

June 10, 1952

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2,600,141

VACUUM CLEANER WITH HEIGHT ADJUSTMENT

Filed Aug. 2, 1946

2 SHEETS—SHEET 1

Fig. 2.

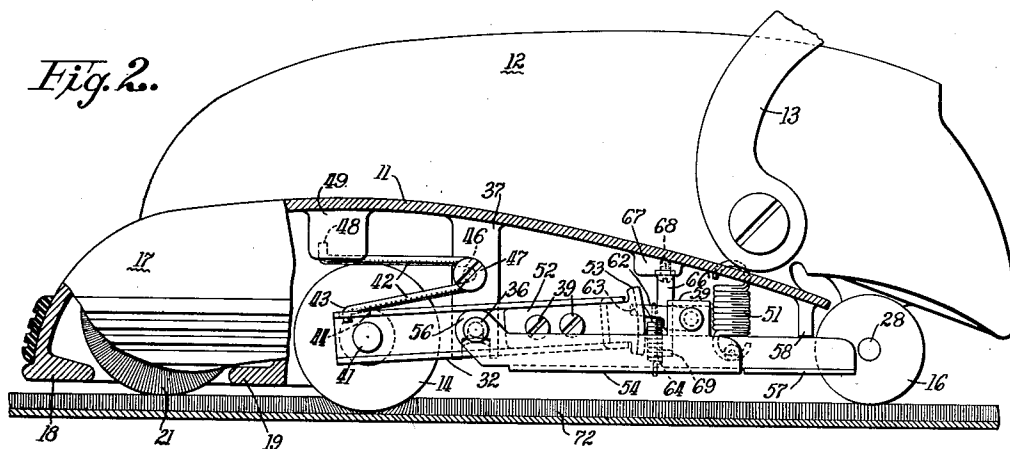
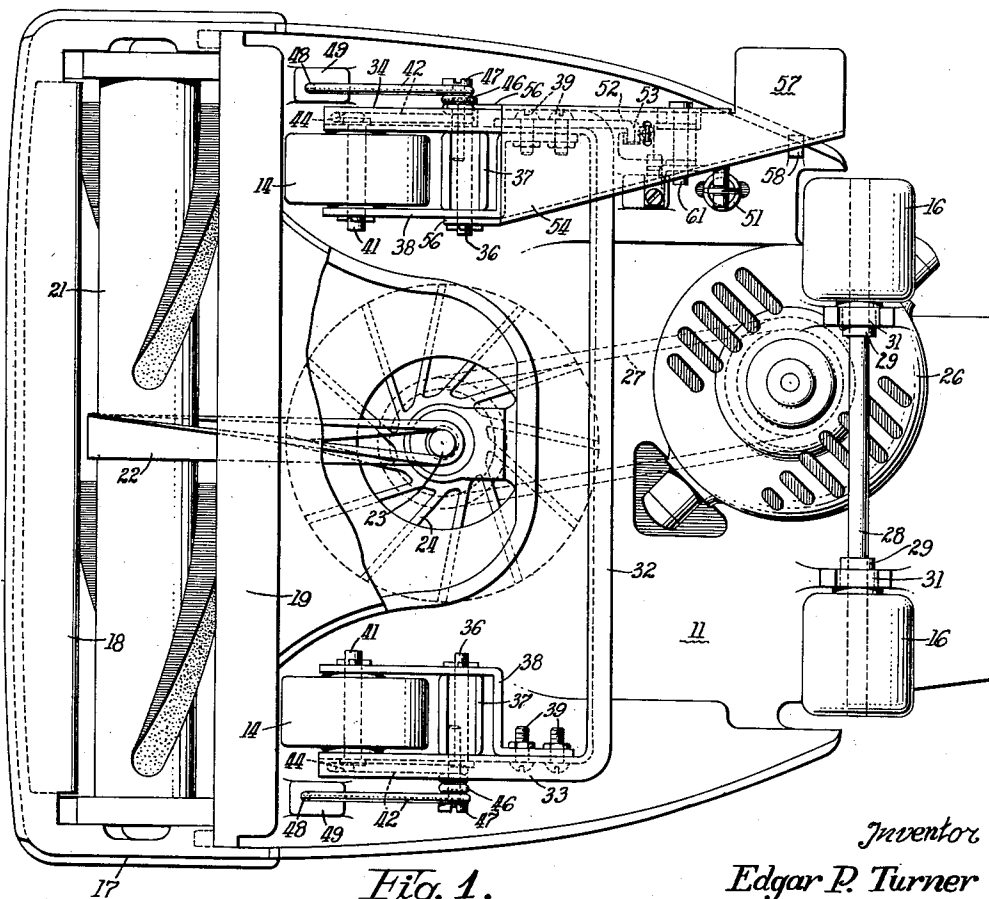


Fig. 1.

