



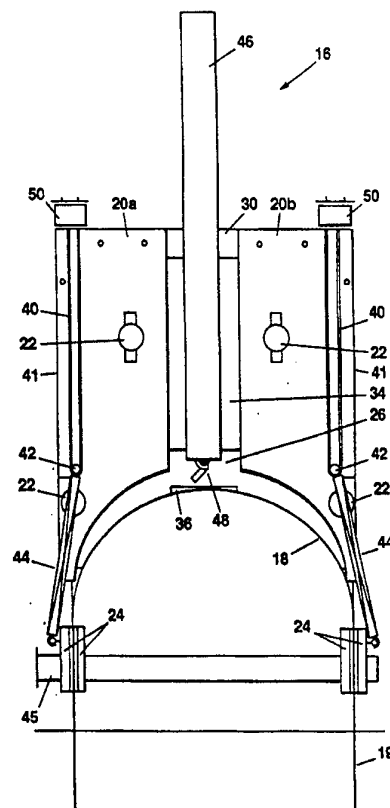
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A01G 13/04		A1	(11) International Publication Number: WO 96/36209
			(43) International Publication Date: 21 November 1996 (21.11.96)
(21) International Application Number: PCT/AU96/00302 (22) International Filing Date: 17 May 1996 (17.05.96) (30) Priority Data: 20160/95 19 May 1995 (19.05.95) AU (71) Applicant (for all designated States except US): AUSTFARM INTERNATIONAL PTY. LIMITED [AU/AU]; 4 Halesmith Road, Mona Vale, NSW 2103 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): GUBERINA, Milton [AU/AU]; 4 Halesmith Road, Mona Vale, NSW 2103 (AU). AGUERO, Arthur [AU/AU]; 4 Halesmith Road, Mona Vale, NSW 2103 (AU). (74) Agent: MARTIN, Michael; Chrysiliou Moore Martin, 143 Sydney Road, Fairlight, NSW 2094 (AU).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>	

(54) Title: A DEVICE, FOR THE MECHANICAL INSERTION AND REMOVAL OF AGRICULTURAL HOOPS, ATTACHED TO A TRACTOR

(57) Abstract

This invention relates to farm machinery and more particularly to machinery useful in market gardening of vegetables and the like grown in temporary enclosures. The invention provides a device (16) for sequentially inserting hoops (18) into the ground, which comprises a member (26) adapted to hold or engage a hoop (18), the member (26) reciprocally movable between a first operative position and a second operative position, and drive means (42, 46) for moving the member (26) between the first and second operative positions, wherein, in moving from the first to the second operative position, the member (38) will drive a hoop (18) engaged or held by the member (38) at least partially into the ground. The invention also provides a device for sequentially removing hoops (18) from the ground, which comprises a member adapted to hold or engage a hoop (19), the member is reciprocally moveable between a first operative position and a second operative position; and drive means for moving the member between the first and second operative positions, wherein, in moving between the first and second positions the member will remove a hoop (18) engaged or held by the member from ground.



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A DEVICE, FOR THE MECHANICAL INSERTION AND REMOVAL OF AGRICULTURAL HOOPS,
ATTACHED TO A TRACTOR

Technical Field

This invention relates to farm machinery and more particularly to machinery useful in market gardening of vegetables and the like.

5 **Background Art**

It is common, in commercial farms, to grow vegetables and the like in temporary enclosures, so as to speed growth and improve productivity. The vegetables are planted in rows and a temporary enclosure is placed over each row. The enclosure usually comprises a series of spaced apart U-shaped hoops inserted
10 into the ground with a long sheet of transparent plastics material stretched over the hoops along the row.

The sides of the plastics material are buried in the ground along the rows, thereby fully enclosing the vegetables.

Current practice is that the hoops are manually inserted into the ground and,
15 similarly, manually removed. The plastics material is also manually placed and removed from the hoops. This is not only an unpleasant operation but is time consuming and expensive. Moreover, manual placing of the hoops is not particularly accurate in either spacing of the hoops from one another or sideways relative to the centre line of the row.

20 **Disclosure of Invention**

In an attempt to overcome at least one of the disadvantages as discussed above, the invention, in one broad form, comprises a device for inserting hoops into the ground, the device comprising:

25 a member adapted to hold or engage a hoop, the member reciprocally movable between a first operative position and a second operative position,

drive means for moving the member between the first and second operative positions,

wherein, in moving from the first to the second operative position, the member will drive a hoop engaged or held by the member at least partially
30 into the ground.

Preferably the member reciprocates along a linear path. However, a non linear path may be utilised. The member preferably reciprocates along a vertical path and preferably pushes the hoop into the ground from above. Additionally or as the sole engagement, the member may hold the hoop.

- 5 Preferably there is provided holding means for holding the hoop in position prior to insertion. The holding means may be mechanical devices or magnets.

Preferably the device includes guides to aid in guiding the hoop into the ground.

The drive means may comprise a hydraulic ram which reciprocates the member in either one or both directions.

- 10 If it only moves the member in one direction, preferably this is the "return" cycle and preferably one or more springs are provided for the "driving" cycle. Where springs are used for the driving cycle, preferably the ram is engaged with the member by way of a releasable catch.

