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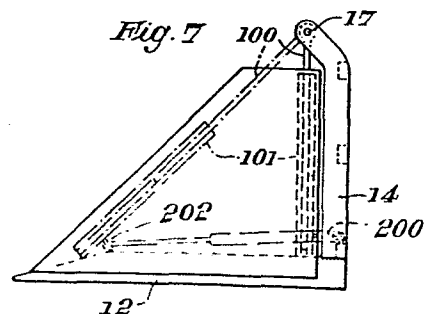
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(54) **Fork lift trucks or tractors unloading attachment.**

(57) The invention provides an attachment which is adapted to be fitted to the tines (11) of an attachment with which an agricultural tractor is equipped or to the tines (11) of a fork lift truck in order to improve the unloading capabilities of such vehicles. The attachment according to the invention has a back plate (15,100-101) movable relatively to said tines (11) under the control of double-acting hydraulic ram means (18,200) in order to sweep the load off the tines. The attachment according to the invention comprises tines (12) which are securable to (and detachable from, when not needed) the tines (11) of the tractor attachment or fork lift truck.

Suitable configurations of back plate and ram means adapt the attachment for use as a grab and, with side plates, as a grain bucket.



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FORK LIFT TRUCKS AND
AGRICULTURAL TRACTORS.

TITLE MODIFIED
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This invention relates to fork lift trucks and agricultural tractors.

In agriculture, in particular, the operator of a fork lift truck or of an agricultural tractor equipped for example with a buck
5 rake has the problem, when dealing with materials such as manure and silage, of trying to ensure that the entire load is discharged from the fork; it will be appreciated that manure and silage tend to adhere to the tines of the fork and thus prevent the load from slipping off the tines.

10 When using a fork lift truck, discharge is assisted by the mast being tiltable rearwardly and forwardly about a horizontal pivot axis. However, the extent of tilt is small; by way of example, with some fork lift trucks the tilt angles are 8° rearwardly and 6° forwardly; with others, the tilt angles are 10° rearwardly and 4° forwardly; but, in any event, the maximum tilt
15 forwardly is 10° . A 10° forwards tilt is not of much use when trying to discharge a sticky load like manure or silage. Consequently, some manufacturers offer purpose-made attachments for mounting upon the mast and for connection to the hydraulic circuit
20 of the fork lift truck. The attachment comprises at least one hydraulic ram which is operated to tilt the fork in such a manner

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that the tines make an included angle of say 45° - 50° with the mast which may or may not have been tilted forwardly. Such an angle (viz 45° to 50°) is steep enough to cause all or the major proportion of even a sticky load to slide off the tines.

5 The attachments mentioned in the preceding paragraph are, however, quite expensive and may only be used for a limited amount of time during a period of one year. In these days of a high inflation rate and very high interest rates, it is essential to reduce costs wherever possible.

10 When using an agricultural tractor equipped with a buck rake, it is recommended (by at least one text book) to fill a silage clamp by backing the tractor on to the previously deposited load and then to tip the rake. This mode of operation ensures that the tines of the rack drop to a steeper angle, whereby a better deposi-
15 tion of green crop material is obtained. This recommendation quite clearly indicates that there is a problem even with the discharge of a relatively non-sticky load and that the problem will be even more severe with a load of sticky material like silage or manure.

20 The principal object of the present invention is to try to improve the handling of materials like silage and manure, and even of materials like green crop or hay, when using fork lift trucks or agricultural tractors equipped with a buck rake or other tined

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attachment.

In the following description and in the appended Claims, a fork lift truck and an agricultural tractor equipped with a tined attachment will be referred to as "a vehicle of the type described".

5 Accordingly, the present invention consists in a vehicle of the type described having at least two forwardly projecting tines, a frame releasably connected to said tines directly or indirectly, a back plate pivotally connected to said frame, and double-acting hydraulic ram means connected between said frame
10 and said back plate and operable to move the back plate about its pivot axis relatively to said tines.

In a generally preferred embodiment of said vehicle, said frame includes a first portion which is upstanding and a second portion which comprises at least two tines which extend in
15 a generally horizontal direction from said first portion, said back plate being pivotally connected to the first portion of said frame.

The two tines referred to in the preceding paragraph may be hollow for the purpose of accommodating the first-mentioned tines with which the vehicle is provided. In such a case, said two
20 tines may be secured directly to the first-mentioned tines, as for example by screws or nuts and bolts.

In a particularly useful form of said generally preferred embodiment, said second portion consists of more than two (for

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example, five) tines.

Moreover, it is possible to increase the usefulness of the vehicle by providing said second portion with a plate covering said at least two (possibly hollow) tines and by securing
5 horizontally spaced second and third plates in an upstanding manner to the first portion and to the respective one of the two tines. In this manner, a grain bucket is created.

In one form of said vehicle according to the present invention, the back plate may be provided with elongate slot means
10 through which the pivot axis of the back plate extends; this will enable the free edge of the back plate to move along a substantially horizontal plane instead of in an arc when the back plate is used to push a load (e.g. manure or silage) off the tines.

If the back plate and the associated hydraulic ram are
15 mounted in one way relatively to one another on the frame, the back plate is useable to push loads off the tines. However, if the so-called back plate and the associated hydraulic ram are mounted in another way relatively to one another on the frame, said plate will be useable as one element of a grab in order to deal with things
20 like bales, brushwood, logs, fencing posts and so on.

