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(54) **Wrapping machine**

Umwicklungsmaschine

Machine d'emballage

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(73) Proprietor: **Pomatec di Podeschi Mauro**
47865 San Leo RN (IT)

(72) Inventor: **Podeschi, Mauro**
47865 San Leo (RN) (IT)

(74) Representative: **Modiano, Micaela Nadia**
Modiano & Partners (IT)
Via Meravigli, 16
20123 Milano (IT)

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Description

[0001] Wrapping machines are machines that complete the packaging for shipping of goods placed together on a pallet, by enveloping them with film from a reel supported rotatably in an unwinding assembly that performs a translational motion vertically in relation to the height of the packaging to be provided.

[0002] Depending on the manner of performing the wrapping, the machines currently in use can be defined as follows:

a - machines wherein the trolley supporting the reels moves vertically along the column ascending from a fixed footing arranged proximate to a rotating platform on which the pallet rests with the goods to be wrapped;

b - machines wherein the trolley supporting the reels moves vertically along the column of a motorized vehicle (a robot) that is rotatable around the goods placed together on a pallet which is immobile on the ground;

c - machines wherein the trolley supporting the reels moves along the vertical part of an upside-down L-shaped rotatable arm the horizontal part of which is pivoted above the pallet with the goods to be wrapped;

d - machines wherein the reels are supported by a ring that rotates around the goods collected on a pallet which is immobile on the ground.

[0003] US 2007/204564 discloses a ring wrapping apparatus having a combination of elements as set forth in the pre-characterizing portion of the appended claim 1.

[0004] The aim of the present invention is to provide a more advantageous way of wrapping, with the film of a reel, the goods placed together on a pallet which is immobile on the ground.

[0005] Within this aim, an object of the invention is to provide a wrapping machine that, being less cumbersome and less demanding than conventional machines, is highly competitive with them from all viewpoints, including the economic one.

[0006] In accordance with the invention, there is provided a wrapping machine as defined in the appended claims.

[0007] This and other characteristics of the new wrapping machine are described hereinafter with the assistance of the accompanying drawings wherein, by way of non-limiting example:

Figure 1 is a perspective view from above of a first embodiment of an annular frame traveled by a trolley supporting the reels and with the reel arranged below it;

Figure 2 is a plan view of the annular frame of Figure 1;

Figures 3 and 4 are respectively a vertical cross-

section taken along the line XX and a vertical cross-section taken along the line YY in Figure 2;

Figure 5 is a perspective view from above of a second embodiment of an annular frame traveled by two trolleys supporting the reels and with the reels arranged above them;

Figure 6 is a schematic perspective view of a wrapping machine according to the invention.

[0008] It should be noted first of all that in the accompanying drawings it has been decided, for the sake of simplicity of description, to show not the entire wrapping machine, but only the elements that perform the operational function thereof, i.e. a horizontal frame 1 that, having the shape of a quadrangular ring with rounded corner edges, or being circular or any other shape required, is perimetrically traveled by at least one assembly 2 for transporting a reel of film B with which to wrap a pile of goods arranged on a pallet positioned immobile on the ground and at the center of the annular frame 1.

[0009] Substantially, the annular frame 1 is supported by a horizontal structure that projects from the front of a vertical fixed structure called portal 35 and along which it can perform a translational motion vertically, being motorized, in order to cause to transit, from above or from below according to requirements, the pile of goods to be completely wrapped with the film.

[0010] From the accompanying drawings it can be seen that the annular frame 1 is constituted, in this case, by two tubes 11 that are circular in cross-section and which, being rectangular shaped with rounded corners, are coupled, mutually, in parallel and overlaid, by a plurality of brackets 12 arranged both along the sides and also at the rounded corners.

[0011] The brackets 12 are provided, optionally except for those positioned at the corners, with a portion protruding inside the annular frame 1 and conveniently perforated in order to enable the fixing, with conventional screw means, of the entire frame 1 to the horizontal structure for support and vertical translational motion thereof.

[0012] According to a first embodiment of the invention, shown in Figures 1-2-3-4, the reel-supporting assembly 2 travels the annular frame 1 thanks to two trolleys 20 which are substantially C-shaped in order to embrace from outside the two tubes 11, on which each one of them slides by way of wheels 21 that are positioned so as to act on the sides and above the upper tube and on the sides and below the lower tube, as in Figure 3.

[0013] The trolleys 20 are integral with an almost vertical bracket 22 interposed between them and together with which they are fixed above a horizontal plate 23 that has applied thereto, below, the reel B and the rollers necessary to the correct unwinding of the film, as in Figure 4.

[0014] The movement of the reel-supporting assembly 2 is achieved with an entrainment system with two overlaid belts and with motorization within the annular frame 1. In substance, a closed-ring flat belt 3' is strung both outside a plurality of idle pulleys 30, smooth and mounted

on the brackets 12 described above, and also on a driving pulley 31, connected to a conventional electrical gear motor (not shown for the sake of simplicity) and positioned therewith within the perimeter of the annular frame 1. A second flat belt 3" has one end fixed to the bracket 22 with adapted screw means and is then completely overlaid on the belt 3', except at the portion strung on the driving pulley 31, until the other end is also fixed to the bracket 22, specifically to a springloaded belt tightening pulley 24. In this manner, the open belt 3", being overlaid on the closed belt 3', is entrained by it and, consequently, the reel-supporting assembly 2 to which it is connected in the bracket 22 moves.

