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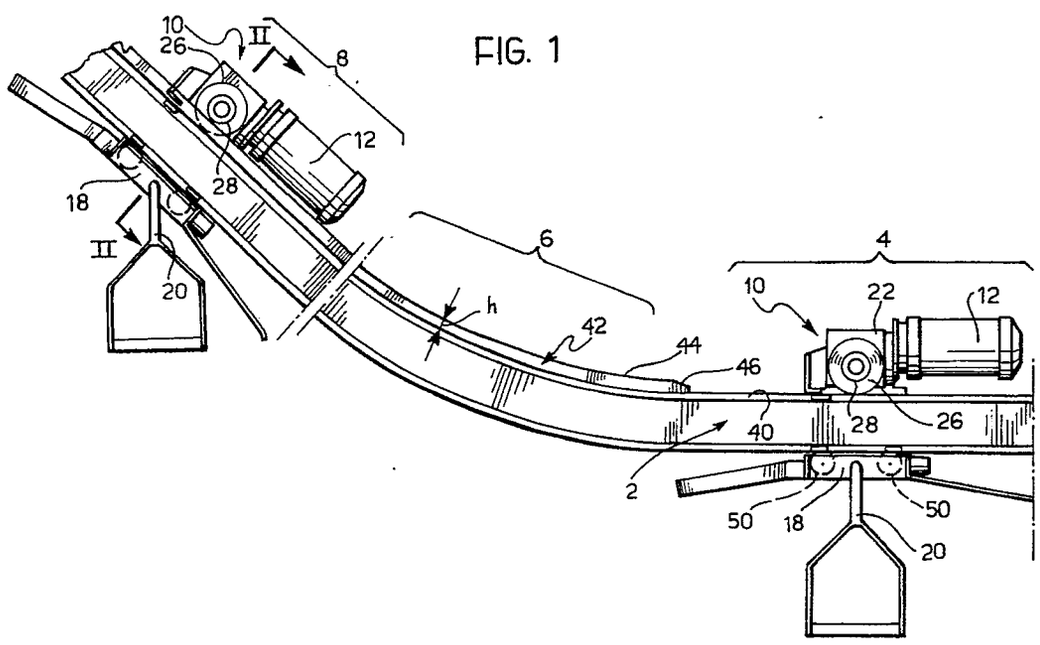
(54) Monorail conveyor system and a motor-driven carriage for the system.

(57) A monorail conveyor system includes at least one motor-driven carriage (10) provided with two drive wheels (26,28) with different rolling radii fixed together coaxially. The smaller-diameter drive wheel (28) is intended to roll on a raised track (42) located in correspondence with rail portions in which it is necessary to reduce the speed of the carriage.

FIG. 1



EP 0 442 248 A1

MONORAIL CONVEYOR SYSTEM AND A MOTOR-DRIVEN CARRIAGE FOR THE SYSTEM

The present invention relates to a motor-rail conveyor system including at least one motor-driven carriage having a drive wheel which rolls on a track of the rail.

In monorail conveyor systems, particularly overhead conveyor systems, there is a problem of changing the speed of the carriage on certain portions of the monorail, for example on rising sections or around bends. Indeed it is advantageous to reduce the speed of the carriage in order to allow the latter to travel up a rising portion without the need to provide the carriage with an excessively powerful electric motor which is consequently heavy and expensive.

The object of the present invention is to provide a conveyor system of the type specified at the beginning in which the carriage is able to reduce its own speed automatically on predetermined portions of the track.

According to the present invention this object is achieved by the provision of a conveyor system of the type defined above, characterised in that at least one portion of the rail has a second track alongside the first and spaced therefrom in a direction perpendicular to the axis of rotation of the drive wheel and in that the carriage has a second drive wheel fixed coaxially to the first for rolling on the second track, the second wheel having a rolling radius which is less than that of the first wheel and such that the sum of the rolling radius of the second wheel and the distance between the first and second tracks in a direction perpendicular to the axis of rotation of the drive wheels is greater than the rolling radius of the first wheel.