In another form of said vehicle according to the present invention, said back plate may consist of telescopic parts, the double-acting hydraulic ram means being connected between said

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frame and one of said telescopic parts of said back plate. Said double-acting hydraulic ram means preferably comprises two hydraulic piston/cylinder assemblies, the free ends of the piston rods being connected to points on said one telescopic part which are as near as possible to the mid-length point of the free (bottom) edge of said one telescopic part, and the respective ends of the cylinders being connected at widely spaced locations at opposite sides of said frame.

The present invention will now be more particularly described with reference to the accompanying diagrammatic drawings, in which :-

Figures 1 and 2 illustrate in side and front elevations, respectively, one embodiment of a vehicle of the type described (as defined above) including a frame and a pivotally mounted back plate;

Figure 1A illustrates in side elevation another embodiment of said vehicle;

Figure 3 illustrates an alternative mounting of the back plate in order to create a grab;

Figure 4 illustrates additional side plates employed to create a grain bucket;

Figure 5 illustrates a modification of the arrangement illustrated in Figure 4;

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Figure 6 illustrates another embodiment in which the pivotally mounted back plate consists of telescopic parts; and

Figures 7 and 8 illustrate a modification of the arrangement illustrated in Figure 6.

5 The following description will generally make reference to a fork lift truck but it is to be understood that such references are by way of example only, the description applying equally well, mutatis mutandis, to an agricultural tractor equipped with a tined attachment.

10 Figure 1 illustrates a fork lift truck whose mast 10 has horizontally spaced forks or tines 11 of which only one is visible in the drawing. These forks 11 extend into two box-section tines 12 (see also Figure 2) which are spaced equally from three additional box section tines 13. Attached to the outer two tines 13 are two
15 pillars 14 and the parts 12, 13 and 14 are connected to one another by horizontal frame members which are illustrated in Figure 2 but which have not been given reference numerals. The parts 12, 13 and 14 thus connected together constitute a frame. A back plate
20 15 is pivotally connected to the upper free ends of the pillars 14; in order to achieve this, corresponding parts of the plate 15 are extended to provide horizontally spaced elongated slots 16 at its upper end and the pivot axis 17 of the plate 15 extends through the slots. The cylinder of a hydraulic ram 18 is mounted at one end

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thereof on the frame and the piston rod end of said ram is connected to the back plate 15; when the ram is extended, the plate 15 is moved from its upright position to the position thereof which is indicated by the reference numeral 19. There could, of course, be two or more hydraulic rams 18 instead of the single ram which is illustrated.

The slot 16 may be of the configuration indicated by the reference numeral 20 in order to provide an extension of the "reach" of the free edge of the plate 15 (see Figure 1A).

Referring to Figure 3, if a farmer were to require the use of another kind of tool, the so-called back plate 15 shown in Figure 1 can be mounted on the respective pillars 14 in such a manner that the hydraulic ram or rams 18 is/are oriented in a direction opposite to that illustrated in Figure 1, and the ram or rams can be connected to a member such for example as a transverse rod (not illustrated) which joins two eyes which are provided one at the end of each of the slots 16. Thus modified, the device can be used as a grab to deal with bales, brushwood, logs and so on.

Referring to Figure 4, the arrangement illustrated in Figures 1 and 2 can be modified by securing a base plate 25 across the tops of the box-section tines 12. Side plates 26 are secured, for example by welding, to the base plate, and the resultant

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structure can be connected in any desired manner to the pillars 14 in order to increase the stability of the arrangement. Thus modified, the arrangement can act as a grain bucket and the back plate 15 is used to eject the load in the usual way.

5 Still referring to Figure 4, the arrangement can be provided with a hydraulic ram 30 which can be operated to raise or lower a pivotal front portion 31 of the bottom plate of the bucket; this pivotal portion 31 could help to retain a granular or particulate load in the bucket.

10 Referring to Figure 5, a modified arrangement is illustrated in which the use of an expensive ram 30 (Figure 4) can be avoided. The side plates 26 can carry guides 40 for two lengths 41 of chain or wire, one end of each length being connected to the plate 15 and the other end thereof being connected to the pivotal
15 portion 31. Said portion 31 will be raised when the back plate 15 has been fully retracted (i.e. moved into the upright position thereof illustrated in Figure 5) by the ram or rams 18.

 Referring to Figure 6, a vehicle of the type described (as defined above) is provided with a back plate which comprises
20 two telescopically arranged parts 100, 101 which can be brought from either of its illustrated positions to the other under the control of the hydraulic ram 18. The free end or edge of the part 100 is pivotally connected to the pillars 14 of the frame, the pivot axis

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being indicated by the reference numeral 17. The part 101 is movable relatively to the part 100 so as to push the load off the hollow tines 12.

Of course, the telescopic parts of the embodiment
5 illustrated in Figure 6 may be, for example,

(1) a rectangular plate 100, and a hollow box 101 of rectangular shape in front elevation and having an open side or edge so that the plate 100 can extend into said box 101; or

(2) a plurality of rods or tubes 100 of circular section
10 and a plurality of tubes 101 of circular section, at least the tubes 101 being so interconnected as to keep them parallel to one another, said rods/tubes 100 and tubes 101 being so spaced from one another in the horizontal direction as to constitute an efficient pushing device.

15 Obviously, the grain bucket modifications described above with reference to Figures 4 and 5 could be applied to the arrangement illustrated in Figure 6 and, with a hydraulic ram 18 of appropriate dimensions and with appropriate positioning thereof as regards its mounting point on said frame, the parts 100, 101 of the
20 embodiment of Figure 6 could be used as a grab.

