurality of rows of bristles so arranged that each point on the carpet between the ends of the brush is struck once during each revolution of the brush.

I prefer an arrangement as illustrated wherein a single spiral row of bristles makes one revolution about the brush and extends from end to end. Obviously a similar effect could be obtained if the single row of bristles only went right straight along the brush and was not spiral at all or if the single row of bristles only spiraled about or across the brush. The disadvantage of such structures as these is that there will be times when the brush is in contact with the carpet and times when it is completely out of contact with the carpet and

you would get chattering and vibration and change in the load on the motor which would be objectionable.

Or you might have a spiral wound a number of times around the brush. The difficulty would be that the separate strokes of the brush would come so close together on the carpet measured in a direction parallel with the axis of the brush, that the carpet would be held away from the brush too much and not be afforded an opportunity to vibrate back and forth.

The essential thing, therefore, is that the bristles are so arranged that if you take any point on the carpet along the brush that point is struck but once each revolution. There may be another point somewhere along which is struck between the blows on the first point but that second point also is struck only once for each revolution.

My invention, therefore, relates to a particular kind of brush for suction sweepers but it also relates to the coöperation in a suction sweeper and with a suction sweeper of a particular kind of brush.

My invention is illustrated more or less diagrammatically in the accompanying drawings wherein,

Figure 1 is a side elevation in part section of a suction sweeper using my brush;

Fig. 2 is a plan view of the preferred type of brush;

Fig. 3 is a plan view of a slightly modified form;

Fig. 4 is a plan view showing an unbalanced brush wherein the bristles are not wound in spiral;

Fig. 5 is an end elevation of Fig. 4;

Fig. 6 is a plan view of a brush with the bristles only wound partly about the brush barrel;

Fig. 7 is an end elevation of Fig. 6;

Fig. 8 is a plan view of a longer brush showing the bristles wound in a spiral extending a plurality of times around the barrel.

Fig. 9 is a view of a modified form of brush.

Like parts are indicated by like characters in all the figures.

My suction sweeper is made up of a fan housing A, a motor housing A<sup>1</sup> in which is a motor not shown driving a fan A<sup>2</sup>. This fan sucks air up through a suction casing A<sup>3</sup> from a suction nozzle A<sup>4</sup> having an open mouth A<sup>5</sup> and discharges the air through a discharge passage A<sup>6</sup> in a suitable receptacle not here shown. A<sup>7</sup> A<sup>8</sup> are supporting rollers holding the apparatus above the floor so that the carpet A<sup>9</sup> may be drawn up against the open mouth of the suction nozzle by the air suction.

B is a brush barrel mounted for rotation on a shaft B<sup>1</sup> supported in the suction hous-

ing. This barrel carries a pulley B<sup>2</sup> driven by a belt B<sup>3</sup> which in turn is driven by the motor in any suitable manner. B<sup>4</sup> B<sup>4</sup> are dust or thread guards attached to the ends of the shaft B<sup>1</sup> and adapted to overhang the ends of the brush barrel, to guard the bearings against dirt and dust and also to position the brush barrel in the suction nozzle.

C C are a series of separate tufts or bristle bunches projecting radially from the brush barrel. It will be noted that they are arranged, as shown in Figs. 1, 2 and 3, along a spiral line spiraling about the brush barrel and so arranged that they make one full revolution. This results in a structure and arrangement such that only one bunch of bristles is in contact with the carpet at a time. This is modified, of course, slightly by the flexibility of the bristles so that if the carpet comes up near enough one, or two, or possibly three bunches may for an instant be in contact at the same time but the arrangement is such that if the bristles are stiff and the carpet is a plane surface only one bunch at a time contacts it.

It will be observed that as the brush rotates in the direction shown by the arrows, the point of contact of bristles with carpet will move toward the right in Fig. 2 until the extreme right hand bristle bunch has beaten the carpet beneath it. Then the point of contact jumps back to the left end of the brush and moves to the right again. This continues while the brush rotates and attention is again called to the fact that each individual bristle strikes the carpet once at each revolution and that each strip of carpet beneath one individual bristle bunch is struck only once during each revolution but that in the preferred form one bristle bunch is always in contact with the carpet so that there is always the same resistance to the rotation of the brush.

In the modified form shown in Fig. 3 the only difference is that the belt drive for the brush barrel is at the end and thus there is no unswept portion at the center of the brush. The spiral arrangement of the separate bristle bunches is the same, they act the same and get substantially the same result.

