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(54) **Wind deflector for cranes and crane provided with said wind deflector**

Windabweiser für Kräne und Kran versehen mit diesem Windabweiser

Déflecteur du vent pour grue et grue équipée d'un tel déflecteur

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Description

[0001] The present invention concerns a revolving crane.

[0002] More precisely, the present invention relates to revolving cranes with upper counterpoise. Such known cranes comprise, for instance, cranes referred to as "tower crane" or "city crane", or "counterjib crane". They consist of a vertical tower that is anchored to the ground, in fixed or displaceable position, by means of a ballasted base or of other -even non-displaceable- fastenings; said base supports a lift jib and a counterjib, either directly or through a connection structure. The lift jib and the counterjib can be rotatably connected to a fixed vertical tower; alternatively, the lift jib and the counterjib can be connected in fixed way to a vertical tower that can rotate around its axis.

[0003] The presence of the counterjib, provided with a counterpoise or ballast, allows balancing the weight of the revolving lift jib and of the load thereof, if any, when the crane operates. Such ballast in general consists of a plurality of blocks of material having a high specific weight, such as concrete, cast iron, steel, etc

[0004] An example of a crane of the previously described type is disclosed for instance in the patent GB 665,013.

[0005] DE discloses a portal crane construction using aerodynamically hollow sections around the trellis structure of the crane for improving the behavior of the crane to wind conditions.

[0006] DE 3345327 discloses a tower crane comprising a counter-jib equipped with a lateral wind shield which can assume a first position parallel to the crane axis in the working state and perpendicular to the crane axis in the rest state.

[0007] GB 742,368 discloses a jib crane equipped with a mast having tubular members in which a cabin for crane control can be provided, said tubular members being provided with external surface arranged to give reduced wind resistance.

[0008] One of the well-known main points to be face up to while designing and manufacturing cranes, and in particular with upper counterpoise cranes, relates to the crane stability, with particular reference to the resistance to the so-called "non-operating wind" (or "storm wind"). In this connection it has to be noted that the resistance of the crane to the "non-operating wind" is closely related to determining the height of the crane during the design, since the greater is the distance from the ground, the more intense is the action of the wind.

[0009] In this connection it can be useful to remind the known concepts of "operating wind" and "non-operating wind".

[0010] With the expression "operating wind" the wind is meant that acts on the crane during operation; during operation, the wind strikes the crane in zones that vary depending on the crane position relative to the wind direction, that is sometimes on the sides, sometimes on the front, sometimes on the rear part.

[0011] With the expression "non-operating wind" the maximum wind is meant that strikes the crane when the latter is not operating, that is at rest; in "non-operating wind" conditions, the crane rotates around its rotation axis due to the only thrust of the wind and, consequently, tends to align itself in the wind direction, so as to be struck on the back and to provide the last possible resistance. In this condition the wind strikes the rear wall of the free end of the counterjib, that it is usually made up of an assembly of surfaces substantially perpendicular both to the ground and to the lift jib.

[0012] It has to be noted that the stability of cranes and, in particular, their resistance to the "non-operating wind" is one of the parameters to be complied with according to crane design norms, such as the norm FEM 1.004.

[0013] The present invention originates and can be applied expecially to improving the safety and the stability of a crane of the kind previously described when its structure must resist to the condition of "non-operating wind" (or "storm wind").

[0014] In fact an object of the present invention is to provide a device that concurs to increase the crane safety and stability in "non-operating wind-" or "storm wind" conditions, without substantially modifying or interfering with the structure or operation of the crane itself.

[0015] This and other objects are achieved with a windbreaker deflector for cranes and with a crane provided with said windbreaker deflector according to the enclosed claims.

[0016] Advantageously, the increase of the stability and resistance to the "non-operating wind" of a crane with upper counterpoise is achieved by installing a windbreaker deflector according to the present invention at the free end of the counterjib of said crane.