As will be explained in the description which follows, on flat portions, the carriage moves at high speed by virtue of the engagement of the larger-diameter wheel with the first track. On rising portions, on bends or wherever it is necessary to reduce the speed of the carriage, the smaller-diameter drive wheel encounters and engages the second track and hence the carriage reduces speed automatically without the need to change the speed of rotation of the motor or the transmission ratio of the gear system.

According to another aspect, the present invention relates to a motor-driven carriage for use in a monorail conveyor system, including a drive wheel intended to roll on a first track of the rail, characterised in that it includes a second drive wheel fixed coaxially to the first and having a rolling radius which is smaller than that of the latter, the second drive wheel being intended to roll on a second track of the rail alongside the first track and spaced therefrom in a direction perpendicular to the axis of rotation of the drive wheels of the carriage.

Further characteristics and advantages of the present invention will become apparent from the detailed description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a side view of a portion of an overhead monorail conveyor system according to the present invention,

Figure 2 is a section taken on the line II-II of Figure 1 on an enlarged scale, and

Figure 3 is a view taken on the arrow III of Figure 2.

Figure 1 shows part of an overhead monorail conveyor system in which the rail 2 extends along a flat portion 4, a connecting portion 6 and a rising portion 8.

A plurality of carriages 10 can run on the monorail and each of these has an electric motor 12, for example a three-phase induction motor, which drives the carriage along the monorail 2.

As can be seen in greater detail in Figure 2, the rail 2 has a double-T section and is supported by a plurality of brackets 14. On one side of the rail 2 is a bar 16 which is contacted by a plurality of brushes (not illustrated) carried by the carriage 10, the brushes carrying the electricity supply and any control signals to the electric motor 12. Each carriage 10 includes a basic structure 18 which is generally C-shaped in cross-section. As can be seen in Figure 1, a load-support structure 20 is articulated to the lower arm of the structure 18. The upper part of the structure 18 carries a gearbox 22 (for example of the helical wheel and worm wheel type) on which the electric motor 12 is cantilevered.

A pair of drive wheels which are fixed coaxially together are keyed to the output shaft 24 of the gearbox 22 and are indicated 26 and 28 respectively. The drive wheel 26 has a rolling radius R_1 about twice that of the rolling radius R_2 of the wheel 28. The wheel 26 has a hub 30 keyed to the shaft 24 of the gearbox 22 by a key 32. The hub 30 carries two circumferential bands 34, 36 of polyurethane material, preferably of the type known by the trade name VULKOLLAN, which constitute the wheels 26 and 28.

As can be seen in Figure 2, the rail beam 2 has an upper, active portion 38 with a width substantially equal to that of the two adjacent drive wheels 26, 28. The active portion 38 of the beam 2 can be seen to include a first track 40 on which the drive wheel 26 will roll. Along the rising portions of the rail 2, such as that indicated 8 in Figure 1, and

also along the connecting portions 6, a profiled section 42 is located on the rail 2 and extends parallel to the first track 40. The upper surface of the profiled section 42 constitutes a second track 44 on which the smaller-diameter wheel 28 is intended to roll. The second track 44 is spaced from the first track 40 by distance H equal to the height of the profiled section 42. As seen in Figure 2, the sum of the rolling radius R_2 of the wheel 28 and the height h of the profiled section 42 is greater than the rolling radius R_1 of the first wheel 26. Consequently, when the wheel 28 rolls on the second track 44, the larger-radius wheel 26 is inactive. As seen in Figure 1, the profiled section 42 has an inclined connecting portion 46 at each end (only one of which is visible in the drawing) on which the changeover from one drive wheel to the other occurs.

Each carriage 10 also has a series of vertical-axis guide wheels 48 which bear against opposite sides of the rail 2. The lower part of the carriage 10 carries a pair of wheels 50 which are spaced apart in the direction of the rail 2 and intended to bear against and to roll on a surface of the latter opposed to the active portion 38.

