Feb. 28, 1933. F. RIEBEL, JR 1,899,108

VACUUM CLEANER

Filed Dec. 2, 1929

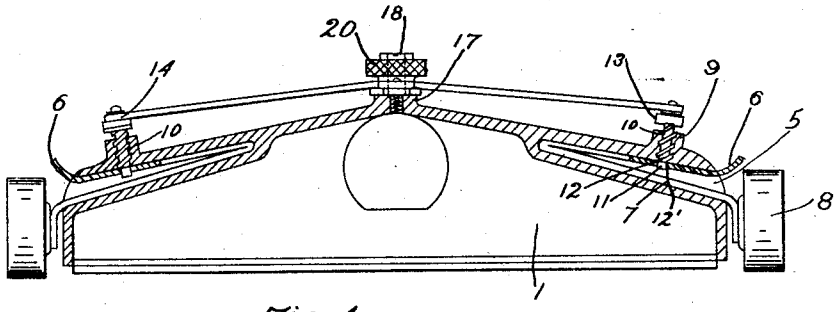


Fig. 1

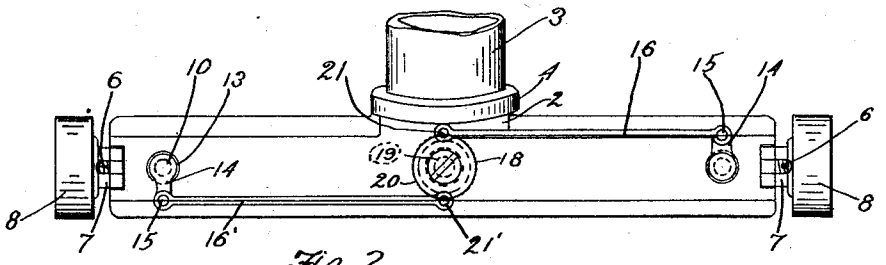


Fig. 2

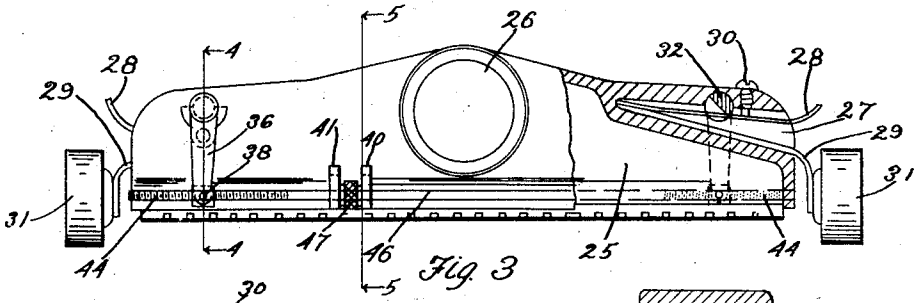


Fig. 3

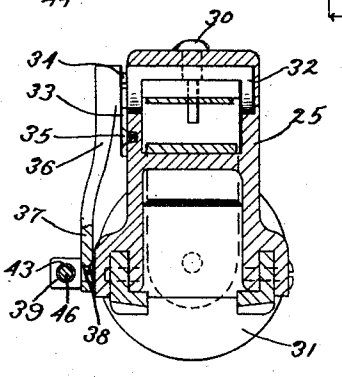


Fig. 4

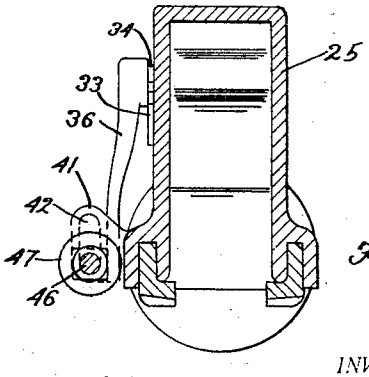


Fig. 5

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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

Application filed December 2, 1929. Serial No. 410,988.

