Oct. 29, 1940. B. S. FOSS 2,219,810

VACUUM CLEANER

Filed Feb. 9, 1938

Fig. 1

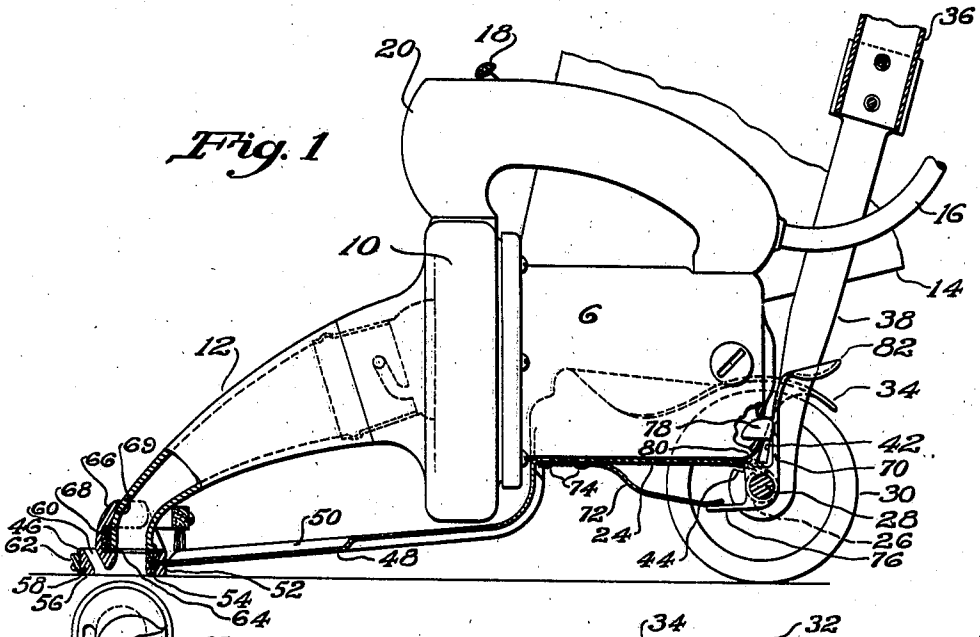


Fig. 2

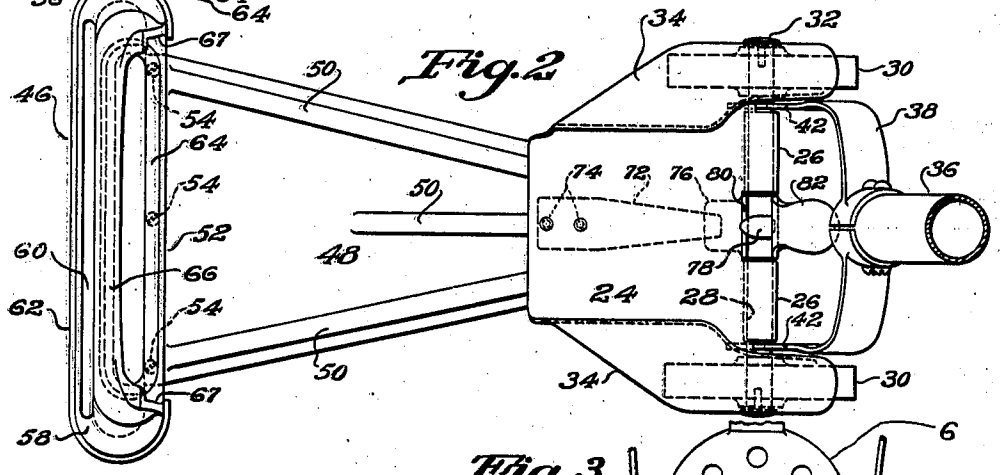


Fig. 3

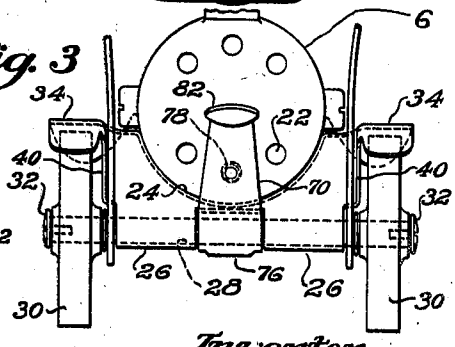
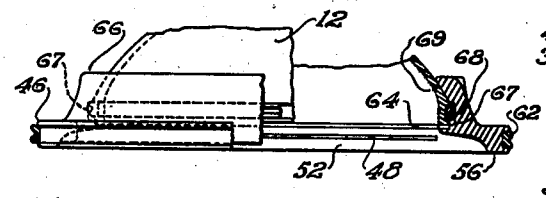


Fig. 4



Witness

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VACUUM CLEANER

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5 Claims. (Cl. 15—16)

The present invention relates to vacuum cleaners, and more particularly to improvements in that type of vacuum cleaner wherein a hand vacuum cleaning unit may be adapted for floor work by mounting the same upon a wheeled carriage provided with a propelling handle, the hand cleaning unit being demountable for hand operation when desired.

In the present inventor's prior Patent No. 2,070,986, issued February 16, 1937, there is disclosed a carriage arranged to support a hand vacuum cleaner with the nozzle or other suction device of the latter in contact with the floor or floor covering, the motor housing of the vacuum cleaner being secured to the carriage by means of straps encircling the housing and joined by a toggle-action clamp.

Because of the fact that the size and shape of suction nozzle best adapted for use with a hand cleaner is substantially different from the nozzle most suitable for use on floor coverings and the like, there was devised the improved construction forming the subject-matter of a co-pending application of the present inventor, Serial No. 137,611, filed April 19, 1937.

This improvement consisted in providing a supplementary floor-engaging suction nozzle mounted upon the carriage and adapted to be engaged by the nozzle or other suction device of the hand vacuum cleaner, as disclosed in the aforesaid application. The efficiency of the combination hand cleaner and carriage for floor work were thereby substantially increased without altering the hand cleaning unit or impairing its efficiency for hand use. In this construction, the vacuum cleaner unit is secured to the floor carriage by means of a spring clip into which the motor housing is forced, the nozzle of the cleaner resting upon the top face of the supplementary nozzle with the suction passage of the nozzle of the hand unit in communication with the passage in the supplementary nozzle.

