Oct. 16, 1923. 1,470,894

N. A. THROOP

VACUUM CLEANER

Filed March 11, 1920 2 Sheets-Sheet 1

Fig. 4.

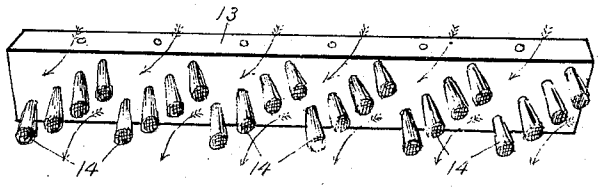


Fig. 5.

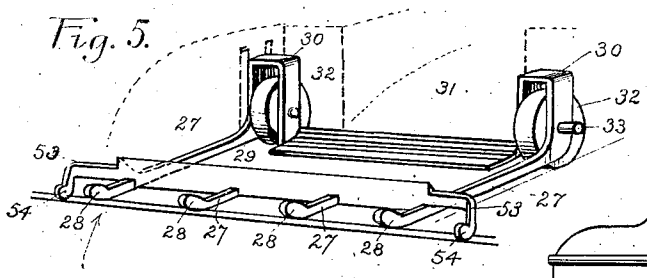
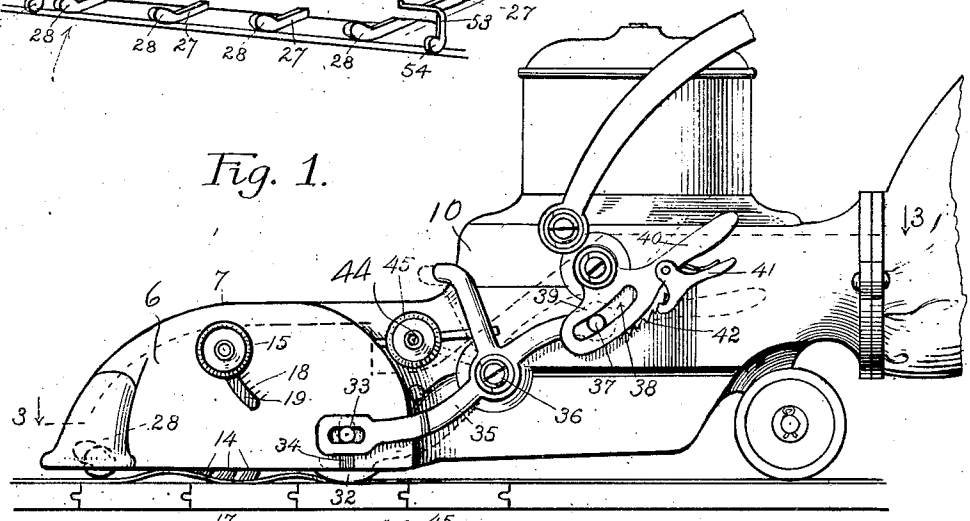


Fig. 1.



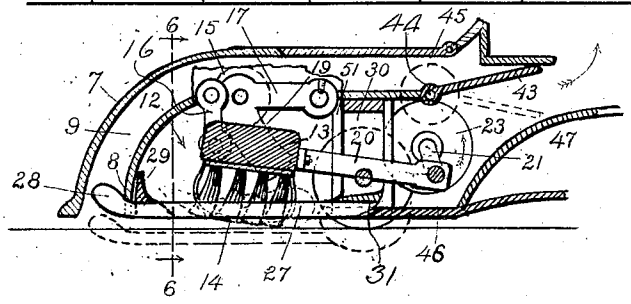


Fig. 2.

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Fig. 3.

