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(54) **Suction dredger**

(57) The invention concerns a suction dredger (19) comprising a hold (18) for holding a load such as sand, shingle or similar material and a crane (3) for moving the load from the hold (18) onto an unloading belt (24) along the hold (18), wherein the crane (3) comprises a grab or clamshell (4) that can move along the length of the hold (18) and above a crane belt (23) and wherein the crane

belt (23) transports the load unloaded from the grab or clamshell (4) to the unloading belt (24).

In accordance with the invention, the grab or clamshell (4) moves through an opening (36) with a hatch (29) located above the hold (18) and the crane belt (23) and wherein the closable hatch (29) comprises a sloped upper surface to guide the load unloaded from the grab or clamshell (4) to the crane belt (23).

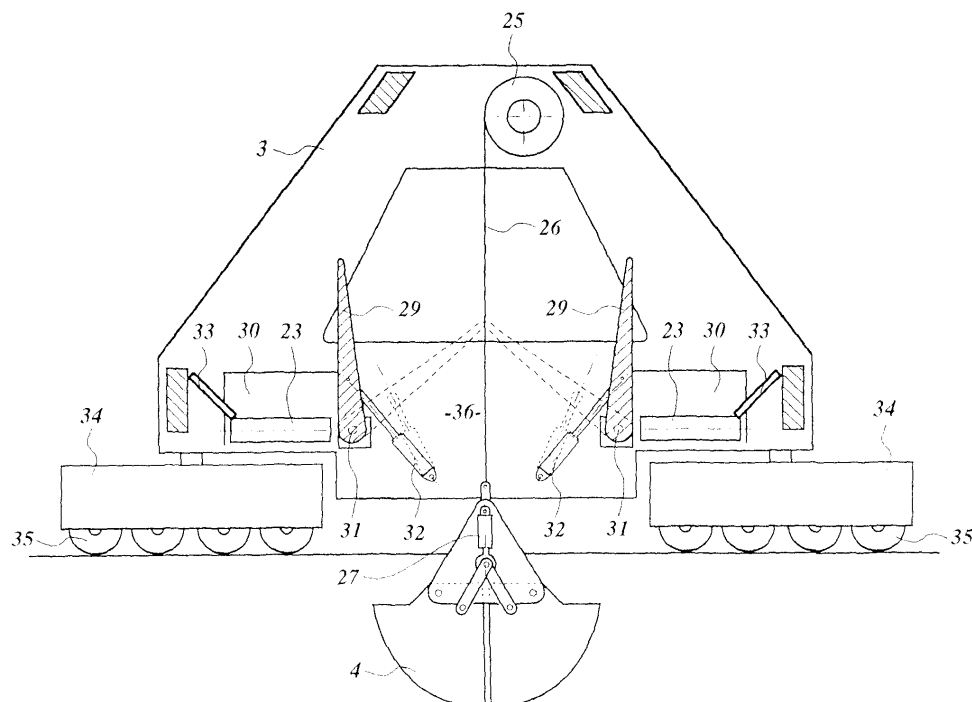


Fig. 5

Description

[0001] The invention concerns a suction dredger in accordance with the preamble of claim 1. In an embodiment of the suction dredger, the vertically hoisted bucket is unloaded onto a crane belt by moving the crane belt sideways to a position under the bucket and after the load is deposited on the crane belt the crane belt is moved sideways to allow the bucket to pass downwards for collecting a new load. The disadvantage of the known design is that the sideways movement of the crane belt causes an interrupted flow or an additional bump of the load on the unloading belt, which is undesirable. In another embodiment, the crane and the crane belt are stationary relative to the unloading belt and the bucket moves sideways to a position above the crane belt. This leads to a complicated construction of the bucket movement. To overcome these disadvantages the suction dredger is according to claim 1. In this way, the crane and the crane belt remain more or less in the same position relative to the unloading belt so that there is a constant flow of load on the unloading belt and the bucket makes only vertical movements.

[0002] In accordance with an embodiment, the suction dredger is according to claim 2. In this way, the opening of the hatch also moves the load onto the crane belt.

[0003] In accordance with an embodiment, the suction dredger is according to claim 3. In this way, the crane supports the hatch in a simple and robust construction.