Certain practical difficulties have arisen, however, in the above construction with regard to the mounting of the hand cleaner unit on the carriage, both as to ease of attachment and removal of the unit, and more particularly as to the attaining of a sufficiently air-tight joint between the hand cleaner nozzle and the supplementary floor nozzle of the carriage. Even a slight leakage in the connection greatly reduces the force of suction on the work, and thus substantially impairs the efficiency of the cleaner for floor work, where a high degree of suction is particularly necessary.

The spring clip of the prior construction substantially encircles the motor housing, and necessarily embraces the housing with considerable pressure. As a result, if the hand cleaner is not pushed into place with its nozzle opening in exact register with the opening in the supplementary nozzle and with their respective contacting faces exactly parallel, the resistance to bodily and rotational movement of the motor housing relative to the carriage prevents any correction in alignment and the hand unit must be removed and re-inserted or else the combination operated with excessive leakage at the joint between the nozzles. In addition, the substantial degree of force required to push the cleaner into the clamp and to remove the unit from the carriage has proved to be a drawback to the prior construction.

The object of the present invention is to provide a vacuum cleaner of the above type of novel and improved construction and arrangement, comprising a hand cleaning unit and a wheeled floor carriage for demountably supporting the same, the carriage having a nozzle for adapting the nozzle of the hand unit for floor work, wherein the hand cleaner may be quickly and easily mounted upon the carriage with the nozzle of the cleaner positively aligned and in substantially air-tight contact with the supplementary nozzle of the carriage.

