April 7, 1953 E. P. TURNER 2,633,597

VACUUM CLEANER WITH MOTOR AND HANDLE MOUNTED ON TRUNNIONS

Filed Nov. 5, 1947 2 SHEETS—SHEET 1

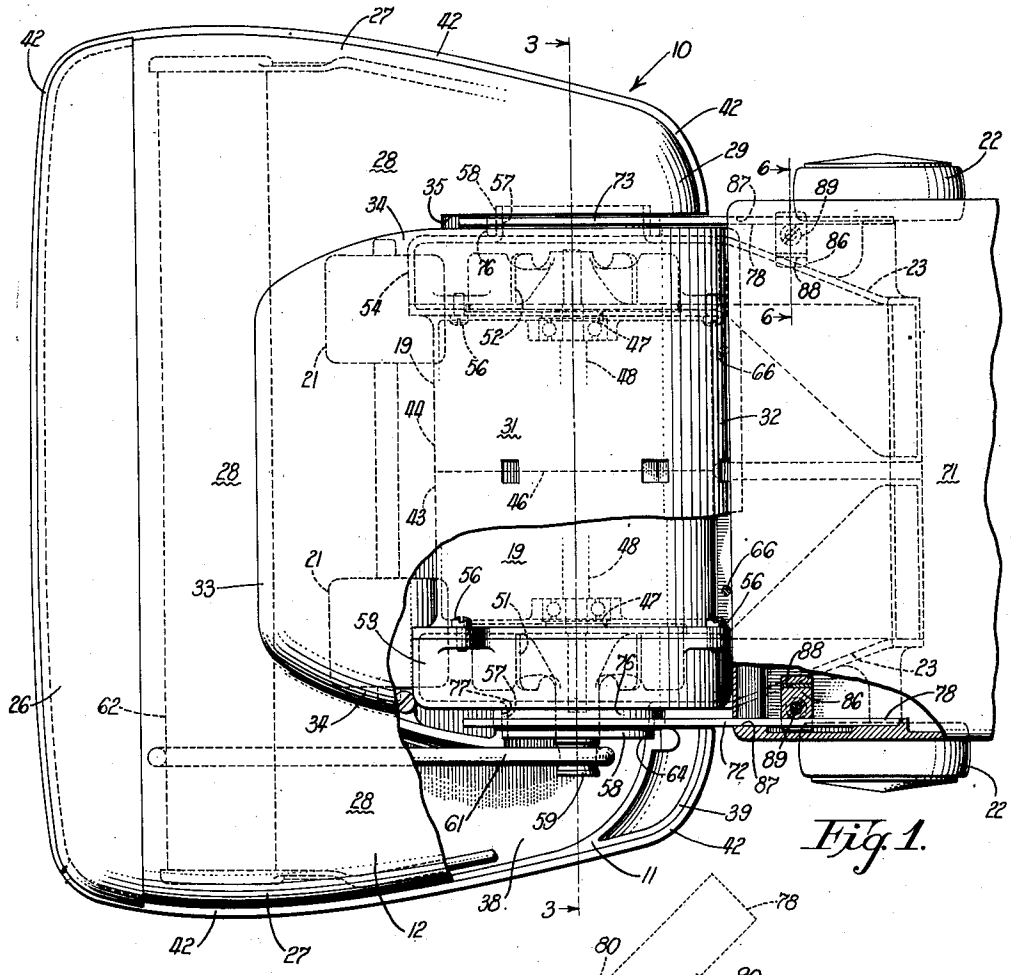


Fig. 1.