[0004] In accordance with an embodiment, the suction dredger is according to claim 4. In this way, the moving parts of the hatch can be half of the width of the opening and two crane belts transport the load to the unloading belt. This makes it possible to open the hatch quicker and so to increase the unloading capacity.

[0005] In accordance with an embodiment, the suction dredger is according to claim 5. In this way, the bucket can remain open when lowered through the opening so that it is ready to grab a new load.

[0006] Embodiments of the invention are described with the aid of the accompanying drawing in which

Figure 1 shows a side view of a suction dredger,
Figure 2 shows a top view of the suction dredger of figure 1,
Figure 3 shows cross section III-III of the suction dredger of figure 1,
Figure 4 shows cross section IV-IV of the suction dredger of figure 1, and
Figure 5 shows a crane on the suction dredger of figure 1 in schematic cross section.

[0007] Figures 1-5 show a suction dredger 19. The suction dredger 19 is a vessel with a bow 14 and a stern 21 with crew quarters 1 and a propulsion and steering system 20 and a hold 18 for holding sand, shingle or similar material sucked from the bottom of the sea. The suction dredger 19 has a suction pipe 6 that is coupled

to the suction pipe gantry 7. The suction pipe 6 has a suction head 2 and a pump 5. During use the suction pipe 6 extends from the suction pipe gantry 7 into the sea at the side of the suction dredger 19 with the suction head 2 on the sea floor. The pump 5 pumps a mixture of water with sand, shingle or similar material into the hold 18. In the hold 18 the sand, shingle or similar material settles in as sediment in the hold 18 and excess water flows out of the hold 18.

[0008] After the hold 18 is filled up with sand, shingle or similar material the suction dredger 19 ends the loading phase and the suction pipe 6 is brought inboard and the suction dredger 19 sails to an unloading station. At the unloading station the suction dredger 19 is moored alongside a quay or the bow 14 is brought near a location where a distribution belt 9 mounted on the bow 14 can deposit the sand, shingle or similar material. Also the suction dredger 19 can be unloaded while it is anchored and smaller vessels moor alongside.

[0009] Rails 22 extend on both sides of the hold 18 and a crane 3 can travel over the rails 22 along the length of the hold 18. The crane 3 has a bucket 4, also known under the names of grab or clamshell. The bucket 4 has a width that is more or less equal to the width of the hold 18 and extends over the width of the hold 18. Cables 26 connect the bucket 4 with a cable drum 25, rotating the cable drum 25 results in hoisting and lowering the bucket 4. The bucket 4 has pistons 27 for opening and closing the bucket 4. After lowering the opened bucket 4 through an opening 36 into the hold 18 and setting it on the sediment deposited in the hold 18, the pistons 27 close the bucket 4 and the cable drum 25 hoists the bucket 4 upwards. After the bucket 4 is hoisted above hatches 29 through the opening 36 and the hatches 29 can rotate around the hinges 31, the hatches 29 rotate downwards by actuating the pistons 32 and close the opening 36 under the bucket 4.

[0010] In closed position, as shown in interrupted lines in figure 5, each hatch 29 forms an inclined surface, a slope, towards a crane belt 23. The crane belts 23 extend on both sides of the opening 36 perpendicular to the rails 22 through an opening 30 in the side of the crane 3 to above an unloading belt 24. At the side of the crane belt 23 away from the hatch 29 a guide plate 33 prevents material to fall off from the crane belt 23. After the bucket 4 above the closed hatches 29 is opened by actuating the pistons 27 the content of the bucket 4, sand, shingle or similar material, falls onto the closed hatches 29 and slides towards the crane belt 23.

[0011] The crane belts 23 transport the sand, shingle or similar material to the unloading belt 24. After the bucket 4 is unloaded, pistons 32 move the hatches 29 upwards to the position as shown in figure 5 and the bucket 4 is lowered into the hold for the next cycle of fetching a batch of sand, shingle or similar material. It will be clear that in the course of unloading the hold 18 wheels 35 mounted in carriages 34 will move the crane 3 along the length of the suction dredger 19.

[0012] In the disclosed embodiment, there are two hatches 29 and two crane belts 23. In a further embodiment the opening 36 is closed with one hatch 29 and there is one crane belt 23 transporting sand, shingle or similar material to the unloading belt 24. In the shown embodiment the hatches rotate around a hinge 31. In another embodiment the hatch 29 is coupled by linkage arms to the crane and can make a combined movement so that while rotating the hatch 29 moves sideways as well.

