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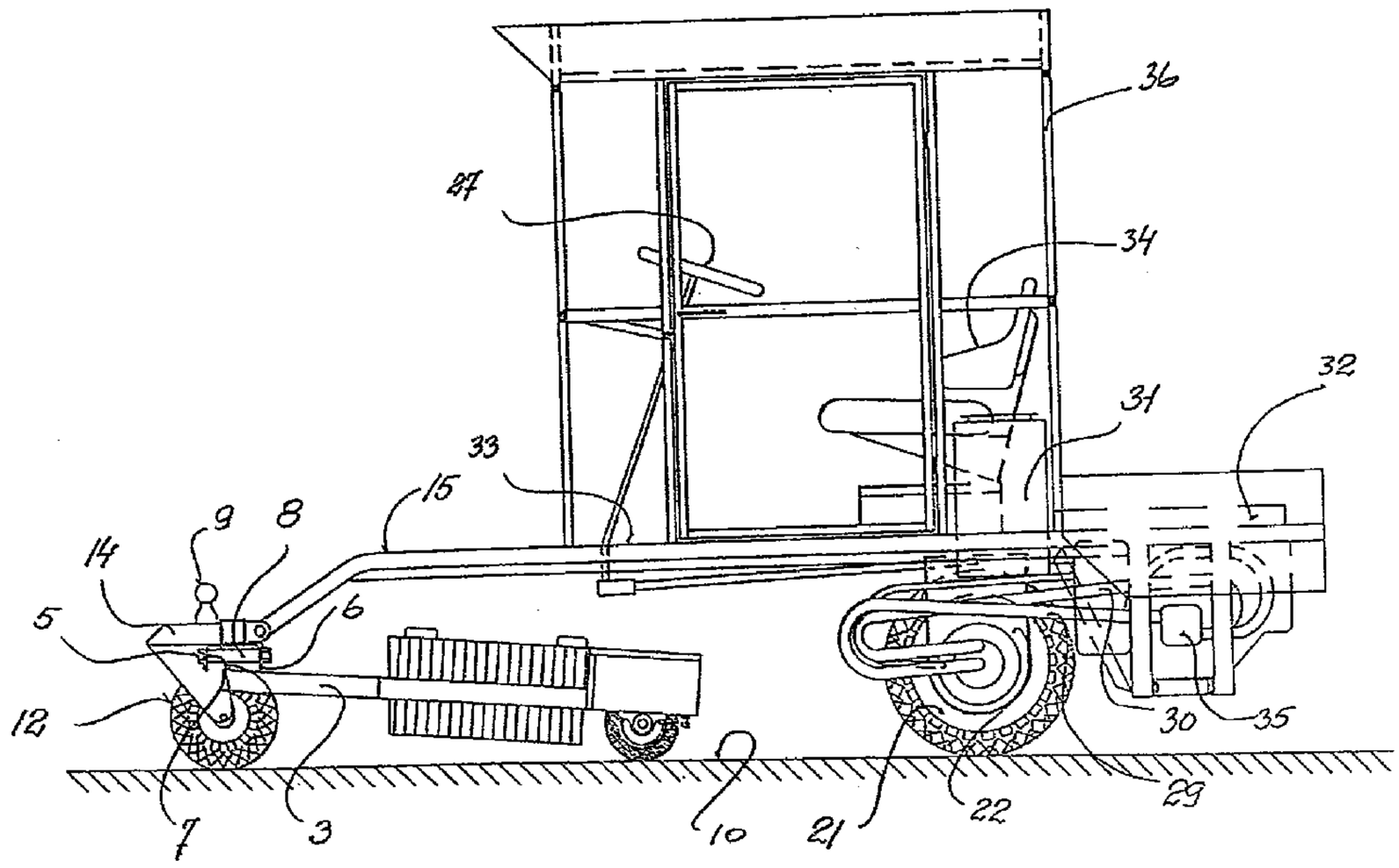
(54) **APPAREIL D'ENTRAINEMENT**

(54) **DRIVE APPARATUS**



(57) The present invention relates to an apparatus for displacement or advancement of implements (1-3), for example ball collectors or harvesters, lawnmowers etc., in which a forward beam (4) is provided with at least two spaced-apart pivotal wheels (11, 1.2) and with coupling means (5, 6, 7) for coupling of a number of implements (1-3), and the beam (4) is connected to a frame (15) which is provided with at least one steerable drive wheel (21) spaced at such a distance from the beam (4) that the number of implements (1-3) has. room between the frame (4) and the steerable drive wheel (21).