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2 SHEETS—SHEET 2

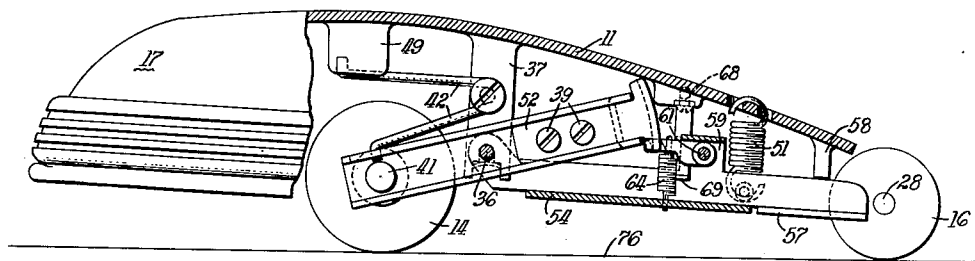


Fig. 4.

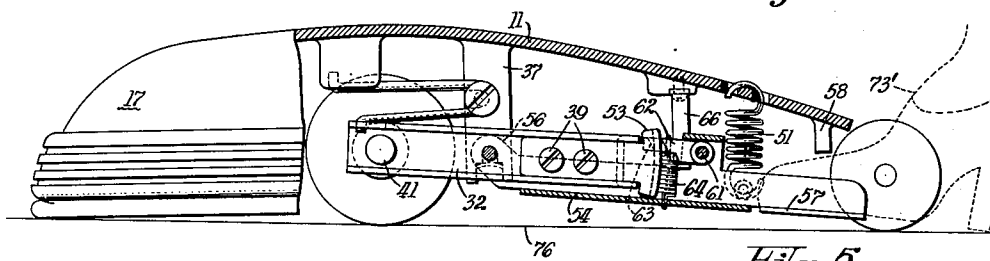


Fig. 5.

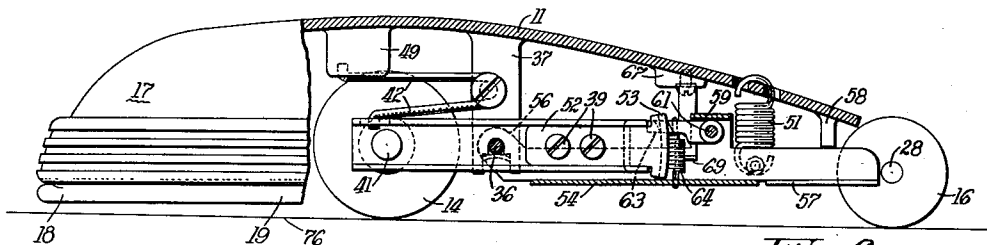


Fig. 6.

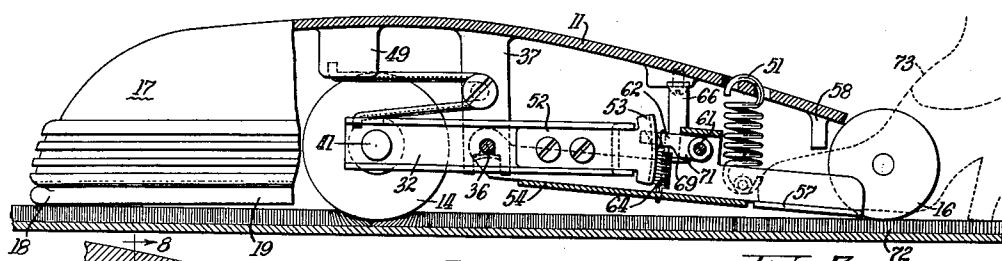


Fig. 7.

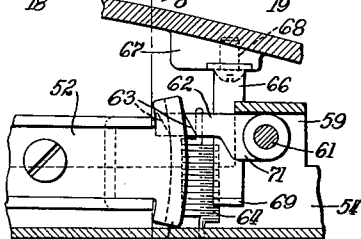


Fig. 8.