- 15 A supply device is preferably provided to automatically supply another hoop to the device every time a hoop is inserted into the ground. The supply device preferably comprises at least one rod having a helical groove in its surface sized to receive the hoop and drive means for rotating the rod.

- 20 Preferably the supply means comprises four rods to engage the hoop at spaced locations. More preferably the supply means includes guide means associated with each rod to maintain the hoop or hoops in contact with the associated rod. The supply means may also comprise a storage means, with multiple hoops mounted on the rods, in a spaced apart manner.

In another broad form, the invention also provides a device for removing hoops inserted in the ground, the device comprising:

- 25 a member adapted to hold or engage a hoop, the member reciprocally movable between a first operative position and a second operative position;

drive means for moving the member between the first and second operative positions,

- 30 wherein, in moving between the first and second positions the member will remove a hoop engaged or held by the member from ground.

Preferably the member moves along an inclined path, so that its rearward motion is equal to the forward motion of the tractor.

Preferably the member includes holding means to hold the hoop as it is being withdrawn. This is useful where one leg of the hoop may stick in the ground.

- 5 Without holding means the member is more likely to straighten the hoop without removing it. The member is preferably pivotably mounted on a mobile carriage and pivots to eject a hoop which has been removed from the ground. However other ejection mechanisms may be used.

- 10 Preferably the drive means may comprise a hydraulic ram which reciprocates the member in either one or both directions. If it only moves the member in one direction, preferably this is the "return" cycle and preferably one or more springs are provided for the "driving" cycle. Where springs are used for the driving cycle, preferably the ram is engaged with the member by way of a releasable catch.

- 15 The invention shall be better understood from the following description of non-limiting embodiments of the invention and the drawings, in which:

Brief Description of the Drawings

- Figure 1 is a schematic plan view showing a tractor with an embodiment of the invention for inserting hoops attached thereto.
- Figure 2 is a schematic side view of the figure 1 device.
- 20 Figure 3 is a front elevation of a hoop insertion device according to the invention.
- Figure 4 is a side elevation of the device of figure 3.
- Figure 5 is a side elevation of a delivery mechanism for the insertion device of figures 3 and 4.
- 25 Figure 6 is a front elevation of the mechanism of figure 5.
- Figure 7 is a side elevation of a device for removing hoops inserted in the ground.
- Figure 8 is a front elevation of the device of figure 7.

Best Mode of Carrying Out the Invention

Referring to figures 1 to 6 there is shown a tractor 10 carrying two hoop delivery/insertion devices 12, one on either side of the tractor 10. Two devices are not necessary, but having two mounted on one tractor obviously doubles
5 productivity compared to having a single delivery/insertion device.

The delivery/insertion devices 12 each comprises a storage/delivery mechanism 14 and an insertion mechanism 16. The storage/delivery mechanism 14 stores hoops 18 and delivers one hoop at a time to the insertion mechanism 16, for insertion into the ground at regular intervals.

10 Figures 3 and 4 show the insertion device 16.

The insertion device 16 has a forward facing face plate 20 on which are mounted four magnets 22. These are for holding a hoop 18 against the face plate 20 when the hoop 18 is delivered to the insertion device 16 by the storage/delivery mechanism 14. There are two guides 24 located at the base of the face plate 20,
15 which are to aid in guiding the hoop into the ground.

These are positioned below the hoop when it is first delivered to the face plate 20 and only guide the hoop 18 when it is being inserted into the ground.

The insertion device 16 has a U-shaped frame 30 and The two plates 20, 28 are mounted on either side of the frame. There is provided an anvil 26, which is
20 sandwiched between the face plate 20 and a rear plate 28. The anvil 26 operates in the manner of a guillotine and is vertically movable between the two plates 20 and 28. The upper limit of the anvil's movement is limited by the upper frame member 32. The face plate 20 is composed of two plates 20a and 20b with a central opening 34 extending vertically the height of the frame 30. The anvil has a
25 forward extending protrusion 36 that passes through the opening 34. A semi-circular shaped driving member 38 is mounted on the protrusion 36 and has a shape corresponding to that of the hoop 18. The driving member 38 extends in front of the face plate 20, but close to it. Thus as the anvil moves downwards, the driving member will engage a hoop 18 secured to the face plate 20 by the
30 magnets 22 and drive it downwards into the ground. Obviously the magnets will not prevent the hoop 18 moving under the influence of the driving member 38.

Each face plate 20a, 20b has an elongate slot 40a & 40b adjacent the respective outer edge 41. The anvil 26 has two pins 42, each of which engages in one of the slots 40a & 40b. Attached to each pin 42, forward of the face plates 20a, 20b is a

spring 44. The other end of the spring is attached to the lower edge 45 of the frame. The springs 42 are thus tensioned by raising of the anvil 26 and will tend to urge the anvil 26 downwards. Upwards motion of the anvil 26 is achieved by a centrally mounted hydraulic ram 46.

