ABSTRACT: A domestic refuse compactor including a receptacle in which household refuse is compacted by a ram to a fraction of its former volume. The ram is operated to compact the refuse with a preselected maximum force by means of a pair of axially fixed rotatable screws axially driving a pair of nuts threadedly mounted thereon. The nuts are yieldably connected to the ram through a corresponding pair of coil springs coaxially about the respective screws. Switches are provided responding to a preselected contraction of the springs corresponding to the preselected maximum force to stop the compaction operation of the ram and cause the ram to be moved reversely to a retracted position completing the compacting operation.
REFUSE COMPACTOR APPARATUS

SPECIFICATION

This invention relates to refuse compactors and in particular to means for controlling the operation of a ram means in such a refuse compactor.

As shown and described in copending U.S. Letters Pat. application Ser. No. 724,959 of Lester H. Hinkel, Gordon H. Brown and Robert M. Chandler for a "Refuse Compactor," filed April 29, 1968, owned by the assignee hereof, a new and improved refuse compactor is provided for compacting to a small fraction of its normal volume refuse such as conventional household refuse. The compactor permits the containment of a substantial amount of such refuse such as would ordinarily be found in refuse compacted within a refuse compactor means wherein the ram means is driven downwardly into a receptacle into which the refuse is delivered by the user. Upon application of a preselected maximum compaction force by the ram against the refuse in the receptacle, the ram is automatically reversed and brought back to a retracted position above the receptacle for facilitated delivery of further refuse therein to until such time as the receptacle is filled with compacted refuse whereupon the compacted refuse may be removed and suitably disposed of.

The present invention comprehends an improved means for operating the ram to resiliently compact the refuse with the preselected maximum force.

Thus, a principal feature of the present invention is the provision of a new and improved means for operating a ram means in a refuse compactor.

Another feature of the invention is the provision of such a refuse compactor means having new and improved contractible means providing a driving connection between the drive means and ram means.

A further feature of the invention is the provision of such a refuse compactor means wherein the contractible means includes a ram, a upright member, and a transverse member connecting the upright member to an upper portion of the ram means.

A further feature of the invention is the provision of such a refuse compactor means wherein the shoulder means is provided at a bottom portion of the upright member disposed outwardly of the holding means.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a front elevation of a refuse compactor means provided with ram operating means embodying the invention;

FIG. 2 is a side elevation thereof;

FIG. 3 is a fragmentary enlarged vertical section thereof taken substantially along the line 3-3 of FIG. 1;

FIG. 4 is a side elevation of the structure of FIG. 3; and

FIG. 5 is a schematic diagram of the electrical circuitry thereof.

In the exemplary embodiment of the invention as disclosed in the drawing, a refuse compactor generally designated 10 is shown to comprise a compactor generally similar to that shown and disclosed in said Hinkel et al. application Ser. No. 724,959, referred to above. Said application may be referred to for a complete disclosure of the refuse compactor structure.

As shown in FIG. 1, the refuse compactor 10 briefly comprises a base 11 on which a receptacle, or drawer, 12 is movably carried by suitably track means 13. The receptacle 12 is adapted to receive a quantity of refuse, such as milk cartons, paper, bottles, cans and other kitchen refuse. The refuse is compacted in the receptacle 12 by a ram 14 which, as shown in FIG. 1, is normally disposed above the receptacle 12 in a retracted position. As discussed briefly above, the ram is forcibly driven against the refuse in the container 13 when desired by the user to effect a substantial compaction of the refuse thereby permitting a substantial quantity of refuse to be collected before requiring disposal thereof.

The upright member 14 is carried on a cross bar 15 connected at its opposite ends to the upper ends of a pair of upright members 16 and 17. The upright members are arranged to be moved vertically downwardly and upwardly at opposite sides of the receptacle 12 for lowering the ram 14 into the receptacle and returning it to the retracted position. The means for driving the upright members 16 and 17 comprises a pair of nuts 18 threaded one each to a pair of upright screws 19 and 20 at opposite sides of the receptacle 12. The screws are rotatably mounted at their lower ends on base 11 by suitable journals 21 and at their upper ends on a top plate 22 by suitable journals 23. An electric motor 24 is secured to the top plate 22 by a bracket 25, as shown in FIG. 2, to drive a vertical shaft 26 through a pulley system 27. The lower end of the shaft 26 is provided with a sprocket 28 which drives a chain 29 trained over sprockets 30 and 31 on the lower ends of screws 19 and 20, respectively, for concurrently rotating the screws as an incident of rotation of the motor 24. Rotation of each nut member 18 is prevented by means of a nut engaging means 32 projecting outwardly therefrom through elongated slots 34 in the side walls 35 and 36 of the upright members 16 and 17. The studs 32 are provided with enlarged heads 37 for maintaining the association thereof with the upright members.

Thus, rotation of the screws 19 and 20, causes axial movement of the associated nut and as the screws are concurrently rotated, both nuts move upwardly and downwardly similarly.

Movement of the nuts 18 is transferred to the upright members 16 and 17 by means of a pair of coil springs 38 coaxially disposed about the corresponding screws 19 and 20, with each of the springs 38 extending between the nut 18 and a bottom plate 39 extending between the side walls 35 and 36 of the upright members. Thus, when the screws 19 and 20 are rotated to lower the ram from the retracted position of FIG. 1,
downward movement of the ram is effected to contact the upper surface of the refuse in the receptacle 12. As compacting pressure builds up, the springs 38 are compressed. The springs are heavy duty springs so that a substantial compacting force such as approximately 750 pounds may be applied through the springs with a spring compression thereof in the order of approximately one inch.

