

PATENT SPECIFICATION

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(54) COMPACTOR

(71) I, GEOFFREY SERCOMBE, a British subject, of 19, St Martins Approach, Ruislip, Middlesex, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a compactor for compacting material in an open topped removable container, and has a particularly useful application in the compacting of waste materials contained in skips. The present invention does not relate to baling devices or baling machines or baling presses.

In many factories, and on building sites a large quantity of waste material which accrues is deposited into large containers (called skips) which are open at their tops. Such skips are typically heavy metal containers with a capacity of a few hundred cubic feet so that for transportation of the skips, either loaded or empty, special transporters with hoisting gear are required.

Conventionally, a skip, when full, is loaded onto a transporter and taken to a remote place where the waste material is emptied out of the skip, optionally into a compactor device. The compacted waste material may be later taken for incineration, reclamation or dumping. Compacting of the waste material before disposal is important since a substantial part of the waste usually comprises items with a high volume: weight ratio, for example cardboard boxes, ferrous and non-ferrous swarf, paper and other rubbish where relatively large voids exist between items. This compacting of waste material into a smaller volume is becoming currently more important in view of the increases in the cost of shifting loaded skips.

The present invention seeks to provide a compactor capable of compacting material, in particular voluminous waste material, in an open-topped container, so that a greater weight of material can be accommodated in each container.

According to the present invention, there is provided a compactor for compacting

material in an open-topped removable container, the compactor comprising a pressure platen having a pressing surface to exert downward pressure on the material, the platen being movable between a pressing position and a retracted position vertically higher than and horizontally removed from the pressing position, a support which carries the platen, a ground-engaging base upon which the support is pivotally mounted, the base having means for preventing movement, in a horizontal plane during the compacting, of a removable container from a position below the pressing position of the platen, and power means for moving the pressure platen into and out of the container, between its pressing and retracted positions, the movement being in a substantially vertical direction throughout its extent within the container.

When compacting material in a large and heavy skip, a downward force must be exerted upon the material in the skip in order to compact it, and the platen of the compactor according to the invention can subsequently be removed to a position horizontally and vertically spaced from the skip so that a transporter may collect and remove a full skip.

In the compactor, the power means may be a ram which is used for applying the force to the pressure platen via the support in order to move the pressure platen between its pressing and retracted positions. Preferably, the ram is powered hydraulically. The ram may be arranged to extend to exert a force to the support in a non-vertical direction and the support may be in the form of a cranked beam arranged and constructed so that the non-vertical force applied to it is transformed to a substantially vertically downward force at the pressing surface. The beam may have two faces at an obtuse angle to each other at the end supporting the platen, the latter being pivotally mounted thereon by a pin or the like. These faces serve as stops to limit pivoting of the platen, allowing the platen to pivot through a small angle whereby it can

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take up a position consistent with the characteristics of the material being compacted. A spring may optionally be included to bias the platen towards one or other of these faces. Two or more rams may be arranged in parallel and the pressure platen may then be carried by a support including two or more beams spaced one from another. The platen may be hinged to the support, or may be connected thereto by a universal joint.

The support is pivoted to the base, rotation of the support about the pivot producing the necessary horizontal and vertical displacements of the pressure platen.

The ram may be fixed to the base so that, in use, it reacts against the base, a portion of the base being located directly below the pressing position of the pressure platen and being constructed to be capable of receiving a skip upon the said portion.

While a ram, particularly a hydraulic ram has many advantages when used as the power means, it may be replaced by any other suitable form of power means. For example, the support can be moved by a motor driven leadscrew arrangement, whereby a threaded member attached to the support runs on a leadscrew driven by a motor. An electric motor or fluid driven motor may be used to drive the leadscrew. As another alternative, a winch type system may be used, whereby a chain or rope secured to the support is wound on to a winch drum, the winch drum being driven by any suitable motor. In yet another alternative the pressure platen is supported by a beam attached to a shaft, and a rotary actuator is directly connected to the shaft, to apply a turning force to it. This forces the platen down onto the material to be compacted.