The carriages 10 move at high speed along the flat portions of the rail 2 since the larger-radius wheel 26 rolls on the first track 40 of the rail 2. When the smaller-radius wheel 28 encounters the profiled section 42, the velocity of the carriage 10 falls automatically although the rate of rotation of the electric motor 12 remains almost constant. Thus, even a relatively small-power motor suffices to drive the carriage and its load up the rising portions.

Naturally, the principle of the invention remaining the same, the constructional details and forms of embodiment may be varied widely with respect of that described and illustrated without thereby departing from the scope of the present invention.

Claims

1. A monorail conveyor system including at least one motor-driven carriage (10) having a drive wheel (26) which rolls on a track (40) of the rail (2), characterised in that at least one portion (6, 8) of the rail (2) has a second track (44) alongside the first and spaced therefrom in a direction perpendicular to the axis of rotation of the drive wheel (26), and in that the carriage (10) has a second drive wheel (28) fixed coaxially to the first for rolling on the second track (44), the second wheel (28) having a rolling radius (R_2) which is less than that of the first wheel (26) and such that the sum of the rolling radius (R_2) of the second wheel (28) and the distance (h) between the first and second tracks (40, 44) in a direction perpendicular to the axis of rotation of the drive wheels (26, 28) is greater than the rolling radius (R_1) of the first wheel (26).

2. A system according to Claim 1, characterised in that the first and second wheels (26, 28) are side by side and in that the rail (2) has an active portion (28) with a width substantially equal to the width of the two adjacent drive wheels.

3. A system according to Claim 2, characterised in that the said second track (44) is constituted by the upper surface of a profiled section (42) fixed to the rail (2) alongside the active portion of the latter which forms the first track (40).

4. A system according to Claim 1, characterised in that the second track (44) is disposed in correspondance with rising portions of the monorail (2).

5. A system according to Claim 3, characterised in that the profiled section (42) which forms the second track 44 has an inclined connecting portion(46)at each end.

6. A motor-driven carriage for use in a monorail conveyor system, including a drive wheel (26) intended to roll on a first track (40) of the rail (2), characterised in that it includes a second drive wheel (28) fixed coaxially to the first and having a rolling radius (R_2) which is smaller than that of the latter, the second drive wheel (28) being intended to roll on a second track (44) of the rail (2) alongside the first track (40) and spaced therefrom in a direction perpendicular to the axis of rotation of the drive wheels (26, 28) of the carriage (10).

7. A carriage according to Claim 6, characterised in that the first wheel (26) has a hub (30) with an elongate portion on which the second wheel (28) is fixed.

8. A carriage according to Claim 6, characterised in that it includes a basic structure (18) with a generally C-shaped, cross-section, which carries a series of guide wheels (48) with axes perpendicular to the axis of rotation of the drive wheels (26, 28) for bearing against opposite sides of the rail (2), and in that it includes a pair of wheels (50) with axes parallel to the axis of rotation of the drive wheels (26, 28) for rolling against a surface of the rail (2) opposed to the said track (40, 44).