The present invention relating, as indicated, to vacuum cleaners has more specific reference to the suction nozzle commonly employed in connection with such cleaners and specifically to means for adjusting the position of the nozzle with respect to the surface to be cleaned as the vacuum cleaner is moved over such surface in the course of its operation.

It is common knowledge to those acquainted with the art that the vertical position of the suction slot in the suction nozzle with respect to the surface to be cleaned should be varied to correspond to the characteristics of such surface since the distance which the suction slot of the nozzle is away from the floor surface will be different for a hard surface, such as linoleum, than when the suction nozzle is run over the surface of a thick pile carpet or rug. In addition to the provision of means for so adjusting the suction nozzle, it is essential to the efficient operation of the machine that both ends of the nozzle have the same relative position with respect to the surface to be cleaned. Not only is it desirable that both sides of the nozzle be readily adjustable to present the respective ends of the nozzle at equal distances from the floor surface, but an adjustment means in order to be readily adaptable for use in the hands of an inexperienced operator shall be capable of making the above described adjustments simply and without any knowledge on the part of the operator as to the particular mechanics by which the equalized adjustment is obtained.

It is an object of my invention to provide a means whereby the vertical adjustment of the suction nozzle of a vacuum cleaner with respect to the surface to be cleaned can be accomplished more expediently and with greater degree of accuracy than has heretofore been possible with constructions in common use. It is a further object of my invention to provide a means whereby the adjustment of both ends of the suction nozzle with respect to the surface to be cleaned will be the same regardless of the vertical distance through which such an adjustment may be made.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a part section, part elevation of a suction nozzle for a vacuum cleaner embodying one form of my invention; Fig. 2 is a fragmentary plan view of the nozzle shown in Fig. 1; Fig. 3 is a part section, part elevation of a suction nozzle showing another form of my invention; Fig. 4 is a transverse section of the nozzle illustrated in Fig. 3, taken on the plane substantially indicated by the lines 4—4; and Fig. 5 is a transverse section of the nozzle illustrated in Fig. 3, taken on the plane substantially indicated by the lines 5—5.

Referring more specifically to the drawing and more especially to Fig. 1, the nozzle here illustrated consists of a main body 1 which has integrally united therewith a tubular member 2 which is adapted to be removably secured to the tubular member 3 by means of the collar 4. The body 1 of the nozzle has sockets 5 formed in the terminal portions thereof, which sockets are adapted to receive the tangs 7 and leaf springs 6 forming the resilient mountings for the wheels 8, as set forth in my copending application Ser. No. 342,979, filed February 27, 1929. The main body 1 has bosses 9 formed integrally therewith and adjacent the sockets 5, which bosses 9 have sockets formed therein which are internally threaded and adapted to receive the screws 10. The screw 10 has a reduced end 11 which passes through the aperture 12′ formed therefor centrally in the upper tang 6 of the wheel mountings. The reduced end 11 of the screw 10 forms a shoulder 12, the diameter of which is greater than the diameter of the aperture 12′ so that the body of the screw 10 rests upon the upper

surface of the spring 6 and when the screw is moved into the socket 5, the spring 6 will be placed under tension.

The screw 10 has its upper terminal portion 13 formed with an arm 14 which carries a pin 15 and to which is pivotally secured the adjusting rod 16. Centrally of the main body 1 of the suction nozzle is a projecting boss 17 in which is mounted the supporting screw 18 on which is journalled the collar 19. Collar 19 has a portion 20 thereof formed into a knurled knob by means of which the collar 19 may be turned on the supporting screw 18. Collar 19 has projections 21 and 21′ integrally formed therewith which are adapted to secure one end of the adjusting rods 16 and 16′.

Referring more specifically to Fig. 3, the suction nozzle and its associated wheel mountings here shown, in which the main body 25 of the nozzle has a substantially cylindrical projection 26 extending therefrom and which has sockets 27 formed in the terminal portions of the nozzle body, which sockets are adapted to receive the tangs 29 and leaf springs 28 which are secured therein by means of the screws 30, will be better understood in connection with my co-pending application Ser. No. 391,123, filed September 9, 1929.

