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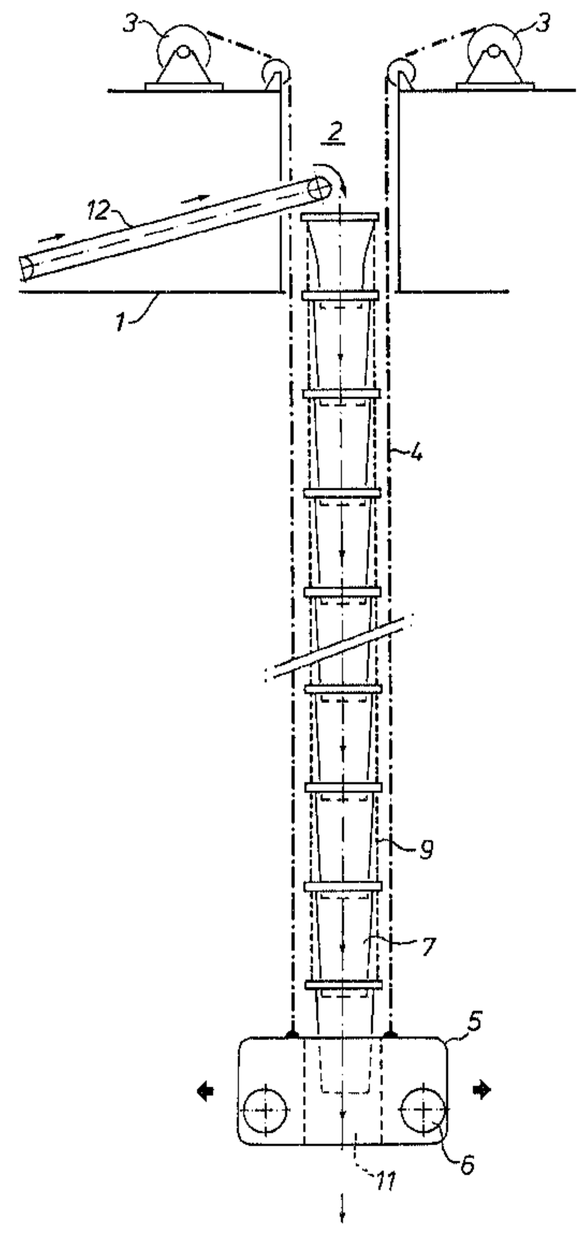

(57) Abrégé/Abstract:
The invention relates to a vessel provided with tubular means descending from or beside the vessel, said tubular means being intended for depositing material therethrough on the underwater bottom surface. Driving means are provided near the bottom end of said tubular means, by which the end of the tubular means is movable transversely to the longitudinal axis of the tubular means. Along at least most of its length the tubular means is built up of a number of shells arranged one above the other, whose upper sides and bottom sides are open, said shells slightly tapering off toward the bottom, whereby the upper end of a shell overlaps the bottom end of a shell located therebelow, while forming an open gap between said overlapping shell ends. Each shell is connected, by flexible connecting means, to the shell located directly therebelow.

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A B S T R A C T

The invention relates to a vessel provided with tubular means descending from or beside the vessel, said tubular means being intended for depositing material therethrough on the underwater bottom surface. Driving means are provided near the bottom end of said tubular means, by which the end of the tubular means is movable transversely to the longitudinal axis of the tubular means. Along at least most of its length the tubular means is built up of a number of shells arranged one above the other, whose upper sides and bottom sides are open, said shells slightly tapering off toward the bottom, whereby the upper end of a shell overlaps the bottom end of a shell located therebelow, while forming an open gap between said overlapping shell ends. Each shell is connected, by flexible connecting means, to the shell located directly therebelow.

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Vessel

The invention relates to a vessel provided with tubular means descending from or beside the vessel, said tubular means being intended for depositing material therethrough on the underwater bottom surface, whereby driving means are provided near the bottom end of said tubular means, by which the end of the tubular means is movable transversely to the longitudinal axis of the tubular means, and whereby hoisting cables are attached to the bottom end of the tubular means, which hoisting cables extend between the bottom end of the tubular means and hoisting gear present on the vessel.

