

May 12, 1942.

R. E. DUNBAR

2,282,950

VACUUM CLEANER

Filed Feb. 16, 1938

2 Sheets-Sheet 1

Fig. 1.

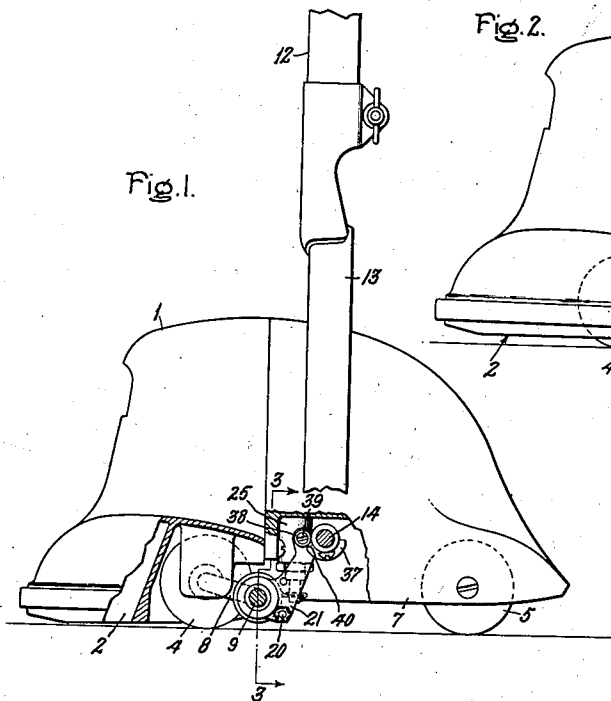


Fig. 2.

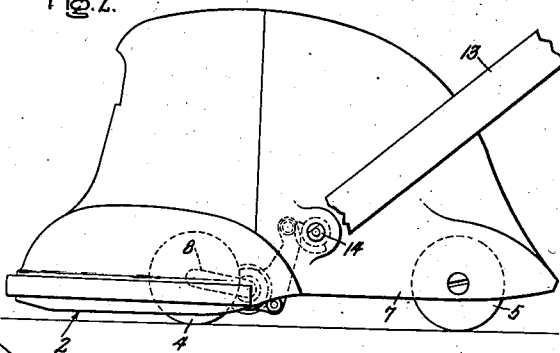


Fig. 3.

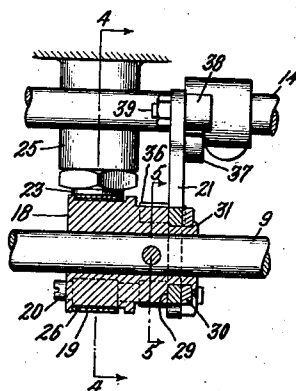


Fig. 4.

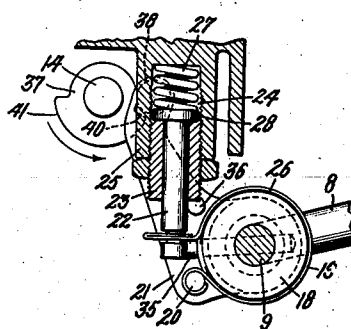


Fig. 6

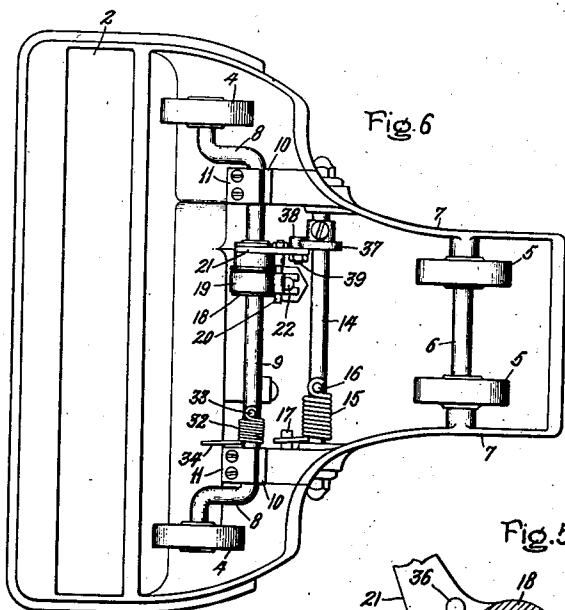
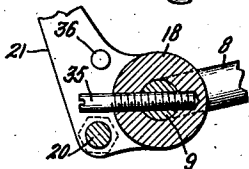


Fig. 5.