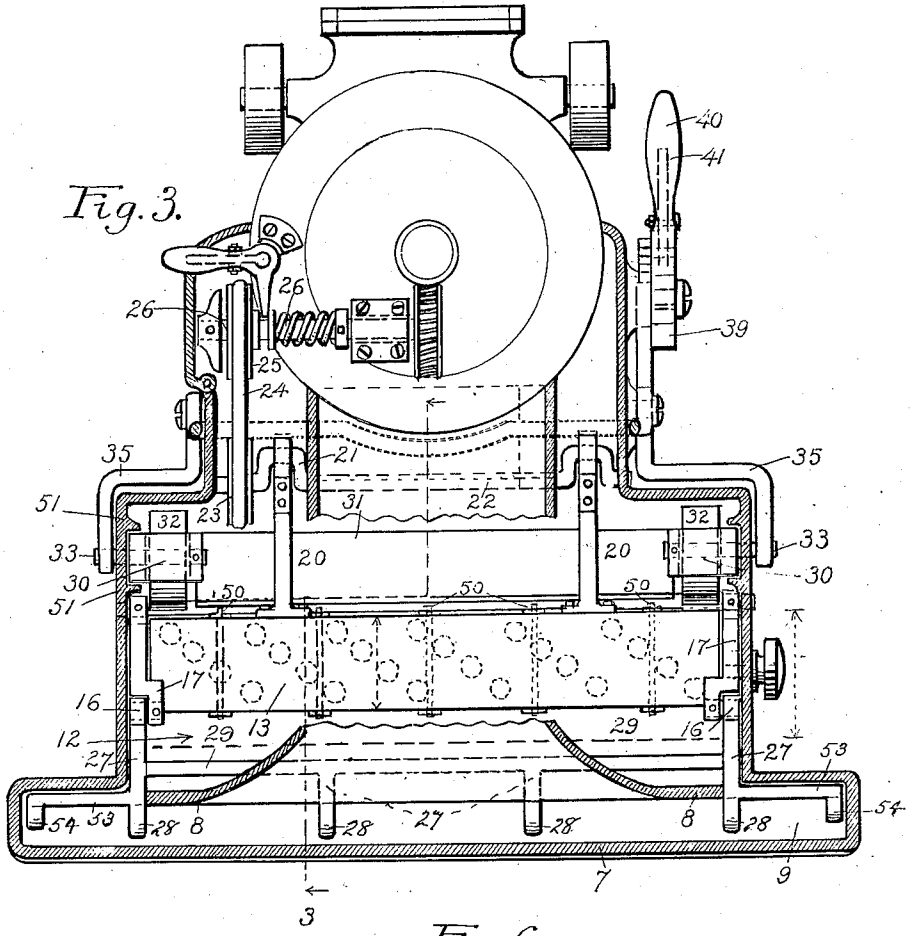
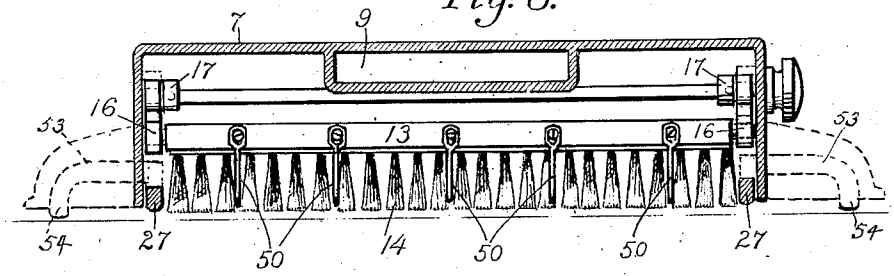


Fig. 6.



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Patented Oct. 16, 1923. 1,470,894

UNITED STATES PATENT OFFICE.

NEWTON A. THROOP, OF CHICAGO, ILLINOIS.

VACUUM CLEANER.

Application filed March 11, 1920. Serial No. 365,036.

To all whom it may concern:

Be it known that I, NEWTON A. THROOP, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Vacuum Cleaners, of which the following is a full, clear, and exact description.

