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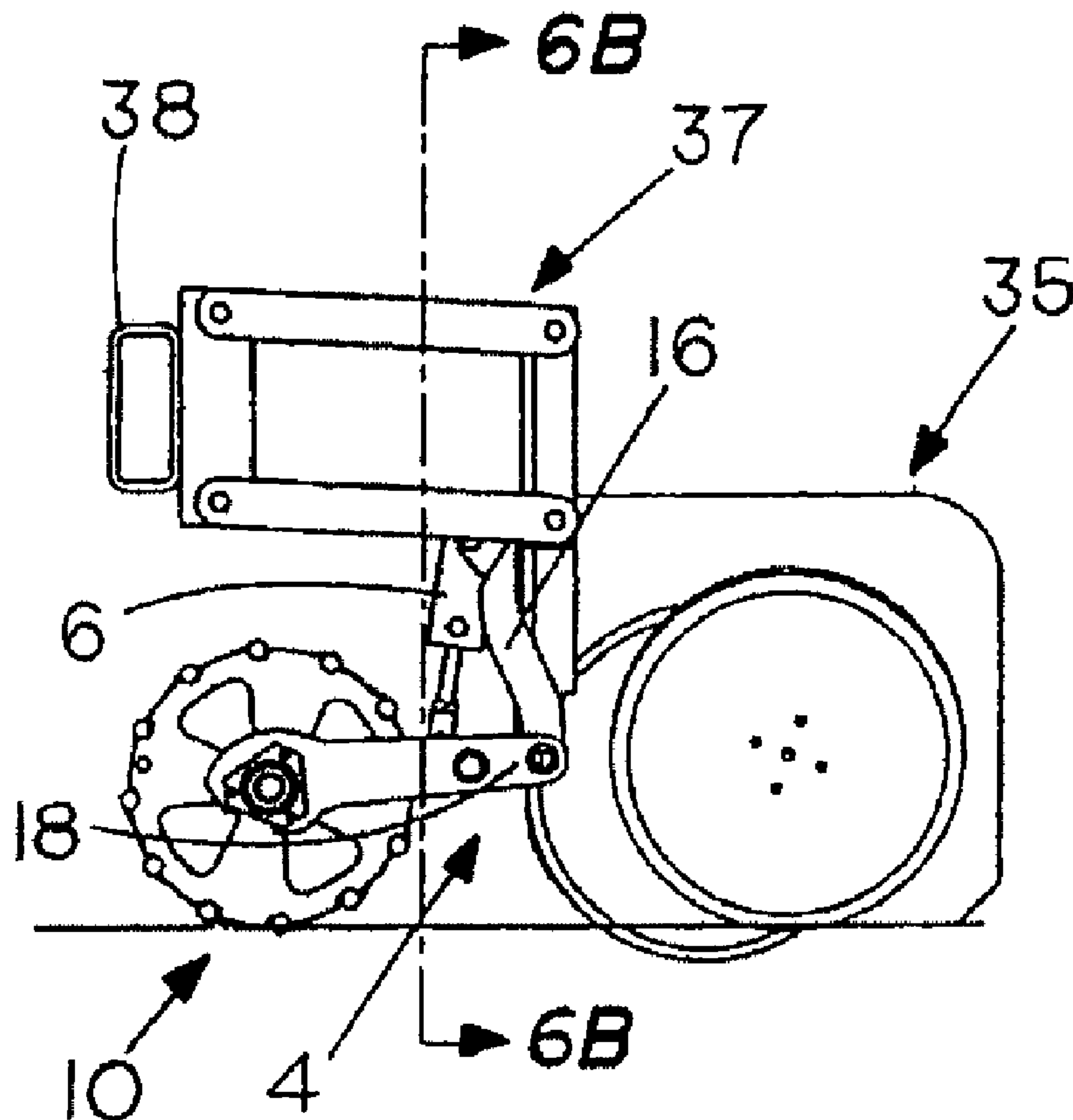
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(54) **Titre : INSTRUMENT POUR LE TRAVAIL DU SOL ET LA PLANTATION**

(54) **Title: SOIL TILLING AND PLANTING IMPLEMENT**



(57) **Abrégé/Abstract:**

The combination of a rolling basket tillage implement and a seed distribution implement is disclosed. A height-adjustable mounting system for a rolling basket soil tillage implement is also disclosed for use with a planter that enables such an implement to be raised above the soil as needed to avoid wet conditions.



SOIL TILLING AND PLANTING IMPLEMENT

ABSTRACT OF THE DISCLOSURE

The combination of a rolling basket tillage implement and a seed distribution implement is disclosed. A height-adjustable mounting system for a rolling basket soil tillage implement is also disclosed for use with a planter that enables such an implement to be raised above the soil as needed to avoid wet conditions.

SOIL TILLING AND PLANTING IMPLEMENT

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BACKGROUND OF THE INVENTION**I. Field of the Invention**

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This invention is generally directed to the field of agriculture machinery, and more particularly, it relates to a preplanting tillage implement used in combination with a seed planting device. Specifically, the invention relates to a rolling basket tillage implement used in tandem with a seed planting implement in which the rolling basket may have an independent height adjustment aspect.

II. Related Art

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In the spring, prior to planting, farmers must prepare their fields for accepting seed. Many tillage implements have been designed and are used to condition the soil in preparation for planting. Traditional farming includes both primary and secondary tillage tasks to prepare the soil such as plowing, disking, field cultivating and harrowing. Disking is an example of a method of primary tillage and harrowing is an example of a method of secondary tillage.

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Primary tillage is a first pass over the soil using a soil conditioning implement attached to the rear of a tractor which works deep into the soil. The soil is usually worked about four inches deep to break up clods of soil, remove air pockets, and destroy weeds deep in the earth. Secondary tillage involves another pass over the same soil, at a more shallow depth, using implements which are generally attached to the rear of the primary tillage unit such that the secondary tillage unit follows the primary tillage unit. The secondary tillage unit generally works the soil to a depth of about two inches. The

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secondary tillage unit is usually a final conditioning tool to prepare the soil for planting. Such units may chop up crop residues, break up soil clods and break up any crust on the top of the soil, provide weed control, incorporate
5 chemicals into the soil, and stir and firm the soil closer to the surface.

Rolling basket seedbed finishers represent an important type of secondary soil conditioning implement. Rolling baskets are primarily used as soil leveling devices
10 to break up and minimize clods of soil and to remove air pockets from the soil. Farmers obtain great benefit from using rolling baskets as a means of secondary tillage to provide a level soil for planting. The ability to break up clods of soil, remove air pockets and further incorporate
15 chemicals generally leads to better crop yields at harvest.

Accordingly, it would be beneficial if a secondary tillage operation using a rolling basket could advantageously be combined with a planting operation such
20 that one could take immediate advantage of soil in condition for planting by accomplishing the planting project during the same pass over a field. Thus, the attachment of rolling basket tillage for use in conjunction with a seed planting implement would be desirable.

25 However, the use and effectiveness of rolling baskets or other soil conditioning implements is greatly limited by the condition of the soil. If the soil is too wet, rolling basket soil conditioning implements may become filled and clogged with soil which make them useless for further soil
30 conditioning until they are again emptied of soil. When a farmer realizes that areas of soil in a field are too wet to use such implements, he will generally forego the use of such soil conditioning implements entirely for the season.

This means that much of the soil may not be properly
35 treated and an expensive farming implement will lay idle.

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This is not a desirable or economically efficient situation for farmers.

It would, therefore, also be beneficial to provide an arrangement or mechanism that enables intermittent use of a soil conditioning implement, particularly a rolling basket seedbed finisher, and/or a planter in a field where areas of soil are dry enough for use, but where there are also areas which are too wet for use. Such a device would allow a farmer to raise rolling basket seedbed finishers above the soil and out of use whenever they reach a section of a field where the soil is too wet and thereafter enable the rolling basket finisher to be lowered and reconnect with the soil in areas where the soil is suitable for use.

SUMMARY OF THE INVENTION

The present concept is related to combining said conditioning implement in the form of rolling basket seedbed finishers with planters to accomplish multiple tasks in a single pass. An aspect of the present concept relates to mounting rolling basket seed finishers on planting equipment. A further aspect of the present concept is related to a mounting assembly for a soil conditioning implement in the form of a rolling basket seedbed finisher. The mounting assembly is for individual rolling baskets which are a part of a plurality of such soil conditioning implements generally arranged in a spaced aligned manner on a multi-row planter, seed drill or other implement, which is used to distribute seeds into the soil, hitched to and pulled by a tractor or other prime mover.

Certain embodiments of the mounting assembly include a height adjustable mounting arrangement for each of the rolling basket soil conditioning implements. Each height adjusting mechanism includes an actuator for adjusting the relative height of a corresponding rolling basket individually, and an associated control system for operating the height adjusting mechanism. The actuator

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preferably includes a hydraulic or pneumatic cylinder, which may be single or double acting. It is also an aspect of the present invention for the mounting assemblies and associated implements to be combined with a planter and arranged such that rolling basket soil conditioning takes place in front of each individual seed planting unit on a planter.

In a preferred embodiment, each mounting assembly for each rolling basket soil conditioning implement may be controlled from a central control system that includes control switches or a control pad, or the like, having a control device associated with each rolling basket located in the cab of an associated tractor. In this manner, a user is able to adjust the height of each mounting assembly individually and therefore the height of each associated soil conditioning rolling basket implement may be adjusted individually as needed.

It will be appreciated by those skilled in the art that a plurality of actuator devices such as pneumatic or hydraulic cylinders, or the like, together with the necessary controls can be connected to be operated from the cab of a tractor or other farm implement device prime mover by conventional means in a well known manner.

