

[54] **COMPACTOR AND FILTER SYSTEM**

[75] Inventor: **Ben J. Valor**, Troy, Ohio

[73] Assignee: **Hobart Corporation**, Troy, Ohio

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Related U.S. Application Data

[63] Continuation of Ser. No. 273,693, July 21, 1972, abandoned.

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[51] Int. Cl. **B30b 15/14**

[58] Field of Search **98/1; 126/299; 34/72, 80, 34/82; 21/55; 55/384, 473; 62/78, 89, ; 312/31; 100/70, 143, 90, 53, 102, 229 A**

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Primary Examiner—Billy J. Wilhite

Attorney, Agent, or Firm—Biebel, French & Bugg

[57] **ABSTRACT**

A refuse compactor which includes a housing, a vertically reciprocal compacting ram mounted within the housing, a waste receiving drawer slidable into a compacting position beneath the ram and a filtering system within the housing for neutralizing odors emanating from waste materials deposited in the drawer. The filter system, which may utilize activated charcoal as the deodorizing medium, includes a circulating fan mounted at the intake end of a duct positioned within the housing for circulating air within the housing through the duct and through a filter mounted in the outlet end of the duct. The fan is preferably driven by a two speed motor which may be controlled either manually by a three position switch, or automatically through actuation of the ram and through movement of the drawer.

