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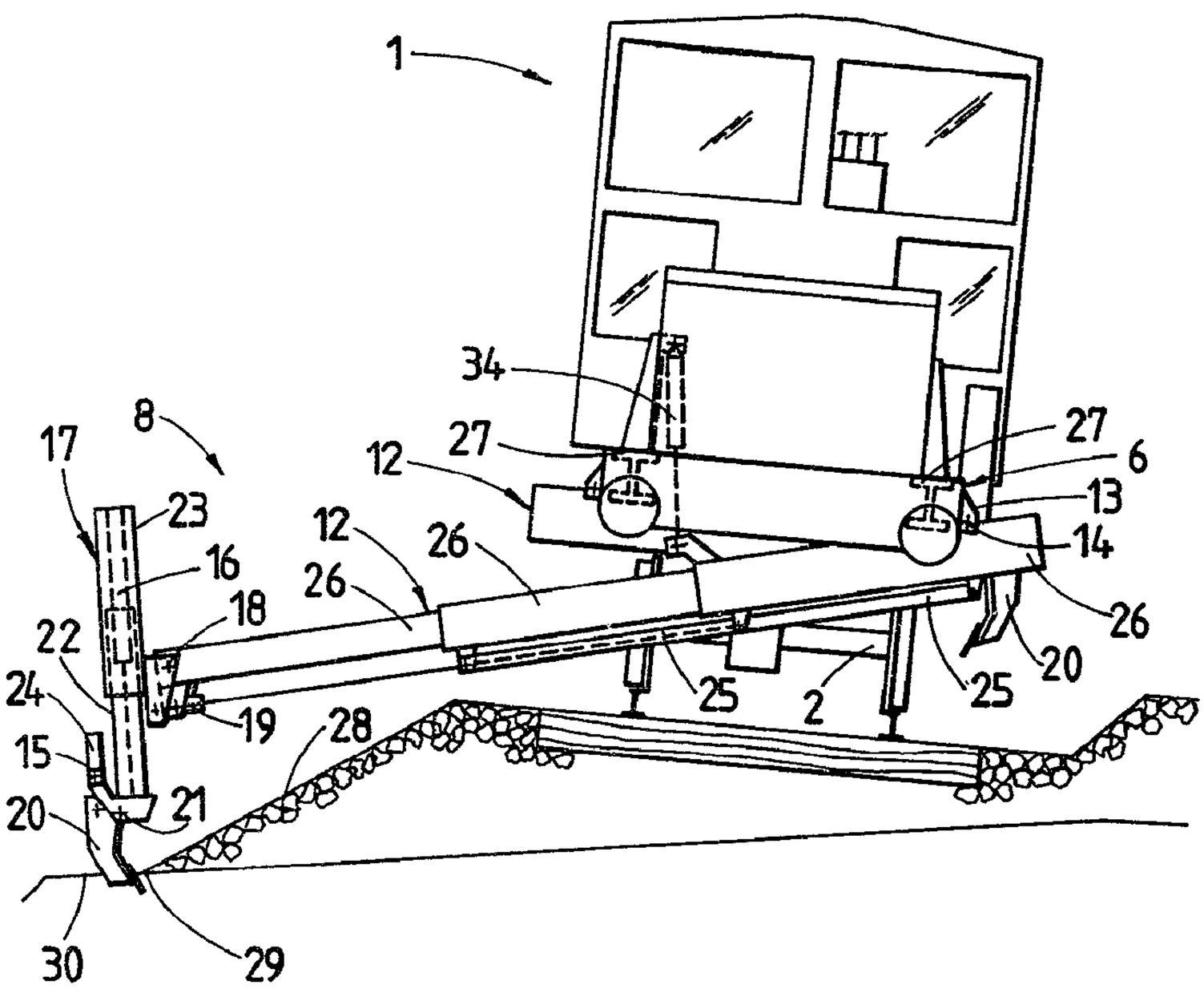

(57) Abrégé/Abstract:
A ballast plough (1) consists of a machine frame (6) supported on on-track undercarriages (2), with which is associated a centre plough (5) which is vertically adjustable by means of drives and on each longitudinal side of the machine a vertically adjustable shoulder plough (8) having a plough blade (20) which may be brought into contact with ballast. The said shoulder plough is provided with an articulation point (13) and a telescopically extendable carrier frame (12) extending perpendicularly to the longitudinal direction of the machine. The articulation point (13) is situated in each case - viewed in the transverse direction of the machine - on the longitudinal side of the machine which is further away from the associated plough blade (20) of the shoulder plough (8). The plough blade (20) is mounted for pivoting about an axis (21) extending in the longitudinal direction of the machine and is connected to a shoulder angle adjustment drive (15).