[0017] The windbreaker deflector according to the invention allows diverting the air flow that otherwise would strike the rear wall of the free end of the counterjib and of the counterpoise or ballast. Therefore, thanks to the action of said windbreaker deflector, the shape coefficient -defined for instance in the above quoted calculation norm FEM 1.004-is greatly reduced, that has to be considered for calculating the wind pressure on the part of counterpoise struck by the wind itself.

[0018] This way, when the crane in conditions of "non-operating wind" rotates so as to align its jib and counterjib in the wind direction and so as to expose the free end of the counterjib to the wind, the counterjib provides a minimum resistance to the wind.

[0019] Therefore, thanks to the presence of the windbreaker deflector according to the invention, that allows providing the minimum resistance to the wind achievable with the crane structure on which said windbreaker deflector is installed, the safety and the stability of said crane are greatly increased.

[0020] Advantageously, according to a preferred embodiment of the invention, the windbreaker deflector has

a rounded profile and has preferably a semicircular section: such profile on one hand allows to reduce the resistance to the wind that strikes the deflector and, on the following detailed description, with reference to the attached Figures, wherein:

Figure 1 is a perspective view of the counterjib of a crane incorporating the windbreaker deflector according to the invention;
Figure 2 is a side view of the counterjib of Figure 1;
Figure 3 is a top view of the counterjib of Figure 1;
Figure 4 is a rear view of the counterjib of Figure 1.

[0021] With reference to Figures 1 and 2, the counterjib is shown of a traditional upper counterpoise crane; said counterjib 1 comprises a pair of lateral bulkheads 13, arranged for containing a counterpoise or ballast 15 made up of a plurality of blocks placed side by side each to another, and also made up of a beam or horizontal frame 19, which in its turn is fixed to a revolving structure 17; said structure 17 allows the lift jib (not shown) and the counterjib 1 to be rotated relative to the vertical tower (not shown).

[0022] According to the invention, a windbreaker deflector 11 is fixed on the counterjib 1, at the free end of said counterjib. Said windbreaker deflector 11 has the purpose of "breaking" the wind that, otherwise, would directly strike the counterpoise or ballast 15 of said counterjib 1, in particular in conditions in which the crane is not operating. In fact, in conditions of "non-operating wind" the crane, due to the wind action, rotates so as to align itself along the direction of the wind itself: in such conditions, the presence of said windbreaker deflector 11 arranged at the free end of the counterjib 1 concurs "to cut" the wind and to expose the minimum possible resistance to the wind itself, allowed by the crane structure.

[0023] As shown in Figure 3, windbreaker deflector 11 has advantageously a rounded, substantially semi-cylindrical shape, with the concavity directed towards the counterjib 1, since such shape contributes to reduce the resistance to the wind and, at the same time, allows the overall dimensions of said deflector to be kept limited.

[0024] It has to be noted that any rounded shape profile can advantageously be used for the windbreaker deflector 11; for instance, rather than having a semi-cylindrical shape with circular section, as shown in Figure 3, the deflector 11 can have a semi-cylindrical shape with elliptic section or also a semispherical or semiellissoidal shape.

[0025] Moreover the rounded profile of windbreaker deflector 11 can be approximated with a body having a prismatic shape with a polygonal profile, preferably having a high number of sides.

[0026] In Figure 4, the counterjib the 1 and windbreaker deflector are shown in a rear view, that is in strike direction from which the wind blows in "non-operating wind" conditions. As clearly shown in that Figure , the flat surface of the counterpoise or ballast 15 that in a traditional crane would be fully struck by the "non-operating wind" are completely covered by the windbreaker deflector 11 according to the invention and are hidden behind it.

[0027] Moreover from Figure 4 it is clear that windbreaker deflector 11 is made with such shape and dimensions so as to partially or -like in the embodiment described here- completely cover the rear wall of the crane counterjib 1, however without interfering in any case with the bearing structure of a traditional crane.

[0028] Said deflector 11 can be made of metal sheet or other easily available and formable materials.

