

**INSTRUCTIONS**

(a) If Convention application insert "Convention"

(a) convention

AUSTRALIA

Patents Act

620392

**APPLICATION FOR A PATENT**

(b) Insert FULL name(s) of applicant(s)

Y/We (b) C. van der Lely N.V.

(c) Insert FULL address(es) of applicant(s)

of (c) 10 Weverskade, MAASLAND, the Netherlands

(d) Insert TITLE of invention

hereby apply for the grant of a Patent for an invention entitled

(d) A mowing machine

(e) Insert "complete" OR "provisional"

which is described in the accompanying (e) complete specification.

(Note: The following paragraph applies only to Convention applications)

This application is a Convention application based on the basic application(s) for a patent or similar protection identified by number, country, and filing date as follows:

(f) Insert number, country and filing date for the/or EACH basic application

(f) 88.01039, the Netherlands, April 21, 1988

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19/04/89

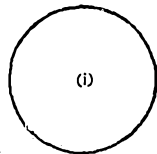
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367 Collins Street  
Melbourne, Australia 3000

(g) Insert DATE of signing

Dated (g) MAASLAND, April 7, 1989

(h) Signature of applicant(s) (For body corporate see headnote\*)



(h)

*[Handwritten signature]*  
Ary van der Lely (Director)

(i) Corporate seal if any

Note: No legalization or other witness required

PHILLIPS ORMONDE AND FITZPATRICK  
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Melbourne, Australia

DECLARATION FOR A PATENT APPLICATION

INSTRUCTIONS

- (a) Insert "Convention" if applicable
(b) Insert FULL name(s) of applicant(s)
(c) Insert "of addition" if applicable
(d) Insert TITLE of invention
(e) Insert FULL name(s) AND address(es) of declarant(s) (See headnote\*)
(f) Insert FULL name(s) AND address(es) of actual inventor(s)
(g) State how applicant(s) derive(s) title from actual inventor(s) (See headnote\*\*)
(h) Insert Country, filing date, and basic applicant(s) for the/or EACH basic application
(k) Insert PLACE of signing
(l) Insert DATE of signing
(m) Signature(s) of declarant(s)
Note: No legalization or other witness required

In support of the (a) convention application made by (b) C. van der Lely N.V., a Dutch limited liability company of 10 Weverskade, MAASLAND, the Netherlands

(hereinafter called "applicant(s)") for a patent (c) for an invention entitled (d)

A mowing machine
Ary van der Lely, Director of

I/we (e) C. van der Lely N.V., MAASLAND, the Netherlands

do solemnly and sincerely declare as follows:

- 1. I/we are the applicant(s) (or, in the case of an application by a body corporate)
I am authorized to make this declaration on behalf of the applicant(s).
2. I/we are the actual inventor(s) of the invention (or, where the applicant(s) is/are not the actual inventor(s))
2. (f) KOORN, Maarten, 103 Borneostraat, VLAARDINGEN, the Netherlands
and
SIKKEMA, Sape, 12 Paul Krugerstraat, MAASSLUIS, the Netherlands

is/are the actual inventor(s) of the invention and the facts upon which the applicant(s) is/are entitled to make the application are as follows:

- (g) by virtue of a labour agreement of 01.01.1981 and 21.01.1985, respectively
The applicant is the assignee of the invention from the said actual inventors.

(Note: Paragraphs 3 and 4 apply only to Convention applications)

- 3. The basic application(s) for patent or similar protection on which the application is based is/are identified by country, filing date, and basic applicant(s) as follows:
(h) the Netherlands, April 21, 1988, by C. van der Lely N.V.

- 4. The basic application(s) referred to in paragraph 3 hereof was/were the first application(s) made in a Convention country in respect of the invention the subject of the application:

Declared at (k) MAASLAND
Dated (l) April 7, 1989

(m) [Signature]
Ary van der Lely (Director)

To: The Commissioner of Patents

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**(12) PATENT ABRIDGMENT (11) Document No. AU-B-33178/89**  
**(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 620392**

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- (54) Title  
**A MOWING MACHINE**
- International Patent Classification(s)  
(51)<sup>4</sup> **A01D 034/66**
- (21) Application No. : **33178/89** (22) Application Date : **19.04.89**
- (30) Priority Data
- (31) Number (32) Date (33) Country  
**8801039 21.04.88 NL THE NETHERLANDS**
- (43) Publication Date : **26.10.89**
- (44) Publication Date of Accepted Application : **20.02.92**
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- (56) Prior Art Documents  
**US 4694640**  
**US 4428181**  
**0118952**
- (57) Claim

1. A mowing machine comprising a cutter bar which extends substantially transversely to the direction of operative travel over the field and rotary mowing members arranged thereabove, which cutter bar is connected for its support in at least two places to a carrier frame, at least one of which connections includes a resilient element which permits of a limited relative movement between the carrier frame and the portion of the cutter bar that is contiguous to the connection, wherein the resilient element is provided with a <sup>spring like</sup> plate-shaped material extending in a substantially vertical plane located in the direction of operative travel to permit mainly movements of the cutter bar relative to the carrier frame in a substantially vertical plane transversely to the direction of operative travel.



## A MOWING MACHINE

The present invention relates to a mowing machine comprising a cutter bar which extends substantially transversely to the direction of operative travel over the field and rotary mowing members arranged thereabove, which cutter  
 5 bar is connected for its support in at least two places to a carrier frame, at least one of which connections includes a ~~flexible member~~ *resilient element* which permits of a limited relative movement between the carrier frame and the portion of the cutter bar that is contiguous to the connection.

10 By connecting the cutter bar to the carrier frame in at least two places there is obtained a framework which to a high extent absorbs the forces acting on the cutter bar in a direction opposite to the direction of operative travel of the mowing machine. On the other hand, the cutter bar, in  
 15 particular when it is relatively long, is subjected to forces which are directed upwardly in a vertical plane and may cause deformation thereof. This deformation results in an increased tension in the positions where the said connections to the cutter bar and the carrier frame are provided, i.e. by the  
 20 occurrence there of bending moments and forces acting in the longitudinal direction of the cutter bar. The results thereof may manifest themselves in an unwanted wear of the transmission system which passes through the cutter bar and is required for driving the mowing members. So as to obviate  
 25 these unwanted phenomena at least partly, it is known to provide one of the connections with a pivotable element having a pivot shaft extending in the direction of operative travel of the mowing machine. This measure, however, does not provide the desired tension relief of the said connections.  
 30 The invention has for its object to improve this tension relief.

To that end, according to the invention, the  
~~flexible member is constituted by a resilient element. This resilient element renders it possible to reduce to a signifi-~~  
 35 ~~cant extent not only the bending moments occurring in the connections but also the forces acting in the longitudinal~~



flexible member is provided with a <sup>spring like</sup> plate-shaped material extending in a substantially vertical plane located in the direction of operative travel. This renders it possible to reduce to a significant extent not only the bending moments occurring in the connections but also the forces acting in the longitudinal direction of the cutter bar. The resilient element is arranged in such a manner that movements of the cutter bar relative to the carrier frame are permitted in a substantially vertical plane transversely to the direction of operative travel. In this connection, the framework to a sufficient extent retains the possibility of absorbing the forces exerted in a direction opposite to the direction of operative travel.

Furthermore, the resilient connection can be preferably effected both via a mowing member arranged on the cutter bar and also outside the reach of the mowing members.