Referring to Figures 7 and 8, there is disclosed a modification of the Figure 6 embodiment, two double-acting hydraulic rams 200 being positioned near the bottom of the pillars 14

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instead of near the top thereof. It will be seen, from Figure 8,
that the cylinders of the rams 200 are connected at 201 to the
frame at locations which are widely spaced from one another in
the horizontal direction, and that the free ends of the piston rods
5 of said rams are connected to the part 101 at points 202 which are
(a) as close to one another as possible and
(b) at or in the vicinity of the mid-length point of the free edge
of said part 101. Indeed, the points 202 could be a single
fixing location instead of two closely adjacent points. This
10 arrangement of rams 200 and their connection between the frame
and the telescopic back plate is particularly efficient when dealing
with a load which may be on only one half of the available space
on the tines 12 or plate 25; this situation can easily arise for
example when clearing out a corner in a silage clamp or barn. The
15 push provided by the rams 200 is effective even with such a one-
sided load.

It will be appreciated that, in practice, we shall be able
to sell a device to farmers which they will be able to use with fork
lift trucks and agricultural tractors equipped with a tined attach-
20 ment which they already possess or which they intend to buy; the
farmer will not need to spend so much money as he is forced to do
at the moment if he wants to be able to pick up and then discharge
manure and silage quickly and efficiently.

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A single, centrally located ram 18 is disclosed in the drawings but, obviously, two or even more rams can be provided; these would be spaced from one another in the optimum manner.

The particular fixings mentioned in connection with Figure 4 could be modified. Thus, in addition to welding the up-
5 right sides 26 of the bucket to the plate 25, they could be welded to the respective outermost ones of the tines 13.

It will be obvious that some advantages will be obtained by using a back plate 15 which is mounted for movement to and fro
10 about a pivot axis, the free edge of said plate moving along an arc which forms part of a circle.

If the point of fixing of the piston rod of the hydraulic ram to the back plate in any of Figures 1, 1A, 4, 5 and 6 were to cause the respective back plate to move in such a manner that its
15 free edge followed an arcuate path, the arrangement of Figures 7 and 8 could be adopted. In such a case, the single hydraulic ram 18 of, for example, Figures 1 and 2 would be replaced by the two hydraulic rams of the embodiment of Figures 7 and 8.

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CLAIMS:

1. A vehicle of the type described (as defined above) having at least two forwardly projecting tines (11), a frame (12, 13, 14) releasably connected to said tines directly or indirectly, a back
5 plate (15) pivotally connected to said frame, and double-acting hydraulic ram means (18, 200) connected between said frame and said back plate and operable to move the back plate about its pivot axis (17) relatively to said tines.
2. A vehicle as claimed in Claim 1, wherein said frame
10 includes a first portion (14) which is upstanding and a second portion (12) which comprises at least two tines which extend in a generally horizontal direction from said first portion, said back plate (15) being pivotally connected to the first portion of said frame.
- 15 3. A vehicle as claimed in Claim 2, wherein said at least two tines of said second portion (12) are hollow and accommodate the first-mentioned tines (11) with which the vehicle is provided.
4. A vehicle as claimed in Claim 3, wherein said at least two tines of said second portion (12) are releasably secured
20 directly to the first-mentioned tines.
5. A vehicle as claimed in any one of the preceding Claims, wherein said second portion (12) is provided with a plate (25) covering said at least two tines, horizontally spaced second and

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third plates (26) being secured in an upstanding manner to the first portion, each of said second and third plates also being secured to a respective one of the two tines.

5 6. A vehicle as claimed in any one of the preceding Claims, wherein the back plate (15) is provided with elongate slot means (16, 20) through which the pivot axis (17) of the back plate extends, whereby the free edge of the back plate is enabled to move along a substantially horizontal plane instead of in an arc when the back plate is used to push a load off the tines.

10 7. A vehicle as claimed in any one of the preceding Claims, wherein one end of said ram means (18, 200) is connected to the frame and the other end thereof is connected to the back plate (15, 100, 101) at a location between the axis (17) and the lowermost edge of the back plate, whereby the back plate is useable to
15 push loads off the tines.

8. A vehicle as claimed in Claim 6, wherein one end of the ram means (18) is connected to the frame and the other end thereof is connected to the slot means of said back plate, whereby said plate is useable as one element of a grab.

