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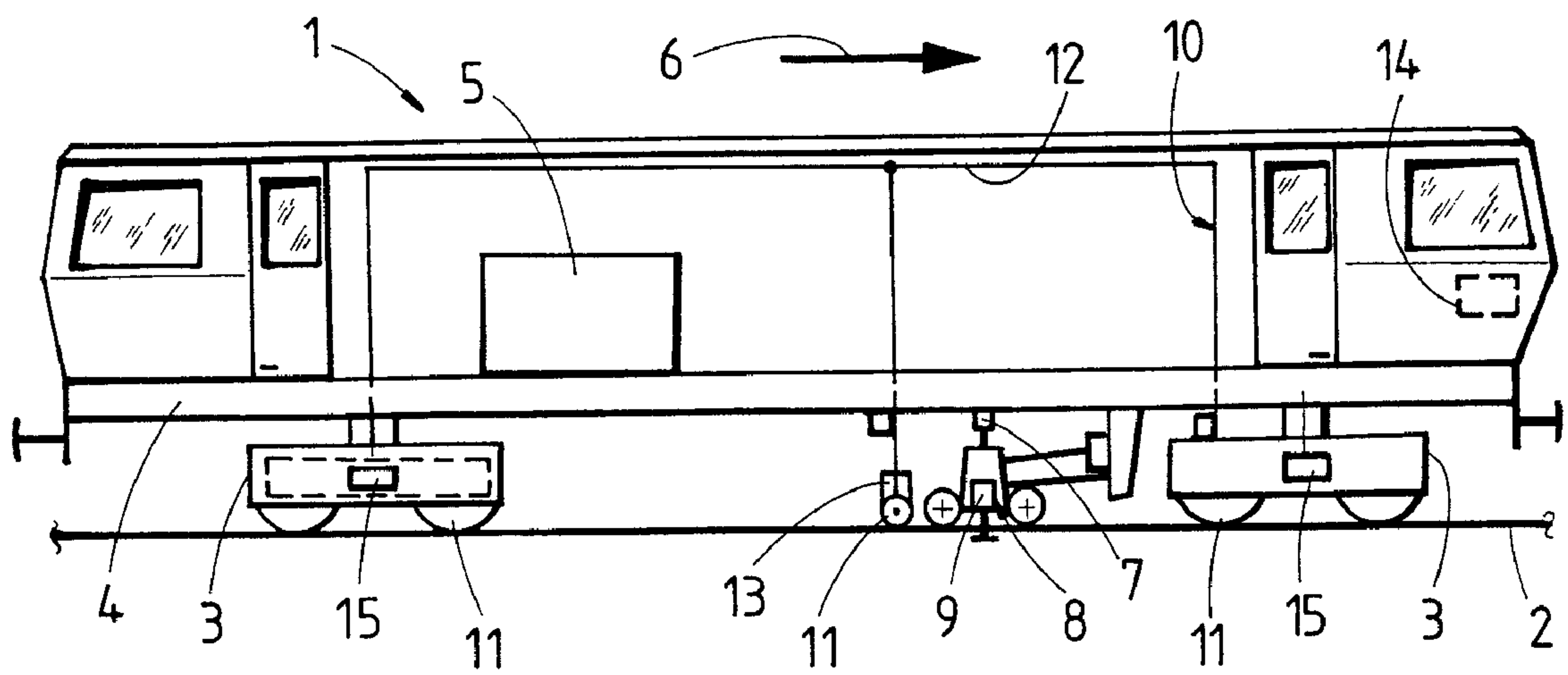
(54) Title: A METHOD AND MACHINE FOR THE LOWERING OF A TRACK



(57) Abrégé/Abstract:
For the controlled lowering of a track (2), in a rear scanning location (11) of a measuring system (10) a longitudinal slope (α) of the track (2) is captured and recorded. For a length extending back at least (10) meters, a current height profile (16) is generated and a rear compensation line (17) overlaid thereon and representing a target track position is calculated. The rear scanning location (11) is computationally guided along the rear compensation line (17) such that a compensation value for the position of the measurement axis (12) results at a center scanning location (11) positioned between the rear and a front scanning location (11).

