This invention relates to vacuum cleaners and more particularly to means for raising and lowering the nozzle of a vacuum cleaner depending on the type of floor covering being cleaned.

It is well known that vacuum cleaners may be used to clean different kinds of floor coverings. For example, a vacuum cleaner is generally used on what might be termed a normal floor. This could include most ordinary types of floor covering; such as, a hard surface rumpus room rug or linoleum. However, where the cleaner is used on a thick pile rug, the wheels of the vacuum cleaner sink into the thick pile a sufficient distance to place the nozzle too close to the rug surface for proper cleaning. Sinking of the wheels into the rug also makes it hard to push and maneuver the cleaner. Under these circumstances, it is desirable to raise the nozzle slightly to compensate for the sinkage of the wheels.

Nozzle height adjusting mechanisms are not new, however, mechanisms heretofore used have not always been satisfactory when considered from all angles and thus one of the primary objects of the present invention is to provide an improved nozzle height adjusting mechanism for vacuum cleaners.

Another object of the present invention is to provide a vacuum cleaner having an improved nozzle height adjusting mechanism which raises and lowers the nozzle by lowering and raising the rear portion of the vacuum cleaner.

A further object of the invention is to provide an improved nozzle height adjusting mechanism which has a minimum number of comparatively simple parts.

A still further object of the invention is to provide an improved nozzle height adjusting mechanism whereby the nozzle of a vacuum cleaner can be raised by exerting pressure on the handle of the vacuum cleaner and whereby the nozzle can be lowered or returned to its normal position by stepping on an operating pedal.

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.

FIG. 1 is a perspective view showing the general over all form of a vacuum cleaner embodying the present invention.

FIG. 2 is a bottom plan view of the vacuum cleaner shown in FIG. 1.

FIG 3 is an enlarged sectional view taken substantially on the line 3-3 of FIG. 2 and showing the nozzle height adjusting mechanism positioned to lower the rear portion of the cleaner body and thus raise the nozzle.

FIG. 4 is a view similar to FIG. 3 but showing the nozzle height adjusting mechanism positioned to lower the nozzle.

FIG. 5 is an exploded perspective view illustrating parts shown in FIGS. 1 through 4.

Referring more specifically to the drawings the invention is disclosed as embodied in a vacuum cleaner 15 having a chassis 16 fashioned to support an electric motor 17 for driving a pair of fan impellers (not shown) enclosed in a fan housing 18-18 which communicate with a rearwardly open common discharge duct 19 to which a dust bag 20 may be connected. A lower access plate 22 which is releasably held to the frame 16 by a swingable latch 21, is provided with a pair of rearwardly extending arms 23-23 designed to cover intake air passage ways (not shown) formed in the chassis 16. The front portion of the access plate 22 is provided with two apertures 26 and 27 and a binding lips 28 which form the lower portions of the intake nozzle 29 of the vacuum cleaner 15. Directly above the lips 28 and the apertures 26 and 27 is located a rotary brush 31. A pair of front support wheels 32-32 are rotatably carried by the access plate 22.

The rear portion 36 of the chassis 16 is equipped with a nozzle height adjusting mechanism indicated generally by the numeral 41. The nozzle height adjusting mechanism 41 herein shown is the type which raises the nozzle 29 by causing the chassis 16 to pivot about the front wheels 33-33 in a manner as to lower the rear portion 36 of the chassis 16, and lowers the nozzle 29 by raising the rear portion 36 of the chassis 16, and the nozzle height adjusting mechanism 41 comprises a rear axle 42 formed with a central portion 43, opposite ends of the portion 43 being offset so as to form journal portions 44-44 and the external ends of the portions 44-44 are each offset to form arms 46-46 and splines 47-47 for rotatably carrying rear wheels 48-48. The portions 44-44 of the axle 42 are journaled in bearing recesses 49-49 formed in dependent bosses 51-51 which are integral with the chassis 16 and the portions 44-44 are pressed into the bearing recesses 49-49 by a retaining plate 52 which is secured to the chassis 16 by screws 53-53 threaded into the bosses 51-51 and by screws 54-54 threaded into a pair of bosses 56-56 formed integral with the chassis 16. Each of the bosses 56-56 has a bearing recess 57 which with the help of the retaining plate 52 turnable supports a shaft 58 to the central portion of which is secured, as by welding, one end of a hook 59, the hook 59 being so positioned and arranged as to hook (FIG. 2) over the central portion 43 of the axle 42. Thus both the axle 42 and the shaft 58 are turned held in bearing recesses by the plate 52.

One end of the shaft 58 has secured thereto, as by brazing, the lower end of an upstanding pedal 61 the upper end of which carries a boot 62 for engagement by the foot of the person operating the vacuum cleaner. The other end of the shaft 58 turnable carries a spring biased pedal 63 for latching and unlatching the position of a propelling handle 64. Since the pedal 63 forms no part of the present invention, it will not be described in detail.

The hook 59 and thus the shaft 58 (FIGS. 3 and 4) are biased to turn in a counter clockwise direction (FIG. 3) by a helical spring 66 which is coiled around the shaft 58. To accomplish this, one end 67 of the spring 66 is looped around the mid portion of the hook 59 and the other end 68 of the spring 66 enters a hole 69 formed in the retaining plate 52. The portions 44-44 of the axle 42 are biased to turn in a clockwise direction by a double helical spring 72 which is wound around the shaft 73. As indicated above, the spring 72 is double and therefore comprises two coils 76 and 77 joined at a bent-back or U-shaped connection 78. The end of coil 76 remote from the connection 78 is bent at 79 (FIG. 2) to engage a side of one of the bosses 56 and the end of the coil 77 remote from the connection 78 is formed straight at 89 and enters a hole 81 drilled in the chassis 16. The coils 76 and 77 and the stem 63 are held in position by a concavity 82 formed in the retaining plate 52, and the U-shaped connection 78, as best seen in FIGS. 2 and 3, is forestally pressed against one side of the central portion.
3. A nozzle height adjusting mechanism for a vacuum cleaner of the type wherein the nozzle of the vacuum cleaner is raised by lowering the rear portion of the vacuum cleaner chassis and wherein the nozzle is lowered by raising the rear portion of the chassis, said nozzle height adjusting mechanism comprising in combination a rear axle turnably mounted on a rear portion of said chassis, a central offset portion formed as part of said rear axle, offset arms and spindles formed at opposite ends of said axle, wheels carried by said spindles, spring means biasing said axle to turn said axle in a predetermined direction, a hook carried by said shaft and so located and arranged as to engage and hold the central offset portion of said rear axle, and means for turning said shaft to disengage the said hook from engagement with the central offset portion of said rear axle.

4. A nozzle height adjusting mechanism for a vacuum cleaner of the type wherein the nozzle of the vacuum cleaner is raised by lowering the rear portion of the vacuum cleaner chassis and wherein the nozzle is lowered by raising the rear portion of the chassis, said nozzle height adjusting mechanism comprising in combination a rear axle turnably mounted on a rear portion of said chassis, a central offset portion formed as part of said rear axle, offset arms and spindles formed at opposite ends of said axle, wheels carried by said spindles, spring means biasing said axle to turn said axle in a predetermined direction, a hook carried by said shaft and so located and arranged as to engage and hold the central offset portion of said rear axle, and means for turning said shaft to disengage the said hook from engagement with the central offset portion of said rear axle.