In a special preferred embodiment, the cutter bar is connected to the carrier frame in the two positions via different mowing members, e.g. the two outermost ones. More specifically, one or more mower members is/are provided with a substantially drum-shaped crop guide, a connection between the cutter bar and the carrier frame then extending via or through a crop guide.

Preferably, the resilient element is provided with plate-shaped material which extends in a substantially vertical plane located in the direction of operative travel. In particular, the resilient element consists of a metal plate, e.g. a leaf spring having a thickness of 3 to 4 mms, which is connected near its upper edge to the carrier frame and near its lower edge to members attached to the cutter bar.

In a further preferred embodiment the resilient element extends at least partly within a substantially drum-shaped crop guide disposed on a mowing member. In particular, the resilient element, which near its upper end is connected to the carrier frame, is connected near its lower end to a stationary supporting member arranged within a rotating crop guide. This supporting member is



then connected to the relevant mowing member in such a manner that it is supported rotatably relative thereto. The supporting member is provided with a cover disposed substantially over the drum, which cover has a central aperture through which

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the resilient element extends. Between the cover and the carrier frame there extends a flexible sleeve, within which the resilient element and/or its connection means extends/-extend.

5           In a preferred embodiment there is not only provided between the cutter bar and the carrier frame at least one connection having a resilient element, but the cutter bar is also connected in at least one position to the carrier frame via a pivot, whose pivot shaft extends substantially  
10 horizontally in the direction of operative travel of the mowing machine. This accomplishes a further stress relief of the places in which the connections to the cutter bar and the carrier frame are disposed. The carrier frame can be connected to a mowing member via this pivot.

15           The mowing members are drivingly interconnected via the cutter bar and are driven via a drive shaft which is connected to one of the mowing members, preferably an outermost one. The drive shaft is located at least partly within a substantially drum-shaped crop guide arranged on the relevant  
20 mowing member. The carrier frame is connected via the pivot to the mowing member which is driven by the drive shaft. In the region of the pivot shaft, the drive shaft is provided with a flexible coupling, e.g. a chain coupling or a universal joint. In a practical embodiment, the drive shaft is  
25 bearing-supported above the flexible coupling in a portion which is rigidly connected to the carrier frame and the drive shaft is bearing-supported below the flexible coupling in a pivot member which is pivotable about the pivot shaft relative to the carrier frame. This pivot member is located at  
30 least partly within a substantially drum-shaped crop guide arranged on the relevant mowing member. The pivot member is fitted with a cover located over the drum and is closely contiguous thereto.

          As has already been stated in the foregoing, the  
35 carrier frame may be connected via the pivot to the mowing member which is driven by the drive shaft. This is not only possible by providing the drive shaft with a flexible coupling in the region of the pivot shaft and by supporting



the drive shaft under the flexible coupling in a pivot member capable of pivotal movement about the pivot shaft relative to the carrier frame, but, for example, also by supporting the drive shaft - without a flexible coupling - in a sleeve-shaped member which is rigidly connected to e.g. a transmission system box from which, via the drive shaft, the drive of the mowing members is effected, the carrier frame then being connected to this sleeve-shaped member via the pivot. In this embodiment, it is preferred to drive the input shaft of the transmission system via one or more belts.

As has already been stated in the foregoing, the resilient connection between the cutter bar and the carrier frame can be effected both via a mowing member arranged on the cutter bar and also outside the reach of the mowing members. In the latter case, the connection can comprise an upwardly extending connecting beam which at its upper end is rigidly connected to the carrier frame and at its lower end is connected to the cutter bar via the resilient element. Preferably, the lower end of the connecting beam is connected to the cutter bar via a substantially horizontal connection element which constitutes the resilient element. In a practical embodiment, this connection element is plate-shaped and is constituted e.g. by a spring steel plate.

The mowing machine disclosed here can be moved by a tractor both as a side-mounted and as a front-mounted machine. The carrier frame of the mowing machine can alternatively be suspended from a frame with wheels; the mowing machine can then co-operate with a crusher which is also suspended from this frame. In a special embodiment of the invention, the connection between the carrier frame and the cutter bar can extend via the crusher, the resilient element then being arranged between the crusher and the cutter bar.

In what follows, therefore, the invention relates to a mower-crusher comprising a cutter bar which extends substantially transversely to the direction of operative travel over the field and mowing members arranged thereabove, which cutter bar is connected for its support in at least two places to a carrier frame which is suspended from a frame,

with the aid of which the mower-crusher is connected to a tractor, a crusher device also being suspended from the said frame. According to the invention, the mower-crusher is of such a construction that the connection between the carrier  
 5 frame and the cutter bar is effected via the crusher device, while a resilient element is arranged between the crusher device and the cutter bar. In particular, the resilient element can be constituted by a spring steel plate arranged between the lower end or a point near the lower end of the  
 10 crusher device and the cutter bar. This mower-crusher, too, may be of such a structure that it can be moved by a tractor both as a side-mounted and a front-mounted machine.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the  
 15 accompanying drawings of some embodiments, in which drawings:

Figure 1 is a plan view of a first embodiment of a mower-crusher;

Figure 2 is a partial rear view of the mower-crusher of Figure 1;

Figure 3 is a side view of the mower-crusher of Figure 1;

Figures 4 and 5 are cross-sectional views of a first connection between the carrier frame and the cutter bar  
 25 of the mowing unit in the mower-crusher of Figure 1;

Figure 6 is a cross-sectional view of a second connection between the carrier frame and the cutter bar of the mowing unit in the mower-crusher of Figure 1;

Figure 7 is a schematic front view of a first  
 30 embodiment of a front-mounted mowing machine according to the invention;

Figure 8 is a partial side view of a mower-crusher in accordance with a second embodiment;

Figure 9 is a schematic front view of a second  
 35 embodiment of a front-mounted mowing machine according to the invention;

Figure 10 is a plan view of the mowing machine of Figure 9, and

Figure 11 is a side view of the mowing machine shown in Figure 9.

In the various drawings, which only show the implement schematically, corresponding components are denoted  
5 by the same reference numerals.

The mower-crusher, as shown in plan view (Figure 1), in side view (Figure 3) and in partial rear view (Figure 2), is provided with a pivotal arm 1, by means of which it can be connected to a tractor. Via a pivot 2 the pivotal arm  
10 1 is connected to a first frame 3 which is supported drivably by means of wheels 4. The wheels 4 are pivotably connected to the first frame 3 by means of pivots 5. The pivotal movement of each of the wheels relative to the first frame 3 is effected by means of a hydraulic cylinder 6.

15 The machine furthermore includes a cutter bar, constituted by a supporting beam 7, with mowing members 8. The mowing members 8 are disc-shaped, are provided at their outer periphery with blades 9 and are capable of rotation around upwardly directed shafts. The drive of the mowing  
20 members 8 is accommodated in the supporting beam 7. The two outermost mowing members are provided with drum-shaped crop guides 10 which rotate together with the said mowing members.

The mower-crusher includes a second frame 11, in which a crusher device 12 is fitted. In substance, this  
25 crusher device 12 is constituted by a horizontally extending tube 13, to which crusher members 14 are arranged. The tube 13 together with the crusher members 14 is capable of rotating around its longitudinal axis, i.e. in such a manner that the front side moves upwardly. Consequently, the crop  
30 mown by the mowing unit is seized by the crusher members 14, which discharge the crop upwardly and rearwardly; during this upward and rearward movement the crusher members 14 advantageously process the crop.