ABSTRACT

A ballast plough (1) consists of a machine frame (6) supported on on-track undercarriages (2), with which is associated a centre plough (5) which is vertically adjustable by means of drives and on each longitudinal side of the machine a vertically adjustable shoulder plough (8) having a plough blade (20) which may be brought into contact with ballast. The said shoulder plough is provided with an articulation point (13) and a telescopically extendable carrier frame (12) extending perpendicularly to the longitudinal direction of the machine. The articulation point (13) is situated in each case - viewed in the transverse direction of the machine - on the longitudinal side of the machine which is further away from the associated plough blade (20) of the shoulder plough (8). The plough blade (20) is mounted for pivoting about an axis (21) extending in the longitudinal direction of the machine and is connected to a shoulder angle adjustment drive (15).

Ballast Plough

The invention relates to a ballast plough comprising a machine frame supported on on-track undercarriages, with which is associated a centre plough which is vertically adjustable by means of drives and on each longitudinal side of the machine a vertically adjustable shoulder plough having a plough blade which may be brought into contact with ballast and with an articulation point and a telescopically extendable carrier frame extending perpendicularly to the longitudinal direction of the machine.

A ballast plough comprising a machine frame supported on on-track undercarriages is known through U.S. Patent No. 5,097,608, issued on March 24, 1992. Between the on-track undercarriages this has a vertically adjustable centre plough and shoulder ploughs positioned in front of the said centre plough. Each shoulder plough is joined to the machine frame by means of a lateral articulation point arranged on the machine frame and having an axis extending in the longitudinal direction of the machine, and has a carrier frame which may be extended telescopically in the transverse direction of the machine by means of a drive.

The object of the present invention lies in creating a ballast plough of the type described in the introduction, the shoulder ploughs of which may also be used for treating the track bench region adjacent to the base of the crown of the ballast bed.

This object is achieved with a ballast plough of the type described in the introduction in that the articulation point - viewed in the transverse direction of the machine - is in each case arranged on the longitudinal side of the machine

which is further away from the associated plough blade of the shoulder plough, and the plough blade is mounted for pivoting about an axis extending in the longitudinal direction of the machine and is connected to a shoulder angle adjustment drive.

As a result of this combination of features, it is possible both to extend the carrier frame and thus the operating range and also to effect a rapid change to the shoulder angle, so that in addition to the ballast shoulder, the track bench region, which in most cases forms a horizontal surface, can also be treated without difficulty. The specific articulated attachment of the carrier frame to the machine frame further ensures the very advantageous arrangement of the carrier frame beneath the machine frame for the purpose of transfer travel. This neither affects the view from the driver's cab on to the track nor is there any adverse effect on the situation in which the two shoulder ploughs are in an inoperative position while the centre plough is being used on its own.

Accordingly, one aspect of the present invention resides in a ballast plough comprising a machine frame supported on on-track undercarriages, with which is associated a center plough which is vertically adjustable by means of drives and on each longitudinal side of the machine frame a vertically adjustable shoulder plough having a plough blade which may be brought into contact with ballast and with an articulation point and a telescopically extendable carrier frame attached to the machine frame by means of said articulation point and extending perpendicularly to the longitudinal direction of the machine frame, wherein the plough blade is connected to a shoulder angle adjustment drive to allow pivoting of said plough blade about an axis extending in the longitudinal direction of the machine frame, characterised in that the articulation point – viewed in the transverse direction of the machine frame – is in each case arranged on the longitudinal side

of the machine frame which is further away from the associated plough blade of the shoulder plough.