- 5 The ram 46 is arranged such that contraction of the ram 46 causes upwards motion of the anvil 26. If desired, the device may be modified so that expansion of a ram raises the anvil 26. The upper limit of motion of the anvil 26 is defined by rubber shock absorbers 50, which are located at the upper ends of the slots 40a and 40b. Thus the anvil 26 may be raised until the pins 42 bear on the shock
10 absorbers 50. In use, the pins 42 will bear on the shock absorbers 50 before the ram 46 is fully contracted. This is to aid in durability and to reduce transfer of shock to the tractor from raising of the anvil 26.

The ram 26 is attached to the anvil by way of a catch 48. The anvil 26 may be raised by the ram 46, tensioning the springs 44 and when the catch 48 is
15 released, the springs 44 will draw the anvil 26 downwards.

In use, the ram 46 is actuated to raise the anvil 26 and a hoop 18 is delivered to the face plate 20, as will be discussed later. In this position the driving member 38 is just above the hoop. The catch 48 is then released and the springs 44 draw the anvil 26 and driving member 38 rapidly downwards to contact the hoop 18. The
20 hoop 18 is then driven down into the ground. As mentioned before, the hoop 18 is initially above the guides 24 but on initial downwards movement, the free ends 19 of the hoop 18 enter the guides 24. As the hoop 18 continues downwards into the ground, the guides aid in maintaining the hoop 18 in a correct orientation and to prevent buckling.

- 25 The springs 44 are of a stiffness that they drive the anvil 26 and hoop 18 into the ground at a speed that negligible forward movement of the tractor occurs during the insertion phase. Once the hoop 18 has been driven into the ground, the tractor 10 continues forward and the hoop 18 passes underneath the insertion device 16. Since the guides 24 are open towards the rear, they do not impede
30 movement of the hoop relative to the device 16. The ram 46 is then activated to raise the anvil 26 to its upper position, so enabling another hoop 18 to be delivered and the cycle to be repeated.

Referring to figures 5 and 6, the hoop storage/delivery device 14 is mounted in front of insertion device 16 and comprises a base 60 mounted to the tractor 10.
35 Mounted on the base 60 are two longitudinally extending beams 62. Mounted at

the ends of these beams 62 are uprights 64. Mounted between the upper ends of the uprights 64 are two parallel drive members 66a,b. Mounted adjacent the lower ends of the uprights are a further two parallel drive members 66c,d. The four drive members are mounted for rotation about their axes and are coupled so as to rotate together and at the same angular velocity. Rotation of the drive members is achieved by flexible members 68, which may be belts or chains. The flexible members 68 are arranged such that all of the drive members 66a, b, c and d rotate in the same direction, ie, either all clockwise or all anti clockwise. This enables the drive members 66a, b, c and d to be identical, and so reduces the number of different parts required.

The drive members 66 each has a helical groove in their surface with a width wide enough to receive a hoop. As seen in Fig. 6, the four driving members 66a-d are positioned so that the two upper driving members 66 engage the arch of the hoop 18 whilst the two lower driving members 66c and d engage the hoop 18 adjacent its free ends. Preferably the drive members 66 are made or surfaced with a plastics material that has a low coefficient of friction with steel.

A drive (not shown) is provided to rotate the four driving members 66 at an appropriate speed and at the appropriate time. Rotation of the four drive members thus causes any hoop(s) so engaged to be moved linearly along the drive members towards the insertion mechanism. The gap between the rear most end of the driving members 66 and the face plate 20 of the insertion mechanism 16 is relatively small. Thus as a hoop 18 is ejected from the rearward end of the delivery device, the magnets attract and hold it to the face plate 20.

Since the hoops will be re-used, it is likely that they may become bent or slightly out of shape over time. If the hoop 18 is bent outwards, its lower ends will not engage the two lower driving members. Accordingly, two guides 70 are provided on either side of the mechanism 14.

Each of the guides 70 comprise an upright post 72 at the front of the delivery mechanism 14 and two horizontally extending guide bars 74. These guide bars extend rearwards adjacent the upper and lower drive members 66. These guide bars 74 are preferably comprised of or coated with a low friction plastics material. If coated with a plastics material, preferably the coating is replaceable to accommodate wear. The guide bars 74 are spaced at a distance from the drive members 66 so that a hoop must engage within the groove on the drive member 66. The gap between the guide bars 74 and drive members 66 is less than the thickness of the hoop.

The insertion device 16 and delivery device 14 are operated by a control unit (not shown) which activates each device at the appropriate time, preferably when the tractor has travelled a preset distance since the last hoop was inserted into the ground. Preferably measurement of distance travelled is by way of a sensor
5 mounted to one of the tractor's wheels. This is a better solution compared to using a separate measuring wheel, since a separate measuring wheel is more likely to slip than the tractor wheel.

In a preferred form, a disc having 58 holes arranged circumferentially is mounted on one of the tractor wheels or axles. An optical or magnetic sensor detects
10 rotation of the wheel and causes one hoop to be inserted for each rotation of the disc, ie. every 58 holes. Obviously, for different sized wheels, the number of holes counted for each cycle may be varied.

When the control device determines a hoop is to be inserted, it causes the ram 46 to raise the anvil 26. The drive members are rotated one revolution to deliver a
15 hoop to the face plate 20 and then the catch 48 is released.