In order to collect the crop displaced rearwardly  
35 by the crusher device 12 into a swath having a smaller width than that of the mowing machine, two swath boards 15 are arranged in the first frame 3. The swath boards 15 are arranged pivotably in the first frame 3 about vertical shafts

16 (Figure 1). The angle at which the swath board 15 is arranged can be set by connecting the rod 17 to the first frame 3 in different positions. A plurality of apertures 18 (Figure 1) are provided for the purpose. The swath boards include substantially vertical sections and sections that are folded obliquely downwardly and forwardly, so that the crop discharged rearwardly by the crusher device 12 is led towards the swath to be formed in an optimum manner.

The second frame 11 is suspended from the first frame 3 in such a manner that it is movable in the vertical direction. This suspension will be explained in detail with reference to Figure 2, in which drawing the suspension means are shown at one side only. At the portion 19 of the first frame 3 a tilting element 20 is pivotable about a horizontal shaft 21 which extends substantially in the direction of operative travel of the mower-crusher. Between the tilting element 20 and a support 22 mounted on the portion 19 there is arranged a tension spring 23 which compensates the force exerted on the tilting element 20 by a tensile member 24. The tensile member 24, which has one end connected to the tilting element 20, has its other end connected pivotably to the second frame 11. In this manner, the lateral force exerted by the tension spring 23 is converted into an upwardly directed force on the second frame 11. The second frame 11 is furthermore movably connected to the first frame 3 by means of lower pivotal members 25 (Figure 3), which are connected pivotably to both the second frame 11 and the first frame 3. The vertically movable second frame 11 is limited in its upward movement in that the lower pivotal members abut against a stop 26. The second frame 11 is furthermore movably connected to the first frame 3 by means of an upper pivotal member 27, which also is connected pivotably to both the second frame 11 and the first frame 3. This upper pivotal member 27 is adjustable in length. By adjusting the length of the upper pivotal member, it is possible to alter the position of the second frame 11 relative to the first frame 3. For example, when the length of the upper pivotal member is reduced, then the position in which the tensile member 24 acts on the

second frame 11 is slightly moved to the rear relative to the pivot shaft, by means of which the lower pivotal members 25 are connected to the second frame 11; the tensile member is then moved slightly downwards and also slightly towards the rear.

The second frame 11 accommodates a gear box 28 (Figure 1). Inside the gear box 28, the main drive shaft 29 coming from the tractor is connected both to the drive of the mower members on the cutter bar and to the drive of the crusher device.

Furthermore, in Figure 1 is shown a hydraulic cylinder 30, one end of which is connected pivotably to the pivotal arm 1 and the other end to the first frame 3. By controlling the length of the hydraulic cylinder 30, it is possible to adjust the pivotal angle of the pivotal arm 1 with respect to the mower-crusher.

In addition, it should be noted that the mower-crusher shown in Figures 1, 2 and 3 is provided with protection screens (not shown). These protection screens consist of metal frames, across which there is arranged a plastic-coated cloth or any other type of flexible material which hangs down all around.

The mowing unit of the mower-crusher or, when the crusher device is lacking, the mowing machine includes a cutter beam which, as has been stated in the foregoing, is constituted by the supporting beam 7, and superjacent mowing members 8, a carrier frame 31 (Figures 1 and 3) and two connections between the cutter bar and the carrier frame, which connections in the embodiment shown in Figures 1 to 3 are effected via the two outermost mowing members, both of which are provided with a substantially drum-shaped crop guide. The manner in which the first connection is effected is shown in Figures 4 and 5, while the manner in which the second connection is effected is shown in Figure 6.

In Figures 4 and 5, the connection between the supporting beam 7 and the carrier frame 31 includes a resilient element 32 which is designed here as a metal plate which near its upper edge is connected to the carrier frame 31 by

means of bolts 33 and a connection plate member 34, and near its lower edge to a supporting member 36 by means of the bolts 35. The resilient element 32 extends in a plane located in the direction of operative travel. The supporting member 5 36 is bearing-supported in the relevant mowing member 8 by means of bearings 37. The resilient element 32 is located partly within the drum-shaped crop guide 10 arranged on the mowing member 8. Furthermore, connection plate members 38 are bolted to the supporting member 36 by means of the bolts 35; 10 these connection plate members themselves are bolted by means of bolts 39 to a cover 40 for the drum-shaped crop guide 10. The cover 40 has a central aperture 41, through which the resilient element 32 extends. A flexible sleeve 42 extends between the cover 40 and the carrier frame 31. The resilient 15 element 32 and its connection means 33, 34 to the carrier frame 31 extend within this sleeve 42. The resilient element 32 allows of both a slight bending and a slight shift of the supporting beam 7 relative to the carrier frame 31 in a vertical plane transversely to the direction of operative 20 travel.

In Figure 6 the connection between the supporting beam 7 and the carrier frame 31 includes a pivot 43 whose pivot shaft extends horizontally in the direction of operative travel. A pivotal member 44 is pivotable about the pivot 25 shaft relative to a member 45 which is rigidly connected to the carrier frame 31. The drive shaft for the mowing members 8 in the supporting beam 7 extends through the member 45 and the pivotal member 44. The upper portion 46 of the drive shaft is bearing-supported in the member 45 by means of 30 bearings 47. The lower portion 48 of the drive shaft is bearing-supported in the pivotal member 44 by means of bearings 49. The upper portion 46 of the drive shaft is connected to the lower portion 48 thereof by means of a flexible coupling 50, e.g. a chain coupling or a universal 35 joint, which is arranged in the region of the shaft of the pivot 43. The pivotal member 44 is arranged partly within the drum-shaped crop guide 10 disposed on the relevant mowing member 8. A cover 51 is rigidly connected to the pivotal

member, which cover is located over this drum-shaped crop guide and is tightly contiguous thereto.

The invention as it has been described so far is not only suitable for use in a mowing machine or in a mower-crusher which, as is apparent from Figures 1 to 3, is moved by a tractor as a side-mounted machine but also in a front-mounted mower or front-mounted mower-crusher. The use in a front-mounted mowing machine is shown in Figure 7. The second connection (Figure 7) between the supporting beam 7 and the carrier frame 31 extends via the gear box 52, while a second gear box 53 is arranged halfway in the carrier frame. The mowing members 8 are driven by a transmission system which extends from the power take-off shaft of the tractor via the gear box 53, one half of the carrier frame 31, the gear box 52, the member 45 and the pivotal member 44 to the relevant outermost mowing member and from there to the further mowing members 8. The resilient element 32 is included in the first connection between the carrier frame 31 and the supporting beam 7, while the second connection between the carrier frame 31 and the supporting beam 7 includes the pivot shaft 43 with the flexible coupling 50 in the drive shaft.

Figure 8 shows a partial side view of a mower-crusher, wherein the first connection between the carrier frame 31 and the supporting beam 7 does not extend via the relevant outermost mowing member but via the crusher device of the mower-crusher, i.e. via the second frame 11 thereof. In this situation, the resilient element is constituted by a spring steel plate 54 which has one end connected to the supporting beam 7 and the other end to the lower end of the second frame 11 of the crusher device. The second connection between the carrier frame 31 and the supporting beam 7 can extend again via the relevant outermost mowing members, as is shown e.g. in Figure 6 or in Figure 9 to be described hereinafter.