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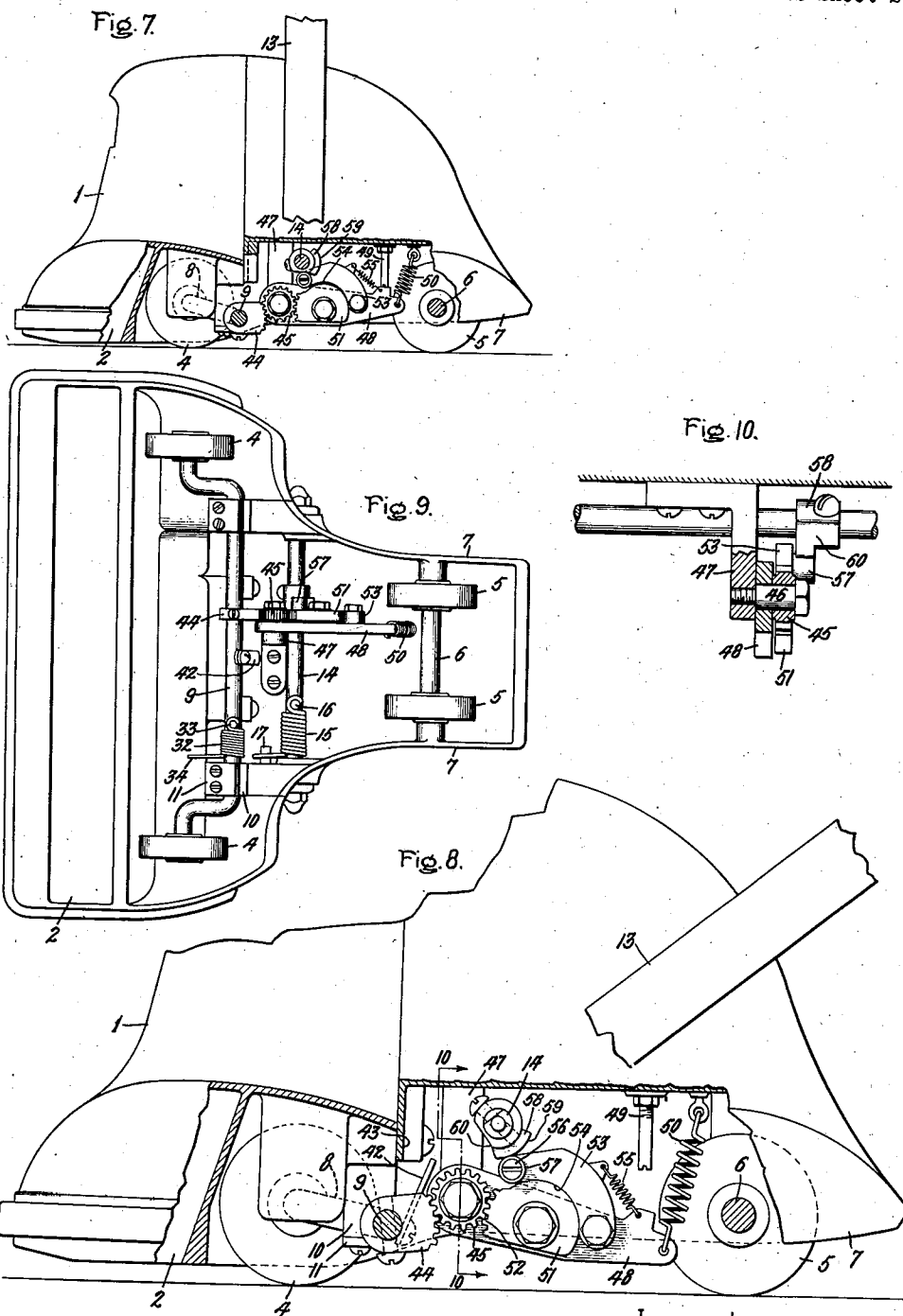
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VACUUM CLEANER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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VACUUM CLEANER

Ralph E. Dunbar, East Cleveland, Ohio, assignor
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Application February 16, 1938, Serial No. 190,790

9 Claims. (Cl. 15-16)

The present invention relates to floor type vacuum cleaners, and in particular to an arrangement for adjusting the height of the suction nozzle.

