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## 54 An apparatus for counting a series of articles.

57 A counting apparatus for an unbroken series of articles (K) has been described.

According to the invention the counting mechanism (14) comprises an endless moving around counting member (15) comprising dogs (16) operated by the articles (K), the mutual distance of said dogs being smaller than the length of the articles

and larger than the half of said length.

Furthermore, in the conveyor path (8) of the articles (K) two spaced guides (30) for the articles have been installed, which guides restrict the width of said conveyor path (8) to a size which is somewhat larger than the width (B) of the articles.

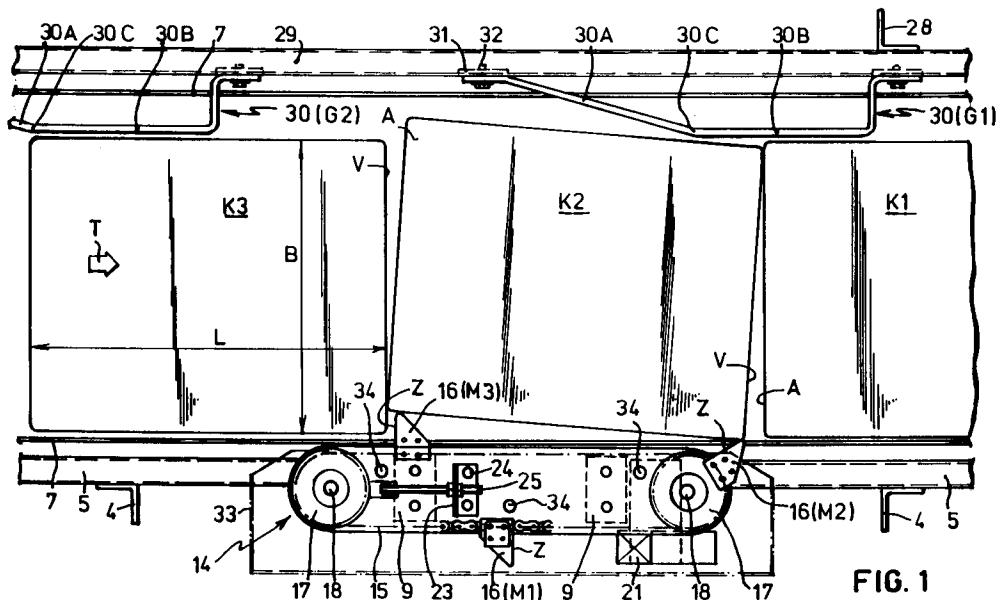


FIG. 1

The present invention relates to an apparatus for counting a series of articles supplied on a conveyor, which apparatus comprises a counting mechanism operated by the articles.

Applicants are familiar with such an apparatus from their own experience. In such an apparatus the articles are counted by means of a counting mechanism consisting of a photoelectrical cell having a transmitter and a receiver, in which the beam of light between said transmitter and receiver is each time interrupted by the articles and in this way said articles are counted. Although such a counting mechanism works reliably and safely, this known counting apparatus has the disadvantage that the articles should be spaced from one another, otherwise when two or more articles contact one another with their ends they will be counted as one article.

The mutual distance of the articles has a negative effect on the capacity of the counting apparatus, and in addition requires the division of the conveyor on the site of the counting apparatus, the arrangement of the parts of the conveyor spaced from one another and the positioning of a third conveyor in the formed space, which third conveyor runs faster than both parts of the first mentioned conveyor so as to space the articles. One can also space the articles by stopping the articles in front of the counting apparatus for a brief period. The additional, third conveyor and the stopping device render the counting apparatus more expensive and more sensitive to defects.

The invention aims at removing the disadvantages of the known counting apparatus.

According to the invention this is attained; in that the counting mechanism comprises an endless, moving around counting member, in that the counting member is provided with dogs extending into the conveyor path of the articles and the mutual distance thereof, measured along a straight line, being smaller than the length of the articles in the conveying direction and greater than the half of said length, and in that two guides for the articles are mounted in the conveyor path of the articles on the site of the counting member, said guides restricting the width of the conveyor path to a size which is somewhat larger than the width of the articles perpendicular to the conveying direction, which guides are spaced from one another in the conveying direction.

By applying these measures it is attained that the articles with their ends abutting each other, consequently without interval, may be conveyed and counted. For this purpose one neither needs a faster running intermediate conveyor keeping the articles spaced, nor a device for stopping each article for a brief period.

