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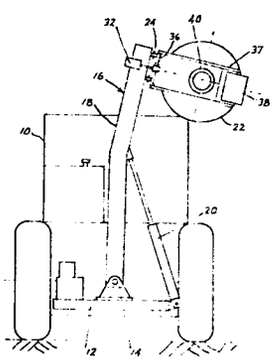
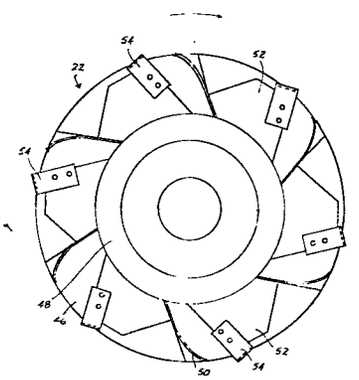
(54) Trench cutter.

(57) Trench cutter (16) arranged to be mounted on a prime mover (10) and to be pivoted laterally of the prime mover between a raised transport position and a lowered operative position. The arm (18) has mounted thereon a rotary cutter member (22) comprising face cutting blades (52) and Invert cutting blades (54).

By the use of the trench cutter of the present invention a trench is cut laterally of the prime mover as the latter moves forwardly.





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TITLE:

Trench Cutter

DESCRIPTION:

The present invention relates to a trench cutter.

In accordance with the present invention there is provided a trench cutter arranged to be mounted on a prime mover comprising an arm having a first end arranged to be pivotally mounted on the prime mover such that it can be pivoted in a vertical plane extending laterally of the prime mover between a first raised, transport position and a second lowered, operative position, and a second end having mounted thereto a rotary cutter member comprising a plurality of radially spaced first facing cutting blades, and a plurality of spaced, invert cutting second blades mounted on the rotary cutter member generally rearwardly of the first blades, said second blades being arranged to form the invert of a trench when the rotary cutter member is rotated, means being provided for rotating the rotary cutter member about its axis laterally of the direction of movement of the prime mover when in use.

Preferably the rotary cutter member further comprises a plurality of forwardly extending blades mounted on a back plate generally normal to the direction of rotation of the rotary cutter member, said forwardly extending blades being arranged to remove spoil to the side of the trench.

In accordance with the present invention there is further

provided a prime mover comprising a rear frame member having the first end of an arm of a trench cutter of the present invention, pivotally mounted thereto.

Preferably the prime mover is provided with an hydraulic power output which can be used to transmit power to the rotary cutter member to cause it to rotate. Further, there is preferably provided an hydraulic piston and cylinder mounted between the prime mover and the arm for raising and lowering the arm. The trench cutter of the present invention when mounted on a prime mover can be moved to another location upon raising the arm to the raised transport position.

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

Figure 1 is a rear view of a prime mover being mounted thereon a trench cutter in accordance with the present invention, said trench cutter comprising an arm which as shown is in a raised, transport position;

Figure 2 is a view similar to Figure 1 with the arm of the trench cutter in a lowered, operative position;

Figure 3 is a front elevation of a rotary cutter member bearing part of the trench cutter of Figures 1 and 2;

Figure 4 is a side elevation of the rotary cutter member of Figure 3 showing its mode of attachment to the arm of the trench cutter;

Figure 5 is a view similar to Figure 1 of a

modified embodiment of the present invention; and;

Figure 6 is a side elevation partially broken away of a rotary cutter member of the embodiment of Figure 5.

In Figures 1 and 2, there is shown a prime mover 10 in the form of a tractor having a rear, laterally extending horizontal frame member 12.

An upwardly facing bracket 14 is mounted on the frame member 12. The bracket 14 contains an aperture adjacent its upper end. The prime mover 10 is provided with an hydraulic power take off.

Mounted to the prime mover 10 is a trench cutter 16 in accordance with the present invention. The trench cutter 16 comprises an elongated arm 18 having a first end provided with an aperture. The first end of the arm 18 is connected to the bracket 14 by a pin or the like extending through the aperture in the bracket 14 and the aperture in the arm 18. The pin or the like is secured in place by any suitable means. An hydraulic piston and cylinder assembly 20 has one end connected to an end of the frame member 12 and a further end connected to an intermediate point on the arm 18.