Abstract

For the controlled lowering of a track (2), a longitudinal inclination (α) of the track (2) is determined at a rear tracing point (11) of a measuring system (10) and stored. For a length reaching back at least 10 meters, a current vertical profile (16) is formed, and a rear compensation straight line (17) is calculated which is superimposed upon the vertical profile and renders a target track position. The rear tracing point (11) is guided by calculation along the rear compensation straight line (17), so that a compensation value for the position of the measuring chord (12) ensues at a middle tracing point (11) positioned between the rear tracing point (11) and a front tracing point (11).

(Fig.1)

A METHOD AND MACHINE FOR THE LOWERING OF A TRACK.

[0001] The invention relates to a method and a machine for the controlled lowering of a track according to the features hereinafter described.

[0002] A machine of this type, called a track stabiliser, is known from US 5 172 637. The measuring system comprises three measuring axles designed to roll on the track, with each of which is associated a respective transverse pendulum for detecting the transverse inclination of the track. In this way, it is possible to precisely copy the transverse track inclination that was present prior to operation of the machine, so that said inclination is unchanged after operation of the machine.

[0003] According to GB 2 268 021 or GB 2 268 529, it is known, in connection with a cleaning of the ballast, to arrange two longitudinal pendulums on a respective on-track undercarriage in order to detect the actual position of the track prior to the removal of the ballast and to reproduce said position after the introduction of the new ballast.

[0004] It is the object of the present invention to create a method or a machine of the kind mentioned at the beginning with which the track position after the lowering of the track can be improved.

[0005] According to the invention, this object is achieved in one aspect by a method for the controlled lowering of a track, in which the latter is set in transverse vibrations with the aid of dynamic striking forces and loaded with a vertical static load, wherein a settlement defining the lowering of the track is controlled by a measuring system, tracing the track position, which has a measuring chord extending in the longitudinal direction of the machine and comprising tracing points rolling on the track, comprising the following method steps: a) at a rear said tracing point, with regard to the working direction, of the measuring system, a longitudinal inclination of the track is detected in connection with a distance measurement and stored, b) from the stored values for the longitudinal inclination and the distance measurement, a current vertical profile of the track is formed for a length of track reaching back at least 10 meters from the rear tracing point with regard to the working direction, and a rear compensation straight line is calculated which is superimposed upon the vertical profile and renders a target track position, c) the rear tracing point is guided by calculation along the rear compensation straight line so that a compensation value for the position of the measuring chord ensues at a middle said tracing point positioned between the rear tracing point and a front said tracing point.

[0006] The particular problem posed by residual faults which are present after the use of the stabilising unit lies in the fact that, in the course of operation of the machine, these faults can lead to an ever growing negative influence upon the rear tracing point. With the method according to the invention, it is now possible to guide the rear tracing point of the measuring system along a virtual compensation straight line. With this, it can be reliably precluded that the precision of the measuring system is compromised by remaining residual faults in connection with the lowering of the track with the aid of the stabilising unit.

[0007] According to another aspect of the invention, the said object is also achieved in another aspect with a machine for the controlled lowering of a track, comprising a stabilizing unit, arranged between on-track undercarriages and provided for form-fitting application to the track and producing dynamic striking forces, and a measuring system for detecting a longitudinal inclination of the track, the measuring system comprising a front tracing point and rear tracing point, with regard to a working direction, each for rolling on the track, a middle tracing point positioned between the former, and an odometer, further wherein: a) a longitudinal pendulum for detecting the longitudinal inclination of the track is provided on a rear said on-track undercarriage with regard to the stabilising unit, b) a control device is provided for storing the longitudinal inclination and for forming a current vertical profile and for determining, by calculation, a rear compensation straight line which is superimposed upon the current vertical profile and renders a target position.

[0008] This embodiment requires merely small additional structural expense without any need to change the measuring system itself.

[0009] Additional advantages of the invention become apparent from the dependent claims and the drawing description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention will be described in more detail below with reference to an embodiment represented in the drawing in which

[0011] Fig. 1 is a schematic side view of a track stabiliser having a measuring system for a controlled lowering of a track,

[0012] Fig. 2 is a schematic representation of the measuring system, and

[0013] Figs. 3, 4 are further schematic representations, respectively, of the vertical profile of the track.