DRIVE APPARATUS

ABSTRACT OF THE DISCLOSURE

The present invention relates to an apparatus for displacement or advancement of implements (1-3), for example ball collectors or harvesters, lawnmowers etc., in which a forward beam (4) is provided with at least two spaced-apart pivotal wheels (11, 12) and with coupling means (5, 6, 7) for coupling of a number of implements (1-3), and the beam (4) is connected to a frame (15) which is provided with at least one steerable drive wheel (21) spaced at such a distance from the beam (4) that the number of implements (1-3) has room between the frame (4) and the steerable drive wheel (21).

DRIVE APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for displacement or advancement of implements, for example ball collectors (so-called ball harvesters), lawnmowers, etc.

In many contexts, it is desirable to be able to displace or advance various types of implements and, at the same time, to be able to steer and turn the implements in small spaces and with small turning radii. However, prior art apparatuses for this purpose suffer from many drawbacks which limit their applicability. The prior art apparatuses are often of extremely complicated design and construction, which entails high manufacturing costs and high running and maintenance costs. Moreover, because of their complicated nature, prior art apparatuses have proved to suffer from a certain degree of unreliability. A further express wish in this art is that the total vehicle, implying the apparatus for displacement or advancement in combination with the implement or implements, must be readily adaptable to the substrate or ground over which it is driven and, as it were, 'soak up' possible unevenness in the terrain without limiting the efficiency or terrain index of the implement or implements.

The object forming the basis of the present invention is to obviate or at least reduce the drawbacks inherent in prior art apparatuses of the type contemplated herein and to satisfy the established desiderata.

This object is attained according to the present invention in that the apparatus disclosed by way of introduction in characterised in that a forward beam is provided with at least two pivotal wheels disposed in spaced-apart relationship, and with coupling means for coupling of a number of implements; and that the beam is connected to a frame which is provided with at least one steerable drive wheel

spaced at such a distance from the beam that the number of implements will have room between the frame and the steerable drive wheel, and which extends freely over the number of implements. The beam is pivotally connected to the frame in such a manner that the beam and the frame are pivotal in relation to one another about a horizontal axis. The pivotal wheels on the beam are freely rotatable, in the manner of castors or swivels. The drive wheel is journalled in a generally U-shaped bracket which is pivotal in the frame. The drive wheel is connected to a hydraulic motor. The hydraulic motor is placed in the hub of the drive wheel. The drive wheel is of considerably larger diameter than the pivotal wheels on the beam, whereby the frame slopes from the drive wheel towards the frame. A seat and a steering arrangement are disposed on the frame. The steering arrangement is disposed, by turning of a steering wheel in one direction in which the number - or cluster - of implements is to be displaced or advanced, to realise a drive wheel response throw in the opposite direction.

The present invention realises a displacement or advancement apparatus of an extremely simple and uncomplicated design and construction which, moreover, will permit advancement or displacement of implements disposed thereon in a highly efficient and gentle manner. Since the advancement force and requisite pivotal force act in substantially the same direction, a very small turning radius will be achieved and, above all, relatively slight forces will act on the implements and the various parts of the apparatus. To a considerable extent, this feature makes possible the simple design and construction of the apparatus. Since the implement or implements may be placed between the forward support wheels and the rear drive wheel, the peripheral speed of the implement or implements will be greatly reduced in different turning radii, which is often of considerable advantage for the function of the implement or implements and gives improved operational results.

The nature of the present invention and its aspects will be more readily understood from the following brief description of the

accompanying Drawings, and discussion relating thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic side elevation of one embodiment of the apparatus according to the present invention; and

Fig. 2 is a top plan view of the embodiment of Fig. 1.