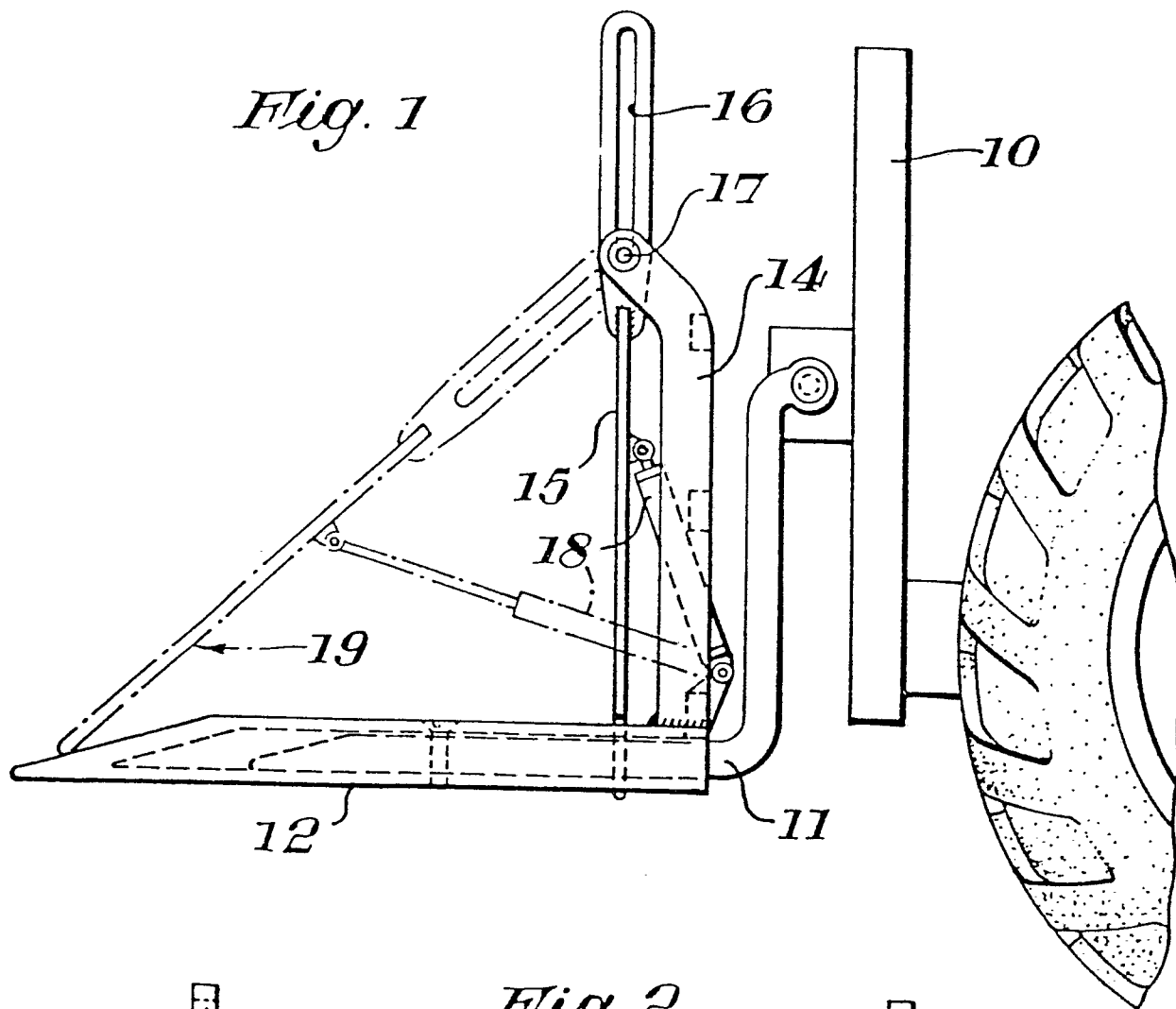
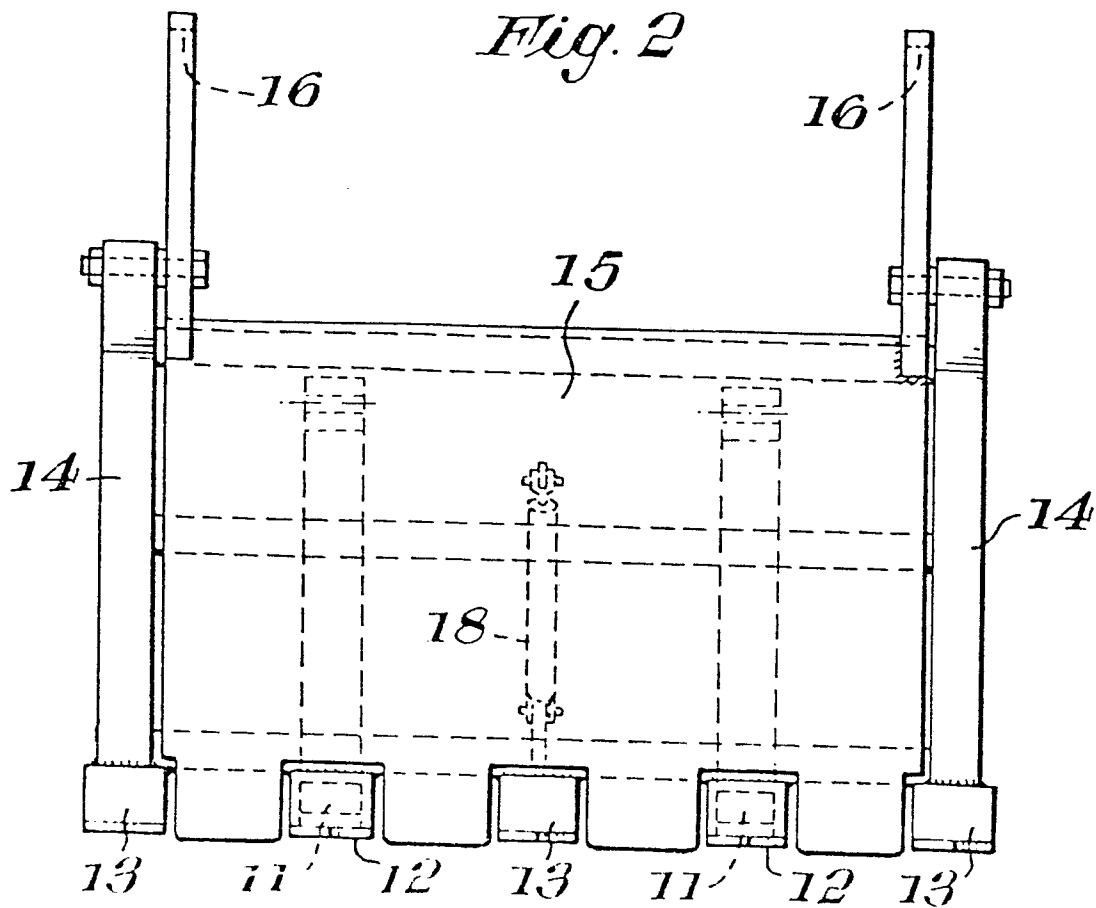
20 9. A vehicle as claimed in any one of Claims 1 to 5, wherein said back plate consists of telescopic parts (100, 101), the double-acting hydraulic ram means being connected between said frame (12, 13, 14) and one of said telescopic parts (101) of said back