Referring to figures 7 and 8, there is shown a device 80 for removing hoops from the ground. The device 80 comprises a base 82 attached to the tractor 10. Mounted on the base 82 and extending in a forward direction is an inclined frame 84. The frame 84 is mounted to the base 82 by way of stanchions 86 and 88.
20 Stanchion 86 is pivotably mounted at one end to the lower end of the frame 84 and at its other end is pivotably mounted to the base 82.

Similarly, stanchion 88 is pivotably mounted to the upper end of the frame 84 and at its other end to the base 82. The length of the upper stanchion 88 is adjustable whilst the angular position of the fixed length stanchion 86 is adjustable by way of
25 adjustable length stay 90. Thus, the height and angle of the frame 84 may be adjusted relative to the base 82 and hence to the ground.

Mounted on the frame 84 is a track 92 and a retrieval carriage 94 is mounted on the track. This carriage 94 is movable longitudinally along the track 92. Mounted on the carriage is an arcuate retrieval member 96, which has a shape
30 corresponding to that of the hoops 18. As seen in figure 7, the upper surface 97 of the retrieval member is flat. However, if desired, it may be V or U-shaped to better hold the hoop as it is drawn from the ground.

The carriage 94 and retrieval member 96 are caused to reciprocate along the track 92 by a suitable drive mechanism. This may be by a simple double action

hydraulic ram, or it may be a similar drive to that used with the insertion device 16. In the latter case, it will be appreciated that the springs will be arranged to drive the carriage 94 upwards along the track 92 and the ram will draw it downwards.

- 5 As seen in fig. 8, when the carriage 94 is at its lowermost position, the retrieval member 96 is below the height of a hoop inserted in the ground and may fit within the hoop. As the tractor moves 10 forward, the retrieval member 96 passes within the hoop 18. Suitable sensors, not shown, such as micro-switches or proximity switches, sense when the hoop is over the retrieval member 96 and cause the
10 drive mechanism to raise the carriage 94 and member 96 upwards. The retrieval member bears on the underside of the hoop 18 and lifts it out of the ground.

When the carriage reaches the upper limit of its travel, the entire carriage may be caused to tip to eject the hoop 18 into a hopper. Alternatively, a simple lever 100 may be provided to swipe the hoop 18 off the retrieval member.

- 15 It will be appreciated that the angle of the frame 84 will be selected so that , as the carriage moves along the track to withdraw a hoop its rearward velocity will match the forward speed of the tractor. Thus the carriage moves only vertically with no horizontal ground speed when it is rising upwards.

- It will be appreciated that many modifications and variations may be made to the
20 embodiments described herein by those skilled in the art without departing from the spirit or scope of the invention.

Industrial Applicability

The invention has applicability in the field of agricultural machinery.

