A housing for equipment having rotating tools for treating lumpy to liquid materials comprises an inner peripheral wall which surrounds and is spaced from the flight circle of said rotating tools, an outer peripheral wall which surrounds said inner wall, two end walls, which cover the tools in front and at the rear, respectively, said end walls and said inner peripheral wall confining a working chamber, in which said rotating tools are carried by a drivable shaft, which axially extends into the working chamber, said tools being adapted to move the material to be treated outwardly and to treat said material in said chamber, said working chamber having a centrally opening inlet and an outlet which extends outwardly adjacent to said inner peripheral wall, and means for discharging the treated material from the working chamber through said outlet, said means comprising a revolving endless belt, which forms at least a portion of said inner peripheral wall of the housing and extends out of said working chamber of the housing outwardly through said outlet.
HOUSING FOR EQUIPMENT HAVING ROTATING TOOLS FOR TREATING LUMPY TO LIQUID MATERIALS

SUMMARY OF THE INVENTION

A housing for equipment having rotating tools comprises an inner peripheral wall, an outer peripheral wall, and two end walls, which together with the inner peripheral wall define a working chamber for the tools. The two peripheral walls are formed by a revolving endless belt.

This invention relates to a housing for equipment having rotating tools for treating lumpy to liquid materials, particularly for activators, disintegrators or mixing machines, which equipment comprises rotors operable to disintegrate and/or mix sand, iron ore, loam and other organic and/or inorganic materials of any desired consistency.

The machines have the great disadvantage that they cannot be used to treat materials which tend to adhere so that they may deposit on the walls of the housing and form a layer in such a thickness that the operation of the tools is obstructed and the discharge of the treated material is adversely affected or even interrupted.

In the operation of conventional machines, this danger has sometimes been avoided in that the materials were in a dry state as they were fed into said machines and were treated therein and in special mixers were subsequently combined with the liquid components required for the finished product. This mode of operation is complicated and time-consuming and requires uneconomically expensive equipment.

It is an object of the present invention to avoid the stated disadvantage of the known equipment. This is accomplished according to the invention in that at least part of the inner peripheral wall of the housing is formed by a belt, which is adapted to be moved outwardly out of the working chamber of the housing.

In a particularly desirable embodiment of the housing according to the invention, the inner peripheral wall of the housing consists of a revolvable endless belt, which has one portion that defines the working chamber and another portion which is accessible from the outside.

According to another feature of the invention, the end wall which defines the working chamber of the housing has a portion which adjoins the movable peripheral wall of the housing, at least said portion of said end wall is rotatable and a scraper is provided, which serves to clean that surface of the rotatable end wall which faces the working chamber.

An embodiment of the housing according to the invention is shown on the drawing, in which FIG. 1 is a vertical transverse sectional view showing a disintegrator provided with the housing according to the invention and FIG. 2 is a sectional view taken on line II—II in FIG. 1.

The disintegrator shown on the drawing comprises a housing 1, in which two rotors 2, 3 are rotatably mounted. These rotors are adapted to rotate in opposite senses. For this reason, a shaft 2A drives the rotor 2 to rotate in the direction of the arrow A and a shaft 3A drives the rotor 3 to rotate in the opposite direction A'. The rotor 2 carries two concentric circular series of blades 4, 4', which serve as beating and/or mixing tools.
The rotatable annular parts 6', 7' are in contact with the respectively adjacent lateral edge portions of that part of the revolving belt 5A which forms the inner peripheral wall of the housing. As a result, the annular parts 6', 7' are frictionally driven by the belt 5A. A ring- or disc-shaped seal 17 of rubber, plastics material or the like is provided between each of the annular parts 6', 7' and the adjacent stationary inner part 6' or 7'.

To ensure that coarse foreign particles, particularly of metal, which may penetrate through the belt 5, cannot result in damage or accident, the clearance space 1B enclosed by the revolving belt 5A contains a shield 20, which consists of metal or another material and conforms to the periphery of the working chamber and is preferably flexible and may consist only of sections which may be provided in the endangered areas. The shield 20 may be held by struts, which may be carried in turn by said frame or parts thereof.