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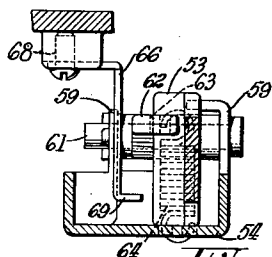


Fig. 9.

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UNITED STATES PATENT OFFICE

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VACUUM CLEANER WITH HEIGHT
ADJUSTMENT

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3 Claims. (Cl. 15—358)

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This invention relates to vacuum cleaners and more particularly to vacuum cleaners having a nozzle height adjusting mechanism whereby the nozzle may be semi-automatically positioned at an optimum distance above the surface being cleaned.

Mechanisms for adjusting the nozzle height of vacuum cleaners are known in the art. However, previously employed mechanisms of this character, that have had a semblance of automatic operation, have left much to be desired in that they have been composed of a large number of relatively complicated parts and have been expensive to manufacture. Therefore, an object of the present invention is to provide a nozzle height adjusting mechanism for vacuum cleaners that will have a minimum number of comparatively simple parts and which will be easy to operate and inexpensive to manufacture.

One important object of the invention is to provide an improved vacuum cleaner in which the various parts are arranged for maximum efficiency, convenience, and utility of operation.

A specific object of the invention is to provide an improved semi-automatic nozzle height adjusting mechanism, by means of which the nozzle of a vacuum cleaner is lifted to a position approximately three-sixteenth of an inch above the upper face of a floor or floor covering each time a foot-lever, carried by the cleaner, is depressed and subsequently released, regardless of the nature of the floor covering.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings;

Fig. 1 is a partly broken away bottom plan view of a vacuum cleaner embodying the present invention;

Fig. 2 is a partly broken away side elevational view of the vacuum cleaner shown in Fig. 1, the parts being properly adjusted for cleaning a thick-pile rug;

Fig. 3 is a fragmentary elevational view of the vacuum cleaner shown in Figs. 1 and 2, the parts being shown in the position they assume while the mechanism is being adjusted for operation on a thick-pile rug;

Fig. 4 is a fragmentary elevational view of the

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vacuum cleaner as it would appear after being transferred from an extremely thick-pile rug to a hard surfaced floor;

Fig. 5 shows the vacuum cleaner in the process of being adjusted for cleaning a hard surfaced floor;

Fig. 6 shows the vacuum cleaner properly adjusted for cleaning a hard surface floor;

Fig. 7 is an enlarged view of a portion of the mechanism shown in Figs. 2 and 6; and

Fig. 8 is a fragmentary sectional view taken along the line 8—8 of Fig. 7, and looking in the direction of the arrows.

In the preferred embodiment of the invention illustrated in the drawings, there is shown a vacuum cleaner having a main body portion 11, a cover 12, a handle 13, and pairs of front and back supporting wheels 14 and 16. The front portion of the main body 11 is formed into a nozzle 17 having relatively wide front and rear lips 18 and 19, providing therebetween an intake opening. A brush 21, in any known manner, is rotatably mounted in the nozzle 17 and the brush is driven, by means of a belt 22, from the lower end of a vertically disposed shaft 23, the central portion of which rotatably supports a fan 24. The fan shaft 23 is driven from a motor 26 by means of a belt 27 connected to the upper end of the shaft 23. The fan 24, in a conventional manner, exhausts the nozzle cavity 17, thereby picking up dirt from the floor or floor covering and depositing it in a dust bag (not shown).

The relatively wide faced rear wheels 16 are secured to opposite ends of an axle 28 having journals 29 that are rotatably supported in a pair of fixed bearing bosses 31 depending from a rear portion of the main body 11.

