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(54) **A device for handling a load**

Vorrichtung zur Handhabung einer Last

Dispositif de manutention d'une charge

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Description

[0001] The invention relates to an apparatus for displacing a load, comprising a platform with a telescopic boom movable in the vertical plane, means mounted on the free end of the boom for removably arranging attachments such as lift forks, a winch supported by the platform for a hoisting cable guided along the boom and having a hook for the load.

[0002] Such an apparatus is normally used for earth-moving purposes or load displacement, for which purpose the telescopic arm is provided with an exchangeable attachment. Such a vehicle is also known in the field as a "telescopic handler". This machine is provided for this purpose with a number of suitable attachments, for instance an excavator or gripping device, forks for use with pallets, and a tackle for hoisting purposes. A lift platform can further be arranged for lifting workers such as painters and the like.

[0003] In US 6,244,450 an apparatus is disclosed for displacing a load, comprising a platform with a telescopic boom movable in a vertical plane, a winch supported by the platform for a hoisting cable guided using the boom and having a hode for the load.

[0004] The invention has for its object to modify the apparatus of the type stated in the preamble such that it can operate better as hoisting apparatus.

[0005] To this end the apparatus is distinguished according to the invention in that a jib provided with a fixed top pulley for the cable is pivotally mounted on the free end of the boom, wherein the length of the jib is such that, as seen in the vertical plane, for all positions of the boom the vertical line along the top pulley runs clear of these mounting means on the boom.

[0006] Owing to the use of the jib it is possible to obtain a greater range, which is however possible up to a determined angular position of the boom relative to the horizontal.

[0007] Owing to the pivot, the jib can be folded relative to the boom, whereby the telescopic handler can operate up to a maximum height.

[0008] The invention further relates to an apparatus for displacing a load, comprising a platform with a telescopic boom movable in the vertical plane, a winch supported by the platform for a hoisting cable guided along the boom and having a hook for the load.

[0009] Such an apparatus, which can be a random crane with telescopic mast, is distinguished according to the invention in that a jib provided with a fixed top pulley for the cable is pivotally mounted on the free end of the boom, wherein the length of the jib is such that, as seen in the vertical plane, for all positions of the boom the vertical line along the top pulley runs clear of these mounting means on the boom.

[0010] The advantage of this embodiment is that when the telescopic boom is extended, i.e. when the sections of the boom slide apart, the hoisting cable co-displaces synchronously so that the crane operator need only concentrate on the load for hoisting, which retains the same height in a determined angular position during lengthening or shortening of the boom. Above mentioned and other features of the invention are elucidated in the figure description hereinbelow of two embodiments.

[0011] In the drawing:

Fig. 1 shows a perspective view of a mobile platform in the position of use;
Fig. 2 shows a detail of the top of the boom applied in the apparatus of figure 1;
Fig. 3 shows a detail corresponding with figure 2 of the top of the boom with folded jib applied in the apparatus of figure 1;
Fig. 4 shows the position of the jib in use of the telescopic handler with other attachments;
Fig. 5 shows a schematic view of the synchronous control in a telescopic boom and the hoisting cable.

[0012] Designated in figure 1 with the numeral 1 is the mobile platform which can be manufactured in random manner. At the four corner points the mobile platform 1 is embodied with outriggers 2 which can be retracted and extended in known manner to enable stable arrangement of the platform in the situation of use. On platform 1 is arranged a turret 3 which is embodied here with a telescopic arm 4 in the form of four pipe sections slidable into each other.

[0013] On the free end of telescopic arm 4, i.e. the end remote from pivot shaft 5, is arranged a coupling member 7 which in the normal course of events is used for coupling of random attachments, for instance forks for pallet use, excavators for excavation purposes and other types of attachment.

