(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 061 790**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **82200269.7**

(22) Date of filing: **02.03.82**

(51) Int. Cl.³: **B 66 C 19/00**
B 66 C 3/02

(30) Priority: **20.03.81 NL 8101393**

(43) Date of publication of application:
06.10.82 Bulletin 82/40

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: **FRANS SWARTTOUW B.V.**
Van Riemsdijkweg 78 P.O. Box 54143
NL-3008 JC Rotterdam(NL)

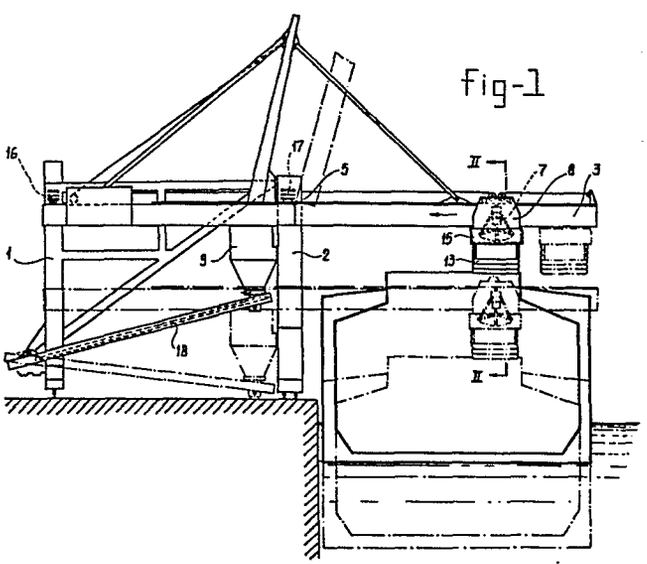
(72) Inventor: **Van Deijk, Jan Dirk Albert**
Kempenaar 82
NL-2991 PJ Barendrecht(NL)

(74) Representative: **van der Beek, George Frans et al,**
Nederlandsch Octrooibureau Johan de Wittlaan 15 P.O. Box 29720
NL-2502 LS Den Haag(NL)

(54) Grab crane.

(57) To prevent leaking and spreading of dust at the transhipment of bulk goods, a grab crane having a travelling trolley 6, 24, 25 to which a grab 7; 26, 27 is suspended, comprises a housing 8; 21 in which at least a substantial part of the grab may be received and in which at least a part of the horizontal transport of the bulk good can take place. This housing may either be connected to the travelling trolley 6 or it may be formed by the beam 21 in which the trolley 24; 25 may run.

Fig-1



EP 0 061 790 A1

0061790

Grab crane.

The invention is related to a grab crane with at least one supported beam and a travelling trolley movable along, on or in said beam, to which by means of cables an up and down movable grab is suspended.

Grab cranes are used for transshipment of bulk material as coal, ore and chemicals. A great disadvantage of it is the formation of dust, caused by material leaking from the grab or deposited on the grab and falling down from it. In particular with strong winds the released dust is blown away strongly. From the side of environmental experts an increasing exists against grab cranes.

To solve this problem continuous dischargers have been suggested. For transshipment of various bulk materials in principle the possibility exists of a so-called slurry conveying system, in which the bulk material is for instance disperged in water and after transshipment a separation is brought about between bulk material and liquid. This method still presents a number of unsolved problems. Pneumatic transport has as disadvantages a low capacity and a high energy expenditure. Also the known continuous method, in which material is clamped between two belts and is conveyed in vertical direction, exhibits disadvantages as not being suitable for various bulk materials and restricted manoeuvrability in the hold of a ship. Finally as continuous discharger a vertical bucket ladder could be used. Such a heavy machine also can be manipulated with difficulty in the hold of a ship. The trimming, that means the complete emptying of the hold is not possible with clamping belts and a bucket ladder. Moreover, a bucket ladder practically cannot be adapted to the weight of the product, so it would have a too large capacity when applied to a light product and a too low capacity when applied to a heavy product.