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plate.

10. A vehicle as claimed in Claim 9, wherein said double-acting hydraulic ram means comprises two hydraulic piston/cylinder assemblies (200), the free ends of the piston rods being
5 connected to a point or points (202) on said one telescopic part (101) which is or are as near as possible to the mid-length point of the free (bottom) edge of said one telescopic part, the corresponding ends of the cylinders being respectively connected at widely spaced locations (201) at opposite sides of said frame.

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Fig. 1*Fig. 2*

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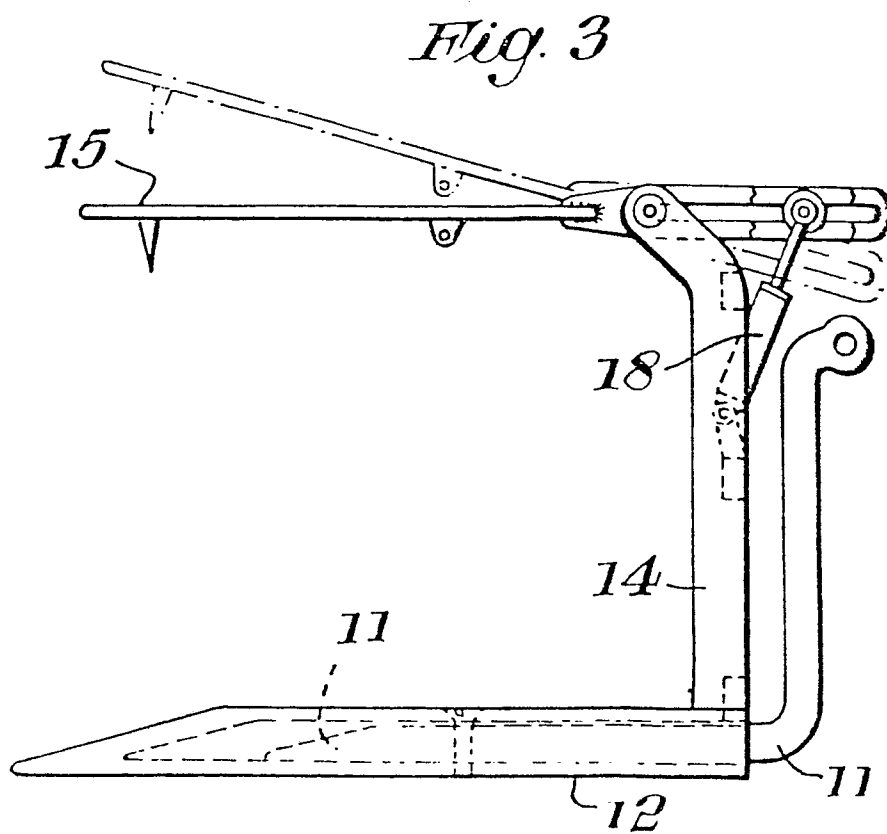
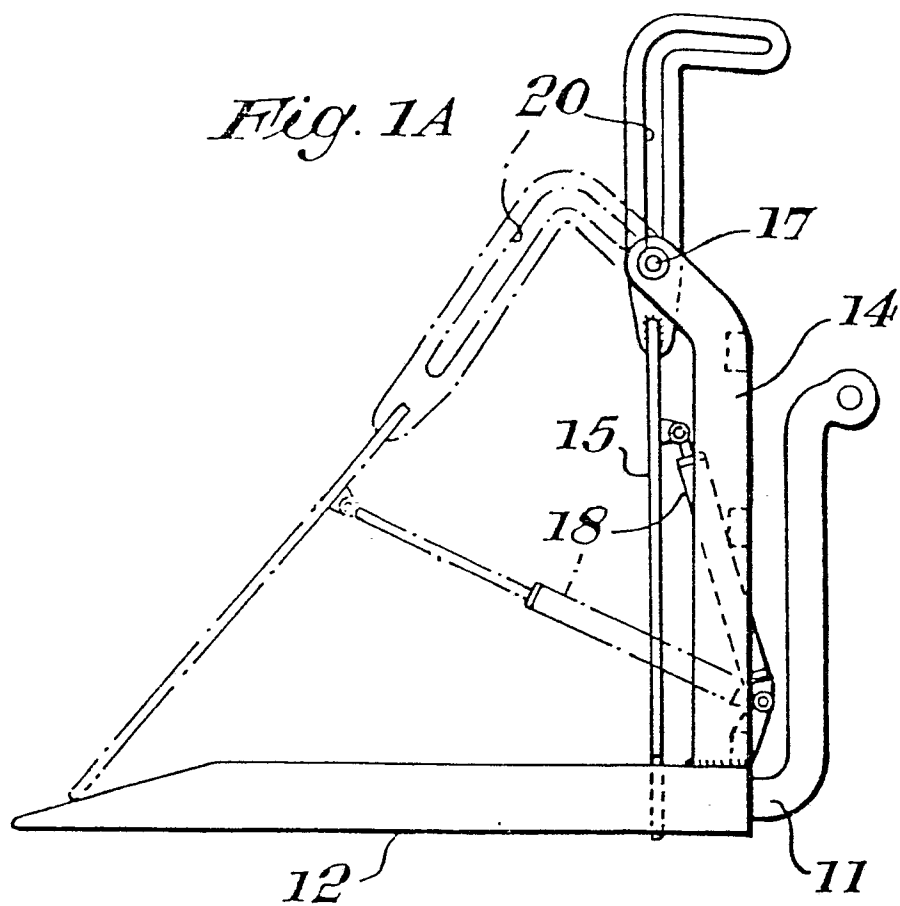
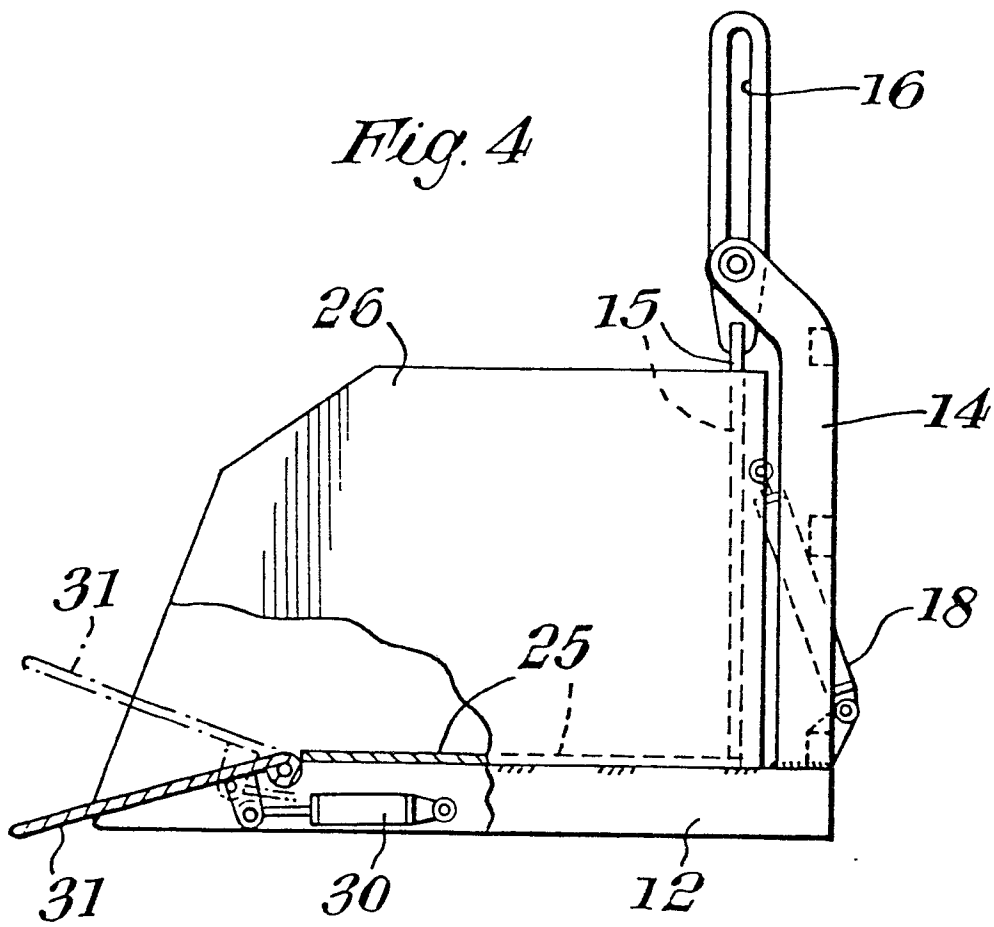
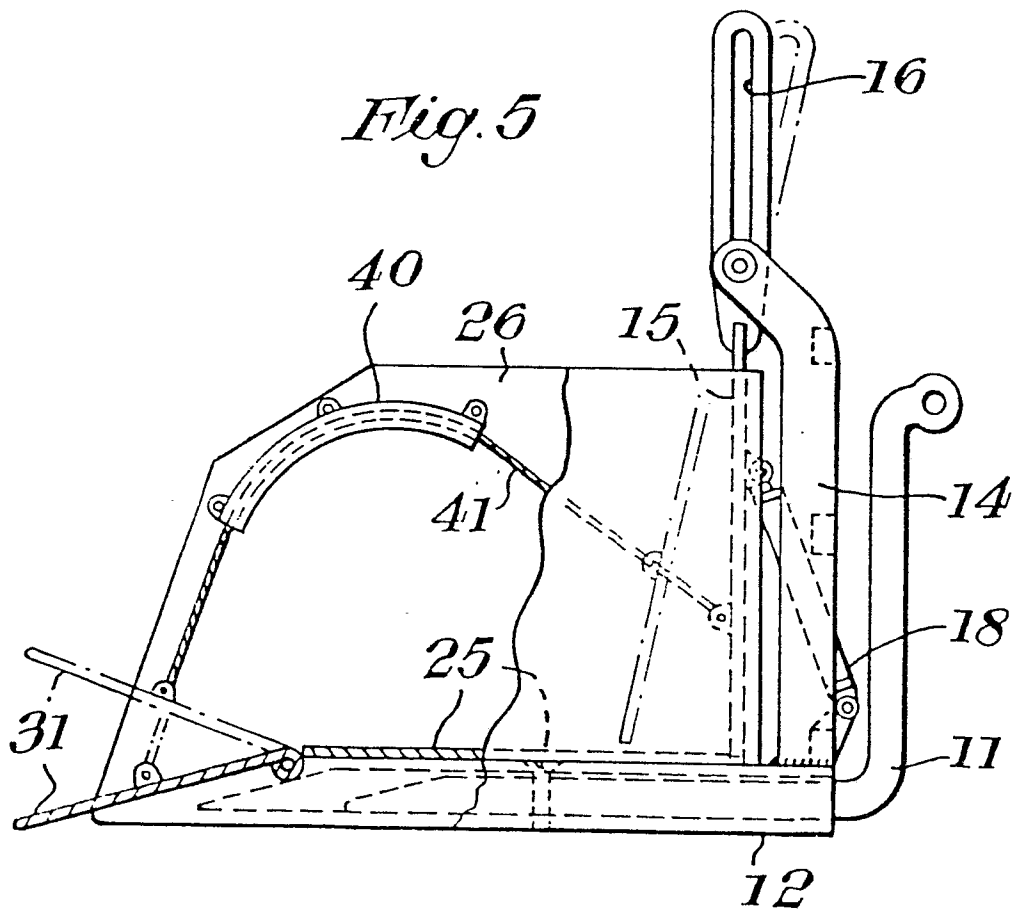
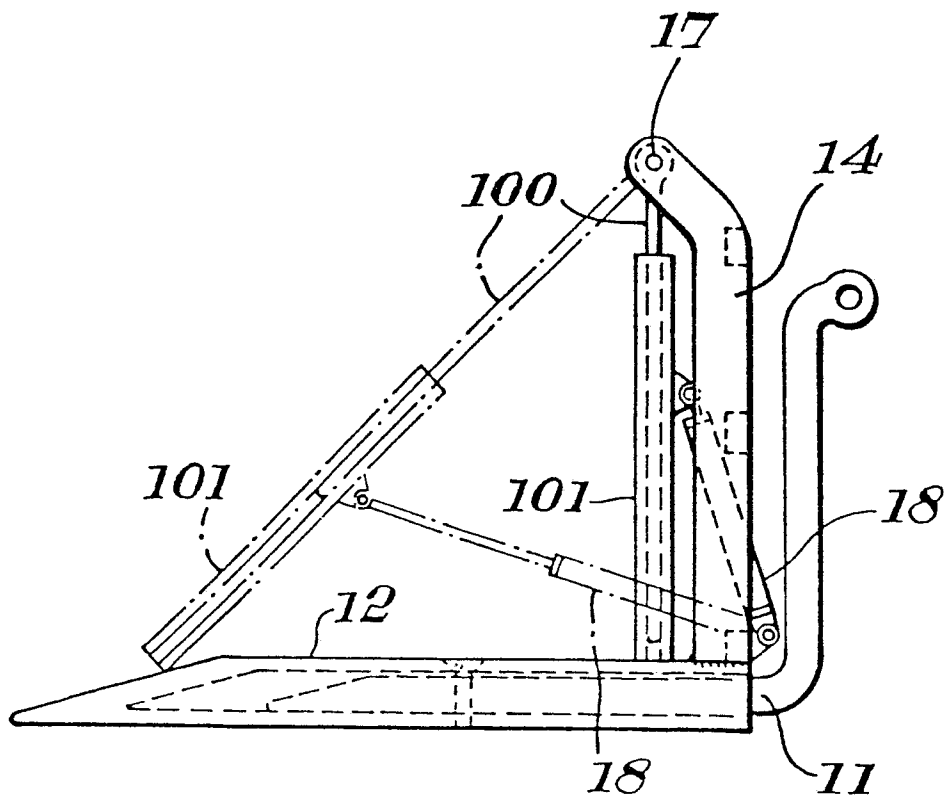
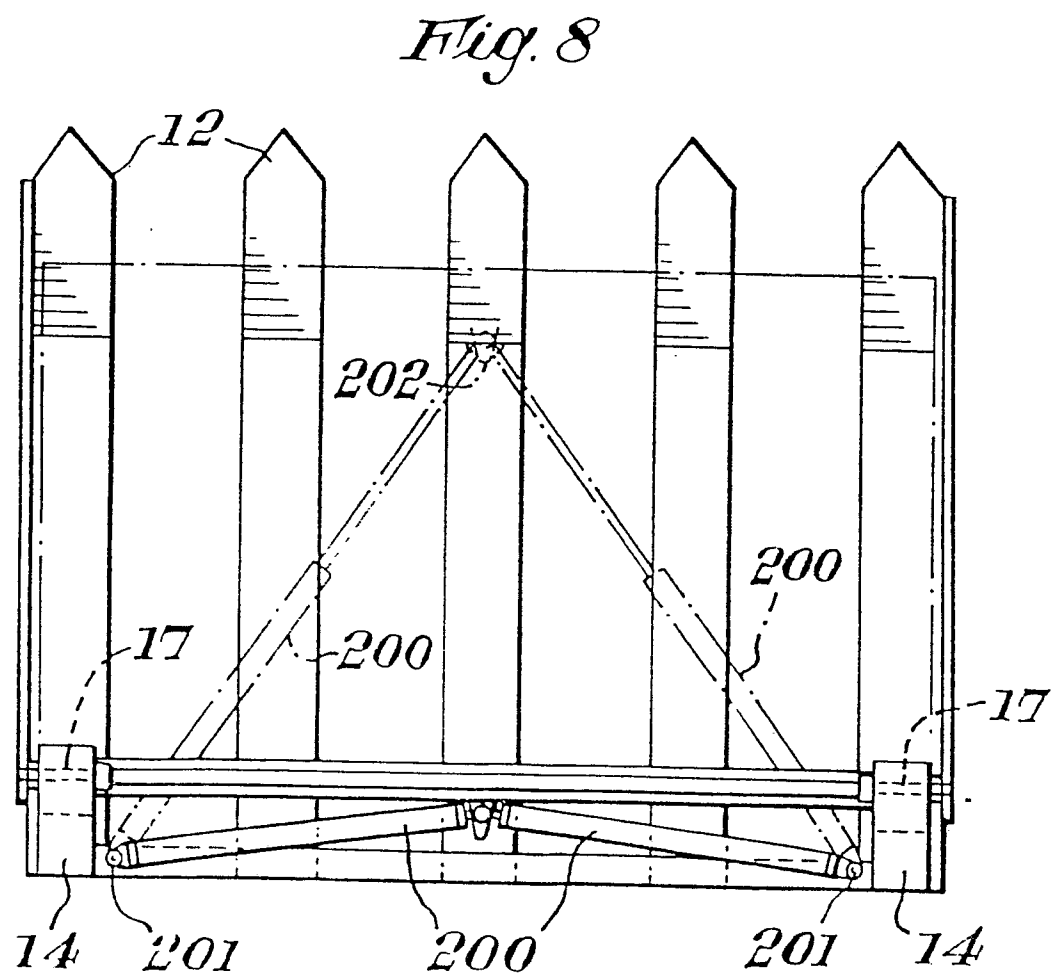
