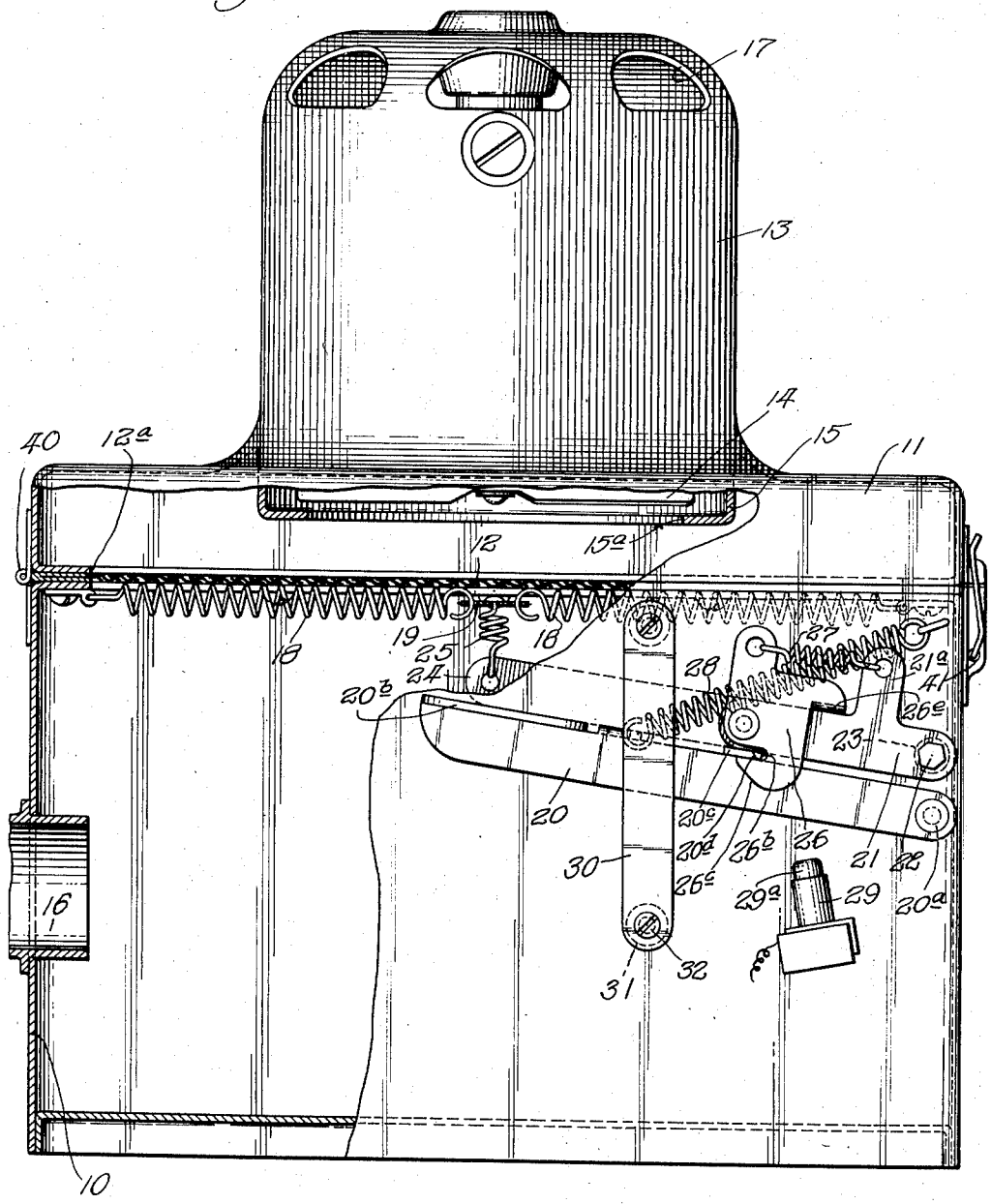
Feb. 13, 1951 C. H. SPARKLIN 2,541,122

VACUUM CLEANER

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Fig. 1.



