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2,870,863

COUPLING

Filed Oct. 4, 1955

2 Sheets-Sheet 1

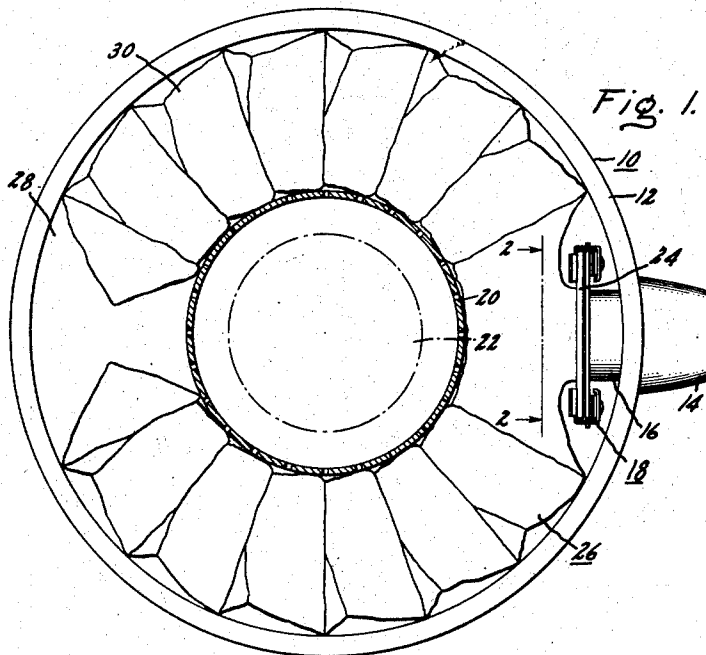


Fig. 1.

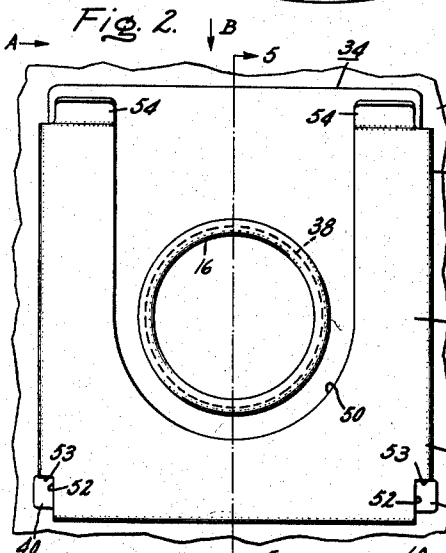


Fig. 2.

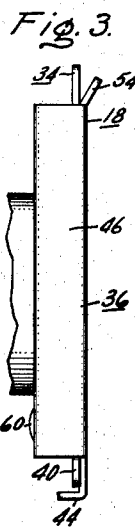


Fig. 3.

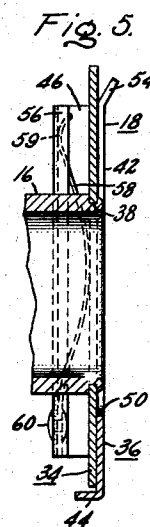


Fig. 5.

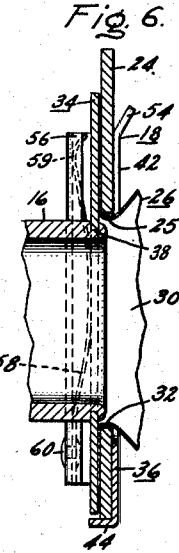


Fig. 6.

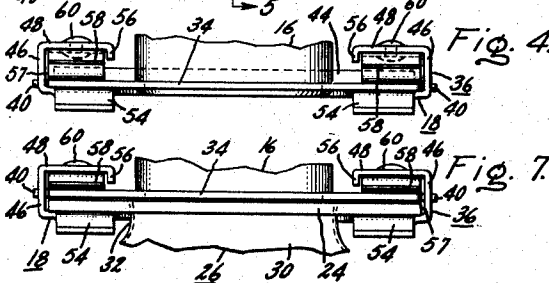


Fig. 4.