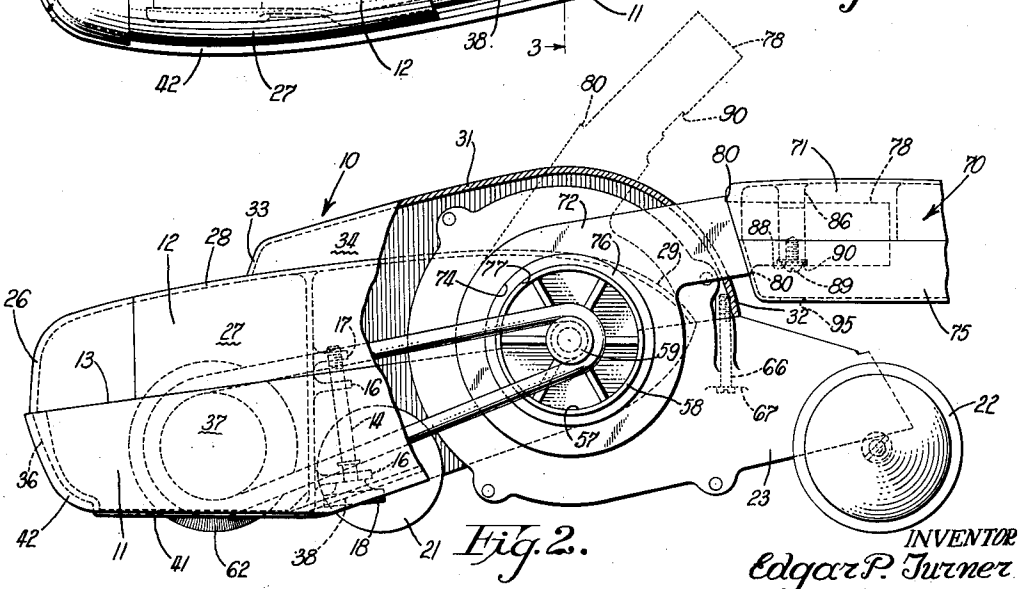


Fig. 2.

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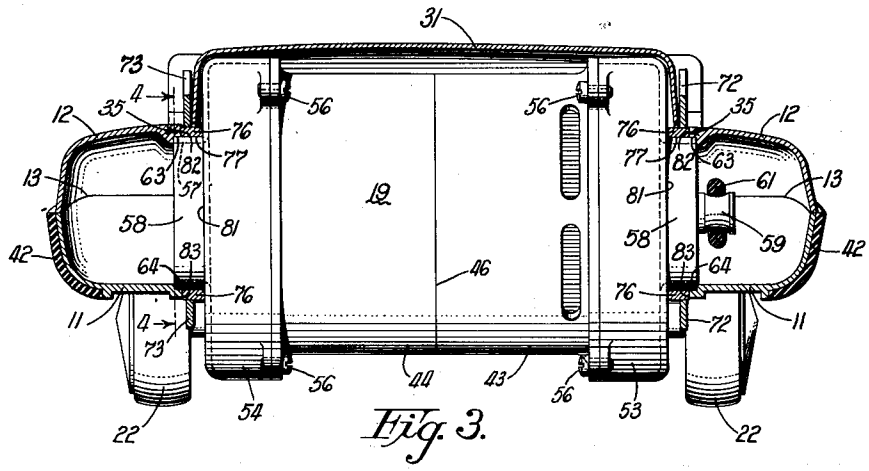


Fig. 3.

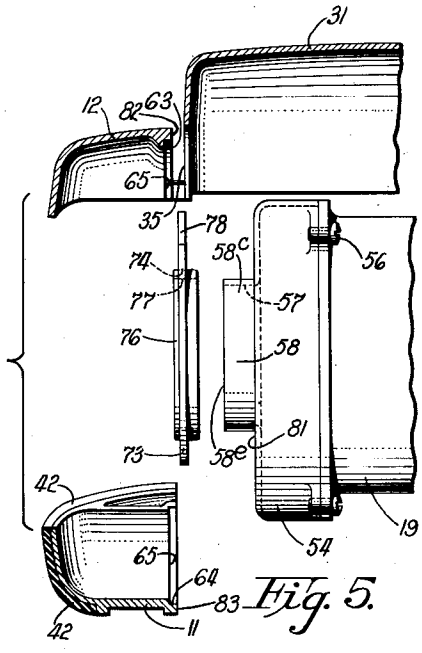


Fig. 5.