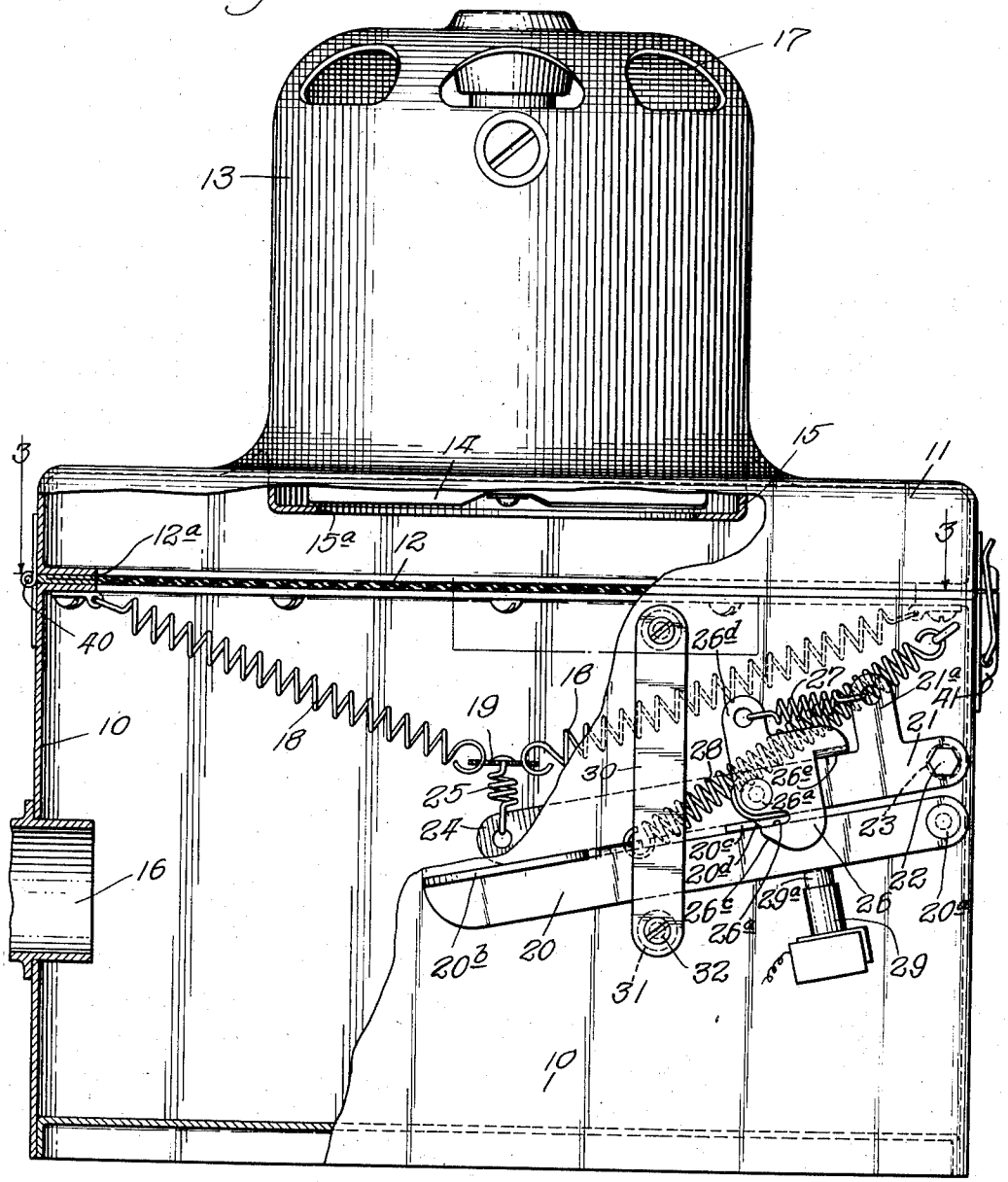
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VACUUM CLEANER

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Fig. 2.



