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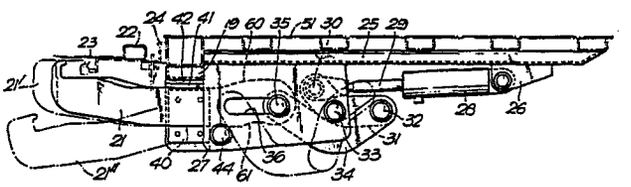
(71) Applicant: **Tollemache Limited, Misterton, Doncaster South Yorkshire, DN10 4DN (GB)**

(72) Inventor: **Wilson, Melvin Stuart, 12 Rookery Croft Epworth, Doncaster South Yorkshire (GB)**

(74) Representative: **Williams, Trevor John et al, J.A. KEMP & CO. 14 South Square Gray's Inn, London WC1R 5EU (GB)**

(54) Mechanism for securing a container to a compactor.

(57) A linkage mechanism for securing a container to a compactor has a hooked latch arm (21) which is adapted to be both swung inwardly and to be retracted to engage and draw a container against the compactor outlet. Cam surfaces (60, 61) are provided on opposite sides of the latch arm positively to move the latch arm inwardly and outwardly upon respective retracting and advancing movement of the latch arm. An over centre arrangement (A, B, C), is provided whereby the loads on the drive motor (28) are relieved when the latch arm (21) is fully retracted.



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COMPACTOR LATCHING MECHANISM

This invention relates to a latching mechanism and more especially to a latching mechanism for securing a container to a compactor.

In large industrial compactors it is necessary to be able to secure the container, for example a roll-on-roll-off container or a fixed height body type container over the exit from a compactor chamber so that upon operation of a large ram the container is filled with material displaced from the compactor chamber. Typically, such a compaction process is required when loading containers with compressible waste material or rubbish or other compressible material.

The problem arises that one wants automatically to take care of any slight misalignments of the container with the compactor and then to draw and hold the container into tight sealed relationship to the end on the compactor to enable the material to be forced from the compactor chamber into the container.

The object of the present invention is to provide an improved latching mechanism which utilizes a latch arm which can function not only to hold the container against the compactor in a reliable manner but also to take care of any fine alignment necessary of the container with the compactor.

In GB-A-1393316 there is disclosed a latching mechanism for securing a movable structure to a stationary structure comprising a body adapted to be secured to the stationary structure, a hooked latch arm guided for sliding movement by said body between a retracted position in which it is adapted to engage and hold the movable structure in engagement with the stationary structure and an advanced position to release such movable structure, and drive means for moving said latch arm between its retracted and advanced positions, said latch arm being

mounted to said body by a pivot adjacent its rear end guided for movement longitudinally of said body and comprising a cam surface cooperable with said body whereby said latch arm is swung about said pivot axis for inward movement towards said movable structure upon retracting movement of said latch arm, and said drive means comprising a linkage connecting the pivot with a drive motor and including a connection to the body, the linkage being such as to comprise an over-centre arrangement to relieve loading on the drive motor when the latch arm is fully retracted. In this prior proposal the movable structure is a ship's latch and the latching mechanism is a latch battening device which can rely upon gravity during uncoupling due to the vertical arrangement of the latch and the fact that the mechanism is used only infrequently, at the beginning and end of each voyage, such that any stuck latches can be released manually. The present invention requires the latch to be moved in a horizontal plane and to be able to exert a substantial force against the side of a container for alignment purposes.

The present invention is characterised in that the stationary structure is a compactor adapted to have a container latched thereto as the movable structure, in that the inward movement of the latch arm is limited by the provision of a second cam surface thereon engageable with the body, in that said second cam surface is effective to pivot said latch arm outwardly away from the container upon advancing movement of the latch arm and in that the first cam surface is cooperable with the body to limit outward movement of the latch arm upon advancing movement of the the latch arm. The cam surfaces are provided on both sides of the latch arm so as positively to move the latch arm during both inward and outward movement with the movement of the latch arm itself being between limits as

defined by the cam surfaces so that it will be properly positioned to receive the container substantially, but not accurately, aligned with its final required position.