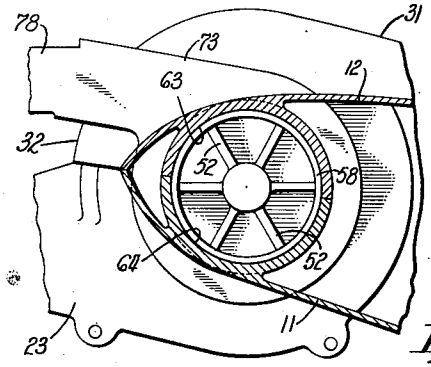


Fig. 4.

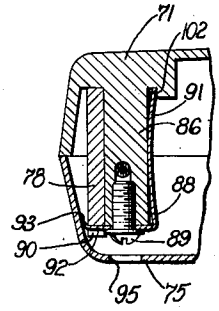


Fig. 6.

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VACUUM CLEANER WITH MOTOR AND HANDLE MOUNTED ON TRUNNIONS

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Application November 5, 1947, Serial No. 784,167

8 Claims. (Cl. 15—383)

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This invention relates to vacuum cleaners and has for one of its primary objects to provide an improved mounting arrangement for various parts of a vacuum cleaner.

A further object of the invention is to provide an improved mounting arrangement for a motor-fan unit of a vacuum cleaner.

Another object of the invention is to provide an improved pivotal mounting for the handle of a vacuum cleaner.

The invention consists in 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 plan view of a vacuum cleaner embodying this invention, parts being broken away to show internal construction;

Fig. 2 is a side elevational view of the vacuum cleaner shown in Fig. 1, parts also being broken away;

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 1 and looking in the direction of the arrows;

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3;

Fig. 5 is a partly exploded view of a portion of the mechanism shown in Fig. 3; and

Fig. 6 is a sectional view on the line 6—6 of Fig. 1 and shows means for securing the handle to the trunnion arms.

In the preferred embodiment of the invention illustrated in the drawings, the vacuum cleaner is shown as having an ambulatory casing or chassis 10 formed from a lower chassis shell 11 and an upper chassis shell 12; the two shells being joined on a line inclined slightly to the horizontal and indicated by the numeral 13. The lower shell 11 is held to the upper shell 12 by a screw 14 that is rotatably supported in a pair of bosses 16 formed integral with the lower shell 11. The threaded end of the screw 14 enters a threaded hole in a boss 17 integral with the upper shell 12. The lower end of the screw 14 is provided with a knurled head 18.

A combination electric motor and fan unit 19 is supported in the chassis 10 and the vacuum cleaner as a whole is supported on front and rear wheels 21 and 22. The front wheels are rotatably supported on axles carried by the lower chassis shell 11, whereas the rear wheels 22 are journaled on axles secured to rearwardly extending exhaust ports 23, that are formed as part of the motor driven fan unit 19.

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The upper chassis shell 12 has a front wall 26, side walls 27, a top wall 28, and rear wall portions 29. Integral with the top wall 28 is a centrally located cupola 31 which extends above the wall 28 and, when the vacuum cleaner is fully assembled, overlies the motor-fan unit 19. The cupola 31 has a back wall portion 32 which extends a short distance to the rear of the back wall portions 29. The cupola 31 also has a front wall 33 and a pair of side walls 34. Adjacent opposite sides of the side walls 34, the top wall 28 of the upper shell 12 is provided with a pair of long narrow parallel slots 35, the purpose of which will appear presently. The lower chassis shell 11 is substantially U-shaped in plan view and has a front wall 36, side walls 37, a bottom wall 38 and back wall portions 39. A forward portion of the bottom wall 38 is apertured to provide a suction mouth 41. The front wall 36, the side walls 37, and the back walls 39 of the lower chassis shell 11 as well as the front wall 26 of the upper chassis shell 12 are preferably covered with a sheel of resilient material 42 which acts as a bumper.

