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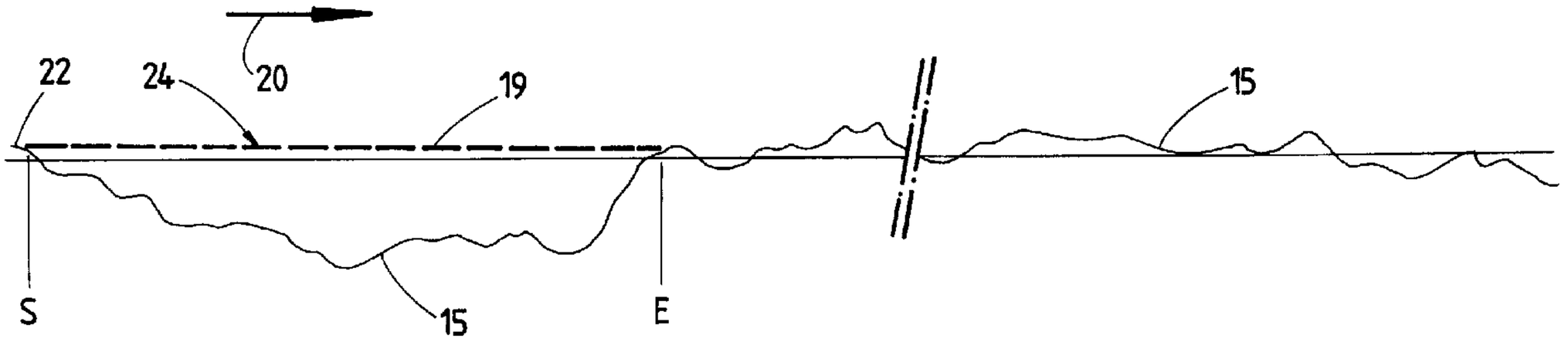
(54) Titre : METHODE DE CORRECTION DE LA POSITION D'UN RAIL
(54) Title: A METHOD OF CORRECTING THE POSITION OF A TRACK



(57) Abrégé/Abstract:
A track position correction of a track is carried out while surveying separately the vertical position faults of both rails and concentrating the correction operations on extreme deviations from the desired values. These are lifted, while being delimited by starting and end point (S,E), to a desired vertical position (19) determined electronically and conforming to the adjoining, uncorrected track sections (22).

ABSTRACT

A track position correction of a track is carried out while surveying separately the vertical position faults of both rails and concentrating the correction operations on extreme deviations from the desired values. These are lifted, while being delimited by starting and end point (S,E), to a desired vertical position (19) determined electronically and conforming to the adjoining, uncorrected track sections (22).

A method of correcting the position of a track

The invention relates to a method of correcting the position of a track composed of rails and sleepers.

In an article "Leitcomputer für Stopfmaschinen" in the technical periodical "Der Eisenbahningenieur" 44 (1993) 9, pages 570-574, a modern computing unit called "ALC" for carrying out an optimal track position correction is described in detail. In addition to guiding the tamping machine in accordance with a known desired geometry of the track, there is also the possibility to guide the tamping machine with unknown desired geometry. To do so, a measuring run is carried out with the tamping machine before the track position correction and, with the aid of an electronic versine compensation, a desired track position with corresponding correction values is obtained from the surveyed actual track geometry.

The object of the present invention is to provide a method of track position correction which is particularly suited for optimal elimination of extreme track position faults which are confined to only short track sections.

According to the invention, this object is achieved with a method characterized by the following steps:

a) surveying, independently of one another, the left and right rail of a track section for determining and recording an actual vertical position by means of a computing and controlling unit,
b) electronically smoothing vertical position faults exceeding a selectable tolerance limit, thus forming a desired vertical position,
c) locating a track correction section, intended for the position correction into the determined desired vertical position, within the surveyed track section by establishing a starting and end point (S,E) for the position correction,
d) positioning a tamping unit of a tamping machine precisely at the starting point (S) of the determined track correction section,
e) limiting the rail lift at the starting point (S) to the vertical position of the uncorrected track section adjoining the starting point (S), and

f) carrying out the track position correction while lifting and tamping both rails of the track independently of one another into the determined desired vertical position.

With this combination of steps of the method it is possible, while avoiding an expensive correction of the entire stretch of track, to treat only relatively short problem sections, afflicted with extreme faults which cannot be tolerated any more, in such a way that, on the one hand, a durable elimination of the extreme faults and, on the other hand, also an optimal conformance of the corrected section with the average actual position of the adjoining untreated track section can be achieved. It is essential in this context to develop a separate desired position for both rails independently of one another, particularly in track curves with superelevations, in order to thereby avoid dangerous twisting faults after the track position correction.