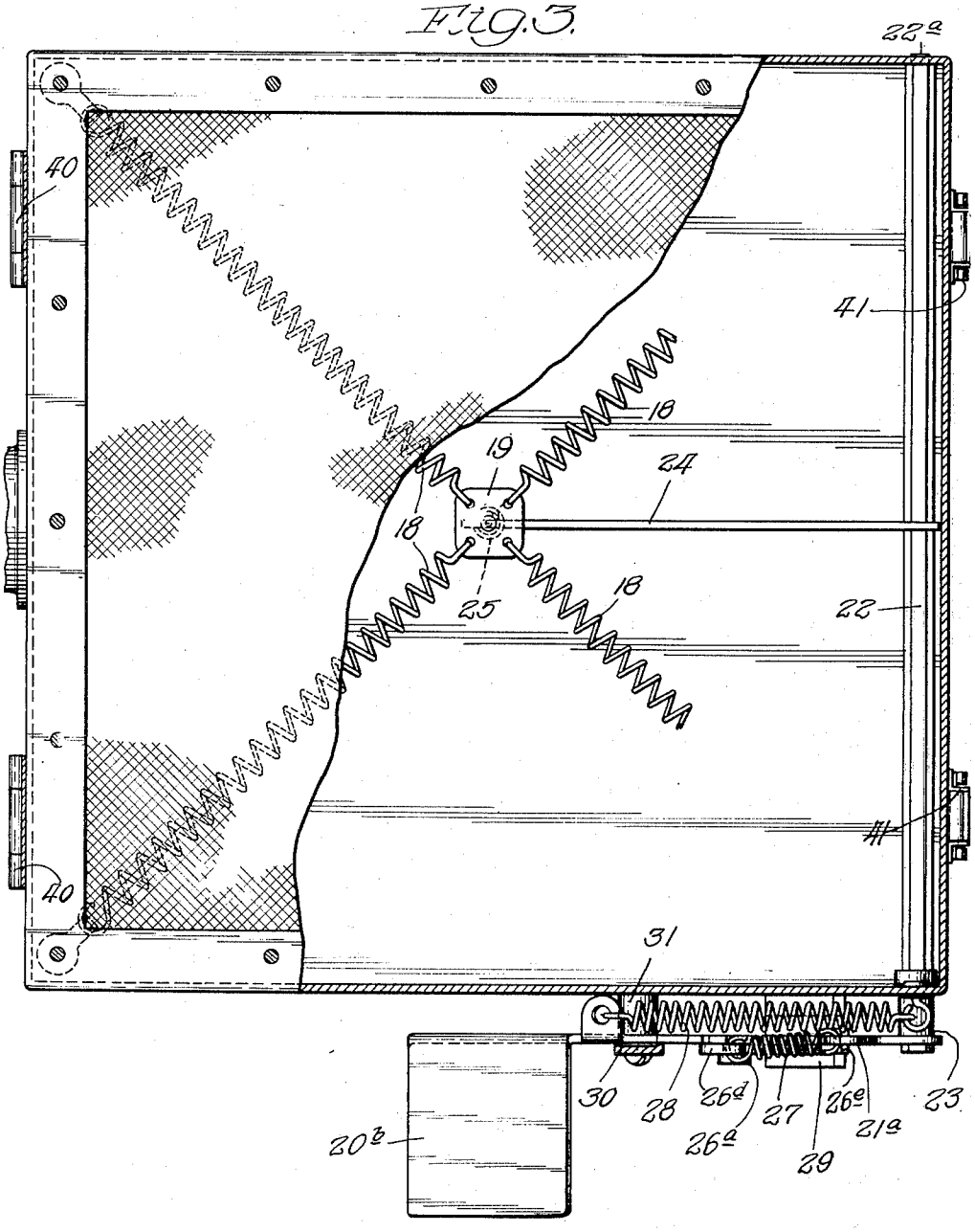
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Fig. 3.