18 Claims, 6 Drawing Figures

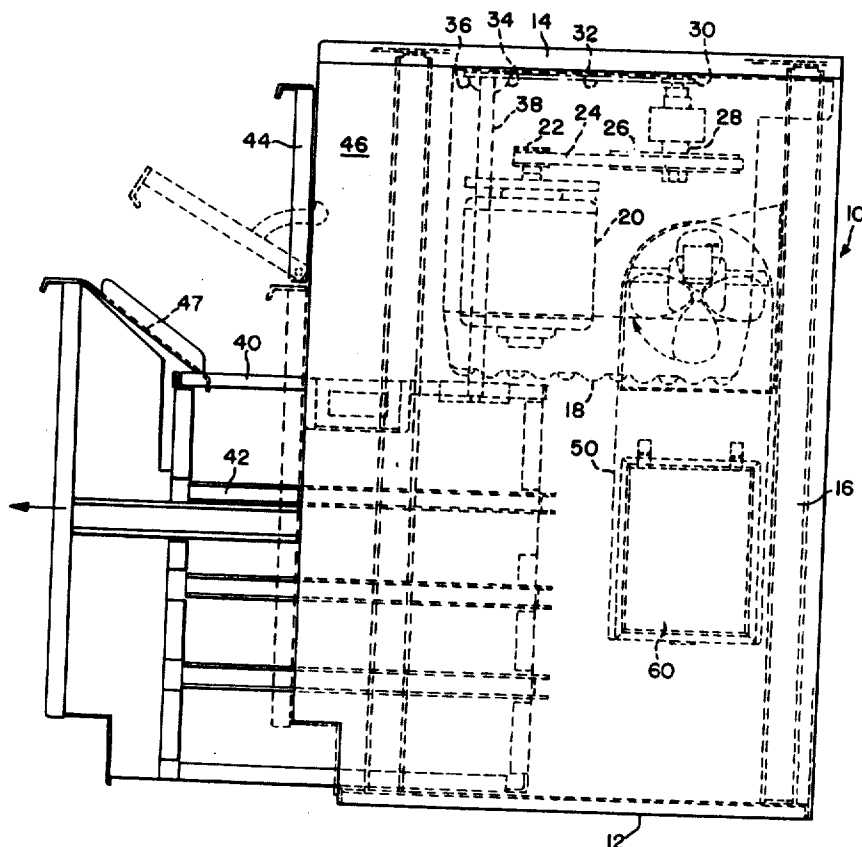


FIG-2

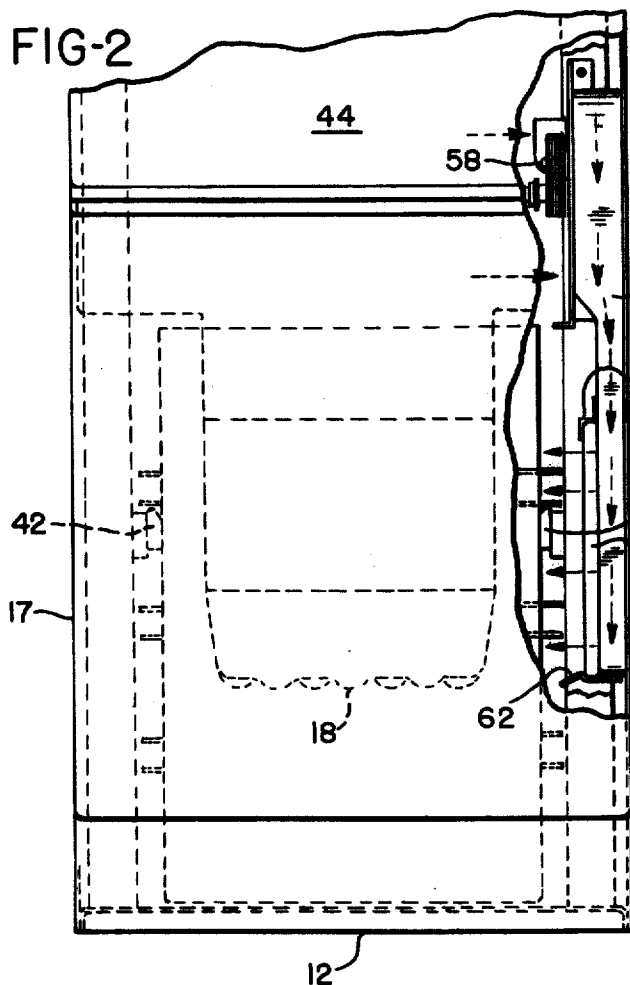


FIG-6

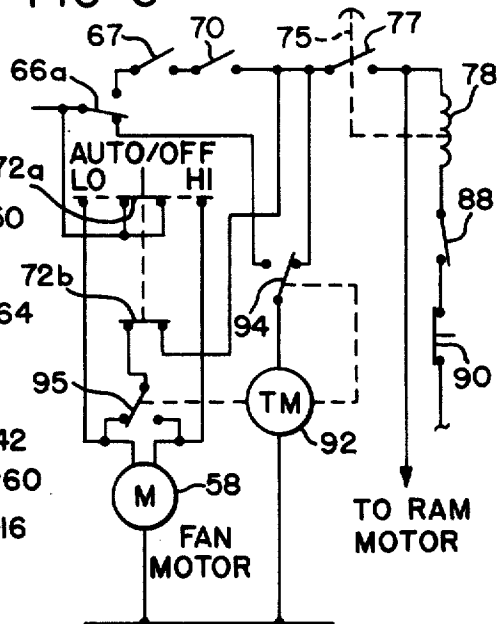


FIG-3

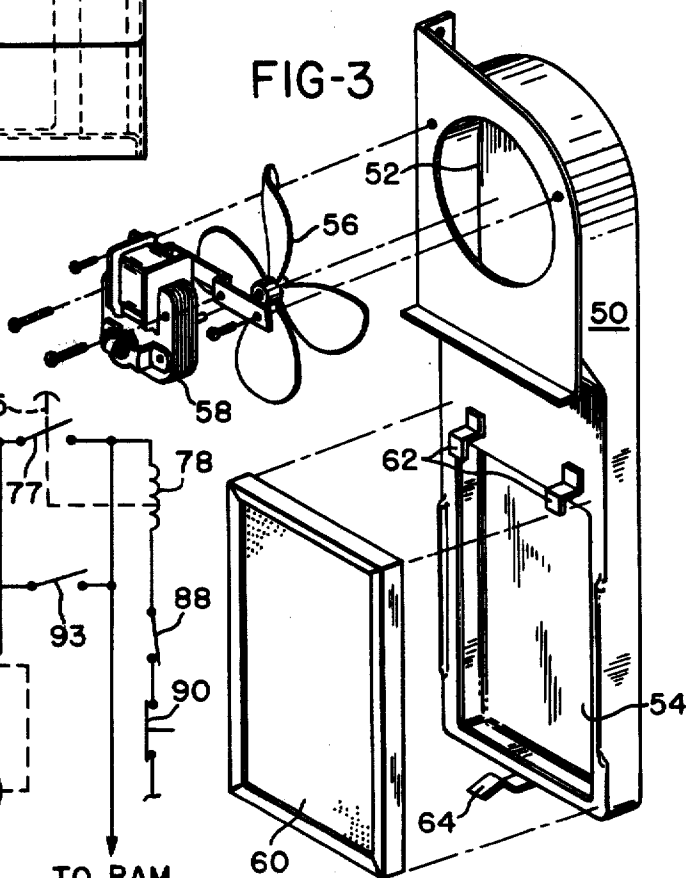
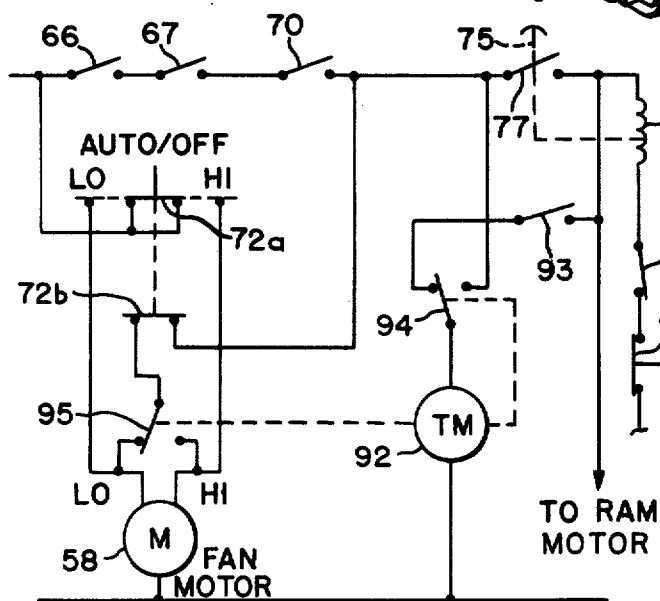


FIG-5



COMPACTOR AND FILTER SYSTEM

This is a continuation of application Ser. No. 273,693, filed July 21, 1972, now abandoned.

CROSS REFERENCE TO RELATED APPLICATION

COMPACTOR AND DRIVE ASSEMBLY, Ser. No. 194,891, filed Nov. 2, 1971.

BACKGROUND OF THE INVENTION

The above noted, related application discloses apparatus for compacting solid waste materials to a fraction of their original volume to facilitate handling and disposal of the wastes. The compactor includes a housing having a ram mounted for vertically reciprocal movement within the housing to compact solid waste materials deposited in a drawer slidably received in the housing.

While the compactor described in the above noted application satisfactorily reduces the volume of waste materials treated therein, it will be appreciated that odors generated by some waste materials deposited in the compactor may prove offensive. This problem may be compounded somewhat by what is, in fact, one of the main advantages of the use of a compactor, that is, that the waste material may be allowed to accumulate in the compactor for a greater period of time than would be the case if it were merely deposited in some sort of refuse container.

While this problem has been recognized in the industry, attempts to cope with offensive odors have generally involved utilizing some sort of chemical treatment, such as an aerosol spray applied either manually or automatically to material deposited in the compactor, or irradiation by, for example, ultraviolet light.

SUMMARY OF THE INVENTION

The present invention provides means for preventing offensive odors from escaping from the housing of a compactor by circulating air within the compactor housing through an odor absorbing filter containing a material such as activated carbon.