With this object in view, a feature of the present invention consists in the provision of a wheeled carriage to which may be secured a hand type vacuum cleaner, the carriage being provided with a handle for propelling the cleaner over the work and having a supplementary floor engaging nozzle for adapting the nozzle or other suction device of the hand cleaner for floor work, the supplementary nozzle being provided with means for guiding and urging the suction device of the hand cleaner into positive alignment and effective pneumatic connection with the said floor engaging nozzle.

Another feature of the invention consists in the provision in a wheeled carriage of the type described having a supplementary floor-engaging nozzle, of simple and readily operated clamping means for securing the hand cleaning unit to the carriage while urging the suction device of the unit into contact with the guiding and directing means carried by the supplementary nozzle, whereby said device is caused to assume an aligned and substantially air-tight connection with the supplementary nozzle of the carriage.

In the accompanying drawing illustrating the

preferred embodiment of the invention, Fig. 1 is a view in side elevation of the carriage with the hand cleaning unit mounted thereon, the carriage and lower end of the handle being shown in section and portions of the nozzle and motor housing of the hand cleaner being broken away; Fig. 2 is a top plan view of the carriage shown in Fig. 1 with the hand cleaner removed; Fig. 3 is an end view, in rear elevation, of the carriage and the motor housing of the hand cleaner; and Fig. 4 is a detail view in front elevation, partly in section, of the supplementary nozzle and a portion of the hand cleaner nozzle positioned thereon.

The hand vacuum cleaner illustrated in the drawing is similar to that shown in applicant's co-pending application above referred to, and is of conventional construction and arrangement, comprising a motor housing 6, a fan casing 10, a suction nozzle 12 attached by a bayonet type lock to the fan casing and extending forwardly and downwardly therefrom, and a dust collecting bag 14. The cleaner is adapted to be connected to a source of electricity by the cord 16, the operation of the fan motor being controlled by a switch 18. A grip or handle 20 secured to the cleaner enables the unit to be held by the operator for hand operation. To afford ventilation for the motor of the cleaner, the end of the motor housing is provided with a number of circular openings 22, as shown in Fig. 3.

The carriage, upon which the hand cleaner may be mounted to permit its use as a traveling floor cleaner for operation on rugs, carpets, and the like, is adapted to support at one end thereof the motor housing of the hand cleaner, and at the other end the nozzle of the cleaner. The support for the motor housing comprises a plate 24 of generally cylindrical shape adapted to embrace the lower portion of the housing. The rear portion of the plate is bent downwardly to form portions 26 surrounding an axle 28, (see Fig. 3), upon the ends of which are rotatably mounted a pair of wheels 30, screws 32 serving to retain the wheels on the axle.

The supporting plate 24 is formed with sidewardly and rearwardly directed extensions 34 in the nature of fenders projecting over the wheels, these extensions serving to protect the dust bag 14 of the hand cleaner from contact with the wheels.

The carriage is provided with the usual tubular handle for propelling and guiding the cleaner over the work, the lower end of the handle being indicated at 36. The handle is secured to a yoke 38, the arms of which are pivoted upon the axle at each side of the plate 24.

To limit the forward and rearward movement of the handle on the carriage to a range suitable for convenient operation of the cleaner, the rear portion of the plate 24 extends beyond the axle-encircling portions 26 and in front of the arms of the yoke 38, as indicated at 40. The arms of the yoke are cut away as shown in Fig. 1 to provide shoulders or abutments, the engagement of the shoulder 42 with the portion 40 of the support limiting forward movement of the handle, while rearward movement is limited by the shoulder 44.

The carriage is provided with a supplementary floor-engaging nozzle 46 mounted at the forward end of the plate 48, which may be formed integrally with the plate 24 which supports the motor housing of the hand cleaner. The plate 48 extends downwardly and forwardly beneath the fan casing 10, and is provided with longitudinally extending upstanding ribs 50 to afford stiffness without the use of thick and heavy material.