[0014] Mounted according to the invention on the upper end of the boom is a jib 8 which is further elucidated hereinbelow with reference to figures 2 and 3. This jib is particularly intended for lengthening boom 4 such that the boom with jib 8 can form one long boom for a hoisting attachment, this such that a hoisting cable 9 can be trained along the boom and jib 8 via guides. Cable 9 is wound or unwound round a driven drum 10 and is provided on the free end with a hook 11 for a load L.

[0015] Figure 2 shows a detail of jib 8 which is mounted pivotally on the end of telescopic boom 4. In the position according to figure 2, the jib 8 is in line with boom 4 and cable 9 runs round a top pulley 12 which is received for free rotation on a shaft 13 between mounting plates 14.

[0016] At the pivot shaft 15, which is also the rotation shaft of a second cable pulley 16, jib 8 with two support plates 17 is rotatable relative to the boom end.

[0017] In the position of figure 3 the jib is folded down relative to boom 4, which can be performed manually by the operator if the boom is retracted and swivelled downward, wherein the locking positions can be achieved using known pin-hole connections.

[0018] The difference between operation in the position in figure 2 respectively 3 is that the boom in the po-

sition according to figure 2 can reach an angle of inclination of $\alpha 1$ with the horizontal, but in figure 3 of $\alpha 2$, which is greater than $\alpha 1$. This is possible because, due to the folded-down position, the vertical line along the outside of top pulley 12 always runs along the mounting means 7 for the other attachments.

[0019] Owing to this construction it is possible either to obtain a greater range in the lengthened position according to figure 2 or to reach a maximum height in the position according to figure 3.

[0020] In figure 4 can be seen that the jib is also provided with a second pivot shaft 20 which extends perpendicularly of said first pivot shaft 15. Jib 8 can hereby be folded along boom 4, whereby the telescopic arm 4 with mounting means 7 for the other attachments becomes freely accessible.

[0021] Figure 5 shows a schematic diagram, wherein the sections of boom 4 are monitored by a roller 25 along which a magnet sensor 26 detects the rotation, i.e. the distance covered by the sections relative to the other section. The generated signal from the magnet sensor is fed to an electronic circuit 27, which also receives information from a second magnet sensor 28 co-acting with a roller 29 which rolls against movable hoisting cable 9.

[0022] During lengthening respectively shortening of boom 4 the sections will move in or out of each other as according to arrow P1. This movement is detected by sensor 25, 26, while simultaneously the motor of the winch drum is actuated, wherein the displacement of hoisting cable 9 is measured by sensor 28, 29. Both the signals generated by magnet sensors 26, 28 are compared in comparing circuit 27, which then adjusts the motor of winch drum 10 in the case of differences.

[0023] With this embodiment the operator is not distracted and can concentrate fully on the load.

[0024] It is possible within the scope of the invention to apply such a compensation system as according to figure 5 on any random crane with telescopic arm. It can of course also be applied to the above described telescopic handler as shown in the drawings.

Claims

1. Apparatus for displacing a load, comprising a platform (1) with a telescopic boom (4) movable in the vertical plane, a winch supported by the platform (1) for a hoisting cable (9) guided along the boom (4) and having a hook (11) for the load (L), **characterized in that** said apparatus comprises a means (7) mounted on the free end of the boom (4) for removably arranging attachments such as lift forks, and **in that** a jib (8) provided with a fixed top pulley (12) for the cable (9) is pivotally mounted on the free end of the boom (4), wherein the length of the jib (8) is such that, as seen in the vertical plane, for all positions of the boom (4) the vertical line along the top pulley (12) runs clear of these mounting means (7) on the boom (4).

2. Apparatus as claimed in claim 1, **characterized in that** a second cable pulley (16) is arranged close to the pivot (15) between the jib (8) and the boom (4).

3. Apparatus as claimed in claim 1 or 2, **characterized in that** the pivot line between the jib (8) and the boom (4) lies through the axis of rotation of the second cable pulley (16).

4. Apparatus as claimed in any of the foregoing claims, **characterized in that** a second pivot shaft (20) is arranged perpendicularly of the first shaft (15) between boom (4) and jib (8).

