United States Patent [19]

Oosterling

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[54] **HARROW**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **172/53,** 172/102

[51] **Int. Cl.** **A01b 35/00**

[58] **Field of Search** 172/40, 101, 102, 52, 53

[56] **References Cited**

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Primary Examiner—Stephen C. Pellegrino

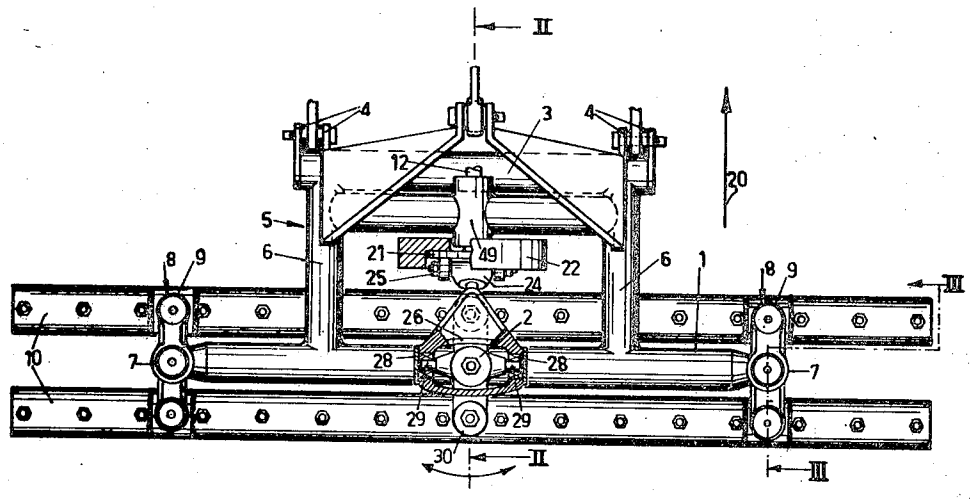
Attorney, Agent, or Firm—Synder, Brown and Ramik

[57] **ABSTRACT**

In a harrow comprising reciprocating driven harrow beams directed transversely to a forward movement of its frame, said harrow beams are connected to each other and to the frame by means of parallel levers swingably beared on the frame and to the harrow beams.

In order to compensate differences in the distances between the engaging points of the levers on the harrow beams and/or differences in the lengths of these levers, the levers consist each of two lever parts which are beared round a common axis swingably with respect to each other on the frame.