[0029] Thanks to its simple structure that can be easily and cheaply manufactured, and to the fact that it can be installed without interfering with the crane structure and operation, said windbreaker deflector 11 can be applied to whichever traditional crane of the type previously described.

[0030] Moreover, although in the described embodiment the windbreaker deflector 11 is fastened to the lateral bulkheads 13 of the counterjib 1, it is also possible to provide for said windbreaker deflector to be directly fixed to said counterpoise or ballast 15, at the end of the latter that is directed towards the outside of counterjib 1.

[0031] Analogously, although said windbreaker deflector 11 has been described like a separate and free-standing piece, it is possible to provide for directly obtaining it by forming the last one of the blocks that make the counterpoise or ballast 15 up, so as to form said block with the shape of the desired windbreaker deflector. Alternatively said windbreaker deflector 11 can be obtained by suitably shaping the structure itself of the counterjib 1 at the free end of said counterjib.

[0032] It is also possible to provide for the windbreaker deflector 11 to extend along the counterjib 1, starting from the free end of said counterjib 1, so as to contain inside itself a part of said counterjib 1.

[0033] In particular it is possible to provide for the counterpoise or ballast 15 to be contained inside the windbreaker deflector 11.

[0034] Alternatively it is possible to provide for the windbreaker deflector 11 to be advantageously used for containing components or appliances that are normally used on a crane of the described type, such as an electric control panel, measuring devices, winches, motors, pulleys, reduction gearings, tension bars, ladders, staircases, balconies and the like.

[0035] As it appears evident from the previous description, a windbreaker deflector 11 according to the invention achieves the stated scopes, since it can be mounted on the free end of a counterjib of a traditional crane, so as to "break" the wind that strikes said counterjib when the crane, in "non-operating wind" conditions, rotates until its jib and its counterjib are aligned to the wind direction, so that, thanks to the presence of said windbreaker deflector, said counterjib will offer the minimum possible resistance allowed by the crane structure itself on which said deflector is mounted.

Claims

1. Revolving crane with upper counterpoise of the type comprising a vertical tower and a lift jib and a counterjib (1) connected at an end to said vertical tower and equipped with a counterpoise or ballast (15) on the opposite free end, **characterized in that** the rear wall of the free end of the counterjib is at least partially covered with a windbreaker deflector (11), said windbreaker deflector (11) substantially consisting of a semi-circular body with rounded profile, the concavity thereof being directed towards said counterjib (1), for diverting the air flow that otherwise would strike said rear wall of the free end of the counterjib and of the counterpoise or ballast.

2. Crane according to claim 1, wherein said counterjib (1) comprises a beam or frame (19) connected at an end to said vertical tower and having a counterpoise or ballast (15) near its free opposite end.

3. Crane according to claim 1 or 2, wherein said windbreaker deflector (11) is directly fixed to the structure of said counterjib (1).

4. Crane according to claim 2, wherein said windbreaker deflector (11) is fixed to said counterpoise or ballast (15).

5. Crane according to claim 2, wherein said windbreaker deflector (11) is directly made out of a shaped portion of said counterpoise or ballast (15).

6. Crane according to claim 1, wherein said windbreaker deflector (11) it directly made out of the structure of said counterjib (1), said structure being shaped at the free end of said counterjib.

7. Crane according to any of claims from 1 to 6, wherein said windbreaker deflector (11), starting from the free end of said counterjib (1), extends along said counterjib (1) so as to contain a part of said counterjib (1) inside said deflector (11).

8. Crane according to claim 7, wherein said windbreaker deflector (11) contains said counterpoise or ballast (15) inside the deflector (11).

9. Crane according to claim 7, wherein said windbreaker deflector (11) contains inside itself appliances to be used on said crane, such as an electric control panel, measuring devices, winches, motors, pulleys, reduction gearings, tension bars, ladders, staircases, balconies.

10. Crane according to any of claims 1 to 9, wherein said windbreaker deflector (11) has a substantially semicylindrical shape, with a circular or elliptic section.

11. Crane according to any of claims 1 to 9, wherein said windbreaker deflector (11) has a substantially semispherical or semiellissoid-like shape.