Figures 9 to 11 show a further embodiment of a front-mounted mowing machine in accordance with the invention. The first connection between the carrier frame 31 and the supporting beam 7 is arranged outside the reach of the

mowing members. This connection incorporates a vertically extending connecting beam 55 which at its upper end is rigidly connected to the carrier frame 31 and at its lower end to the supporting beam 7 via an intermediate plate member 56 and a resilient element 57. The resilient element 57 is constituted by a substantially horizontally extending plate-shaped connection member, e.g. a spring steel plate.

The second connection between the carrier frame 31 and the supporting beam 7 can be designed as is shown in Figure 6; Figures 9 and 10 show, however, a different embodiment. In the said drawings, the carrier frame 31 is connected pivotably to a sleeve-shaped member 58. To that end, to this sleeve-shaped member 58 there are connected rigidly pivot pins 59, around which the fork-shaped end 60 of the carrier frame 31 can pivot. Furthermore, the sleeve-shaped member is connected rigidly to a transmission system box 61, from which the drive of the mowing members 8 is effected via the drive shaft supported in this sleeve-shaped member 58. The outermost mowing member, via which the remaining mowing members are driven, is provided again with a crop guide 10; the sleeve-shaped member 58 extends partly inside this crop guide and includes an edge section 62 which is tightly contiguous to the crop guide and covers same. The forces acting on the cutter bar during operation are transferred by the drive shaft extending through this second connection between the carrier frame 31 and the supporting beam 7 to the input shaft 63 of the transmission system in the transmission system box 61. These forces can be such that the drive shaft and, via its bearing, the sleeve-shaped member 58 and the transmission system box may be subjected to a slight displacement in a vertical plane perpendicular to the direction of operative travel. This also implies a slight displacement and/or pivotal movement of the input shaft 63 in the said vertical plane. Hence, the input shaft 63 is here preferably driven by one or more belts 64, more specifically from a shaft 65 which is supported rigidly relative to the carrier frame 31. This shaft 65 itself is driven again by a power take-off shaft of the tractor via the gear box 66.



Finally, it should be noted that the invention is not limited to the above-described embodiments; many modifications can be provided without departing from the scope of the invention. Thus, it is possible e.g. to combine the  
5 disclosed front-mounted mowers with a crusher and to use the framework formed by the cutter bar, the carrier frame and the specific interconnections as described in various types of rotary disc-mowers.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

5 1. A mowing machine comprising a cutter bar which extends substantially transversely to the direction of operative travel over the field and rotary mowing members arranged thereabove, which cutter bar is connected for its support in at least two places to a carrier frame, at least one of which connections includes a resilient element which permits of a limited relative movement between the carrier frame and the portion of the cutter bar that is contiguous to the connection, wherein the resilient element is provided with a <sup>spring like</sup> plate-shaped material extending in a substantially vertical plane located in the direction of operative travel to permit mainly movements of the cutter bar relative to the carrier frame in a substantially vertical plane transversely to the direction of operative travel.

10 15 2. A mowing machine as claimed in claim 1, wherein the resilient element effects the connection via a mowing member arranged on the cutter bar.

20 3. A mowing machine as claimed in claim 2, wherein the cutter bar is connected to the carrier frame in two places via different, preferably the two outermost, mowing members of the cutter bar.

25 4. A mowing machine as claimed in any one of the preceding claims, wherein one or more mowing members includes/include a substantially drum-shaped crop guide, and that a connection between the cutter bar and the carrier frame extends via or through a crop guide.

30 5. A mowing machine as claimed in any one of the preceding claims, wherein the resilient element consists of a metal plate, preferably a leaf spring having a thickness of 3 to 4 mms, which is connected near its upper edge to the carrier frame and near its lower edge to members attached to the cutter bar.

35 39 6. A mowing machine as claimed in any one of the preceding claims, wherein the resilient element, which near its upper end is connected to the carrier frame, is connected near its lower end to a stationary supporting member arranged within a rotating crop guide and connected



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to the relevant mowing member in such a manner that it is supported rotatably relative thereto.

5 7. A mowing machine as claimed in claim 6, wherein the supporting member is provided with a cover disposed substantially over the drum-shaped crop guide, which cover has a central aperture through which the resilient element extends.

10 8. A mowing machine as claimed in claim 7, wherein between the cover and the carrier frame there extends a flexible sleeve, within which the resilient element and/or its connection means extends/extend.

15 9. A mowing machine as claimed in any one of the preceding claims, wherein the carrier frame is connected to a mowing member via a pivot, whose pivot shaft extends substantially horizontally in the direction of operative travel of the mowing machine.

20 10. A mowing machine as claimed in claim 9, wherein the mowing members are drivingly inter-connected via the cutter bar and are driven via a drive shaft connected to, preferably, an outermost mowing member, which drive shaft is located at least partly within a substantially drum-shaped crop guide arranged on the relevant mowing member.

25 11. A mowing machine as claimed in claim 10, wherein the carrier frame is connected via the pivot to the mowing member which is driven by the drive shaft.

30 12. A mowing machine as claimed in claim 11, wherein the drive shaft is provided with a flexible coupling, preferably a chain coupling or a universal joint, in the region of the pivot shaft.

35 13. A mowing machine as claimed in claim 12, wherein the drive shaft is bearing-supported above the flexible coupling in a portion which is rigidly connected to the carrier frame, and in that the drive shaft is bearing-supported below the flexible coupling in a pivot member which is pivotable about the pivot shaft relative to the carrier frame.

39 14. A mowing machine as claimed in claim 13, wherein the pivot member is located at least partly within



a substantially drum-shaped crop guide arranged on the relevant mowing member and fitted with a cover located over the drum-shaped crop guide.

5 15. A mowing machine as claimed in claim 9, 10, or 11, wherein the drive shaft is supported in a sleeve-shaped member, to which the carrier frame is connected via the pivot, which sleeve-shaped member furthermore is rigidly connected to a transmission system box from which the drive of the mowing members is effected via the drive shaft.

10 16. A mowing machine as claimed in claim 15, wherein the transmission system is provided with an input shaft driven by means of one or more belts.

15 17. A mowing machine as claimed in claim 1, wherein the connection between the cutter bar and the carrier frame, which connection includes the resilient element, is arranged backward relative to the cutter bar and further upwardly to the carrier frame outside the reach of the mowing members.

20 18. A mowing machine as claimed in claim 17, wherein the connection includes an upwardly extending connection beam which at its upper end is rigidly connected to the carrier frame and at its lower end is connected to the cutter bar via a substantially horizontal connection element which constitutes the resilient element.

25 19. A mowing machine as claimed in claim 18, wherein the connection element is plate-shaped and, preferably, is a spring steel plate.

30 20. A mowing machine as claimed in any one of the preceding claims, wherein the carrier frame is suspended from a frame, via which the mowing machine is connected to a tractor.

35 21. A mowing machine as claimed in any one of the preceding claims, wherein the carrier frame is suspended from a frame which is provided with wheels.

22. A mowing machine as claimed in claim 20 or 21, wherein it co-operates with a crusher device suspended from the frame.

39 23. A mowing machine as claimed in claim 22,



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wherein the connection between the carrier frame and the cutter bar extends via the crusher device, the resilient element being arranged between the crusher device and the cutter bar.

5           24.   A mowing machine substantially as hereinbefore described with respect to any one of the embodiments as shown in the accompanying drawings.