In other embodiments, the rolling basket devices may be fixed to the planter and other mechanical devices may be used to apply varying degrees of force to the soil being processed. These include compression or torsion springs, inflatable air bags, shock absorber devices which may be spring loaded, or the like. Air bag systems may be single or double acting.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing features and advantages of the invention will become apparent to those skilled in the art from the following detailed description of one or more preferred

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embodiments, especially when considered in conjunction with the accompanying drawings in which:

5 Figure 1 shows a perspective view of a mounting assembly using a shell-type assembly to attach to a rolling basket;

Figure 2 shows a side view of the mounting assembly of Figure 1;

Figure 3 shows a perspective view of an alternative mounting assembly attaching a rolling basket;

10 Figure 4 shows a side view of the mounting assembly of Figure 3;

Figure 5 illustrates the mounting assembly of Figures 3 and 4 attached to the front of a planting implement with the soil conditioning rolling basket shown in a raised position;

Figure 6A is a view similar to Figure 5 showing the soil conditioning rolling basket implement in a lowered ground engaging position;

20 Figure 6B is a cross-sectional view taken along line B-B of Figure 6A;

Figure 7A is a schematic perspective view showing a rolling basket attached to a main frame member of a planter implement;

25 Figure 7B is a view similar to Figure 7A with a double acting air bag as the actuator;

Figure 8 is a front view of the mounting assembly of Figures 3-7 attached to a farming implement;

30 Figures 9A-9F depict other embodiment of rolling baskets similar to those of Figures 1 and 3 using other types of actuating or force-applying devices; and

Figure 10 is a block diagram of a pneumatic control system for controlling mounting assemblies and a schematic drawing of a rolling basket soil conditioning system combined with a multi-row planter; and

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DETAILED DESCRIPTION

This description of the preferred embodiments is intended to illustrate representative examples of inventive concepts and is not intended to be limiting as to the scope of the concepts. The examples are to be read in connection with the accompanying drawings, which are to be considered part of the entire written description of this invention. In the description, relative terms such as "lower", "upper", "horizontal", "vertical", "above", "below", "up", "down", "top" and "bottom" as well as derivatives thereof (e.g., "horizontally", "downwardly", "upwardly", etc.) should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not require that the apparatus be constructed or operated in a particular orientation. Terms such as "connected", "connecting", "attached", "attaching", "join" and "joining" are used interchangeably and refer to one structure or surface being secured to another structure or surface or integrally fabricated in one piece, unless expressively described otherwise.

An aspect of the invention is directed to an adjustable mounting bracket assembly for attaching a soil conditioning implement in the form of a rolling basket device, particularly to the frame of a planter.

As shown in the embodiment of Figures 3-8, the mounting assembly 2, for a rolling basket soil conditioner 10 comprises at least three parts, a height adjustable mounting 4, a height adjusting mechanism or actuator, which may be in the form of a hydraulic (6A in Figure 9E) or pneumatic cylinder 6, and an associated control system (Figure 10) for operating a plurality of such height adjusting mechanisms to adjust the height of a plurality of spaced associated connected rolling baskets as normally used in tandem with a planter as towed by a tractor.

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As illustrated in Figure 3, the height adjustable mounting 4 is composed of several parts including an attachment plate 12 and a pair of spaced parallel side plate members 16 and attachment arms 18 for coupling the rolling basket soil conditioning implement to the attachment plate 12. The attachment plate 12 is adapted to be fixed to the frame of a farming implement in the form of a conventional planter along with the attachment plates of other units such that the soil ahead of each planting unit is conditioned.

Each mounting assembly includes spaced arms 18 which extend away from an associated rolling basket soil conditioning and leveling implement 10 which is journaled for rotation between the arms 18 as at 20. The arms 18 connect to the members 16 fixed to the attachment plate 12.

The arms 18 are connected to each other by a common crossbar 24 which also supports one end of a cylinder or actuator 6.

As illustrated in Figures 3 and 4, the arms 18 and the members 16 of the attachment plate 12 are designed such that they pivotally connect to each other. Any manner known in the art which connects and enables the arms 18 to pivot at 22 relative to the members 16, such as bearings, bushings, etc., can be employed so that the adjustable mounting 4 is able to move towards and away from the surface of the ground with the operation of cylinder 6 which may be attached using a clevis arrangement as at 26 to attach the rod end and a bracket arrangement as at 28 to attach the blind end of the cylinder 6 to the attachment plate 12.

The height adjusting actuator 6 may be a hydraulic or pneumatic cylinder, or other devices, as illustrated, those skilled in the art will recognize that any mechanical mechanism able to raise and lower the soil conditioning implement 10, as shown in Figures 5 and 6, may be used.

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Thus, in some embodiments, height adjusting depends on raising the planter with the rolling baskets attached. In those embodiments, downward force may be provided by a spring-operated mechanism, an inflatable air spring, or any similar system known in the art, such as are shown in Figures 9A-9D. As indicated, several preferred embodiments utilize pneumatic cylinders as compressed air is generally available on tractors to connect to and operate farm implements. It will be recognized, however, that hydraulic systems are also commonly used in these types of applications.

The rolling basket units 10 further include a pair of side plates 30 connected by a plurality of spaced steel bars 32 which may be internally or externally attached to the plates 30. A central spindle or axle 34 is also provided.

Figures 5, 6A, 6B, 7A and 7B also depict a planting implement 35 having a seed distributing arrangement 36 (Figure 6B) and a connecting frame 37 including a main structural member 38 that connects together a plurality of similar units 35.

As shown in Figures 5 and 6A, the operation of the actuator 6 serves to raise and lower the soil conditioning rolling basket implement 10 in accordance with the operation of a control system. It should be noted that in an implement carrying a plurality of soil conditioning rolling baskets 10, as shown in Figure 10, an associated control system enables the raising and lowering of the soil conditioning implements individually as desired by the operator in the tractor or other towing vehicle. It may also enable the soil conditioning implement 10 to be positioned in a floating mode riding the soil surface or lowered with applied force as needed.

An alternate embodiment of the mounting bracket assembly is shown generally at 102 in Figures 1 and 2 and

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also includes a height adjustable mounting 104. That system utilizes a shell or shroud 114 covering the upper portion of the rolling basket 110. Pivotaly connected members 116 and arms 118 are shown together with mounting
5 bracket 120 and clevis attachment 122. The actuating cylinder or other such device is not shown.

Figure 10 is a schematic drawing of a soil conditioning system used with a multi-row seed planter so that a field may be properly leveled and thereafter receive
10 seeds from the planter modules. In this schematic drawing, a tow bar 40 is connected to a trailer tongue 42 that is adapted to be connected by a clevis (not shown) to a towing work vehicle, such as a farm tractor. Secured to the tow bar are a plurality of rolling basket tillage devices 44.

15 Primary tillage devices (not shown) may, for example, comprise disk harrows or rake harrows of conventional design known in the art may be used prior to employing the rolling baskets. As previously explained, the primary harrows are arranged to dig deeper into the soil and
20 typically produce clumps depending on soil type and moisture content. It is preferable that the clumps become crushed and broken up and the soil leveled by the action of the secondary rolling basket devices 44 leaving the field prepared to receive seed at the time of seeding and the
25 seed distributed by planter modules 46.

The user or driver of the tractor or other prime mover determines whether the soil is too wet for the soil conditioning implements 2 to effectively work or not. If the soil is too wet, the user sends a signal via the
30 control system, to activate the height adjusting mechanism 4. In a preferred embodiment, the height adjusting mechanism is connected to a pneumatic system which has an air compressor 50 for maintaining a predetermined pressure in an accumulator 52. At least one pneumatic solenoid
35 valve 58 is connected between the accumulator and each

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actuator 6 to control the application of the pressure supplied to the actuator 6. A manifold 56 in Figure 10 is shown as supplying pressurized air, via solenoid valves 58, to one or more actuators 6 under control of electrical signals from an operator's controller module which includes a key pad control (which may be remote) at 60. A combined electrical and pneumatic connection is shown at 62 and a manifold controller is shown at 64. The system may incorporate a pressure regulator (not shown) to adjust the amount of force (from the pressurized air) applied to raise the soil conditioning implement.

Pressurized air is then supplied to the pneumatic cylinders 6 in a well known manner to the mounting assembly, which, in turn, will raise the soil conditioning implement if the user has determined the soil in that location is too wet for use, or lower the soil conditioning implement if the soil is suitable to use the soil conditioning implement. It will be appreciated that the cylinders 6 may be single or double acting with single acting cylinders used to raise the soil conditioning implements on the power stroke and allow the basket to float under its own weight when the pressure is released. Double acting cylinders can be used to fix the implement in a lowered position.

As also shown in Figure 10, each of the plurality of rolling basket soil conditioning assemblies may be placed in front of each of a plurality of seed distribution units of a planter as at 46 to ready the soil to receive the seeds. Each of the mounting assemblies for the soil conditioners may be controlled individually or simultaneously with others. Also, groups of mounting assemblies may be controlled. If the mounting assemblies are controlled individually, the manifold 56 (either pneumatic or hydraulic), may supply pressurized air through the use of solenoid valves 58. The operator is able to

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control the height adjustment and so the application of one soil conditioning implement, a specific group of soil conditioning implements, or all of the soil conditioning implements using the control pad 60 in the cab of the tractor. As indicated, the control pad 60 may be any kind known in the art for sending control signals to solenoid or other pneumatic or hydraulic valves.

The system allows for maximum efficiency of the soil conditioning implements, for if one row or a few of the rows in a field are too wet, but the remaining rows are dry, the user may selectively apply the soil conditioning rolling basket implements to suitable rows. The user, therefore, is able to maximize the effect of using rolling basket soil conditioning devices in a field.

Figure 7A depicts a rolling basket device 10 in accordance with the invention fixed to the main structural member 38 of a planting implement, a unit of which is shown at 35 in which the attachment plate 12 is attached to the member 38 by an additional framework 70. A similar arrangement is shown in Figure 7B in which the actuator is a double acting air bag system as at 72.

Figures 9A-9E depict alternative actuator devices used in combination with the rolling baskets. They include a pair of torsion springs as at 80 in Figure 9A which are used to provide an amount of downward force on the rolling basket 10. Similarly, Figure 9B utilizes a compression spring 82 connected between mounting plate 12 and cross member 24. A spring and shock absorber arrangement 84 is shown in Figure 9C and a single acting air bag or air shock absorber is shown in Figure 9D.

It should be noted that rolling baskets having mounting arrangements with devices providing downward force only are normally raised manually when they need to be out of contact with the soil. They are held in a raised

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position using a manually-operated latch system such as is at 88 shown in Figure 9F.

This invention has been described herein in considerable detail in order to comply with the patent statutes and to provide those skilled in the art with the information needed to apply the novel principles and to construct and use such specialized components as are required. However, it is to be understood that the invention can be carried out by specifically different equipment and devices, and that various modifications, both as to the equipment and operating procedures, can be accomplished without departing from the scope of the invention itself.

What is claimed is:

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CLAIMS

1. A soil conditioning implement comprising a remotely controllable, height-adjustable attachment mechanism for a soil conditioning implement further comprising:
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- (a) a mounting plate adapted to be fixed to a seed planter or tow bar that is adapted to be drawn by a tractor;
 - (b) a pair of arms pivotally attached to the mounting plate in parallel, spaced relation
10 flanking said soil conditioning implement, said arms extending away from the mounting plate;
 - (c) a rolling basket tillage implement journaled for rotation between the pair of arms; and
 - (d) a remotely controllable actuator device
15 operatively coupled between the mounting plate and the pair of arms for selectively raising and lowering the rolling basket implement relative to the ground.
2. The soil conditioning implement as in claim 1
20 wherein said actuator device is operably attached to a common member connected between said pair of arms.
3. The soil conditioning implement as in claim 1
25 wherein said soil conditioning implement includes a plurality of spaced height adjustable attachment mechanisms.
4. The soil conditioning implement as in claim 1
wherein the actuator is selected from the group consisting of hydraulic and pneumatic actuators.
- 30 5. The soil conditioning implement as in claim 4 wherein said actuator is selected from single and dual acting air bags.
6. The soil conditioning implement as in claim 4
wherein said actuator is a pneumatic cylinder.
- 35 7. The soil conditioning implement as in claim 4

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wherein said actuator is a hydraulic cylinder.