The two-fold pivotable mounting of the plough blade of the ballast plough described above, characterised in that a carrier body bearing the plough blade of the shoulder plough together with the shoulder angle adjustment drive and a vertical adjustment drive for vertical adjustment of the plough blade is itself mounted on the telescopic carrier frame for pivoting about a pivot axis extending in the longitudinal direction of the machine frame and is connected to a pivot drive or characterised in that the carrier body of the shoulder plough is formed from an inner and an outer telescopic tube, the former being displaceable in the longitudinal direction thereof, the plough blade together with the axis and the shoulder angle adjustment drive being secured to the lower end of the inner telescopic tube, makes a relatively large pivoting angle possible, with the result that the treatment of a track bench adjacent to the outer rail of a superelevated section is also unrestrictedly possible.

The further development of the ballast plough described above, characterised in that the end of the carrier frame lying opposite the plough blade of the shoulder plough is designed to project beyond the transverse cross-sectional outline of the machine frame, and characterised in that a drive for the vertical adjustment of the shoulder plough is secured between two longitudinal supports of the machine frame, which are spaced apart from one another in the transverse direction of the machine frame, on the longitudinal support which is further away from the articulation point, and further characterised in that the carrier frame is designed in three parts, wherein the distance between the articulation point and the end of a part of the carrier frame on the plough side and connected to the articulation point is smaller than or equal to the distance between the two longitudinal

supports, enables the carrier frame to be designed in a particularly advantageous manner to produce the widest possible adjustment range of the shoulder plough, but without the clearance gauge being exceeded for the transfer of the ballast plough.

In another aspect, the present invention resides in a ballast plow machine for railway track maintenance comprising a machine frame supported on on-track undercarriages; a vertically adjustable center plow attached to said machine frame; a vertically adjustable shoulder plow located on each longitudinal side of said machine, each shoulder plow including a telescopically extendible carrier frame extending perpendicularly to the longitudinal direction of said machine, a plow blade which may be brought into contact with ballast, and an articulation point by means of which said carrier frame is attached to said machine frame; said articulation point, when viewed in a transverse direction of said machine, being located on the longitudinal side of said machine which is further away from the plow blade associated with said shoulder plow; and a shoulder angle adjustment drive associated with each plow blade for pivoting said associated plow blade about an axis which extends in the longitudinal direction of said machine.

The invention is described in more detail below with the aid of an embodiment.

Fig. 1 shows a schematically simplified side view of a

ballast plough with a centre- and two shoulder ploughs,

Fig. 2 shows a view of the machine in the longitudinal direction of the machine, a shoulder plough being extended for the treatment of a track bench, and

Fig. 3 shows a partly schematically represented plan view of the shoulder plough as shown in Fig. 2.

The ballast plough 1 evident in Fig. 1 is mobile by means of on-track undercarriages 2 on a track 3 composed of sleepers and rails with the aid of a motive drive 4. Between the two on-track undercarriages 2, a centre plough 5 is vertically adjustably connected to a machine frame 6. Located in a section of the machine frame 6 which is bent upwards at a right angle is a vertically adjustable sweeping device 7 with a lateral conveyor belt for transporting surplus ballast away. Arranged in the opposite end region of the machine frame 6 to the sweeping device 7 are two shoulder ploughs 8 which will be described in greater detail below with reference to Fig. 2 and 3. A driver's cab 9 with a central control means 10 and also a central power plant 11 are situated on the machine frame 6.

The shoulder plough 8 evident in Fig. 2 and 3 is secured on a carrier frame 12 extending perpendicularly to the longitudinal direction of the machine and designed so as to be telescopic. The said carrier frame is in turn secured for pivoting about an axis 14 extending in the longitudinal direction of the machine, forming an articulation point 13, on the longitudinal machine side of the machine frame 6 which is further away from the shoulder plough 8 in the transverse direction of the machine.

The plough blade 20 is mounted together with a shoulder angle adjustment drive 15 and a vertical adjustment drive 16 on a carrier body 17 which is itself mounted on the telescopic carrier frame 12 for pivoting about a pivot axis 18 extending

in the longitudinal direction of the machine and is connected to a pivot drive 19. The plough blade 20, extending in the longitudinal direction of the machine, of the shoulder plough 8 is secured to the lower end of an inner telescopic tube 22 of the carrier body 17 for pivoting about an axis 21 extending in the longitudinal direction of the machine. The said inner telescopic tube is mounted for displacement in the longitudinal direction thereof in an outer telescopic tube 23 which is mounted for pivoting about the pivot axis 18. A shoulder angle adjustment cylinder 24 is provided for adjusting the plough blade 20 about the said axis 21.