When a first article on the conveyor approaches the counting apparatus, it is moved in transverse direction on the conveyor path by a first guide, so that it with its front end contacts a first dog on the endless counting member and carries the counting member. The first dog on the counting member is now carried by the first article over about the mutual distance of the dogs, so that a second dog on the endless counting member contacts the rear half of the first article in conveying direction, that has passed already the first guide and pushes it in an oblique position on the conveyor path. This causes a part of the front end of a second article, which has already been moved in transverse direction on the conveyor path by the first conduit, to extend outside the rear end of the first article and thereby contacts the second dog and carries said second dog and the endless counting member again over about the mutual distance of the dogs, etc.

In this respect the dogs on the endless counting member are intermittently moved over about the mutual distance of the dogs, and thereby the articles may be counted easily, e.g. by fixing a metal plate to the dogs, which plate passes a fixed inductive switch.

With a preferred embodiment of the counting apparatus according to the invention the guides are two guide rails consisting of a portion, which is obliquely positioned with respect to the conveying direction, and of a portion parallel to the conveying direction, said portions merging into one another in a point, and at the front guide rail in conveying direction, the distance in conveying direction between the mentioned point and the point, where the dogs enter the conveyor path, is smaller than the length of the articles.

Thereby it is attained that each article is brought into an oblique position on the conveyor path at the right moment, in such a way, that the front face of the next article may displace a dog and therewith the counting member.

With a specifically effective embodiment of the counting apparatus according to the invention, the counting member is an endless chain provided with three dogs.

The invention will be further illustrated on the basis of the drawing with an example.

Fig. 1 is a top view of the counting apparatus according to the invention,  
 fig. 2 is a side view of the counting apparatus according to fig. 1, and  
 fig. 3 is an end view of the counting apparatus according to fig. 1 and 2.

The counting apparatus according to the invention is mounted on a support frame 1 fixed to a frame 2 on which a conveyor 3 for the articles K is

supported. The support frame 1 consists of supports 4 fixed to the frame 2 of the conveyor 3 and of a supporting beam 5 which is mounted substantially horizontally to the supports 4.

The conveyor 3 is preferably a roller conveyor, the rollers 6 of which are preferably partially freely rotatable and are for instance partially driven, in such a way, that the articles K to be conveyed are driven with a certain force in conveying direction T. The conveyor 3 is at both sides provided with an angle iron 7 limiting a conveyor path 8, the width of which being about 15% larger than that of the articles K. The counting apparatus according to the invention will be described by way of example on the basis of the counting of crates K, but it stands to reason that also other articles than crates can be counted, for instance, boxes, cases and the like.

Two square supports 9 are mounted on the supporting beam 5 which are clamped by means of a clamping plate 10 in the U-shaped supporting beam 5 and through bolts 11, in such a way, that the supports 9 may be adjusted in a longitudinal direction of the supporting beam 5. A supporting plate 13 is mounted on the horizontal flange 12 of both supports 9 by means of bolts 9a, on which supporting plate the actual counting mechanism 14 is mounted.

The counting mechanism 14 comprises, according to the invention, an endless counting member 15, which is an endless chain in the example shown, said chain being provided with three dogs or cams 16, each of which being fastened on a link, said dogs or cams being trapezoidal and their long parallel side Z faces the arriving articles K, and may for instance be made of nylon. The chain 15 runs over two chain wheels 17, each being rotatably mounted on a shaft 18 which is mounted perpendicularly to the supporting plate 13. Between each chain wheel 17 and the supporting plate 13 a spacer tube 19 may be mounted on the shaft 18, and the shafts 18 are fixed on the supporting plate 13 by means of screw thread ends and a nut.

According to the invention the mutual distance of the dogs 16 on the chain 15, measured along a straight line, is smaller than the length L of the crates K in the conveying direction T and larger than the half of said length L. The function thereof will be elucidated hereinafter.

For instance, to each dog 16 a metal plate 20 is fixed, with which a counting instrument 21, in this case an inductive switch, can be operated and consequently the articles K may be counted in a way to be described hereinafter.

The counting mechanism 14 yet further comprises a tensioning device 22 for the chain 15, which tensioning device consists of a square support 23 fixed to the supporting plate 13 with bolts 24, of a stud 25 which protrudes through a bore in

the support 23 and which is fixed to the support 23 with two bolts 26, and of a connecting strip 27 which is fixed with its one end to the stud 25 and with its other end e.g. to the spacer tube 19 on the left shaft 18 in fig. 1. This shaft 18 protrudes through an elongated hole (not shown) in the supporting plate 13.