Further embodiments and advantages of the invention become apparent from the drawing.

The method according to the invention will be described in more detail below with reference to the drawing in which

Fig. 1 shows a side view of a tamping machine, and

Fig. 2 to 6 each show a simplified schematic representation of actual and desired position curves of a track section.

The tamping machine 1 shown in Fig. 1 has a machine frame 3 supported on on-track undercarriages 2 and is mobile on a track 6 composed of rails 4 and sleepers 5. For carrying out the track position correction, an independently vertically adjustable tamping unit 7 and track lifting and lining unit 8 are provided per rail 4, respectively. Provided for the track surveying is a reference system 10, designed to roll on the track 6 by means of tracer rollers 9, which comprises for each rail 4 a reference chord 11, extending in the longitudinal direction of the machine, for tracing the vertical position and a

further, central reference chord 12 for tracing the lateral position of the track 6. For recording an actual track position and computing a desired position, an electronic computing and controlling unit 13 with a monitor 14 is provided.

Shown in Fig. 2 and 3 is an actual vertical position 15,16 of the left and right rail 4, respectively. A line 17 visible in Fig. 2 indicates the theoretical desired superelevation position of the left rail 4. In Fig. 3, an extreme deviation of the actual vertical position 16 from the desired position is shown. If this track section were to be corrected in the conventional way, the actual position of the left rail shown in Fig. 2 would automatically be raised into the theoretical desired position, represented by dash-dotted line 18, via a transverse inclinometer with reference to the right rail 4. Due to the independent surveying and track position correction, according to the method, of the two rails 4, only the right rail shown in Fig. 3 is raised into a desired vertical position 19 (conforming to the adjoining, uncorrected track regions), while the superelevated left rail lying opposite in this region remains unchanged in the still acceptable actual vertical position 15. The desired vertical position 19 is achieved, after surveying the actual vertical position 15, with the aid of the computing and controlling unit 13 by means of a known electronic versine compensation (electronic smoothing). In case the superelevated rail, for example, shows a vertical position fault which is not acceptable any more, said rail is also adapted to conform to the superelevation position of the adjoining rail sections. The transverse inclinometers located on the machine 1 only serve for information about the existing superelevation and have no influence on the control of the machine or the track position correction.

The method according to the invention will be described in more detail below with particular reference to Figs. 4 to 6.

The first operational step consists of a measuring run of the tamping machine 1 in the direction represented by an arrow 20, during which the actual vertical positions 15,16 of the right and left rail 4 (Fig. 5 and Fig. 4) are registered independently of one another and recorded in the computing and controlling unit 13. Following this, vertical position faults which exceed a selectable tolerance limit are determined by the controlling and computing

unit 13 and smoothed according to a known electronic versine compensation method, thus forming a desired vertical position 19, and are shown on the monitor 14.

Those track correction sections 24 which now are to undergo a track position correction are delimited either manually or automatically by electronically defining a starting and end point S and E. Thereafter, the tamping machine 1 is moved to the first starting point S (Fig. 4) until the tamping unit 7 is positioned exactly above the starting point S. This exact positioning can be closely followed on the monitor 14 (Fig. 6) by the operator since a cursor line 21 moves in the longitudinal direction of the track synchronously to the motion of the tamping machine 1 relative to the track 6 or relative to the actual and desired vertical position, likewise visible on the monitor 14. Additionally, a mileage indication 23 of the track 6 can be seen.

After the exact positioning, to be accomplished easily in this manner, of the tamping unit 7 at the starting point S, only the left tamping unit 7 is lowered for carrying out the track position correction, wherein naturally also only the left rail 4 is raised by the track lifting and lining unit 8 into the desired vertical position 19 determined by the electronic smoothing.

Since, along with the start of the track position correction, the distance measurement for the right rail 4 automatically also begins, the right tamping unit 7 can also be lowered automatically, after reaching the starting point S for the right rail 4 (see Fig. 5), to begin the track position correction. As soon as the end point E for the respective rail 4 is reached, the track position correction is terminated.

The method according to the invention has the advantage that the track position correction operations can be finished relatively quickly by concentrating on extreme track position faults, wherein in an advantageous way the uncorrected track sections continue to remain in their highly compacted, stabilized position comprising merely slight, acceptable track position faults.