The material to be treated is introduced through a feed pipe 18, which opens adjacent to the center of the inner part of at least one of the two end walls 6, 7 of the housing 1, in this case at the inner part 6' of the end wall 6. It will be understood that additional feed pipes may be provided and that the feed pipes may open into the working chamber at different positions. To facilitate the maintenance, at least one of the two end walls 6, 7, together with the backing rollers 8 or 9, as well as the drive means, not shown, can be laterally displaced, as is indicated in dotted lines in FIG. 1, and the revolving endless belt 5A together with the associated part of the shield 20 and the deflecting pulleys 11, 11' are pivotally movable upwardly about the deflecting roller 12, as is indicated in dash-dot lines in FIG. 2, so that the interior of the housing is rendered accessible. In the present case the end wall 7 can be laterally displaced together with the shaft 3A and the rotor 3. The inner part 7' of the end wall 7 is held against rotation and the shaft 3 is rotatably mounted in said inner part 7'. For the sake of clarity, the rotor 3 is not shown in its laterally extended position.

To enable an upward pivotal movement of the deflecting pulleys 11, 11', suitable tracks are provided for the shafts of said pulleys, e.g. on the machine frame or frame section 10. The design of such tracks need not be described more fully because it can be determined by any person skilled in the art concerned.

Because one of the end walls 6, 7, in the present case the end wall 7, can be laterally displaced, the rotors 2, 3 may be replaced by other rotors for different operations. The range of displacement of the end wall will depend, inter alia, on the dimensions of the various internal parts to be used and may amount to from 100 millimeters to 1000 millimeters or more. The displaceable end wall and the pivotally extendable part of the belt 5A are provided with means, not shown, for locking the end wall or belt, respectively in its operating position. For discharging the material, the belt extends laterally out of the working chamber 1A in a horizontal direction in one of the two lower corners, in the present case in the lower right corner in FIG. 2, under the deflecting pulley 11, and is then trained around the deflecting pulley 13, which drives the belt, which is then returned to form the outer peripheral wall of the housing. As a result, an outlet 19 is defined between the lower deflecting pulley 11 and the horizontal portion 5B of the revolving belt 5A. The height of said outlet can be determined by a wedge 19A, which may be removable or adjustable in height and covers those portions of the peripheries of the rotors 2, 3 which are not contacted by the belt 5A.

A scraper 14 disposed under the deflecting pulley 13 serves to remove adhering material from the belt. Additional scrapers 15 and 16 protrude from the rotatable annular parts 6' and 7' of the end walls 6 and 7 over the stationary inner parts 6' and 7' thereof and from the wedge 19A or the frame section 10 over the rotatable annular parts 6' and 7', respectively.

The housing according to the invention may be used in the following manner. The materials to be treated are charged at a metered rate through the feed pipe 18 and, if desired, through additional inlets into the working chamber and are treated there by the rotors, e.g., to activate, mix, homogenize or disperse the material. The material or mixture which has been treated is thrown by centrifugal force against the belt 5A and in part against the end walls 6, 7, mainly against the rotatable annular outer parts 6' and 7' thereof. The material received by the revolving belt 5A is continuously discharged by the latter outwardly through the gap between the belt 5A and the wedge 19A and from the reversing pulley 13 drops into a collecting bin or onto another conveyor. The material which adheres to the belt is removed by the scraper 14, which may consist of a knife. The scraper 14 may be succeeded by additional means, not shown, which clean the belt by treating it with solvents, water or other methods. Such treatment of the belt is required particularly in the processing of plastics materials, synthetic resins and other mixtures which adhere and may harden quickly, such as plaster of Paris. The materials adhering to the end walls 6, 7 are removed by the scrapers 15, 16.

It will be understood that various modifications in design may be adopted within the scope of the invention. For instance, separate drive means may be provided for the rotatable annular parts 6', 7' of the end walls 6, 7 of the housing 1. Besides, the revolving belt 5A may wrap the rotors 2, 3 only in the upper half thereof so that the housing 1 is open at the bottom. In this case, discharge means, e.g., a screw conveyor, may be provided under the rotors 2, 3 and may be used also for mixing operations if additional ingredients, such as coarse aggregate, fibers, etc. for making plastics materials, building materials or the like are to be added to the material which has been treated by the rotors 2, 3. For this purpose, the discharge device may be provided with separate inlet openings. Besides, the wedge 19A may be replaced by a gate, which controls the size of the discharge opening.