[0015] From the description up to this point it can be seen that, since the pallet with the pile of goods to be wrapped has to be positioned centrally with respect to the annular frame 1, it is necessary for the frame to wait above outside the zone of vertical encumbrance of the goods and then descend and begin the winding from the highest point. A much more advantageous manner of operating, especially in terms of saving time, is to position the annular frame below the resting surface of the pallet with the goods, in order to immediately begin the winding cycle after positioning the pallet and, thus, proceeding from the bottom upward. This is particularly advantageous especially if watertight coverings are to be provided, for which it is essential to begin the winding from below.

[0016] In order to make the winding cycle starting from below the resting surface of the pallet even faster and more advantageous, the reel B can be positioned above the sliding trolleys 20. In this manner, the pile of goods can be wrapped at a greater height than the height of the vertical fixed structure of the machine, with considerable reduction of encumbrance for both transport and installation.

[0017] Such a solution is shown in Figure 5 where, moreover, the possibility is shown of mounting more than one reel-supporting assembly on a single annular frame. This possibility can be advantageous in cases where it is necessary to perform a winding operation with many layers of film, since the time for performing the operation is considerably reduced. Naturally, in this solution each reel-supporting assembly is moved by two belts 3' and 3" each strung on the corresponding transmission pulleys 30 and driven by its driving pulley 31.

[0018] In conclusion, attention is drawn to the importance of being able to provide an annular frame having the shape of the goods to be wrapped and following the dimensions thereof, since the smaller encumbrance with respect to conventional circular frames brings a considerable simplification of storage and transport, especially for very big products for which, with conventional winding systems, it would be necessary to set up very wide rings or arms. A further advantage of having the dimensions of the frame follow the product is the resulting constant nature of the unwinding tension of the film, while, when using conventional systems, the tension is greater in the

corners and lesser on the sides.

[0019] Finally, without prejudice to the functional characteristics illustrated and described, the devised machine can be susceptible of modifications and variations which, while still included in the present patent scope, may inter alia concern: the motorization and the type of guides chosen in order to enable the vertical translational motions of the annular frame; the general shape of the wrapping machine; the positioning of the reel-supporting assembly within the annular frame rather than outside, with consequent positioning of the driving pulley and of the corresponding external motorization thereof.

[0020] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A wrapping machine, of the type comprising a substantially vertical fixed structure (35), means of movement, arranged along said structure (35), at least one assembly (2) for unwinding at least one reel of film (B) rotatably supported thereon for the packaging for shipping of goods placed together on a pallet, at least one horizontal frame (1) with a shape chosen between the shape of a polygonal ring with rounded corner edges and the shape of a toroid, which is associated with said vertical movement means and is perimetricaly traveled by the at least one assembly (2), said goods being arranged on a pallet which can be positioned immobile on the ground and in the center of said horizontal annular frame (1), for the translational motion of said frame (1) on said fixed structure (35) on the outside of said goods placed together on a pallet, and an entrainment system comprising a belt drive for the movement of said assembly (2) on said annular frame (1), the wrapping machine being **characterized in that** said entrainment system comprises two overlaid belts (3', 3") of which the first (3') is motorized and the second (3") is directly connected to the assembly (2).
2. The wrapping machine according to claim 1, **characterized in that**
 - said first belt (3') is a closed-ring flat belt (3') strung on a plurality of idle transmission pulleys (30) which are smooth and applied perimetricaly to the frame (1), and on a driving pulley (31);

- said second belt (3") is a second flat belt (3"), overlaid on the first belt (3') except in the portion strung on the driving pulley (3 1), having the ends fixed to the assembly (2) and one of said ends being fixed to the assembly (2) at a springloaded belt tightening pulley (24) for the mutual elastic forcing of the two belts (3', 3") against each other, with consequent entrainment of the second belt (3"), and of the assembly (2) associated therewith, by the first belt (3').
3. The wrapping machine according to claim 1, **characterized in that** said annular horizontal frame (1) is constituted by two tubes (11) that are parallel and overlaid, and which are coupled so as to be mutually parallel by a plurality of brackets (12).
4. The wrapping machine according to claim 3, **characterized in that** the assembly (2) is slideable along the annular horizontal frame (1) by way of two trolleys (20) surmounting the two tubes (11), said trolleys (20) being provided with wheels (21) that can roll on the upper tube and on the lower tube.
5. The wrapping machine according to claim 4, **characterized in that** said trolleys (20) are integral with a bracket (22) for coupling to a horizontal plate (23) for supporting said reel of film (B).
6. The wrapping machine according to claim 2, **characterized in that** it comprises at least two reel-supporting assemblies (2) on the annular frame (1), each reel-supporting assembly comprising two respective belts (3', 3") strung on the corresponding transmission pulleys (30) and driven by its driving pulley (31).
7. The wrapping machine according to claim 5, **characterized in that** the reel (B) is arranged above its sliding trolleys (20).
8. The wrapping machine according to claim 5, **characterized in that** the reel (B) is arranged below its sliding trolleys (20).
9. The wrapping machine according to claim 3, in which the brackets (12) are provided, optionally except for those positioned at the corners, with a portion (12') protruding inside the annular horizontal frame (1) and provided with means of coupling to the vertical movement means thereof.