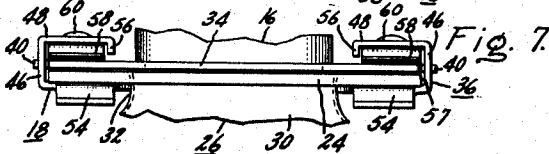


Fig. 7.

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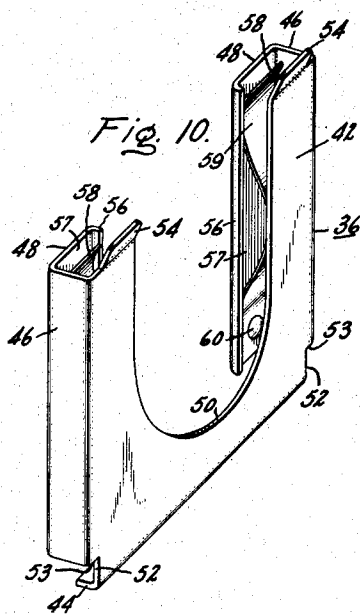
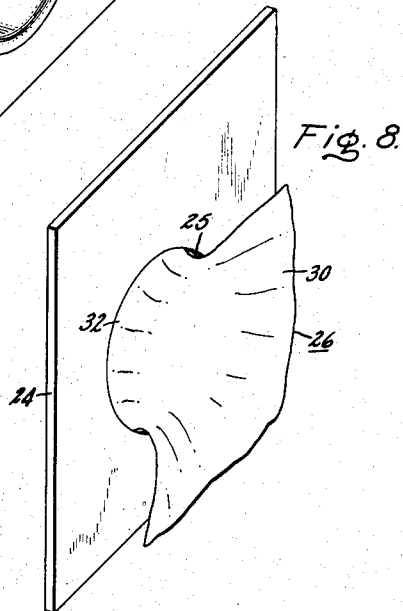
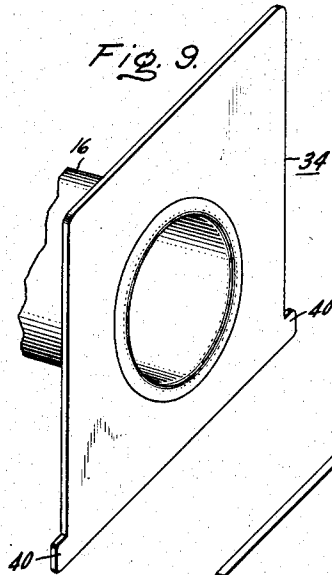
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COUPLING

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Application October 4, 1955, Serial No. 538,437

12 Claims. (Cl. 183—43)

This invention relates generally to a coupling and, particularly to one between a rigid member and a non-rigid member, such as a rigid, vacuum cleaner, dirt bag fastener and a non-rigid, removable dirt bag.

In application, Serial No. 411,056, filed February 18, 1954, by Mr. W. N. Kemnitz and myself, now Patent No. 2,771,152, and assigned to the same assignee as the instant application, there is disclosed an invention relating to a vacuum cleaner and a disposable dirt bag therefor. The instant invention pertains to an improvement in the coupling formed by the vacuum cleaner bag fastener and the dirt bag, and particularly to the construction of the bag fastener. As was pointed out in the referred-to prior application, due to the increasing use of vacuum cleaners by domestic users, the modern trend in the vacuum cleaner art is to provide disposable dirt bags. It is highly desirable that the insertion and removal of such dirt bags be simple, swift and sanitary. It is concomitantly important, however, to assure a tight coupling between the dirt bag and the vacuum cleaner to preclude any leakage of dirt-laden air, and thereby insure that all dirt-laden air passes through the dirt bag, where the dirt is removed from it. It is fundamental in an art as competitive as the vacuum cleaner art, that the accomplishment of foregoing desirable purpose be effected at a minimum cost.

It is an object of this invention to provide an improved coupling for a rigid member and a non-rigid member, and particularly one which is useful as a connection between a disposable dirt bag and a vacuum cleaner. More particularly, it is an object of this invention to provide such an improved coupling which is simple, swift and sanitary in use, and which, further, effects a tight connection when the members are coupled.

Other objects and details of that which I believe to be novel and my invention will be clear from the following description and claims taken with the accompanying drawings, in which are shown one embodiment of the invention.

Fig. 1 is an elevation view of a vacuum cleaner having a part removed to more clearly show the internal construction.