At the other side of the roller conveyor 3, opposite the counting mechanism 14, two supports 28 are fixed on the frame 2 of the conveyor 3, to which at the upper ends of the supports facing the conveyor 3 a U-shaped supporting beam 29 is fixed, to which according to the invention spaced guide rails 30 are mounted. The guide rails 30 are clamped to the U-shaped supporting beam 29 by means of a clamping plate 31 and through bolts 32, in such a way, that the rails 30 are adjustably in longitudinal direction of the beam 29.

The guide rails 30 are in upstream and downstream direction of the conveyor 3 spaced from a part of the conveyor path 8 wherein the dogs 16 on the endless chain 15 move transversely into the conveyor path 8.

The guide rails 30 consist of a portion 30A which is positioned obliquely to a conveying direction T and of a portion 30B which is positioned parallelly to the conveying direction T, said portions merging into one another in point 30C. The portion 30B restricts the width of the conveyor path to a size which is preferably somewhat larger than the width B of the crates K perpendicular to the conveying direction T.

The counting mechanism 14 yet further comprises a housing 33 which is open at its side facing the roller conveyor 3 and which is fixed on the supporting plate 13 by bolts 34 and spacer tubes 35.

The operation of the counting apparatus according to the invention is as follows; vide fig. 1.

So as to facilitate the description of the operation, the crates to be counted are indicated in fig. 1 with K1, K2 and K3, respectively, while the dogs 16 carried by said crates are indicated with M1, M2 and M3, respectively, and the guide rails 30 are indicated with G1 and G2, respectively. In the situation according to fig. 1 the crate K1 has carried the dog M1 and the crate K2 the dog M2 into the positions which are drawn in fig. 1.

Upon conveying the crates K in the direction T, when they arrive at the counting apparatus, they are first pushed towards the counting apparatus by the guide rail G2, consequently in figure 1 to the right with respect to the conveying direction T, so as to enable their front face V to engage with the long parallel side Z of the dogs 16. Therewith, the crate K2 has carried the dog M2 into the position according to fig. 1, whereas the dog M3 during this movement of the crate K2 is moved into the con-

veyor path 8 of the crates K and therewith has pushed the rear end of the crate K2 to the left in relation to the conveying direction T. As a result, the crate K2 takes the oblique position as drawn in fig. 1, because the front end of the crate K2 meanwhile has arrived at the position of the guide rail G1, so that this front end cannot be pushed along to the left.

This oblique position of the crate K2 is reached, in that the mutual distance of the dogs 16, measured along a straight line, is smaller than the length L of the crates K and larger than the half of said length L, so that the dog M3 engages the rear half of the side face of the crate K2. The rear end of the crate K2 may move to the left with respect to the conveying direction T, because the guide rail G1 is spaced downstream from the portion of the conveyor path 8, in which the dogs 16 on the endless chain 15 move transversely into the conveyor path 8. Therewith, in the conveying direction T the distance between the point 30C of the guide rail G1 and the point, where the dogs 16 enter the conveyor path 8, is smaller than the length L of the crates. Consequently, as soon as the dog M3 engages the rear half of the crate K2, the front face V of the crate K2 has already passed the point 30C of the guide rail G1.

Because of the transverse movement of the rear portion of the crate K2, the crate K3 may engage with its front face V the dog M3 and move it into the position of the dog M2 in fig. 1, etc.

With the above-described counting apparatus it is possible to convey the crates K with the front faces V contacting the rear faces A through the counting apparatus, and therewith to count the crates K. Each time a dog 16 passes the inductive switch 21, it is operated by the metal plate 20 beneath the dog 16 (fig. 3), and a crate K is counted.

When crates, boxes or other articles have to be counted, which have different sizes than for which the counting apparatus according to the described embodiment is constructed and adjusted, it may be necessary to change the length of the endless counting member 15, to modify the number of dogs 16 and/or to move and/or replace the guide rails 30 by other guides.