As a further alternative, the pivoting motion of the support, which effects the pressing motion of the platen, may be caused through a gear train of which one pinion is attached to the support and other gears transmit the drive thereto from a motor of any suitable type. According to another alternative, a direct induction type drive may be used whereby a magnetic field produced by suitably arranged coils or like devices acts on a permanent magnet or an electrical coil disposed on or secured to the support, the arrangement being such that the support or beam serves as an armature and is shifted by the magnetic induction effect caused when current is fed through the field coils or like devices. Other forms of power means may occur to one skilled in the art.

Preferred embodiments of the present invention will now be particularly described with reference to the drawings

accompanying the Provisional Specification, in which:

Figure 1 shows a schematic side-elevational view of a first embodiment of the invention, the support and pressure platen being shown in full lines in the pressing position, and in broken lines in the retracted position; and

Figure 2 shows a similar schematic side-elevational view of a second embodiment of the present invention.

Referring firstly to Figure 1, a removable skip 10 contains voluminous waste material, generally indicated at 12. The skip 10 stands on a ground-engaging base 14, which base 14 also supports a pivot connection 16 for a hydraulic ram 18, and a pair of mounting members 20, one of which is obscured by the other in Figure 1. A support 22 in the form of a cranked beam is mounted between the mountings 20 on a pivot 21. The pivot 21 may be substantially closer to the base 14 than is shown in Figure 1. The hydraulic ram 18 is pivotally connected to the support 22 at a point denoted by reference numeral 24. On the end of the support 22 distant from the pivot 21 is mounted a pressure platen 26 having a pressing surface 28.

The base 14 has upstanding projections 30 thereon which serve as means for preventing movement of the skip in a horizontal plane. Although projections 30 are shown as separate components fixed to the base 14, they may be formed as an integral part of the base.

The support 22 and pressure platen 26 are shown in full lines in Figure 1 in the pressing position. If the hydraulic ram 18 is retracted, the support 22 and platen 26 will be rotated about the pivot 21 until the retracted position, shown in broken lines, is reached. In the retracted position of the support 22 and the pressure platen 26, there is no part of the compactor positioned directly above the skip 10, and a transporter will be unhindered when hoisting and removing a skip or when lowering a skip into position on the base 14.

The line of action of the ram 18, when the support 22 and the platen 26 are in the retracted position, is denoted in Figure 1 by a broken line and is indicated by the reference numeral 32. It is important that the line of action 32 always passes above the pivot 21 so that actuation of the ram 18 will move the support 22 and platen 26 in the required direction.

It can be seen from Figure 1 that the line of action 32 of the ram 18 moves further away from pivot 21 as the support 22 and platen 26 move from the retracted position to the pressing position; thus, the mechanical advantage of the compactor is greatest in the pressing position.

The mountings 20 could be the walls of a

housing (not shown in Figure 1) large enough to accommodate the whole of the support 22 and platen 26 in the retracted position.

The base 14, mountings 20, support 22 and platen 26 are of a material strong enough to withstand the forces involved, the strength of support 22 being determined at the points of weakness 34 and 36. Preferably these elements are of cast iron or steel.

The second embodiment of the invention shown in Figure 2 is modified in that the ram 18 is housed in a cavity 38 underneath the base 14. The cavity 38 may be underground or may be enclosed in a housing 40 of which base 14 is the top wall. The advantage of this embodiment is that it requires less ground space; the advantage of the embodiment of Figure 1 is that it is less costly to install.

In Figure 2, elements similar to those in Figure 1 are denoted by similar reference numerals. The support 22 passes through a hole in base 14, which hole is large enough to allow movement of the support 22 between the pressing position (shown in full lines) and the retracted position (shown in broken lines). The pivot 21 may have a pivot pin which is mounted in the base and extends across a hole in the base or mountings may be provided, similar to mountings 20 of Figure 1 or constituting walls of a housing for the support 22 and platen 26 when in the retracted position.