The hydraulic piston and cylinder assembly 20 is operatively connected to the hydraulic power take off of the prime mover 10 and is arranged, in use, to raise and lower the arm 18 in a vertical plane extending laterally of the prime mover 10. Thus, in the position shown in Figure 1 the arm 18 is raised by extension of the hydraulic piston and cylinder assembly 20. In this position, the trench cutter 16 can be readily transported to another location. In the position shown in Figure 2, the arm 18 is lowered by contraction of the hydraulic piston and cylinder assembly 20 and in this position the trench cutter 16 can be used to cut a trench.

The arm 18 further comprises a second end having mounted thereon a rotary cutter member 22. The rotary cutter member 22 is mounted to the arm 18 in the following manner as shown most clearly in Figure 4.

A pair of brackets 24 extend outwardly from the arm 18. The extremities of the brackets 24 are located between a pair of rearwardly extending flanges 26 mounted on a plate 28. The extremities of the brackets 24 each contain an aperture. The brackets 24 are pivotally mounted between the flanges 26 on a circular rod 30.

Further, an hydraulic piston and cylinder assembly 32 is pivotally mounted between a further rearward facing bracket 34 on the arm 18 and a circular rod 36 mounted between the flanges 26 (see also Figures 1 and 2). The purpose of the hydraulic piston and cylinder assembly 32 will be described hereinafter. At its lower end as seen in Figure 4, the plate 28 has a further pair of rearwardly extending flanges 37. A stabilising roller 38 is rotatably mounted between the flanges 37. Further, an hydraulic motor 40 is mounted to the rear of the plate 28 between the flanges 26 and 36. The hydraulic motor 40 is in driving connection with the cutter member 22. In the embodiment shown, the hydraulic motor 40 drives the cutter member 22 by means of a shaft and reduction gear assembly.

The cutter member 22 is mounted to the drive from the hydraulic motor 40 and is spaced from the plate 28 by means of stationary spacer 42.

The cutter member 22 comprises an annular disc 44 having welded thereto a flat circular back plate 46. The back plate has a rear surface welded to the annular disc 44 and a front surface having mounted thereon various blades as will be described.

Firstly, there is welded to the front surface of the back plate 46 a cylindrical drum 48 which is mounted on the back plate 46 concentrically therewith. A plurality of radially spaced slinger blades 50 are embedded in the back plate 46. The blades 50 each have an inner edge which is welded to the periphery of the drum 48 and a rear side which is welded to the back plate 46. Further, each blade 50 extends generally forwardly from the back plate 46.

So as to positively locate each blade 50 on the back plate 46 and prevent flexing and breakage during use each blade 50 is embedded in and so positively engaged with with the back plate 46.

Between each of the blades 50, a face cutting blade 52 is welded to the forward edge of the periphery of the drum 48. Each face cutting blade 52 terminates at a point radially inward of the periphery of the back plate 46. Preferably each face cutting blade 52 extends at an angle to the back plate 46. For maximum face cutting effect, the forward edge of each cutting blade 52 is thus preferably located further away from the back plate 46 than the trailing edge as the cutter

is rotated (in the clockwise direction as seen in Figure 3). It is also found that most wear takes place at the outer ends of the forward edges of the cutting blades 52. Therefore, a wear resistant tip 54 is preferably bolted onto each blade 52. The wear resistant tips are L-shaped and the leg of the L-shape is bolted to a respective blade 52. The leg of the L-shape extends forwardly and radially outwardly of the blade 52 and thus in use protects the blade 52 from wear. When the tip 54 becomes worn, the tip 54 can be readily removed and replaced by a fresh tip 54.

Further, the base of each L-shaped tip 54 extends rearwardly and forms an invert cutting blade. The invert cutting blades shape the lower end of the trench following the cutting of the trench base and give it a neat concave shape.

As can be seen in Figure 3 the leg of the L-shape extends radially outwardly so as to extend to a point radially outward of the periphery of the backing plate 46. Thus, the base of the L-shape is also located radially outward of the periphery of the backing plate 46.

Further, as shown, the trailing edge of each blade 52 preferably abuts a side of a forwardly extending blade 50 for greater rigidity in use. Also, the leading edge of each blade 52 may terminate at its inner end in contact with the next leading forwardly extending blade 50.