DETAILED DESCRIPTION

The embodiment of the present invention shown on the Drawings will be described in connection with employment of the apparatus for displacement or advancement of a number (or cluster) of golf ball harvesters 1, 2, 3 of per se conventional design. The harvesters 1, 2 and 3 are coupled to a beam 4 by means of a bolt 5 which extends through lugs 6 and 7 protruding from the beam 4, and a sleeve 8 which is fixedly welded on the forward portion of the harvesters 1, 2 and 3. The bolt 5 runs freely through the sleeve 8, whereby the harvesters 1-3 will be pivotal about the bolt 5. The harvesters 1 and 3 are pivotally secured to the beam 4 at the ends thereof, while the harvester 2 is secured centrally on the beam 4. A drawbar 9 is also disposed centrally on the beam 4 and may be utilised for other types of implements or for towing the apparatus shown on the Drawings.

The beam 4 is supported from a substrate 10 by means of two spaced-apart wheels 11 and 12. The wheels 11 and 12 are advantageously of the castor or swivel type which are secured on mounting brackets or plates 13 and 14 projecting forwardly from the beam 4.

The beam 4 is interconnected with a frame 15 by means of two bolts 16 and 17 extending in parallel with the frame 4, these bolts extending through lugs which are secured on the beam 4 and the leading ends of the frame 15. Thus, the beam 4 and the frame 15 are pivotal relative to one another about a horizontal axis. The frame 15 is provided with a forward cross strut 18 and a substantially centrally disposed carrier plate 19 extending from the cross strut 18 to the rear portion of the frame 15. The frame 15 includes a further cross strut 20 for rigidifying and stabilising the frame 15 and for carrying various details and fittings.

If desired, the frame 15, the cross struts 18 and 20 and the carrier plate 19 may be wholly or partly covered by a chequered plate (not shown).

A drive wheel 21 is pivotally or rotatably disposed at the rear portion of the frame 15. The drive wheel 21 is journalled in a substantially U-shaped bracket 22 whose bottom shank is provided with a shaft which pivotally extends through the plate 19 and, on the opposing side of the plate 19, carries a wheel 24. The shaft 23 is ideally journalled in the plate 19 in some suitable manner. The bracket 22 and the drive wheel 21 are thus pivotal in the frame 15 about a shaft, with the aid of the wheel. The wheel is included in a steering arrangement which, in the present embodiment, consists of a drive chain or drive belt which, via a guide wheel, extends to a wheel turnable by means of a steering wheel 27. Since the belt or chain is cross-laid between the wheels, the drive wheel 21 will be caused to turn in a direction opposite to the direction in which the steering wheel 27 is turned, whereby the beam 4 and the harvesters 1-3 will be turned in the same direction as the direction of turn of the steering wheel. Naturally, the steering arrangement need not, as in this case, be mechanical but could just as well be hydraulic or operative in any other manner as intimated in Figs. 1 and 2.

Ideally, the drive wheel 21 is provided, in its hub, with a per se known hydraulic motor which, via hoses 29 and 30 and a three-way valve 35, is connected to a per se known hydraulic pump via a hydraulic tank 31. The hydraulic pump is driven by a suitable type of motor which, in the present embodiment, is illustrated in the form of an internal combustion engine 32. A seat 34 is further provided on the frame 15 and possibly also a cab intimated by broken lines on the Drawings. Furthermore, other protective plating and hoods may be provided as intimated by broken lines. A pedal 33 is further provided on the frame for switching the valve 35 between its neutral position, forward position and reverse position, and corresponding driving of the hydraulic motor in the drive wheel 21. In addition, a suitable brake device may be provided if desired, this being optionally hand-operated or foot-operated by a pedal.

The apparatus and arrangements described in the foregoing are, naturally, not restricted to the displacement or advancement of the illustrated golf ball harvesters 1-3, but may of course be employed, without any major modifications, for advancement or displacement of, for instance, cylinder lawnmowers or the like. By lengthening the beam 4, this may be rendered capable of accepting five such harvesters or even more. In addition, the frame 15 may be superstructured by a cab 36.

The present invention should not be considered as restricted to that described above and shown on the Drawings, many modifications being conceivable without departing from the spirit and scope of the inventive concept as disclosed in the appended claims.