4 Claims, 4 Drawing Figures



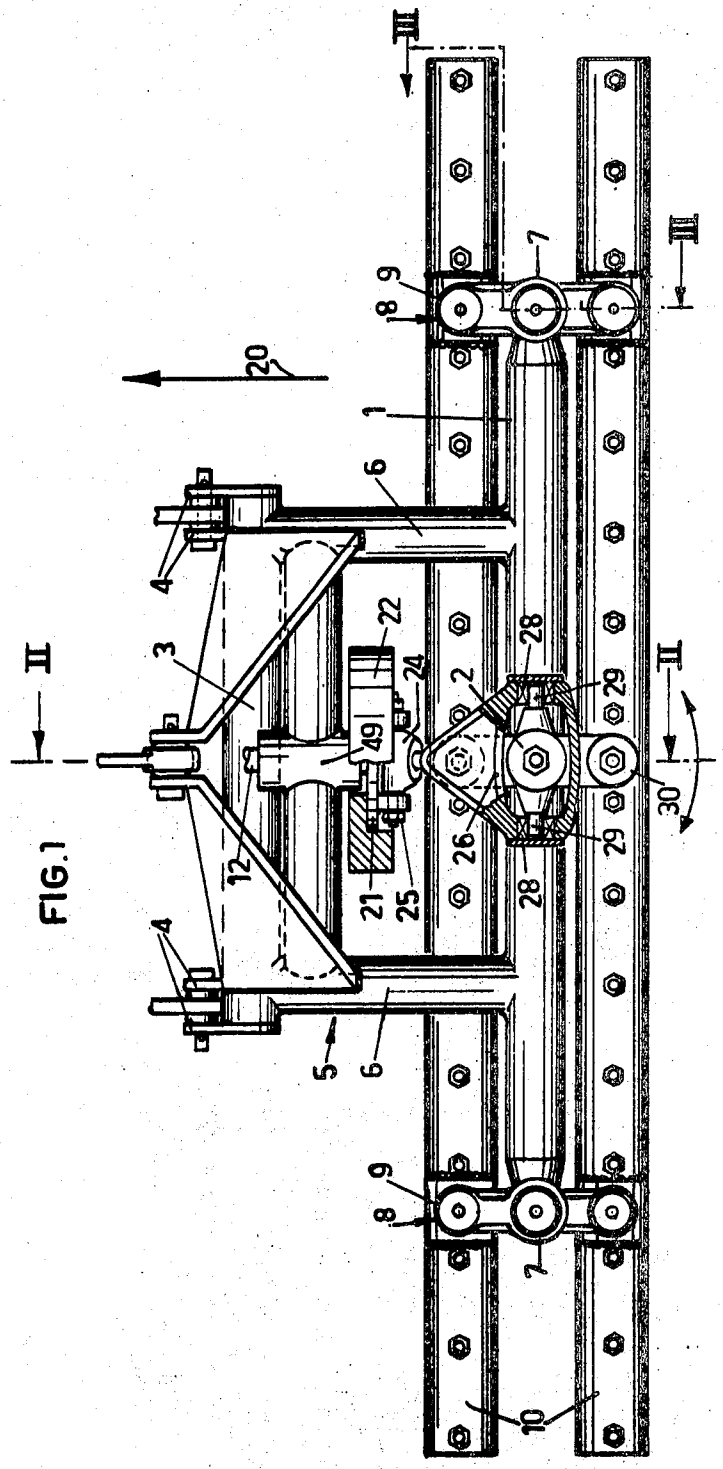
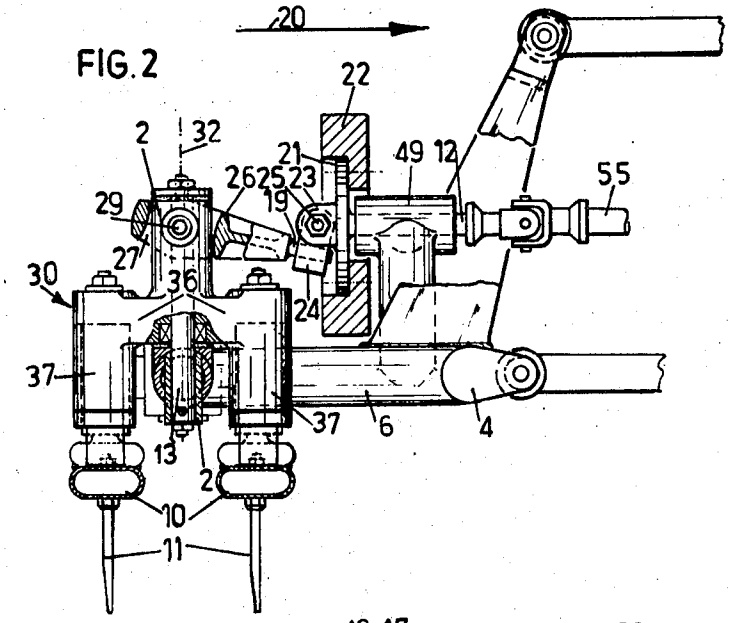