DATED:           18 September 1991

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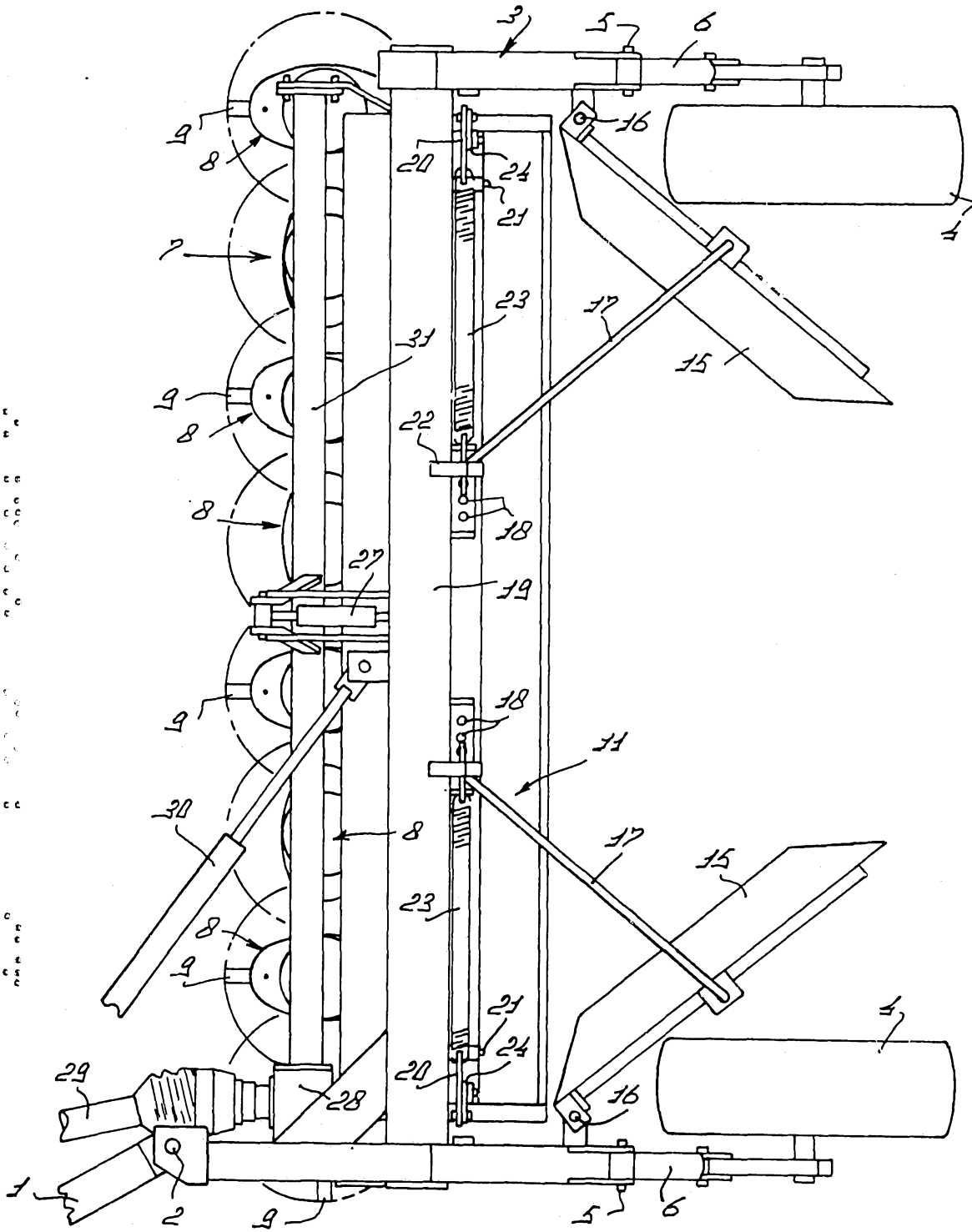