Patentansprüche

1. Eine Einwickelmaschine von der Art, die Folgendes umfasst:
- eine im Wesentlichen vertikale feste Struktur

(35),
Bewegungsmittel, angeordnet entlang der Struktur (35),
mindestens einen Aufbau (2) zum Abwickeln von mindestens einer Rolle Film (B), die zur Verpackung für den Versand von Waren, die zusammen auf eine Palette platziert sind, drehbar darauf gelagert ist,
mindestens einen horizontalen Rahmen (1) mit einer Form, gewählt aus der Form eines polygonalen Rings mit gerundeten Ecken und der Form eines Toroids, der mit den vertikalen Bewegungsmitteln verbunden ist und perimetrisch von dem mindestens einen Aufbau (2) durchlaufen wird, wobei die Waren auf einer Palette angeordnet sind, die unbeweglich auf den Boden und in die Mitte des horizontalen ringförmigen Rahmens (1) positioniert werden kann, für die Translationsbewegung des Rahmens (1) auf der festen Struktur (35) entlang der Außenseite der Waren, die zusammen auf eine Palette platziert wurden, und
ein Mitnahmesystem, das einen Riemenantrieb für die Bewegung des Aufbaus (2) auf dem ringförmigen Rahmen (1) umfasst,
wobei die Einwickelmaschine **dadurch gekennzeichnet ist, dass** das Mitnahmesystem zwei übereinander gelegte Riemen (3', 3") umfasst, von denen der erste (3') motorisiert ist und der zweite (3") direkt mit dem Aufbau (2) verbunden ist.

2. Die Einwickelmaschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass**

- der erste Riemen (3') ein Flachriemen (3') in Form eines geschlossenen Rings ist, aufgelegt auf eine Vielzahl beweglicher Antriebsscheiben (30), die glatt und perimetrisch an dem Rahmen (1) angebracht sind, und auf einer Festscheibe (31);
- der zweite Riemen (3") ein zweiter Flachriemen (3") ist, über den ersten Riemen (3') gelegt, außer in dem Abschnitt, der auf die Festscheibe (31) aufgelegt ist, dessen Enden an dem Aufbau (2) befestigt sind und eines der Enden für die gegenseitige Federspannung der beiden Riemen (3', 3") gegeneinander an einer gefederten Riemenspannrolle (24) an dem Aufbau (2) befestigt ist, mit sich daraus ergebender Mitnahme des zweiten Riemens (3") und des damit verbundenen Aufbaus (2) durch den ersten Riemen (3').

3. Die Einwickelmaschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der ringförmige horizontale Rahmen (1) aus zwei Rohren (11) besteht, die parallel und überlagert und durch eine Vielzahl

von Armen (12) so gekoppelt sind, dass sie zueinander parallel sind.

4. Die Einwickelmaschine gemäß Anspruch 3, **dadurch gekennzeichnet, dass** der Aufbau (2) mit Hilfe zweier Schlitten (20) entlang des ringförmigen horizontalen Rahmens (1) verschiebbar ist, welche die zwei Rohre (11) überragen, wobei die Schlitten (20) mit Rädern (21) versehen sind, die auf dem oberen Rohr und dem unteren Rohr rollen können. 5 10
5. Die Einwickelmaschine gemäß Anspruch 4, **dadurch gekennzeichnet, dass** die Schlitten (20) einteilig mit einem Arm (22) zur Kopplung mit einer horizontalen Platte (23) zum Tragen der Filmrolle (B) sind. 15
6. Die Einwickelmaschine gemäß Anspruch 2, **dadurch gekennzeichnet, dass** sie mindestens zwei rollentragende Aufbauten (2) auf demselben ringförmigen Rahmen (1) umfasst, wobei jeder rollentragende Aufbau zwei entsprechende Riemen (3', 3'') umfasst, die auf die entsprechenden Antriebsscheiben (30) aufgelegt sind und von seiner Festscheibe (31) angetrieben werden. 20 25
7. Die Einwickelmaschine gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die Rolle (B) oberhalb ihrer Gleitschlitten (20) angeordnet ist. 30
8. Die Einwickelmaschine gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die Rolle (B) unterhalb ihrer Gleitschlitten (20) angeordnet ist. 35
9. Die Einwickelmaschine gemäß Anspruch 3, worin die Arme (12), wahlweise mit Ausnahme derjenigen, die an den Ecken positioniert sind, mit einem Abschnitt (12') ausgestattet sind, der innerhalb des ringförmigen horizontalen Rahmens (1) hineinragt und mit Mitteln zur Kopplung mit den vertikalen Bewegungsmitteln davon ausgestattet ist. 40

Revendications

1. Machine d'emballage appartenant au genre comprenant une structure (35) fixe essentiellement verticale, des moyens de déplacement, disposés le long de ladite structure (35), au moins une installation (2) de déroulement d'au moins une bobine de film (B), qu'elle supporte de manière rotative, pour l'emballage destiné à l'expédition de produits placés ensemble sur une palette, au moins un cadre horizontal (1) de forme choisie entre celle d'un anneau polygonal avec des arêtes d'angle arrondies et celle d'un tore, cadre, qui est associé auxdits moyens de déplacement verticaux 45 50 55

et parcouru périmétriquement par l'au moins une installation (2), lesdits produits étant disposés sur une palette pouvant être positionnée de façon immobile sur le sol et au centre dudit cadre horizontal annulaire (1) pour le mouvement de translation dudit cadre (1) sur ladite structure fixe (35) le long de l'extérieur desdits produits placés ensemble sur une palette, et un système d'entraînement comprenant une distribution par courroie pour le déplacement de ladite installation (2) sur ledit cadre annulaire (1), la machine d'emballage étant **caractérisée en ce que** ledit système d'entraînement comprend deux courroies superposées (3', 3''), dont la première (3') est motorisée et la seconde (3'') est directement reliée à l'installation (2),