Fig. 2 is a view taken substantially on line 2—2 of Fig. 1 after the disposable dirt bag has been removed.

Fig. 3 is a fragmentary, side, elevation view of Fig. 2, looking in the direction of arrow (A).

Fig. 4 is a fragmentary, top, elevation view of Fig. 2 looking in the direction of arrow (B).

Fig. 5 is a fragmentary, sectional view taken substantially on line 5—5 of Fig. 2.

Fig. 6 is a view similar to Fig. 5 showing the parts after a dirt bag has been coupled.

Fig. 7 is a view similar to Fig. 4 showing the parts after a dirt bag has been coupled.

Fig. 8 is a perspective view of a dirt bag.

Fig. 9 is a perspective view of the back plate of the vacuum cleaner dirt bag fastener.

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Fig. 10 is a perspective view of the pressure plate of the vacuum cleaner dirt bag fastener.

The invention may be applied in any environment where it is desirable to provide an inexpensive, effective coupling between a rigid member and a non-rigid member. It is particularly useful in a vacuum cleaner where it may be incorporated as a means for connecting a disposable dirt bag to the vacuum cleaner, therefore, it is illustrated, and will be described, as applied to a vacuum cleaner; it should be clearly understood, however, that it may be used in other applications, wherever a coupling of the type is needed.

Fig. 1 illustrates, for the purposes of exemplification, the improved coupling incorporated in a vacuum cleaner. Vacuum cleaner 10 comprises an outer, rigid cylindrical wall 12 having an external inlet 14 for connection to a conventional vacuum cleaner hose, which communicates with an inlet tube 16 disposed internally of the wall 12, and which supports at its inner end the dirt bag fastener 18. Bag fastener 18 is the rigid coupling member. As used herein the term "rigid" signifies that the components of the bag fastener are made of rigid material, such as a metal, or hard plastic, however, there may be some movement of the components relative to each other; the term is used primarily to distinguish the physical characteristics of the bag fastener from those of the disposable dirt bag 26, which is the non-rigid member and may be made of filter paper or fabric, other than its mounting portion 24.

Concentrically spaced within the cylindrical wall 12 is an inner, rigid, perforate, cylindrical wall 20 which surrounds a conventional, schematically illustrated, fan and motor unit 22. The details of the vacuum cleaner form no specific part of this invention and, therefore, will not be described in detail; this invention relates primarily to the coupling formed by the bag fastener 18 and the mounting portion 24 of the disposable dirt bag 26. As illustrated in Fig. 1, an annular cavity 28 is formed between the outer and inner cylindrical walls of the cleaner, and the disposable dirt bag 26 is disposed therein when it is coupled to the bag fastener 18 for use. It will be understood that the dirt bag may be removed and disposed of by uncoupling its mounting portion from the bag fastener of the cleaner.

By reference to drawings, the detailed construction of the improved coupling will become apparent. It will be observed in Figs. 1, 6 and 7 that the coupling comprises the aforementioned bag fastener 18 formed on the vacuum cleaner and the mounting portion 24 formed on the disposable dirt bag 26. As was the case in the referred-to application of Mr. Kemnitz and myself, the disposable dirt bag comprises a flexible, receptacle portion 30 made of filtering fabric, paper or the like, and the mounting portion 24 in the form of a rigid or semi-rigid mounting plate which may be cardboard or the like (see Fig. 8). Mounting plate 24 is apertured at 25, and is secured to the receptacle portion by passing the neck 32 of the receptacle portion through the aperture 25 and cementing or gluing it to the mounting plate.

The bag fastener 18 comprises a back plate 34 and a pressure plate 36 (see Figs. 2, 3, 4 and 5). Back plate 34 is illustrated by itself in Fig. 9; it has a central opening 38 and is rigidly connected to inlet tube 16, with its opening aligned with the tube. The back plate is rigid, thin, generally rectangular and has a pair of oppositely, laterally projecting tabs 40 formed at one of its sides.