The supplementary nozzle is secured to the supporting plate in any suitable manner, a satisfactory arrangement being that shown in the drawing with the front edge of the plate inserted in a horizontal slot in the rear wall 52 of the nozzle, the position of the slot vertically being such that the top face of the slotted wall 52 is substantially flush with the top surface of the ribs 50 adjacent the nozzle. Vertically directed screws 54 serve to clamp the nozzle firmly to the plate.

The air passage of the supplementary nozzle 46 is adapted to be in communication with the passage in the nozzle of the hand cleaner when the cleaner is in position on the carriage, the upper portion of the air passage in the nozzle 46 being of substantially the same dimensions as the inside of the mouth of the nozzle 12. The lower portion of the air passage of the supplementary nozzle is substantially greater in length, as illustrated in Fig. 4, than the length of the hand cleaner nozzle, thereby increasing the effective cleaning width of the hand cleaner when used for floor work.

The lips 56 of the bottom or work contacting face of the nozzle 46 are substantially greater in width than the lips of the hand cleaner nozzle to enable the nozzle to move smoothly over work having an uneven surface, such as thick rugs and carpets.

The front wall 58 of the supplementary nozzle is of greater thickness than the rear wall 52 to permit the provision of a slot 60 extending substantiallly the length of the nozzle and adapted to direct a stream of air downwardly onto the work and along the surface thereof. The suction of the hand cleaner is thus rendered more effective in picking up threads and the like and in removing dirt from deep pile fabrics.

To prevent injury to furniture and other objects by impact with the cleaner when used for floor work, a strip 62 of rubber or other soft yielding material is secured by an adhesive or by suitable fastening means in a channel formed in the front and side edges of the supplementary nozzle. The top face of the supplementary nozzle adjacent the passage is likewise provided with an insert 64 in the nature of a gasket of soft rubber or the like adapted to be engaged by the nozzle of the hand cleaner to assist in obtaining a tight connection between the nozzles.

In order that the hand cleaner may be readily mounted on the carriage with certainty that the nozzle will in every case be in proper alignment with the supplementary nozzle and in firm and substantially leak-proof contact with the sealing gasket or insert 64, the supplementary nozzle is provided with a lip or abutment 66 adapted to engage the nozzle of the hand cleaner and to direct the same into aligned and sealing contact with the supplementary nozzle.

The abutment is preferably formed integrally with the supplementary nozzle 46 of light metal such as aluminum, and comprises front and end wall portions upstanding from the top face of the nozzle and set back somewhat from the edges thereof. The inside surfaces of the walls of the abutment are formed to have substantially the shape of the front and end exterior surfaces of the hand cleaner nozzle adjacent its lower end, the lower portion 67 of the inside of the abutment rising vertically as illustrated in Figs. 1 and 4 to provide clearance for the rubber bumper

strip 68 secured to the hand cleaner nozzle, while the upper portion 69 of the interior of the abutment is inclined rearwardly along the front wall and inwardly along the end walls.

The abutment is arranged to permit the introduction of the hand cleaner nozzle from the rear, the upper surface of the rear portion of the supplementary nozzle being unobstructed so that the hand cleaner nozzle may be slid forwardly along the ribs 50 and onto the top face of the supplementary nozzle. Alignment of the nozzles in a sidewise direction is insured by engagement of the nozzle of the hand cleaner with the end walls of the abutment, while the front wall of the abutment limits the forward movement of the hand cleaner so that exact registration of the air passages is obtained. As a consequence of the engagement of the sloping inner surfaces of the abutment with the correspondingly inclined exterior surfaces of the hand cleaner nozzle, the latter mentioned nozzle is wedged or forced downwardly into firm contact with the sealing gasket when the nozzle is urged in a forward direction relative to the supplementary nozzle.