12. Crane according to any of claims 1 to 9, wherein the rounded profile of said body of said windbreak (11) is approximated with a body having a polygonal profile.

13. Crane according to any of claims 1 to 12, wherein said windbreaker deflector (11) is made of a metal sheet or such formable material.

Patentansprüche

1. Drehkran mit oberem Gegengewicht, mit einem vertikalen Turm sowie einem Hubbalkenausleger und einem Gegenauslegerarm (1), der am einen Ende mit dem vertikalen Turm verbunden und am gegenüberliegenden freien Ende mit einem Gegengewicht oder Ballast (15) ausgestattet ist,
dadurch gekennzeichnet, dass die Rückwand des freien Endes des Gegenauslegerarms mindestens teilweise durch einen Windschutzabweiser (11) abgedeckt ist, der im Wesentlichen aus einem halbrunden Körper mit Rundprofil besteht, dessen Höhlung zum Gegenauslegerarm (1) weist, um die Luftströmung abzulenken, die sonst die Rückwand des freien Endes des Gegenauslegerarms und das Gegengewicht oder den Ballast treffen würde.

2. Kran nach Anspruch 1,
wobei der Gegenauslegerarm (1) einen Balken oder Rahmen (19) aufweist, der am einen Ende mit dem vertikalen Turm verbunden ist und nahe seines gegenüberliegenden freien Endes ein Gegengewicht oder einen Ballast (15) aufweist.

3. Kran nach Anspruch 1 oder 2,
wobei der Windschutzabweiser (11) direkt an der Tragkonstruktion des Gegenauslegerarms (!) befestigt ist.

4. Kran nach Anspruch 2,
wobei der Windschutzabweiser (11) am Gegengewicht oder Ballast (15) befestigt ist.

5. Kran nach Anspruch 2,
wobei der Windschutzabweiser (11) direkt als ausgeformter Abschnitt des Gegengewichts oder Ballasts (15) hergestellt ist.

6. Kran nach Anspruch 1,
wobei der Windschutzabweiser (11) direkt aus der Tragkonstruktion des Gegenauslegerarms (1) hergestellt ist, die am freien Ende des Gegenauslegerarms ausgeformt ist.

7. Kran nach einem der Ansprüche 1 bis 6, wobei der Windschutzabweiser (11), am freien Ende des Gegenauslegerarms (1) beginnend, sich entlang des Gegenauslegerarms (1) so erstreckt, dass er einen Teil des Gegenauslegerarms (1) innerhalb des Abweisers (11) enthält.

8. Kran nach Anspruch 7, wobei der Windschutzabweiser (11) das Gegengewicht oder den Ballast (15) innerhalb des Abweisers (11) enthält.

9. Kran nach Anspruch 7, wobei der Windschutzabweiser (11) in sich Ausrüstungen zur Verwendung am Kran enthält, wie elektrische Steuerpulte, Messeinrichtungen, Winden, Motore, Rollen, Untersetzungsgetriebe, Zugstangen, Leitern, Treppenstufen, Balkone.

10. Kran nach einem der Ansprüche 1 bis 9, wobei der Windschutzabweiser (11) eine im Wesentlichen halbzylindrische Form mit einem runden oder elliptischen Querschnitt aufweist.

11. Kran nach einem der Ansprüche 1 bis 9, wobei der Windschutzabweiser (11) eine im Wesentlichen halbkugelförmig oder halbellipsoidförmig ausgebildet ist

12. Kran nach einem der Ansprüche 1 bis 9, wobei das abgerundete Profil des Körpers des Windschutzes (11) einem Körper mit Vieleckprofil angenähert ist.

13. Kran nach einem der Ansprüche 1 bis 12, wobei der Windschutzabweiser (11) aus Metallblech oder einem derart formbaren Werkstoff hergestellt ist.