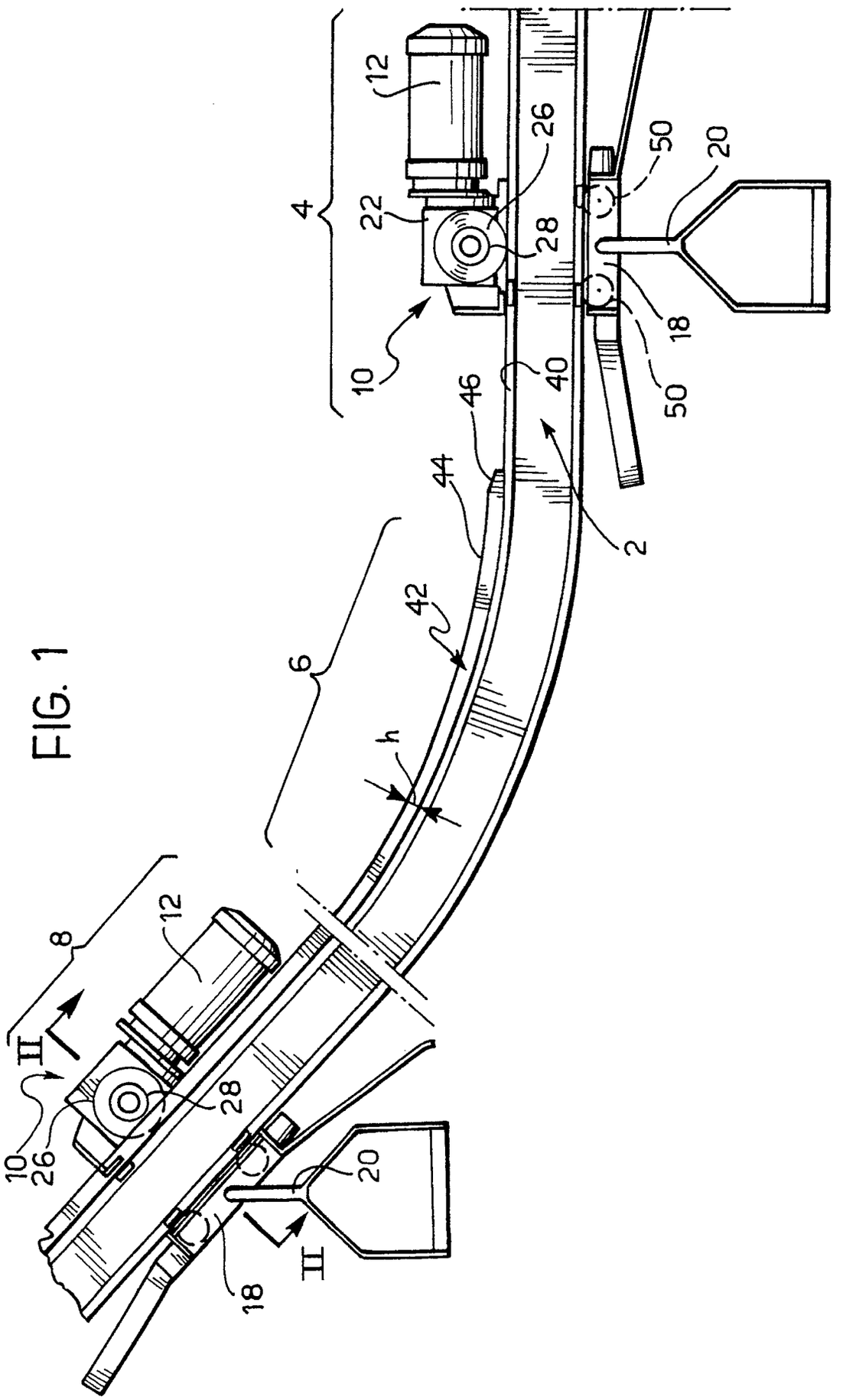