My invention relates to improvements in vacuum cleaners and particularly to such type of cleaners as employ both the inrush of the air and a brush to cleanse rugs, carpets and other surfaces over which it sweeps.

The objects of my invention are, first, to provide a flat brush that can dig into and beat the surface of the material being cleansed at the same time it sweeps or it can be adjusted to just lightly lift the dirt therefrom; second, that can hold down the carpet or run while sweeping so that it will not become choked, and so that the inrush of air into the nozzle of the cleaner will not be obstructed, third, so that the lighter dust and dirt can be lifted and at the same time the brush be depended upon to beat and loosen the more tenaciously adhering particles of dirt and dust and facilitate the removal of the same; fourth, to use the air vacuum and brush in conjunction with a beater, and fifth, that can be used in conjunction with means for adjusting the volume of the inrush of air into the nozzle of the cleaner. These and other objects I accomplish by the means hereinafter described and as particularly pointed out in the claims.

In the drawings:

Figure 1 is a side view of my invention.

Figure 2 is a longitudinal section of the front portion of the same.

Figure 3 is a horizontal section taken on dotted line 3, 3, Figure 1, showing parts of the partition separating the exclusive air intake-passage from the combined air intake and sweeping chamber thereof, so as to expose the mechanism in the latter.

Figure 4 is a perspective view of the brush removed from said cleaner.

Figure 5 is a perspective view of the means for holding down the carpet, removed from the cleaner.

Figure 6 is a transverse vertical section taken on dotted line 6, 6, Figure 2.

The housing 6 of my improved sweeper, up through which the dirt and débris is drawn by the operation of the vacuum creating device, projects out in front of the dome, or other chamber in which said devices are situated, and has the front part of its top 7 curved downward, terminating in a straight transverse front edge. This front edge constitutes the front edge of the transversely elongated mouth of the air inlet-passage 9, which is preferably wider than the housing immediately back of said mouth. The rear wall of the inlet-passage extends from the rear edge 8 of the mouth and said passage gradually narrows and its walls are cast in one piece with the top wall of the housing, as it, the said passage, extends centrally and longitudinally to the rear and discharges into the fan or vacuum chamber 10 of the sweeper.

Immediately back of the mouth of the air inlet the housing is so constructed as to provide a substantially rectangular chamber 12 in which the brush of my improved sweeper is placed. This brush consists of a back 13 that is, preferably, of a transversely elongated rectangular shape, substantially as shown in Figures 3 and 4 of the drawings. This brush has several rows 14, 14, of brush fibers that are arranged obliquely across and project downwardly from the underside of the back, at suitable distances apart, and so that the end of one row will be substantially in the same transverse vertical plane as the opposite end of the next row. The brush is provided with a series of U-shaped beaters 50, consisting of resilient metal strips or wires the ends of which are secured in any suitable manner to the front and rear edges of the back of the brush and which are of such dimensions that the lower horizontal stretches thereof are in a horizontal plane just above the lower ends of the brush fibers. When the brush is in action these beaters beat the fabric, and materially assist in cleansing the same.

This brush is placed in chamber 12 so that its length is transverse to the path of the vacuum cleaner and its ends are suspended by links 16, 16, from the forward ends of the adjustable supporting-frames 17. These supporting-frames consist of longitudinal bars whose rear ends are pivotally connected at their rear ends in any suitable manner to the sidewalls of chamber 12, and the forward ends of said frames 17, are capable of being adjusted up or

down and maintained in their adjusted position by manipulating set-screws 15, that extend out through segmental slots, 18, the curvature of which is struck from the center of the pivot of the rear end of the supporting-frame in the side walls of said chamber 12, and are provided with a milled head on their outer ends. The threaded barrels of screws, 15, extend into supporting-frames 17, which latter are each provided with a downwardly extending segmental shield 19 that is designed to close the slots 18, so as to prevent the suction through the slot interfering with the inrushing air current through the open bottom of said chamber 12.