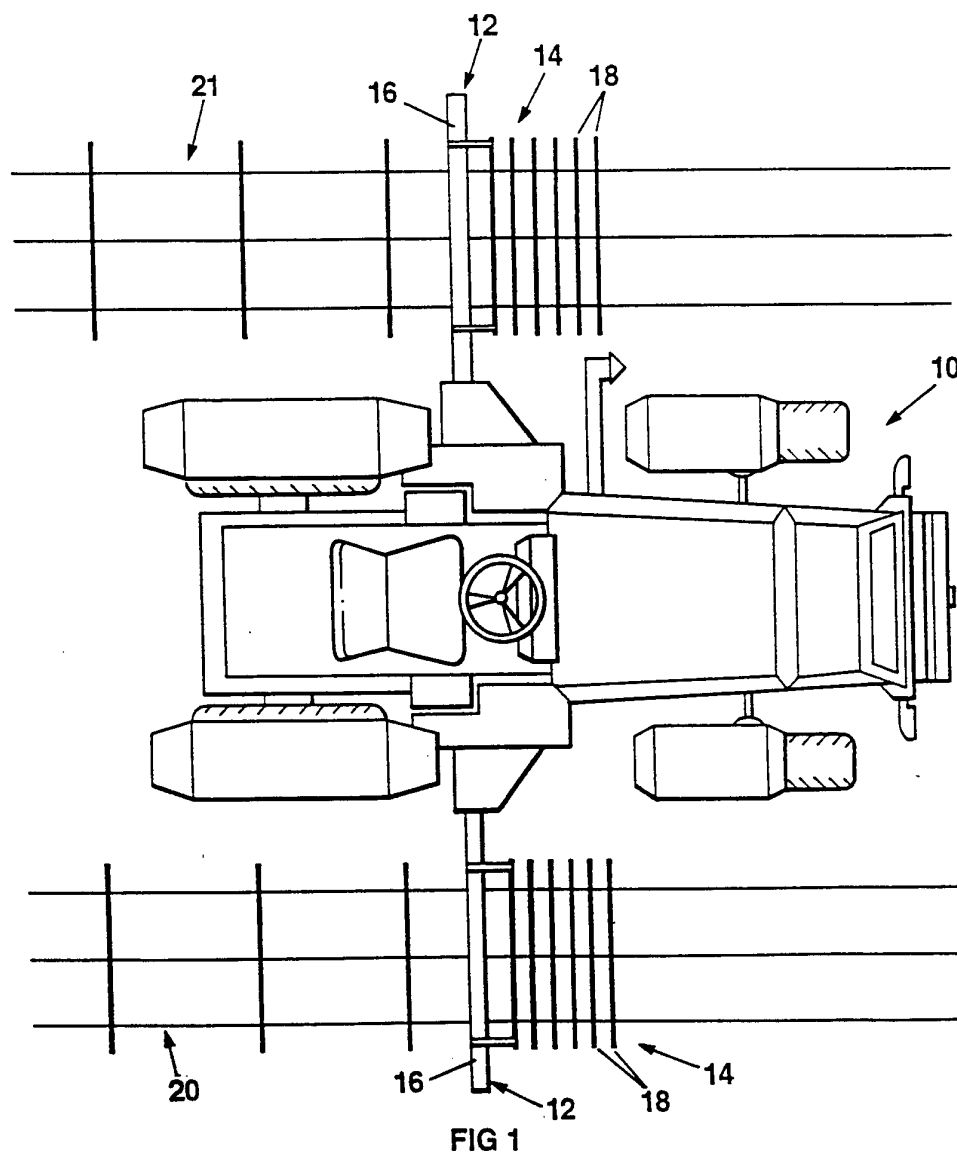
The claims

1. A device for sequentially inserting hoops into the ground, the device comprising:
 - 5 a member adapted to hold or engage a hoop, the member reciprocally movable between a first operative position and a second operative position,
drive means for moving the member between the first and second operative positions,
wherein, in moving from the first to the second operative position, the member will drive a hoop engaged or held by the member at least partially
10 into the ground.
2. The device of claim 1 wherein the member reciprocates along a linear path between the first and second positions.
3. The device of claim 1 or 2 wherein the member reciprocates along a substantially vertical path between the first and second positions.
- 15 4. The device of any one of claims 1 to 3 further including holding means to hold a hoop in position prior to insertion into the ground.
5. The device of claim 4 wherein the holding means comprises at least one magnet.
6. The device of claim 4 or claim 5 wherein the holding means is attached to or
20 part of, the member.
7. The device of claim 4 or claim 5 wherein the holding means is separate from the member.
8. The device of any one of claims 1 to 7 further including guide means for guiding the hoop as it is driven into the ground.
- 25 9. The device of any one of claims 1 to 8 wherein the drive means comprises at least one hydraulic or pneumatic ram.
10. The device of any one of claims 1 to 9 wherein the drive means comprises at least one spring.

11. The device of claim 10 when dependent on claim 9 wherein the at least one ram moves the member from the second to the first position and the at least one spring moves it from the first to the second position.
- 5 12. The device of claim 11 wherein the ram is releasably attached to the member by a catch and, when in the first position, the catch is releasable to allow the at least one spring to move the member to the second position.
13. The device of any one of claims 1 to 12 further including means to supply hoops one at a time for insertion into the ground.
- 10 14. A device for inserting hoops into the ground, substantially as herein before described with reference to the drawings.
15. A delivery device for sequentially delivering hoops, the delivery device comprising: at least one rod having at least one helical groove in its surface, the groove sized to engage a hoop; and, drive means to cause the rod to rotate about its axis.
- 15 16. The device of claim 15 wherein there are four helical rods.
17. The device of claim 15 or 16 further comprising guide means associated with the or each rod, for maintaining a hoop in contact with the groove on the respective rod.
- 20 18. A delivery device, substantially as herein described with reference to the drawings.
19. A device for sequentially removing hoops from the ground, the device comprising:
- a member adapted to hold or engage a hoop, the member reciprocally movable between a first operative position and a second operative position;
- 25 drive means for moving the member between the first and second operative positions,
- wherein, in moving between the first and second positions the member will remove a hoop engaged or held by the member from ground.
20. The device of claim 19 wherein the member reciprocates along a linear path between the first and second positions.
- 30

21. The device of claim 19 or 20 wherein the member reciprocates along a substantially vertical path between the first and second positions.
22. The device of any one of claims 19 to 21 wherein the member includes means to firmly grip the hoop as it is extracted from the ground.
- 5 23. The device of any one of claims 19 to 22 wherein the member is pivotally mounted on a carriage.
24. The device of any one of claims 19 to 23 wherein the member moves along a track inclined to the horizontal and vertical.
- 10 25. The device of claim 24 wherein the angle and height of the track is adjustable.
26. The device of any one of claims 19 to 25 wherein the drive means comprises a hydraulic or pneumatic ram.
27. The device of any one of claims 19 to 26 wherein the drive means comprises at least one spring.
- 15 28. A device for removing hoops from the ground, substantially as hereinbefore described with reference to the drawings.