In cleaners of this type the nozzle is supported on a carriage having supporting wheels or other surface engaging supporting elements which support the cleaner on the surface being cleaned. When used on floor coverings the wheels sink into the nap of the floor covering and unless some change is made in the nozzle adjustment the nozzle will be too high when used on floor coverings having a short or stiff nap and too low when used on floor coverings having a long or soft nap. For ideal operation the nozzle should be supported a fixed distance above the surface of the nap of the floor covering. The floor covering will then be drawn up against the suction nozzle and subjected to nearly constant suction.

The object of my invention is to provide an improved construction and arrangement for adjusting the suction nozzles of floor type vacuum cleaners, and for a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawings, Fig. 1 is a side elevation, partly broken away, of a vacuum cleaner embodying my invention, the cleaner being shown in the inoperative position in which the suction nozzle is lowered against the surface of the nap on the floor covering; Fig. 2 is a side elevation of the cleaner, the cleaner being in the operative position with the suction nozzle raised a fixed distance above the surface of the nap of the floor covering; Fig. 3 is a sectional view taken on line 3-3 of Fig. 1; Fig. 4 is a sectional view taken on line 4-4 of Fig. 3; Fig. 5 is a sectional view taken on line 5-5 of Fig. 3; Fig. 6 is a bottom plan view of the cleaner; Fig. 7 is a side elevation, partly broken away, of a modification, the cleaner being in the inoperative position in which the nozzle is lowered against the surface of the nap of the floor covering; Fig. 8 is a view similar to Fig. 7 with the cleaner in the operative position in which the nozzle is raised a fixed distance above the surface of the nap of the floor covering; Fig. 9 is a bottom plan view; and Fig. 10 is a sectional view on line 10-10 of Fig. 8.

Referring to the drawings, there is shown a vacuum cleaner having a casing 1 having an integral suction nozzle 2 at the front through which dust-laden air is drawn by a motor driven fan mounted within the casing. The dust-laden air is discharged through a duct 3 at the rear

as a bag (not shown). The cleaner is supported by front supporting wheels 4 and rear supporting wheels 5. The rear supporting wheels are journaled on a shaft 6 extending between and fixed to the rear walls 7 of the cleaner casing. The front supporting wheels are journaled on the offset ends 8 of a rock shaft 9 rotatably held in bosses 10 on the under side of the cleaner casing by plates 11. The front and rear supporting wheels and the supports therefor comprise a carriage on which the cleaner is supported. The cleaner is moved over the surface being cleaned by a handle 12 having a fork 13 fixed to a shaft 14 journaled in the walls 7 of the cleaner casing. A coil spring 15 arranged around the shaft 14 and having its ends bearing on a stop 16 on the shaft and a stop 17 on the cleaner casing biases the handle to the vertical position shown in Fig. 1. When the handle is released by the operator, it is urged toward the vertical position by the spring 15. During the normal use of the cleaner the handle extends angularly from the cleaner at a position between the horizontal and the vertical convenient to the operator.

The rock shaft 9 carrying the front supporting wheels 4 has a releasable connection with the vacuum cleaner casing which comprises a brake drum 18 pinned to the shaft 9 and a brake band 19 having one end connected to a pin 20 on a bell crank lever 21 and the other end connected to a plunger 22 slidable in a sleeve 23 threaded into a recess 24 in a boss 25 of a vacuum cleaner casing. The brake band, due to its inherent resilience, is biased to a position spaced from the brake drum. To increase the friction between the brake band and the brake drum a strip 26 of friction material is arranged therebetween. The brake band is tightened by movement of the pin 20 in a clockwise direction, as viewed in Fig. 4. The tension in the brake band is limited by a compression spring 27 arranged between the bottom of the recess 24 and the head 28 of the plunger 22. When the tension on the brake band exceeds the pressure exerted by the spring 27 the plunger 22 slides upward in the sleeve 23 to relieve the tension in the brake band. The head 28 of the plunger normally rests against the upper end of the sleeve 23. The bell crank lever 21 is loosely pivoted on the brake drum 18 between a shoulder 29 on the brake drum and a washer 30 which is held in place by a spunover portion 31. When the lever 21 occupies the position shown in Fig. 4 the

is accordingly free to turn relative to the brake band.