The resilient tangs 29 and springs 28 which form mountings for the wheels 31, which carry the suction nozzle over the surface to be cleaned, are adjusted by the cam element 32 which is journaled in the walls of the suction nozzle 25, this last-named adjusting means forming the subject matter of the last co-pending application referred to above. The cam element 32 is secured in the walls of the suction nozzle by means of the securing plate 33 engaging the circumferential groove 34 formed on the cam element adjacent the outer surface of one wall of the suction nozzle. The securing plate 33 is removably secured to the wall of the suction nozzle by means of the screw 35. The cam element 32 has integrally formed therewith the depending arm 36 which at its lower end 37 carries the pin 38 which revolubly supports the block 39.

The suction nozzle wall has integrally formed therewith, or otherwise rigidly secured thereto, projecting ears 40 and 41 which have elongated apertures 42 formed therein and extending substantially vertically of the supporting ears 40 and 41. The blocks 39, which are revolubly mounted on the pins 38 and thereby secured to the terminal portions 37 of the arms 36, have threaded apertures 43 extending centrally therethrough, which threaded apertures are adapted to threadably engage the threaded terminal portions 44 and 45 of the rod 46. The rod 46 passes through the apertures 42 in the members 40 and 41, and rigidly secured to the rod intermediately of the supporting members 40 and 41 is a preferably knurled collar 47, by means of which the rod 46 may be rotated. The operation of the various forms of my invention will now be briefly described.

When the suction nozzle is run over a surface to be cleaned which is of the type necessitating a change in the distance between the suction slot and the surface over which the tool passes from the distance at which the wheels are normally maintained the screws 10, as illustrated in Fig. 1, may be rotated in a clockwise direction, and being so rotated will pass downwardly through the threaded boss 9 and depress the spring 6 of the mountings for the wheels 8. As the tension between the tangs 7 and springs 6 is increased the weight of the cleaner resting on the wheels 8 will force the suction nozzle a greater distance from the floor than when the tension between the tangs 7 and springs 6 is less. The projecting reduced end 11 of the screw 9 which extends through the aperture 12 in the tang 6 will prevent an excessive upward movement of the spring 7 and therefore materially assists in maintaining the proper relation between the suction slot and the surface to be cleaned. As hereinbefore explained, for the efficient operation of the suction tool it is essential that the vertical adjustment for both supporting wheels be the same in order to insure a uniform passage of the suction slot over the floor surface. This simultaneous adjustment of the screws 10, by means of which the distance between the suction slot and the floor is controlled, is effected by means of the adjusting arms 16 and 16′ which are connected to the knurled adjusting screw 20. By turning the screw 20, either clockwise or counterclockwise, by hand or like means, the screws 10 can be simultaneously caused to respectively descend or elevate in the threaded bosses 9 and thereby effect a simultaneous like adjustment of both wheel supporting means.

In the form of adjusting means for the wheel mountings as illustrated in Figs. 3, 4 and 5 the cam element 32, upon being rotated, will depress the spring 28 of the wheel mountings for the wheel 31 and effect adjustment similar to that hereinbefore described in connection with the mechanism illustrated in Figs. 1 and 2. In order to accomplish a simultaneous and like adjustment of the supporting means for both wheels of the suction nozzle illustrated in Figs. 3, 4 and 5 a rotation of the knurled collar 47, which may be effected by hand or otherwise, will rotate the rod 46 which, through its threaded engagement with the blocks 39, will simultaneously move each of the arms 36 a like amount. It will be noted in this connection that the members 40 and 41 serve as lateral supporting means for the collar 47 and maintain the arms 36 in the position to which they have been moved by the actuation of the ad-

justing rod 46. The direction in which the faces of the cams 32 are disposed with respect to the tangs 28 will govern the direction of the slope of the threads on the threaded terminal portions 44 of rod 46. If the cam faces are arranged as illustrated in Fig. 3 the slope of the threads on the threaded portion of the rod 46 will be such as to effect a depression of the tangs 28, the rod 46 will preferably be rotated in a counter-clockwise direction, the thread on the left-hand terminal portion of the rod 46 will be a right-hand thread and that on the right-hand terminal threaded portion of the rod 46 will be a left-hand thread, so that upon clockwise rotation of the rod 46 the blocks 39 will be moved toward each other to effect a simultaneous and like adjustment of the wheel mountings.