CLAIMS:

1. An apparatus for propelling a plurality of implements comprising a beam provided at a forward end of the apparatus, a frame extending freely over the plurality of implements, at least two pivotably mounted wheels provided on said beam at a predetermined distance from each other, coupling means for coupling the plurality of implements to the beam, at least one steerable drive wheel provided on the frame, and means for connecting said beam to the frame at a position so as to provide a sufficient space between the frame, the beam and the at least one steerable drive wheel to accommodate said plurality of implements between said pivotably mounted wheels and said at least one steerable drive wheel.

2. The apparatus as claimed in claim 1, wherein the pivotably mounted wheels are freely rotatable and include castors.

3. The apparatus as claimed in one of claims 1 or 2, wherein the plurality of implements include one of a ball collector, harvester, and lawnmower.

4. The apparatus as claimed in claim 1, wherein the at least one steerable drive wheel has a larger diameter than a diameter of the wheels provided on the beam, and wherein the frame slopes in a direction from the drive wheel toward the beam.

5. The apparatus as claimed in claim 4, further comprising a seat and a steering arrangement disposed on the frame.

6. The apparatus as claimed in claim 5, wherein the steering arrangement is constructed such that by turning a steering wheel of the steering arrangement in a direction in which the plurality of implements are to be displaced a response of the at least one steerable drive wheel occurs in an opposite direction.

7. An apparatus for displacement or advancement of implements, the apparatus comprising a forward beam pivotally connected with a frame of the apparatus such that the forward beam and the frame are pivotal relative to one another about a horizontal axis, at least two spaced-apart pivotal wheels provided on said forward beam, and coupling means for coupling the plurality of implements, wherein the beam is connected to the frame which is provided with at least one steerable drive wheel spaced at such a distance from the beam that

the plurality of implements have room between the frame and the steerable drive wheel, and wherein the frame extends freely over the plurality of implements.

8. An apparatus for displacement or advancement of implements, the apparatus comprising a forward beam provided with at least two spaced-apart pivotal wheels, and coupling means for coupling the plurality of implements, wherein the forward beam is connected to the frame provided with at least one steerable drive wheel journaled in a generally U-shaped bracket pivotal in the frame, said at least one steerable drive wheel being spaced at such a distance from the beam that the plurality of implements have room between the frame and the at least one steerable wheel, and wherein the frame extends freely over the plurality of implements.

9. The apparatus as claimed in claim 8, wherein the at least one steerable drive wheel is connected to a hydraulic motor.

10. The apparatus as claimed in claim 9, wherein the hydraulic motor is disposed in a hub of the at least one steerable drive wheel.

11. The apparatus as claimed in one of claims 7, 8, 9, or 10, wherein the plurality of implements include one of a ball collector, harvester, and lawnmower.

12. An apparatus for propelling a plurality of implements comprising a beam provided at a forward end of the apparatus, a frame extending freely over the plurality of implements, at least two pivotably mounted freely rotatable wheels including casters provided on said beam at a predetermined distance from each other, coupling means for coupling the plurality of implements to the beam, at least one steerable drive wheel provided on the frame, and means for connecting said beam to said frame at a position so as to provide a sufficient space between the frame, the beam and the at least one steerable drive wheel to accommodate said plurality of implements, wherein the at least one steerable drive wheel has a larger diameter than a diameter of the wheels provide on the beam, and wherein the frame slopes in a direction from the drive wheel toward the beam.

13. The apparatus as claimed in claim 12, further comprising a seat and a steering arrangement disposed on the frame.

14. The apparatus as claimed in claim 13, wherein the steering arrangement is constructed such that by turning the steering wheel of the steering arrangements in a direction in which the plurality of implements are to be displaced a response of the at least one steerable drive wheel occurs in an opposite direction.

15. An apparatus for displacement or advancement of implements, the apparatus comprising a forward beam pivotally connected with a frame of the apparatus such that the forward beam and the frame are pivotal relative to one another about a horizontal axis, at least two spaced-apart pivotal wheels provided on said forward beam and coupling means for coupling the plurality of implements, wherein the beam is connected to the frame which is provided with at least one steerable drive wheel spaced at such a distance from the beam that the plurality of implements have room between the frame and the steerable drive wheel, the frame extends freely over the plurality of implements the at least one steerable drive wheel has a larger diameter than a diameter of the wheels provided on the beam, and wherein the frame slopes in a direction from the drive wheel toward the beam.