The electrical components (not shown) of the motor are housed within two cup-like frame members 43 and 44, the lip-rim portions of which abut on a plane 46, which plane is perpendicular to the central axis of the motor-fan unit 19. This plane 46, as best seen in Fig. 1, also coincides with the longitudinal center line of the vacuum cleaner. Each of the motor-frame members 43, 44 is concentrically apertured, as at 47, for journaling the motor shaft 48. This arrangement of parts places the motor shaft 48 parallel to the floor on which the wheels operate and also perpendicular to the longitudinal center line of the vacuum cleaner. Impeller fans 51 and 52 are carried by opposite ends of the motor shaft 48. The fans 51 and 52 are respectively housed in fan casings 53 and 54 held to the respective motor frame members 43 and 44 by screws 56. For a more complete showing of the motor-fan unit, reference may be had to an application, Serial No. 784,165, filed November 5, 1947, by Floyd T. Smith, now Patent No. 2,540,178. Each of the fan casings is apertured by an intake eye 57 and each eye is surrounded by a cylindrical trunnion 58 that is formed integral with its fan casing and extends outwardly therefrom. The trunnions 58, which are formed on opposite ends of the motor-fan unit 19, each have an outer cylindrical surface 58c and an end abutting surface

58e. A hub 59 of the fan impeller 51 is extended sufficiently to pass through the eye 57 and beyond the end of the trunnion on the fan casing 53. A pulley formed on the outer end of the hub extension 59 drives a belt 61, which in turn drives a rotary brush 62 which may be of conventional form. Each of the trunnions 58, which are formed integral with the fan casings 53 and 54, respectively, are concentric with the fans 51 and 52, as well as being concentric with the motor-frame members 43 and 44 and the motor shaft 48.

The combination motor-fan unit 19 is primarily supported in the vacuum cleaner chassis 10 by having the two opposite trunnions 58 clamped (Figs. 3, 4 and 5) between the upper and lower chassis shells 12 and 11 which for this purpose are each formed with a pair of semi-cylindrical trunnion engaging surfaces 63 and 64, respectively. Each of the surfaces 64 on the lower shell 11 is so formed that when the two chassis shells are clamped together each of the surfaces 64 will be complementary to one of the surfaces 63 on the upper shell 12, thereby forming two cylindrical trunnion engaging surfaces. Each of the surfaces 63 and 64 terminates in a semi-circular axial abutting surface 65. These surfaces are spaced apart transversely of the chassis shells 11 and 12 a distance that is substantially equal to the distance between outside ends 58e of the two trunnions 58 formed on opposite ends of the motor-fan unit 19. This assures that the unit 19 will be positioned properly with respect to the chassis shells. The motor unit 19 is additionally secured to the upper chassis shell 12 by a pair of screws 66 which pass through bosses 67 formed as part of the exhaust ports 23. These screws enter threaded holes in the upper chassis shell 12.

In addition to acting as a means for positioning and supporting the combination motor and fan unit 19 in the chassis 10, the two trunnions 58 provide a means for pivotally mounting a vacuum cleaner handle 70, only a lower portion of the handle being herein shown. The handle 70 has an inverted box portion 71 which is covered by a lower cover 75 secured thereto by a means not herein shown. A pair of flat trunnion arms 72 and 73 are provided, and each trunnion arm has an aperture 74 into which is press fitted a bearing bushing 76, made from a bearing composition and having an internal bearing surface 77. This surface 77, in each case, is rotatably positioned on the outer cylindrical surface 58c of one of the trunnions 58. Each of the trunnion arms 72 and 73 has an outwardly extending rectangular leg 78 which passes through one of the two slots 35 and thereafter is secured to the box portion 71 of the handle 70. Each leg 78 is provided on opposite sides thereof with a pair of shoulders 80 which engage the box 71 and cover 75 thereby properly positioning the handle 70 with respect to the chassis 10. The means for securing the handle 70 to the legs 78 includes a pair of posts 86 (Figs. 2 and 6) that are formed integral with and extend outwardly from the inner surface of the box 71. Each of the legs 78 of the arms 72, 73 passes through an aperture 87 formed in the lower end of the handle 70 and is clamped to one of the posts 86 by means of an L-shaped clip 88. One leg 91 of the L-shaped clip 88 has its longitudinal dimension bent, that is to say, the leg 91 is bent about an axis positioned transversely to its longest dimension. This leg 91, when in position, is adjacent one side of the post 86, with one end of the leg entering a recess 102 formed in the box 71. The other leg 92, of the clip 88, passes over the end of the post 86 and is held thereto by a headed screw 89. The leg 92 extends beyond the post 86 and thereby enters an appropriately sized notch 90 formed on one side of the leg 78. The leg 92 after it passes beyond the member 78 is formed with a small bent over portion or hook 93 which engages the leg 78 thereby holding the leg 78 adjacent the side of the post 86 which is remote from the side thereof which is adjacent the leg 91 of the clip 88.