5. Apparatus for displacing a load according to any of the previous claims, **characterized in that** a switching circuit (27) is arranged for actuating the winch motor synchronously with the motor for the telescopic boom (4).

6. Apparatus as claimed in claim 5, **characterized in that** the switching circuit is provided with a displacement sensor (25, 26) for a boom section and a displacement sensor (28, 29) for the hoisting cable (9), wherein a comparing circuit (27) fed by signals from the sensors actuates the winch motor in the case of difference.

Patentansprüche

1. Vorrichtung zum Verlagern einer Last, mit einer Plattform (1) mit einem ausfahrbaren Ausleger (4), der in der vertikalen Ebene bewegbar ist, einer Winde, die von der Plattform (1) gehalten ist, für ein Hubseil (9), das entlang des Auslegers (4) geführt ist und einen Haken (11) für die Last (L) hat,
dadurch gekennzeichnet,
dass die Vorrichtung ein Mittel (7) enthält, das an dem freien Ende des Auslegers (4) befestigt ist, um Zubehörteile wie Hubgabeln auswechselbar anzuordnen, und dass ein Auslegearm (8) mit einer festen oberen Rolle (12) für das Seil (9) schwenkbar an dem freien Ende des Auslegers (4) befestigt ist, wobei die Länge des Auslegearms (8) so ist, dass, in der vertikalen Ebene gesehen, in allen Positionen des Auslegers (4) die vertikale Linie entlang der oberen Rolle (12) räumlich frei von diesem Befestigungsmittel (7) an dem Ausleger (4) läuft.

2. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet,
dass eine zweite Seilrolle (16) nahe dem Gelenk (15) zwischen dem Auslegearm (8) und dem Ausleger (4) angeordnet ist.

3. Vorrichtung nach Anspruch 1 oder 2,
dadurch gekennzeichnet,
dass die Gelenklinie zwischen dem Auslegearm (8) und dem Ausleger (4) durch die Drehachse der zweiten Seilrolle (16) verläuft.

4. Vorrichtung nach jedem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass eine zweite Gelenkachse (20) senkrecht zu der ersten Achse (15) zwischen dem Ausleger (4) und dem Auslegerarm (8) angeordnet ist.

5. Vorrichtung zum Verlagern einer Last nach jedem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass ein Schaltkreis (27) angeordnet ist, um den Windenmotor synchron mit dem Motor für den ausfahrbaren Ausleger (4) zu betätigen.

6. Vorrichtung nach Anspruch 5,
dadurch gekennzeichnet,
dass der Schaltkreis mit einem Verlagerungssensor (25,26) für einen Auslegerabschnitt und einem Verlagerungssensor (28,29) für das Hubseil (9) versehen ist, wobei eine Vergleichsschaltung (27), die Signale von den Sensoren erhält, den Windenmotor in dem Fall einer Differenz betätigt.

Revendications

1. Appareil pour déplacer une charge, comprenant une plate-forme (1) avec une flèche télescopique (4) mobile dans le plan vertical, un treuil supporté par la plate-forme (1) pour un câble de levage (9) guidé le long de la flèche (4) et ayant un crochet (11) pour la charge (L), **caractérisé en ce que** ledit appareil comprend un moyen (7) monté sur l'extrémité libre de la flèche (4) pour agencer de manière amovible des fixations telles que des fourches de levage, et **en ce qu'**une fléchette (8) munie d'une poulie supérieure fixe (12) pour le câble (9) est montée à pivotement sur l'extrémité libre de la flèche (4), où la longueur de la fléchette (8) est telle que, vu dans le plan vertical, pour toutes les positions de la flèche (4) la ligne verticale le long de la poulie supérieure (12) est en dehors de ce moyen de montage (7) sur la flèche (4).

2. Appareil selon la revendication 1, **caractérisé en ce qu'**une deuxième poulie à câble (16) est agencée à proximité du pivot (15) entre la fléchette (8) et la flèche (4).