16. The apparatus as claimed in claim 15, further comprising a seat and a steering arrangement disposed on the frame.

17. The apparatus as claimed in claim 16, wherein the steering arrangement is constructed such that by turning the steering wheel of the steering arrangement in a direction in which the plurality of implements are to be displaced a response of the at least one steerable drive wheel occurs in an opposite direction.

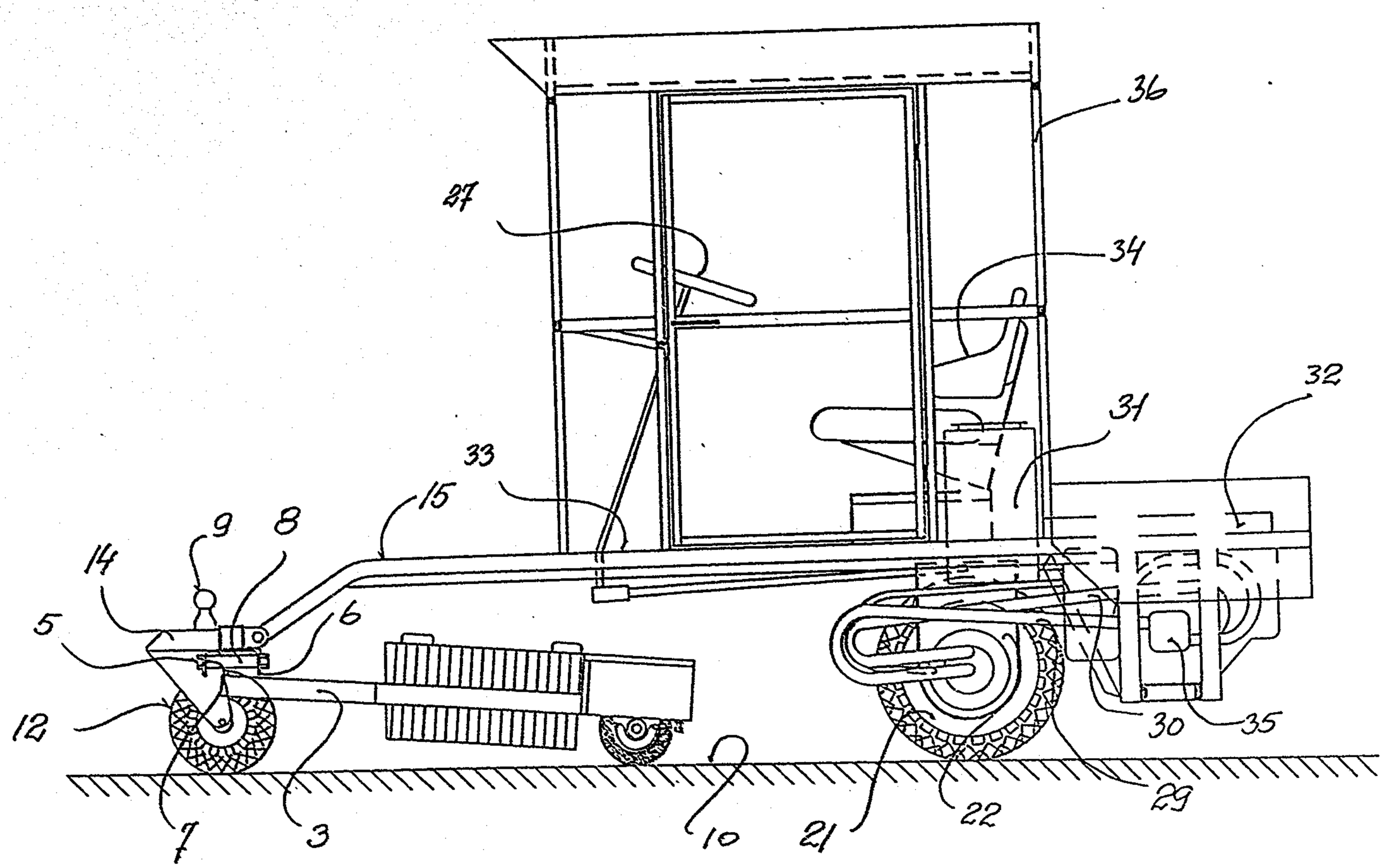