The system in accordance with the present invention preferably includes a flat duct mounted on an interior surface of the housing and having a circulating fan mounted in its intake end. Both the intake and outlet to and from the duct are located within the housing so that air recirculates within the housing, thereby avoiding the possibility of discharging insufficiently treated or odor laden air into the area in which the compactor is located.

The duct is positioned with the housing such that the intake thereinto is positioned adjacent the top of the drawer, which is the prime source of odor laden air, and the outlet is near the bottom of the enclosure, inducing an air flow upwardly around the drawer to further assist in directing odor laden air into the filter system.

The filter is removable from the system for replacement or reactivation and in this regard its position in the house makes it readily accessible for change by simply extending the drawer or removing the drawer from the housing.

The motor for driving the circulating fan is preferably a two speed motor which may be controlled by a manual, three position switch so that the fan can be shut off

entirely or run at low or high speeds, depending upon the requirements of the system.

The motor may also be controlled automatically, so that it is deenergized when the drawer is open, at which time the filter system would have little effectiveness since the odor causing contents would be largely outside the housing. On closing the drawer, after, for example, additional refuse is placed in the drawer, the fan will run at a high speed for some preselected time interval, after which a timer automatically reduces the rate of speed to a lower rate for substantially continuous operation until the drawer is reopened or the fan is manually switched off.

Compaction of the material in the drawer may also result in an increase in the amount of odor emanating from the drawer. Therefore, the control for the motor may also be actuated by movement of the ram in a compacting stroke, with the fan motor running at high speed for some preselected interval of time and then decreasing in speed for continuous running until either the drawer is opened or the motor is manually switched off.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a compactor in accordance with the present invention;

FIG. 2 is a fragmentary front view thereof;

FIG. 3 is an exploded perspective view of the components of the filter system;

FIG. 4 is a wiring diagram illustrating the controls for the compactor and filter system of the present invention;

Fig. 5 is a wiring diagram illustrating a modified and more elaborate control;

FIG. 6 is wiring diagram showing another control system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring initially to FIG. 1 of the drawings, it will be seen that a compactor in accordance with the present invention includes a housing 10 having a base 12, a top 14 and walls 16 and 17 extending between the top and base of the housing. A ram 18 is positioned in the upper portion of the housing during inactive periods and includes a motor 20 mounted within the ram and driving a pulley 22.

A belt 24 wraps the pulley 22 and a large diameter pulley 26 mounted on one end of a shaft 28 rotatably mounted within the ram and carrying a sprocket 30 at its opposite end. Sprocket 30 is in turn wrapped by a chain 32 which also wraps a sprocket 34 mounted on an internally threaded nut 36 rotatably mounted on the ram and threadably engaging a stationary jack screw 38.

While only one jack screw and nut are shown in FIG. 1 of the drawings, the system preferably includes three, triangularly arranged jack screws, all as described in detail in the above noted, related application. Regardless of the specific number of jack screws, it will be seen that energizing of the motor 20 will result in rotation of the nuts 36, causing the ram to move upwardly and downwardly along the stationary jack screws.

A drawer 40 is received in the housing on drawer slides 42 for sliding movement between a compacting position beneath the ram 18 and a noncompacting posi-

tion displaced outwardly from the housing in which material may be added to or removed from the drawer.

Additionally, the compactor may include a hinged door 44 located near the top of the housing so that small articles or refuse may be placed in the chamber 46 behind the door 44 resting on plate 47 and drop into the drawer when it is moved outwardly from its compacting position.

The compactor will also preferably include a safety interlock system as shown in FIG. 4 of the drawings, to prevent actuation of the ram when the drawer is not centered beneath the ram. Additionally, the compactor will include a reversing switch, so that after some predetermined load is imposed on the motor 20 during compaction it will reverse, retracting the ram from the drawer.