The invention aims to provide an environmental friendly grab crane with which the above-mentioned disadvantages

of continous dischargers are avoided and also the above-indicated problem of leaking material and blowing away of dust is solved.

According to the invention the above-indicated grab crane is characterized by a housing for enclosing at least a substantial part of the grab, in which housing at least a part of the horizontal transport of the material can take place in a substantially dustfree way.

As soon as the grab is enclosed in the housing the losses due to leaking and blowing away of dust are prevented.

The possibility is present to make use of a relatively small housing that is connected to the travelling trolley and can be moved herewith. An other possibility is that the housing is mainly formed by a tubular beam, in which the travelling trolley and the grab can be run. The possibility exists that the grab discharges the material in the housing in which or with which it is moved substantially horizontally; during this horizontal transport of the material the grab can return to its grabbing position.

To restrict the vertical transport of the grab to a minimum it is preferred that the beam can be moved in vertical direction along the legs of the portals of the crane.

Blowing away of dust can be prevented if the tube or trunk can be positioned below the entrance of the housing for the grab.

This tube or trunk for instance is designed as an accordeon so it can be pulled up when not in use.

In the embodiment with a relatively small housing that can be moved together with the travelling trolley, the bottom of the housing may comprise at least one hinged portion.

The trunk preferably is connected to a carriage that can be moved along rails connected to the beam or beams.

In case the housing is formed by a tubular beam, in the bottom of it a slit may be provided that can be covered by a belt that can be wound.

The tube or trunk in this case can be connected to the end of the belt that can be wound. The capacity of the crane can be increased by mounting two tracks for a travelling trolley next to each other inside the tubular beam, each track being destined for a travelling trolley with grab.

In case two grabs cannot pass each other, because of the fact, that they overlap in transverse direction at its free end the beam can be provided with a parking place for a travelling trolley with grab.

The invention will be described with the aid of the following figures, in which two embodiments are shown.

Figure 1 shows a side view of a first embodiment.

Figure 2 shows a cross-section along the line II-II.

Figure 3 shows a longitudinal section of the detail according to figure 2.

Figure 4 shows a side view of the second embodiment.

Figure 5 shows a cross-section along the line V-V in figure 4.

The crane according to the figures 1, 2 and 3 comprises two portals 1, 2 that support two beams 3, 4. The forwardly directed part of these beams can pivot in the usual way at 5 (see dotted line), so it will not be an obstacle during mooring and departing of ships.

Along the beams a travelling trolley 6 can be moved to which a grab 7 of usual construction is suspended by means of closing ropes and holding ropes. The travelling trolley may be a machine trolley, e.g. machine trolley drawn by cables or a cable trolley. Latter is the case in the shown embodiment.

When the grab is pulled upwards it arrives into a housing 8 and in this it is moved horizontally to and from the hopper 9.

In the embodiment according to figures 1, 2 and 3 this housing 8 is relatively small and is suspended to the travelling trolley 6, so it can be moved along with the travelling trolley.

The bottom of the housing 8 comprises two hinged flaps 11, that can be opened and closed by hydraulic or pneumatic cylinders 12.

Below the bottom an accordeon shaped tube 13 may be provided. This is connected to a tube that in its turn is connected to a carriage 15, that will ride on flanges of the beams 3, 4. In case of dusty material the tube is used to prevent blowing of the falling bulk material. In case not dusty materials are transshipped, the carriage 15 together with tube 13 can be moved to the parking position at the free end of the beam to perform the normal use of the crane as known until now. This position is indicated with dotted lines in figure 1. The transport of the carriage 15 of the tube 13 also is possible by means of cables and a winch.

Obviously, the flaps 11 are brought into the horizontal closing position during horizontal transport of the housing 8.