5 8. The soil conditioning implement as in claim 1 further including an arcuate shroud partially surrounding the rolling basket, said shroud being affixed to the pair of arms.

9. The soil conditioning implement as in claim 8 further including a pair of side plate members affixed to side edges of the mounting plate, said pair of arms pivotally attached to the pair of side plate members.

10 10. A soil conditioning and planting implement combination comprising:

(a) a plurality of soil conditioning mechanisms for said soil conditioning and planting implement, each said mechanism further comprising:

15 (1) a mounting plate adapted to be fixed to a planting implement that is adapted to be drawn by a tractor;

20 (2) a pair of arms pivotally attached to the mounting plate in parallel, spaced relation flanking said soil conditioning mechanism, said arms extending rearward from the mounting plate;

25 (3) a rolling basket tillage implement carried by and journaled for rotation between the pair of arms;

30 (4) a remotely controllable mechanical device operatively coupled between the mounting plate and the pair of arms for selectively raising and lowering the rolling basket tillage implement relative to the ground or providing a directional force on said tillage implement;

35 (b) a multi-row planting implement associated with said plurality of said soil conditioning mechanism.

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11. The soil conditioning implement as in claim 10 wherein said mechanical device is selected from single and double acting hydraulic and pneumatic cylinders, single and double acting air bag devices, compression and tension springs and shock absorbers or combinations thereof.

12. A soil conditioning and planting implement comprising in combination:

- 10 (a) a seed distribution implement adapted to be drawn by a tractor or other prime mover;
- (b) at least one rolling basket tillage implement attached to said seed distribution implement in a manner such that rolling basket tillage occurs just prior to seeding;
- 15 (c) a mechanized system comprising an actuator selected from single and dual acting air bags to raise and lower said at least one rolling basket tillage implement independent of said seed distribution implement; and
- 20 (d) a control system that enables the raising and lowering of said at least one rolling basket tillage implement and is operable from said prime mover.