In the embodiment of Figure 2 the line of action 32 of the ram 18 must always pass below pivot 21. Again the mechanical advantage of the compactor is greatest when the support 22 and platen 26 are in the pressing position. In this embodiment, the pivot connection 16 for ram 18 is not on the base 14 but in the cavity 38; pivot connection 16 may be mounted on a support 42 as shown in Figure 2.

The skip for use with the compactor preferably has four side walls upstanding from a base plate and hinged flaps connected to the skip walls whereby a normally open top of the skip can be closed by swinging over these flaps immediately after a compactor according to the invention has compressed the skip contents and been withdrawn. The skip may also have detent means whereby retaining bars or retaining plates can be temporarily placed to hold material in the skip in a compressed condition. Such detent means may include ledges within the skip under which plates or bars can be engaged, or aligned holes or slots in walls of the skip through which bars or plates can be inserted, just after withdrawal of the pressure platen. The base and the pressure platen could be adaptable so that the compactor could accommodate skips of different sizes. Means may be provided for

moving either skips or the compactor so that skips are presented successively to the compactor, for example the skips could be placed on a movable conveyor, or a slide or roller conveyor, with a loading end and a take-off end, the compactor being arranged and constructed to compact material in a skip between the two ends of the conveyor.

The invention can be applied to the compaction of items such as scrap cars, lorry cabs, or oil-drums. The compressed article can be removed from beneath the pressure platen, after compaction and after retraction of the pressure platen, by a crane grab or any other suitable means.

WHAT I CLAIM IS:—

1. A compactor for compacting material in an open topped removable container, the compactor comprising a pressure platen having a pressing surface to exert downward pressure on the material, the platen being movable between a pressing position and a retracted position vertically higher than and horizontally removed from the pressing position, a support which carries the platen, a ground-engaging base upon which the support is pivotally mounted, the base having means for preventing movement, in a horizontal plane during the compacting, of a removable container from a position below the pressing position of the platen, and power means for moving the pressure platen into and out of the container, between its pressing and retracted positions, the movement being in a substantially vertical direction throughout its extent within the container.

2. A compactor according to claim 1, in which the support is in the form of a cranked beam arranged and constructed so that a non-vertical force applied thereto by the power means is transformed to a substantially vertical downward force at the pressing surface.

3. A compactor according to claim 2, wherein the platen is pivoted at one end of the beam and the beam has two faces at an obtuse angle to each other at the end supporting the platen, these faces serving as stops to limit the pivoting movement of the platen on the support.

4. A compactor according to claim 3, including a spring to bias the platen to pivot towards one of these faces.

5. A compactor according to any one of claims 1—4, wherein the support comprises two or more spaced beams.

6. A compactor according to any preceding claim, wherein the power means comprises at least one ram connected to the support for transmitting a force via the support to the pressure platen to move the pressure platen between its pressing and retracted positions.

7. A compactor according to any one of

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housing (not shown in Figure 1) large enough to accommodate the whole of the support 22 and platen 26 in the retracted position.

5 The base 14, mountings 20, support 22 and platen 26 are of a material strong enough to withstand the forces involved, the strength of support 22 being determined at the points of weakness 34 and 36. Preferably these elements are of cast iron or steel.

10 The second embodiment of the invention shown in Figure 2 is modified in that the ram 18 is housed in a cavity 38 underneath the base 14. The cavity 38 may be underground or may be enclosed in a housing 40 of which base 14 is the top wall. The advantage of this embodiment is that it requires less ground space; the advantage of the embodiment of Figure 1 is that it is less costly to install.

20 In Figure 2, elements similar to those in Figure 1 are denoted by similar reference numerals. The support 22 passes through a hole in base 14, which hole is large enough to allow movement of the support 22 between the pressing position (shown in full lines) and the retracted position (shown in broken lines). The pivot 21 may have a pivot pin which is mounted in the base and extends across a hole in the base or mountings may be provided, similar to mountings 20 of Figure 1 or constituting walls of a housing for the support 22 and platen 26 when in the retracted position.