Fig. 1

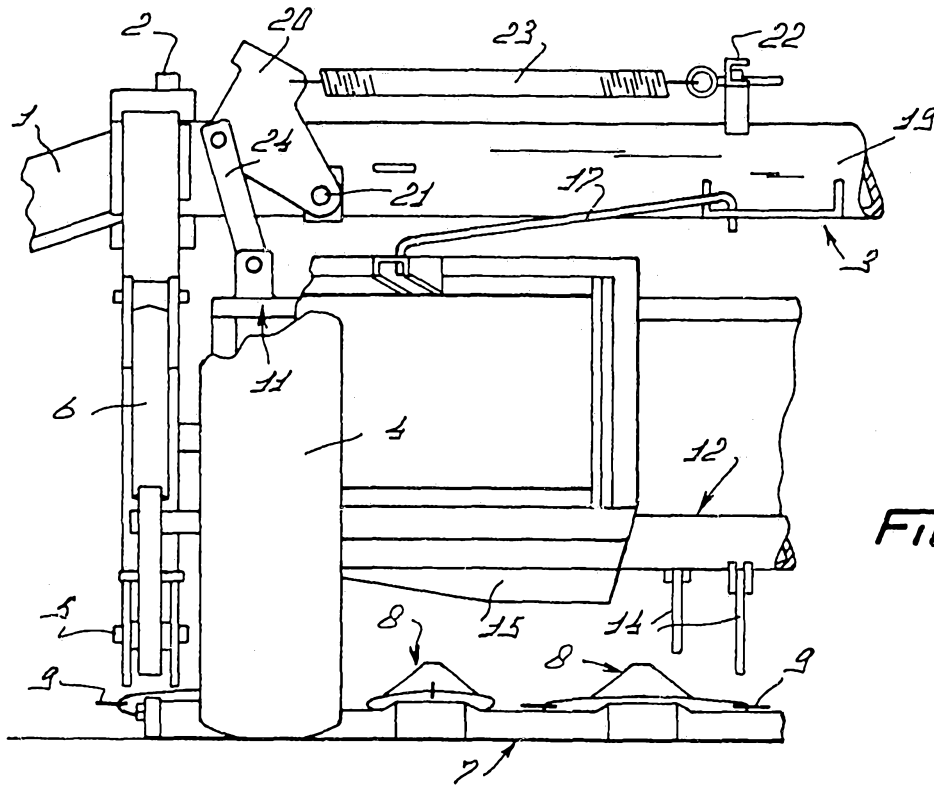


FIG. 2

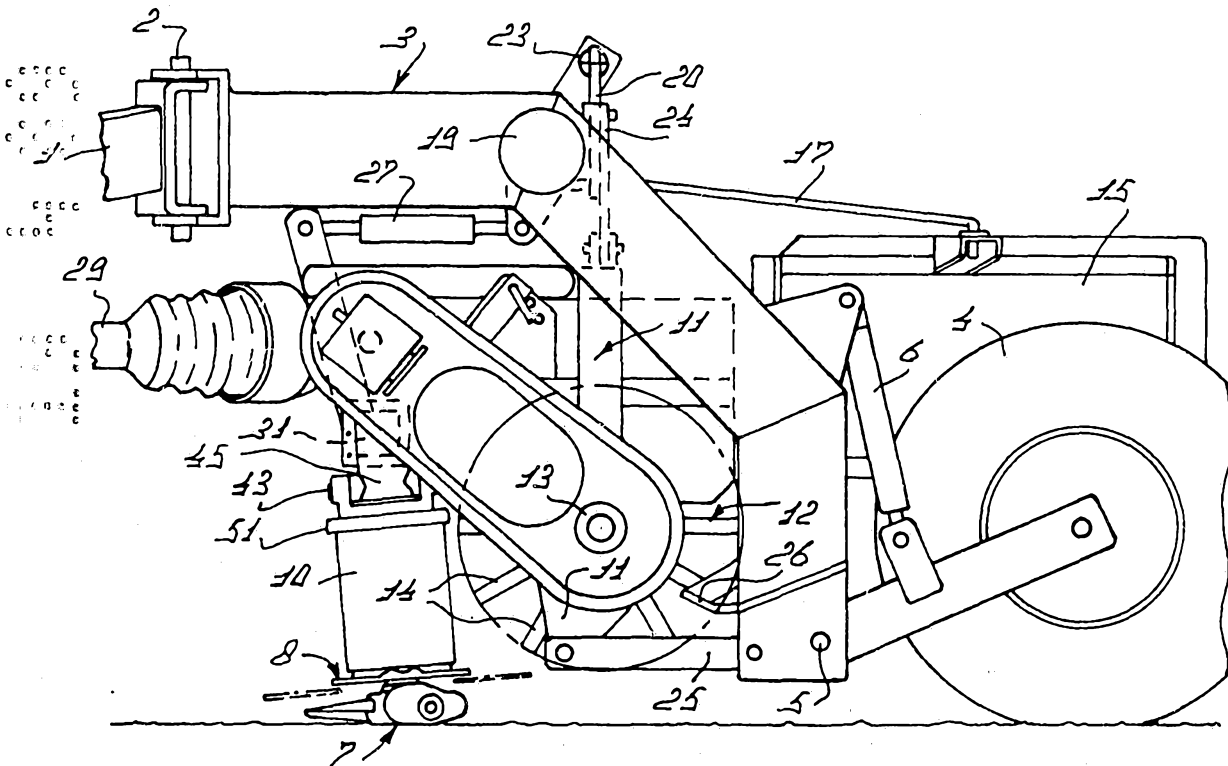
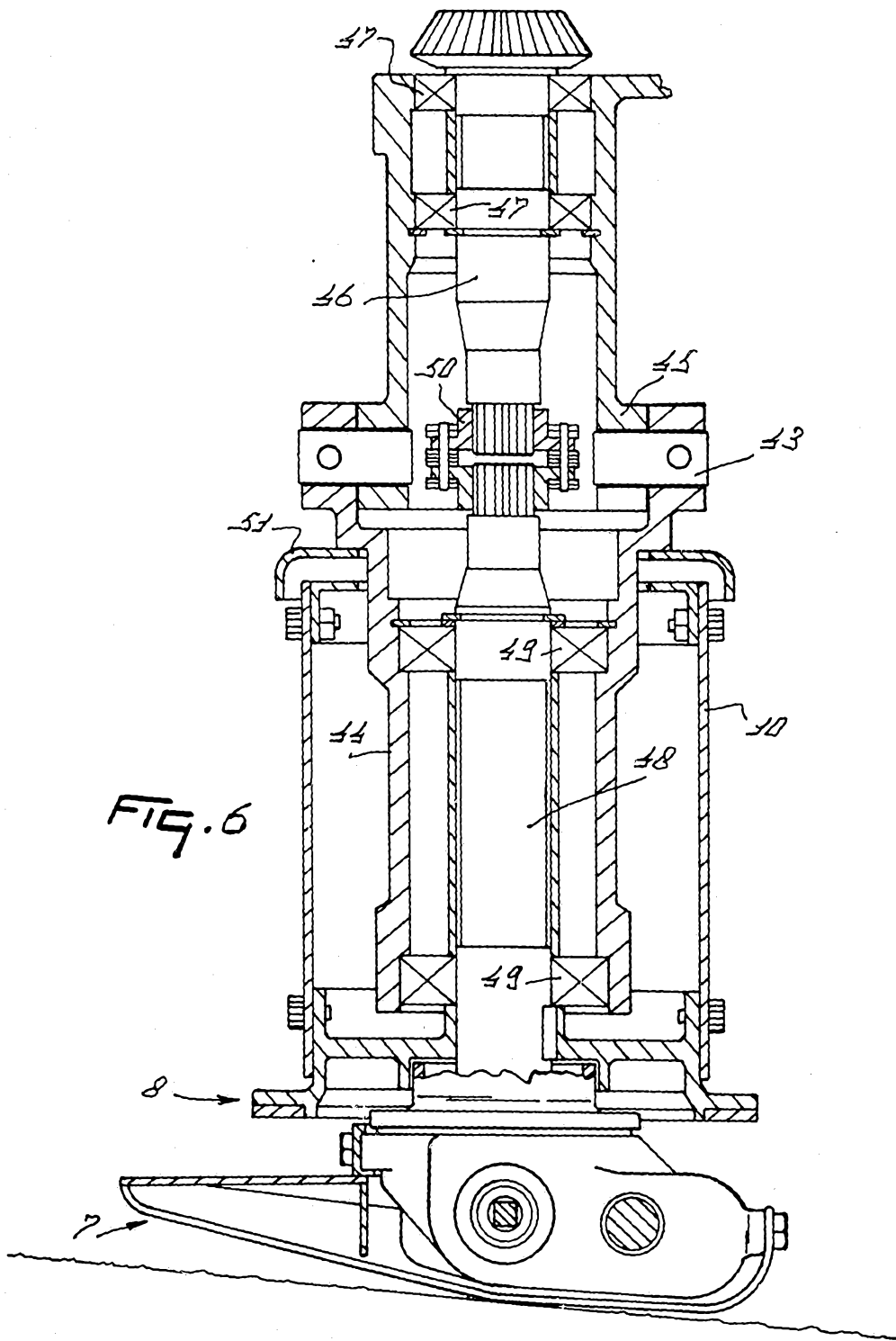
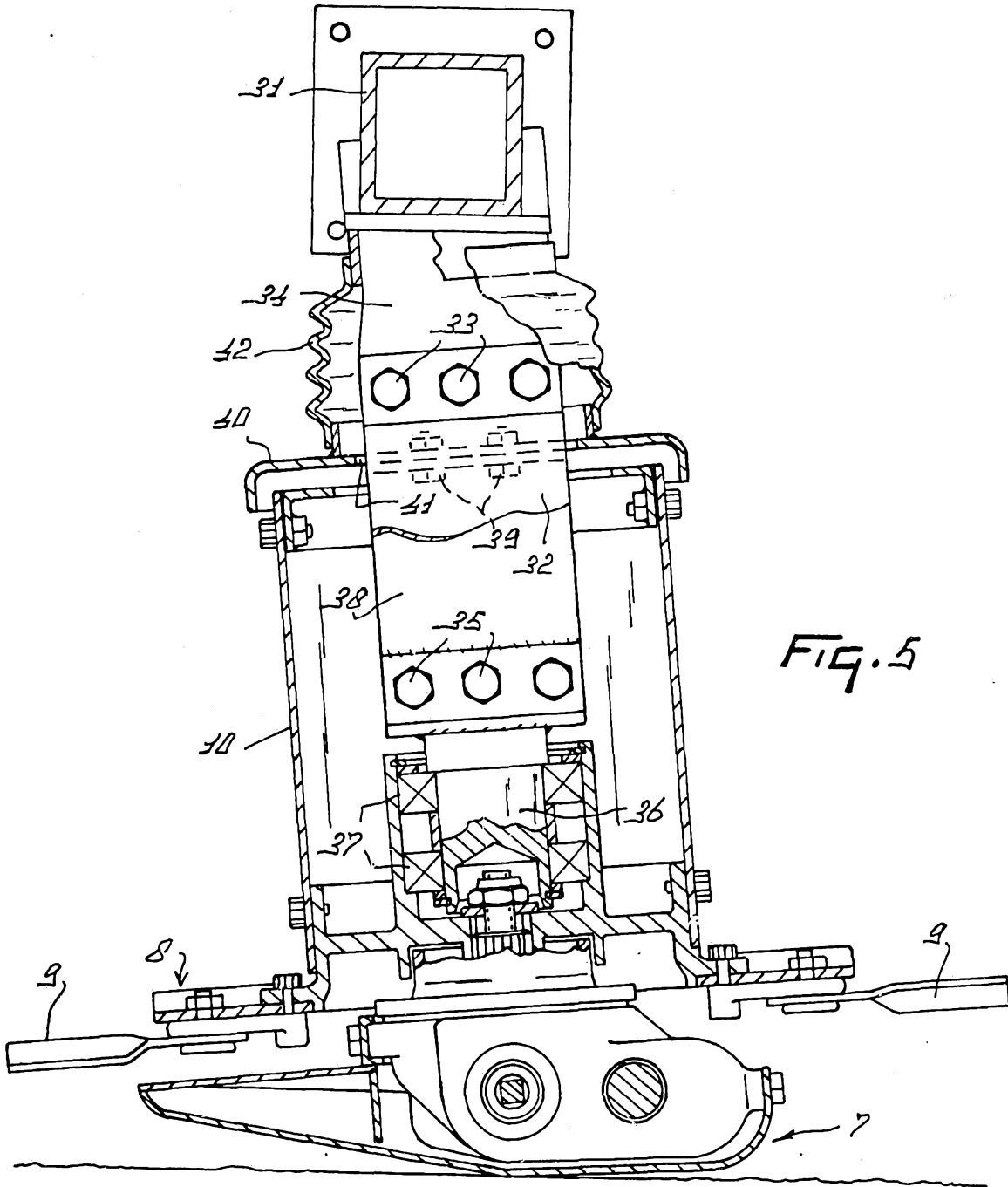