To secure the hand cleaner to the carriage while urging the cleaner nozzle forwardly against the abutment 66, clamping means are provided for retaining the motor housing of the cleaner in aligned position on the support 24 and at the same time applying a yielding forward pressure on the housing. The clamping means comprise a lever 70 pivotally mounted on the axle 28 between the portions 26 of the supporting plate, the lever being rocked in counterclockwise direction as viewed in Fig. 1 by a spring 72 secured at one end by rivets 74 to the under side of plate 24 and bearing at its other end against arm 76 of the lever. Secured to and projecting forwardly from the upper portion of the lever 70 is a pointed boss or latching pin 78 of substantially circular cross-section, which pin is adapted to fit part way into the lower ventilating hole 22 or other appropriate aperture in the end of the motor housing of the hand cleaner. As illustrated in the side view, Fig. 1, the bottom of the pin is straight up to its point, thus positively preventing upward displacement of the cleaner even though the pin may extend only a short distance into the opening. The top of the pin is curved forwardly and downwardly to provide an inclined surface by which the pin and clamping lever may be pushed back by engagement with the rounded corner of the motor housing when the cleaner is forced downwardly into position on the carriage.

The clamping lever is limited in its forward rocking movement when the cleaner is removed from the carriage by means of a projection 80 which is adapted to engage the edge of the plate 24 between the axle-encircling portions 26. The upper end of the lever 70 is bent outwardly and dished slightly to form a handle or flinger strip 82 by which the lever may be rocked by the operator against the force of the spring 72 to release the cleaner from the carriage.

To mount the hand cleaner on the carriage for use as a traveling floor cleaner, it is merely necessary for the operator to grasp the vacuum cleaner by its handle 20 and lower the cleaner onto the carriage until the nozzle comes into contact with top of the ribs 50 of the plate 48 which supports the supplementary nozzle. The hand cleaner is then pushed forward on the carriage, the nozzle readily sliding along the ribs onto the top face of the supplementary nozzle and into engagement with the walls of the abutment 66. With the nozzle of the cleaner positioned on the supplementary nozzle, the motor end is then lowered on the semi-cylindrical supporting plate, being guided into place by the flaring sides thereof. Downward pressure on the handle of the cleaner forces the pin carried by the clamping lever 70 out backwardly of the motor housing, thereby permitting the same to descend to seated position on the supporting plate.

In this position the lower ventilating hole 22 in the end of the motor housing is brought into alignment with the pin, which snaps into the opening under the action of the spring 72 on the clamping lever 70, thereby locking the motor housing firmly in place on the support and at the same time urging the cleaner forwardly on the carriage to cause the abutment to force the hand cleaner nozzle down into sealing contact with the supplementary nozzle. Since vertical separation of the nozzles is impossible without rearward horizontal movement of the hand cleaner relative to the carriage, which movement is firmly resisted by the spring 72 of the clamping lever, the hand cleaner is secured against displacement in any direction by the impacts and vibration incidental to floor work.

The pin type clamping means for the motor housing permits a certain degree of rotation of the housing relative to the support, thus enabling the nozzle of the hand cleaner always to be held by the abutment in alignment with the supplementary nozzle, regardless of any rocking or twisting of the carriage as the combination is moved over the work.

The hand cleaner is readily disengaged from the carriage for hand-held operation by rocking the clamping lever away from the motor housing, the operator pressing down upon the handle 82 with either the thumb or the toe of the shoe and at the same time lifting the cleaner from the support, the nozzle readily slipping out of engagement with the abutment.

While the invention has been described and illustrated as embodied in a particular construction and arrangement now considered to be the preferred form, it is to be understood that the invention is not so limited, but may be embodied in other forms and arrangements of parts within the scope of the appended claims.