2. Machine d'emballage suivant la revendication 1, **caractérisée en ce que**

- ladite première courroie (3') est une courroie plate fermée (3') enfilée sur une pluralité de poulies folles de transmission (30), qui sont lisses et appliquées périmétriquement au cadre (1), et sur une poulie motrice (31),

- ladite seconde courroie (3'') est une seconde courroie plate (3'') superposée sur la première courroie (3'), à l'exception de la portion enfilée sur la poulie motrice (31), courroie, dont les extrémités sont fixées à l'installation (2), une desdites extrémités étant fixée à l'installation (2), à une poulie de tension de courroie chargée par ressort (24) pour le forçage élastique mutuel des deux courroies (3', 3'') l'une contre l'autre, avec pour effet l'entraînement de la seconde courroie (3'') et de l'installation (2) associée, par la première courroie (3').

3. Machine d'emballage suivant la revendication 1, **caractérisée en ce que** ledit cadre horizontal annulaire (1) est constitué par deux tubes (11) qui sont parallèles et superposés et couplés de manière à être parallèles l'un par rapport à l'autre par une pluralité de pattes (12). 40

4. Machine d'emballage suivant la revendication 3, **caractérisée en ce que** ladite installation (2) peut coulisser le long du cadre horizontal annulaire (1) par l'intermédiaire de deux chariots (20) surmontant les deux tubes (11), lesdits chariots (20) étant munis de roues (21) pouvant rouler sur le tube supérieur et sur le tube inférieur. 45 50

5. Machine d'emballage suivant la revendication 4, **caractérisée en ce que** lesdits chariots (20) forment une seule pièce avec un support (22) pour le couplage à une plaque horizontale (23) servant de support à ladite bobine de film (B). 55

6. Machine d'emballage suivant la revendication 2, **caractérisée en ce qu'elle** comprend au moins deux installations de support de bobine (2) sur le cadre annulaire (1), chaque installation de support de bobine comprenant deux courroies respectives (3', 3'') enfilées sur les poulies de transmission (30) correspondantes et entraînées par leurs poulies motrices (31). 5
7. Machine d'emballage suivant la revendication 5, **caractérisée en ce que** la bobine (B) est disposée au-dessus de ses chariots coulissants (20). 10
8. Machine d'emballage suivant la revendication 5, **caractérisée en ce que** la bobine (B) est disposée au-dessous de ses chariots coulissants (20). 15
9. Machine d'emballage suivant la revendication 3, dans laquelle les pattes (12) sont prévues, optionnellement à l'exception de celles positionnées aux angles, avec une portion (12') faisant saillie vers l'intérieur du cadre horizontal annulaire (1) et munie de moyens de couplage aux moyens de déplacement vertical de celui-ci. 20