The brush is reciprocated sidewise towards and from the front of the housing by means of connecting-rods 20, whose rear ends are pivotally connected to the cranks 21 of a crank-shaft 22, the ends of which latter are journaled in the side-walls of the housing immediately to the rear of the point where the housing is narrowed to define the rear wall of chamber 12. Near one end shaft 22 is provided with a concaved sheave 23, which is connected preferably, by means of an elastic belt 24, to a sheave 25, which latter derives motion in any suitable manner by drive-shaft 26 that takes its motion from the fan-shaft.

The operation of the brush is such that during its rearward motion, it digs down into the nap of the rug or carpet which it is sweeping and loosens the same and sweeps the dust and dirt to the rear, but when the brush is moving toward the front of the housing the rear end of the connecting rods 20 will be lifted by the cranks 21 to such an extent that said brush will be lifted off of the carpet or rug, and therefore avoid sweeping the dirt and dust forwards. In other words, the sweeping accomplished by this brush will always be towards the rear.

In order to regulate the distance between the edges of the mouth of the air inlet-passage and the lower edges of chamber 12 from the surface of the carpet or rug that is being swept, and to hold the carpet or rug down a sufficient distance below such edges, a series of equi-distant longitudinal disposed runners 27 are provided, the forward ends of which extend through recesses in the lower edge of the rear wall of the mouth of the air inlet-passage and terminate in shoes 28. These shoes are curved upwards so that when said runners have been lifted to the limit of their upward movement they will have retreated up into the mouth of the air inlet-passage out of the way. Immediately to the rear of the rear wall of the mouth of the air-inlet these runners, 27, are connected by a cross-bar 29. The outer runners extend to the rear of this cross-bar and their rear ends are connected with or merge into the lower ends of the outer branches of inverted U-shaped frames 30, 30. The lower ends of the inner branches of these frames are connected by a transverse strip of metal 31, and it is in the space between this strip and cross-bar 29 that the brush operates. Wheels 32, 32, are loosely mounted on transverse shafts 33, between the branches or legs of the inverted U-frames 30, 30, and the ends of such shafts 33, extend out through vertical slots 34 in the side-walls of the housing, and enter suitable elongated openings in the forward ends of correspondingly curved arms 35, 35, that are connected and project forward from ends of a transverse rock-shaft, 36, so that they move simultaneously and to a corresponding extent. One of these arms extend to the rear of shaft 36 and is provided with an outwardly projecting pin 37, that enters and engages a curved slot 38 in a cam 39, which latter is pivotally connected to the adjacent side walls of the rear extension of the housing of the vacuum cleaner. This cam has a rearwardly extending arm 40 and the underside of said arm has a spring controlled pawl 41 fulcrumed thereto. Pawl 41 is adapted to engage a segmental rack 42 secured to and made integral with the adjacent side of the housing. The slot 38 is struck from a center eccentric to the fulcrum of the cam, so that when the foot of the operator is pressed down upon arm 40, the wheels 32, 32, and runners 27, 27, will be raised, and the vacuum cleaner lowered accordingly as desired, to decrease the circulation of air at the mouth of the air inlet-passage and into the open bottom of the brush chamber 12.

The outer legs of the U-shaped frames engage guideways made by providing the inner surface of chamber 42 with suitable spaced apart vertical ribs 51, 51, and thus insure the runners always remaining in a horizontal position as they are raised and lowered.

The portion of the bottom of the inlet-passage 9 extending to the rear of the vertical transverse plane of shaft 22, comprises a damper 43, which consists of a flat horizontal plate, the forward edge of which is hinged to the rear edge of said bottom by the transverse pintle 44 of a suitable hinge. This pintle 44 extends beyond the side walls of the housing and has a suitable button 45 on its outer end with which to turn it. The chamber 12 below the shaft 22 has a bottom 46 that has an upwardly and rearwardly curved extension 47 which latter had its upper rear edge suitably connected to the bottom of the vacuum chamber, and this bottom 46 and its extension form a dust pan, as it were, that directs the sweepings of the brush up through the opening covered by said damper. The rear edge of the damper

43, when it is closed, rests upon the transverse ridge or prominence made by the joinder of extension 47.