## Claims

1. An apparatus for counting a series of articles supplied on a conveyor, said apparatus comprising a counting mechanism operated by the articles, **characterized in that** the counting mechanism (14) comprises an endless, moving around counting member (15), that the counting member (15) is provided with

5 dogs (16) extending into the conveyor path (8) of the articles (K) and the mutual distance thereof, measured along a straight line, being smaller than the length (L) of the articles (K) in the conveying direction (T) and larger than the half of said length, and

10 that in the conveyor path (8) of the articles (K) on the site of the counting member (15) two guides (30) for the articles are installed restricting the width of the conveyor path to a size which is somewhat larger than the width (B) of the articles perpendicular to the conveying direction (T), said guides (30) being spaced from one another in the conveying direction.

15 2. A counting apparatus according to claim 1, **characterized in that** the guides are two guide rails (30) comprising a portion (30A) which is positioned obliquely with respect to the conveying direction (T), and a portion (30B) which is positioned parallelly to the conveying direction, said portions merging into one another in a point (30C), and  
20 in that at the foremost guide rail (30, G1) in conveying direction (T), the distance in conveying direction between the mentioned point (30C) and the point, where the dogs (16) enter the conveyor path (8), is smaller than the length (L) of the articles (K).

25 3. A counting apparatus according to claim 1 or 2, **characterized in that** the counting member is an endless chain (15) provided with three dogs (16).