In this connection, it is also essential that the rail lift at the starting point S, initiating the track position correction, is limited to the vertical position of the uncorrected track section 22 adjoining the starting point S. In order to overlift the single faults because of greater durability, there has to be a prescribed superelevation not only for the reference rail but also for the superelevated rail 4. Depending on the magnitude of the vertical position fault, there is the possibility of normal tamping, double or triple tamping as well as high pressure tamping. Normally, the first sleepers following the starting point S are normal-tamped, then double-tamped in the vicinity of the maximum of the vertical position fault, wherein high pressure is additionally switched on depending on the fault magnitude and also on the sleeper type. As soon as the vertical position fault becomes smaller again when approaching the end point E (the operator sees the position thereof with regard to the vertical position fault on the monitor 14), normal tamping ensues until the end point E is reached. After the track position correction, an acceptance measuring run is carried out with the tamping machine 1.

If, by a preceding precision measurement of the vertical position faults (by means of a combined level-line laser present on the machine or by means of EM-SAT or by means of manual-optical methods), the determined lifting correction values are used, then these are to be entered into the computing and controlling unit 13 separately for the left or right rail 4 for machine control according to the invention, as opposed to a known machine control.

Claims

1. A method of correcting the position of a track (6) composed of rails (4) and sleepers (5), **characterized by** the following steps:

a) surveying, independently of one another, the left and right rail (4) of a track section for determining and recording an actual vertical position (15) by means of a computing and controlling unit (13),

b) electronically smoothing vertical position faults exceeding a selectable tolerance limit, thus forming a desired vertical position (19),

c) locating a track correction section (24), intended for the position correction into the determined desired vertical position (19), within the surveyed track section by establishing a starting and end point (S,E) for the position correction,

d) positioning a tamping unit (7) of a tamping machine (1) precisely at the starting point (S) of the determined track correction section (24),

e) limiting the rail lift at the starting point (S) to the vertical position of the uncorrected track section (22) adjoining the starting point (S), and

f) carrying out the track position correction while lifting and tamping both rails (4) of the track (6) independently of one another into the determined desired vertical position (19).

2. A method according to claim 1, characterized in that the actual vertical position (15,16) of the left and right rail (4) is recorded independently of one another and represented graphically on a monitor (14).

3. A method according to claim 1 or 2, characterized in that the operating modes: normal, double or triple tamping or high pressure tamping are automatically selected in dependence upon the difference between actual and desired vertical position (15,19).

4. A method according to claim 1, 2 or 3, characterized in that the electronic smoothing of the surveyed actual vertical position (15) is achieved by means of a versine compensation method.

5. A method according to any one of claims 1 to 4, characterized in that the respective position of the tamping unit (7) relative to the track (6) is indicated on the monitor (14).