Mounted within the housing along one wall thereof is an elongated flat duct 50 having substantially greater width than depth and positioned within the housing between a wall thereof, such as the wall 16, and the drawer 40 when the drawer is in its compacting position. Duct 50, as best seen in FIG. 3 of the drawings, is provided with an intake end 52 and an outlet end 54.

A circulating fan 56 is mounted in the intake end of the duct and is driven by a motor 58, preferably a two speed motor. A filter 60 of the odor absorbing or adsorbing type, such as an activated charcoal filter, is mounted in the outlet end of the duct by means of two Z-shaped clips 62 and a lower spring clip 64.

As best seen in FIGS. 1 and 2, the intake to the duct is located adjacent the open top of the compactor drawer while the outlet therefrom is positioned adjacent the bottom of the housing. Thus, then the motor 58 is energized air will flow around the top of the compactor drawer, pulling odor laden air into the duct and directing it downwardly through the filter 60. As the air exits from the filter it will flow upwardly around the drawer, forcing any odors coming from the bottom of the drawer into the duct. Thus, the filter system circulates the air around the area that is most likely to emit odor.

Additionally, circulation is confined entirely to the interior of the housing. Therefore, when the air passes through the filter 60, it is not discharged into the area in which the compactor is located. Thus, any odors that have not been removed in the first pass through the filter, are simply recirculated back through the filter system.

It will also be seen that by positioning the filter 60 adjacent the lower portion of the housing the filter is readily accessible for replacement or renewal simply by extending or removing the drawer 40, depressing the spring clip 64, and sliding the filter from beneath the two upper clips 62.

With reference now to FIG. 4 of the drawings, the control of the filter system will be described. As noted above, the motor 58 is preferably a two speed motor and in this regard it may be controlled by a manual, three position switch 72, as indicated in FIG. 4, which includes high, low and off positions.

Additionally, since the efficiency of the filter system in removing odors caused by material in the drawer will be greatly reduced when the drawer is positioned outwardly of the housing, provision is made for deactivating the fan when the drawer is opened. The present system also includes means for automatically operating

the motor 58 at times when the generation of odors are likely to be greatest.

Referring to FIG. 4, the control system is shown, provided with a two speed manual control of the fan motor 58. Interlock switches 66 and 67 are closed only when drawer 40 is closed, and they control all power to the unit. Key switch 70 controls power to the ram drive, and the manual three-position switch (off-low-high) 72 is connected in parallel with the key switch and the rest of the circuit, so that the fan can be operated without using the key, provided the drawer is closed.

The remainder of the circuit will be described only briefly because its details are not part of the invention, but they do relate to the automatic fan control shown in FIG. 5. Contacts are shown in the position with the drawer open, the ram up, motor stopped, and the key safety switch open. With the key switch 70 operated to close, pushing the start button 75 on starting relay 76 will close its contact 77 and energize its coil 78 to seal in the relay. This also applied power to the starting winding 80 of ram motor 20, through centrifugal starting switch 81, and through the contacts of directional switch 84. Power also is applied to main winding 85 through the overload protector 86.

The holding circuit for relay 76 includes its coil 78, a normally closed ram-operated switch 88, stop switch 90, and the overload protector 86. Switch 88 is arranged to be opened momentarily by the ram only when it is nearing the top of its return stroke. On the downward stroke switch 88 is unaffected and remains closed. Directional switch 84 is held in the position shown when the ram is fully up. When the ram is in any other position, the blades of switch 84 transfer to the contacts shown open.

Thus, as power is first applied the motor starts in a direction to lower the ram in a compacting stroke. The motor immediately comes up to speed and switch 81 opens and transferring of the contacts of switch 84 has no effect on motor direction. However, this change in the direction switch prepares the circuit for reversing the motor as soon as the compacting stroke is resisted enough to slow the motor to a speed where switch 81 closes. The motor then immediately reverses, withdrawing the ram, and near the end of the upward stroke switch 88 opens deenergizing coil 78 of the starting relay. The motor coasts to a stop past the actuation position of switch 88 as relay 76 drops out, so that switch 88 again closes, and with switch 84 moved to the position shown, the motor circuit is ready for the next compacting stroke.