As the handle 70 is raised and lowered, the composition bushings 76 and the trunnion arms 72, 73 rotate as a unit with respect to the trunnions 58. As best seen in Fig. 3, the composition bearing ring 76 is held in position axially with respect to the motor-fan unit by being spaced between an external abutting surface 81 of the fan casing 54 and internal abutting surfaces 82 and 83, respectively, formed on the upper shell 12 and the lower shell 11 adjacent the trunnion engaging surfaces 63 and 64. The bushing 76 associated with the arm 72 is held in an axial position in a manner similar to that just described. Since each of the trunnion arms 72, 73 is press fitted over and therefore is secured to its respective bearing bushing 76, the trunnion arms will likewise be held in proper spaced relation axially of the motor-fan unit 19.

From the foregoing, it will be noted that this invention has provided a vacuum cleaner that is compact and sturdily constructed, and in which means have been provided whereby the motor-fan unit 19 and the handle 70 can be detached quickly and easily from the trunnion arms 72—73. In the event that it becomes desirable to remove the motor-fan unit 19 from within the chassis 10, it is simply necessary to invert the vacuum cleaner, including the chassis 10 and handle 70. Then the two screws 89, the heads of which can be engaged by a screw driver passed through holes 95 provided in the cover 75, are loosened. Loosening the screws 89 permits the handle 70 to be detached from the trunnion arms 72 and 73. Then the lower chassis shell 11 is removed by unscrewing the thumb screw 14. This exposes the motor-fan unit 19, the two screws 66 as well as the belt 61; the latter being easily removed from the hub 59. Unscrewing the two screws 66 completely frees the motor-fan unit 19 from the upper chassis shell 12. Since the trunnion arms 72, 73 are pivoted on the trunnions 58, which are part of the motor-unit 19, it is obvious that the legs 78 of the trunnion arms will be pulled through the slots 35 as the motor-fan unit is removed from the chassis shell 12.

The term "trunnion," as herein used, refers to the two opposite cylindrical projections or similar structures 58 formed on opposite sides of the motor-fan unit 19. The term "trunnion" is not intended to convey the idea that the motor-fan unit turns on the trunnions as an axis. The trunnion arms 72 and 73 rotate with respect to the trunnions, but in the preferred form of construction there is no relative rotary motion between the trunnions and the chassis shells 11 and 12.

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

1. A vacuum cleaner comprising an upper chassis shell, a lower chassis shell, means for securing said lower shell to said upper shell, a pair of semicylindrical surfaces in spaced portions of said upper shell, an axial abutting surface formed adjacent each of said semicylindrical surfaces, a pair of semicylindrical surfaces in spaced por-

tions of said lower chassis shell, an axial abutting surface adjacent each of said semicylindrical surfaces in said lower shell, said two pairs of semicylindrical surfaces being so constructed and arranged as to form two cylindrical surfaces when said lower shell is clamped to said upper shell, a motor-fan unit supported in said chassis, a pair of spaced cylindrical trunnions formed on said motor-fan unit, said trunnions being of such diameter as to fit into said cylindrical surfaces and said trunnions being so spaced as to be axially positioned by said axial abutting surfaces.

2. A vacuum cleaner comprising an upper chassis shell, a lower chassis shell, means for securing said lower shell to said upper shell, a pair of semicylindrical surfaces in spaced portions of said upper shell, a first axial abutting surface adjacent each of said semicylindrical surfaces, a second axial abutting surface adjacent each of said semicylindrical surfaces, a pair of semicylindrical surfaces in spaced portions of said lower chassis shell, an axial abutting surface adjacent each of said semicylindrical surfaces in said lower chassis, a second axial abutting surface adjacent each of semicylindrical surfaces in said lower chassis, a motor-fan unit housed in said chassis shells, a trunnion formed on opposite ends of said motor-fan unit, end abutting surfaces on each of said trunnions, outer cylindrical surfaces on each of said trunnions, said outer cylindrical surfaces of said trunnions being contacted by said semicylindrical surfaces, and said first axial abutting surfaces being contacted by the end surfaces of said trunnions, a cylindrical bearing bushing rotatably carried on each of said trunnions, a trunnion arm secured to each of said bushings, one side face of each of said bushings being in contact with said second abutting surfaces, and a vacuum cleaner handle detachably secured to said trunnion arms.