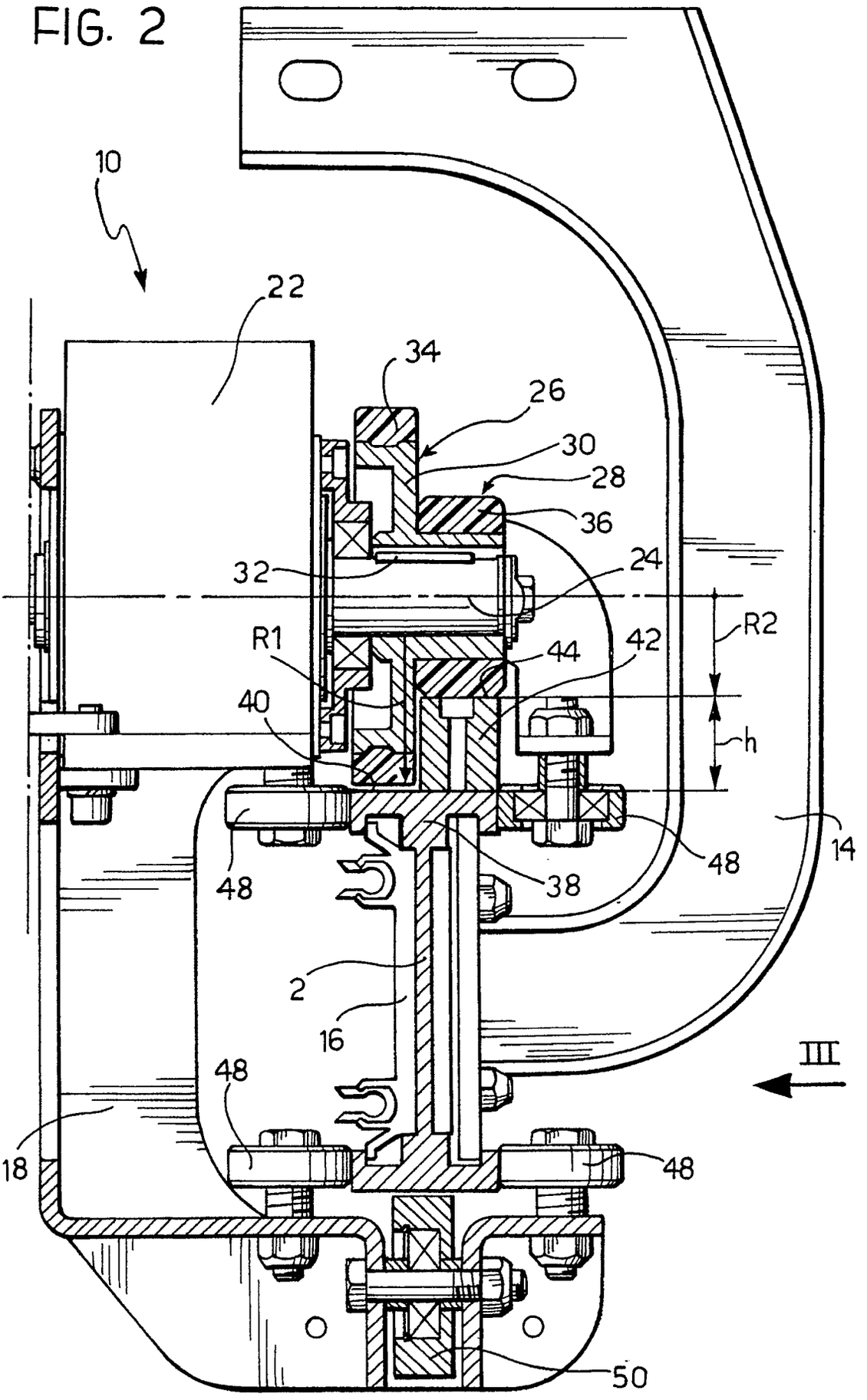