3. Appareil selon la revendication 1 ou 2, **caractérisé en ce que** la ligne de pivot entre la fléchette (8) et la flèche (4) passe par l'axe de rotation de la deuxième poulie à câble (16).

4. Appareil selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**un deuxième axe de pivot (20) est agencé de manière perpendiculaire au premier axe (15) entre la flèche (4) et la fléchette (8).

5. Appareil pour déplacer une charge selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**un circuit de commutation (27) est agencé pour actionner le moteur de treuil de manière synchrone avec le moteur de la flèche télescopique (4).

6. Appareil selon la revendication 5, **caractérisé en ce que** le circuit de commutation est muni d'un capteur de déplacement (25, 26) pour une section de flèche et un capteur de déplacement (28, 29) pour le câble de levage (9), où un circuit de comparaison (27) alimenté par des signaux provenant des capteurs actionne le moteur de treuil dans le cas où il existe une différence.

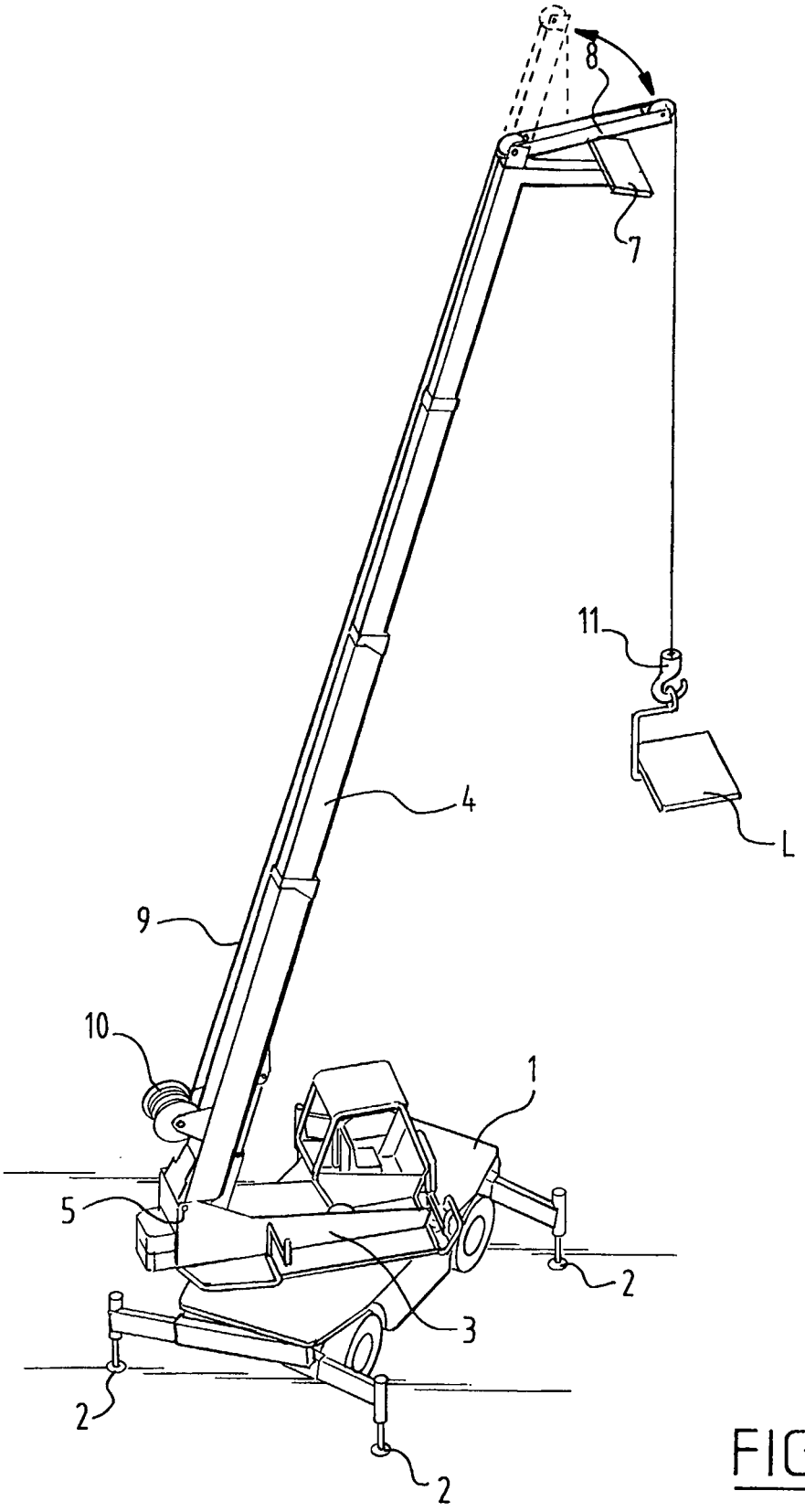


FIG. 1

FIG. 2

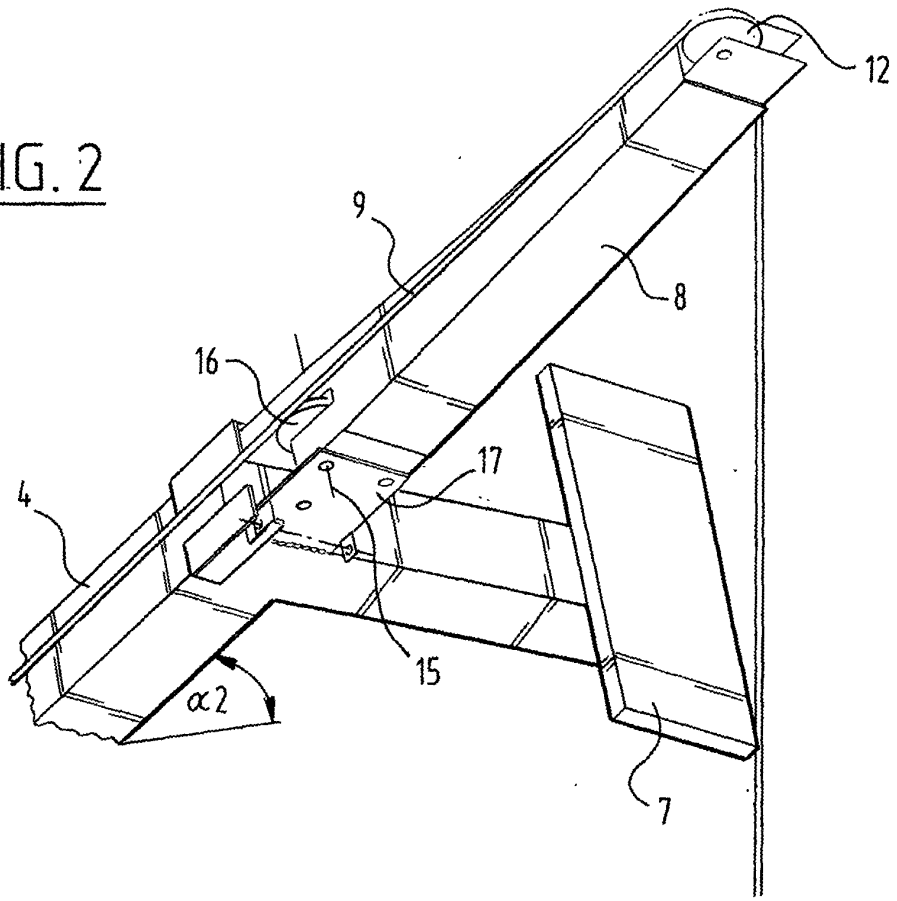
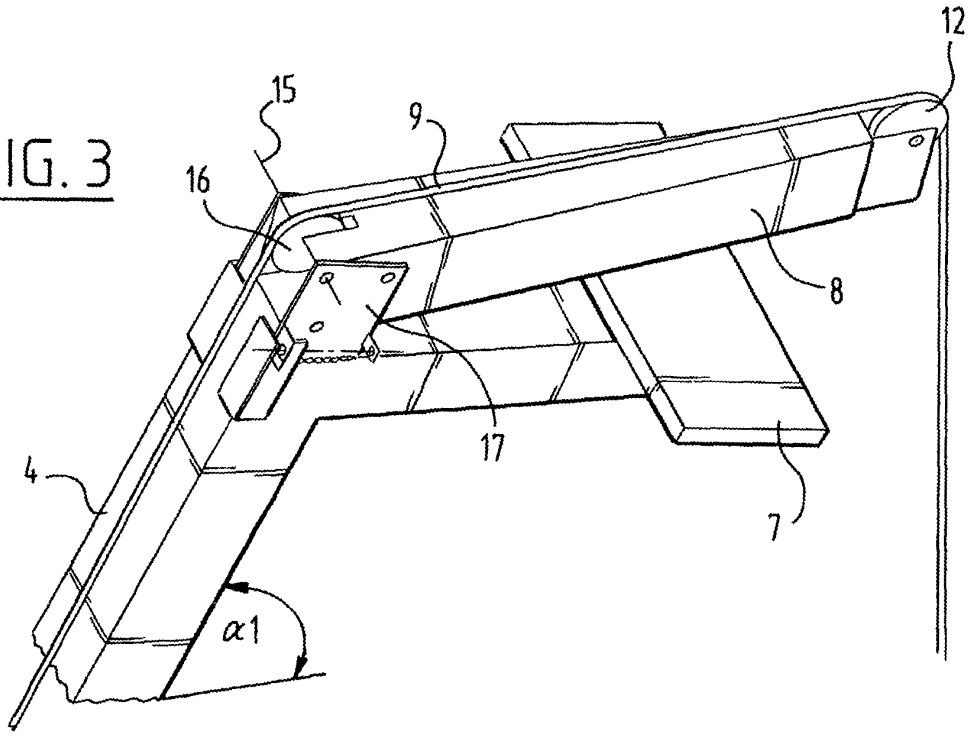