Conveniently, the linkage may comprise first and second links, the first link being pivotally mounted intermediate at its ends to the body, having one end connected to a reciprocable motor and having its other end connected to one end of the second link, the other end of which is connected to said pivot.

Generally, with this arrangement the operation of the motor when the latch arm is in its extended position causes the latch arm initially to swing from an outwardly disposed position towards the container so as to engage the container if it is misaligned and align it with the compactor outlet, subsequent completion of movement of the latch causing the latch hook to engage a keeper member on the container and draw the container into tight engagement with the compactor. Preferably the motor means is fluid powered and may conveniently be a hydraulic jack.

A particularly simple linkage is provided in the preferred construction in which the links are each bell-cranks with the over-centre arrangement being provided by the axes pivotally connecting the ends of the second link being positioned nearer the base of the body to be secured to a compactor than the axis of the pivotal connection between the first link and the body in the retracted position of the latch arm, and being arranged to pass through an aligned position upon initial movement of the motor means to advance the latch arm from its retracted position.

By having the over-centre arrangement it is ensured that once the container is drawn into its required position attached to the compactor the loading on the hydraulic jack or other motor means is relieved due to the fact that the principal forces required to retain the

container on the compactor during compaction of material in the container are held by the shear force across pivot connections provided between the linkage and the latch base.

The invention will be described, by way of example, with reference to the accompanying drawings in which:

Fig. 1 shows a latch embodying the invention in association with a compactor for use with roll-on-roll-off containers;

Fig. 2 shows a latch embodying the invention in association with a compactor for use with fixed body height type containers;

Fig. 3 is a side elevational view of the latch as used with the compactor of Fig. 2; and

Fig. 4 is a plan view of the compactor shown in Fig. 3.

Referring to Fig. 1, a compactor is shown comprising a ram assembly 50 associated with a chamber 51 on opposite sides of which are mounted backing mechanisms 53. As shown in Fig. 2 the latching mechanism is mounted approximately mid-way up the side of the compactor chamber for association with fixed height type containers.

The latching mechanism as shown in Figs. 3 and 4 comprises a body formed of a base 25 provided with upstanding pairs of flanges 26 and 27. The latching mechanism comprises a latching hook arm 21 which is shown in the full line illustrations of Figs. 3 and 4 in its retracted position in which the hooked portion of the arm engages over a keeper member 23 attached to the container 22. The edge of the container is drawn into engagement with a resilient buffer 24 around the periphery of the opening from the compactor chamber 51.

Pivotally mounted to the flanges or lugs 26 is a hydraulic jack 28 provided with a piston 29 the end of

which is connected by a pivot pin 30 to one end of each of two links 31 which are in the form of bell cranks pivoted by a pin 33 at a mid point thereof to the flanges 27. The other ends of the links 31 are connected by pins 32 to one end of each of a pair of second bell crank links 34 the other end of which is connected to a pivot pin 35 connected to the rear end of the latch arm 21 and guided for movement longitudinally of the latch body by being received in guide slots 36 in the flanges 27.

As will be noted from Fig. 4, with the jack 28 in its extended, latch arm retracting position, the linkage is arranged such that the pivot pin 32 is in a position B such that the line between the axes of the pivot pin 32 in the position B and the pivot pin 35 in a position C are nearer the base 25 than the pivot pin 33 at position A. As a consequence upon retraction of the jack 28, the pin 30 will be drawn back causing the bell crank link 31 to pivot in a clockwise direction so that the pin 32 passes from the position B through a central position aligned with the pivot pin 35 to cause the pin 35 to be moved forwardly along the guide slots 36 to advance the bell crank on 21 towards the position 21' in order to disengage the keeper 23 on the container. Continued movement of the hydraulic jack will cause continued movement of the pivot 35 towards the forward end of the guide slots 36 until the latch arm 21 has both been advanced and swung outwardly away from the container to the position shown at 21'' in Fig. 4. The outwardly swinging movement of the latch arm 21 as it is further advanced is caused by the action of two cam surfaces 60 and 61 near the rear end of the latch arm which cooperate with the body to cause the outwardly swinging movement of the latch arm. As will be appreciated from Fig. 4 these cam surfaces 60 and 61 are in the form of inwardly bent or shaped portions of the rear end of the latch arm.