As the springs 38 are compressed, the studs 32 and 33 move downwardly through the slots 34. This downward movement is sensed by switches 40 and 41 carried on the side walls 36 of the upright members as a result of the enlarged heads 37 of the studs moving downwardly against an elongated operator finger 42 carried by the switches 40 and 41 for moving an actuator 43 thereof. As shown in FIG. 5, the switches 40 and 41 are normally closed, single pole switches connected in series with a relay coil 44 which in turn controls a normally open switch 45 which is connected in series with the drive motor 24 across a conventional suitable power supply comprising power supply leads L1 and L2.

As the ram 14 is effectively resiliently mounted to the nut members 18 by the heavy duty springs 38, some cocking of the ram may occur as where less compactible refuse is disposed at one side of the ram, as compared to the refuse at the other side of the ram in the receptacle 12. As the switches 40 and 41 are connected in series, opening of either switch will effect the termination of the compaction operation. Further, as the ram is resiliently mounted, shock forces, such as resulting from breaking of bottles and the like during the compaction operation, will not be transmitted to the drive mechanism through the connecting means. As the springs 38 are effectively provided in parallel the total compaction force may be approximately 1,500 pounds where the springs are arranged for effective operation of the switches by a 750 pound force acting on each.

In the use of the compactor 10, the operator may initiate operation by means of a conventional push button, such as push button 46, to energize relay coil 44 and thereby energize motor 24. The coil 44 may further control a holding switch 47 connected in parallel with the push button 46 to maintain the motor 24 energized upon release of the push button.

As disclosed more fully in copending application of Gordon H. Brown, Ser. No. 725,072, filed April 29, 1969, the control may include means for automatically reversing the ram when either or both of the switch 40 and 41 is opened. During the upward movement of the ram 14, the studs 32 and 33 engage the upright walls 35 and 36 at the upper ends of the slots 34 to move the ram upwardly. The ram is retained in the upper position with the studs 32 and 33 at the upper ends of the slots 34 as shown in FIG. 4, until a subsequent operation causes a compression of the springs to open either or both of the switches 40 and 41 as discussed above.

While we have shown and described one embodiment of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement of the invention may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In a refuse compactor having ram means, and means for holding refuse, means for operating said ram means to compact refuse in said holding means with a preselected maximum force comprising: drive means including an electric motor driving a movable member producing a driving force greater than said preselected force; means contractible as a function of force developed thereacross extending between said movable member and said ram means to cause said ram means to move forwardly against the refuse in said holding means thereby to compact the refuse in said holding means, and control means responsive to a preselected contraction of said contractible means comprising a plurality of separately contractible means extending between said ram means and said drive means, and control means comprising a corresponding plurality of switch means and switch mechanism for separately throwing said switch means upon said preselected contraction of any one of said contractible means.

2. In a refuse compactor having ram means, and means for holding refuse, means for operating said ram means to compact refuse in said holding means with a preselected maximum force comprising: drive means including a movable member producing a driving force greater than said preselected force; means contractible as a function of force developed thereacross extending between said movable member and said ram means for transferring force from said member to said ram means to cause said ram means to move forwardly against the refuse in said holding means thereby to compact the refuse in said holding means, and control means responsive to a preselected contraction of said contractible means comprising a plurality of separately contractible means extending between said ram means and said drive means, and control means comprising a corresponding plurality of switch means and switch mechanism for separately throwing said switch means upon said preselected contraction of any one of said contractible means.

3. In a refuse compactor having ram means, and means for holding refuse, means for operating said ram means to compact refuse in said holding means with a preselected maximum force comprising: drive means including a movable member producing a driving force greater than said preselected force; means contractible as a function of force developed thereacross extending between said movable member and said ram means for transferring force from said member to said ram means to cause said ram means to move forwardly against the refuse in said holding means thereby to compact the refuse in said holding means, and control means responsive to a preselected contraction of said contractible means comprising a plurality of separately contractible means extending between said ram means and said drive means, and control means comprising a corresponding plurality of switch means and switch mechanism for separately throwing said switch means upon said preselected contraction of any one of said contractible means.

4. The refuse compactor means of claim 3 wherein said contractible means comprises a helical spring coaxial about said screw and said ram means is provided with a shoulder means, said spring extending between said nut means and said shoulder means, and said shoulder means is provided at a bottom portion of said upright member disposed below said nut means.

5. In a refuse compactor having ram means, and means for holding refuse, means for operating said ram means to compact refuse in said holding means with a preselected maximum force comprising: drive means including a movable member producing a driving force greater than said preselected force; means contractible as a function of force developed thereacross extending between said movable member and said ram means for transferring force from said member to said ram means to cause said ram means to move forwardly against the refuse in said holding means thereby to compact the refuse in said holding means, and control means responsive to a preselected contraction of said contractible means comprising a plurality of separately contractible means extending between said ram means and said drive means, and control means comprising a corresponding plurality of switch means and switch mechanism for separately throwing said switch means upon said preselected contraction of any one of said contractible means.
5. The refuse compactor means of claim 5 wherein said coil springs are disposed at opposite sides of said refuse holding means.

6. The refuse compactor means of claim 5 wherein said control means responsive to a preselected contraction of said contractible means corresponding to said preselected force to stop the forward movement of the ram and thereby limit the force of compaction to said preselected force, said contractible means comprising a pair of coil springs spaced in parallel relationship between said movable member and said ram means.