FIG. 3







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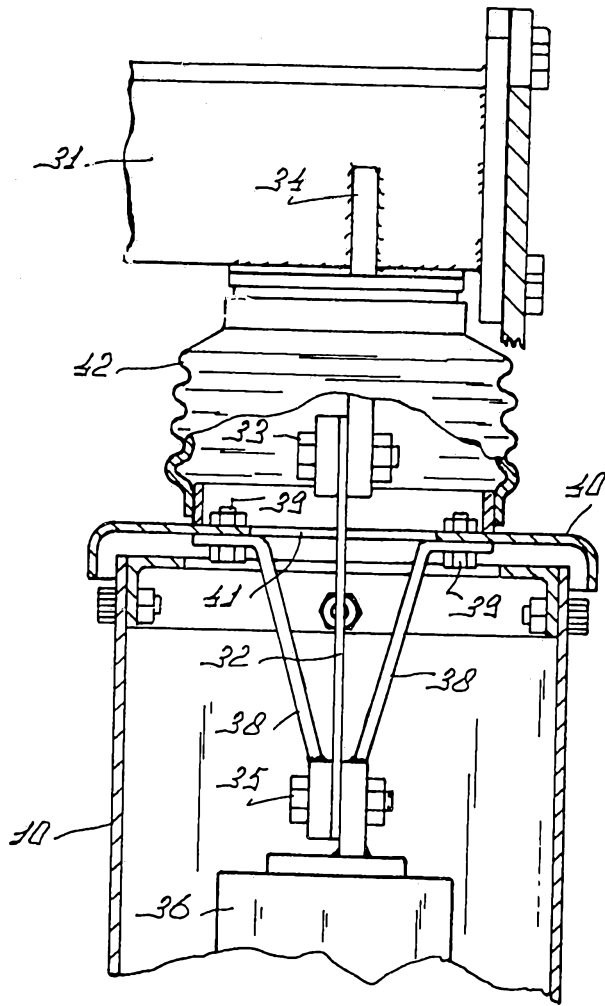


FIG. 4

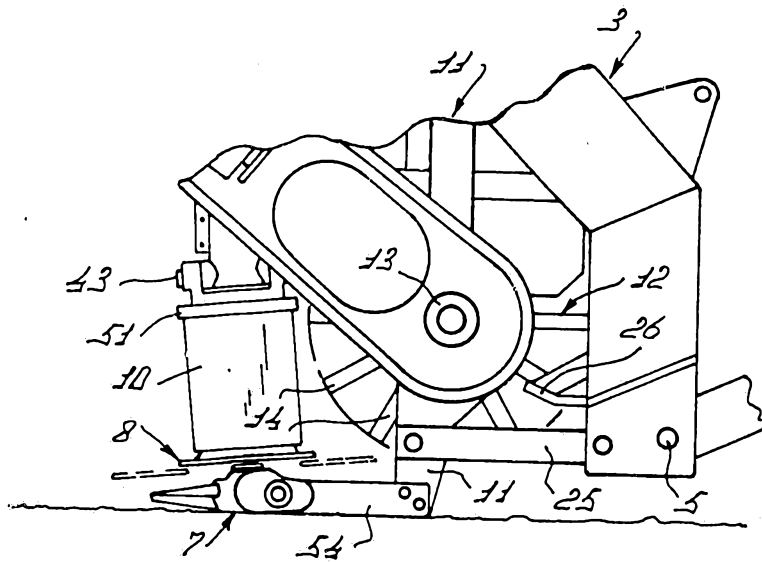


FIG. 8

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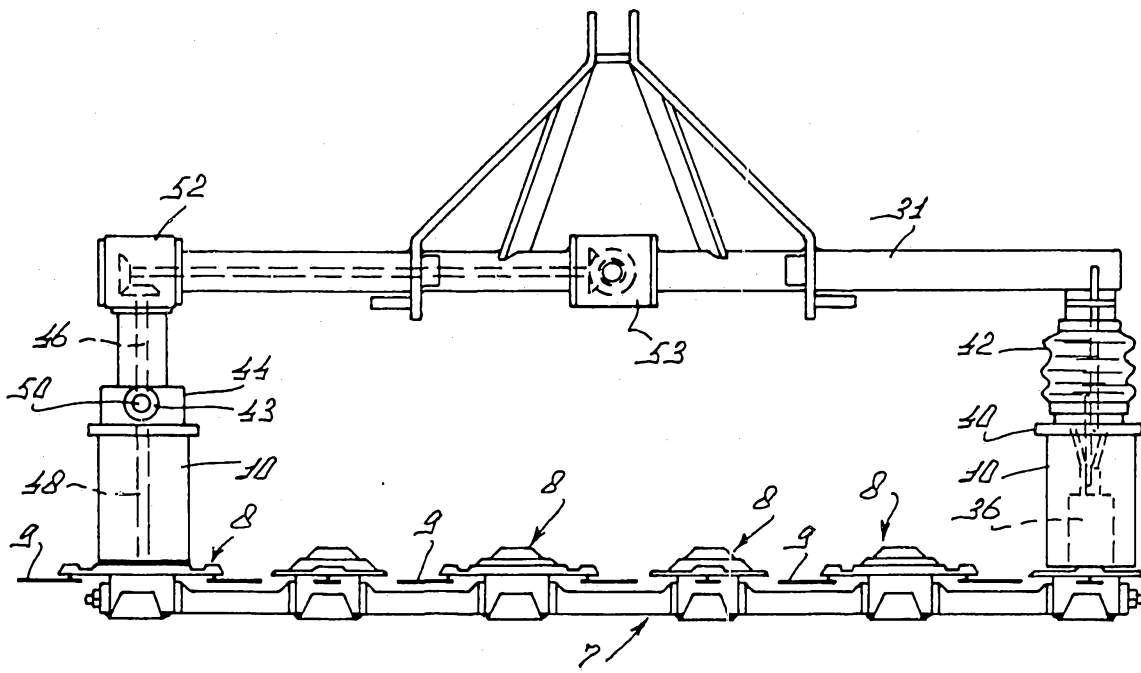