FIG. 1 1/5

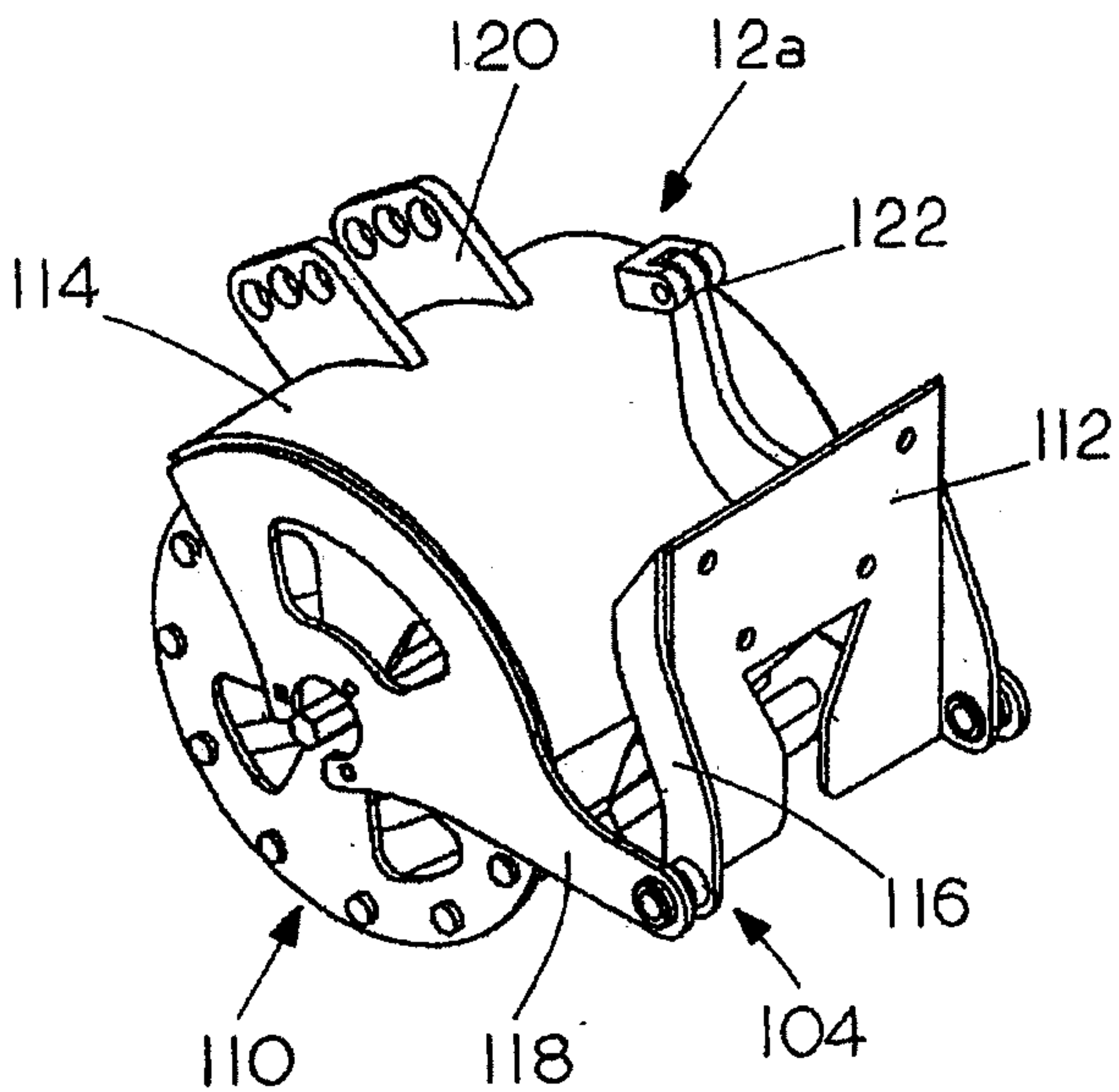


FIG. 2

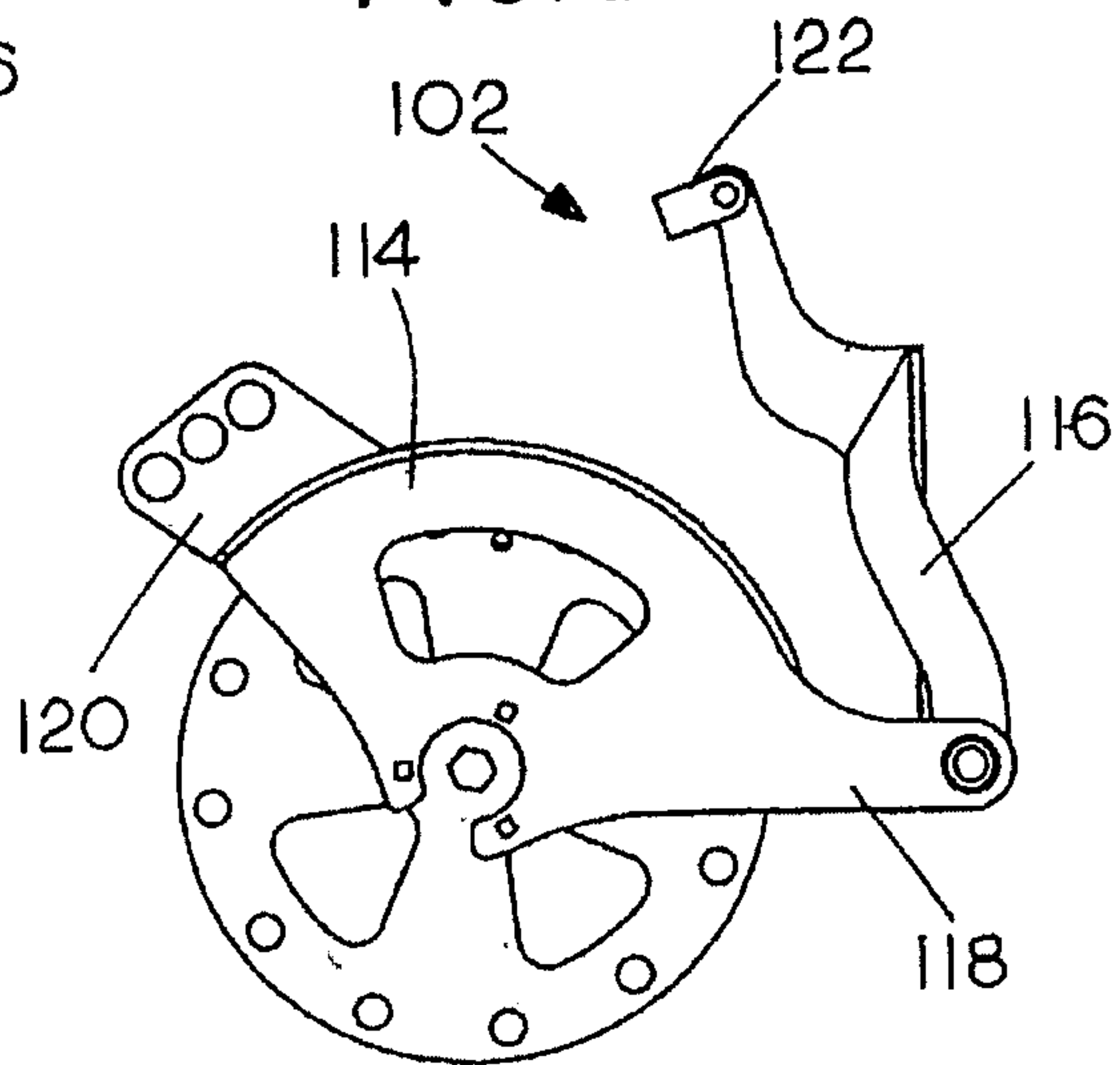


FIG. 3

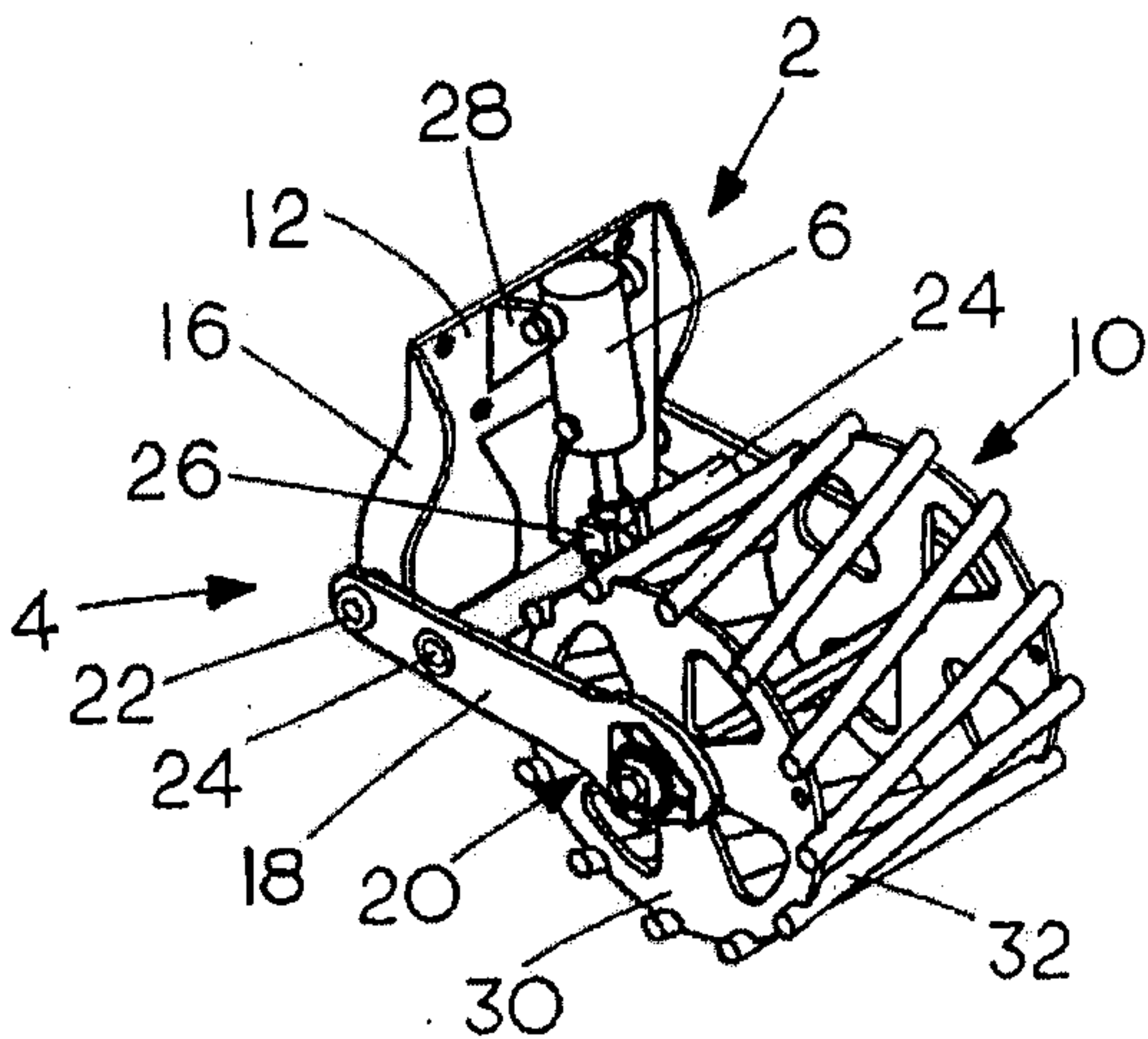
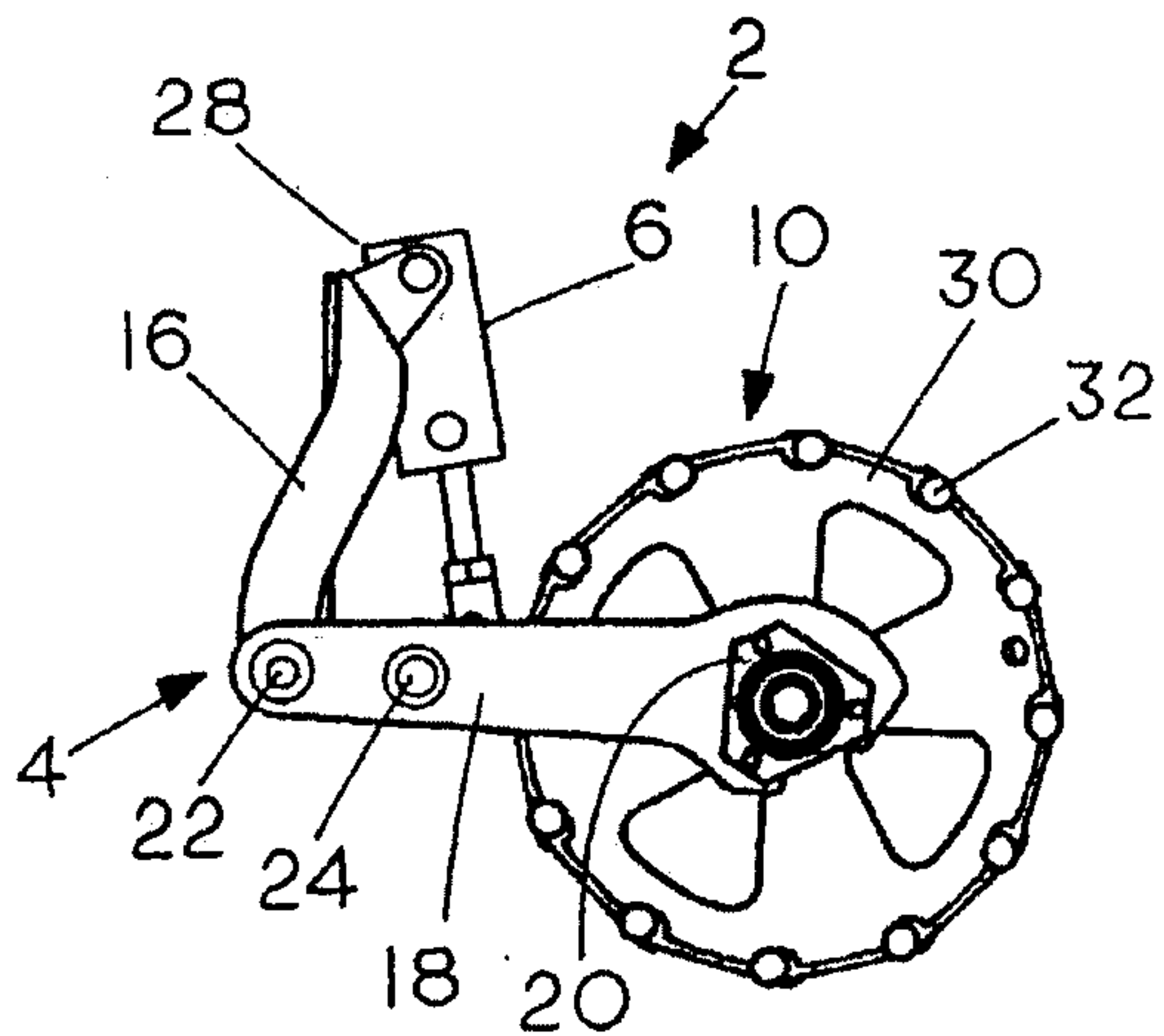