In use, the prime mover 10 is moved to a location

at which it is desired to dig a trench with the trench cutter assembly in the position shown in Figure 1. Then the arm 18 is lowered by contraction of the hydraulic piston and cylinder assembly 20 to the position shown in Figure 2.

To commence trench cutting, the hydraulic piston and cylinder assembly 32 is extended so as to pivot the trench cutter 22 on the mounted to the arm 18. In this position the forward end of the cutter member 22 is tilted downwardly. Then the cutter member 22 is caused to rotate on its axis by the hydraulic motor 40.

The cutting blades 52 and tips 54 excavate a fact in front of the cutter member 22 until the desired depth of cut is achieved. Then the hydraulic piston and cylinder assembly 32 is contracted to return the cutter member 22 to the position shown in Figure 4. The prime mover 10 is moved forward slowly while rotation of the cutter member 22 continues. The blades 52 and tips 54 excavate the face of the trench and thereby extend its length in the direction of movement. The prime mover 10 is moved in a direction parallel to the intended location of the trench and the trench is formed at the side of the prime mover.

Further, the bases of the L-shaped tips 54 shape the trench to the desired concave shape. Further, the blades 50 remove the spoil from the trench and deposit it on the side of the trench. The stabilising roller 38 rolls along the bottom of the formed trench behind the cutter member 22 and

assists in maintaining the cutter member 22 in the desired orientation. The cutting is continued until the trench has been cut to the desired length. Then the arm 18 is raised by extension of the hydraulic piston and cylinder assembly 20 to remove the cutter member 22 from the trench so that the whole assembly can be moved to another location.

It is preferred that the cutter member 22 be in alignment with a rear wheel of the prime mover since it is found that in use this reduces steering problems.

With the construction shown in the drawings all components especially the blades are welded to the rotary cutter member except for the replaceable tips 54 which are bolted on for easy removal.

Further, it is envisaged that the hydraulic motor 40 could drive into a planetary gear arrangement to impart rotation to the cutter member 22.

A modified form of the present invention similar to that shown in Figures 1 to 4, is illustrated in Figures 5 and 6, like reference numerals are used to denote like parts.

In the apparatus shown in Figures 5 and 6, the pivotally mounted arm 18 is bent through a right angle and is pivoted on a pin 19 in the frame member 19.

Further, as can be seen in Figure 5, the apparatus comprises an hydraulic piston and cylinder assembly 60 having one end pivotally mounted on the arm 18 and the other end pivotally mounted on

the mounting for the rotary cutter member 22. The hydraulic piston and cylinder assembly 60 is contracted or extended as required to maintain the cutter member 22 in a desired orientation with the roller 38 lowermost, as the arm 18 is pivoted between its transport and operative position. Further, as shown in Figure 6, the mounting to the arm 18 preferably comprises a rotatably mounted pin 62 mounted on a socket in the second end of the arm 18.

The pin 62 is rigidly connected at one end to a vertical post 64 having its lower end pivotally mounted between the plates 26 or a pin 66. In this embodiment the plates 26 extend continuously downwardly to provide the mounting for the roller 38.

Also, in this embodiment the hydraulic piston and cylinder assembly for tilting the cutter member 22 is horizontally dispersed having one end pivotally connected to the upper end of the post 64 by a bracket 34 and the other end pivotally mounted between the plates 26 on a pin 36. The hydraulic piston and cylinder assembly 32 is contracted or extended as described above to obtain the desired amount of tilt of cutter member 22.

Modifications and variations such as would be apparent to a skilled addressee are deemed within the scope of the present invention.

CLAIMS

1. A trench cutter arranged to be mounted on a prime mover characterised in that it comprises an arm having a first end arranged to be pivotally mounted on the prime mover such that the arm can be pivoted in a vertical plane extending laterally of the prime mover between a first raised, transport position and a second lowered, operative position, and a second end having mounted thereto a rotary cutter member comprising a plurality of radially spaced first, face cutting blades, and a plurality of spaced, invert cutting second blades mounted on the rotary cutter member generally rearwardly of the first blades, said second blades being arranged to form the invert face of a trench when the rotary cutter member is rotated, means being provided for rotating the rotary cutter member about its axis laterally of the direction of movement of the prime mover when in use.

2. A trench cutter according to claim 1, characterised in that the rotary cutter member is mounted on the second end of the arm in such a manner as to be downwardly tiltable so that the rotary cutter member can initially create a hole to the desired depth of the trench to be formed.