The rock shaft 9 is biased in a counterclockwise direction, as viewed in Fig. 1 (a clockwise direction as viewed in Figs. 4 and 5), by a coil spring 32 on the shaft having one end hooked over a pin 33 on the shaft and having its other end bearing against the under side of the cleaner casing at 34. The counterclockwise movement of the shaft 9 is limited by engagement of a pin 35 threaded through the shaft and brake drum (Fig. 5), with a pin 36 fixed in the lever 21. The torque exerted on the pin 36 by the pin 35 is insufficient to tighten the brake band 19.

The brake band 19 is tightened on the brake drum 18 by a cam 37 fixed to the shaft 14. The cam engages a roller 38 rotatably mounted on a stud 39 on the upper end of the bell crank lever 21. When the handle is in the vertical position, shown in Fig. 1, the cam is out of contact with the roller. As the handle is moved in a clockwise direction, as viewed in Fig. 1 (a counterclockwise direction as viewed in Fig. 4), the shoulder 40 on the cam contacts the roller and pivots the lever 21 in a counterclockwise direction about the shaft 9. The pivotal movement of the lever 21 continues until the roller rests against the cylindrical surface 41 of the cam. During the initial part of the pivotal movement of the lever 21 the brake band 19 is tightened against the brake drum 18, locking these parts together. During the succeeding portion of the pivotal movement of the lever 21 the brake band, the brake drum and the rock shaft 9 are rotated as a unit through a fixed angle. This angle is chosen so that the front supporting wheels 4 will be lowered with respect to the vacuum cleaner casing by an amount sufficient to raise the vacuum cleaner nozzle a predetermined distance. When the roller 38 rests on the cylindrical surface 41 of the cam, the parts are held in a fixed position. In this position the handle is inclined rearwardly from the cleaner at an angle between the horizontal and the vertical. The extent of the cylindrical portion 41 of the cam is such that the handle may occupy positions convenient to the operator between the horizontal and a nearly vertical position without changing the position of the lever 21.

In the use of the nozzle adjustment the handle 12 is moved to the vertical position, shown in Fig. 1. In this position the cam 37 is out of contact with the roller 38 and the brake band 19 is released from the brake drum 18. The vacuum cleaner casing now pivots downwardly about the rear supporting wheels 5 until the lips of the suction nozzle 2 rests on the surface of the nap of the floor covering being cleaned. The downward movement of the suction nozzle is partially resisted by the coil spring 32 which tends to move the front supporting wheels 4 downward with respect to the vacuum cleaner casing. The strength of the spring 32 is such that the front supporting wheels 4 sink into the carpet substantially the same amount as when the cleaner is in use. The fact that the lips of the suction nozzle do not sink substantially into the nap of the floor covering is due in part to the relatively great area of the nozzle lips as compared to the area of the supporting wheels and in part to the fact that the coil spring 32 partially balances the downward force exerted by the suction nozzle. When in this position the supporting wheels sink into the nap of the floor covering a distance substantially equal to that

present during the normal use of the cleaner and the lips of the suction nozzle 2 rest substantially on the surface of the nap of the floor covering.

To effect the proper adjustment of the suction nozzle, the handle 12 is moved in a clockwise direction from the position shown in Fig. 1 to the position during normal use of the cleaner in which it extends at an angle between the horizontal and vertical. This movement of the handle turns the shaft 14 and thereby turns the cam 37 moving the shoulder 40 into engagement with the roller 38 and moving the lever 21 in a counterclockwise direction, as viewed in Fig. 1 (a clockwise direction as viewed in Fig. 4) so as to tighten the brake band 19 against the brake drum 18. The initial part of the movement of the lever 21 locks the brake band and brake drum together. After tightening the brake band the lever 21 and the shaft 9 are locked together. During the succeeding part of the movement of the cam 37, i. e., while the cylindrical surface 41 of the cam is being brought into engagement with the roller, the lever 21 is given an additional pivotal movement which turns the shaft 9 through an angle sufficient to raise the suction nozzle a fixed amount. During the normal use of the cleaner the roller 38 rests on the cylindrical surface 41 and the nozzle is held in the adjusted position.

When the cleaner is to be moved to a different type of floor covering the nozzle adjustment may be changed by moving the handle from and returning it to the normal position during use as described above.

In the modification shown in Figs. 7 to 10 inclusive the vacuum cleaner casing, the supporting wheels and the handle are of the same construction as in the previously described construction. Corresponding parts are indicated by the same reference numerals. The modification uses a different connection between the handle and the front supporting wheels for automatically raising the suction nozzle a fixed distance above the nap of the carpet when the handle is moved to its normal position during use.