A U-shaped channel-type support frame 32 positioned with its web substantially vertical and flanges out-facing, has a pair of straight arms 33 and 34, each of which is pivotally supported, at a point intermediate the ends, on an axle pin 36. Each axle pin 36 is carried on the lower end of a boss 37 which depends from the main body portion 11 of the vacuum cleaner. A substantially Z-shaped bracket 38 is secured to the unflanged side of the web of each arm 33 and 34 by bolts and nuts 39. Each bracket 38, in cooperation with the arm to which it is attached, supports an axle pin 41 in a position near the front end of the arm, which position is just to the rear of the nozzle 17. Each axle pin 41 rotatably carries one of the relatively narrow faced front wheels 14. The wheel carrying end of each arm 33 and 34 is biased downwardly by a spring

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42, one end 43 of which slidably engages an elongated hole 44 provided in the upper flange of the end of each arm 33 and 34. A coiled portion 46 of each spring 42 is carried on a screw 47 which is screwed into a threaded hole in the boss 37, and the anchor end 48 of each spring enters a hole in a boss 49 depending from the front end of the main body 11. The springs 42 and a spring 51, in a manner hereinafter described, provide a resilient mounting for the nozzle or front end of the vacuum cleaner, it being understood that the springs 42 are yieldable under the weight of the cleaner.

In addition to holding one of the Z-shaped brackets 38 in place, the bolts and nuts 39 on the arm 34 also fasten one end of an arm 52 to the flanged face of the back end of the arm 34. The unsupported end of the arm 52 carries a substantially vertically extending arcuate smooth surfaced friction clutch member 53, that is formed at right angles to the longitudinal dimension of said arm 52. The function of this clutch member will appear presently.

A channelled foot-pedal lever 54, positioned with the web substantially horizontal and the flanges upstanding, has its front end pivotally mounted on the same axle pin 36 which supports the arm 34. In order to so mount the lever 54, the upstanding flanges are formed into lugs 56, extending beyond the front end of the lever and positioned outside the arm 34 and the brackets 38 carried thereby. The unpivoted end of the lever 54 carries a foot-pedal 57, which projects outwardly beyond the body of the vacuum cleaner (Fig. 1), and thereby is readily accessible to a person operating the cleaner. The pedal end of the lever 54 is biased upwardly against a stop-boss 58 by the hereinbefore mentioned relatively strong tension spring 51, opposite ends of which are anchored to the body 11 and the lever 54.

At a point intermediate the ends thereof, each upstanding flange of the channelled lever 54 is provided with an upstanding boss 59 (Figs. 7 and 8) between which extends an axle pin 61. One end of a dog 62 is pivotally carried on the pin 61, and thus the dog is positioned between the two webs of the channelled lever. The free end of the dog 62 has a friction clutch member in the form of a notch 63, the side walls of which are inclined with respect to the top and bottom surfaces of the dog. When the friction clutch members are assembled in operative relationship, the arcuate clutch rib 53 enters the notch 63 in such a manner that the smooth surfaced arcuate clutch member 53 can be gripped and held in an infinite number of clutch engaging positions by the notch 63. In order to facilitate the functioning of the clutch members 53 and 63, the dog 62 is biased downwardly by a relatively light tension spring 64 which is supported between a point intermediate the ends of the dog 62 and a point on the web of the channelled foot-pedal lever 54.

A substantially Z-shaped bracket 66 is secured to the lower end of a body-boss 67 by a screw 68. A lower hooked-end 69 of this bracket is positioned directly below an abutment 71 formed on the dog 62. When the lever 54 and dog 62 are moved downwardly by the action of the operator's foot depressing the pedal 57, the end 69 trips the dog 62 against the action of the biasing spring 64, thereby releasing the holding connection between the two clutch members 53 and 63. This allows the support frame 32 to move independently of the lever 54.

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Figs. 2 and 3 show the wheels 14 and 16, of the herein described vacuum cleaner, resting on a thick-pile rug 72. It will be noted that the narrow front wheels 14 are sunken into the thick-pile rug 72 whereas the wide faced back wheels 16 are riding substantially on the top of the pile. Fig. 2 shows the vacuum cleaner parts as being properly adjusted for cleaning a thick-pile rug. In Fig. 2 the members 53 and 63 are shown to be in clutching engagement, thus preventing relative movement between the support frame 32 and the lever 54. In other words, when the clutch members are in engagement, the lever 54 and the support 32 are connected to move as a unit and are biased counterclockwise about the fulcrum pin 41 of the front wheels 14 by the springs 42 and 51. In this case the weight of the cleaner, acting through the bosses 37 and 49, tends to compress the spring 42 and to distend the coiled spring 51, and thus the weight of the nozzle 17 can be said to be resiliently supported by the two springs 42 and 51.