Such a vessel is known from Dutch Patent Application 8102244. As is explained in said Application such a vessel is e.g. used for depositing stones intended for the protection of the bottom or of objects present on the bottom, such as pipelines and the like. This vessel is applied successfully when using tubular means built up of steel nets, which can be lifted from its operating position into a collapsed position in a short time, and which can also be returned from said collapsed position to the operating position in a short time.

It is also increasingly required, however, to deposit sand or similar fine-grained material at greater depths, e.g. so as to provide an insulating cover on pipelines. When using the above embodiment, wherein the tubular means is built up of steel nets, it becomes apparent, however, that too great a part of said fine-grained material slips through the mesh of the net and thus does not land in the intended place.

The object of the invention is therefore to obtain a vessel of

the above kind, by means of which also fine-grained material can be effectively deposited on the required place on an underwater bottom surface or on objects present on said bottom surface, as the case may be.

According to the invention this can be achieved in that along at least most of its length the tubular means is built up of a number of shells arranged one above the other, whose upper sides and bottom sides are open, said shells slightly tapering off toward the bottom, whereby the upper end of a shell overlaps the bottom end of a shell located therebelow, while forming an open gap between said overlapping shell ends, each shell being connected, by flexible connecting means, to the shell located directly therebelow.

When shells are used fine-grained material, such as sand or the like, cannot escape laterally from the tubular means through said shells having a closed surface. At the same time it appears that as a result of the conical shape of the shells and the presence of the gaps between the overlapping ends of the shells an effective downward flow of water and material to be deposited present therein takes place, so that, also when fine material, such as sand, is being deposited a comparatively large production capacity, i.e. a comparatively large number of tonnes of material per time unit, is achieved.

In addition it is possible to preserve the advantage of the above-described known construction with regard to the possibility of quickly putting the tubular means into an operating position, or lifting said tubular means, as the case may be, whereby the tubular means occupies comparatively little space, which also contributes towards achieving a large number of productive hours. At the same time, as a result of the flexible construction of the tubular means built up of shells, it is still possible to move the bottom end of the tubular means, by suitable driving means, transversely to the longitudinal direction of the tubular means, so as to be able to deposit material on the required place in the best possible manner.

Of course the construction according to the invention is not only suitable for depositing fine-grained material such as sand, but also for depositing stones or the like. When in that case the shells are made of a material having a low specific gravity, e.g. comparable with the specific gravity of water, a tubular means of considerable length can be used

without undesirably large forces being exerted on the parts supporting the tubular means, so that the device according to the invention is also suitable for depositing at great depths.

DE-A-3 121 361 discloses a vessel for depositing material on a bottom surface under water. For this purpose the vessel is equipped with a vertically extending chute. Particularly when depositing at greater depths the use of such a rigid chute presents many problems. A great length of a chute also involves a large weight of such a chute, so that again comparatively heavy and complicated devices are required in order to be able to move the chute upwards and downwards in its longitudinal direction, since it is usually not acceptable and, in connection with the depth of the water, not possible to allow the chute to project under the vessel while moving the vessel from the one working location to the other. Also the forces exerted on such a chute during operation will be comparatively large, and must be transmitted to the vessel via suitable heavy connecting parts. In practice it has also become apparent, that in case of worsening weather conditions it is much sooner necessary to stop operations with a vessel equipped with such a rigid chute having a great length than with a vessel equipped with a tubular means having a flexible construction.

As is set forth in DE-A- 3 121 361 the described construction is in particular intended for depositing material having a grain size of 20 - 200 mm. In order to reduce the exit velocity at the bottom end of the chute it is proposed to give the bottom end of the chute a larger cross-section than the other part of the tube. In one of the embodiments three funnel-shaped, partially overlapping shells are secured to the bottom end of the chute for this purpose, said shells also having a wider diameter than the tube 7, even at their narrowest ends. Insofar as can be derived from this publication the shells are thereby fixedly arranged with respect to each other and with respect to the chute.

Of course such a vessel equipped with a long closed chute can also be used for depositing fine-grained material such as sand, but in such a closed chute such fine-grained material will move downwards only comparatively slowly, so that the production capacity will only be small in such a case.