3. A trench cutter according to claim 2, characterised in that an hydraulic piston and cylinder assembly is pivotally connected to both the arm and the rotary cutter member so as, in use, to effect said tilting of the rotary cutter member.

4. A trench cutter according to any one of the preceding

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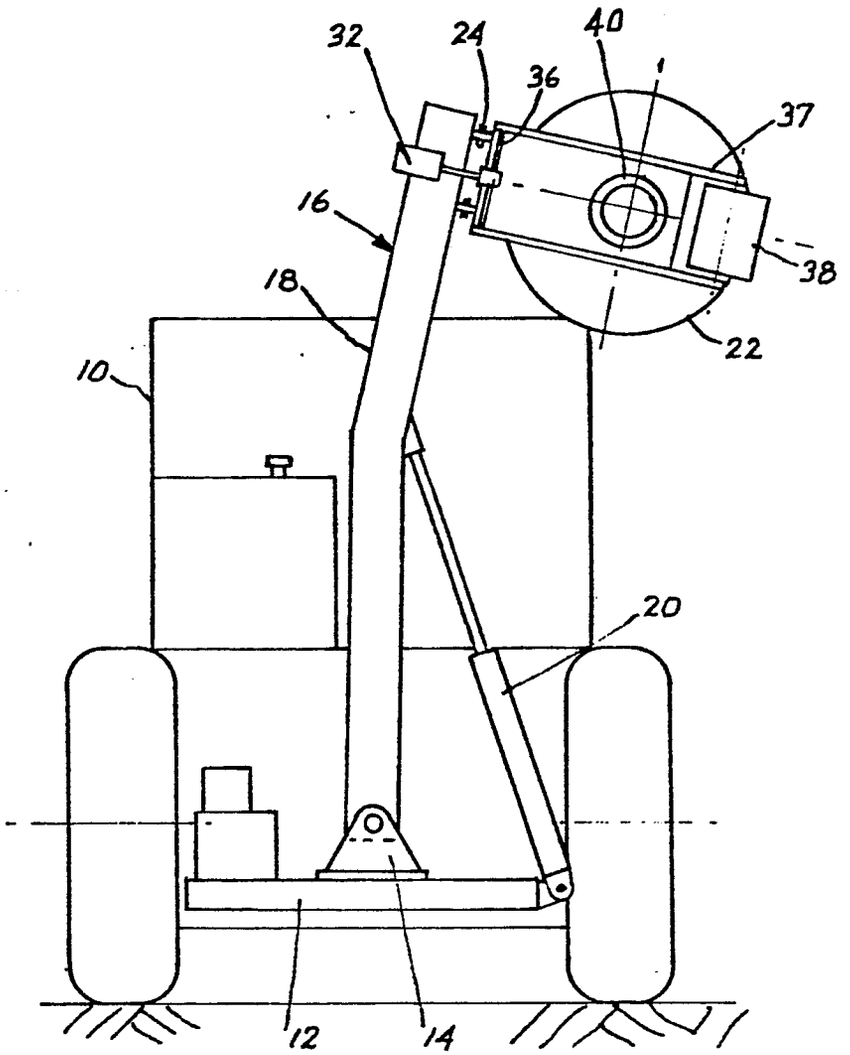