[0014] A machine 1, shown in Fig. 1, for the controlled lowering of a track 2 is also called a track stabiliser. The machine 1 comprises a machine frame 4 supported on on-track undercarriages 3 and is mobile in a working direction 6 with the aid of a motor 5.

[0015] Located between the on-track undercarriages 3 is a stabilising unit 8 which is vertically adjustable by means of drives 7 and has a vibration drive 9. The latter produces transverse vibrations, acting upon the track 2 horizontally and perpendicularly to the longitudinal direction, which, in connection with a vertical static load by the two drives 7, cause a lowering of the track.

[0016] A measuring system 10 comprises — with respect to the working direction 6 — a front tracing point 11, a rear tracing point 11 and a middle tracing point 11, the latter being positioned between the two former, each designed to roll on the track 2 for tracing the vertical track position. Two measuring chords 12 extending in the longitudinal direction of the machine are stretched between the front and rear tracing points 11, with the vertical position of the measuring chords 12 with respect to the track 2 being traced at the middle tracing point 11.

[0017] Arranged on each on-track undercarriage 3 are two longitudinal pendulums 15 spaced from one another perpendicularly to the longitudinal direction of the machine. Each longitudinal pendulum 15 serves for measuring a longitudinal inclination of the track 2. For detecting the distance travelled, an odometer 13 is provided on the middle tracing point 11. A control device 14 serves for storing and processing the measuring data determined by the measuring system 10.

[0018] The measuring system 10 is depicted schematically in Fig. 2. The front tracing point 11 is guided on a preliminary track position corrected by a tamping machine. By means of the middle tracing point 11 positioned in the region of the stabilising unit 8, a lowering of the track 2 in the extent of a prescribed settlement h relative to the measuring chord 12 is detected. The rear tracing point 11 is guided along the final track position.

[0019] On the — with regard to the stabilising unit 8 (see Fig. 1) or the middle tracing point 11 — the rear longitudinal pendulum 15 is provided for detecting the longitudinal inclination α of the track 2. The control device 14 is designed for storing the longitudinal inclination α and for forming a current vertical profile 16 and for determining, by calculation, a compensation straight line 17 which is superimposed on the vertical profile 16 and renders a target position.

[0020] As soon as inaccuracies occur — in the region of the front tracing point 11 — as a result of residual faults after tamping, these inaccuracies are copied, as it were, in the course of the lowering of the track by the stabilising unit. Now, the particular problems resulting therefrom lie in the fact that the rear tracing point 11 is guided along these copied vertical position faults (see full line in Fig. 2) and thus the precision of the lowering of the track is additionally impaired.

[0021] In order to eliminate this grave disadvantage, a longitudinal inclination α of the track 2 is measured by means of the rear longitudinal pendulum 15 (either the left or the right longitudinal pendulum 15 of the corresponding on-track undercarriage 3, depending on the choice of reference rail) at equal spaces (preferably distances of 20 cm) and stored in the control device 14 in connection with a distance measurement by the odometer 13.

[0022] From the stored values for the longitudinal inclination α and the associated distance measurement, a current vertical profile 16 of the track 2 is formed for a length of track reaching back at least 10 meters from the rear tracing point 11 with regard to the working direction 6. Subsequently, the rear compensation straight line 17 is calculated which is superimposed on the vertical profile 16 and renders a target track position.

[0023] The rear tracing point 11 is guided by calculation along the virtual compensation straight line 17 so that a corresponding compensation value for the calculated position of the measuring chord 12 ensues at the middle tracing point 11. This position is relevant for determining the settlement h, i.e. the actual height of the track lowering by means of the stabilising unit 8.

[0024] Shown in Fig. 3 is a front vertical profile 18 of the preliminary track position resulting from tamping of the track 2. This front vertical profile 18 is known from measuring values recorded by the tamping machine and transferred to the control device 14. Should this not be the case, then the front vertical profile 18 can be traced by means of the longitudinal pendulum 15 provided at the front on-track undercarriage 3 and equidistant measurements, and stored. Reaching back over a length of at least 10 meters, a front compensation straight line 19 is formed by calculation. Along the latter, the front tracing point 11 is guided by calculation in order to thereby prevent the residual faults from having any negative influence upon the measuring system 10.