FIG. 4



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FIG. 5

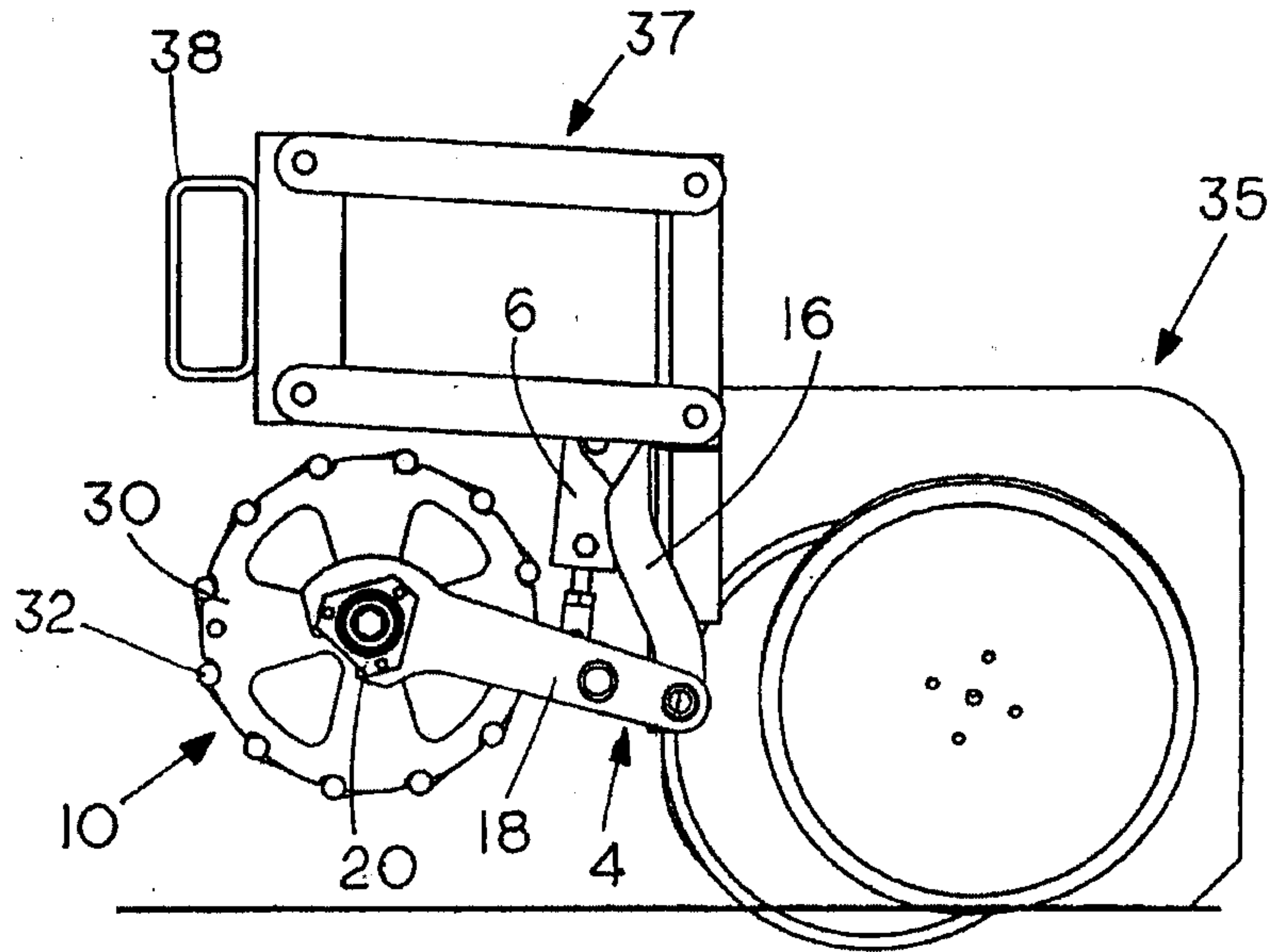


FIG. 6A

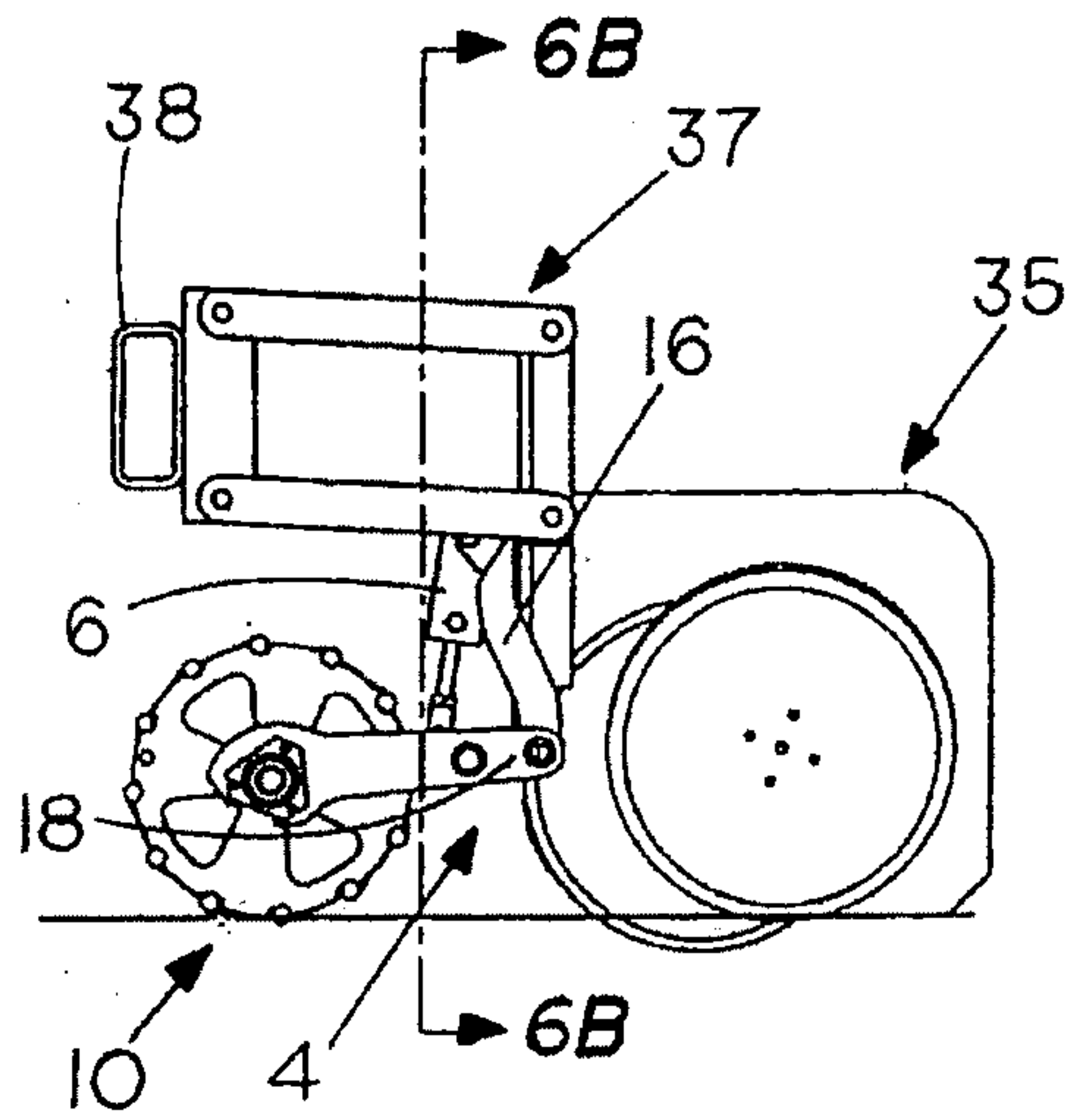
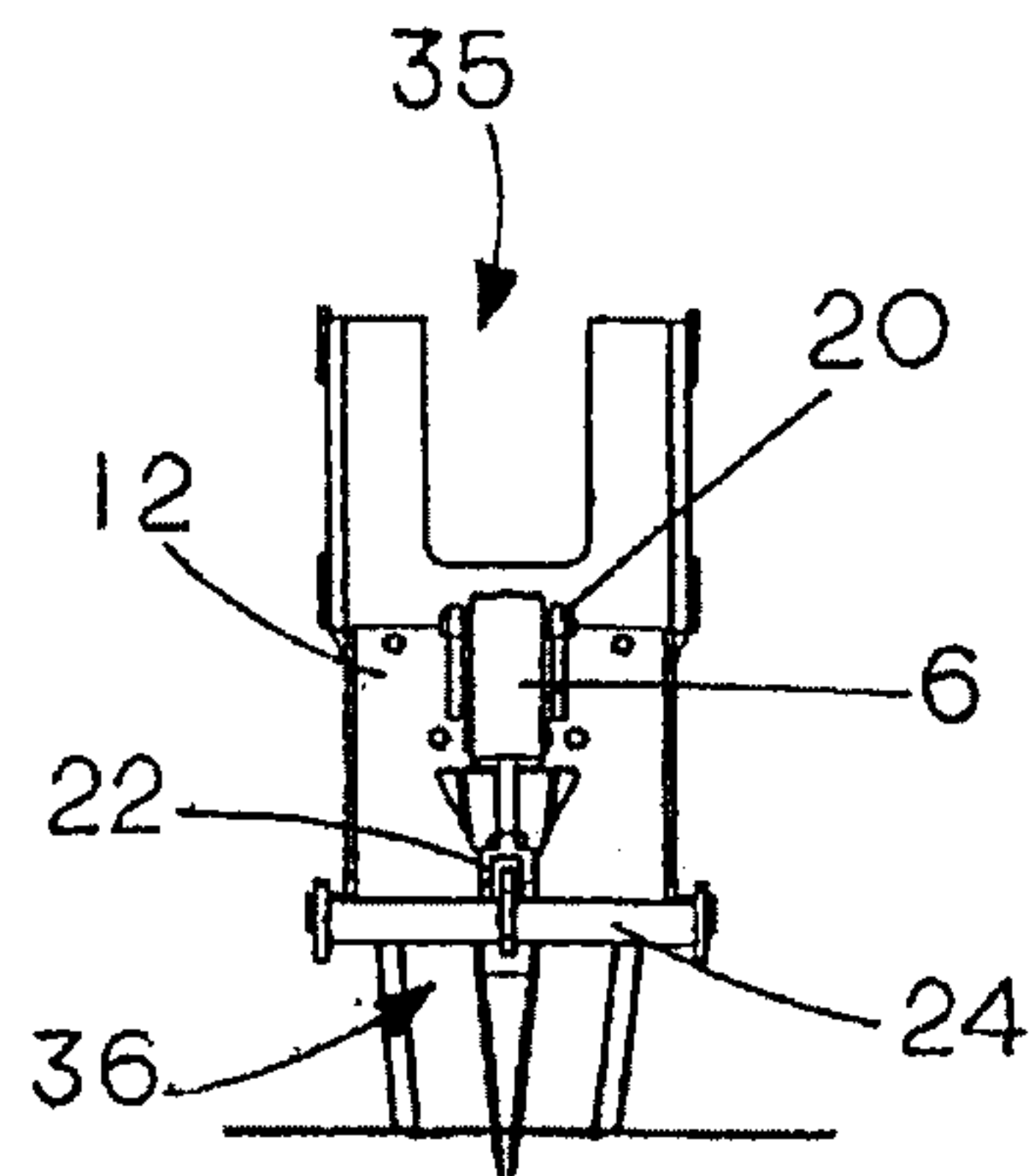