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VACUUM CLEANER

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11 Claims. (Cl. 183—55)

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This invention relates to a vacuum cleaner having a dirt separating member and means for drawing air through said member. It relates particularly to means for agitating the separating member for loosening dirt embedded therein.

The invention is particularly adaptable to those vacuum cleaners of the vertical tank type wherein there is provided a dirt separating member such as a flexible screen arranged above a dirt receptacle and a motor driven fan above the screen for drawing dirt laden air through the screen. The dirt that is separated by the screen ordinarily falls into the dirt receptacle. It has been found, however, that a substantial portion of the dirt remains on the screen with this dirt having the effect of partially closing the openings in the screen. This dirt on the screen causes the cleaner to develop a back pressure which reduces the efficiency of the cleaner. The present invention is concerned with means for agitating the screen so that the embedded dirt will be jarred loose and fall into the dirt receptacle. The agitating means may be operated at any time, but it is preferred that it be operated only when the vacuum cleaner is not operating so that there will be no flow of air through the screen resisting the loosening of the dirt. The agitating means may, of course, be operated at any time, but it has been found that if it is operated between periods of operation of the cleaner, the back pressure is reduced each time to approximately its original low value.

The invention will be described as related to the embodiment shown in the accompanying drawings. Of the drawings: Fig. 1 is an elevation partially in section of a vertical tank type vacuum cleaner embodying the invention with the agitating means shown at rest; Fig. 2 is a view similar to Fig. 1 but showing the agitating means just prior to its operation; and Fig. 3 is a horizontal section taken along line 3—3 of Fig. 2. Although the invention as shown is applied to a vertical tank type vacuum cleaner, it can just as easily be used with a horizontal tank type cleaner, a motor brush cleaner, or any other cleaner wherein dirt is separated from a flow of air by passing the air through a screen or other separating member.

In the embodiment shown in the drawings, the vacuum cleaner comprises a bottom portion 10 serving as a dirt receptacle, a top portion 11 arranged on the bottom portion, a flexible cloth screen 12 between the top and bottom portions with the screen having a marginal reenforcement 12a, an electric motor 13 mounted on the top portion 11, and a suction fan 14 operated by the motor and partially enclosed in a fan housing 15. The dirt receptacle 10 of the cleaner is provided with an air conduit portion 16 extending through a wall of the dirt receptacle and through which dirt laden air is drawn through a nozzle or the like in a well known manner. The air is drawn through the air conduit portion 16 up through the screen 12, through an opening 15a in the fan housing 15 around the motor, and exhausted out through outlet ports 17 in the housing for the motor. The air that flows around the motor serves to cool the motor in the well known manner.

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In order to agitate the screen 12 periodically, there are arranged a plurality of coil springs 18 having one end of each attached adjacent an edge of the screen with these ends being spaced from each other and the other ends attached to each other through a small plate 19. When the springs 18 are used on a vacuum cleaner having a square dirt receptacle 10, as is shown in the drawings, each spring 18 is fastened adjacent a corner of the screen. The small plate 19 is then located opposite the approximate center of the screen 12.

On the outside of the dirt receptacle 10, there is mounted a first lever 20 arranged for rotation about a fulcrum 20a at one end of the lever. Located immediately above the first lever 20 is a second lever 21 of considerably shorter length. This second lever is attached to a hexagonal rod 22 that is mounted to rotate about its axis. This rod 22 extends across the dirt receptacle 10 at one edge thereof and has the lever end held in a sleeve 23 that extends through one wall of the dirt receptacle with the other end of the rod being provided with a small circular extension 22a that extends through the opposite wall of the dirt receptacle. The sleeve end of the rod 22 is mounted adjacent the fulcrum 20a and vertically above the fulcrum.

At approximately the midpoint of the rod 22, there is located an arm 24 extending to a point beneath the small plate 19. The second lever 21 and the arm 24 are mounted for rotation with the rod 22 and are arranged substantially parallel to each other. The free end of the arm 24 is attached by means of a small coil spring 25 to the plate 19.