[0025] As visible in Fig. 4, a target straight line 20 extending parallel to the front compensation straight line 19 and defining the target position after operation of the stabilising unit 8 is formed for the section a (Fig. 1) of the track 2. The difference between said target straight line 20 and the front vertical profile 18 yields the respective settlement h for the lowering the track 2. In order to realize this varying settlement h, either the frequency for the unbalanced mass of the vibration drive or the distance of the unbalanced mass relative to the axis of rotation is altered. Thus, a difference, determined at the middle tracing point 11, between the target position and the actual position of the track 2 is used as a control variable for changing the dynamic striking force.

We Claim:

1. A method for the controlled lowering of a track (2), in which the latter is set in transverse vibrations with the aid of dynamic striking forces and loaded with a vertical static load, wherein a settlement (h) defining the lowering of the track is controlled by a measuring system (10), tracing the track position, which has a measuring chord (12) extending in the longitudinal direction of the machine and comprising tracing points (11) rolling on the track (2), comprising the following method steps:

a) at a rear said tracing point (11), with regard to the working direction (6), of the measuring system (10), a longitudinal inclination (α) of the track (2) is detected in connection with a distance measurement and stored,

b) from the stored values for the longitudinal inclination (α) and the distance measurement, a current vertical profile (18) of the track (2) is formed for a length of track reaching back at least 10 meters from the rear tracing point (11) with regard to the working direction (6), and a rear compensation straight line (17) is calculated which is superimposed upon the vertical profile (16) and renders a target track position,

c) the rear tracing point (11) is guided by calculation along the rear compensation straight line (17) so that a compensation value for the position of the measuring chord (12) ensues at a middle said tracing point (11) positioned between the rear tracing point (11) and a front said tracing point (11).

2. A method according to claim 1, characterized by the following method steps:

a) at the front tracing point (11), with regard to the working direction (6), of the measuring system (10), the longitudinal inclination (α) of the track (2) is detected in connection with a distance measurement and stored,

b) from the detected and stored values for the longitudinal inclination (α) and the distance measurement, a current vertical profile (18) is formed for a length of track reaching back at least 10 meters from the front tracing point (11) with regard to the working direction (6), and a front compensation straight line (19) is calculated which is superimposed upon the vertical profile (18) and renders a target track position,

c) the front tracing point (11) is guided by calculation along the front compensation straight line (19) so that a corresponding compensation value for the position of the measuring chord (12) ensues at the middle tracing point (11).

3. A method according to claim 1 or 2, characterized in that a difference, determined at the middle tracing point (11), between the actual position and the target position of the track (2) is used as a control variable for altering the dynamic striking force.

4. A machine for the controlled lowering of a track, comprising a stabilising unit (8), arranged between on-track undercarriages (3) and provided for form-fitting application to the track (2) and producing dynamic striking forces, and a measuring system (10) for detecting a longitudinal inclination (α) of the track (2), the measuring system comprising a front tracing point (11) and rear tracing point (11), with regard to

a working direction (6), each for rolling on the track (2), a middle tracing point (11) positioned between the former, and an odometer (13) , further wherein:

a) a longitudinal pendulum (15) for detecting the longitudinal inclination (α) of the track (2) is provided on a rear said on-track undercarriage (3) with regard to the stabilising unit (8),

b) a control device (14) is provided for storing the longitudinal inclination (α) and for forming a current vertical profile (16) and for determining, by calculation, a rear compensation straight line (17) which is superimposed upon the current vertical profile (16) and renders a target position.

5. A machine according to claim 4, characterized in that, on a front said on-track undercarriage (3) with regard to the stabilising unit (8), a longitudinal pendulum (15) for detecting the longitudinal inclination (α) of the track (2) is provided, and that a control device (14) is designed for storing the longitudinal inclination (α) and for forming a current vertical profile (18) and for calculating a front compensation straight line (19) which is superimposed upon the current vertical profile (18) and renders a target position.

6. A machine according to one of claims 4 or 5, characterized in that two longitudinal pendulums (15), spaced from one another in the transverse direction of the track, for detecting the longitudinal inclination (α) of the track (2) are provided on each on-track undercarriage (3).