Fig.1

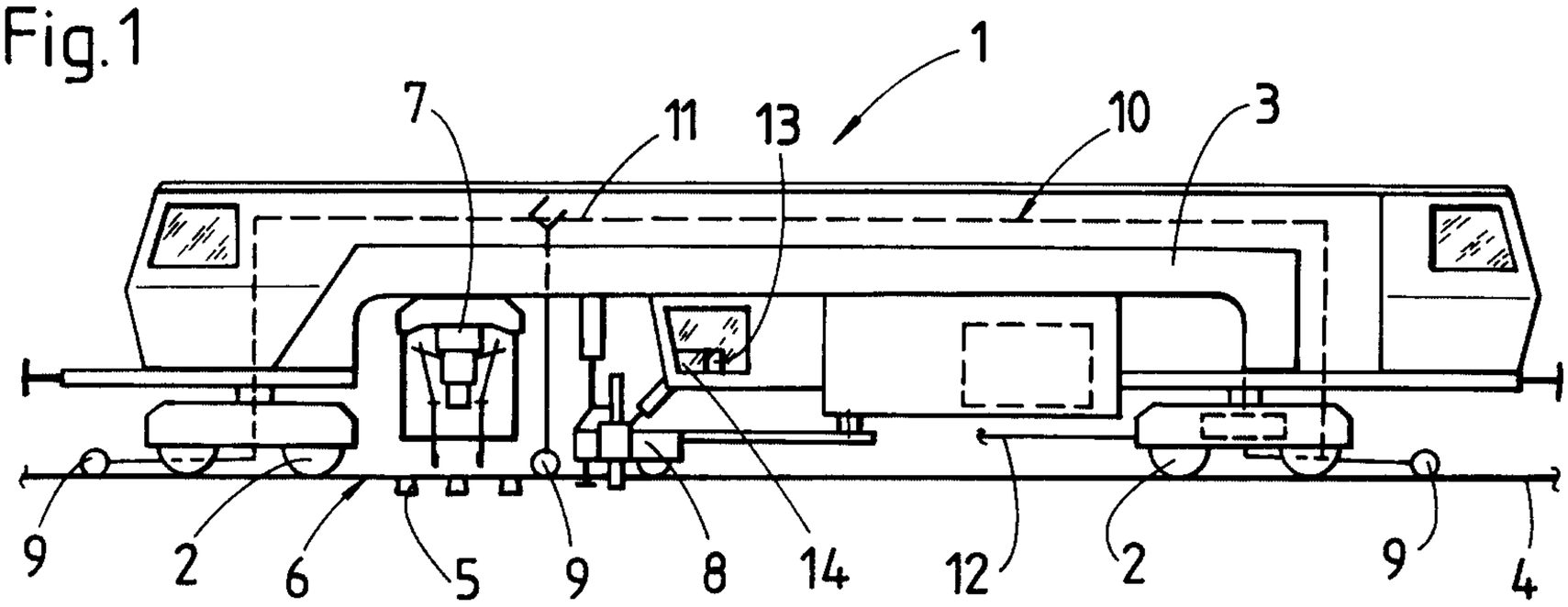


Fig.2

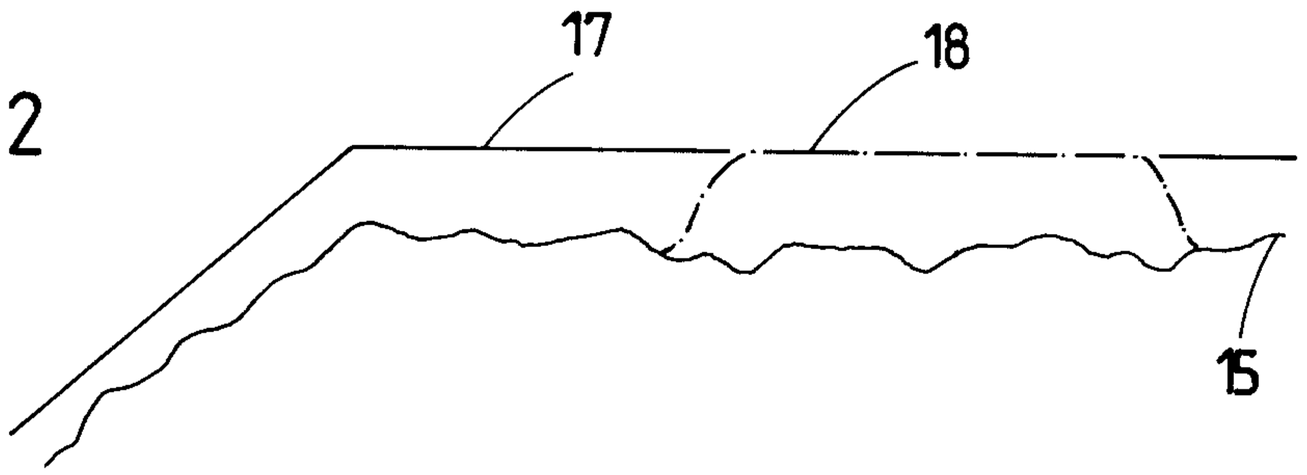