Rotatably mounted on the free end of the second lever 21 is a dog 26 with this dog being mounted on a fulcrum 26a. The dog is provided with an inwardly extending notch 26b located below the bottom side of the second lever 21 and

a sloping cam surface 26c sloping upwardly toward the open end of the notch 26b. The upper end of the dog 26 is provided with an extension 26d. A small coil spring 27 is provided extending between this extension 26c and a similar extension 21a on the second lever 21. This small spring 27 serves to urge the dog 26 in a clockwise direction around the fulcrum 26a as viewed in Fig. 1. A small side extension 26e is provided on the dog 26 with this extension normally resting against the top surface of the second lever 21. This side extension 26e prevents the dog 26 from being turned too far in a clockwise direction under the urging of spring 27. The extensions 21a, 26d, and 26e are so located that when the extension 26e is against the top surface of the second lever 21, the notch 26b will be located between the top surface of the first lever 20 and the bottom surface of the second lever 21 and will be arranged approximately parallel thereto.

At the free end of the first lever 20, there is located a treadle portion 20b extending outwardly from the adjacent side of the dirt receptacle 10. Located on the first lever 20 adjacent the notch 26b in the dog 26, there is a small extension 20c having a downwardly sloping edge surface 20d adjacent the notch 26b in the dog 26. The small extension 20c and the notch 26b are so located that when the levers 20 and 21 are in their topmost positions, the extension 20c will be located within the notch 26b. The coil springs 18 that serve to agitate the screen 12 normally hold the second lever 21 and arm 24 in a topmost position with the springs 18 adjacent the screen 12 (Fig. 1). In order to hold the first lever 20 in a similar position, there is provided a coil spring 28 attached to the first lever 20 and to the dirt receptacle 10.

Located below the lowest position of the first lever 20, there is provided a switch 29 mounted on the outside of the dirt receptacle 10. This switch is in the electrical circuit to the motor 13 and is provided with a plunger portion 29a adapted to turn the switch on and off.

As has been previously explained, the agitating coil springs 18 are normally located adjacent and just beneath the screen 12 and serve to hold the second lever 21 and arm 24 in their topmost position. The spring 28 also serves to hold the first lever 21 in a similar position with the levers being approximately parallel to each other. When in this position, the extension 20c will be located within the notch 26b. With the parts in this position, the cleaner will not be operating. When it is desired to start the operation of the cleaner, the first lever 20 is turned in a counterclockwise direction, as viewed in Fig. 1, by pressing down on the treadle 20b. Because of the engagement of the extension 20c with the notch 26b in the dog 26, this will also serve to draw the second lever 21 arm 24 and springs 18 down. As the downward movement is continued from the topmost position, the extension 20c gradually moves out of the notch 26b. This is brought about by having the two levers 20 and 21 rotatable about spaced points. When the parts have reached the position shown in Fig. 2, the extension 20c on the first lever 20 is almost out of the notch 26b. Further movement of the first lever 20 causes the extension 20c to move completely out of the notch 26b. The springs 18 then snap back up against the screen 21 giving the screen a sharp blow and jarring loose the dirt embedded therein. The second lever 21 and the arm 24 are returned by this action to their topmost position.

Further downward movement of the first lever 20 serves to press the plunger 29a on the switch 29 and start the operation of the motor 13 and fan 14. As can be seen, this arrangement insures the agitation of the screen 12 before the switch is turned on.

When pressure is released from the first lever 20, the spring 28 on this lever causes the lever to be returned to its starting position adjacent the second lever 21. The notch 26b automatically re-engages the extension 20c; this is caused by the sloping edge surface 20d of the extension 20c engaging sloping cam surface 26c of the dog 26. The engagement of these two surfaces 26c and 20d causes the dog 26 to turn in a counterclockwise direction as viewed in Fig. 1 about its fulcrum 26a and against the resistance of the spring 27. When the opening of the notch 26b is opposite the rear edge of the extension 20c, the spring 27 will cause the notch to re-engage the extension 20c. The members will then be locked together and ready for another operation. In order that this re-engagement occur, it is of course necessary that the spring 28 on the lever 20 be stronger than the spring 27 that extends between the dog 26 and the first lever 21.