7. A machine according to any one of claims 4, 5 or 6, characterized in that a distance (a) between the middle tracing point (11) and the front tracing point (11) of the measuring system (10) is smaller than a distance (b) between the middle tracing point (11) and the rear tracing point (11).

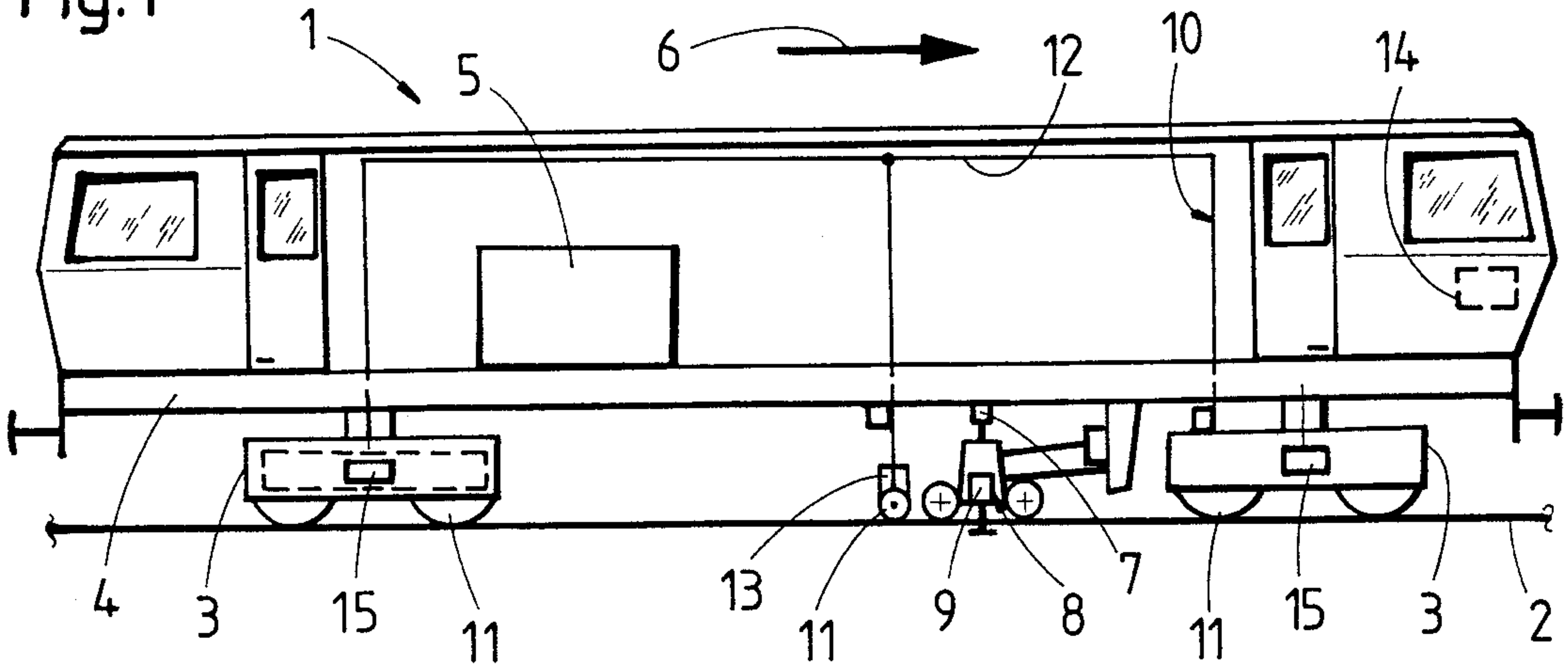


Fig.1

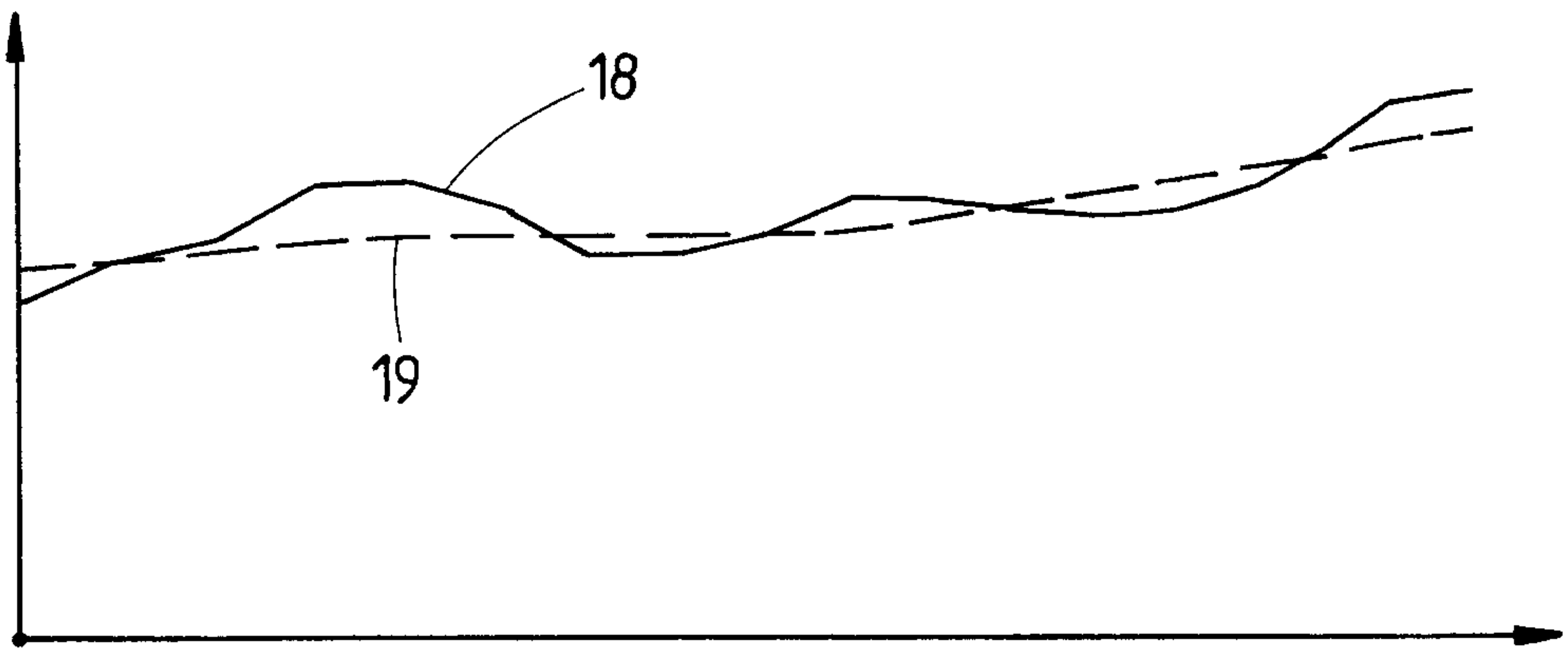


Fig. 3

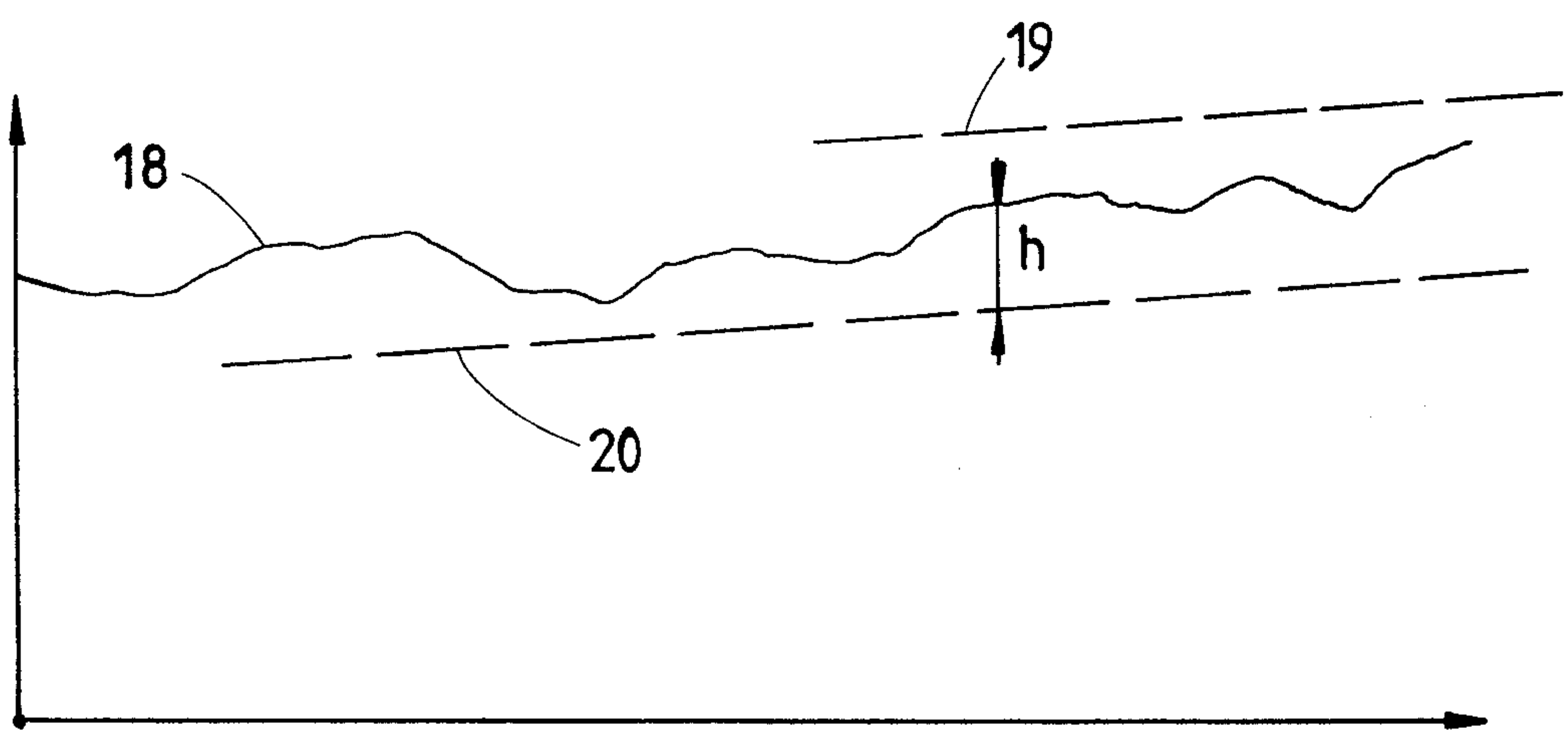