FIG. 1

FIG. 2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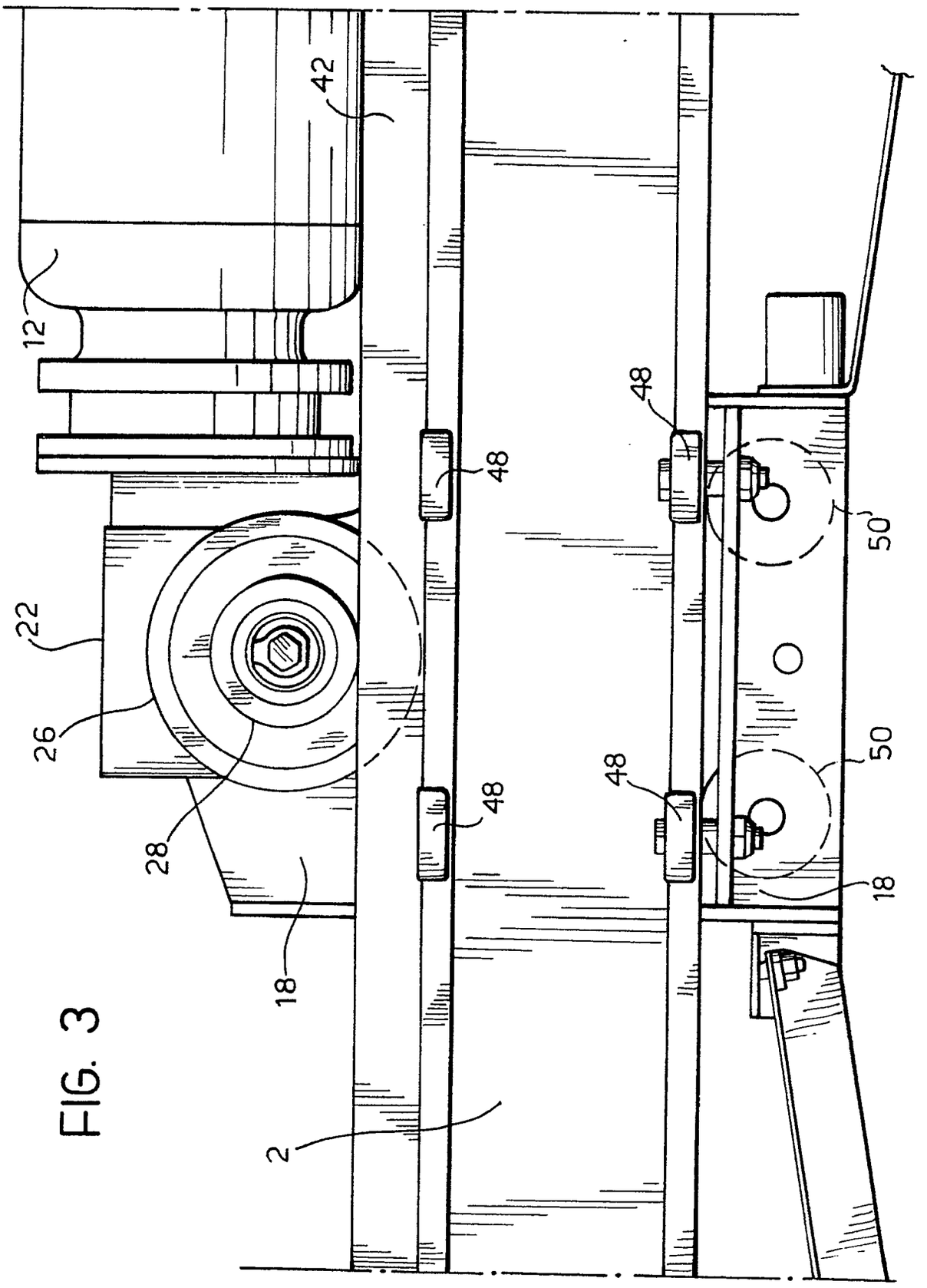

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0592

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-3 243 914 (SIEMENS AG) * page 5, lines 8 - 16; figure 1 *	1-4,6	B 61 B 13/04 B 61 B 3/02 E 01 B 25/24
A	EP-A-0 070 410 (G. UTTSCHEID) * claim 1; figure 1 *	1-4,6,7	
A	DE-A-3 708 175 (ZENITH - MASCHINENFABRIK GMBH) * column 1, line 64 - column 2, line 31; figure 1 *	1-4,6,7	
A	BE-A-5 109 16 (A. WULLSCHLEGER) * page 2, lines 4 - 51; figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 61 B
E 01 B
B 61 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	13 May 91	CHLOSTA P.

CATEGORY OF CITED DOCUMENTS

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