At any time after a compacting stroke begins, if stop switch 90, or key switch 70, is opened, or the motor overload protector 86 opens, the motor will stop. Subsequent operation of the start button 75 will energize the motor to drive the ram upward, provided the appropriate switch contacts are then closed.

In FIG. 5, there is shown a modification in which the fan will automatically operate for a time after each compacting operation, in addition to the manual operation provided by the simpler circuit of FIG. 4, and the fan can also be operated manually with the drawer open. Like reference numerals are applied to like parts and the same reference numerals with suffix *a* are applied to similar parts.

The common terminal of the manually controlled fan switch 72a is connected ahead of drawer interlock switch 66, thus the fan can be operated manually with

the drawer open. Switch 72 has a second set of contacts 72b connected between the open side of key switch 70 and the low speed line to fan motor 58. Therefore, with the drawer closed and manual switch 72a in its neutral or off position, the fan will operate at low speed.

When the drawer is closed, and key switch 70 is closed, once the start button 75 is depressed power is supplied to the timer motor 92 through a second ram operated switch 93, and through timer controlled contacts 94. Switch 93 is open whenever the ram is at its upper limit, contrary to switch 88 which merely opens momentarily as the ram approaches its upper limit.

The timer controlled switch 95 is connected between switch 72b and the low and high speed connections of fan motor 58. Normally in the low speed position, switch 95 transfers to the high speed connection once the timer starts. Switch 94 transfers to connect the timer motor directly to key switch 70, and the timer runs out its cycle, for example 15 minutes. During this period the fan runs at high speed, then reverts to low speed as the timer ends its term, transfers its switches 94 and 95, and stops. It is assumed that the ram will be then at its upper limit and switch 93 will be open.

If the drawer is opened during this period, or the key switch is opened, the timer will merely bolt until the drawer is closed or the key switch closed (as appropriate), then the timer will run the remainder of its term. If the ram is again operated within the term of the timer this will not alter or extend the timer time, since normally one higher speed operation of the fan will be adequate.

FIG. 6 shows another embodiment of the fan control, wherein the fan is automatically operated at a higher speed for a predetermined time after each opening of the drawer. Again, the same reference numerals are applied to parts identical to the other embodiments.

The only differences in this circuit from the circuit shown in FIG. 5 are in the power supply to timer motor 92. Here the timer controlled switch 94 is at the start in the position shown to operate the timer when the drawer is closed and key switch 70 is closed. Interlock switch 66a, operated by the drawer, is of the SPDT type, and has its back contact connected to the timer switch 94 as shown.

Closing the drawer, as following the placing of trash in the receptacle, causes switch 66a to transfer its contacts, and also closes interlock switch 67. If key switch 70 is closed the timer will commence running and will transfer its switch 95 to the high speed fan motor circuit for the timed period. At the end of this time, timer switch 94 will transfer, stopping the timer motor, and switch 95 will revert to the low fan speed circuit. The next opening of the drawer will transfer interlock switch 66a, supplying power to the timer motor to move it to the reset position, at which switch 94 will be transferred back to the normal timer power supply position, as shown. If the drawer should be opened within the timer cycle interval, the fan will stop, because it is powered through switch contacts 72b, then upon closing the drawer again the timer will complete its cycle.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be

made therein without departing from the scope of the invention.