In the modified form shown in Fig. 4 the straight group of bristles strikes the carpet at the same time once each revolution. The brush revolves idly except when it strikes. It then gives the carpet a blow all the way along, drives it down, waits and strikes it again in the next revolution. This will beat the carpet but because of the fact that all the bristles are in contact at once, much greater power is required to rotate the brush and in my preferred form only one group of bristles is in contact at one time. In the further modification where the bristles extend partly around the brush I approach

the desired action of the preferred form. It is better than the straight arrangement but not so good as the preferred arrangement.

In the final modification the action is exactly the same for each revolution as is the preferred form and this would be a preferred arrangement for a very long brush.

In the modified form of brush shown in Fig. 9, it will be noted that there are two spirals wound about the brush in opposite directions from the center but still the bristles are so arranged that each part of the carpet gets beaten only once during each revolution of the brush. The beating line of contact moves from the center of the brush outwardly toward each end then jumps back to the center and repeats instead of moving from end to end of the brush as in other forms.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made both in size, shape and arrangement of parts without departing materially from the spirit of my invention and I wish, therefore, that my drawings be regarded as in a sense diagrammatic.

The use and operation of my invention are as follows:—

The sweeper when properly adjusted with respect to the floor so that the suction induced by the fan will draw the floor covering off the floor, bring it up against the suction nozzle. Air will be drawn through the carpet and across the carpet by the fan. The brush rotates in unison with the fan and as it rotates each separate bristle strikes the carpet once each revolution. Since the bristles project down below the plane of the suction mouth and since there will always be a tendency for the air suction to drag the carpet in, each bristle bunch must beat the carpet or floor covering away in order to pass and since the brush rotates at high speed it will strike a blow on the suspended carpet. This blow will knock the carpet suddenly away, the dirt will be jarred loose and shaken to the surface. It will then be picked up by the air current and carried off.

Because there is only one brush bristle bunch projecting from the brush barrel at each point as you move from one end to the other the carpet is struck but once in each revolution in any one place and there is ample time for the carpet to stop and come back into the open mouth between strokes. If you have a plurality of bristle bunches at each point along the brush then you must cut down the speed of the brush very materially else the carpet will not have time to rise between strokes.

These bristle bunches besides beating the carpet, brush across it and then sweep off adhering lint, thread, hair and the like.

Because the bristles project beyond the plane of the suction opening it is sufficient for the carpet merely to be drawn up against such opening to enable the brush to beat it as it rotates. You must drive the carpet away by the beating stroke and since the carpet no matter how stiff it may be, is held by the suction against the open mouth, this beating always takes place. If the brush bristles ended at the plane of the mouth or did not come quite to it, a thin flexible carpet might still be beaten, because it would bend up into the mouth to meet the brush bristles. This, however, is not as satisfactory and therefore it is important that the bristles project beyond the plane of the open mouth.

It will be understood that the arrangement of the bristles is such that each point on the carpet is not only beaten once each revolution but it is brushed once each revolution, and there is only one action on each point of the carpet from end to end of the brush during each revolution of the brush, and this action takes the form of a simultaneous combined beating and brushing or sweeping stroke.

Partly because of the fact that the pile of the carpet holds the warp away from the nozzle and partly because the strokes of the brush beat the carpet away from the nozzle there is at times a certain amount of passage for the air between the nozzle and the carpet and therefore an air draft may enter the nozzle along the surface of the carpet as well as through the carpet and this air draft will carry in with it particles of dirt from the carpet.

I claim:

1. The combination with a suction cleaner having an open mouthed suction nozzle of a brush mounted for rotation therein comprising a brush body, and a single row of bristle bunches spirally wound about the body through an angle of approximately 360° and extending from end to end of the nozzle.

2. The combination with a suction cleaner having an open mouthed suction nozzle of a brush body mounted for rotation therein, means for drawing the floor covering up against the open suction mouth and means mounted on the brush body for simultaneously brushing and beating each portion of the floor covering between the two ends of the body once only during rotation of the body, comprising a row of bristles extending from end to end of the nozzle.

3. The combination with a suction cleaner having an open mouthed suction nozzle of a brush body mounted for rotation therein, means for drawing the floor covering up against the open suction mouth and means mounted on the brush body for brushing each portion of the floor covering between the two ends of the body once only during

rotation of the body, said means comprising  
a plurality of flexible floor covering engag-  
ing members arranged in a single row from  
end to end of the body and nozzle there be-  
5 ing no two such members in the same plane  
perpendicular to the axis of rotation of the  
body.

In testimony whereof, I affix my signature  
in the presence of two witnesses this 22nd  
day of April, 1918.

HOWARD EARL HOOVER.

Witnesses:

MARION L. INGRAHAM,  
MINNIE M. LINDENAU.