FIG. 1

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FIG. 2



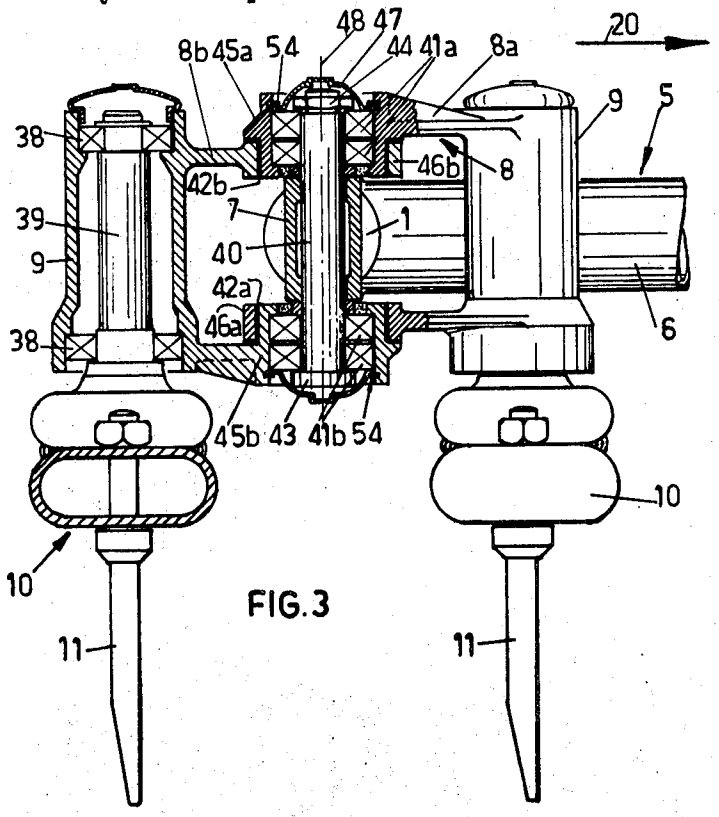


FIG. 3

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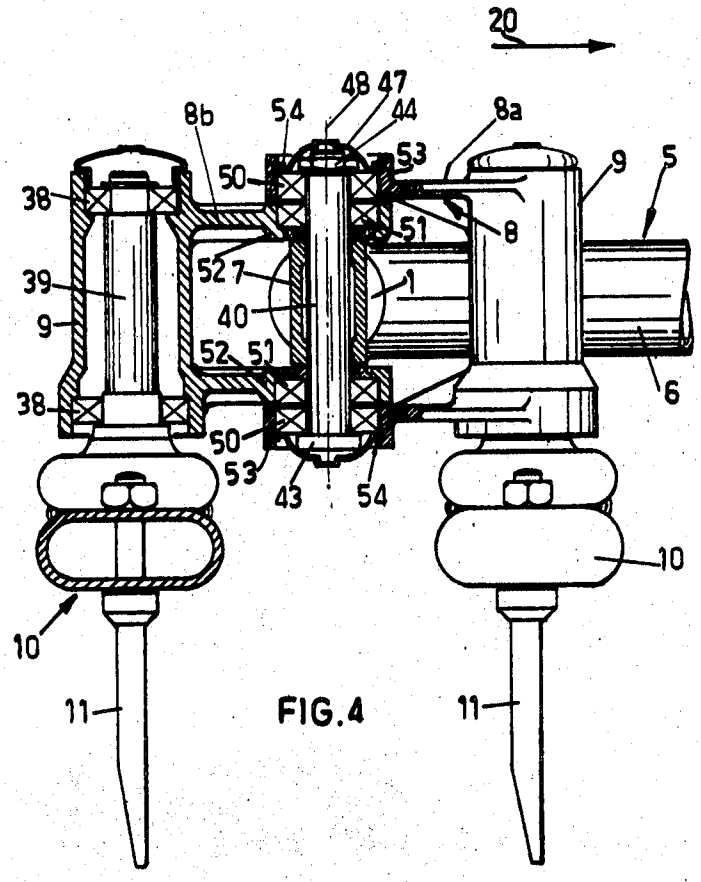


FIG. 4

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HARROW

The invention relates to a harrow, comprising a frame and at least two reciprocating driven harrow beams, directed transversely to a forward movement of the frame, said harrow beams being connected to each other and to the frame by means of at least two parallel levers being each beared between their ends swingably on the frame and with their ends swingably on the harrow beams.

A harrow of this kind is known.

In order to compensate differences in the distances between the engaging points of the levers on the harrow beams and/or differences in the lengths of these levers, the levers are mounted in the known harrow in slot holes of the frame.

At the place of these slot holes inadmissible wear can occur.

The invention provides a harrow of the above mentioned kind, wherein differences in the distances between the engaging points of the levers on the harrow beams and/or differences in the lengths of these levers are also compensated while however, inadmissible wear is prevented, in that at least one of the levers consists of two lever parts which are beared round a common axis swingably with respect to each other on the frame.

Preferably the two lever parts of one and the same lever are beared above as well as under the frame swingably round a pivot with bearings positioned on different levels.

It is also possible, that the one lever part of a lever is beared above as well as under the frame swingably round a pivot with a bearing, and that the other lever part of said lever is beared above as well as under the frame with a slide bearing swingably round a hub of the one lever part.

The invention will be elucidated in the following description with reference to a drawing.

In the drawing:

FIG. 1 shows a plan view partly broken away of the preferred embodiment of the harrow according to the invention;

FIG. 2 shows a side view partly broken away of the harrow of FIG. 1;

FIG. 3 shows a section along the line III—III of FIG. 1; and

FIG. 4 shows a section corresponding to FIG. 3 of a harrow according to the invention performed in another way.

The frame 5 of the harrow of FIGS. 1–3 consists of a transverse beam 1 having in its middle a bearing bush 2, a transverse beam 3 having at each end ears 4 for suspension to a tractor travelling in the direction of arrow 20 and of two longitudinal beams 6.