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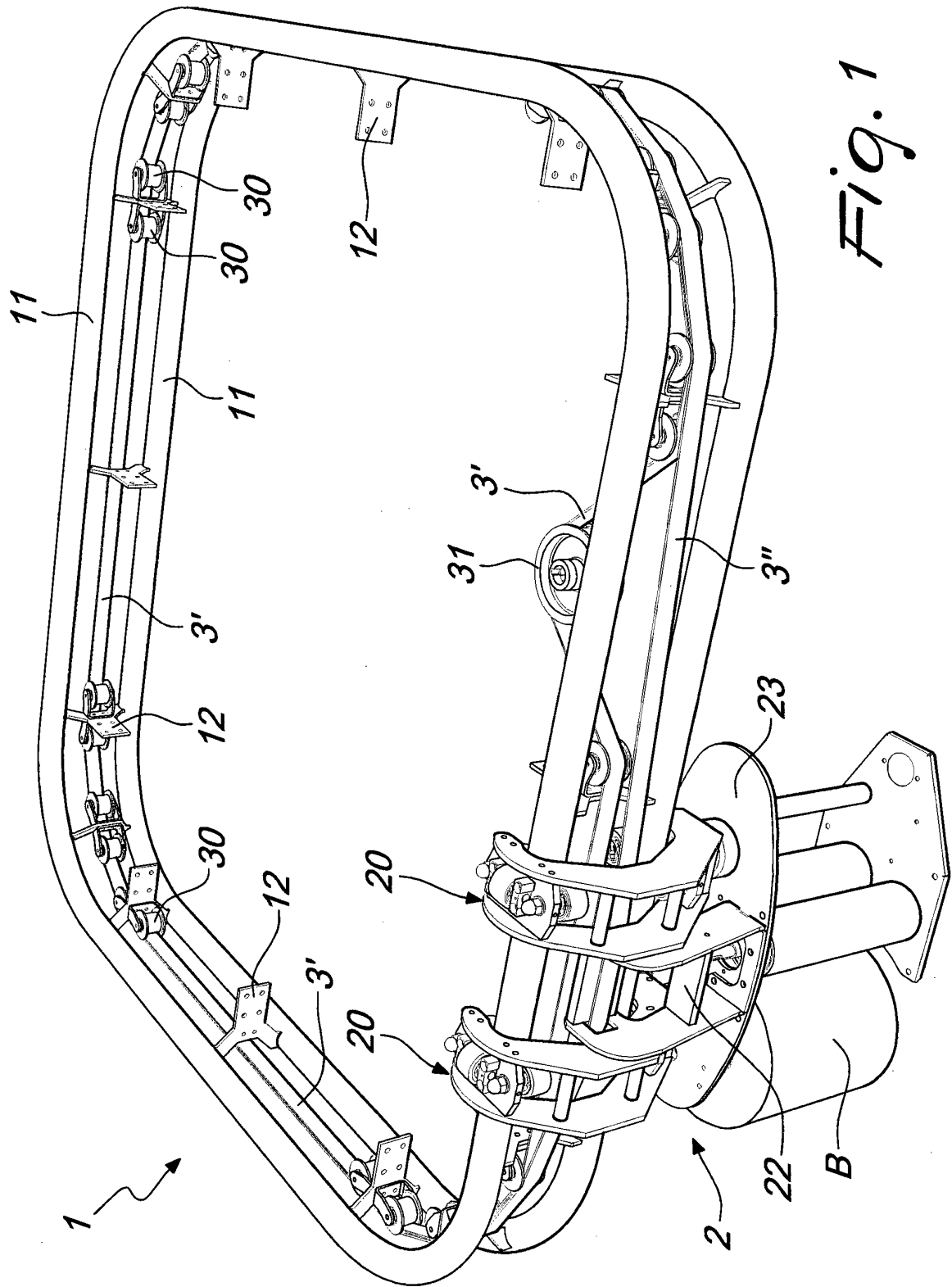
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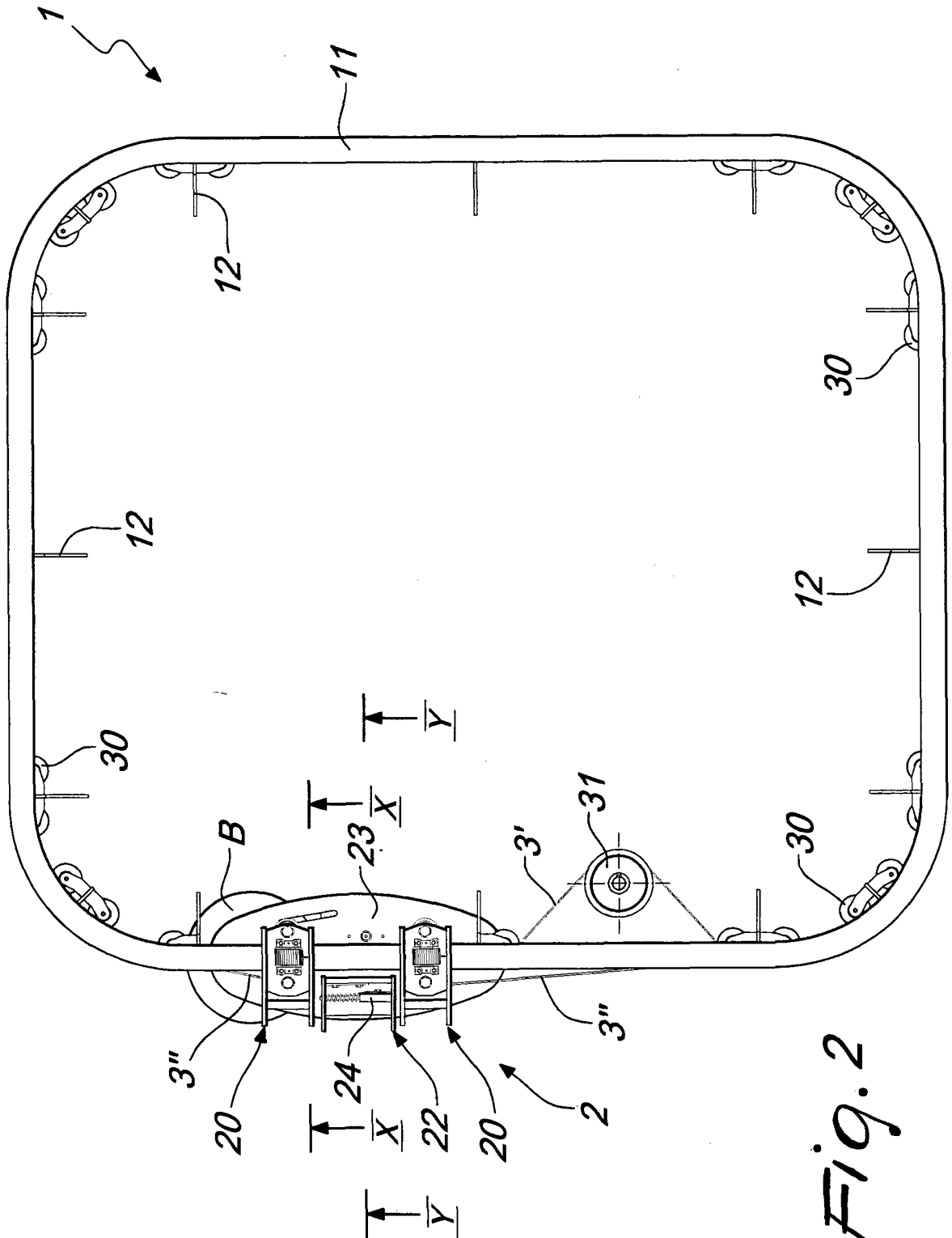