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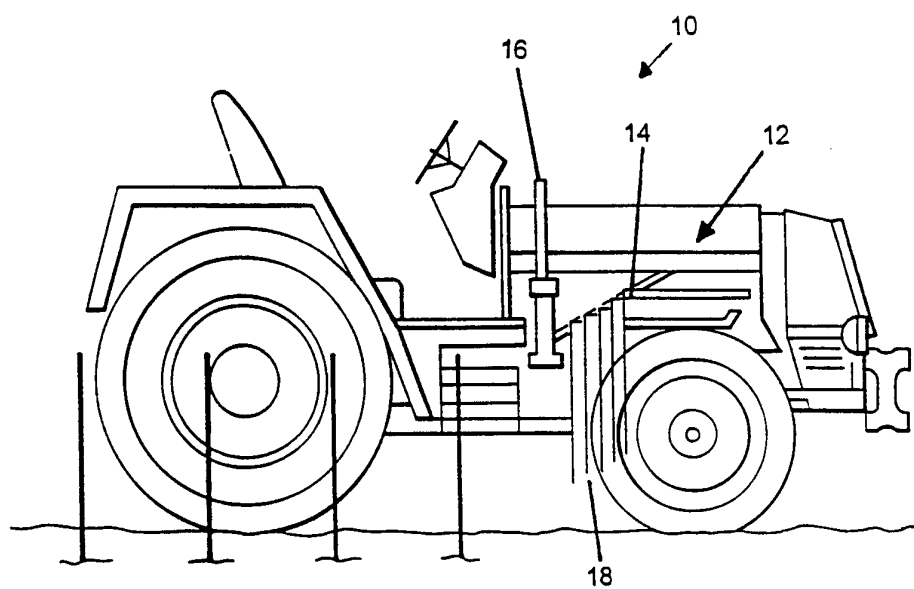


FIG 2

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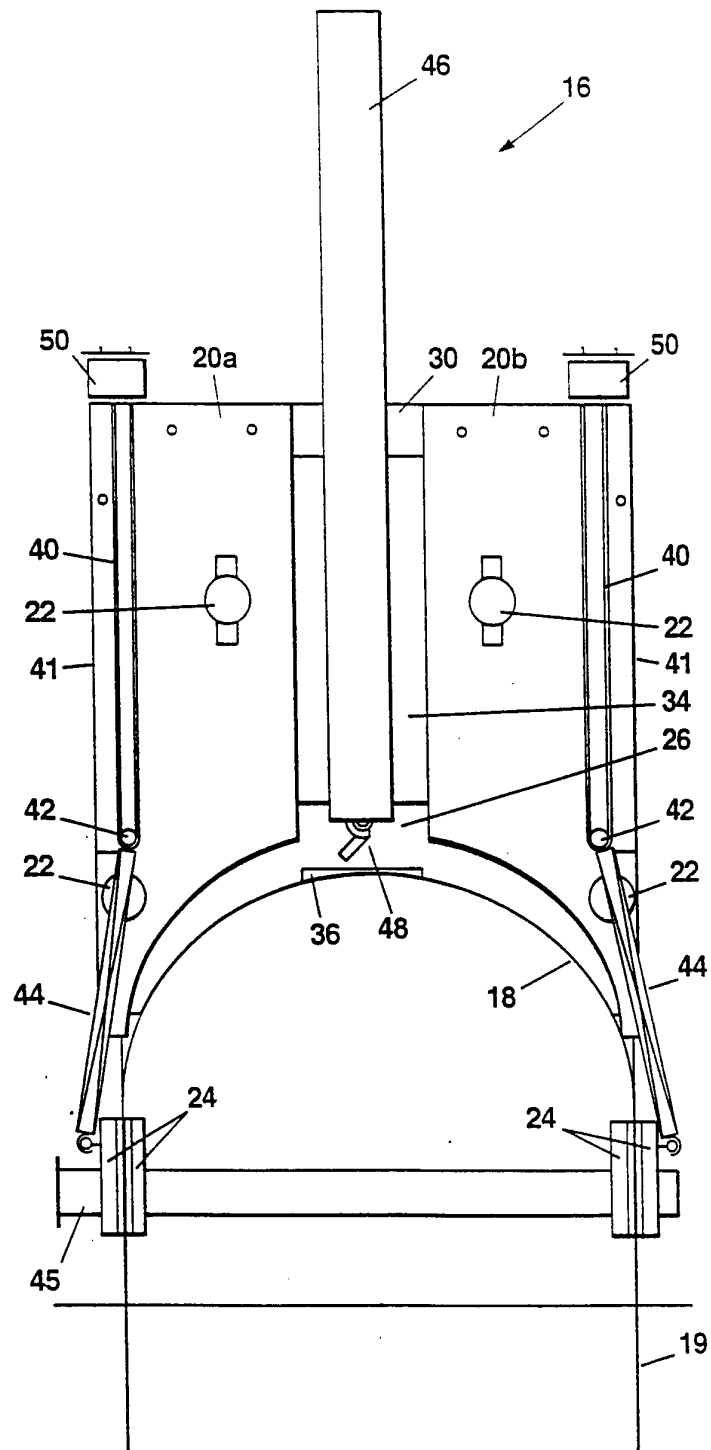