At the ends of the transverse beam 1 bearing bushes 7 are welded for swingably supporting levers 8. The ends 9 of the levers 8 are swingably connected to harrow beams 10 by means of bearings 38 engaging round pivots 39 of the harrow beams 10. In this way the harrow beams 10 having teeth 11 are mounted on the frame 5 for sidewards reciprocating movement. A fixed pivot 40 extends through each bearing bush 7. Each lever 8 consists of the one lever part 8*a* and the other lever part 8*b*. The lever part 8*a* has above the transverse beam 1*a* bearing bush 45*a* being beared round the pivot 40 by means of two ball bearings 41*a* and has

under the transverse beam 1*a* bearing bush 46*a* being beared by means of a slide bearing 42*a* round a bearing bush 45*b* of the lever part 8*b*. The slide bearings 42*a* and 42*b* consist of bushes of wear resistant plastic. The lever part 8*b* is beared above the transverse beam 1 with its bearing bush 46*b* and a slide bearing 42*b* round the bearing bush 45*a* and under the transverse beam 1 with its bearing bush 45*b* and ball bearings 41*b* round the pivot 40. The pivot 40 is a bolt with a head 43 and a nut 44. The ball bearings 41*a* and 41*b* together with covers 47 are fixed by means of safety rings 54. As the lever parts 8*a* and 8*b* can pivot with respect to each other round the common axis 48, it is not necessary that the harrow beams 10 and the lever parts 8*a* and 8*b* of the two levers 8 respectively are equally long, and that the harrow beams 10 are driven sidewards to and fro in exactly the same measure.

The dirve of the reciprocating movement of the harrow beams 10 takes place from the power-take-off of a tractor, engaging via a coupling shaft 55 the end of a shaft 12 being beared in a bearing bush 49. The shaft 12 is jointed with a flange 21 carrying a fly wheel 22 and two ears 23. A bearing 24 is attached to these ears 23 by being hingeable mounted round a bolt 25 extending through said ears 23 with respect to the flange 21. In the bearing 24 the free end 19 of a fork 26 is mounted for rotation. The teeth 27 of this fork 26 engage by means of ball bearings 28 two co-axial transverse arms 29 of a crank 30 being beared round a pivot 13 on the frame 5. As a result of the rotation of the flange 21 the crank 30 obtains an oscillating movement round its axis 32.

The crank 30 has besides the above mentioned transverse arms 29 positioned at both sides of its top end, two crank arms 36 positioned at both sides of its lower end, said crank arms 36 being staggered 90° with respect to the transverse arms 29. The ends of the crank arms 36 consist of bearing bushes 37 for vertical pivots 39 mounted on the top side of the harrow beams 10.

The harrow of FIG. 4 is identical with the harrow of FIGS. 1–3 with the understanding, that the lever parts 8*a* and 8*b* instead of being beared round each other, are beared separately round the pivot 40. The lever part 8*b* has to this aim bearing bushes 52 opposing the top and bottom plane of the transverse beam 1 and receiving ball bearings 51, while the lever part 8*a* has bearing bushes 53 opposing the bearing bushes 52 and receiving ball bearings 50.

What is claimed is:

1. In a harrow construction, in combination:
   - a frame adapted to be attached to a towing vehicle for longitudinal movement over the ground;
   - a pair of harrow beams disposed in horizontal transverse relation with respect to said frame and in spaced relation to each other and on either side longitudinally of said frame;
   - a horizontal drive lever pivotally mounted on said frame about a vertically extending pivot axis between said harrow beams and pivotally connected at each end to a respective harrow beam so as positively to interconnect them for conjoint movement;
   - drive means on said frame for oscillating said drive member about the pivot axis thereof; and
   - a pair of horizontal levers each pivotally mounted on said frame about respective pivot axes spaced from each other and from the pivot axis of said drive member, all of said pivot axes being parallel and

lying in a common plane, at least one of said levers consisting of two lever parts each pivotally connected at one end to said frame about the respective pivot axis and at its other end to a respective harrow beam.

2. In a harrow construction as defined in claim 1 wherein said frame includes a transverse member disposed in a vertical plane between said harrow beams and to which said drive member and said levers are pivotally connected, each of said levers being disposed in straddling relation to said transverse frame member, and a pair of pins passing through said transverse frame member establishing the respective pivot axes of said

levers, each pin having opposite end portions projecting respectively above and below said transverse frame member and pivotally connected at such opposite ends to its respective lever.

3. In a harrow construction as defined in claim 2 wherein one of said lever parts is journalled directly on the opposite ends of its respective pin and the other lever part is journalled on said one lever part.

4. In a harrow construction as defined in claim 2 wherein both of said lever parts are journalled directly on the opposite ends of the respective pin.

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