Fig. 2

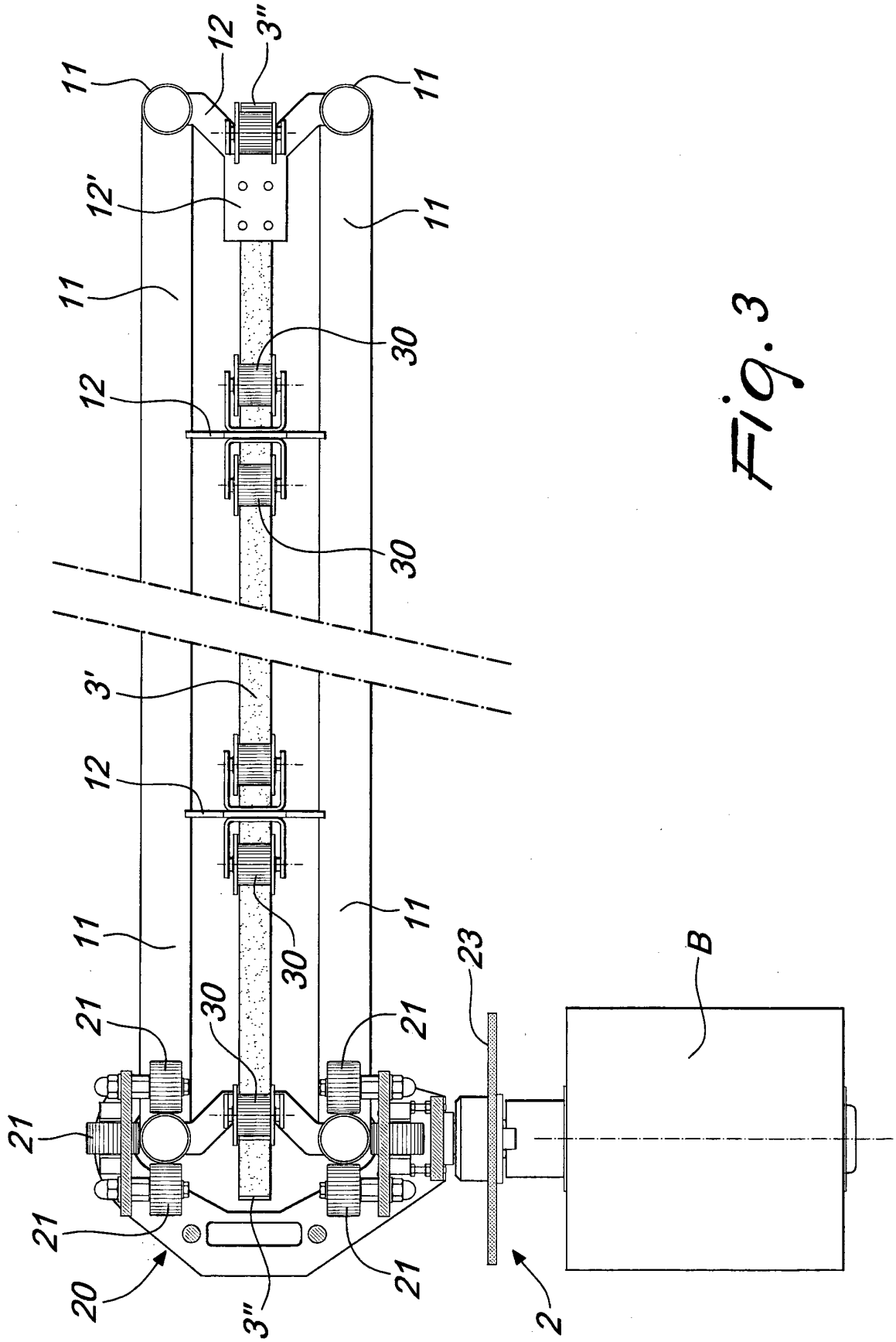


Fig. 3

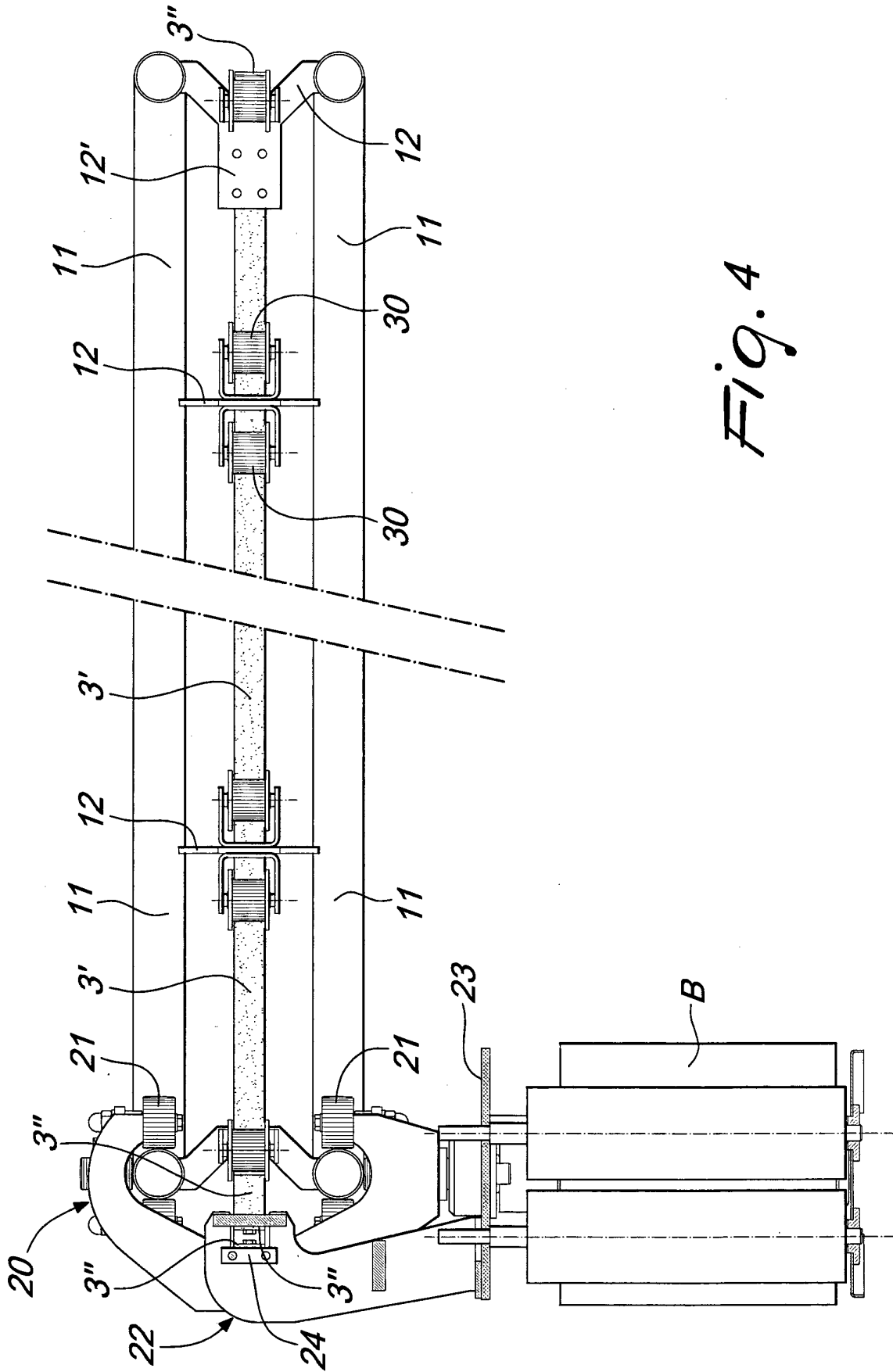