Fig. 4

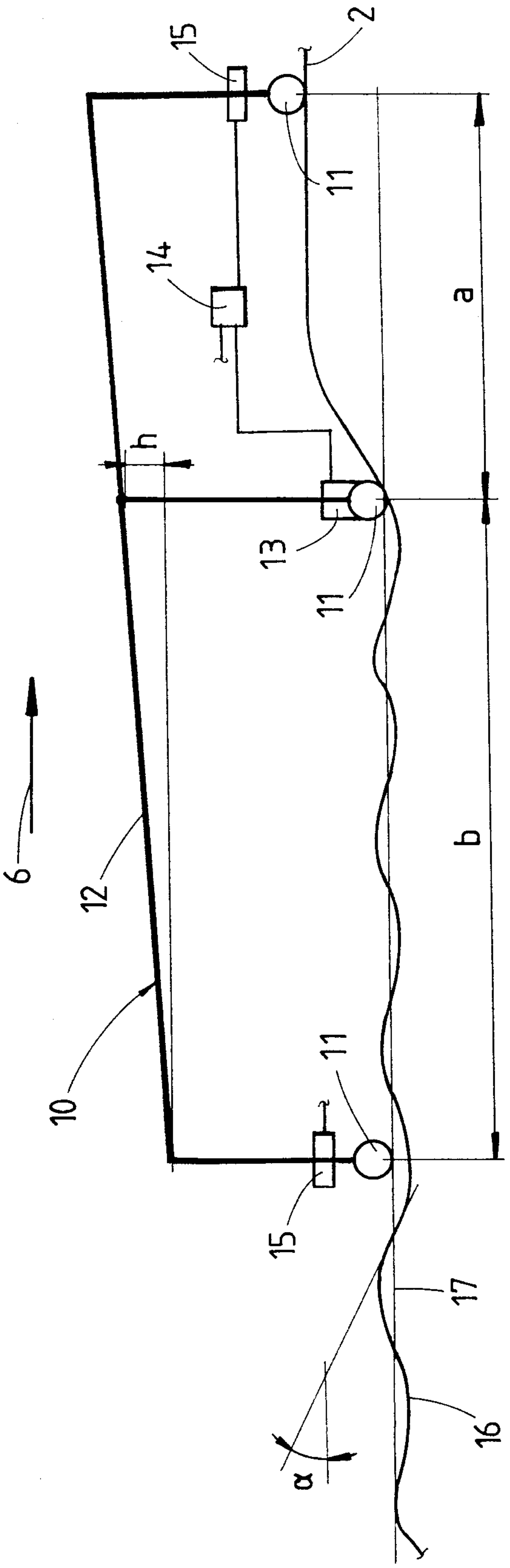
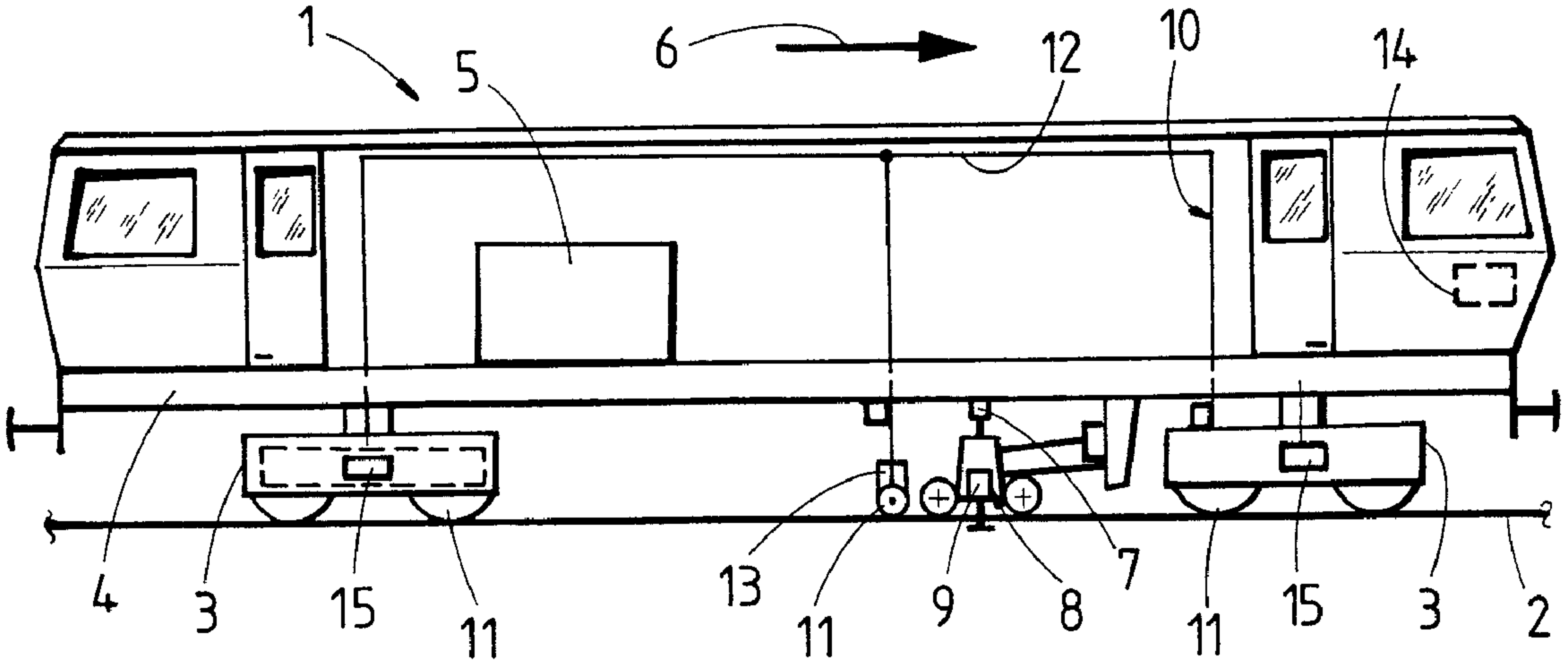


Fig. 2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