The supplementary nozzle, for example, may be constructed in a variety of forms and proportions in order that the suction of the hand cleaner may be utilized most effectively for cleaning floor work without alteration of the hand cleaner or its nozzle or other suction device which would tend to render the cleaner less effective for hand held operation. Nor is the invention limited to the particular clamping means described and illustrated, except where as specified in the claims, other constructions and arrangements for securing the cleaner to the carriage being within the scope of the invention as defined by the claims.

Having thus described the invention, what is claimed is:

1. A carriage for adapting for floor work a hand vacuum cleaner provided with a motor housing and a suction nozzle extending forwardly and downwardly therefrom, the carriage com-

prising a support for the housing, an axle carried by the support, wheels on the axle, a handle associated with the support for moving the cleaner on the work, a supplementary nozzle secured to the support and adapted to be in communication with the nozzle of the hand cleaner when the same is mounted on the support, said supplementary nozzle having a rearwardly inclined abutment arranged to receive the hand cleaner nozzle from the rear and to urge the same downwardly into aligned and sealing contact with the supplementary nozzle when the hand cleaner is urged forwardly relative to the carriage, and means for securing the motor housing to the support and for urging the cleaner forwardly on said support while permitting partial rotation of the motor housing relative to the support about an axis extending in the direction in which the cleaner is urged by said securing means.

2. A carriage for adapting for floor work a hand vacuum cleaner provided with a motor housing and a suction nozzle, the carriage comprising a support for the housing, a supplementary nozzle secured to the carriage and adapted to be engaged by the nozzle of the hand cleaner when the latter is mounted on the support, and means for securing the housing to the support comprising a spring pressed latching member arranged to engage the housing to lock the housing to the support, the member having a camming surface adapted to be engaged by the housing in positioning the hand cleaner on the support for causing said member to yield outwardly relative to the housing, and connections for actuating the member to release the housing.

3. A carriage for adapting for floor work a hand vacuum cleaner provided with a motor housing and a suction nozzle, the carriage comprising a support for the housing, a supplementary nozzle secured to the carriage and adapted to be engaged by the nozzle of the hand cleaner when the latter is mounted on the support, and means for securing the housing to the support comprising a spring pressed pin adapted to enter a recess on the rear of the housing, said pin having a straight bottom engaging face and a beveled top engaging face, and means for withdrawing the pin from the recess to release the housing from the support.

4. A carriage for adapting for floor work a hand cleaning unit comprising a motor housing and a suction nozzle projecting forwardly and downwardly therefrom, the carriage comprising a member adapted to support the motor housing of the hand unit and a supplementary nozzle secured to the supporting member having a work contacting lower face, an upper face provided with resilient means adapted to be in sealing contact with the nozzle of the hand cleaner unit when the same is mounted on the carriage, and a passage between the faces, said supplementary nozzle having an upstanding rearwardly inclined abutment to engage and overlie a portion of the hand cleaner nozzle to position the same on the supplementary nozzle and to force the hand cleaner nozzle downwardly into sealing contact with the upper face of the supplementary nozzle when the hand cleaner is urged forwardly on the carriage, and means adapted to engage the motor housing of the cleaner to secure the same to the supporting member and to urge the cleaner forwardly relative to the carriage.

5. A carriage for adapting for floor work a hand cleaning unit comprising a motor housing and a suction nozzle projecting forwardly and downwardly therefrom, the carriage comprising a member adapted to support the motor housing of the hand unit and a supplementary nozzle carried by the supporting member, said supplementary nozzle having an upstanding rearwardly inclined abutment adapted to engage and overlie a portion of the hand cleaner nozzle to position the same on the supplementary nozzle and force the hand cleaner nozzle downwardly relative to the supplementary nozzle when the hand cleaner is urged forwardly on the carriage, and rearwardly yielding means carried by the supporting member and adapted to engage the rear of the motor housing of the cleaner to urge the same forwardly relative to the carriage and likewise to secure the cleaner thereon.

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