The innermost cam surface 60 engages a wear plate 41 secured via plate 42 to a mounting channel 19. The other outwardly facing cam surface 61 engages a roller or pin 44 supported by the flanges 27. As shown in Fig. 3 the weight of the latch arm 21 is supported by a wear plate 40 mounted to the body.

For use one such latching mechanism is mounted on either side of the compactor. When the latch arms are in their advanced and outwardly swung and disengaged position 21'' a container is moved adjacent to the compactor exit. The hydraulic rams 28 of each latch are then actuated and forced outwardly to cause the latch arm to be retracted by the pin 35 being drawn back along the guides 36. Initial retraction of each latch arm causes it to be swung inwardly, pivoting about the retracting pivot 35 due to the action of the cam surface 61. With both latch arms on opposite sides of the container being swung inwardly any misalignment of the container will be corrected by one or other of the latch arms engaging the container until the container is aligned with the compactor once the latch arms reach the position 21'. Continued movement of the hydraulic jack or motor 28 for each latching mechanism causing the latch arm 21 to be drawn back to engage the container keeper 23 and draw the container towards the compactor. At the end of the retraction movement the pivot pin 32 passes through the position of alignment with the pivot pins 33 and 35 to an over-centre position at position B as shown in Fig. 4. With this arrangement the large forces exerted on the container during use of the compactor are transferred to the action of the pivot pins to the latching mechanism body and thus forces on the hydraulic motor which must otherwise be present during use of the compactor are relieved.

The latching mechanism shown in Figs. 3 and 4 as

applied to the fixed height body container of Fig. 2 is mounted approximately at the mid point of the height of the container and comprises the single base plate 25. In the embodiment of Fig. 1 where the latching mechanism is applied for a roll-on-roll-off container usage the latching mechanism is mounted near the bottom of the compactor chamber rather than half way up its sides. However, an additional difference is shown in this construction in that instead of the latching mechanism having a single base plate 25 which is secured to the side of the compactor chamber, the mechanism comprises a series of shorter base plates which are welded between the grooves between vertical uprights on the outside of the compactor chamber as shown in Fig. 1. However, this is a simple matter of constructual convenience as to how the latching mechanism is mounted to the compactor side wall. Of prime importance is the actual mechanism by which the container engaging latch arms are intially swung in towards the container to align the same before drawing the container back against the compactor with the forces retaining the container in position during use of the compactor being taken up through the mechanical linkage mounting with the motor of the drive means being relieved from unnecessary loading.

CLAIMS

1. A latching mechanism for securing a movable structure to a stationary structure (51) comprising a body (25) adapted to be secured to the stationary structure, a hooked latch arm (21) guided for sliding movement by said body between a retracted position in which it is adapted to engage and hold the movable structure in engagement with the stationary structure and an advanced position to release such movable structure, and drive means (28 - 35) for moving said latch arm (21) between its retracted and advanced positions, said latch arm (21) being mounted to said body (25) by a pivot (35) adjacent its rear end guided for movement longitudinally of said body and comprising a cam surface (61) cooperable with said body (at 44) whereby said latch arm is swung about said pivot axis for inward movement towards said movable structure upon retracting movement of said latch arm, and said drive means comprising a linkage (30 - 34) connecting the pivot (35) with a drive motor (28, 29) and including a connection (33) to the body, the linkage being such as to comprise an over-centre arrangement to relieve loading on the drive motor when the latch arm is fully retracted, characterised in that the stationary structure is a compactor adapted to have a container latched thereto as the movable structure, in that the inward movement of the latch arm (21) is limited by the provision of a second cam surface (60) thereon engageable with the body, in that said second cam surface is effective to pivot said latch arm outwardly away from the container upon advancing movement of the latch arm and in that the first cam surface (61) is cooperable with the body to limit outward movement of the latch arm upon advancing movement of the latch arm.

2. A latching mechanism according to claim 1, characterised in that the linkage comprises first and

second links, (31 and 34) the first link (31) being pivotally mounted (at 33) intermediate its ends to the body, having one end (30) connected to a reciprocal motor (29, 28) and having its other end (32) connected to one end of the second link (34) the other end of which is connected to said pivot (35).