Fig.3

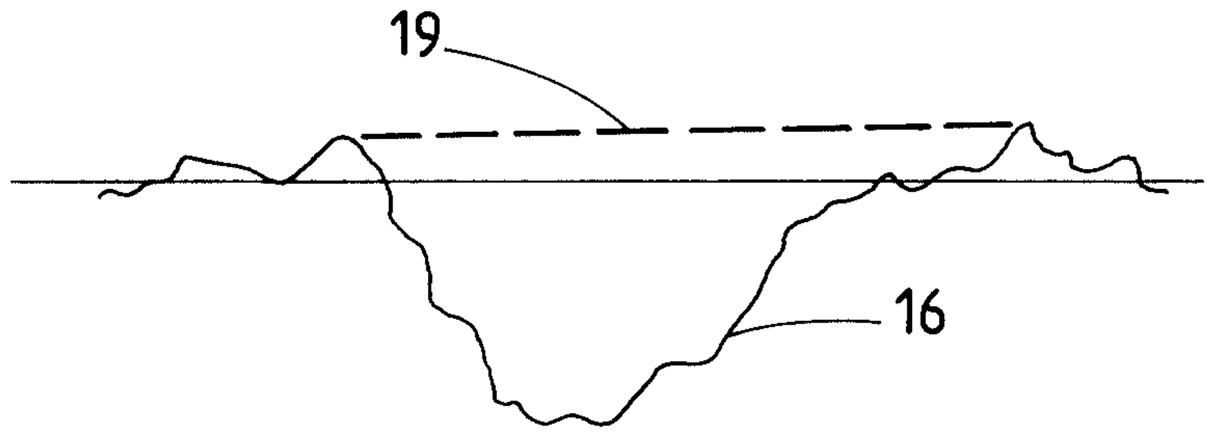
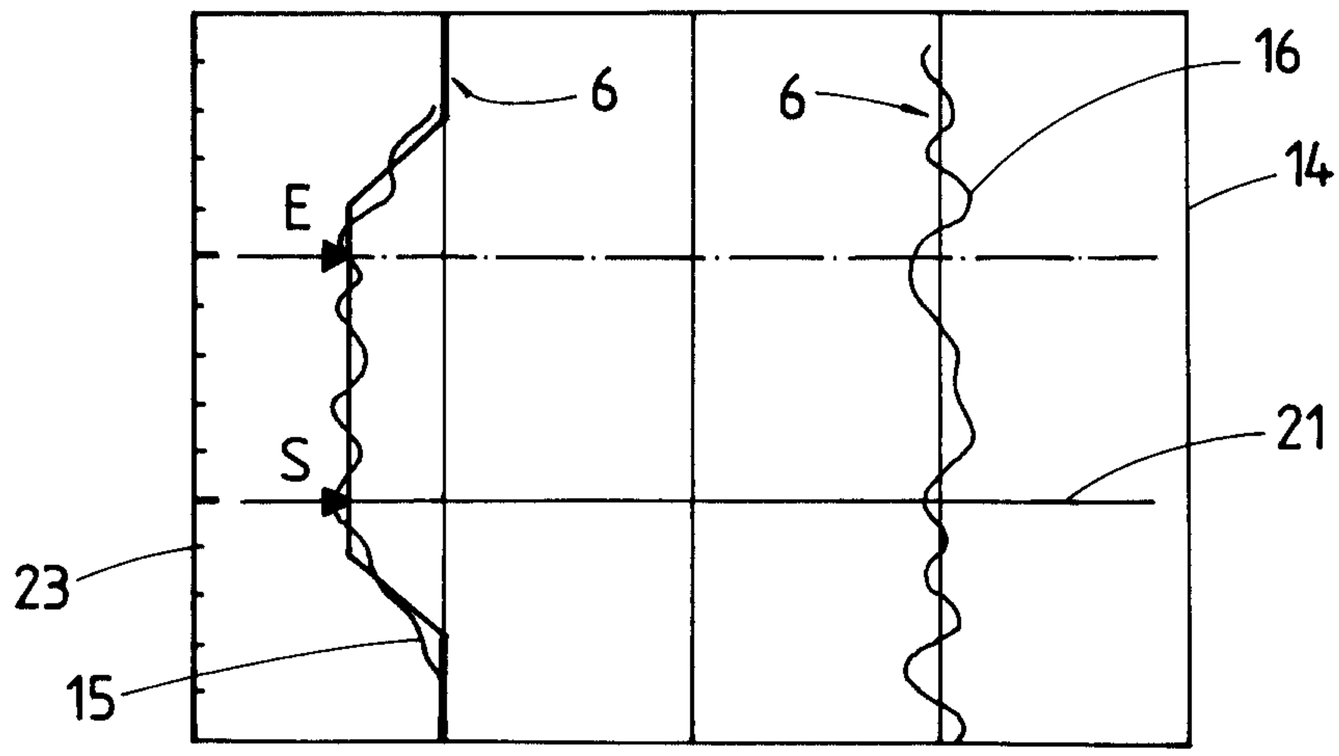