Two drives 25 are provided for the transverse adjustment, with respect to the longitudinal direction of the machine, of the carrier frame 12. The carrier frame 12 is composed of three parts 26 which may be telescoped transversely into one another, the part 26 furthest away from the plough blade 20 being connected both to the articulation point 13 and to a drive 34 for the vertical adjustment. This drive 34 is secured between two longitudinal supports 27 of the machine frame 6, which are spaced apart from one another in the transverse direction of the machine, on the longitudinal support 27 which is further away from the articulation point 13.

In the operating position represented in Fig. 2, the plough blade 20 is already positioned on a track bench region 30 adjoining a crown base 29 of a ballast bed shoulder 28. (The feed plough blades are not represented in Fig. 2 for reasons of greater clarity). The distance between the articulation point 13 of the carrier frame 12 and the end of the carrier frame part 26 on the plough side and connected to the drive 34 is smaller than or equal to the distance between the two longitudinal supports 27.

Located immediately behind the shoulder plough 8 represented in operational use, viewed in the longitudinal

direction of the machine, is a further shoulder plough 8 in a transfer position.

As is evident in Fig. 3, respective feed plough blades 31 are joined both to the front and to the rear end of the plough blade 20. These are designed for pivoting respectively by means of a drive 32 about an axis 33 extending perpendicularly to the lower edge of the plough blade 20. By appropriately angling these feed plough blades 31 (see representation in solid and in dot and dash lines), it is possible to use the shoulder plough 8 in both directions of travel of the ballast plough 1.

WHAT IS CLAIMED IS:

1. A ballast plough comprising a machine frame supported on on-track undercarriages, with which is associated a center plough which is vertically adjustable by means of drives and on each longitudinal side of the machine frame a vertically adjustable shoulder plough (8) having a plough blade (20) which may be brought into contact with ballast and with an articulation point (13) and a telescopically extendable carrier frame (12) attached to the machine frame by means of said articulation point (13) and extending perpendicularly to the longitudinal direction of the machine frame, wherein the plough blade (20) is connected to a shoulder angle adjustment drive (15) to allow pivoting of said plough blade (20) about an axis (21) extending in the longitudinal direction of the machine frame, characterised in that the articulation point (13) – viewed in the transverse direction of the machine frame – is in each case arranged on the longitudinal side of the machine frame which is further away from the associated plough blade (20) of the shoulder plough (8).

2. The ballast plough according to claim 1, characterised in that a carrier body (17) bearing the plough blade (20) of the shoulder plough (8) together with the shoulder angle adjustment drive (15) and a vertical adjustment drive (16) for vertical adjustment of the plough blade (20) is itself mounted on the telescopic carrier frame (12) for pivoting about a pivot axis (18) extending in the longitudinal direction of the machine frame and is connected to a pivot drive (19).

3. The ballast plough according to claim 2, characterised in that the carrier body (17) of the shoulder plough (8) is formed from an inner and an outer telescopic tube (22, 23), the former being displaceable in the longitudinal direction thereof, the plough blade (20) together with the axis (21) and the shoulder angle

adjustment drive (15) being secured to the lower end of the inner telescopic tube (22).

4. The ballast plough according to any one of claims 1to 3, characterised in that the end of the carrier frame (12) lying opposite the plough blade (20) of the shoulder plough (8) is designed to project beyond the transverse cross-sectional outline of the machine frame.

5. The ballast plough according to any one of claims 1 to 4, characterised in that a drive (34) for the vertical adjustment of the shoulder plough (8) is secured between two longitudinal supports (27) of the machine frame (6), which are spaced apart from one another in the transverse direction of the machine frame, on the longitudinal support (27) which is further away from the articulation point (13).

6. The ballast plough according to claim 5, characterised in that the carrier frame (12) is designed in three parts, wherein the distance between the articulation point (13) and the end of a part of the carrier frame (12) on the plough side and connected to the articulation point (13) is smaller than or equal to the distance between the two longitudinal supports (27).