The housing 1 according to the invention may be combined with the central frame which carries the drive motors, bearings, etc., or may constitute a unit in which the inner parts of the housing, the belt 5A etc. are carried by a separate structure, which is combined with the central frame.

What is claimed is:

1. A housing for equipment having rotating tools for treating lumpy to liquid materials, comprising an inner peripheral wall which surrounds and is spaced from the flight circle of said rotating tools, an outer peripheral wall which surrounds said inner wall, two end walls, which cover the tools in front and at the rear, respectively, said end walls and said inner peripheral wall confining a working chamber, in which said rotating tools
are carried by a drivable shaft, which axially extends into the working chamber, said tools being adapted to move the material to be treated outwardly and to treat said material in said chamber, said working chamber having a centrally opening inlet and an outlet which extends outwardly adjacent to said inner peripheral wall, and means for discharging the treated material from the working chamber through said outlet, said means comprising a revolving endless belt, which forms at least a portion of said inner peripheral wall of the housing and extends out of said working chamber of the housing outwardly through said outlet.

2. A housing as set forth in claim 1, characterized in that said revolving endless belt defines a major portion of the periphery of the working chamber, the belt has a surface which faces the working chamber, and the belt comprises an outwardly extending portion which forms at least part of the outer peripheral wall of the housing and in which said surface faces outwardly so that it can be cleaned.

3. A housing as set forth in claim 1, characterized in that said revolving belt forms both the inner peripheral wall of the housing, which inner peripheral wall confines the working chamber, as well as said outer peripheral wall of the housing, said belt extends horizontally outwardly on the underside of the working chamber, and outside of the working chamber is deflected downwardly to discharge the material carried by the belt, and is subsequently returned.

4. A housing as set forth in claim 3, characterized in that a shield is provided in the space defined by the endless belt defining the peripheral wall of the housing and shields at least parts of that portion of the belt which surrounds the working chamber.

5. A housing as set forth in claim 3, characterized in that scrapers for cleaning the surface of the belt are provided at least closely behind the outlet next to the outwardly facing surface of that portion of the revolving belt which forms the outer wall of the housing.

6. A housing as set forth in claim 1, characterized in that said revolving belt forms the inner peripheral wall of the housing, which inner peripheral wall confines the working chamber, and said outer peripheral wall of the housing, and has opposite edge portions which adjacent to the working chamber are guided by laterally protruding outer edge portions of said end walls, which edge portions of the end walls extend parallel to the revolving belt, said outlet of the working chamber is disposed near the bottom thereof and extends in a direction which is tangent to the bottom of the flight circle of the tools, said outlet in its lower portion is defined by an outwardly extending horizontal portion of the revolving belt coming out of the working chamber, a deflecting pulley is disposed outside said outlet and adjoins said horizontal portion of the revolving belt, said revolving belt is trained around said deflecting pulleys between its portions forming said inner and outer peripheral walls of the housing, respectively, that portion of the belt which forms the outer peripheral wall of the housing is guided in a substantially rectangular configuration, and at least that deflecting pulley which is disposed over said outlet and a belt portion which adjoins said last-mentioned deflecting pulley are pivotally movable outwardly away from the working chamber to open the latter.

7. A housing according to claim 1, characterized in that at least one of said two end walls consists of a rotatable peripheral part and a stationary inner part, the rotatable peripheral part is provided with at least one scraper, which scrapes over that surface of the stationary inner part which faces the working chamber, and said peripheral part comprises an annular rim, which bears on rotatably mounted rollers.

8. A housing as set forth in claim 7, characterized in that at least one scraper is provided adjacent to the rotatable peripheral part of the end wall and serves to clean that surface of said peripheral part which faces the working chamber.

9. A housing as set forth in claim 1, characterized in that at least one of the two end walls of the housing is adapted to be axially displaced and to be locked in its operative position. * * * * *