When the damper is closed the dust or débris will not be drawn into the vacuum chamber of the cleaner, but when said damper is open said dust and débris will be swept up through the opening controlled by the damper, into the vacuum chamber, and at the same time the suction through the inlet-passage 9 will draw the loose dust up into and through it to said chamber.

If desired the ends of the cross-bar 29 may extend beyond the outside runner 27 and then bent downwards to form elbows 53, the lower extremities of which are formed into forwardly projecting flanking shoes 54, the under edges of which are slightly lower than the under edges of shoes 28, and thus always insure a certain inrush of air into the air inlet, no matter to what position the shoes 28 may be adjusted, substantially as shown in Figures 5 and 6 of the drawings.

What I claim as new is:

1. In a vacuum cleaner, mechanism for creating a vacuum, a brush reciprocal in the direction of the movement of the cleaner independently of the frame of the same which sweeps the surface being cleaned when moving in one direction and is lifted therefrom when moving in the opposite direction and means actuated by said mechanism for reciprocating and raising said brush.

2. The combination with a vacuum cleaner including mechanism for creating a vacuum carried on a frame, of means for sweeping comprising a brush reciprocating independently of said cleaner frame but in a path coincident with the path of movement of the cleaner, said brush having a sweeping action diagonal to the path of travel of the cleaner, and means for imparting vertical movement to the brush simultaneously with reciprocation in one direction only.

3. In a vacuum cleaner, a housing having an inlet-passage for the production of air suction only, a sweeping chamber separate from and having suction independently of said passage but adjacent thereto, a vacuum chamber into which both said passage and sweeping chamber independently discharge, a reciprocal brush operating in said sweeping chamber, and means for controlling the suction to said sweeping chamber and inlet-passage.

4. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, having an inlet separate from but adjacent to said passage, a vacuum chamber into which both said passage and said sweeping chamber independently discharge, and a series of vertically adjustable longitudinally disposed runners for regulating the distance between the underside of said cleaner and the supporting surface of the same to control the inrush of air into said passage and sweeping chamber.

5. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed runners extending forward from said sweeping chamber into said inlet-passage and terminating therein and devices for adjusting said runners up or down to regulate the distance between the underside of said cleaner and the supporting surface of the same.

6. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed runners extending forward from the sweeping chamber through recesses in the rear edge of the mouth of said air inlet-passage and terminating in upwardly curved shoes in said passage, and devices for adjusting said runners up or down to regulate the distance between the underside of said cleaner and the supporting surface of the same.

7. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed runners, a transverse member in said sweeping chamber to which the rear ends of said runners are secured and means for moving said runners up and down for regulating the distance between the underside of said cleaner and the supporting surface of the same.

8. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed runners, a transverse member within said sweeping chamber to which runners are secured and which has its ends projecting out through slots in the side-walls of said chamber, and means engaging the said ends adapted to move said member and runners up and down to regulate the distance between the underside of said cleaner and the supporting surface of the same.

9. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed run-

ners, a transverse member in said sweeping chamber to which the rear ends of said runners are secured, castors on the free ends of said member for supporting the same and means for moving said runners up and down for regulating the distance between the underside of said cleaner and the supporting surface of the same.

10. In a vacuum cleaner, a housing having an air inlet-passage for the products of air suction only, a separate sweeping chamber, a vacuum chamber into which both said passage and said sweeping chamber discharge, and a series of longitudinally disposed runners, a transverse member within said sweeping chamber to which runners are secured, and which has its ends projecting out through slots in the side-walls of said chamber on the free ends of said member, castors within said chamber for supporting the same, and means engaging the said ends adapted to move said member and runners up or down to regulate the distance between the underside of said cleaner and the supporting surface of the same.