30 In the embodiment of Figure 2 the line of action 32 of the ram 18 must always pass below pivot 21. Again the mechanical advantage of the compactor is greatest when the support 22 and platen 26 are in the pressing position. In this embodiment, the pivot connection 16 for ram 18 is not on the base 14 but in the cavity 38; pivot connection 16 may be mounted on a support 42 as shown in Figure 2.

40 The skip for use with the compactor preferably has four side walls upstanding from a base plate and hinged flaps connected to the skip walls whereby a normally open top of the skip can be closed by swinging over these flaps immediately after a compactor according to the invention has compressed the skip contents and been withdrawn. The skip may also have detent means whereby retaining bars or retaining plates can be temporarily placed to hold material in the skip in a compressed condition. Such detent means may include ledges within the skip under which plates or bars can be engaged, or aligned holes or slots in walls of the skip through which bars or plates can be inserted, just after withdrawal of the pressure platen. The base and the pressure platen could be adaptable so that the compactor could accommodate skips of different sizes. Means may be provided for

moving either skips or the compactor so that skips are presented successively to the compactor; for example the skips could be placed on a movable conveyor, or a slide or roller conveyor, with a loading end and a take-off end, the compactor being arranged and constructed to compact material in a skip between the two ends of the conveyor.

The invention can be applied to the compaction of items such as scrap cars, lorry cabs, or oil-drums. The compressed article can be removed from beneath the pressure platen, after compaction and after retraction of the pressure platen, by a crane grab or any other suitable means.

WHAT I CLAIM IS:—

1. A compactor for compacting material in an open topped removable container, the compactor comprising a pressure platen having a pressing surface to exert downward pressure on the material, the platen being movable between a pressing position and a retracted position vertically higher than and horizontally removed from the pressing position; a support which carries the platen, a ground-engaging base upon which the support is pivotally mounted, the base having means for preventing movement, in a horizontal plane during the compacting, of a removable container from a position below the pressing position of the platen, and power means for moving the pressure platen into and out of the container, between its pressing and retracted positions, the movement being in a substantially vertical direction throughout its extent within the container.

2. A compactor according to claim 1, in which the support is in the form of a cranked beam arranged and constructed so that a non-vertical force applied thereto by the power means is transformed to a substantially vertical downward force at the pressing surface.

3. A compactor according to claim 2, wherein the platen is pivoted at one end of the beam and the beam has two faces at an obtuse angle to each other at the end supporting the platen, these faces serving as stops to limit the pivoting movement of the platen on the support.

4. A compactor according to claim 3, including a spring to bias the platen to pivot towards one of these faces.

5. A compactor according to any one of claims 1—4, wherein the support comprises two or more spaced beams.

6. A compactor according to any preceding claim, wherein the power means comprises at least one ram connected to the support for transmitting a force via the support to the pressure platen to move the pressure platen between its pressing and retracted positions.

7. A compactor according to any one of



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5 claims 1—5, in which the power means comprises a threaded member attached to the support, a leadscrew disposed to engage the threaded member, and a motor to rotate the leadscrew thereby to move the platen between the retracted and the pressing positions.

10 8. A compactor according to any one of claims 1—5, in which the power means comprises a winch system including a drum, a chain or rope secured to the support and wound onto the drum, and means to drive the drum.

15 9. A compactor according to any preceding claim, wherein the distance between the platen and the pivotal

connection of the base to the support is adjustable.

10. A compactor according to claim 1, 2, 3 or 4 including a conveyor to move the container to beneath the pressing position. 20

11. A compactor according to claim 1 and substantially as herein described with reference to Figure 1.

12. A compactor according to claim 1 and substantially as herein described with reference to Figure 2. 25

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