The pressure plate 36 is illustrated by itself in Fig. 10. It comprises a bent and shaped member having a front wall 42, bottom wall 44, a pair of side walls 46, and a pair of rear flanges 48. Note that for purposes of ex-

planation, the wall 42 is considered the front, and the flanges 48 constitute the rear of the pressure plate. The front wall 42 has a large notch 50 having a U-shaped periphery cutout for receiving the neck 32 of the dirt bag when the parts are coupled. A pair of relatively small, rectangular notches 52 are cut out of each of the lower corners of the front wall, and the lower portions of side walls 46 are cut away at 53. The upper portions 54 of front wall 42 are bent slightly out of the major plane of the front wall, and thereby form a pair of flanges for guiding the mounting plate 24 during coupling of the dirt bag to the bag fastener. The bottom wall 44 is bent generally at a right angle to the front wall, as are the side walls 46, the latter being bent in planes that are perpendicular to the plane of the former. However, the bottom wall does not extend rearwardly as far as the side walls. Each of the side walls 46 supports an inwardly directed rear flange 48, which is disposed relatively thereto at a right angle. The flanges oppose each other and are spaced, and have their adjacent edges 56 bent over. As can be clearly seen in Fig. 10, each of the side portions of the front wall, and their adjacent side walls and rear flanges, form a guide channel 57. In each of the channels 57 is disposed a bowed leaf spring 58 which is secured at its lower end to the lower portion of the front face of the rear flange 48 as by a rivet 60. As can best be seen in Fig. 5, the bowed portions of the springs press against the rear face of the front wall 42. The top ends 59 of the springs are free to move during flexing of the springs.

The back plate and pressure plate are shown in assembled position prior to having a dirt bag coupled to them in Figs. 2, 3, 4 and 5. In these figures it will be observed that when the plates are assembled, the back plate 34 is disposed substantially within the pressure plate 36, its side portions being disposed within the channels 57, and its tabs 40 extending laterally through the cutaway portions 53, underneath and beyond the lower edges of the side walls 46 of the pressure plate. It will be observed further, that the front face of the back plate 34 is in intimate, planar contact with the rear face of the front wall 42 of the pressure plate 36, and that it is urged into this position by the bowed central portions of springs 58, which engage it at both of its sides (see Figs. 4 and 5).

To assemble the plates, the pressure plate 36 is disposed above the back plate 34 and moved downwardly over it. The plates may be tilted relative to each other to permit clearance between the bottom wall 44 and the top portion of the back plate 34. During this movement, the springs 58 are compressed sufficiently so as to permit the back plate to be inserted between the rear side of the front wall 42 and the rear flanges and the springs. When the pressure plate reaches a point where its bottom wall 44 clears the side of the back plate having the tabs 40, the force of the springs snap the back plate into place, as shown in Figs. 2, 3, 4 and 5. The springs 58 then maintain the plates in the illustrated, assembled relationship.

When it is desired to couple a member, such as dirt bag 26, to the assembled bag fastener 18, the mounting plate 24 of the member is inserted downwardly into the bag fastener between the rear face of the front wall 42 of the pressure plate and the front face of the back plate 34. To facilitate insertion, the guide flanges 54 may be utilized. The neck 32 of the bag is slid into the U-shaped notch 50 during coupling until the mounting plate 24 is fully mounted. This coupled relationship is shown in Figs. 6 and 7, wherein it will be observed that the mounting plate 24 is disposed between the front wall 42 of the pressure plate and the back plate 34. These parts are in substantial, intimate, planar contact, being maintained in such condition by the springs 58. To remove the dirt bag, it is simply necessary to grasp the top of

the mounting plate 24 and slide it upwardly, out from between the plates of the fastener.

In view of the foregoing, it will be apparent that coupling and uncoupling of the dirt bag to the bag fastener may be effected quickly and readily, and that when coupled, the connection is on three sides of the bag mounting portion over a substantial area, and is tight and effective. As was mentioned, tightness is extremely important in a vacuum cleaner application, for avoidance of leakage is necessary. When used in the vacuum cleaner application, it will be apparent that dirt-laden air will flow from a conventional cleaning tool and hose (not shown), through the inlet 14 and inlet tube 16, out opening 38 in the back plate 34, through the neck 32 and into the dirt bag receptacle portion 30, from which it emerges with the dirt removed and passes through the motor-fan unit 22 and out appropriate discharge openings (not shown). It will be understood that after the dirt bag is full and it is desired to dispose of it, it is simply necessary to open the vacuum cleaner, grasp the top of the mounting plate 24, as mentioned before, and pull it upwardly relative to the bag fastener 18. Thereafter, it may be appropriately disposed of simply by depositing it in a convenient trash receiving receptacle. It should be noted that the removal of the filled dirt bag can be accomplished without touching any of the receptacle portion of the dirt bag, which may be soiled. A new, clean, empty dirt bag may then be mounted in the cleaner by inserting its mounting plate 30 into the bag fastener as described.