Fig. 3 shows the vacuum cleaner in the process of being adjusted or readjusted for cleaning the thick-pile rug 72. The narrow front wheels 14 have sunk below the top of the pile, and the relatively wide back wheels 16 are shown to be riding near the top of the pile. An operator's foot 73 is shown depressing the foot-pedal lever 57. This distends the spring 51 and moves the axle pin 61 and dog 62 downwardly, thereby causing the abutment 71 to engage the end 69. This releases the grip of the clutch dog 62 on the arcuate clutch member 53, and disengagement of the clutch member allows for relative movement between the lever 54 and the support frame 32. As soon as the support frame is free to move, the weight of the cleaner causes it (the support frame) to pivot clockwise about the wheel axes 41. This lowers the pins 36 and the boss 37, which in turn allows the lip 18 of nozzle 17 to rest on top of the pile as shown in Fig. 3. When the operator's foot 73 is removed from the foot-pedal 57, the spring 51 raises the pedal-lever 54 and the spring 64 causes the dog 62 to engage the arcuate member 53, thus causing the U-shaped support frame 32 to turn in a counterclockwise direction about the wheel axle 41. This causes the pin 36 and the boss 37 to be raised; at the same time lifting the nozzle 17 a predetermined distance above the top of the thick-pile rug. The upward movement of the lever 54, and thus the upward movement of the nozzle 17, is stopped when the upstanding flange of the foot-pedal lever 54 engages the bottom of the boss 58. The height to which the nozzle 17 can be raised by the spring 51 above the floor covering is governed by the length of the boss 58 and the height of the upstanding flanges of lever 54.

Fig. 4 shows the vacuum cleaner, as it would appear after having been transferred from an extremely thick-pile rug to a hard surfaced floor 76. Since, in the latter instance, the wheels of the cleaner are resting on a hard floor, the front wheels 14 do not sink below the level of the back wheels 16. This results in the nozzle 17 being elevated to a position higher above the floor than was the case when the cleaner was on a thick rug.

Fig. 5 shows the vacuum cleaner of Fig. 4 in the process of being adjusted for operation on a hard surfaced floor. The showing of Fig. 5 is similar to that of Fig. 3, except that in Fig. 5, the nozzle is shown dropped to the surface on which the wheels are resting instead of stopping on

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top of the pile as shown in Fig. 3. When the operator's foot 73' is removed from the pedal 57, the clutch members 53 and 63 become engaged and the support 32 and the lever 54 are clutched into one unit in a manner similar to that previously described. This causes the spring 51 to raise the nozzle 17 a predetermined and proper distance above the surface of the floor. This condition of operation is illustrated in Fig. 6, wherein, the vacuum cleaner is shown properly adjusted for cleaning a hard surfaced floor. In both Figs. 2 and 6, the nozzle 17 has been raised approximately the same distance, three-sixteenth of an inch, above the top of the surface to be cleaned. In one case, this surface was the top of the pile 72 and in the other case it was the top of the hard surfaced floor 76.

If a cleaner, which has been adjusted for operation on a hard surfaced floor (Fig. 6) is transferred to a rug with a sufficiently thick pile, the front wheels 14 will sink until the lips 18 and 19 are in contact with the top of the pile. Then when the foot pedal 57 is depressed and the clutch members 53—63 disengaged as hereinbefore described, the springs 42 will cause the support-frame 32 to pivot counterclockwise about the axle pin 36, thereby further depressing the front wheels 14 until the resistance of the pile finally stops further movement. Removal of the operator's foot from the pedal 57, engages the clutch members and allows the springs 42—51 and the stop 58 to properly adjust the nozzle upwardly for operation on the thick pile rug.

In the event that a cleaner, which has been previously adjusted for operation on a hard surfaced floor is transferred to a thin pile rug, the wheels 14 may not sink a sufficient distance to cause the lips 18 and 19 to contact the top of the pile. Then when the foot pedal 57 is depressed and the clutch members 53—63 disengaged, the support frame 32 will pivot clockwise about the axle pin 41, thereby lowering the nozzle into contact with the top of the pile. Release of the pedal 57 will engage the clutch and adjust the nozzle upwardly a proper distance, in the manner previously described.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a vacuum cleaner having a main body, of which the forward end is formed into a nozzle portion having a wide lip; the combination of a pair of wheels rotatably mounted on the rear under side of said main body thereby to support a portion of the weight of said body, a support member formed from a channel bar having a web and flanges, the channel bar being bent into the form of a U having a pair of straight arms and having a web substantially vertical and flanges out-facing, a pair of axle pins attached to said main body, and each of said pins pivotally connected to one leg of said U-shaped support member at a point intermediate the ends thereof, a support wheel rotatably mounted on the forward end of each of said arms, a foot-pedal lever pivotally mounted on one of said axle pins, a pair of clutch members for holding said foot-pedal lever to one of said arms, a spring extending between said support member and said body, said spring being of insufficient strength, of itself to hold the nozzle portion of said body in elevated position, said spring, however, yieldingly supporting a portion of the weight of said body from said support member, a second spring extending between said foot-pedal lever and said body for supporting one end of said foot-pedal lever, said second spring being of sufficient strength to move