3. A vacuum cleaner comprising an upper chassis shell; a lower chassis shell secured to said upper chassis shell; a horizontal motor-fan unit supported by said upper and lower chassis shells; a pair of trunnions formed on opposite ends of said motor-fan unit; a pair of trunnion arms, one being pivotally mounted on each of said trunnions; and a handle member secured to said trunnion arms.

4. A vacuum cleaner comprising an upper chassis shell having a pair of long narrow slots formed therein; a lower chassis shell secured to said upper chassis shell; a horizontal motor-fan unit supported by said upper and lower chassis shells; a pair of trunnions formed on opposite ends of said motor-fan unit; a bearing bushing pivotally mounted on each of said trunnions; a trunnion arm secured to each of said bearing bushings, said trunnion arms extending through said narrow slots; and a handle member detachably secured to the ends of said trunnion arms.

5. A vacuum cleaner comprising an upper chassis shell having a pair of long narrow slots formed therein; a lower chassis shell secured to said upper chassis shell, a plurality of supporting and abutting surfaces formed on spaced portions of said upper and lower chassis shells; a horizontal motor-fan unit having a pair of trunnions formed on opposite ends thereof, said motor-fan unit being positioned and spaced by said plurality of surfaces; a pair of trunnion arms, one being pivotally mounted on each of said trunnions and extending through one of said slots; and a handle member secured to said trunnion arms.

6. A vacuum cleaner comprising an upper chassis shell having a cupola formed as a part thereof, said upper shell being provided with a pair of long narrow slots adjacent said cupola; a lower chassis shell secured to said upper shell; a pair of semicircular surfaces on said upper shell; a pair of semicircular surfaces on said lower shell, formed complementary to said semicircular surfaces on said upper shell; a motor-fan unit housed by said two shells; a pair of opposed trunnions formed on said motor-fan unit, said trunnions engaging said semicircular surface in such a manner as to position said motor-fan unit with respect to said shells; a bearing member rotatably carried on each of said trunnions; a trunnion arm secured to each of said bearing members; a leg formed integral with each of said trunnion arms, each of said legs extending through one of said long narrow slots; and a handle member secured to the said pair of legs.

7. A vacuum cleaner comprising an upper chassis shell having a pair of long narrow slots formed therethrough, a lower chassis shell secured to said upper shell, a pair of cylindrical members engaged by said chassis shells and positioned within said chassis shells, a motor-fan unit attached to and concentric with said cylindrical members, a pair of arms pivotally carried on said cylindrical members and projecting through said pair of slots, and a handle member detachably secured to said arms at a point outside said upper chassis shell.

8. An ambulatory type vacuum cleaner arranged for to-and-fro movement on a floor, comprising, a hollow chassis shell having a pair of long narrow slots formed adjacent opposite sides thereof, said slots extending in a direction that is parallel to the direction of the to-and-fro movement; a plurality of supporting wheels rotatably mounted on said chassis shell; a dual-fan motor-unit supported by said chassis shell, said motor unit having a horizontal shaft that extends transversely of the direction of the to-and-fro movement, and said dual-fan motor-unit being symmetrically located in the chassis transverse to the direction of the to-and-fro movement; a brush rotatably supported within said chassis shell and extending at right angles to the direction of the to-and-fro movement; means for driving said rotary brush from said motor shaft; a pair of trunnions located within said chassis shell and at opposite ends of said dual-fan motor-unit; a pair of trunnion arms, one being pivotally mounted on each of said trunnions and extending through the slots in said chassis shell; and a handle member attached to said trunnion arms.

EDGAR P. TURNER.

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