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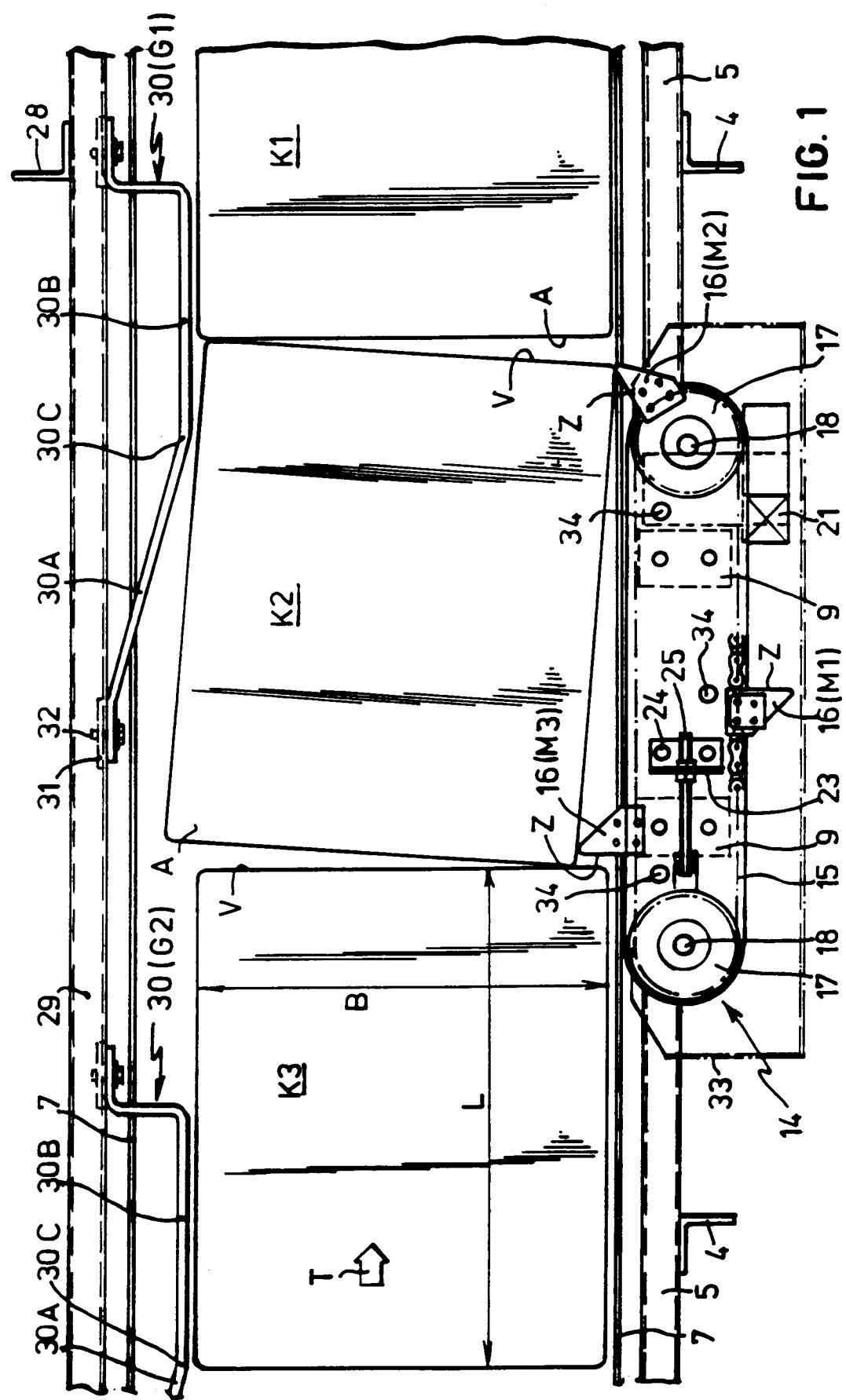
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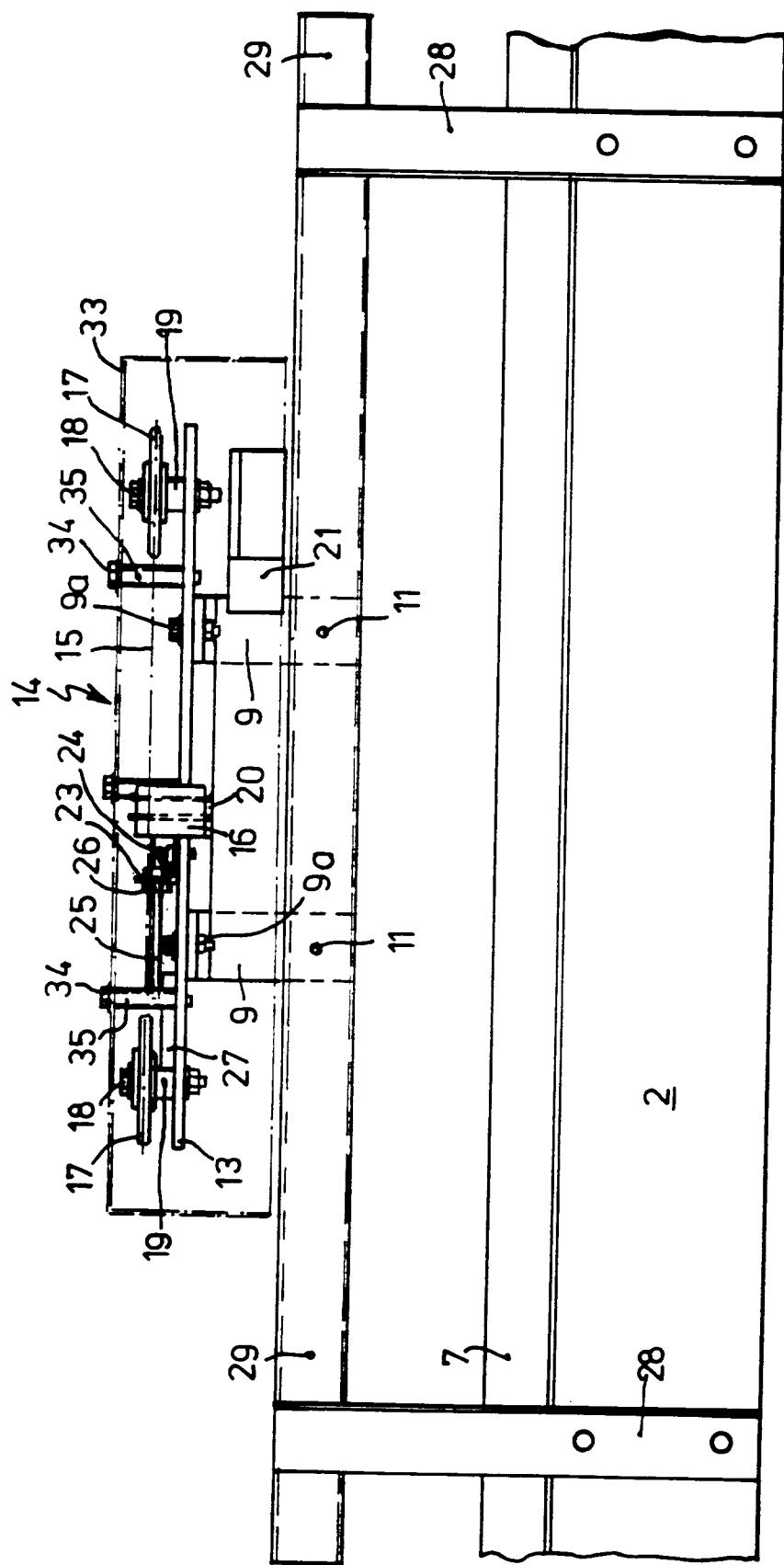