Revendications

1. Grue tournante pourvue d'un Contrepoids supérieur d'équilibre du type comportant une tour verticale et une flèche de levage et une contre-flèche (1) raccordée au niveau d'une extrémité à ladite tour verticale et équipée d'un contrepoids d'équilibre ou d'un lest (15) sur l'extrémité libre opposée, **caractérisée en ce que** la paroi arrière de l'extrémité libre de la contre-flèche est au moins partiellement recouverte par un déflecteur abri-vent (11), ledit déflecteur abri-vent (11) étant constitué essentiellement d'un corps semi-circulaire présentant un profil arrondi, sa concavité étant dirigée vers ladite contre-flèche (1), en vue de dévier le flux d'air qui frapperait sinon ladite paroi arrière de l'extrémité libre de la contre-flèche et du contrepoids d'équilibre ou du lest.

2. Grue selon la revendication 1 dans laquelle ladite contre-flèche (1) comporte une poutre ou un chevalet (19) raccordée au niveau d'une extrémité à ladite tour verticale et comportant un contrepoids d'équilibre ou un lest (15) à proximité de son extrémité libre opposée.

3. Grue selon la revendication 1 ou 2, dans laquelle ledit déflecteur abri-vent (11) est fixé directement sur la structure de ladite contre-flèche (1).

4. Grue selon la revendication 2, dans laquelle ledit déflecteur abri-vent (11) est fixé audit contrepoids d'équilibre ou audit ballast (15).

5. Grue selon la revendication 2, dans laquelle ledit déflecteur contre le vent (11) est constitué directement d'une partie configurée dudit contrepoids d'équilibre ou dudit lest (15).

6. Grue selon la revendication 1, dans laquelle ledit déflecteur abri-vent (11) est directement constitué de la structure de ladite contre-flèche (1), ladite structure étant configurée au niveau de l'extrémité libre de ladite contre-flèche.

7. Grue selon l'une quelconque des revendications 1 à 6, dans laquelle ledit déflecteur abri-vent (11), commençant à partir de l'extrémité libre de ladite contre-flèche (1) s'étend le long de ladite contre-flèche (1) de façon à contenir une partie de ladite contreflèche (1) à l'intérieur dudit déflecteur (11).

8. Grue selon la revendication 7, dans laquelle ledit déflecteur abri-Vent (11) contient ledit contrepoids d'équilibre ou ledit lest (15) à l'intérieur du déflecteur (11).

9. Grue selon la revendication 7, dans laquelle ledit déflecteur abri-vent (11) contient en lui-même des appareils à utiliser sur ladite grue, tels qu'un panneau de commande électrique, des dispositifs de mesure, des treuils, des moteurs, des poulies, des engrenages de réduction, des barres de tension, des échelles, des cages d'escalier, des balcons .

10. Grue selon l'une quelconque des revendications 1 à 9, dans laquelle ledit déflecteur abri-vent (11) présente une configuration essentiellement semi-cylindrique, avec une section circulaire ou elliptique.

11. Grue selon l'une quelconque des revendications 1 à 9, dans laquelle ledit déflecteur abri-vent (11) présente une configuration essentiellement hémisphérique ou de type semi-ellipsoïdal.

12. Grue selon l'une quelconque des revendications 1 à 9, dans laquelle le profil arrondi dudit corps dudit

abri-vent (11) est approximativement celui d'un corps présentant un profil polygonal.

13. Grue selon l'une quelconque des revendications 1 à 12, dans laquelle ledit déflecteur abri-vent (11) est constitué d'une tôle métallique ou d'un tel matériau apte au maçonnage.