With this arrangement, the screen 12 is agitated to dislodge embedded dirt before the motor and fan unit is turned on. The motor and fan unit may be stopped by pressing directly on the plunger 29a of the switch 29 or may be stopped by again operating the lever 20 in the manner heretofore stated.

In order that the lever 20 will be held adjacent an outside surface of the dirt receptacle 10, a strap 30 is provided spaced from the adjacent surface of the dirt receptacle 10 by sleeves 31 and bolts 32. This strap 30 is arranged in frictional engagement with the outside surface of the first lever 20.

If the contact of the springs 18 against the screen 12 causes undue wear on the screen, leather or other wear resisting strips (not shown) can be attached to the screen with these strips being so located as to receive the impact of the springs and impart it to the screen.

The top portion 10 and bottom portion 11 of the cleaner may be attached together in any desired manner. As shown, they are joined by hinges 40 on one side of the cleaner and buckles 41 on the opposite side.

The sleeve 23 around the rod and the extension 22a on the rod need not have too close a fit with corresponding openings in the bottom portion of the cleaner. If there is any leakage of air, the air will be drawn inwardly because of the partial vacuum within the cleaner and thus no dirt will escape.

With the construction just described, the cleaning of the filter is preferably automatic in that in the form shown the filter is agitated before the cleaner motor is turned on and is agitated again before the motor is turned off. This is provided for by having the same mechanism that operates the filter cleaning device arranged to operate the motor switch. This makes it absolutely necessary to clean the filter every time the cleaner is turned on and off. The cleaner will thus maintain full efficiency at all times until the dirt in the dirt compartment has almost reached the filter. The operator does not need to remember to clean the filter and need not even be conscious that there is a filter involved.

It is believed obvious that a similar arrangement can be used to clean the filter without hav-

ing the apparatus also operate the switch, as the filter cleaning function may be made separate from the switch operation.

Having described my invention as relating to one embodiment of the same, it is my intention that the invention be not limited by any of the details of description unless otherwise specified but rather be construed broadly within its spirit and scope as set out in the appended claims.

I claim:

1. In a vacuum cleaner comprising a dirt separating member and means including a motor-driven fan for drawing air through said member, means for agitating said separating member comprising resilient means normally arranged adjacent the separating member, means for applying force to the resilient means to draw said resilient means away from the separating member, means to release substantially said force and permit the resilient means to snap against said separating member, and a switch for operating said fan with said switch being closed by the force-applying means after release of the resilient means.

2. In a vacuum cleaner comprising a dirt receptacle, a dirt separating member arranged above said receptacle and a motor-driven suction fan arranged to draw air through the separating member, means for agitating said separating member comprising resilient means normally arranged adjacent the separating member on the side thereof adjacent the dirt receptacle, means for applying force to the resilient member to draw it away from the separating member, means for substantially releasing said force to permit the resilient means to snap against said separating member, and a switch for closing the circuit to said motor-driven fan with said switch being closed by the force-applying means after release of the resilient means.

3. In a vacuum cleaner comprising a dirt receptacle, a dirt separating member arranged above said receptacle and a motor-driven suction fan arranged to draw air through the separating member, means for agitating said separating member comprising resilient means normally arranged adjacent the separating member on the side thereof adjacent the dirt receptacle, a lever pivotally mounted about a fulcrum, a second lever pivotally mounted about a fulcrum, means normally connecting said levers, an arm pivotally mounted about a fulcrum and attached to said resilient means, means connecting said arm to said second lever for movement therewith, means normally urging said levers and said arm toward a position where the resilient means is adjacent the separating member, and means for releasing the connecting means between the first and second levers when the levers, arm and resilient means have been moved to a position away from the separating member.