As will be evident from the foregoing description, certain aspects of my invention are not limited to the particular details of construction of the examples illustrated, and I contemplate that various and other modifications and applications will occur to those skilled in the art. It is, therefore, my intention that the appended claims will cover such modifications and applications as do not depart from the true spirit and scope of my invention.

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

1. A fastener comprising a back plate and a pressure plate, said plates having opposed planar surfaces, and means secured to one of said plates and disposed between portions of said plates for normally resiliently pressing said surfaces into contact, said plates being mounted for uniform relative movement toward and away from each other and adapted to have the mounting plate of a member to be coupled to said fastener inserted and slid between them.

2. A device as defined in claim 1 wherein one of said plates has an edge portion bent out of its major plane to facilitate insertion of said mounting plate.

3. A device as defined in claim 1 wherein said back plate has an opening, said mounting plate has an aperture, and said pressure plate has a notch which overlies said opening, whereby said mounting plate when coupled to said fastener has its aperture aligned with the opening in said back plate.

4. A device as defined in claim 1 wherein said back plate is rigidly mounted, is substantially rectangular and has a pair of oppositely, laterally extending tabs near one of its sides, and said pressure plate comprises a front wall, side walls and rear flanges which cooperate to form channels for receiving said back plate when the plates are assembled, said tabs adapted to extend laterally beyond said side walls when the plates are assembled whereby said pressure plate engages said tabs to prevent disassembly of said plates.

5. A device as defined in claim 4 wherein said pressure plate includes a bottom wall which is narrower than said side walls, and which contacts an edge of the tabbed side of said back plate to lock the plates when the fastener is fully assembled.

6. A device as defined in claim 1 wherein said means

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comprises a pair of leaf springs which are secured to one of said plates.

7. A coupling for a dirt bag and a vacuum cleaner comprising a bag fastener rigidly mounted on said cleaner, said bag having a mounting plate, said fastener comprising a pair of plates which are normally resiliently pressed into mutual planar contact, said fastener plates being adapted to be parted by said mounting plate upon insertion of said mounting plate therebetween, whereby said fastener plates tightly embrace said mounting plate when the latter is fully mounted in said fastener.

8. A device as defined in claim 7 wherein means are provided on one of said fastener plates for urging said fastener plates toward each other.

9. A device as defined in claim 7 wherein said plates are resiliently pressed into mutual planar contact by a pair of leaf springs which are secured to one of said fastener plates.

10. A device as defined in claim 7 wherein said bag fastener comprises a back plate and a pressure plate, an opening in said back plate, and a notch in said pressure plate which overlies said opening, and said bag comprises a receptacle having said mounting plate secured thereto, said mounting plate having an opening formed therein, whereby the opening in the mounting plate is aligned with the opening in said back plate, and a portion of the receptacle is disposed in said notch when the bag is coupled to the fastener.

11. A device as defined in claim 10 wherein said back plate is rigidly mounted, is substantially rectangular and

has a pair of oppositely, laterally extending tabs near one of its sides, and said pressure plate comprises a front wall, side walls and rear flanges which cooperate to form channels for receiving said back plate when the plates are assembled, said tabs adapted to extend laterally beyond said side walls when the plates are assembled, whereby said pressure plate engages said tabs to prevent disassembly of said plates.

12. A device as defined in claim 7 wherein said bag fastener comprises a back plate and a pressure plate, said back plate is rigidly mounted, is substantially rectangular and has a pair of oppositely, laterally extending tabs near one of its sides, and said pressure plate comprises a front wall, side walls and rear flanges which cooperate to form channels for receiving said back plate when the plates are assembled, said tabs adapted to extend laterally beyond said side walls when the plates are assembled, whereby said pressure plate engages said tabs to prevent disassembly of said plates.

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