FIG 3

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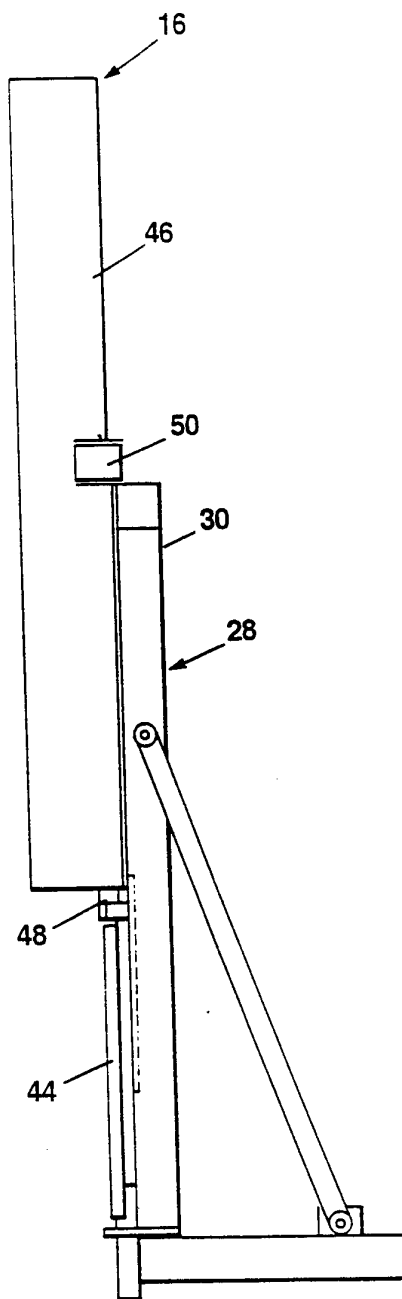
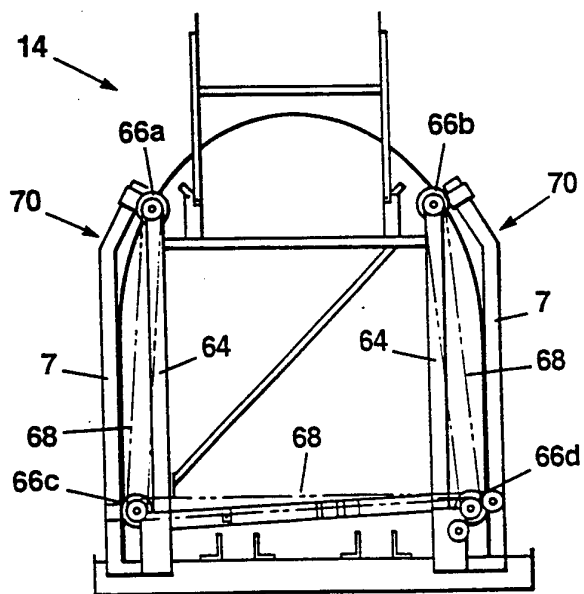
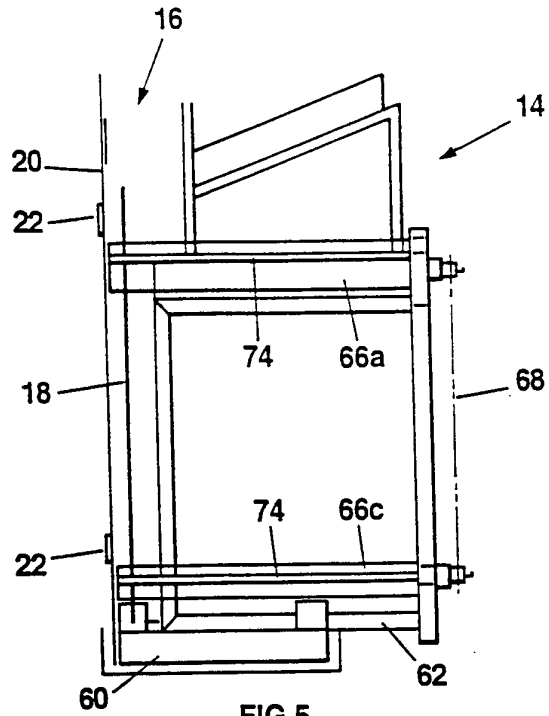


FIG 4

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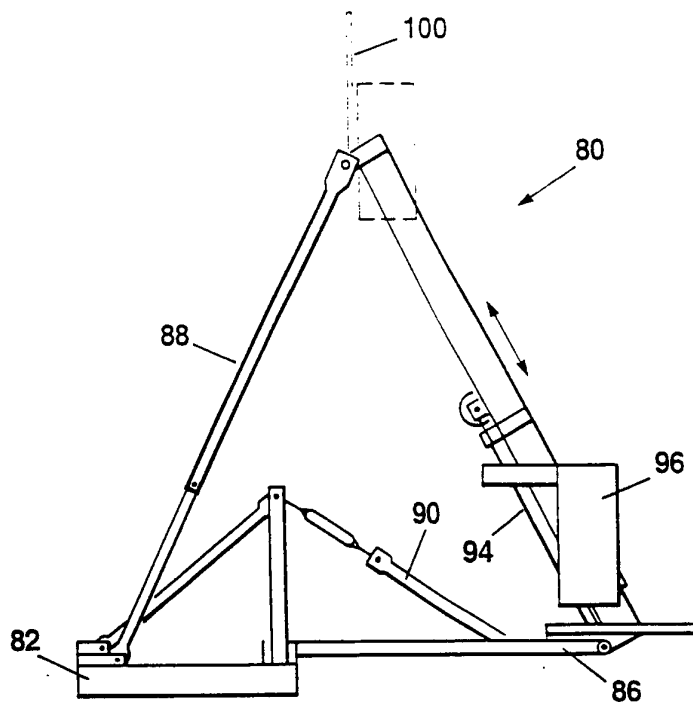