7. A ballast plow machine for railway track maintenance comprising:

a machine frame supported on on-track undercarriages;

a vertically adjustable center plow attached to said machine frame;

a vertically adjustable shoulder plow located on each longitudinal side of said machine, each shoulder plow including a telescopically extendible carrier frame extending perpendicularly to the longitudinal direction of said machine, a plow blade which may be brought into contact with ballast, and an articulation point

by means of which said carrier frame is attached to said machine frame;

said articulation point, when viewed in a transverse direction of said machine, being located on the longitudinal side of said machine which is further away from the plow blade associated with said shoulder plow; and

a shoulder angle adjustment drive associated with each plow blade for pivoting said associated plow blade about an axis which extends in the longitudinal direction of said machine.

8. The ballast plow of claim 7 further comprising a carrier body bearing said plow blade of said shoulder plow and a vertical adjustment drive mounted on said telescopic carrier frame along with said shoulder angle adjustment drive, and a pivot drive connected to said carrier body for pivoting said carrier body about a pivot axis extending in the longitudinal direction of said machine.

9. The ballast plow of claim 8 wherein said carrier body comprises inner and outer telescopic tubes, said inner telescopic tube being displaceable in a longitudinal direction thereof, said plow blade and said shoulder angle adjustment drive being secured to a lower end of said inner telescopic tube.

10. The ballast plow of claim 7 wherein an end of said carrier frame lying opposite said plow blade with which it is associated extends beyond a cross-sectional outline of said machine.

11. The ballast plow of claim 7 further comprising two longitudinal supports spaced apart from one another in a transverse direction of said machine, and a vertical adjustment drive for said shoulder plow secured between said longitudinal supports and on the longitudinal support which is further away from said articulation point.

12. The ballast plow of claim 11 wherein said carrier frame comprises three parts, one of said parts being connected to said articulation point and having an end spaced therefrom in transverse direction and facing the shoulder plow, wherein the distance between said end and said articulation point is smaller or equal to the distance between the two longitudinal supports.