As in the previously described construction, the front supporting wheels 4 are biased downward against the nap of the floor covering by means of the coil spring 32. The downward movement of the wheels is limited by stop 42 fixed to the rock shaft 9. The stop engages a wall 43 on the under side of the vacuum cleaner casing. Fixed on the rock shaft 9 is a segment gear 44 which meshes with a pinion 45 rotatably carried on a stub shaft 46 fixed to a bracket 47. The bracket is secured to the under side of the cleaner casing. Loosely pivoted on the stub shaft 46 is a lever 48 which is urged upward against a stop 49 in the under side of the cleaner casing by a tension spring 50. The lever 48 has a brake drum 51 rotatably mounted thereon which at one side is provided with a segment gear 52 meshing with the pinion 45. Pivoted on the lever 48 is a brake member 53 having an arcuate surface 54 cooperating with the brake drum 51. The brake member 53 is urged out of contact with the brake drum by means of a tension spring 55 arranged between it and the lever 48. On the free end of the brake member 53 is fixed a stub shaft 56 which rotatably carries a roller 57 arranged to cooperate with a cam 58 fixed to the shaft 14. The cam 58 has a cylindrical portion 59 and a cutaway portion 60.

When the handle is in the vertical position

shown in Fig. 7, the roller 57 rests against the cutaway portion 60 of the cam. In this position the brake surface 54 is out of contact with the brake drum 51. This releases the connection between the front supporting wheels 4 and the vacuum cleaner casing and permits the suction nozzle to fall against the surface of the nap of the floor covering. The movement of the suction nozzle toward the nap of the floor covering is a pivotal movement of the vacuum cleaner casing about the rear supporting wheels 5. As in the previously described construction, this movement is partially balanced by the coil spring 32 which tends to force the front supporting wheels 4 downward with reference to the suction nozzle and therefore exerts an upward force tending to raise the suction nozzle. The result is that the front and rear supporting wheels sink into the nap an amount substantially equal to that present during the normal use of the cleaner and the suction nozzle rests substantially on the surface of the nap of the floor covering. The sinking of the suction nozzle into the nap of the floor covering is also prevented to some extent by the relatively large area of the lips of the suction nozzle.

When the handle is in the vertical position, the position of the handle is such that the cleaner cannot be conveniently used. To effect the proper nozzle adjustment for most efficient cleaning, the operator merely moves the handle in a clockwise direction, as viewed in Fig. 7, to a position extending angularly from the cleaner at a convenient position between the horizontal and the vertical. During the initial part of the pivotal movement of the handle the portion 60 of the cam cooperates with the roller 57 and forces the brake member 53 into engagement with the brake drum 51. This locks the brake drum 51 in fixed relation to the lever 48, in the position shown in Fig. 7. During the succeeding portion of the pivotal movement in which the cylindrical surface 59 of the cam is brought into engagement with the roller 57, the lever 48 is pivoted downward in a clockwise direction, as viewed in Fig. 8, against the tension of spring 50 through an angle sufficient to cause rotation of the rock shaft 9 to raise the suction nozzle a fixed distance above the surface of the nap of the floor covering. This rotation of the rock shaft is effected through the gears 44, 45 and 51. The cylindrical surface 59 is of a sufficient extent so that the parts are retained in this position throughout the normal pivotal movement of the handle.

If the cleaner is to be used on a different type of floor covering the proper nozzle adjustment is obtained by moving the handle to a vertical position and returning it to the normal position during use. From another aspect, the adjustment is effected by movement of the handle from and return to its normal position.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a floor type vacuum cleaner, a casing having a suction nozzle, supporting wheels which sink into the nap of the floor covering being cleaned mounted on the casing for movement relative thereto to change the height of the suction nozzle, a handle for moving the cleaner over the surface being cleaned, a connection between the wheels and the cleaner comprising a brake drum, a brake member, a cam for moving the brake member against the brake drum and for thereafter moving the brake member so as to

turn the brake drum, a part on the cleaner fixed relative to the suction nozzle, which part does not sink substantially into the nap of the floor covering, adjusting means mounted on the casing operated by said turning of the brake drum for effecting relative movement of the wheels and nozzle so as to raise said part a predetermined distance, and means for turning the cam to release the connection between the cleaner and the adjusting means and permitting said part to rest on the nap of the floor covering and for thereafter turning the cam to reestablish said connection and actuate said adjusting means so as to raise said part said predetermined distance.