It will be seen that the mechanisms comprising my invention provide a means for simultaneously adjusting the wheel mountings of the suction nozzle which control the distance between the suction slot and the surface over which the cleaner is operated, and having effected this adjustment will positively maintain same until changed by the operator actuating one of the described adjusting means.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a vacuum cleaner, a floor tool, individual resilient supporting devices mounted on said tool near the respective ends thereof, said devices each having a projecting movable wheel carrying part, floor wheels journalled on said parts, an adjusting screw engaged between a portion of a respective supporting device and an adjacent portion of the floor tool threadably associated with one of said portions and engaged against the other so as to carry the weight of the floor tool to said device, a resilient portion of each device being interposed between its adjusting screw and its respective floor wheel and carrying the weight of the floor tool to said wheel, and means for simultaneously rotating said adjusting screws.

2. In a vacuum cleaner, a floor tool having end sockets, individual supporting means mounted in the respective sockets, said supporting means having arcuately movable wheel carrying parts extending outwardly beyond the sockets, individual adjustment devices mounted in the respective sockets and engaging the respective supporting means for adjustably controlling the arcuate movement thereof and means for simultaneously actuating said devices.

3. In a vacuum cleaner, a floor tool, individual supporting devices mounted thereon near the respective ends thereof, each having a projecting wheel carrying part, floor wheels journalled on the respective parts, adjustment devices journalled in the floor tool, each having a non-cylindrical portion engaging a respective supporting device and adapted, when rotated, to vary the position of the supporting device relative to the floor tool, and means for simultaneously rotating said adjustment devices.

4. In a vacuum cleaner, a floor tool, a floor wheel, a resilient supporting device mounted on the floor tool, said device having a projecting, movable part on which said wheel is journalled, and an adjusting screw engaged between a portion of said device and an adjacent portion of the floor tool, threadably associated with one of said portions, and engaged against the other so as to carry the weight of the floor tool to said device, a resilient portion of said device being interposed between said adjusting screw and the floor wheel and carrying the weight of the floor tool to said wheel.

5. In a vacuum cleaner, a floor tool, a support wheel, a tang on which said wheel is journalled, a leaf spring secured to said tang at one end and spaced therefrom at a distance from said end, said tang and leaf spring constituting a mounting which is fulcrumed relative to the floor tool at the end where said tang and spring are secured together, and an adjusting screw engaged between the spaced portion of said spring and an adjacent portion of the floor tool, said screw being threadably associated with one of said portions and engaged against the other so as to carry the weight of the floor tool to said device.

6. In a vacuum cleaner, a floor tool, a floor wheel, a resilient mounting on which said wheel is journalled, said mounting including a leaf spring fulcrumed at its end remote from the wheel, relative to the floor tool, and an adjusting screw engaged between a portion of said spring and an adjacent portion of the floor tool, and threadably associated with one of said portions and engaged against the other so as to carry the weight of the floor tool to said device.

7. In a vacuum cleaner, a floor tool, a supporting wheel, a tang on which said wheel is journalled, a leaf spring secured to said tang at one end and spaced therefrom at its other end, said tang and leaf spring constituting a mounting which is fulcrumed relative to the floor tool at the end where said tang and spring are secured together, and an adjusting screw interposed between said spring and the floor tool, the spring having an opening and the adjusting screw having a reduced end received in said opening and a shoulder en-

gaging the spring, and being threadably associated with the floor tool.