3. A latching mechanism according to claim 2 characterised in that the links are each bell cranks with the over-centre arrangement being provided by the axes of pivotal connections (32, 35) at the ends of the second link (34) being positioned nearer the base of the body (25) to be secured to the compactor than the axis of pivotal connection (33) between the first link and the body in the retracted position of the latch arm and being arranged to pass through an aligned position upon initial movement of the motor means to advance the latch arm from its retracted position.

4. A latching mechanism according to claim 3, characterised in that two pairs of first and second links are provided with the first links being pivotally connected on either side of a drive member (29) from the motor means and the second links (34) being pivotally connected on the remote sides of the first links to pass between two flanges (27) projecting from the base of the body (25).

5. A latching mechanism according to any preceding claim, characterised in that the motor means is a fluid powered motor.

6. A latching mechanism according to any preceding claim characterised in that the pivot (35) is received in and guided by slots (36) in the flanges (27).

7. A latching mechanism according to any preceding claim, characterised in that the wear plate (41) on said base (25) is engageable with the second cam surface of the latch arm and a roller or pin (44) carried

by the body (25) engages the first cam surface.

8. A latching mechanism according to any preceding claim, characterised in that the cam surfaces (60, 61) comprise an inwardly bent or shaped end of the latch arm (21).

9. A compactor characterised by a pair of latches as claimed in any preceding claim mounted thereon for drawing a container into engagement with the compactor to receive material therefrom.

10. A compactor according to claim 9, characterised in that the latches are mounted near the mid point of the compactor side walls to adapt the compactor for use with fixed height body type containers.

11. A compactor according to claim 9, characterised in that the latches are mounted near the bottom of the compactor side walls for adapting the compactor to receive roll-on-roll-off type containers.

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Fig.1.

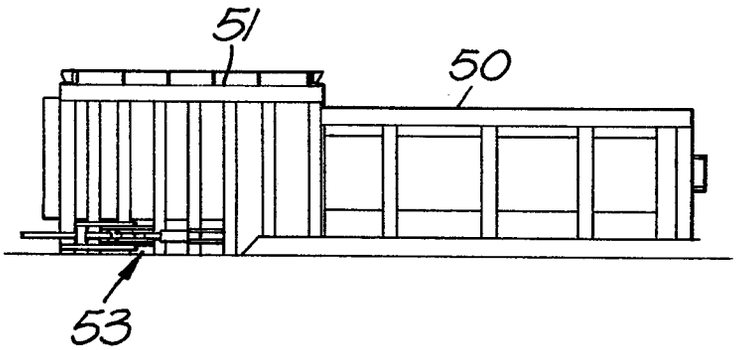
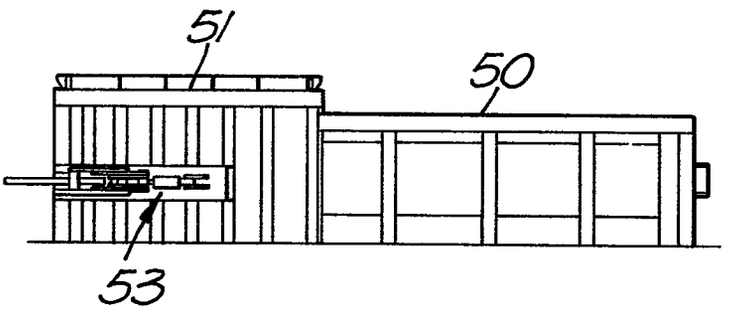


Fig.2.