[0013] The unloading belt 24 extends at one side of the suction dredger 19 along the length of the hold 18 to the bow 14 and ends above a receiving bin 28 of a transverse belt 8. The transverse belt 8, during unloading of the suction dredger 19 located more or less perpendicular to the longitudinal direction of the suction dredger 19, transports the sand, shingle or similar material to a receiving bin 16 of a lifting belt 10. The lifting belt 10 is located on the centerline of the suction dredger 19 and transports the sand, shingle or similar material to the receiving bin 11 of the distribution belt 9.

[0014] A support cylinder 13 is located on the bow 14 of the suction dredger 19. The support cylinder 13 supports a turning hinge 12 that can rotate around a rotation axis 15. The distribution belt 9 is mounted in the turning hinge 12. The distribution belt 9 can rotate around the rotation axis 15, during unloading the suction dredger 19 the rotation of the distribution belt is limited in order to prevent colliding with the lifting belt 10. The distribution belt 9 has a considerable length, for instance more than the width of the suction dredger 19 or more than twice the width of the suction dredger 19, so that the distribution belt 9 can unload at a considerable length in front of the suction dredger 19.

[0015] By placing the lifting belt 10 supported by a frame 17 in the centreline of the suction dredger 19 the design is such that the end of the distribution belt 9 can be near the side of the suction dredger 19 on either side of the ship as shown in figure 2. For this, the forward end of the lifting belt 10 is high above the distribution belt 9 so that it can partly swivel under the lifting belt 10. The receiving bin 28 of the transverse belt 8 is located as low as possible so that the forward end of the unloading belt 24 is low above the deck and the distribution belt 9 can swivel freely over the end of the unloading belt 9.

[0016] In figure 2 the distribution belt 9 is shown at the port side with uninterrupted lines and the distribution belt 9" is shown at the starboard side with interrupted lines. The advantage of the unloading at both sides is that unloading can take place in vessels at both sides of the suction dredger 19 so that the unloading is more or less uninterrupted when unloading into one vessel at one side and thereafter in the next vessel at the other side. Figure 2 shows the maximum reach of the distribution belt 9 with the stripe-dot line, the distribution belt 9 can be tilted upwards so that obstacles within the reach can be avoided.

[0017] After the hold 18 is emptied the suction dredger 19 is prepared for the next sea voyage. For this the lifting

belt 10 is lowered on deck, for instance by moving the backward end of the lifting belt 10 backwards while rotating the frame 17 backwards. The front end of the lifting belt so lowers towards the deck on which it is secured. The distribution belt 9 is rotated backwards and lowered and secured on the center of the suction dredger 19. The crane 3 is secured on deck near the crew quarters 1.

10 Claims

1. Suction dredger comprising a hold (18) for holding a load such as sand, shingle or similar material and a crane (3) for moving the load from the hold onto an unloading belt (24) along the hold, wherein the crane comprises a grab or clamshell (4) that can move between the hold and above a crane belt (23) and wherein the crane belt transports the load unloaded from the grab or clamshell to the unloading belt **characterized in that** the grab or clamshell (4) moves through an opening (36) with a hatch (29) between the hold (18) and above the crane belt (23) and wherein the closed hatch comprises a sloped upper surface to guide the load unloaded from the grab or clamshell to the crane belt (23).
2. Suction dredger in accordance with claim 1 wherein the hatch (29) opens by rotating with its lower side near the crane belt (23).
3. Suction dredger in accordance with claim 1 or 2 wherein a hinge (31) connects the hatch (29) to the crane (3).
4. Suction dredger in accordance with claim 1, 2 or 3 wherein the hatch (29) comprises two parts, one at each side of the opening (36), and each part guides the load to one crane belt (23).
5. Suction dredger in accordance with claim 1, 2 or 3 wherein the hatch (29) comprises one part at the side of the opening (36) which guides the load to the crane belt (23).