FIG. 6B



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FIG. 7A

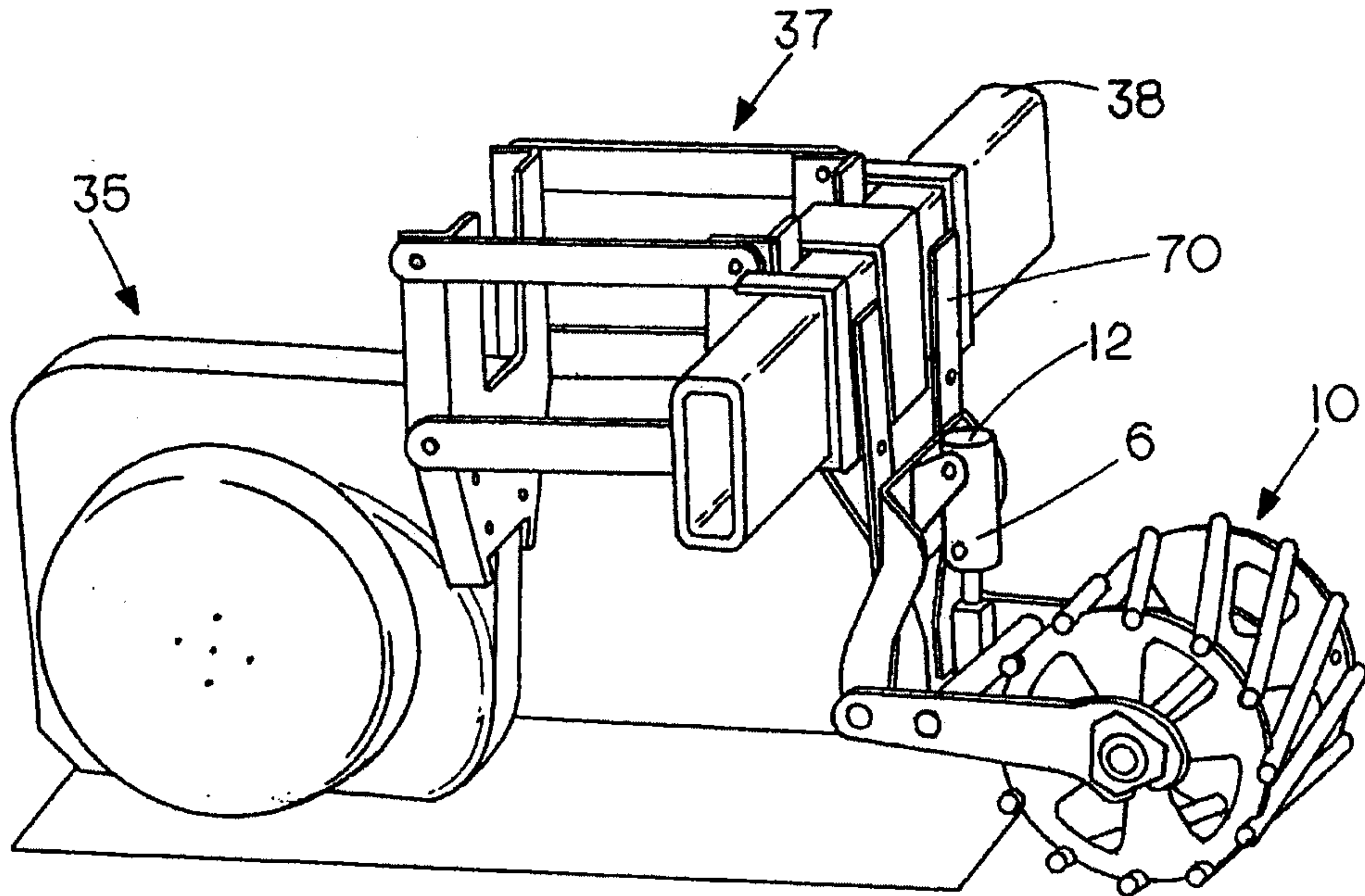
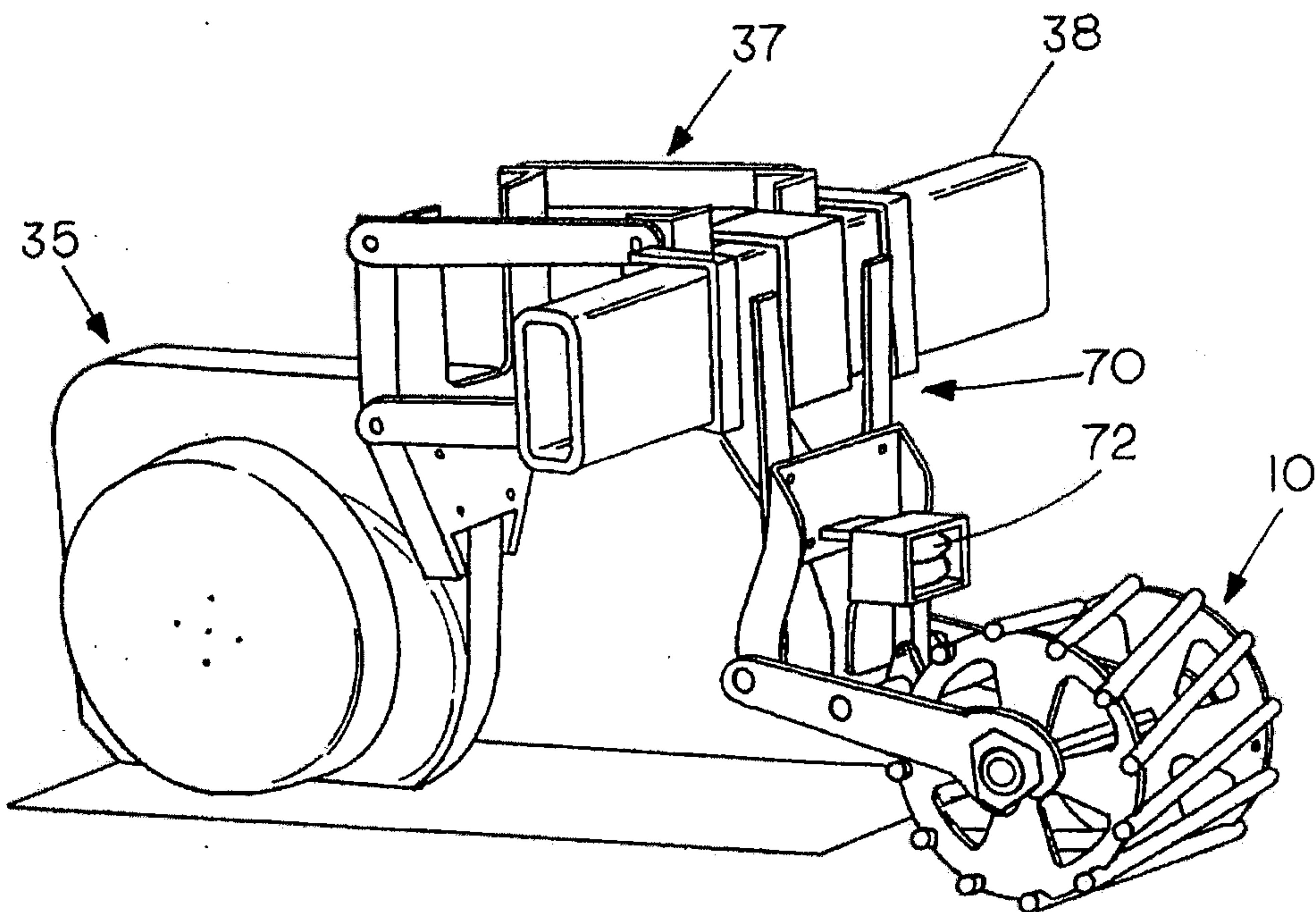