FIG. 3



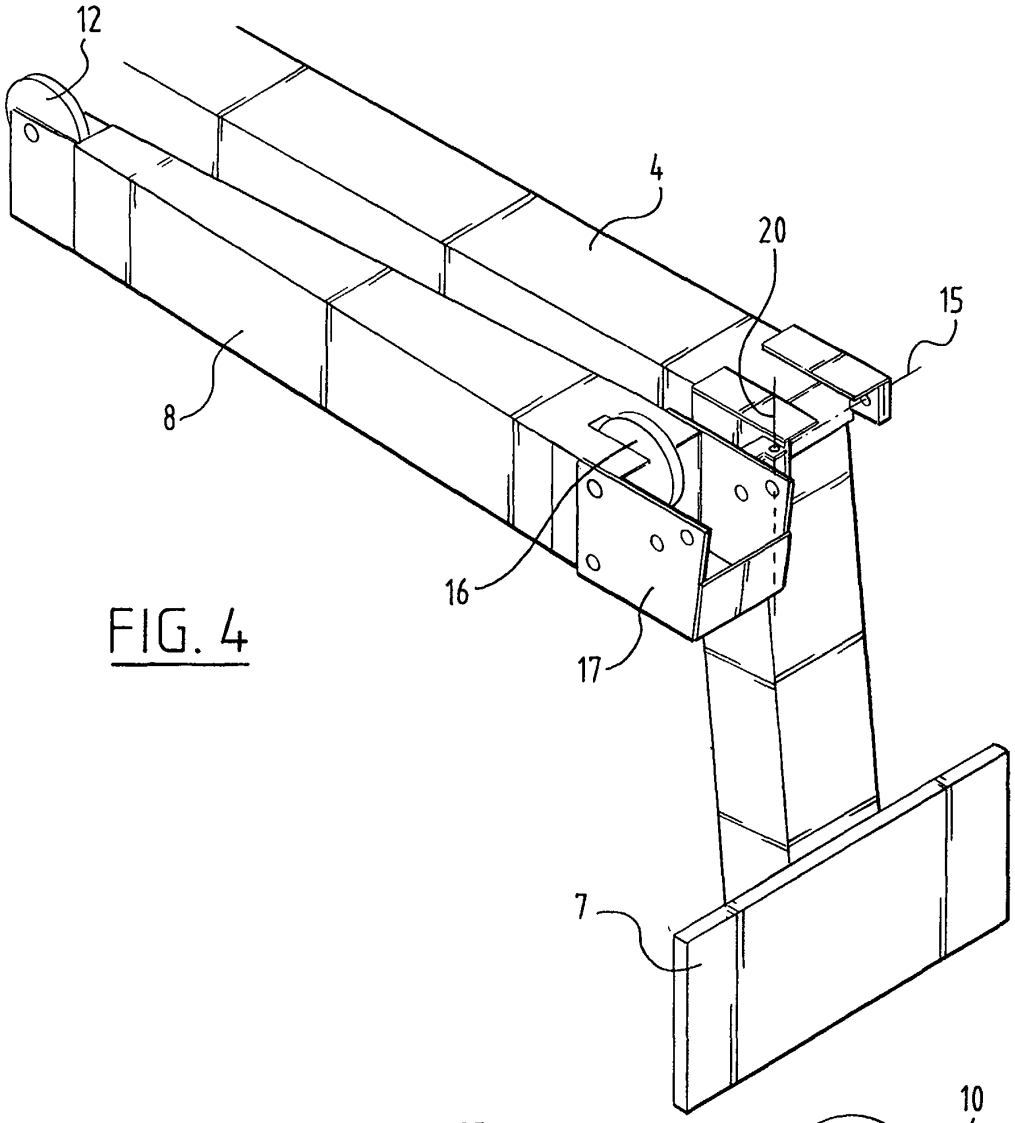


FIG. 4

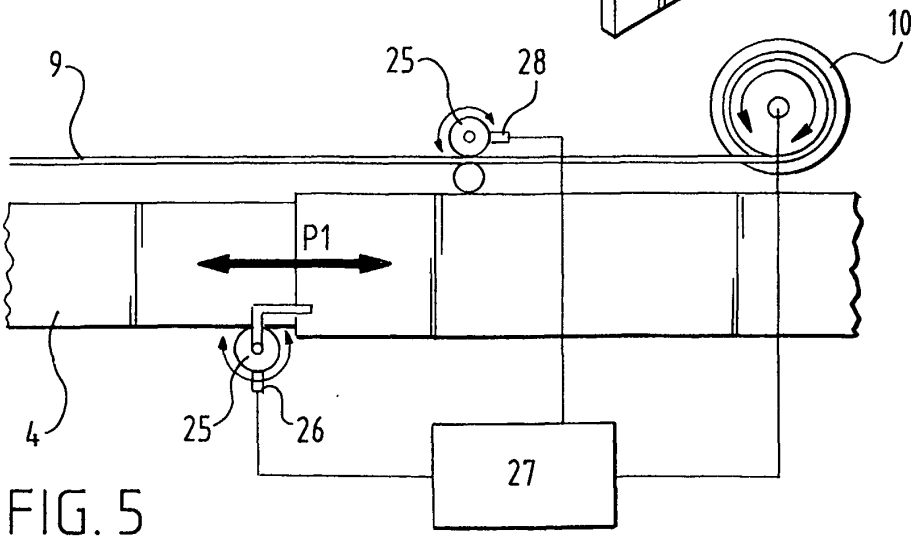


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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