2. In a floor type vacuum cleaner, a casing having a suction nozzle, supporting wheels which sink into the nap of the floor covering being cleaned mounted on the casing for movement relative thereto to change the height of the suction nozzle, a handle for moving the cleaner over the surface being cleaned, said handle being movable relative to the cleaner, a connection between the wheels and the casing comprising a brake drum, a brake member, a cam rotated by the handle for moving the brake member against the brake drum and for thereafter moving the brake member so as to turn the brake drum, a part on the casing fixed relative to the suction nozzle, which part does not sink substantially into the nap of the floor covering, adjusting means mounted on the casing operated by said turning of the brake drum for effecting relative movement of the wheels and casing so as to raise said part a predetermined distance, said cam being ineffective to effect movement of the wheels when the handle is in its normal condition during use, and means operable by the handle for releasing the connection between the casing and brake drum and permitting lowering of said part into contact with the nap and for thereafter reestablishing said connection and moving said brake drum so as to raise said part said predetermined distance.

3. In a floor type vacuum cleaner, a casing having a suction nozzle, supporting wheels which sink into the nap of the floor covering being cleaned, a shaft journaled on the casing for moving the wheels relative to the casing in proportion to the rotation of the shaft, a releasable connection for rotating the shaft comprising frictionally engageable parts mounted on the casing for rotation on an axis fixed relative to the casing, means for moving one of said parts into engagement with the other part and for thereafter rotating said first part so as to effect a corresponding rotational movement of the other part, and a connection between said other part and the shaft for rotating the shaft.

4. In a floor type vacuum cleaner having a suction nozzle, supporting wheels, a handle for moving the cleaner over the surface being cleaned, a connection between the wheels and the cleaner comprising a brake drum, a brake member, a cam rotated by the handle for moving the brake member into engagement with the brake drum and for thereafter moving the brake member so as to turn the brake drum, and means operated by said turning of the brake drum for effecting relative movement of the wheels and nozzle, said cam being ineffective to effect movement of the wheels when the handle is in its normal condition during use.

5. In a floor type vacuum cleaner, a casing having a suction nozzle, supporting wheels which sink into the nap of the floor covering being

cleaned, a mounting for said wheels movable relative to the casing, a connection between the wheel mounting and the casing comprising a brake drum rotatably mounted on the casing, a brake member, a cam for moving the brake member against the brake drum and for thereafter moving the brake member so as to turn the brake drum, and means operated by said turning of the brake drum for effecting relative movement of the wheels and nozzle.

6. In a floor type vacuum cleaner, a casing provided with a suction nozzle, supporting wheels for the casing, a mounting for said wheels movable relative to the casing to change the height of the suction nozzle, adjusting means including a member rotatably mounted on the casing and cooperatively associated with the wheel mounting so as to move the wheel mounting in proportion to the rotation of said member and to effect a corresponding elevation of the suction nozzle, a breakable connection between said wheel mounting and said rotatable member of the adjusting means, and means for breaking said connection and permitting the nozzle to drop to the surface of the floor covering and for thereafter establishing said connection and rotating the rotatable member of said adjusting means through a predetermined angle to elevate the suction nozzle a predetermined distance from its lowered position.

7. In a floor type vacuum cleaner, a casing hav-

ing a suction nozzle, a rock shaft mounted on the casing, offset arms on the rock shaft, supporting wheels mounted on said arms, adjusting means including a releasable connection to the rock shaft as distinguished from said arms for rotating said rock shaft through a predetermined angle, and means for releasing said connection and for thereafter reestablishing said connection and actuating said adjusting means to rotate the rock shaft through said connection.

8. In a floor type vacuum cleaner, a casing having a suction nozzle, a rock shaft mounted on the casing, offset arms on the rock shaft, supporting wheels mounted on said arms, releasable means for rotating said rock shaft through a predetermined angle comprising a brake drum, a brake member, and a cam for moving the brake member against the brake drum and for thereafter moving said brake member so as to turn the brake drum.

9. In a floor type vacuum cleaner, a casing having a suction nozzle, a rock shaft mounted on the casing, offset arms on the rock shaft, supporting wheels mounted on said arms, releasable means for rotating said rock shaft through a predetermined angle comprising a brake drum, a brake band, and means for moving the brake band against the drum and for thereafter moving the brake band in a direction to turn the brake drum.

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