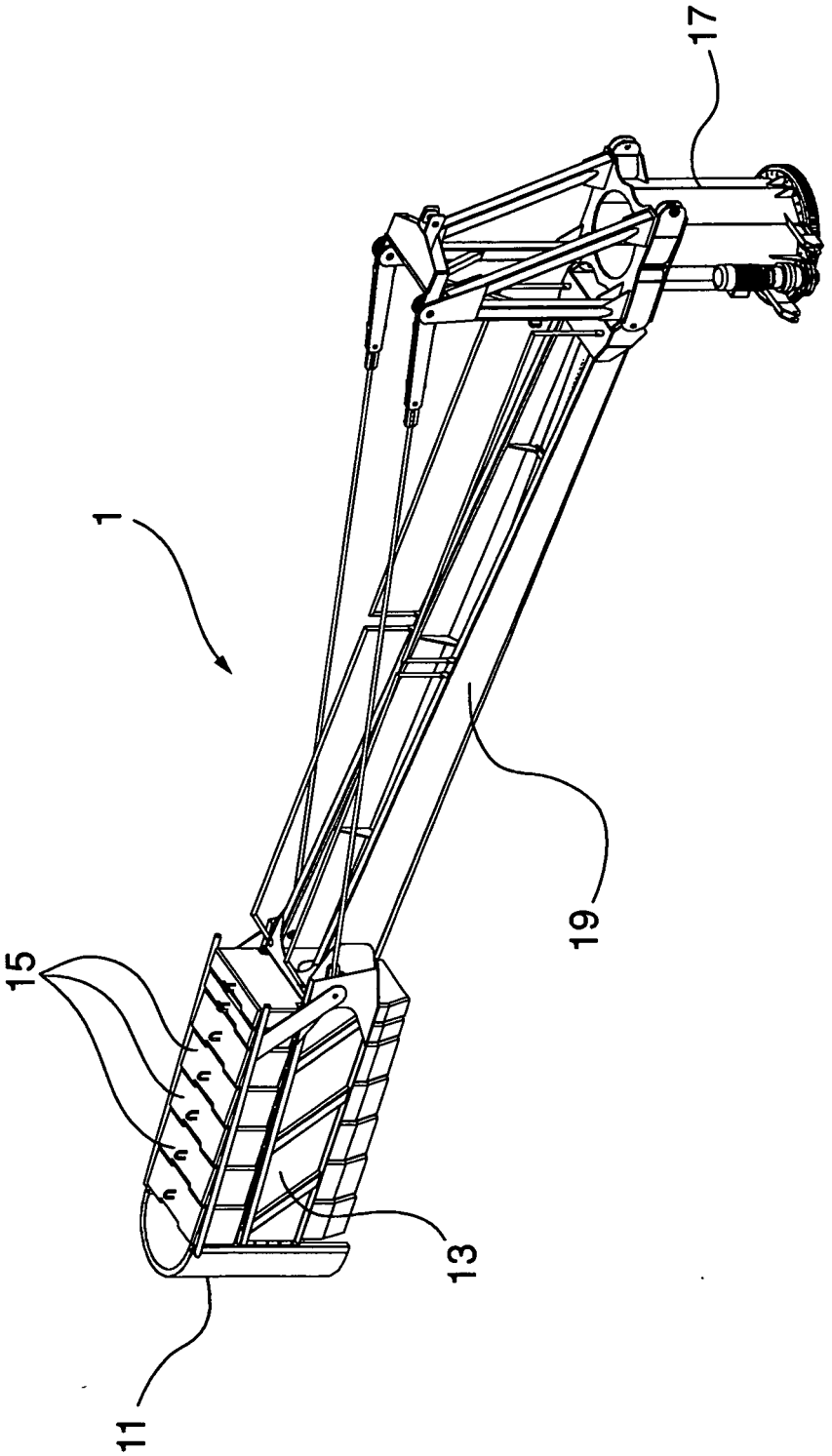


Fig. 1

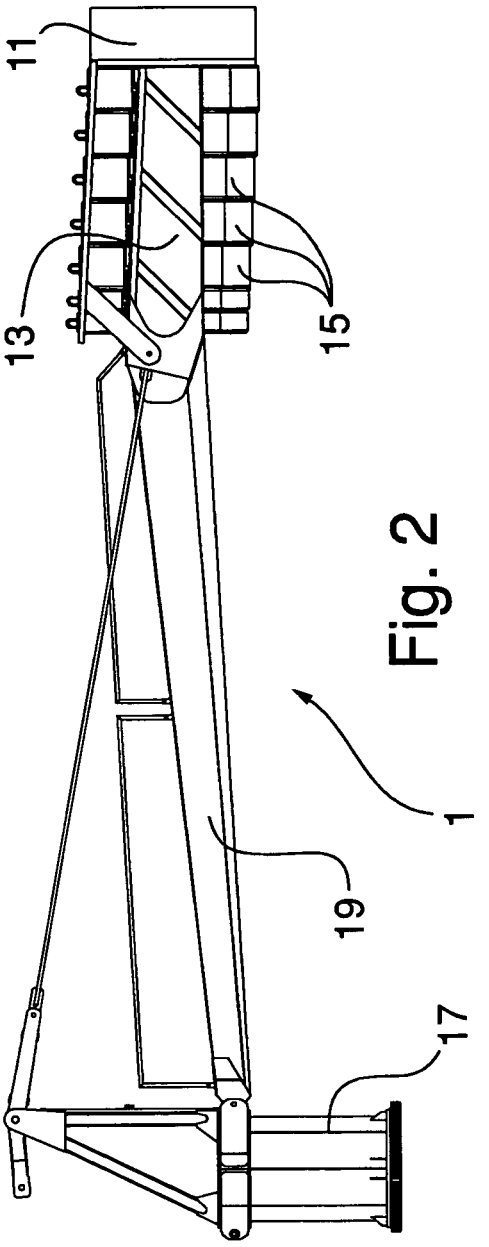


Fig. 2

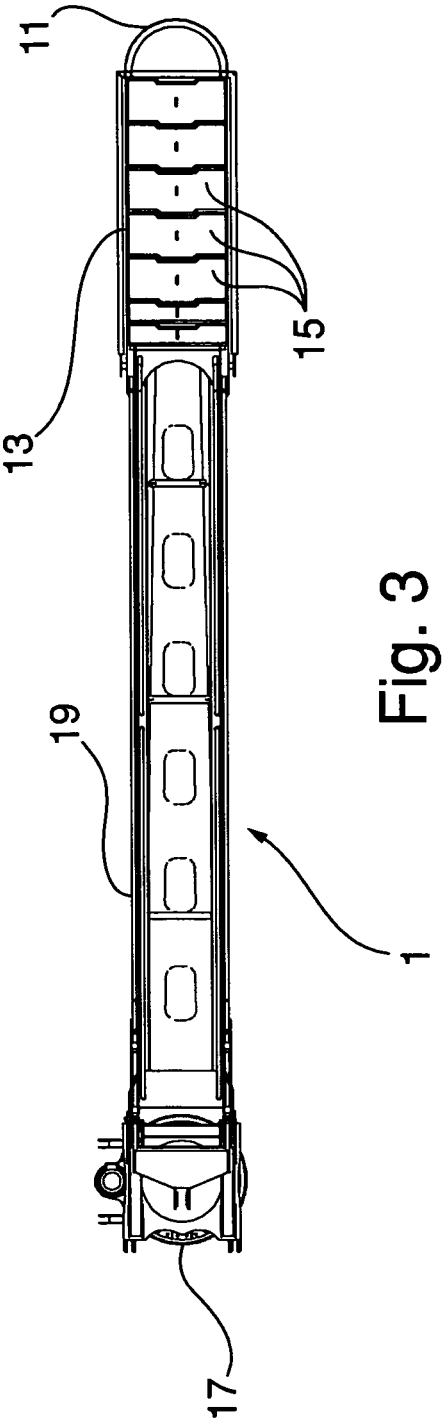


Fig. 3

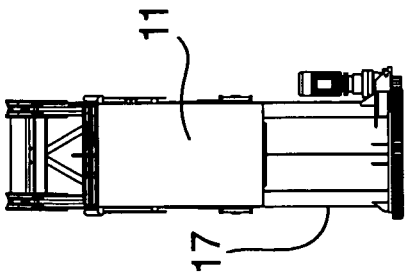


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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