FIG. 7

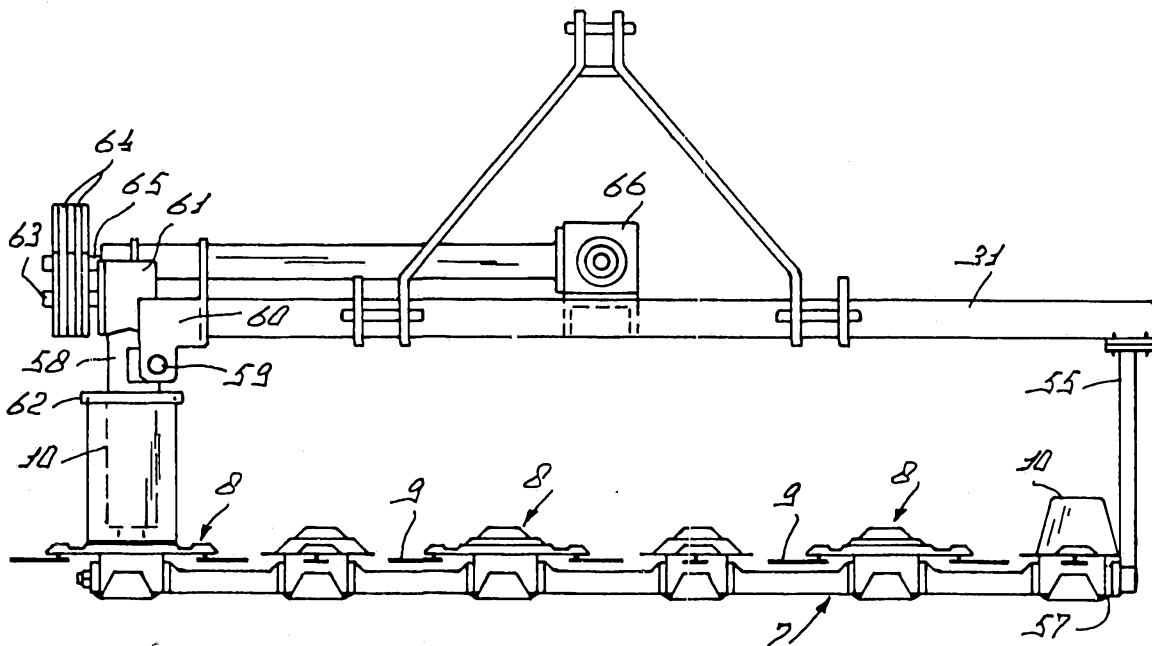


FIG. 9

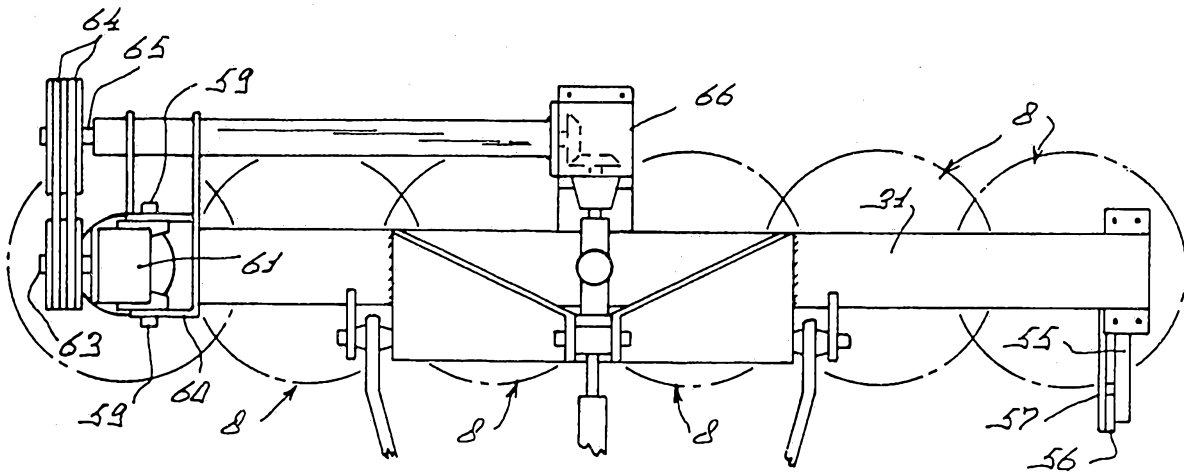


FIG. 10

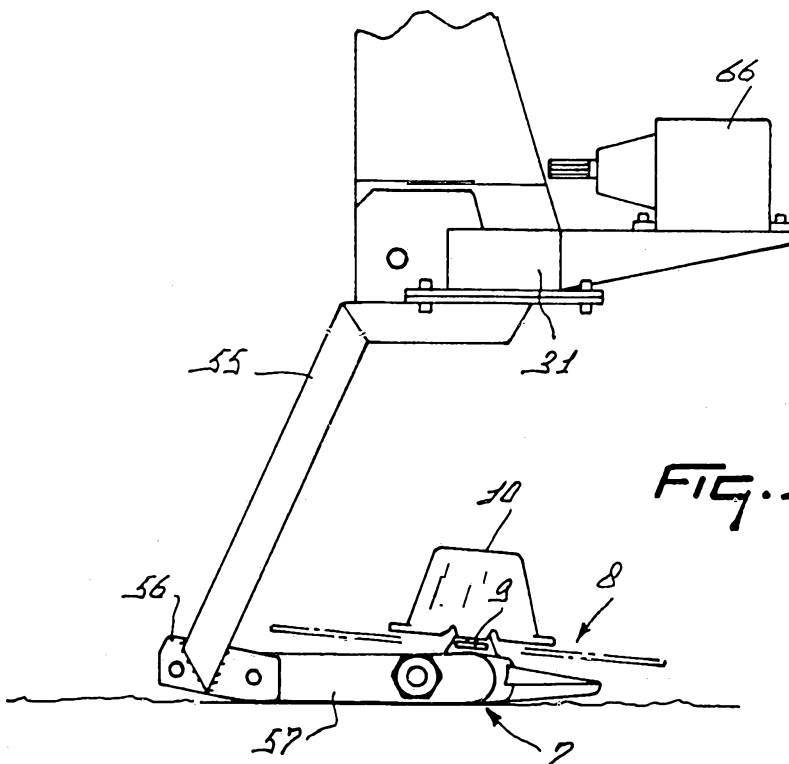


FIG. 11