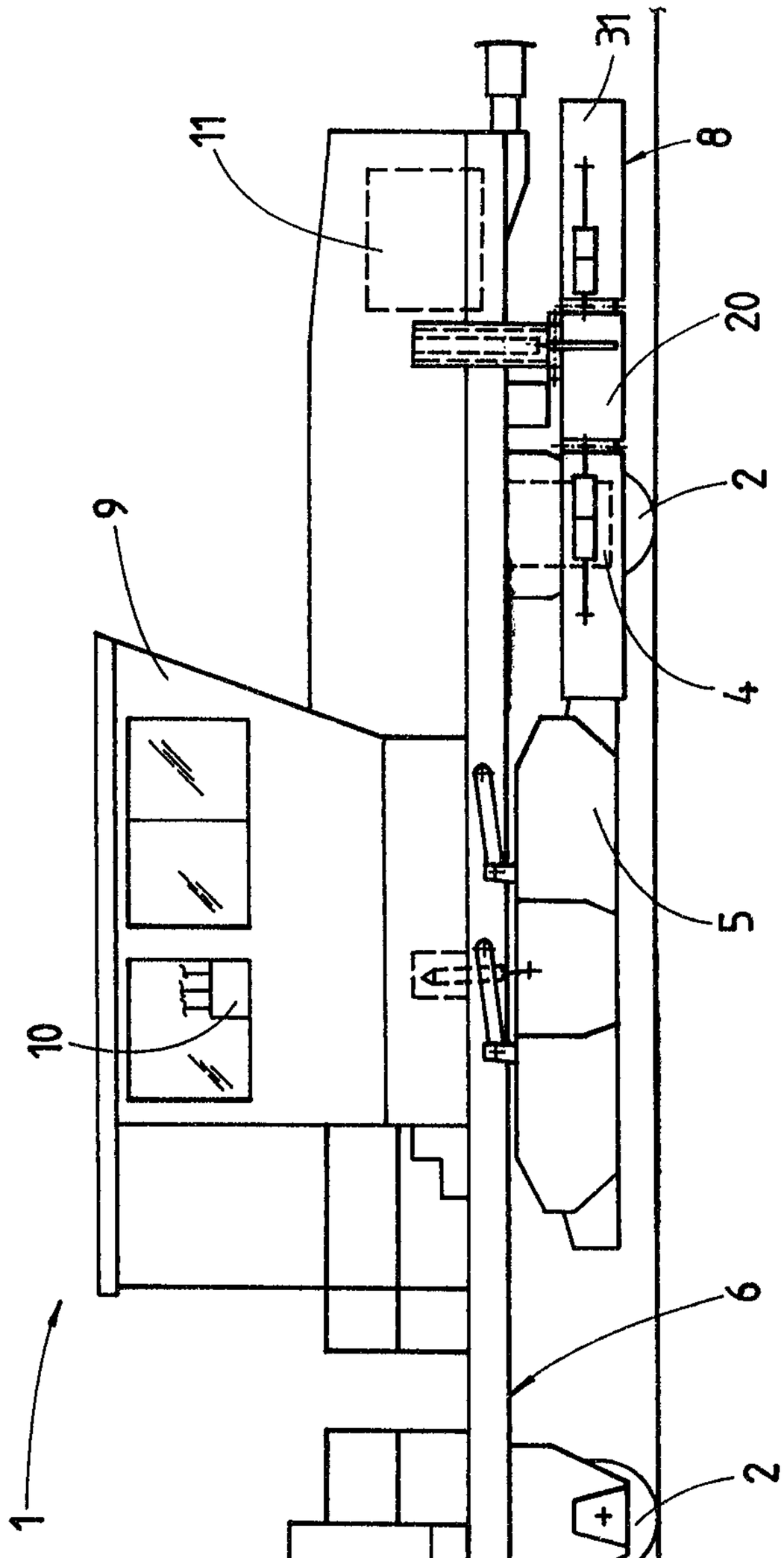

Fig. 1

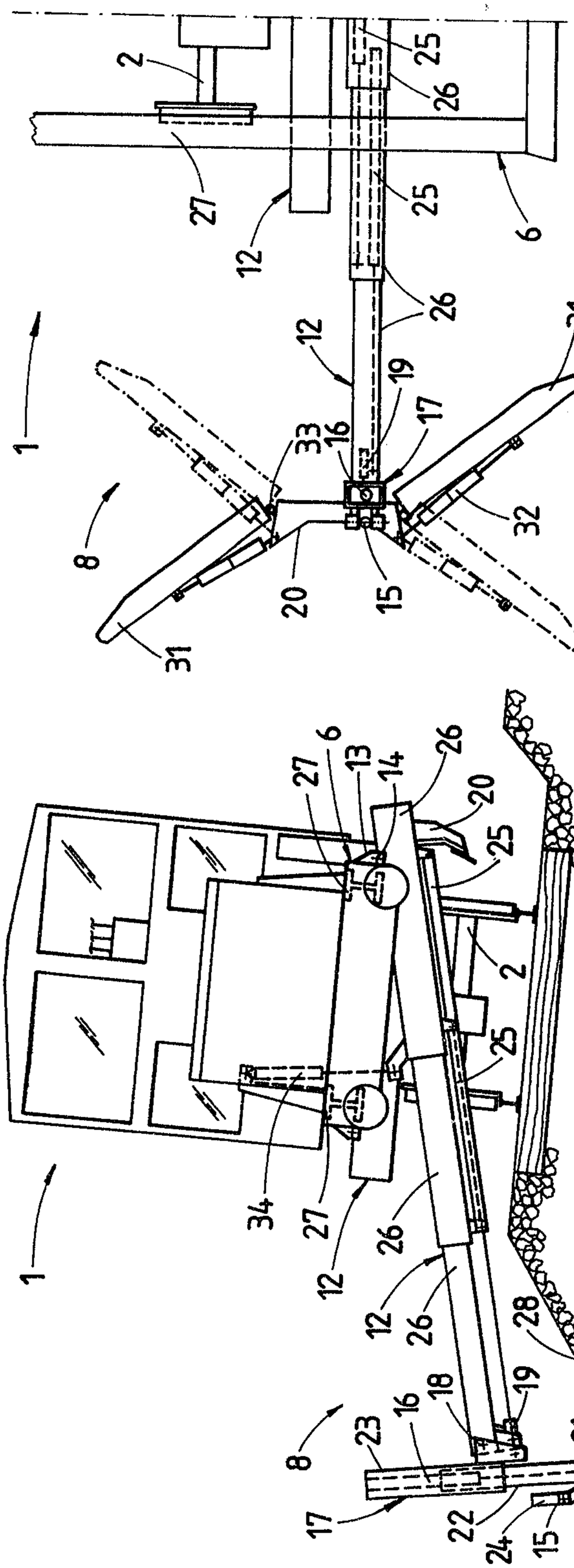

Fig. 3

Fig. 2