FIG. 7B



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FIG. 8

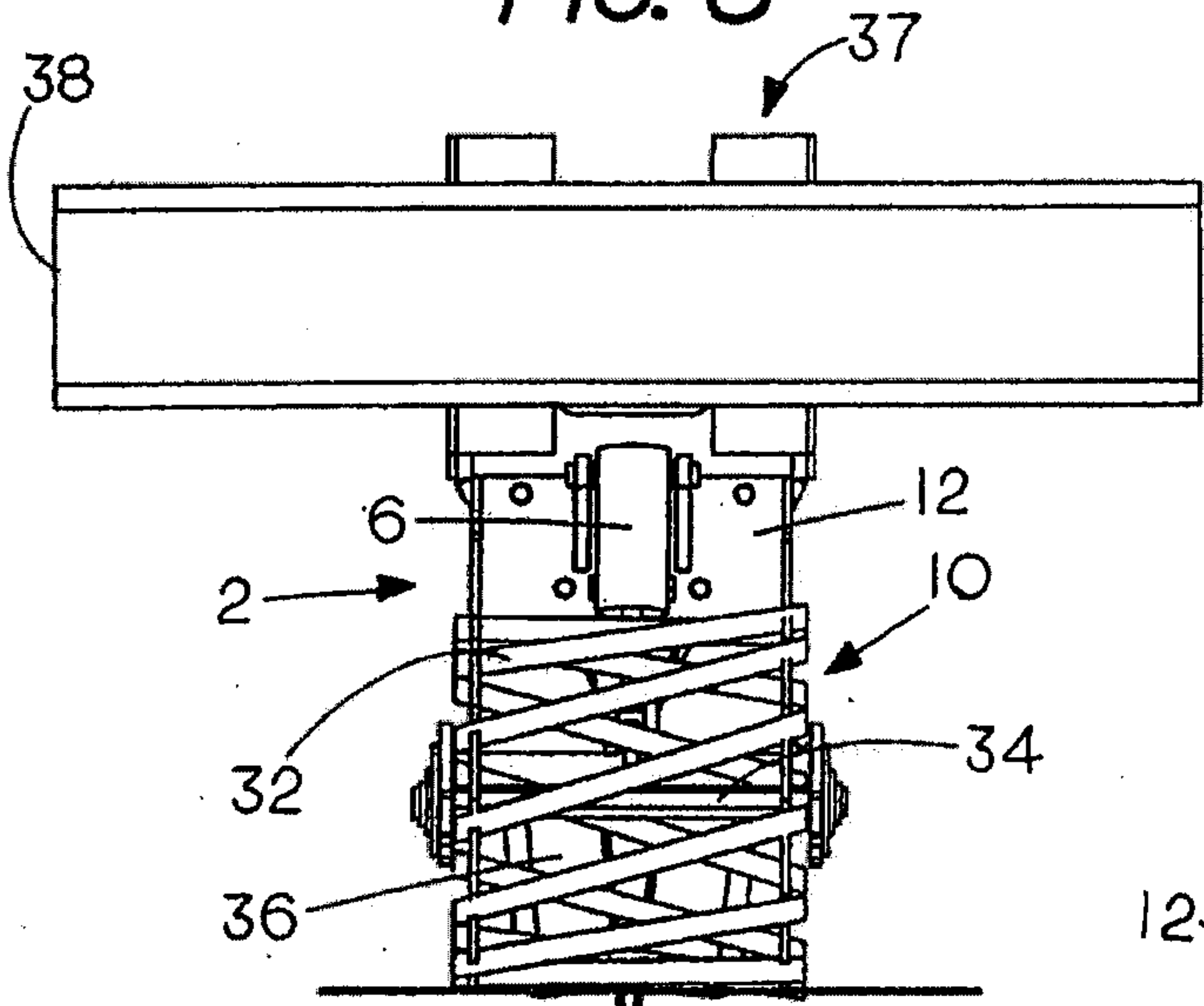


FIG. 9A

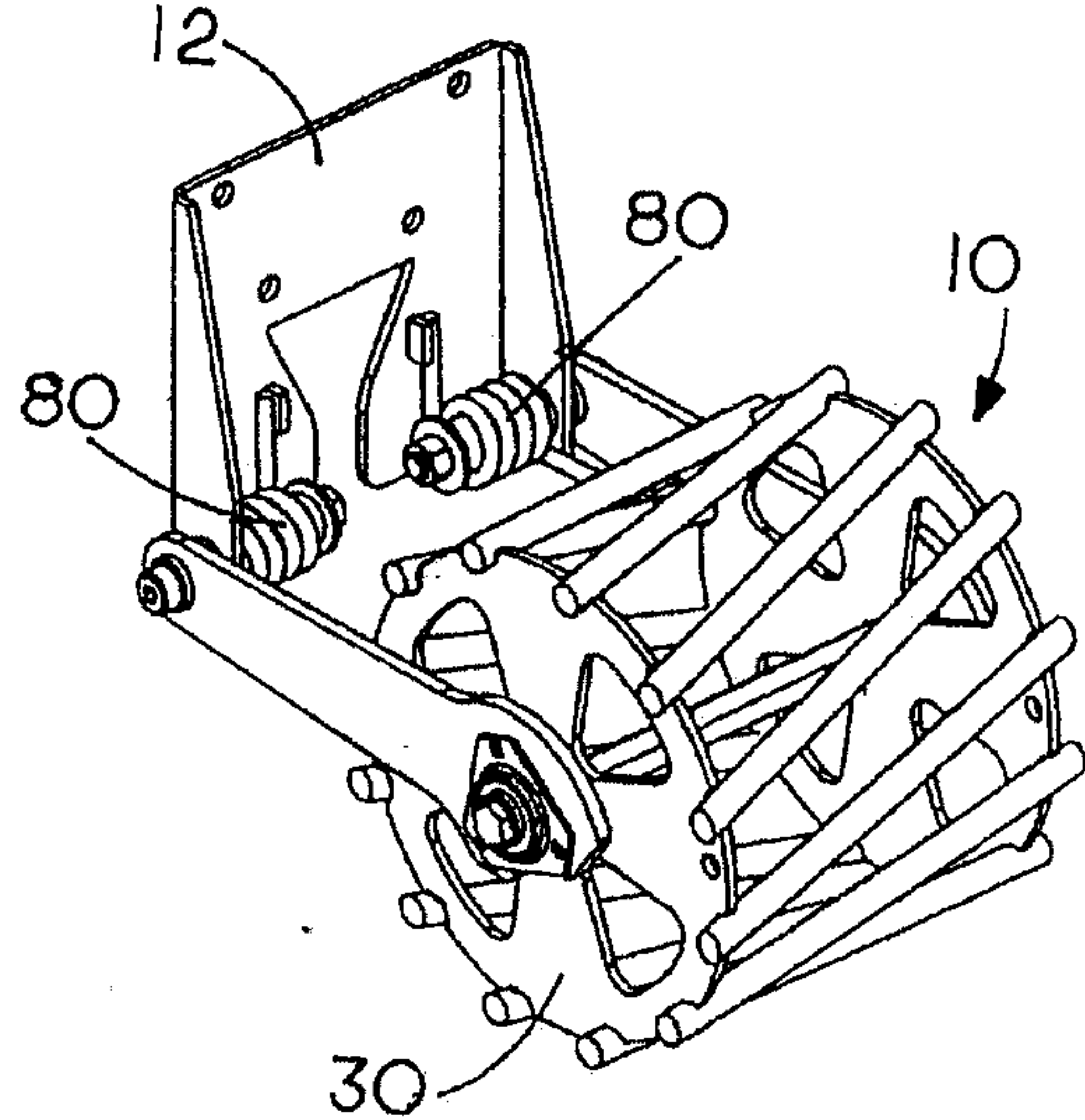


FIG. 9B

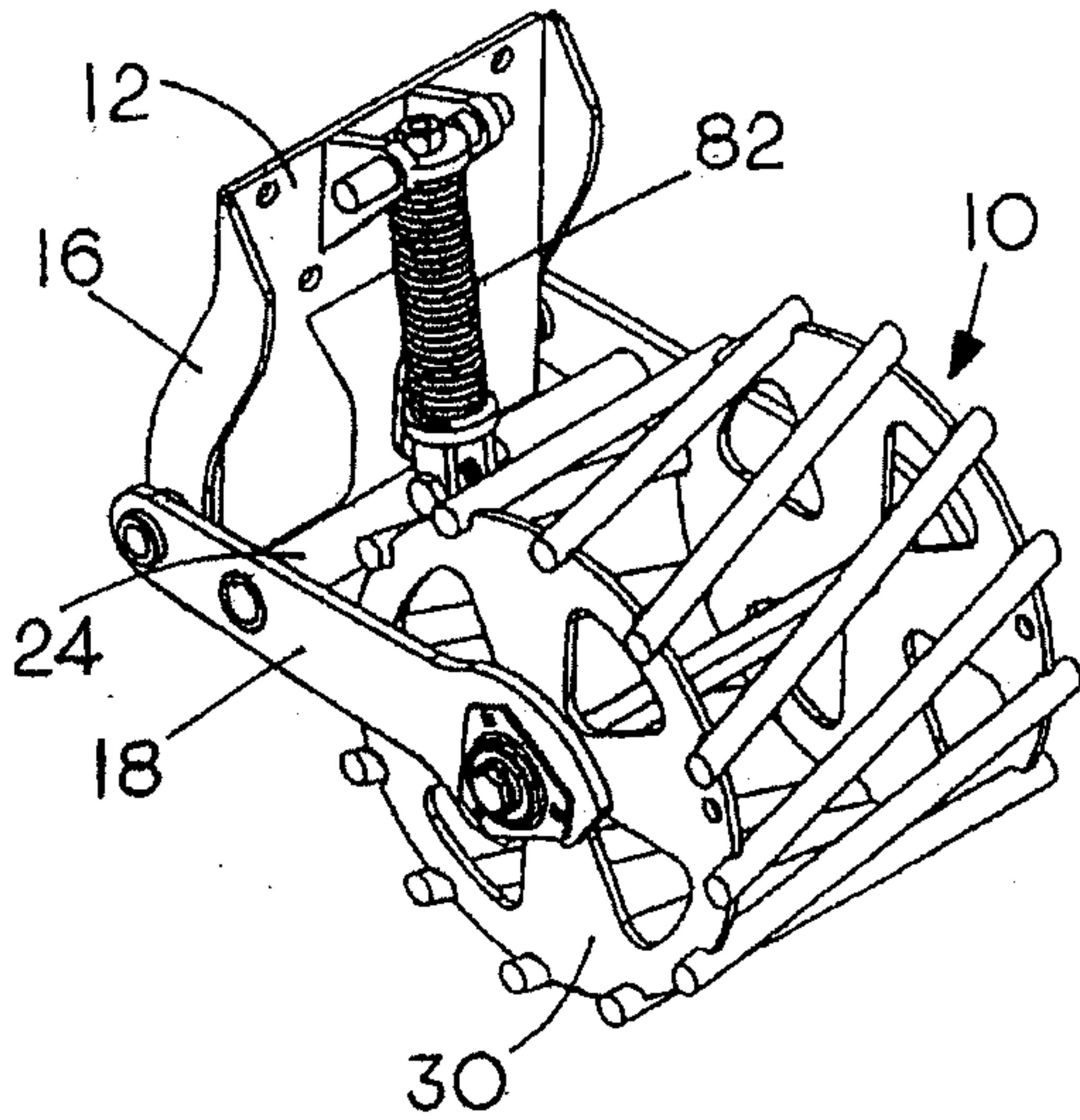