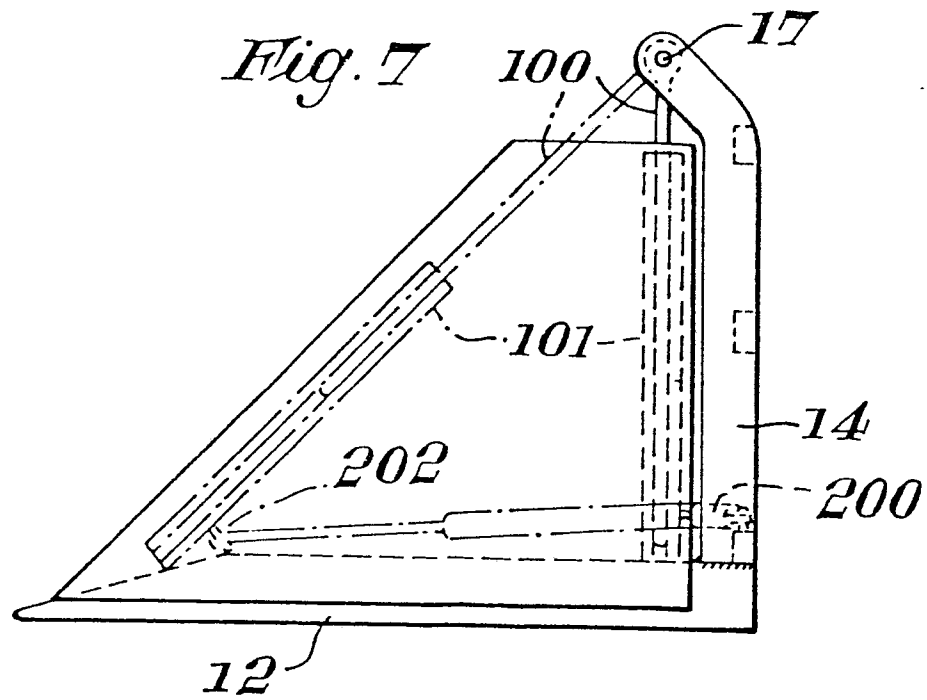


Fig. 4*Fig. 5*

*Fig. 6*





European Patent
Office

EUROPEAN SEARCH REPORT

0049579

Application number

EP 81 30 4296

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 1 516 505 (SANDERSON)</u> * Page 1, lines 22-43; figures 1,2 * --	1,2	B 66 F 9/19
	<u>DE - B - 1 125 351 (MIAG)</u> * Column 1, lines 39-50; figures 1,2 * --	1,2,6 7	
	<u>US - A - 2 742 167 (BRUDI)</u> * Column 1, line 47 to column 2, line 4; figure 3 * --	1,2,9	TECHNICAL FIELDS SEARCHED (Int. Cl.)
	<u>US - A - 2 750 057 (STUART)</u> * Column 1, line 69 to column 2, line 67; figures 1-3 * --	1	B 66 F A 01 D
A	<u>US - A - 3 039 636 (HOYT)</u>		
A	<u>DE - A - 1 506 465 (EICHER)</u>		
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			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
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 The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	14-10-1981	FERRANTI	