Fig. 1

PATENT AGENTS
Bull, Housser & Tupper

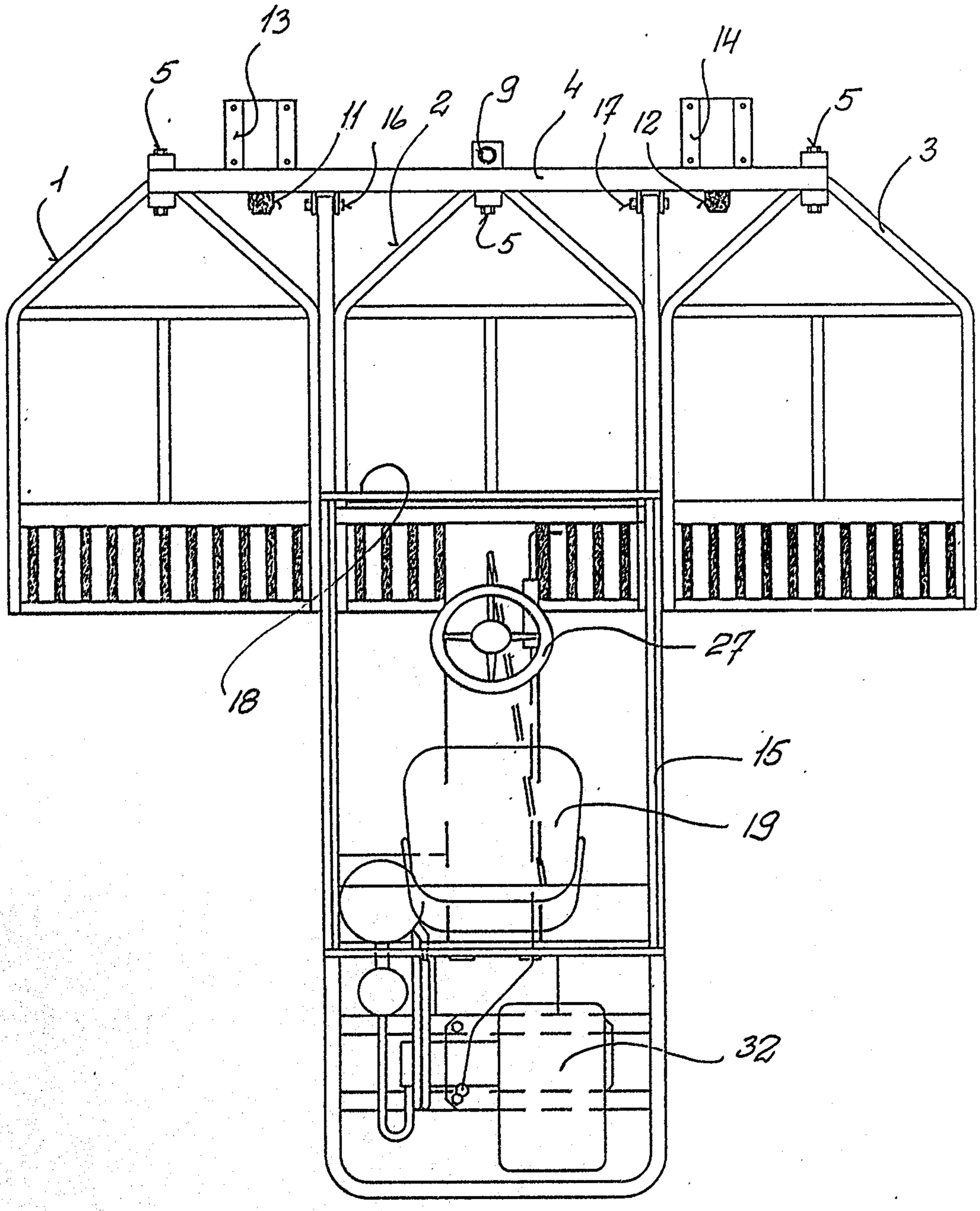


Fig 2

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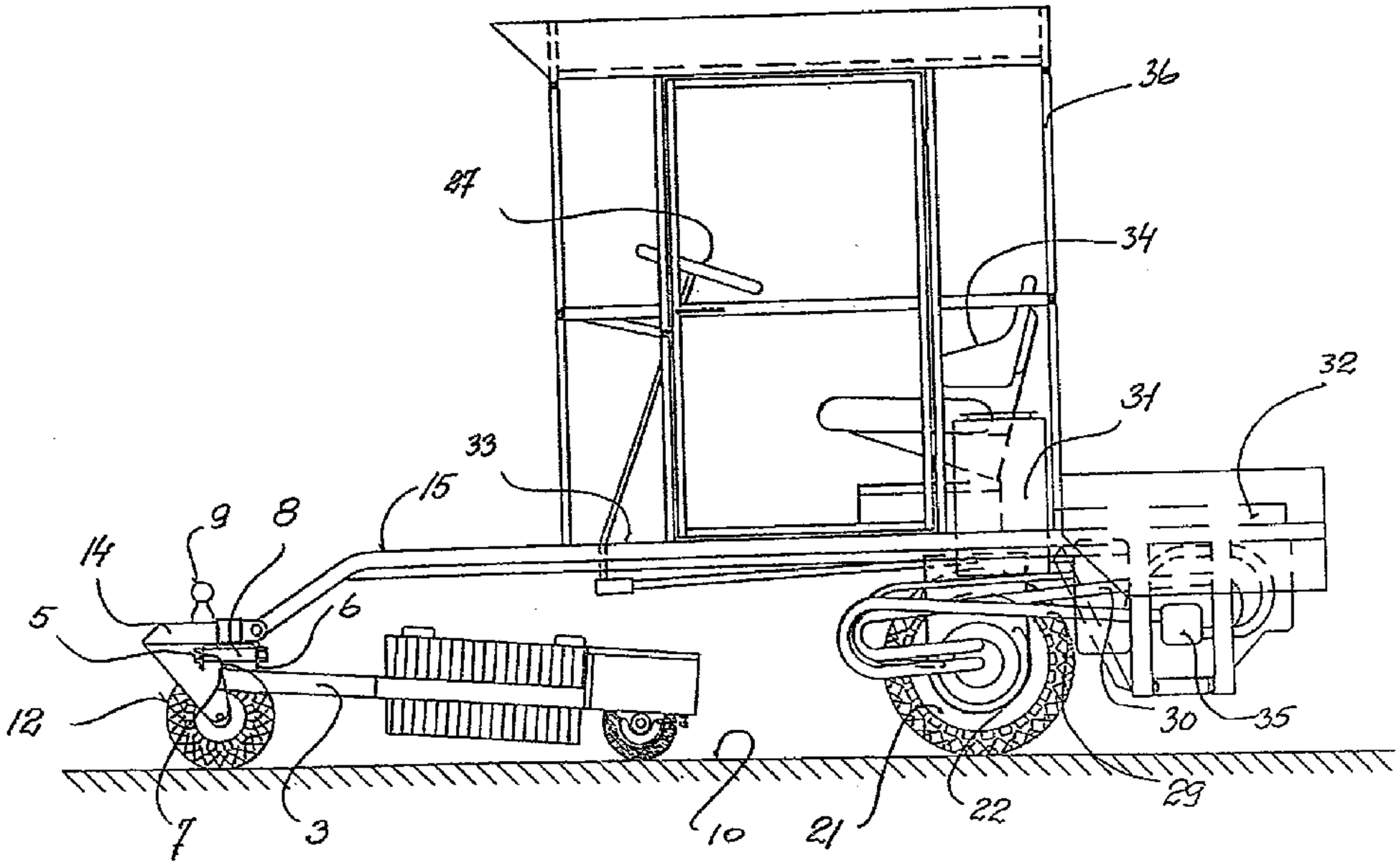
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