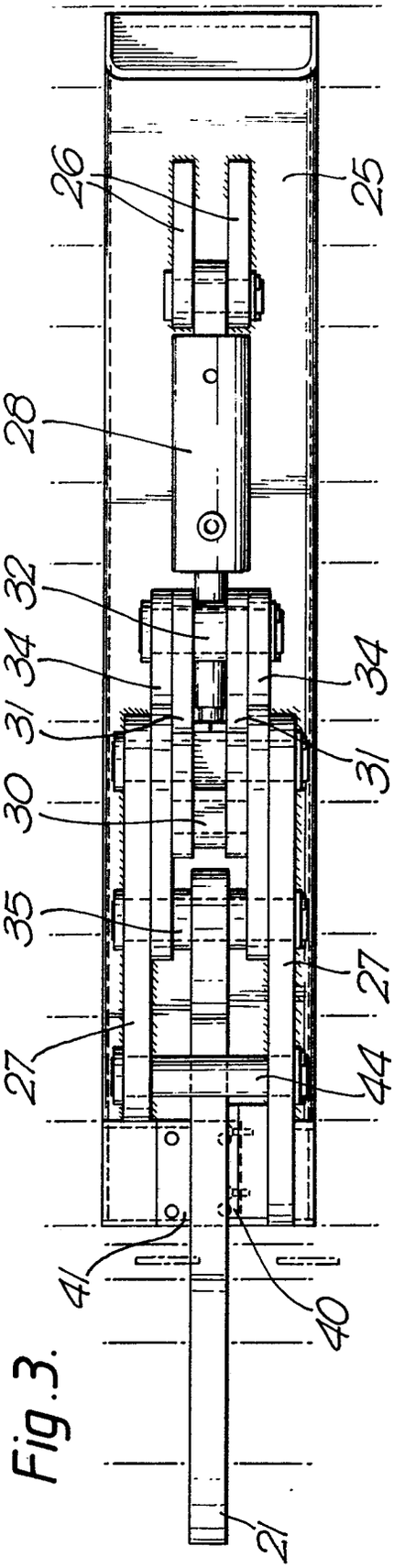

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Fig.3.

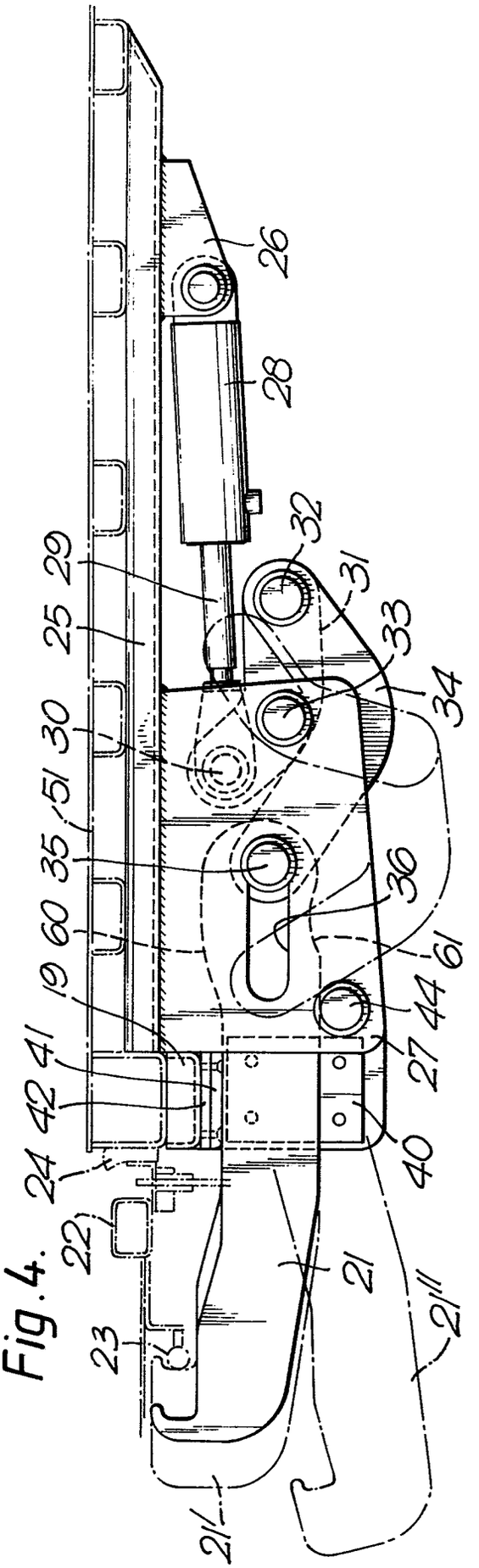
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Fig.4.