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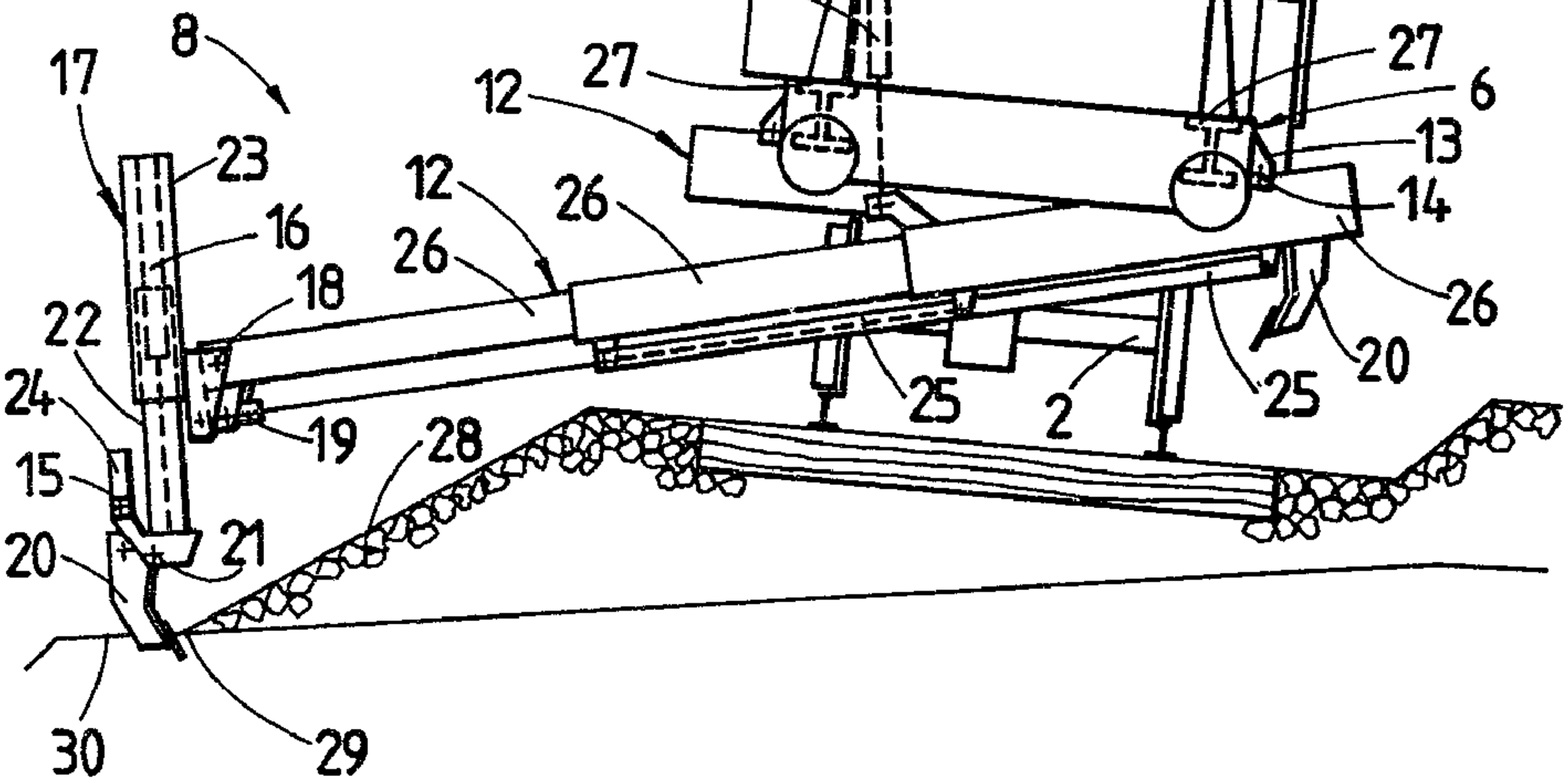
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