8. In a vacuum cleaner, a floor tool, a supporting wheel, a resilient mounting on which said wheel is journalled, said mounting including a leaf spring, being fulcrumed at a point remote from the wheel, relative to the floor tool, said spring having an opening at a distance from said fulcrum point, and an adjusting screw threadably associated with the floor tool and provided with a reduced end received in said opening and a shoulder engaging the spring.

9. In a vacuum cleaner, a floor tool, a supporting wheel, a resilient mounting on which said wheel is journalled, said mounting including a leaf spring fulcrumed at its end remote from the wheel, relative to the floor tool, and an adjusting screw threadably associated with the floor tool and engaging said leaf spring.

10. In a vacuum cleaner, a floor tool having a socket, a supporting wheel, a tang on which said supporting wheel is journalled, said tang being received in the socket and its end remote from the wheel being fulcrumed in the end of the socket, an adjusting screw threadably mounted in the floor tool, and resilient means interposed between said adjusting screw and said tang.

11. In a vacuum cleaner, a floor tool having a socket, a supporting wheel, a tang on which said wheel is journalled, said tang being received in said socket and its end remote from the wheel being fulcrumed against the end of the socket, an adjusting screw threadably mounted in the floor tool and projecting into said socket and a leaf spring secured to said tang at one end and at its other end spaced from the tang and engaging said adjusting screw.

12. In a vacuum cleaner, a floor tool, floor wheels, individual resilient supporting means on which said wheels are journalled, said means being movably mounted on the floor tool near its respective ends, individual adjusting devices engaging the respective supporting means and carrying the weight of the floor tool to said supporting means, resilient portions of said supporting means being interposed between the adjusting devices and the wheels whereby the floor tool is resiliently carried by the floor wheels in a series of normal riding positions determined by the positions of adjustment of said adjusting devices and the existence of a balance between the weight of the cleaner and the tension of the resilient supporting means when flexed under said weight, and means for simultaneously actuating said adjustment devices.

13. In a vacuum cleaner, a floor tool, floor wheels, individual resilient supporting means on which said wheels are journalled, said means being movably mounted on the floor tool near its respective ends, individual adjusting devices rotatably mounted in the respective end portions of the tool, and including movable portions engaging the respective supporting means in positions of adjustment variable under rotation of said devices, and carrying the weight of the floor tool to said supporting means, whereby the floor tool is resiliently carried by the floor wheels in a series of normal riding positions determined by the positions of adjustment of said adjusting devices and the existence of a balance between the weight of the cleaner and the tension of the resilient supporting means when flexed under said weight, said adjusting devices having axial portions projecting from the floor tool, lever arms secured to said axial portions, and means for swinging said arms, comprising a handle element mounted on a shaft extending between said arms and threaded at its ends, and blocks threaded upon said threaded ends and pivoted to said arms, whereby rotation of the shaft will cause said blocks to move longitudinally of the shaft, thereby swinging the arms.

14. In a vacuum cleaner, a floor tool, floor wheels, individual resilient supporting means on which said wheels are journalled, said means being movably mounted on the floor tool near its respective ends, individual adjusting devices rotatably mounted in the respective end portions of the tool, and including movable portions engaging the respective supporting means in positions of adjustment variable under rotation of said devices, and carrying the weight of the floor tool to said supporting means, whereby the floor tool is resiliently carried by the floor wheels in a series of normal riding positions determined by the positions of adjustment of said adjusting devices and the existence of a balance between the weight of the cleaner and the tension of the resilient supporting means when flexed under said weight, said adjusting devices having axial portions projecting from the floor tool, lever arms secured to said axial portions, and means for swinging said arms, comprising a handle element rotatably mounted on the floor tool intermediate said arms, and links pivoted to the handle element and to the respective lever arms and arranged to transmit turning movement of the handle to the arms to swing the same.

Signed by me, this 26th day of November, 1929.

FREDERICK RIEBEL, JR.