The function of the tube 13 is to prevent dust blowing during vertical transport of the grab. In this connection it is important that the beams 3, 4 can be brought at a distance as small as possible above the ship to restrict the length of the accordeon in the vertical conveyor. For that reason these beams are movable in vertical direction with regard to the legs of the portals 1, 2. For instance the beams are suspended to cables, that can be drawn up or lowered by means of winches 16, 17. In a determined selected height position the beams may be locked by not shown locking means, such as pins extending through holes. To move the beams upwardly and downwardly several other embodiments are possible, for instance embodiments the portal legs of which being provided with racks in which tooth gears or sets of locking beams mesh.

In figure 1 a relatively low position of the beams 3, 4 is indicated by dotted lines. This position corresponds with a loaded vessel. In practice it comes to the fact, that the beams during discharge of a vessel are moved upwardly periodically as adaption to the decreasing draught of the ship.

As soon as the housing 8 with filled grab has arrived above the hopper 9, the bottom flaps 11 are brought in the open position and the grap is opened. The material arrives through the

hopper on the discharge conveyor 18. Near the hopper a dust suction means can be provided.

It will be clear that blowing of dust and loss of material by leaking can be restricted to a minimum.

It is not excluded that for an efficient operation of the crane the housing 8 has already started its horizontal movement in the direction of the hopper, while the grab is still on its way in vertical direction to the housing 8.

In figure 2 the control cabine is indicated with 19.

The embodiment according to figures 4 and 5 differs from the above embodiment in that instead of a relatively small housing , that is movable along the beams, a stationary housing is chosen being the beam 21 itself. This beam has the shape of a hollow tube with a substantially open bottom.

In the upper part of the tube rail supports 22, 23 for two travelling trolleys 24 and 25 respectively are mounted. To each of said travelling trolleys a grab 26 and 27 respectively is suspended in the usual way with the aid of closing ropes and holding ropes.

The open bottom of the beam 21 is covered up to the place where the grabs have to be able to enter or to leave the beam by means of a conveyor belt 28, that can be wound on a roller 29. The belt 28 is present for catching spilled material. The roller 29 is in such a position with regard to the hopper 9 that material on the belt, when this is wound, arrives in the hopper.

Also this second embodiment comprises a tube or trunk 13, that either is connected to the end of conveyor belt 28 or is movable separately. Also this tube or trunk is destined to be mounted below the beam entrance for the grabs to avoid dusting and blowing away of dust.

The beam is moreover movable in vertical direction by means of winches 16, 17 that are able to wind or unwind the suspension ropes.

To restrict the width of the beam 21 the two grabs 26, 27 cannot move along each other. During horizontal transport of one

of the grabs the other will be moved in the parking position 31 at the free end of the beam. The open bottom of the beam is covered from the position in which the grabs have to enter or have to leave the beam up to the end of the beam by a conveyor belt 30 that can be rolled. It will be obvious that the system also may contain only one grab.

Within the scope of the invention various modifications and additions to the described system are possible. Instead of the accordeon trunk 13 a telescopic extendable tube may be used. To be able to adapt the dimensions of the grab to the specific weight of the bulk material the grabs can be able to be exchanged for instance by means of a so-called pear-shaped connection or by the possibility of unreaving the ropes.

The embodiment according to figures 1, 2 and 3 is in so far preferred over that according to figures 4 and 5 in that it is cheaper and could be applied in such an efficient manner that with non dusting materials the operating cycle normal up to now can be applied.

The discharge conveyor 18 can be carried out in several ways, for instance so that discharge perpendicular to the shown discharge can take place.

To be able to vary the height position of the beam or beams, this beam or beams can be connected fixed to the portals and the legs of the portals could be provided with ram constructions.

Instead of the belt 28 for catching material that leads from the grab, a container could be used that, after that grab has entered the housing, can be moved below the grab and subsequently moves with the travelling trolley.

Finally it will be clear that the transport of the grab can be made automatic.

By the vertical displacement of the beam the crane driver will have a good sight on his work.

-claims-

CLAIMS

1. Grab crane with at least one supported beam and a travelling trolley movable along on or in said beam to which by means of cables an up and down movable grab is suspended, characterized by a housing (8;21) for enclosing at least a substantial part of the grab (7;26,27), in which housing at least a part of the horizontal transport can take place in a substantially dustfree way.