What is claimed is:

1. A compactor comprising:

- a. a compactor housing including a top, a base and side walls extending between said top and said base,
- b. a receptacle slidably received within said housing and movable between a compacting position within said housing and a noncompacting position displaced from said compacting position,
- c. a ram mounted within said housing above said drawer when said drawer is in said compacting position,
- d. means for moving said ram into and out of said drawer in compacting and retracting strokes,
- e. an elongated, flat duct having substantially greater width than depth mounted in said housing out of the path of movement of said drawer,
- f. said duct extending vertically within said housing and having an intake at its upper end and an outlet at its lower end with both said intake and outlet positioned within said housing,
- g. a two speed, motor driven circulating fan mounted to draw air through said duct,
- h. a filter of activated charcoal mounted in said outlet of said duct whereby air directed through said duct by said fan passes through said filter, and
- i. control means for said fan including; means for deactivating said fan when said receptacle is displaced from said compacting position, means for activating said fan at a relatively higher speed when said receptacle is moved to said compacting position, and means for reducing the speed of said fan after a preset time interval has elapsed after said fan has been activated at said high speed.

2. A compactor comprising:

- a. a compactor housing including a top, a base and side walls extending between said top and said base,
- b. a receptacle slidably received within said housing and movable between a compacting position within said housing and a noncompacting position displaced from said compacting position,
- c. a ram mounted within said housing above said drawer when said drawer is in said compacting position,
- d. means for moving said ram into and out of said drawer in compacting and retracting strokes,
- e. an elongated, flat duct having substantially greater width than depth mounted in said housing out of the path of movement of said drawer,
- f. said duct extending vertically within said housing and having an intake at its upper end and an outlet at its lower end with both said intake and outlet positioned within said housing,
- g. a two speed, motor driven circulating fan mounted to draw air through said duct,
- h. a filter of activated charcoal mounted in said outlet of said duct whereby air directed through said duct by said fan passes through said filter,
- i. control means for said fan including means for deactivating said fan when said receptacle is displaced from said compacting position, means for operating said fan at a higher speed when said ram is moved, and means for reducing the fan speed at

- a predetermined time after said fan has been activated at the higher speed.
3. A compactor comprising:
- a. a compactor housing having a top, a base and sides extending between said top and base, 5
 - b. a receptacle movable between a compacting position within said housing and a noncompacting position displaced therefrom,
 - c. a ram mounted in said housing in opposition to said receptacle, 10
 - d. drive means for moving said ram in a compacting operation into and out of said receptacle in compacting and retracting strokes,
 - e. a filter communicating with the interior of said housing, 15
 - f. means for circulating air in said housing to cause odor laden air within said housing to contact and be deodorized by said filter, and
 - g. an air circulating control coordinated with actuation of said ram for energizing said air circulating means at a higher speed when said ram is moved in a compacting stroke. 20
4. The compactor of claim 3 further comprising:
- a. timer means incorporated in said control means to change the rate of operation of said air circulating means to a lower speed after a preselected time interval. 25
5. A compactor comprising:
- a. a compactor housing having a top, a base and sides extending between said top and base, 30
 - b. a receptacle movable between a compacting position within said housing and a noncompacting position displaced therefrom,
 - c. a ram mounted in said housing in opposition to said receptacle, 35
 - d. drive means for moving said ram in a compacting operation into and out of said receptacle in compacting and retracting strokes,
 - e. a filter communicating with the interior of said housing, 40
 - f. means for circulating air in said housing to cause odor laden air within said housing to contact and be deodorized by said filter, and
 - g. switch means for energizing said air circulating means when said receptacle is moved to said compacting position. 45
6. The compactor of claim 5 further comprising:
- a. timer means connected to said receptacle actuated control to operate said air circulating means at a higher speed when said receptacle is closed and then to reduce the rate of operation of said air circulating means to a lower speed after preselected time interval. 50
7. A compactor comprising:
- a. a compactor housing having a top, a base and sides extending between said top and base, 55
 - b. a receptacle movable between a compacting position within said housing and a noncompacting position displaced therefrom, 60
 - c. a ram mounted in said housing in opposition to said receptacle,
 - d. drive means for moving said ram in a compacting operation into and out of said receptacle in compacting and retracting strokes, 65
 - e. a filter communicating with the interior of said housing,