11. In a vacuum cleaner, the combination with a vacuum chamber, of a reciprocating brush, wholly within the chamber, means for suspending the brush from one point in said chamber and at another point at the rear thereof, and means for reciprocating the brush.

12. In a vacuum cleaner, the combination with a vacuum chamber, of a reciprocating brush, a swinging support at both front and rear for suspending the brush, and means for reciprocating said brush.

13. In a vacuum cleaner, the combination with a housing having an inlet-passage for the products of air suction only, and a separate chamber located to the rear of the mouth of said passage, of a non-rotatable brush in said chamber, means for suspending the same, a transverse shaft having a crank, a rod connecting said crank and brush, and a plurality of longitudinally disposed runners extending forward from said chamber under said brush into the mouth of said inlet passage.

14. In a vacuum cleaner, the combination with a housing having an inlet-passage for the products of air suction only, and a separate chamber located to the rear of the mouth of said passage, of a non-rotatable brush in said chamber, means for suspending the same, a transverse shaft having a crank, a rod connecting said crank and brush, and a plurality of vertically adjustable longitudinally disposed runners extending forward from said chamber under said brush into the mouth of said inlet-passage.

15. In a vacuum cleaner, a vacuum chamber, a reciprocal brush means for actuating said brush to sweep the surface being cleansed in the direction of the movement of the cleaner, when moving in one direction and for lifting said brush therefrom when moving in the opposite direction, and vertically movable beaters carried by the brush that engage said surface during the operation of said brush.

16. In a vacuum cleaner, a vacuum chamber, a reciprocal brush, means for actuating said brush to sweep the surface being cleansed in the direction of the movement of the chamber, when moving in one direction and for lifting said brush therefrom when moving in the opposite direction, and resilient beaters attached to said brush that engage said surface during the operation of the same.

17. In a vacuum cleaner, a vacuum chamber, a reciprocal brush, means for actuating said brush to sweep the surface being cleansed in the direction of the movement of the cleaner, when moving in one direction and for lifting said brush therefrom when moving in the opposite direction, and resilient U-shaped beaters the ends of which are attached to the sides of said brush and engage said surface during the operation of the same.

18. The combination with a vacuum cleaner, a housing having an inlet-passage for the products of air suction only, and a separate chamber located to the rear of the mouth of said passage, of a non-rotatable brush in said chamber, means for suspending the same, a transverse shaft having a crank and a rod having rigid connection with said brush and connected to said crank.

19. In a vacuum cleaner, the combination with a housing having an inlet-passage for the products of air suction only, and a separate chamber located to the rear of the mouth of said passage, of a non-rotatable brush in said chamber, vertically adjustable means for suspending the same, a transverse shaft having a crank and a rod connecting said crank and brush.

20. In a vacuum cleaner having vacuum and sweeping chambers, a non-rotatable brush in the sweeping chamber, a rocking-link for suspending the brush within said sweeping chamber, a crank shaft, and means rigidly connected to the brush and to said crank shaft.

21. In a vacuum cleaner having vacuum and sweeping chambers, a non-rotatable brush in the sweeping chamber, a link suspending said brush within said sweeping chamber, a crank-shaft, and a connecting rod rigidly connected to said brush and operated by said crank-shaft.

22. In a vacuum cleaner, a housing having an air-inlet passage for the products of air suction only and provided with a mouth engaging the surface to be cleaned, a separate sweeping chamber adjacent said mouth but having an independent inlet, a

vacuum chamber into which both said passage and said sweeping chamber independently discharge, and means adjacent said mouth and sweeping chamber for varying the distance between the same and said surface.

In witness whereof I have hereunto set my hand and seal this 1st day of March, 1920.

NEWTON A. THROOP.

Witnesses.
FRANK D. THOMASON,
VIOLET WARDELL.