2. Grab crane according to claim 1, characterized in that the housing (8) is connected to the travelling trolley (6) and is movable therewith.

3. Grab crane according to claim 1, characterized in that the housing (21) is formed by a substantially tubular beam, in which the travelling trolley (24,25) can be run.

4. Grab crane according to one of the forgoing claims, characterized in that the beam (3,4;21) is movable in vertical direction along the legs of the portals (1,2).

5. Grab crane according to one of the forgoing claims, characterized by a tube or trunk (13) that can be positioned below the grab entrance in the housing (8;21).

6. Grab crane according to claim 5, characterized in that the tube or trunk (13) is formed as an accordeon.

7. Grab crane according to claim 2, characterized in that the bottom of the housing comprises at least one hinged flap (11).

8. Grab crane according to claim 5, characterized in that the trunk is connected to a carriage (15) that is movable along rails connected to the beam or beams.

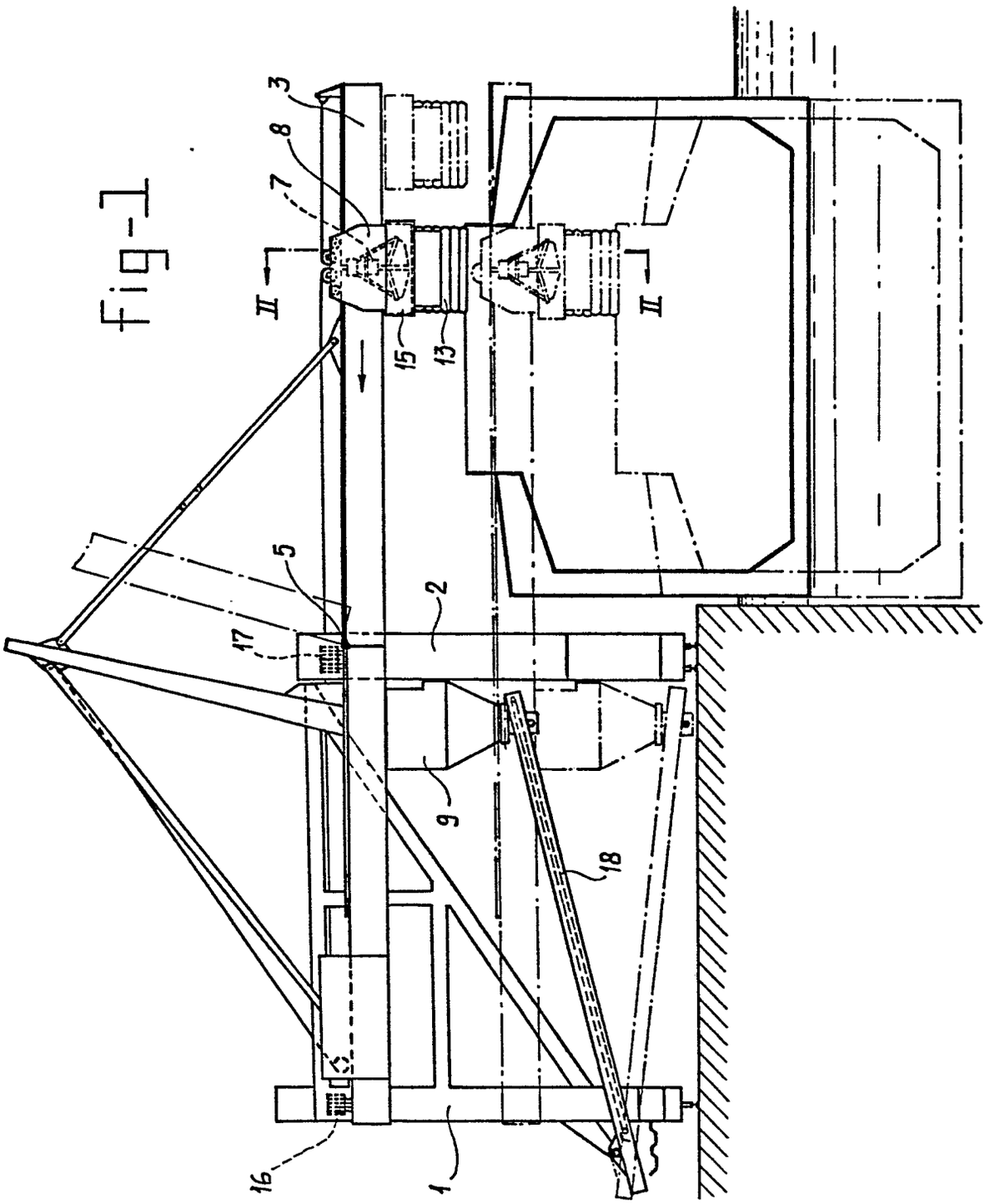
9. Grab crane according to claim 3, characterized in that the tubular beam (21) comprises a slit in its bottom that can be covered by a belt (28) that can be wound.