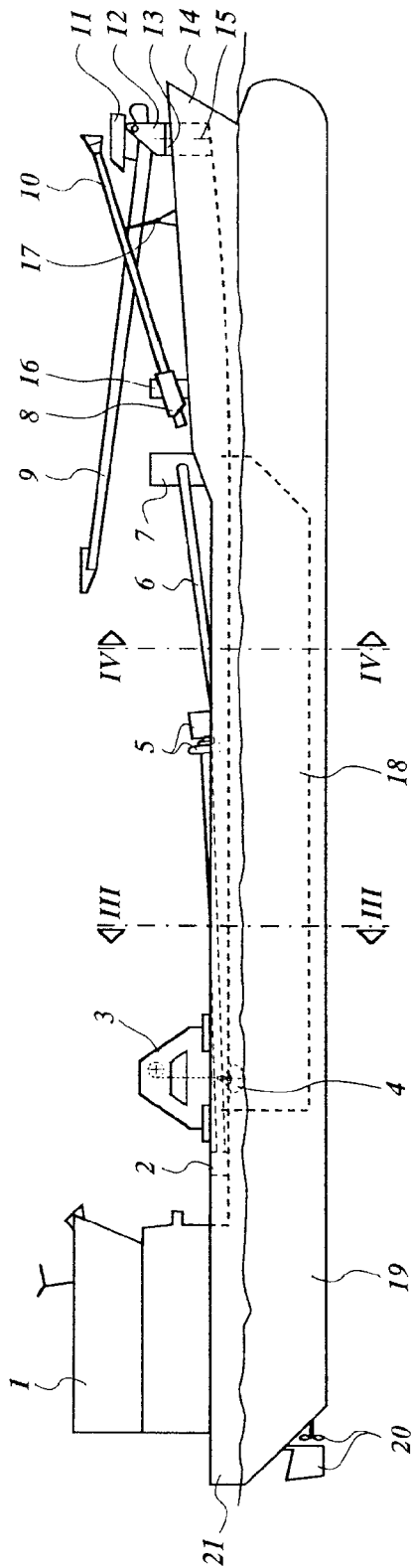


Fig. 1

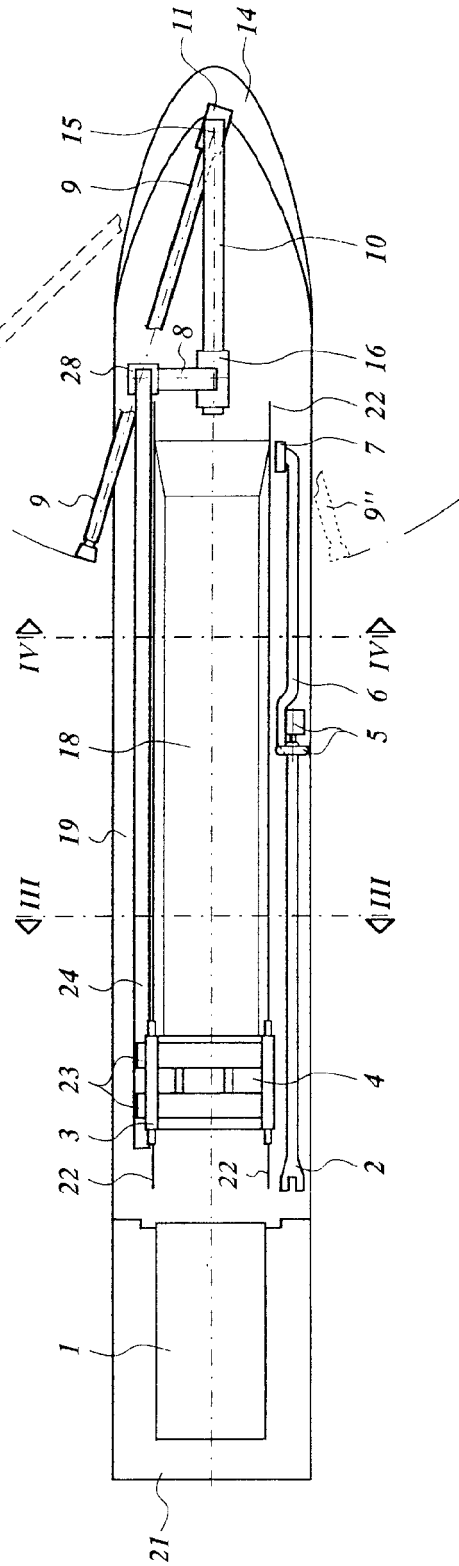


Fig. 2

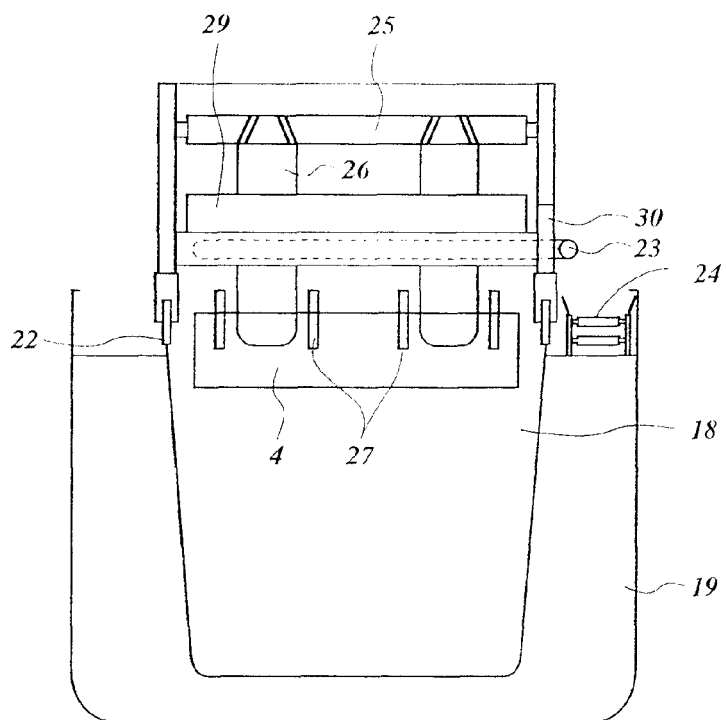


Fig. 3

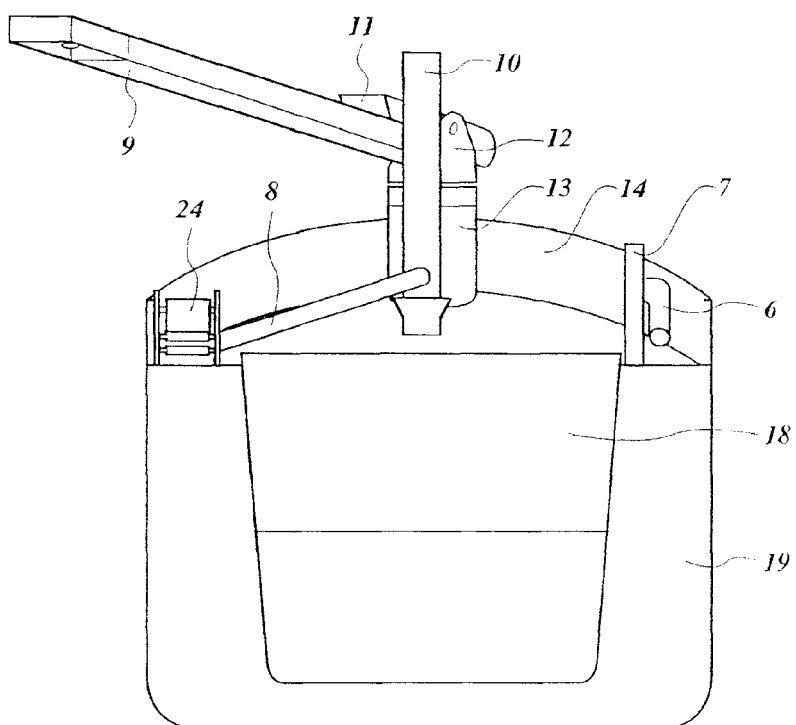


Fig. 4

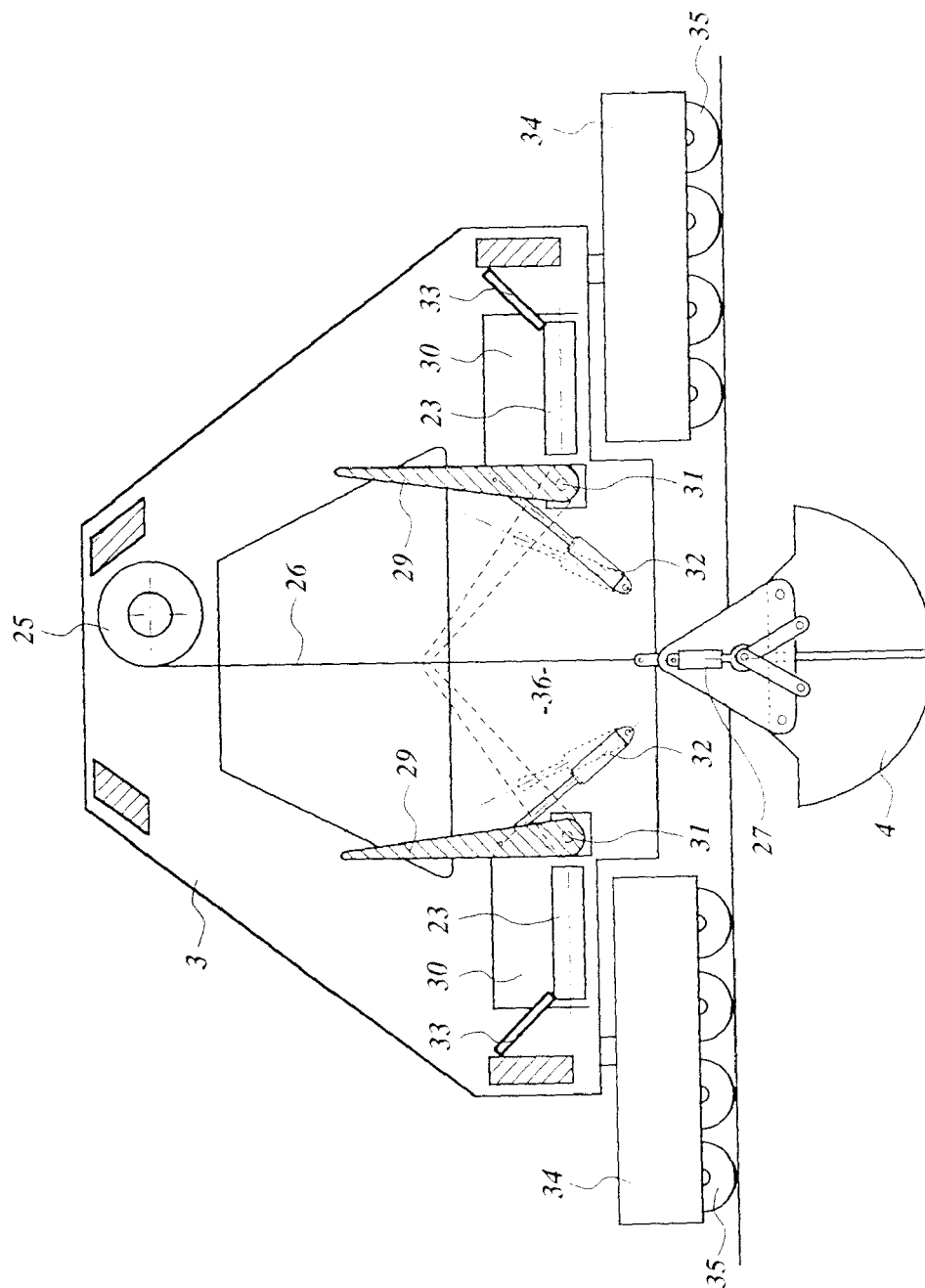


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 8528

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 0 589 536 A (NAGRON MECH HANDLING [NL] NAT MECHANICAL HANDLING B V [NL]) 30 March 1994 (1994-03-30) * column 1, line 31 - column 2, line 13 * * column 3, lines 10-15; figures 1,2 *	1-5	INV. E02F5/00 E02F5/28 E02F7/02 B63B27/22 B65G67/60
Y	US 4 216 997 A (FIEBIG HORST [DE]) 12 August 1980 (1980-08-12) * column 2, lines 22-36; figure 1 *	1-5	
A	US 1 396 193 A (ADRIEN GODIN) 8 November 1921 (1921-11-08) * figure 1 *		
			TECHNICAL FIELDS SEARCHED (IPC)
			E02F B63B B65G B66C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 March 2009	Examiner Papadimitriou, S
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			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 16 8528

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-03-2009

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