- f. means for circulating air in said housing to cause odor laden air within said housing to contact and be deodorized by said filter,
 - g. an air circulating control operable when said ram drive means is actuated for energizing said air circulating means at a higher rate in coordination with movement of said ram in a compacting stroke,
 - h. timer means associated with said air circulation control and connected to reduce the rate of operation of said air circulating means after a preselected time interval, and
 - i. means for deenergizing said air circulating means when said receptacle is displaced from said compacting position.
8. A compactor comprising:
- a. a compactor housing having a top, a base and sides extending between said top and base,
 - b. a receptacle movable between a compacting position within said housing and a noncompacting position displaced therefrom,
 - c. a ram mounted in said housing in opposition to said receptacle,
 - d. drive means for moving said ram in a compacting operation into and out of said receptacle in compacting and retracting strokes,
 - e. a filter communicating with the interior of said housing,
 - f. means for circulating air in said housing to cause odor laden air within said housing to contact and be deodorized by said filter,
 - g. a duct having an intake end near the top of said receptacle spaced therefrom, and an outlet end,
 - h. said air circulating means directing air into said intake end of said duct, and
 - i. said filter being mounted in said outlet end of said duct.
9. The compactor of claim 8 wherein:
- a. said intake and outlet ends of said duct are positioned within said housing to recirculate the filtered air.
10. The compactor of claim 9 wherein said duct comprises:
- a. an elongated flat duct having substantially greater width than depth and mounted in said housing between a wall thereof and said receptacle when said receptacle is in said compacting position.
11. The compactor of claim 8 further comprising:
- a. control means for controlling operation of said air circulating means.
12. The compactor of claim 8 further comprising:
- a. ram actuated control means for automatically actuating said air circulating means when said ram is operated.
13. The compactor of claim 8 further comprising:
- a. receptacle actuated control means for actuating said air circulating means when said receptacle is moved to its said compacting position.
14. A compactor comprising:
- a. a compactor housing having a top, a base and sides extending between said top and said base,
 - b. an open mouth receptacle movable between a compacting position within said housing and a noncompacting position displaced therefrom,
 - c. a ram mounted in said housing in opposition to the open mouth of said receptacle,
 - d. drive means for driving said ram in a compacting stroke into and out of said receptacle,

- e. filter means communicating with the interior of said housing,
 - f. means for circulating air across said open mouth of said receptacle and then through said filter to cause odor laden air within said housing to contact and be deodorized by said filter, and
 - g. duct means for directing said odor laden air from said open receptacle through said filter.
15. The compactor of claim 14 wherein:
- a. said duct means directs air from said filter into said housing at a point spaced from said open mouth of said receptacle.
16. A compactor comprising:
- a. a compactor housing having a top, base and sides extending between said top and base and defining therebetween an enclosed space within said housing,
 - b. means for opening and closing said housing to provide access to said space therein when said housing is open and to maintain said space therein enclosed when said housing is closed,
 - c. an open-topped, refuse-receiving container received in said housing and movable between a compacting position within said enclosed space when said housing is closed and noncompacting positions displaced from said compacting position when said housing is open,

- d. a compacting ram mounted in said housing in opposition to said open, refuse-receiving container when said container is in said compacting position,
 - e. means for reciprocating said ram into and out of said open container to compact and reduce the volume of refuse received therein and thereby permit refuse to accumulate in said container,
 - f. an activated charcoal filter disposed within said enclosed space for adsorbing odors emanating out of said open container and into said enclosed space from refuse accumulated in said container to thereby prevent escape of odors from said enclosed space into a room in which said compactor is located, and
 - g. means for circulating air solely within said enclosed space to promote the contact of odors from accumulated refuse with said adsorbent activated charcoal.
17. The compactor of claim 16 wherein:
- a. said air circulating means is provided with an intake section generally adjacent the open top of said container.
18. The compactor of claim 16 further comprising:
- a. switch means for selectively actuating said air circulating means and operating it at relatively higher and lower speeds.

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