10. Grab crane according to claims 9 and 5, characterized in, that the tube or trunk (13) is connected to the end of the belt (28) that can be wound.

11. Grab crane according to claim 2 or 3, characterized by two tracks (22,23) for travelling trolleys mounted next to each other, each of which being meant for a travelling trolley (24,25) with grab (26,27).

12. Grab crane according to claim 11, characterized in that at the free end of the beam a parking place (31) is provided for one of the travelling trolleys (24,25) at the time.

Fig-1



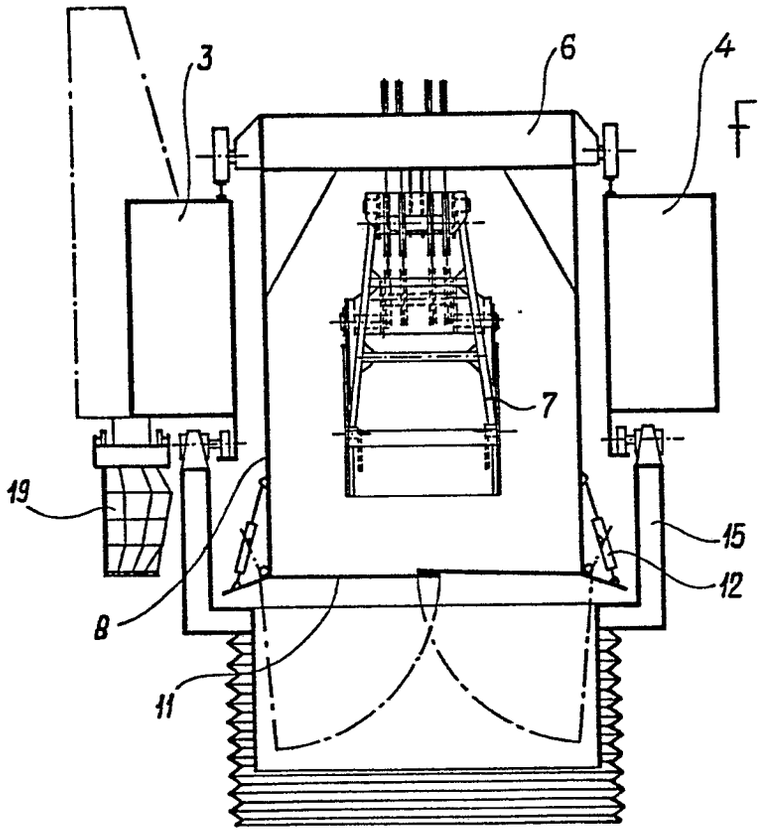


fig-2

fig-3

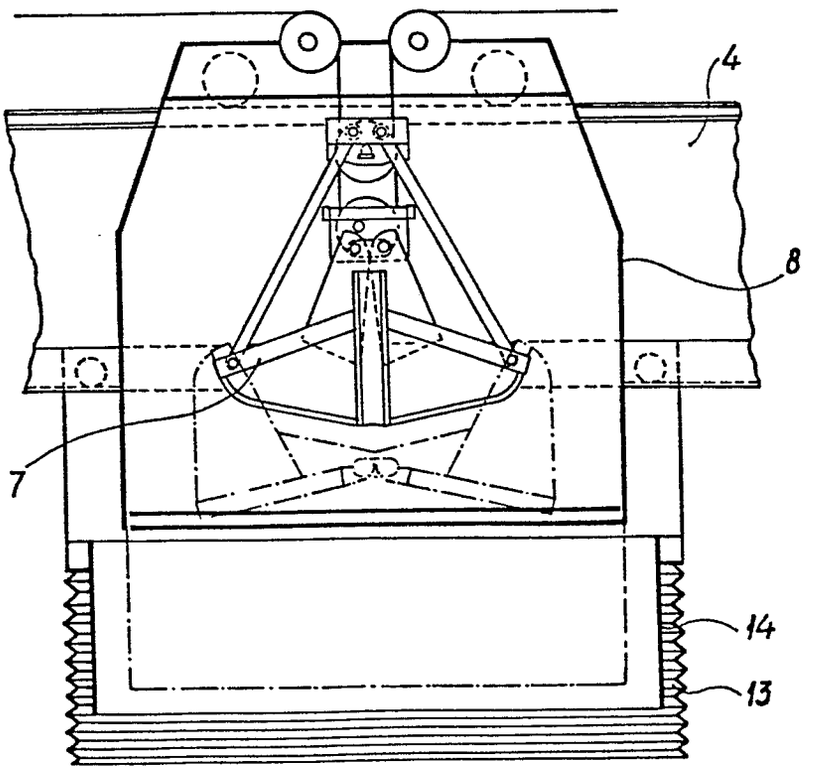
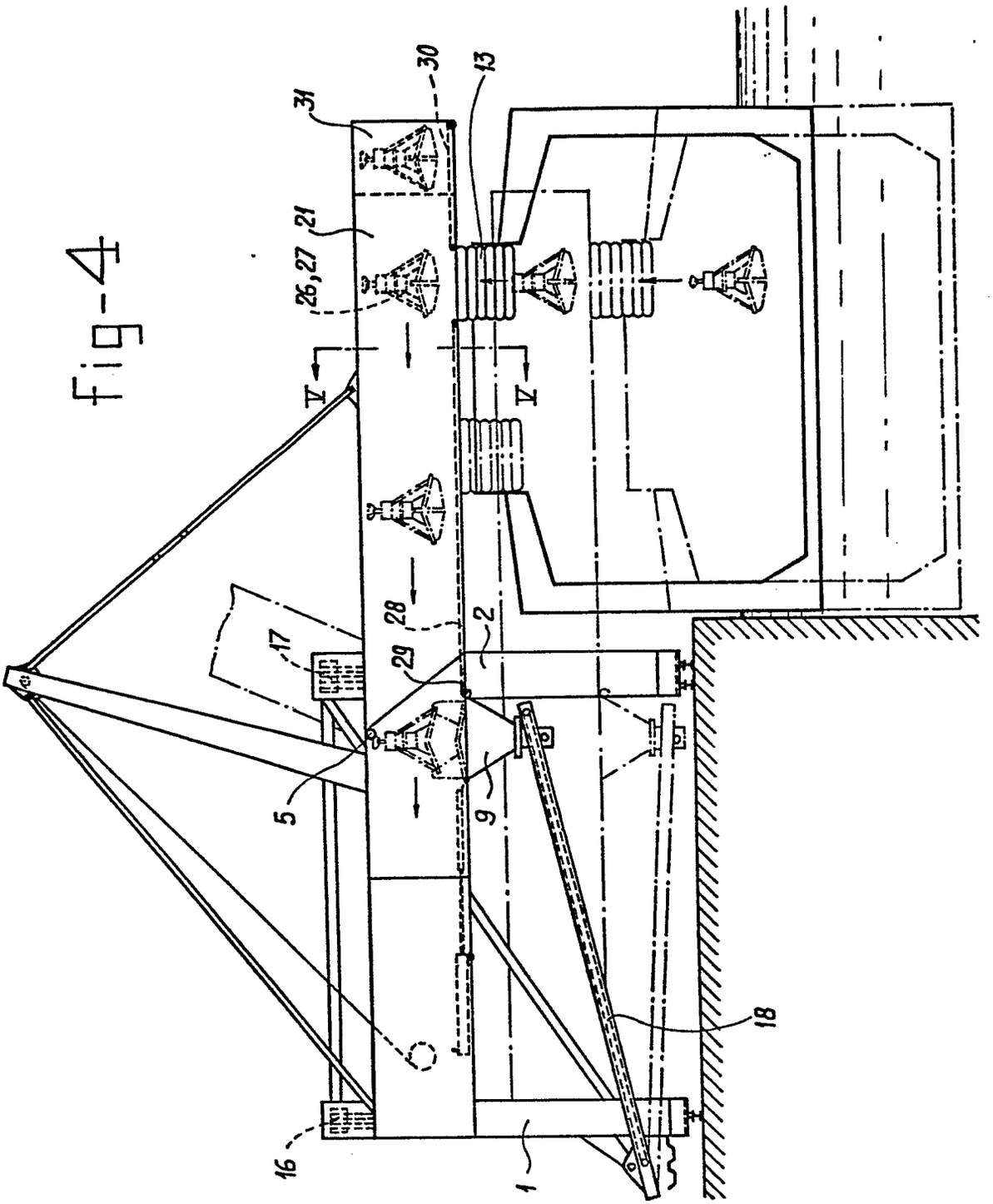
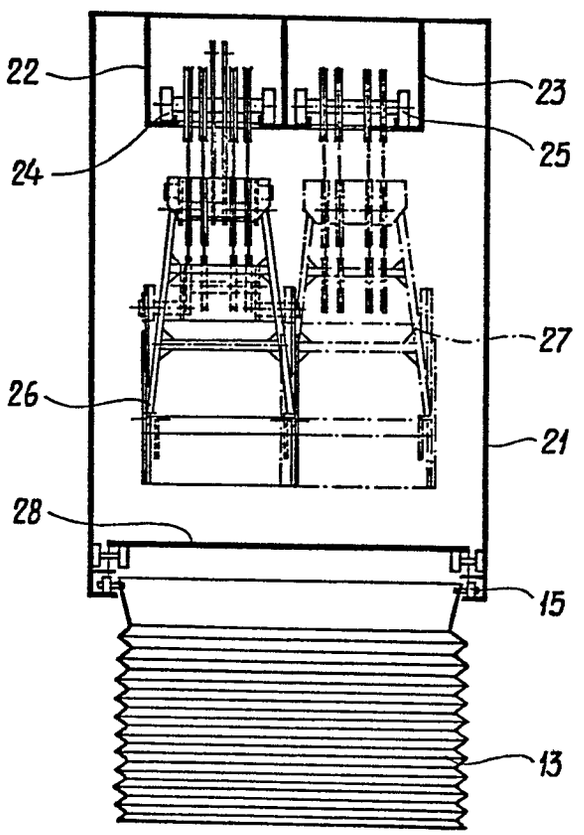


Fig-4



0061790

fig-5



0061790

European Patent Office

Application number

EP 82 20 0269

EUROPEAN SEARCH REPORT

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. ³)
A	NL-A-6 503 943 (KRANBAU EBERSWALDE) *Page 6, lines 35-36; page 7, lines 1-7; figure 3*	1	B 66 C 19/00 B 66 C 3/02
A	GB-A-1 015 366 (HEAD WRIGHTSON AND COMPANY) *Page 2, lines 22-73; figure 1*	1	
A	DE-B-1 126 091 (M.A.N.) *The whole document*	2	
A	US-A-3 783 792 (CULLOM) *The whole document*	4	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 66 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14-07-1982	VAN DEN BERGHE E.J.J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503. 03.82