Fig. 4

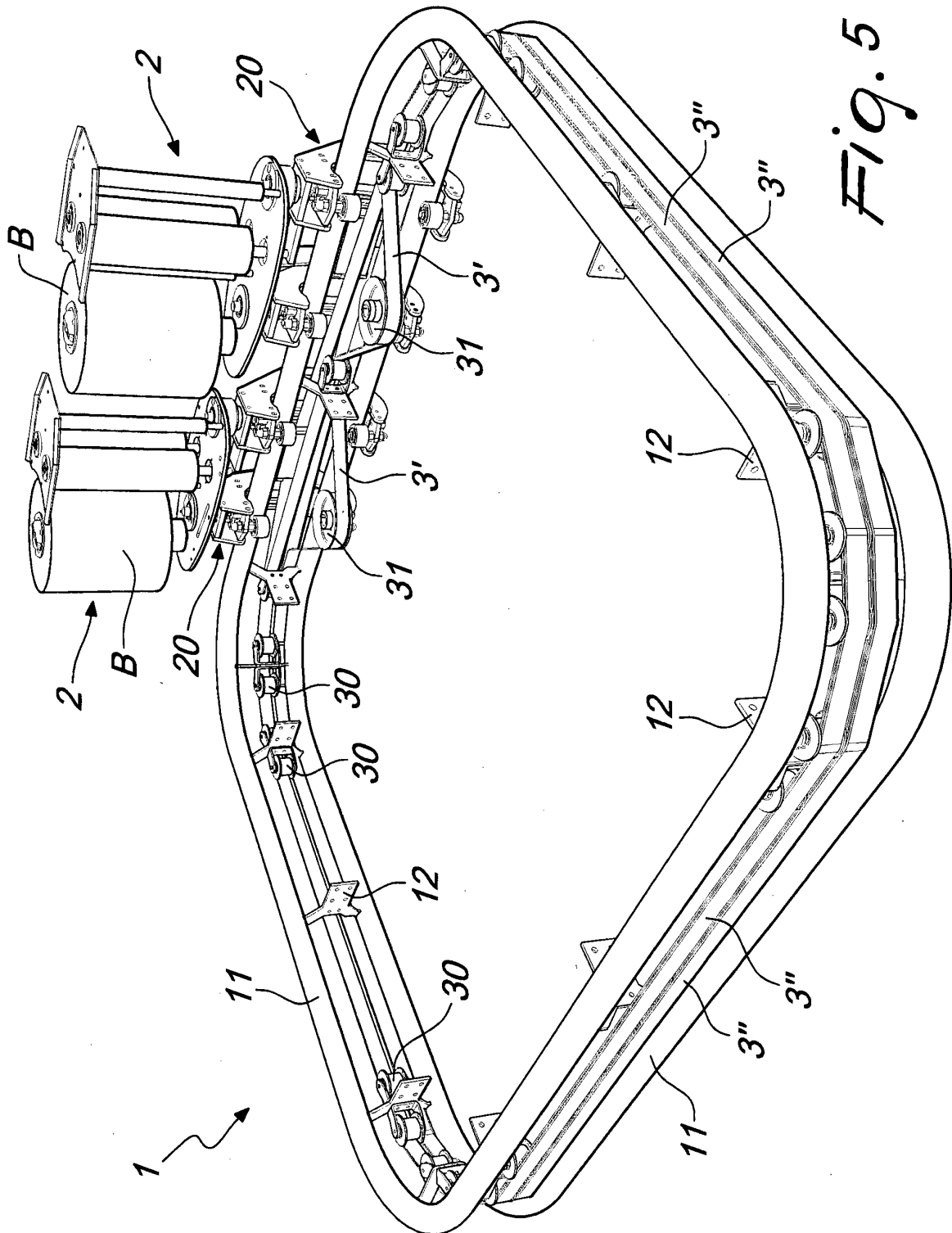


Fig. 5

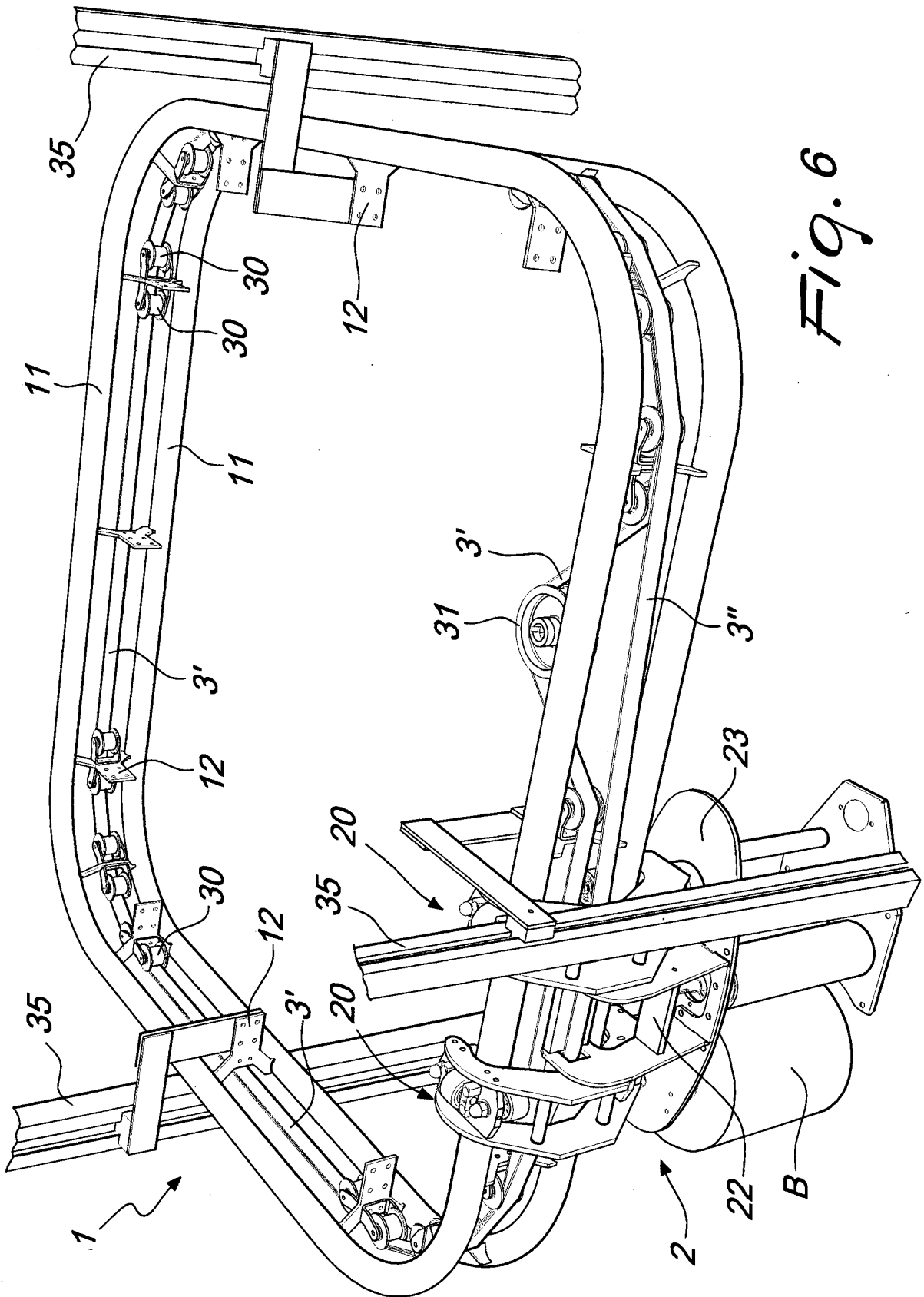


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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