FIG. 2

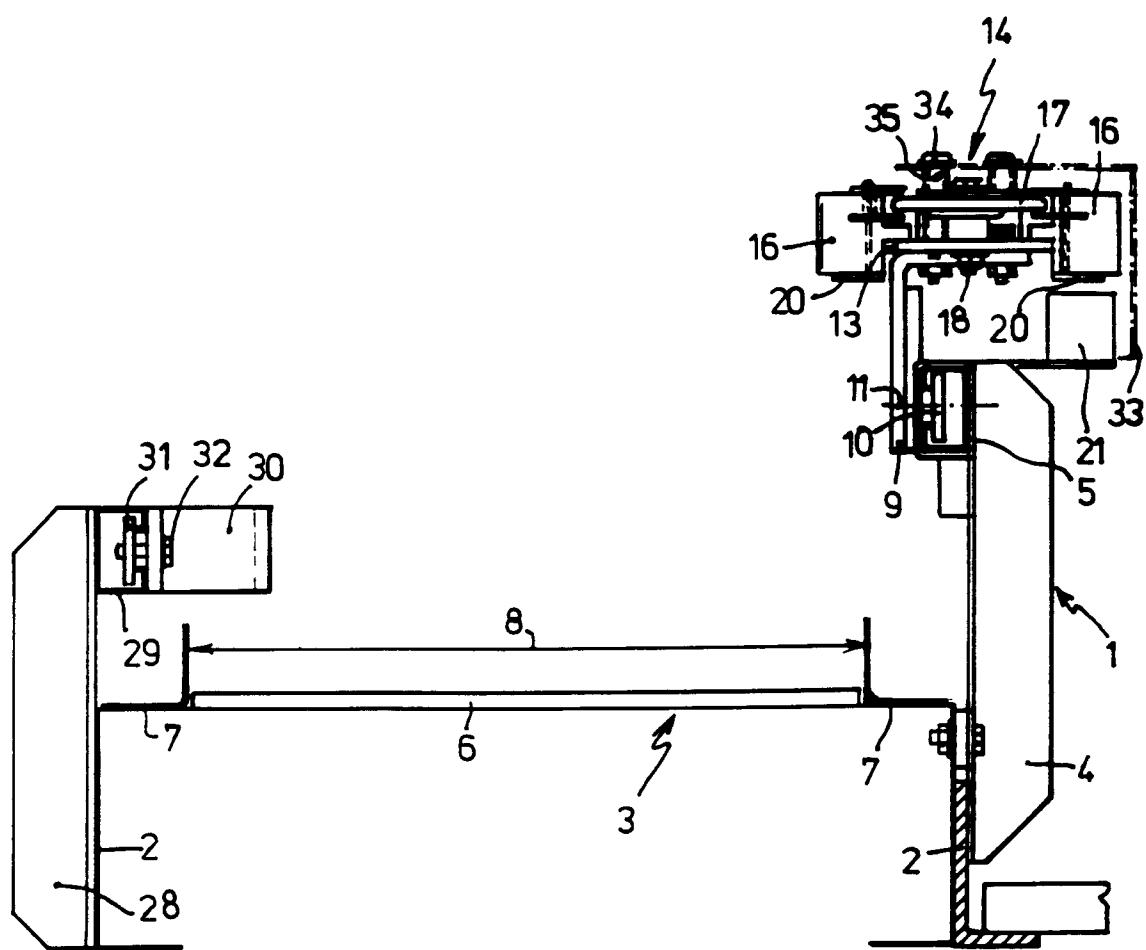


FIG. 3



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## EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1984

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	DE-A-2 247 564 (SCHWEIZERISCHE INDUSTRIE-GESELLSCHAFT) * page 1, line 1 - page 2, line 10 * ---	1	G06M7/00 G06M7/04 -
A	US-A-2 844 318 (W.C. GARNER ET AL.) * column 2, line 52 - line 59; figure 7 * ---	2	
A	GB-A-569 210 (R. T. STOREY) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G06M
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	12 NOVEMBER 1992	VEEN G.E.	
CATEGORY OF CITED DOCUMENTS			
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