Fig.6



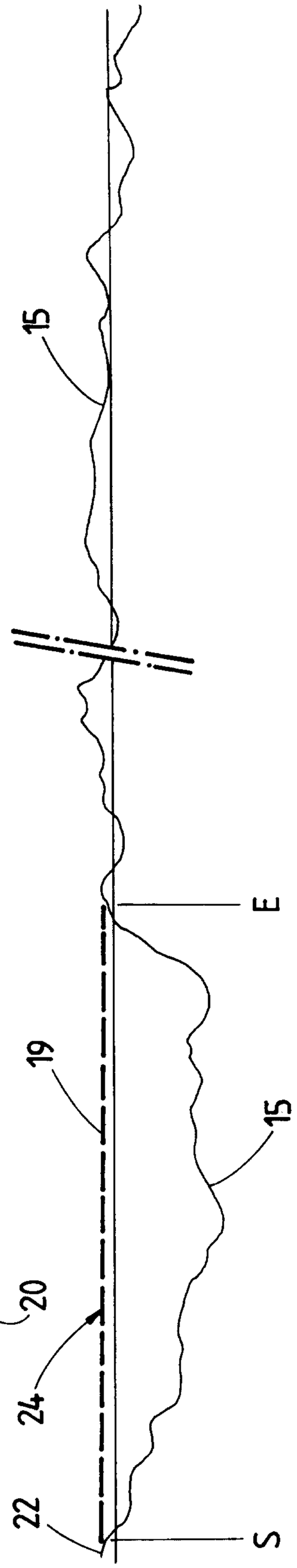


Fig.4

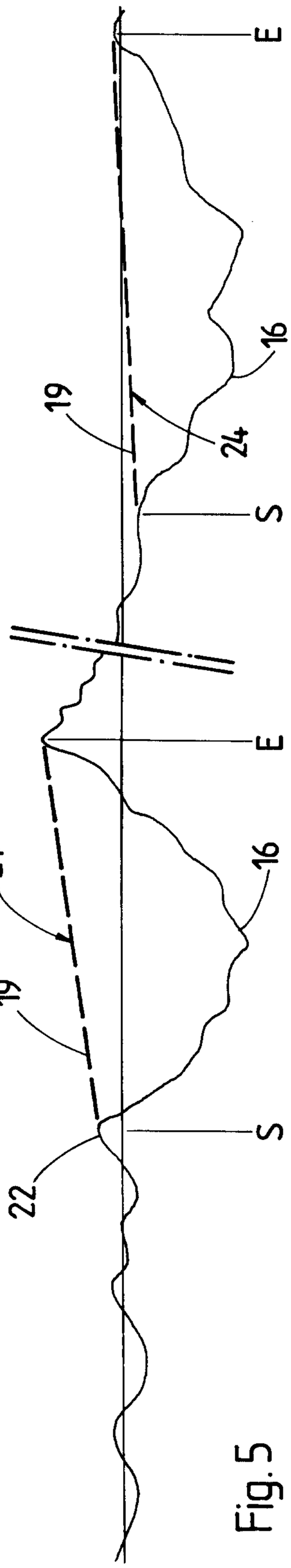
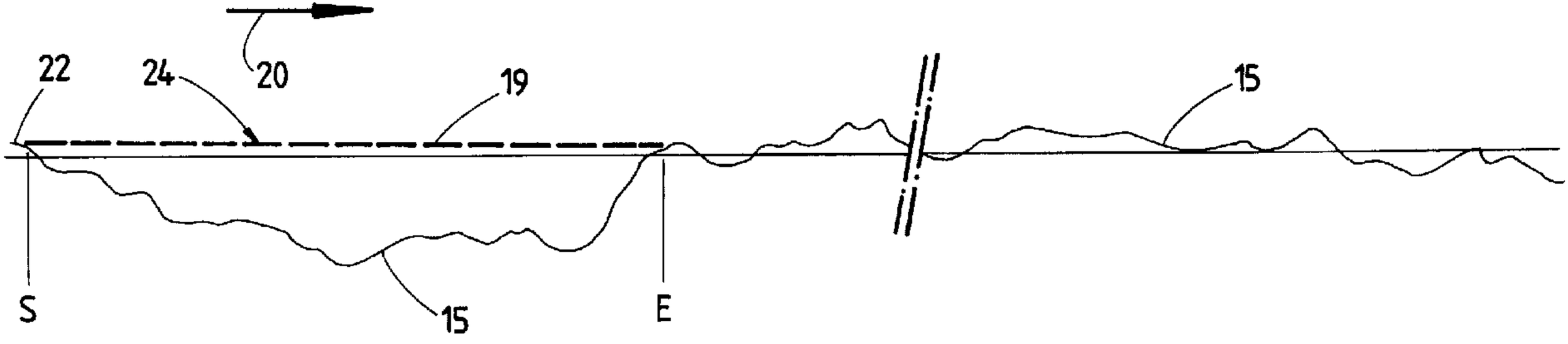


Fig.5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