4. The vacuum cleaner of claim 3 wherein the second lever and the arm are mounted together for movement about a common fulcrum.

5. The vacuum cleaner of claim 3 wherein the first and second levers are located outside said receptacle and the arm is located within the receptacle.

6. The vacuum cleaner of claim 3 wherein the second lever and arm are mounted on a rod member that is rotatable about its axis.

7. In a vacuum cleaner comprising a dirt receptacle, a flexible screen arranged above said receptacle and a motor-driven suction fan arranged to draw air through the screen, means for agitating the screen comprising spring means normally arranged adjacent and below the screen, a lever pivotally mounted about a fulcrum and located outside of the receptacle, a rod having one end adjacent the fulcrum and rotatable about its axis, said rod extending into the receptacle, a second lever normally arranged adjacent the first lever outside the receptacle and mounted on said rod for rotation therewith and connected to said spring means, means urging said levers, arm and resilient means toward a first position where the spring means is adjacent the screen, means normally connecting the levers, means for releasing the connecting means when the levers, arm and resilient means have been moved to a second position where the spring means is away from the screen, and means for re-attaching the connecting means to the levers when the levers have been returned to said first position.

8. In a vacuum cleaner comprising a dirt receptacle, a flexible screen arranged above said receptacle and a motor-driven suction fan arranged to draw air through the screen, means for agitating the screen comprising spring means normally arranged adjacent and below the screen, a lever pivotally mounted about a fulcrum and located outside of the receptacle, a rod having one end adjacent the fulcrum and rotatable about its axis, said rod extending into the receptacle, a second lever normally arranged adjacent the first lever outside the receptacle and mounted on said rod for rotation therewith, an arm mounted on said rod for rotation therewith and connected to said spring means, means urging said levers, arm and resilient means toward a first position where the spring means is adjacent the screen, means normally connecting the levers, means for releasing the connecting means when the levers, arm and resilient means have been moved to a second position where the spring means is away from the screen and means for re-attaching the connecting means to the levers when the levers have been returned to said first position, and a switch in the electrical circuit to the motor with the switch being operated when the first lever has been moved beyond said second position.

9. In a vacuum cleaner comprising a dirt receptacle, a flexible screen arranged above said receptacle and a motor-driven suction fan arranged to draw air through the screen, means for agitating the screen comprising spring means normally arranged adjacent and below the screen, a lever pivotally mounted about a fulcrum and located outside of the receptacle, a rod having one end adjacent the fulcrum and rotatable about its axis, said rod extending into the receptacle, a second lever normally arranged adjacent the first lever outside the receptacle and mounted on said rod for rotation therewith, an arm mounted on said rod for rotation therewith and connected to said spring means, spring means normally urging the first lever to a first position where said first lever is adjacent the second lever, means normally connecting the levers, means for releasing the connecting means when the first lever has been moved to a second position with the agitating spring means away from the screen, means for re-attaching the connecting means when the first lever has been returned to said first position, and a switch in the electrical circuit to the motor, said switch being located adjacent said first lever but slightly beyond it when the lever is in its second position, with the switch being operated upon further

movement of the first lever after the release of the connecting means.

10. The vacuum cleaner of claim 9 wherein the second lever and rod is arranged above the first lever, and the connecting means comprises a hook-shaped member mounted on the second lever and adapted to engage a portion of the first lever when the first lever is in said first position but be out of engagement with said portion when the first lever is in said second position.

11. In a vacuum cleaner comprising a dirt separating member and a motor-driven fan, means normally arranged adjacent the separating member for agitating said member, a switch in the electrical circuit to the motor, apparatus movable through a path from one position to a second position, means including a part of said movable apparatus for operating said switch at said second position, and means also including a part of said movable apparatus for first operating said agitating means at a point in said path between said first and second position and prior to the operating of said switch.

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