FIG. 9C

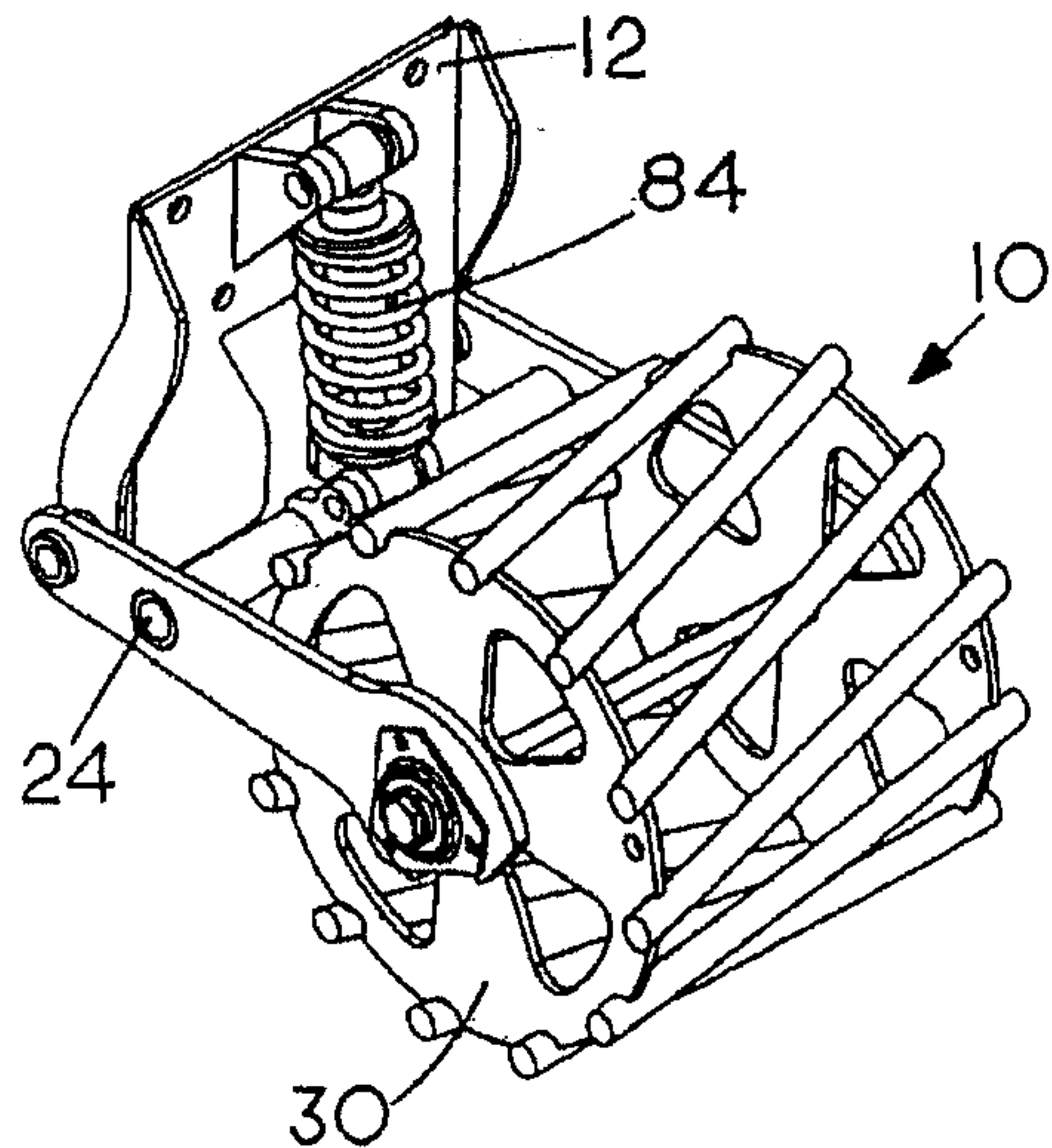


FIG. 9D 5/5

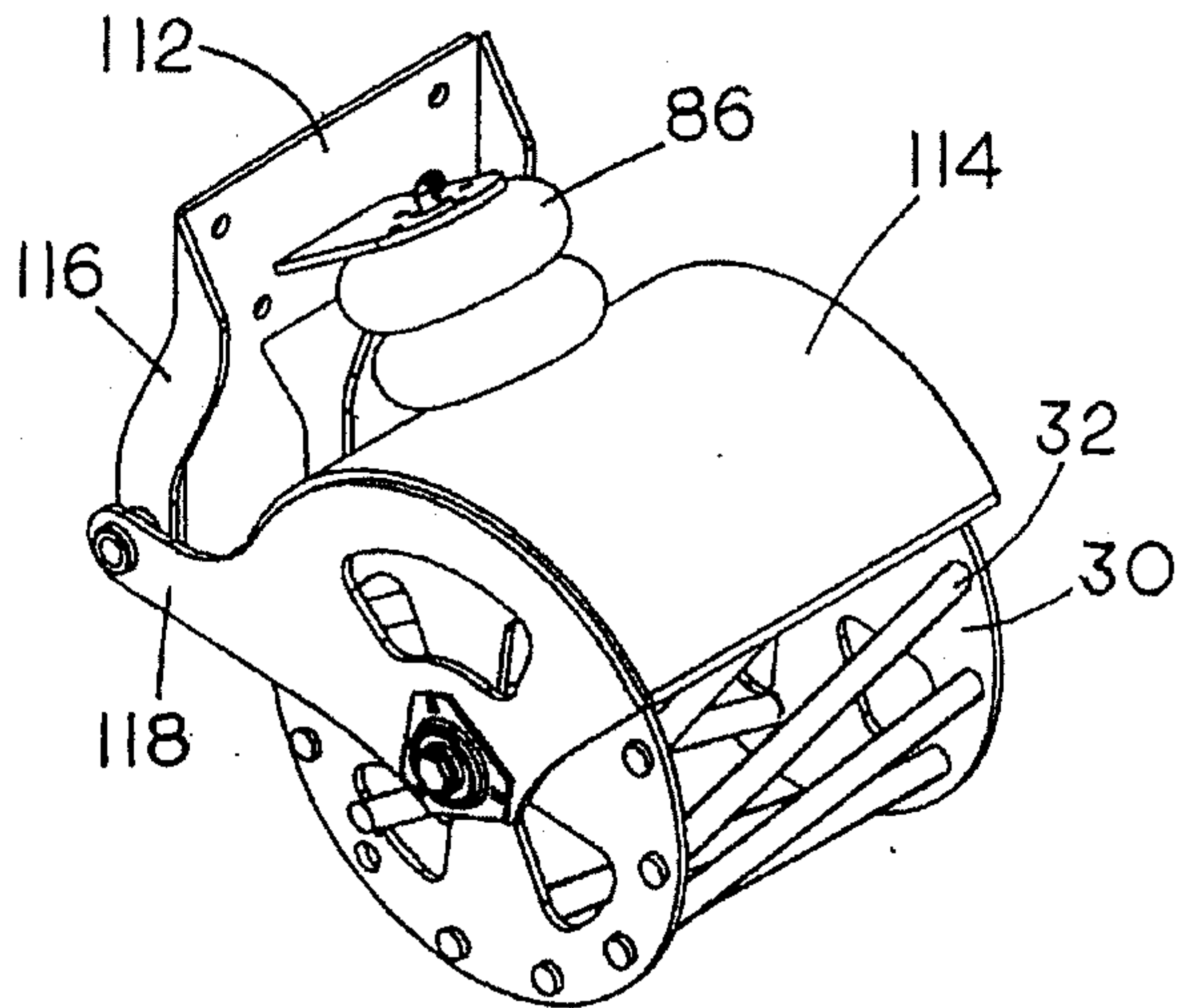


FIG. 9E

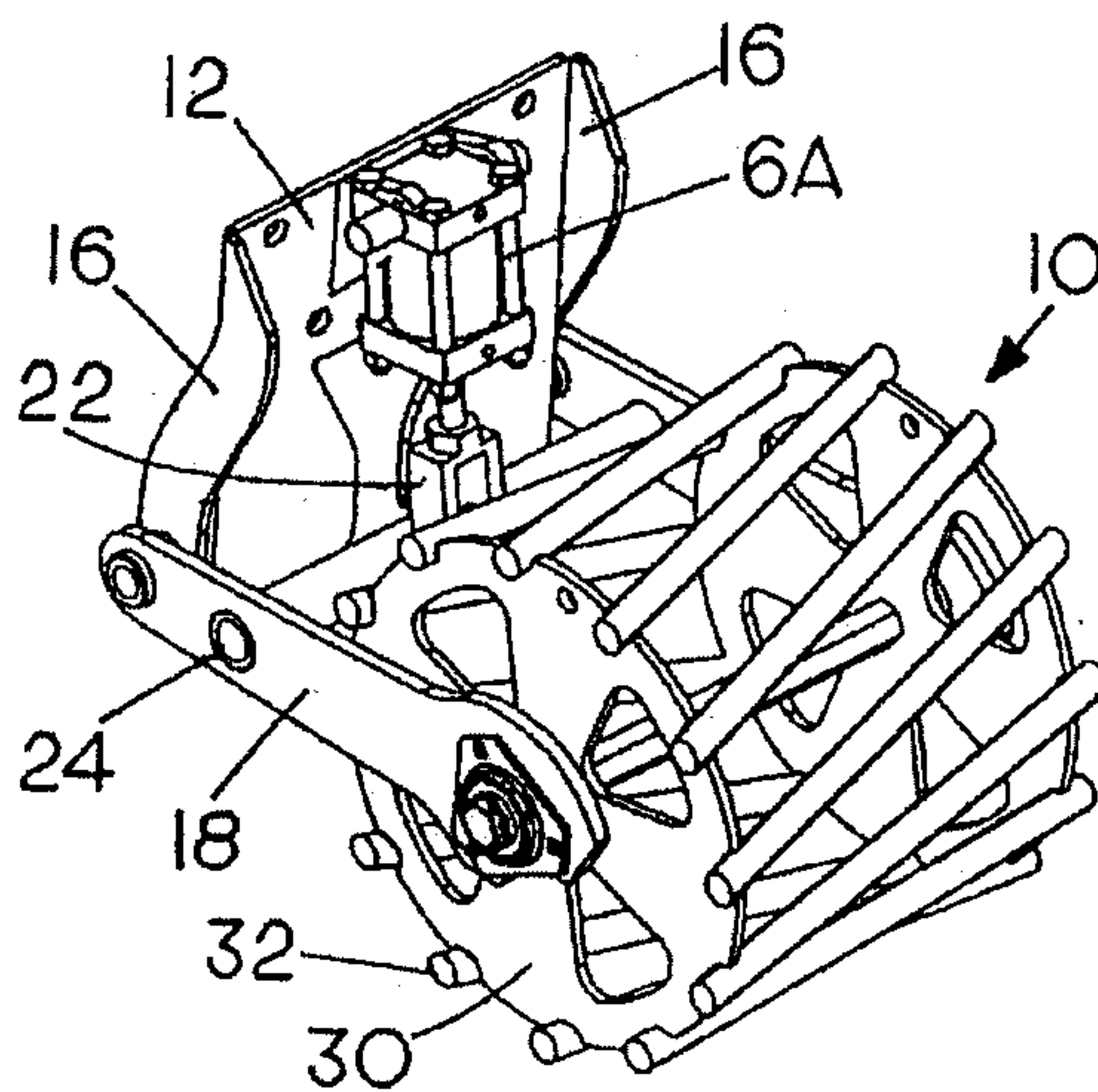


FIG. 9F

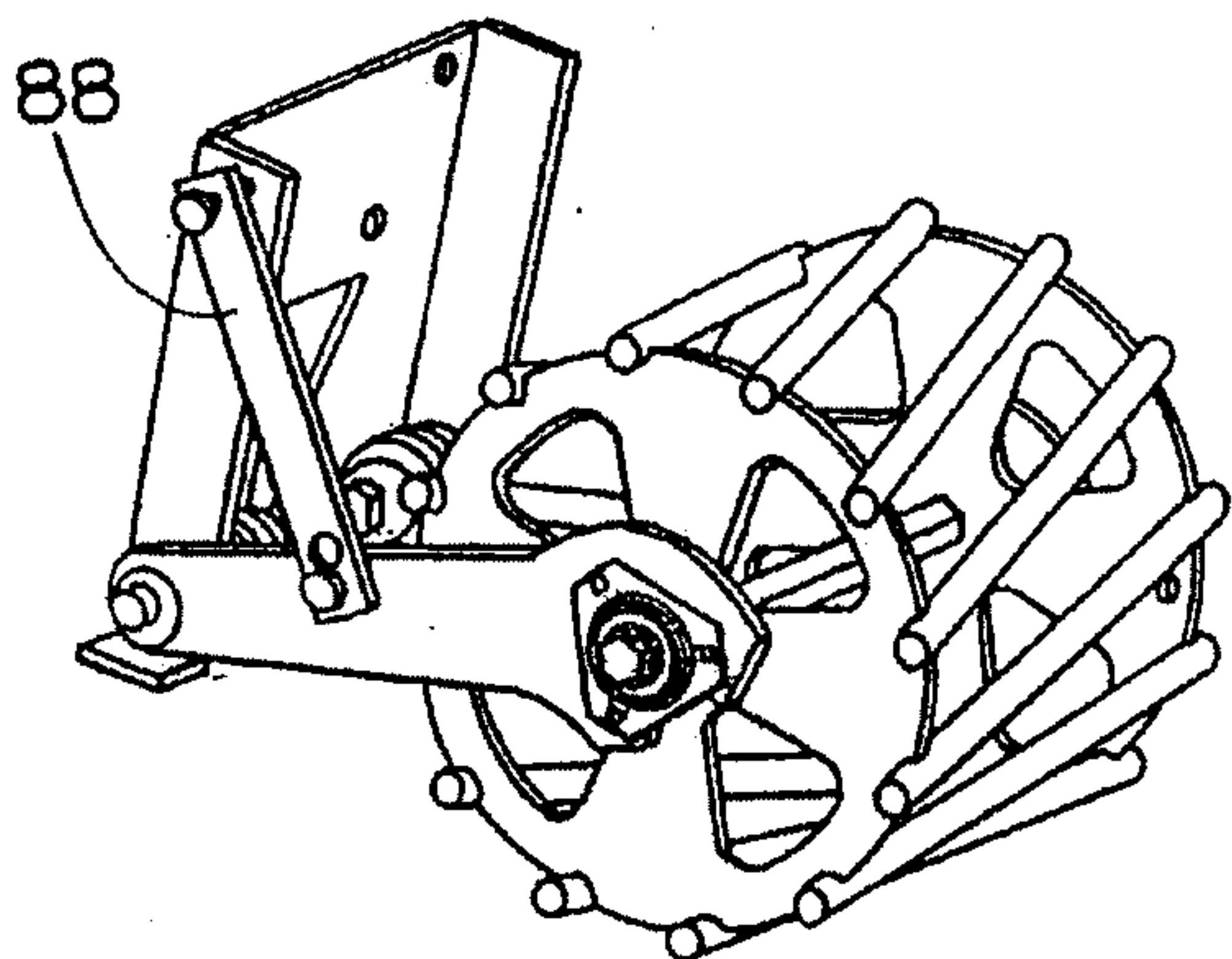


FIG. 10