FIG 7

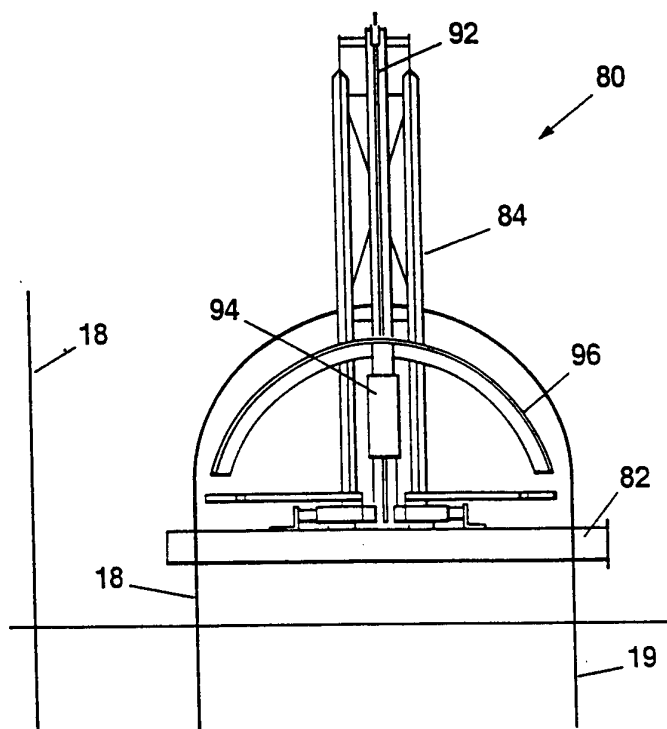


FIG 8

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00302

A. CLASSIFICATION OF SUBJECT MATTERInt Cl⁶: A01G 13/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC : A01G 13/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DERWENT: A01G 13/- and (hoop or tunnel or bell or cloche or u-shape or semi circle)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	Patent Abstract of Japan, JP 4131022 A (KOBASHI KOGYO CO LTD) 01 May 1992 abstract abstract	1, 2, 4, 7, 8, 13 15-17
X A	Patent Abstracts of Japan, JP 4126019 A (KOBASHI KOGYO CO LTD) 27 April 1990 abstract abstract	1-4, 7, 8, 13 15-17
A	Patent Abstracts of Japan, JP 4197115 A (MITSUBISHI KOGYO CO LTD) 16 July 1992 abstract	15-17

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search
16 August 1996

Date of mailing of the international search report

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	Patent Abstracts of Japan, JP 4135422 A (KOBASHI KOGYO CO LTD) 08 May 1992 abstract abstract	1-4, 6, 8-13 15-17, 19-27
X A	Patent Abstracts of Japan, JP 4211310 A (ISEKI & CO LTD) 03 August 1992 abstract abstract	1-4, 7-9, 13 15-17, 19-27
X	Derwent Abstract Accession No. 93-384789/48, Class P13, SU 1777708 (EFIRMASLO ESSENTIAL OIL CROPS ASSOC.) 30 November 1992 abstract	1-6
X A	US 2576467 (LUKENS) 27 November 1951 see figures 3 & 4, page 2 line 39 - page 4 line 14	1-4, 6, 8 19-27
X	EP 547963 A (RABAUB S.A.) 23 June 1993 see figures 7 & 8	19-23, 26, 27
X	FR 2684840 A (RABAUD S.A) 08 June 1993 see figures 1-3	19-26
X A	FR 2451156 (PAVAN) 10 October 1980 see figures 1 & 3	1-4, 6, 8, 10 19-27

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/AU 96/00302

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 14, 18, 28
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
they fail to comply with Rule 6.2(a)

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-13 relate to a device for inserting hoops into the ground. The device has a member to hold the hoop and reciprocally move it from a first to second position. The second position is at least partially within the ground. It is considered the first technical feature is the movement of the member from the first to second operative position.

(see continuation of Box II over sheet)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

Box II

Claims 15-17 relate to a hoop delivery device which uses helically grooved rods as the feed mechanism. This mechanism is considered to be the second technical feature.

Claims 19-27 relate to a device for removing hoops from the ground. The device has a member to hold the hoop and reciprocally move it from a first to a second position. In these claims the first position is at least partially within the ground. It is considered the technical feature of this set of claim is the same as the first technical feature identified against claims 1 to 13 (ie the movement of the member from the first to second operative position)

As such it is considered that there is no special technical relationship between the feature of claims 1-13 and 19-27 and the feature of claims 15-17.

INTERNATIONAL SEARCH REPORT

International Application No.

Information on patent family members**PCT/AU 96/00302**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
JP	4131022				
JP	4126019				
JP	4197115				
JP	4135422				
JP	4211310				
SU	1777708				
US	2576467				
EP	547963	FR	2684841	JP	5260861
FR	2684840				
FR	2451156	ES	490299	ES	8100603
		IT	1195752	JP	56001825
				GR	67193
END OF ANNEX					