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said foot-pedal lever upwardly and when said clutch members are engaged to depress simultaneously the forward wheels to effect elevation of the nozzle portion, a stop carried by said main body for limiting the upward movement of said foot-pedal lever, and a second stop carried by said body for disengaging said clutch members when said foot-pedal lever is moved downwardly against said second spring.

2. In a vacuum cleaner having a main body, a forward portion of which is formed into a nozzle having a wide lip; the combination of a pair of wheels rotatably secured to a rearward portion of said body, a support member having at least one arm, said arm being pivotally connected to a forward portion of said body on an axis located intermediate the ends of said arm, at least one support wheel rotatably mounted on the forward end of said support member, a foot-pedal lever pivotally mounted on the same axis as said arm of said support member, a substantially vertically arcuate smooth surfaced friction clutch member secured to said arm, a clutch dog member pivotally carried on said foot-pedal lever, a free end of said dog member having a notch arranged to be engaged by said arcuate clutch member, a spring extending between said support member and said body, said spring being of insufficient strength, of itself, to hold the nozzle portion of said body in elevated position, said spring, however, yieldingly supporting a portion of the weight of said body from said support member, a second spring extending between said foot-pedal lever and said body for supporting one end of said foot-pedal lever, said second spring being of sufficient strength to move said foot-pedal lever upwardly and when said clutch members are engaged to depress simultaneously the forward wheel to effect elevation of the nozzle portion, a stop carried by said main body for limiting the upward movement of said foot-pedal lever, and a second stop carried by said body for disengaging said clutch members when said foot-pedal lever is move downwardly against said second spring.

3. In a vacuum cleaner having a main body, of which the forward end is formed into a nozzle portion having a wide lip, the combination of a pair of wheels rotatably mounted on the rear under side of said main body, thereby to support a portion of the weight of said body; a support member comprising a U-shaped channel-bar having a web and flanges, said channel-bar having a pair of straight arms and having the web substantially vertical and the flanges out-facing; a pair of axle pins supported on the under central portion of said body and each pivotally mounting one of said arms at a point intermediate the ends thereof; a support wheel rotatably mounted on the forward end of each of said arms; a foot-pedal lever pivotally mounted on the same axial center as said arms of said support member; a substantially vertically arcuate smooth-surfaced friction-clutch member secured to one of said arms; a clutch dog member pivotally carried on said foot-pedal lever, a free end of said dog member having a transverse notch arranged to be engaged by said arcuate clutch member; a pair of V-shaped wire springs of which each has one end connected to said main body, and of which springs the other ends are connected to the forward ends of said straight arms, thereby downwardly biasing the front ends of said arms, said springs being of insufficient strength of themselves to hold the nozzle portion

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of said body in elevated position, a second spring in the form of a helical tension spring, of which one end is connected to said body and of which the other end is connected to the free end of the foot-pedal lever, thereby to elevate the free end of said foot-pedal lever, said second spring being of sufficient strength to move said foot-pedal lever upwardly and when said clutch members are engaged to depress simultaneously the forward wheels to effect elevation of the nozzle portion; a stop carried by said main body for engagement by the free end of said foot-pedal lever, thereby limiting the upward movement of said foot-pedal lever; a third spring in the form of a helical tension spring, of which one end is connected to said foot-pedal lever and of which the other end is connected to the free end portion of said clutch dog member, thereby downwardly biasing said

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clutch dog member; and a second stop in the form of a substantially Z-shaped bracket, of which the upper end is secured to said body, and of which the lower end is hook shaped to be engaged by said clutch dog member when said foot-pedal lever is depressed, thereby to disengage said clutch members.

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