FIG. 1

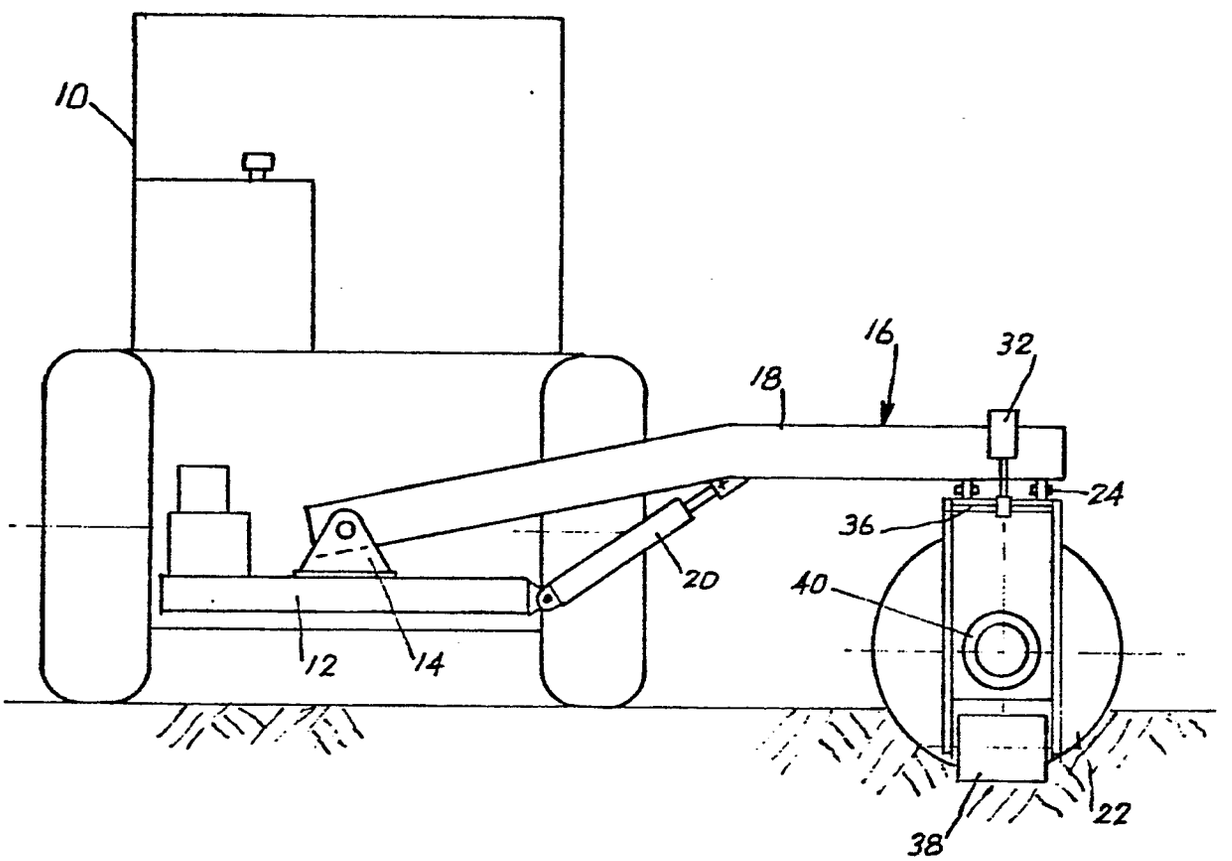

FIG. 2

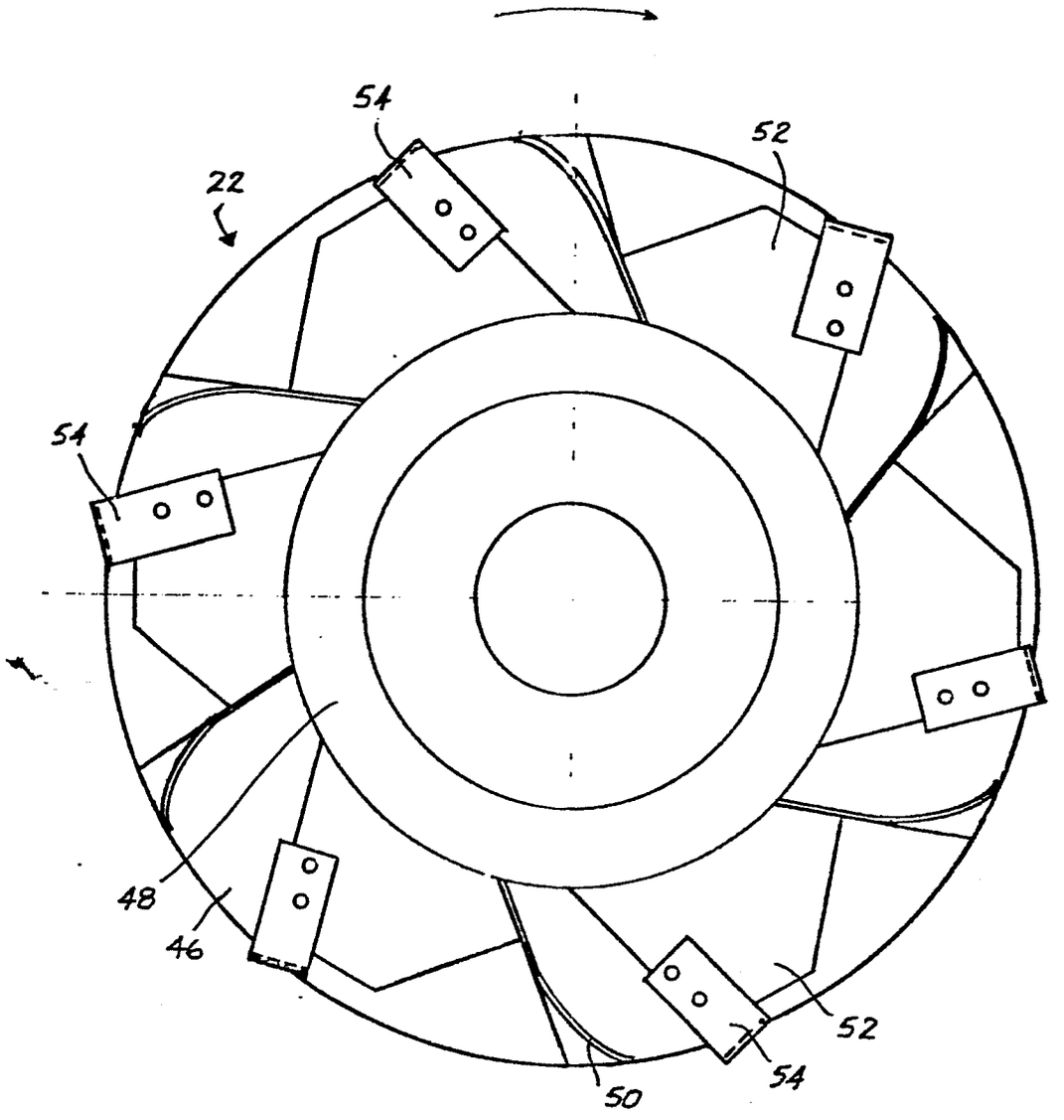

FIG. 3

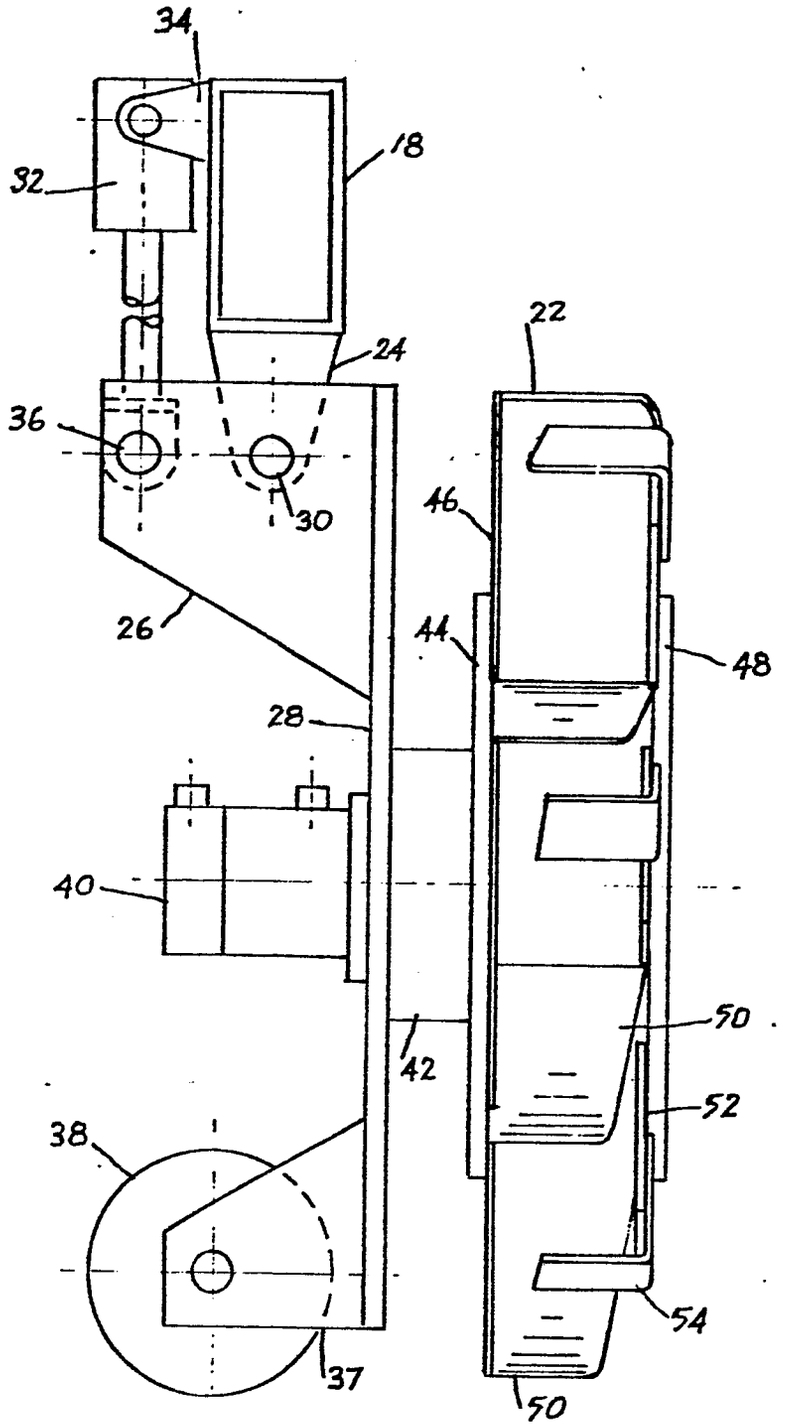

FIG. 4

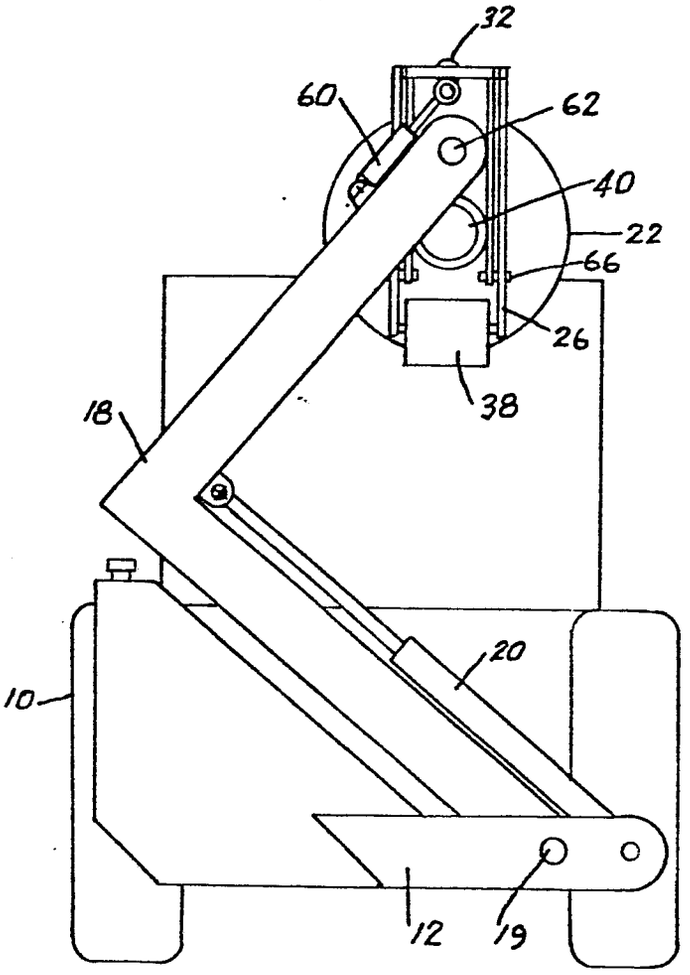

FIG. 5

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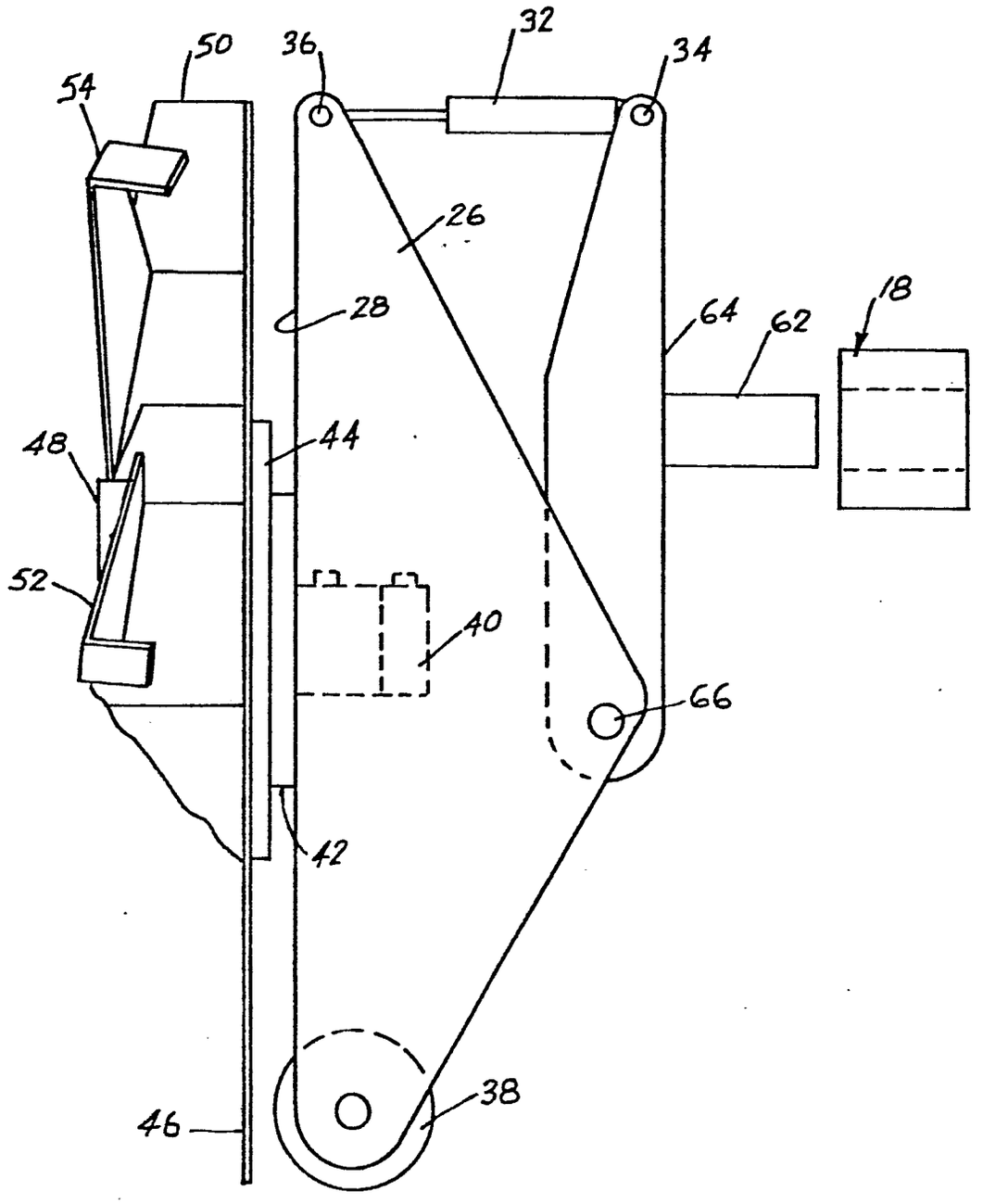

FIG 6

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EUROPEAN SEARCH REPORT

0071677
Application number
EP 81 30 3595

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
Y	FR - A - 1 545 469 (TRENKLE) * Pages 3,4 *	1-4,6 8-10
Y	GB - A - 937 403 (BARTELS) * Whole document *	1,6,7-10
Y	FR - A - 1 601 296 (LACOUR) * Page 2, line 10 - page 4, line 17 *	1,5-7, 9,10
A	FR - A - 1 604 301 (GREFFET) * Whole document *	1
A	FR - A - 1 501 207 (WEBSTER) * Page 4, column 1, paragraph 2; figures 9-11 *	2,3
A	GB - A - 748 459 (HAWKINS) * Claim 4 *	5

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

E 02 F 5/08

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

E 02 F
A 01 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16-03-1982	PAUCNIK

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