The use of chutes built up of partially overlapping conical

shells per se has been known for many decades already, as appears inter alia from British Patent Specification No. 6635/1909, US Patent Specification No. 3,428,156 and French Patent Specification No. 2,468,707, but all these publications relate to chutes used aboveground, which occupy a stationary position during operation.

The invention will be explained in more detail hereafter, with reference to an embodiment of the construction according to the invention diagrammatically illustrated in the accompanying Figures.

Figure 1 diagrammatically illustrates part of a vessel with a tubular means in the operating position, said tubular means being supported by said vessel.

Figure 2 shows a view corresponding with Figure 1, with the tubular means in its collapsed position.

Figure 3 shows on a larger-scale a few shells forming part of the tubular means.

Figure 1 diagrammatically illustrates a vessel 1. Said vessel is provided with a shaft 2 extending along or through the hull of the vessel. Near said shaft winches 3 are disposed, from which a block 5 is suspended by means of cables 4. Said block 5, which forms the bottom end of the chute to be described hereafter, is provided with diagrammatically indicated driving motors 6, by means of which the block 5, and with it the bottom end of the chute, can be moved in directions perpendicularly to each other and transversely to the longitudinal direction of the chute.

The actual chute is built up of a plurality of shells 7 arranged one above the other. As is diagrammatically illustrated in Figure 3 the shells 7 are pivotally coupled near their upper ends, by coupling means 8, to upwardly extending cables 9. As furthermore appears from the Figures the shells 7, which are open at their upper and lower ends, slightly taper off toward the bottom. The connection between the shells 7 and the cables 9 is thereby such, that in the operating position the upper end of a shell 7 surrounds the lower end of a shell 7 located thereabove, whilst a gap 10 is formed between the shell ends in question.

As furthermore appears from Figures 1 and 2 the lower end of the lowermost shell 7 is located within the upper end of a passage 11 provided in the block 5.

In order to deposit material, such as e.g. sand or stones,

material to be deposited, which is present in the hold of the vessel 1, can be deposited into the upper end of the chute by means of a belt conveyor 12, so that said material falls down the chute formed by the shells 7. This will create a downward flow in the chute, and water can be sucked into the interior of the chute through the gaps 10 present between the shells located one above the other, all this as indicated by means of arrows in the Figures. Accordingly a comparatively large quantity of material per time unit can move downwards through the chute, also when fine-grained material such as sand is used.

The chute formed by the shells 7 may be suspended, by means of the cables 9, from the winches 3 or from further winches provided on the vessel, by means of which the chute can be lifted. The conical shells 7 may thereby be telescoped, as is diagrammatically indicated in Figure 2, so that the shells forming the chute will occupy only comparatively little space when out of use. The telescoped shells can thereby be removed in groups and be stored on the vessel, whilst when the chute is being extended the successive shells can be provided in groups again.

Preferably the shells 7 are made of a material having a specific weight which at least substantially corresponds with the specific weight of water. When using such shells no undesirably large forces will be exerted on the cables and the like supporting the shells, so that a tubular means, built up of shells 7, having a great length can be used (depositing at a great depth, therefore), without undesirably large forces being exerted on the cables 9 and the parts connecting the cables 9 to the vessel.

CLAIMS

1. A vessel (1) provided with tubular means descending from or beside the vessel (1), said tubular means being intended for depositing material therethrough on an underwater surface, wherein driving means (6) are provided near the bottom end (5) of said tubular means, by which the end of the tubular means is movable transversely to the longitudinal axis of the tubular means, and wherein hoisting cables (4) are attached to the bottom end of the tubular means, which hoisting cables extend between the bottom end of the tubular means and hoisting gear (3) present on the vessel (1), characterized in that the tubular means comprises a number of shells (7) arranged one above the other, each shell having an open upper end and an open lower end and tapering towards the lower end, and wherein the upper end of a shell overlaps the bottom end of a shell located thereabove, while forming an open gap between said overlapping shell ends, each shell (7) being connected, by flexible connecting means (9), to the shell located directly therebelow.

2. A vessel according to claim 1, characterized in that said shells (7) have a specific gravity that corresponds generally to the specific gravity of water.

3. A vessel according to claim 1 or 2, characterized in that near their upper ends said shells (7) are coupled to the flexible connecting means (9).

4. A vessel according to claim 3, characterized in that said flexible connecting means comprise chains or cables.

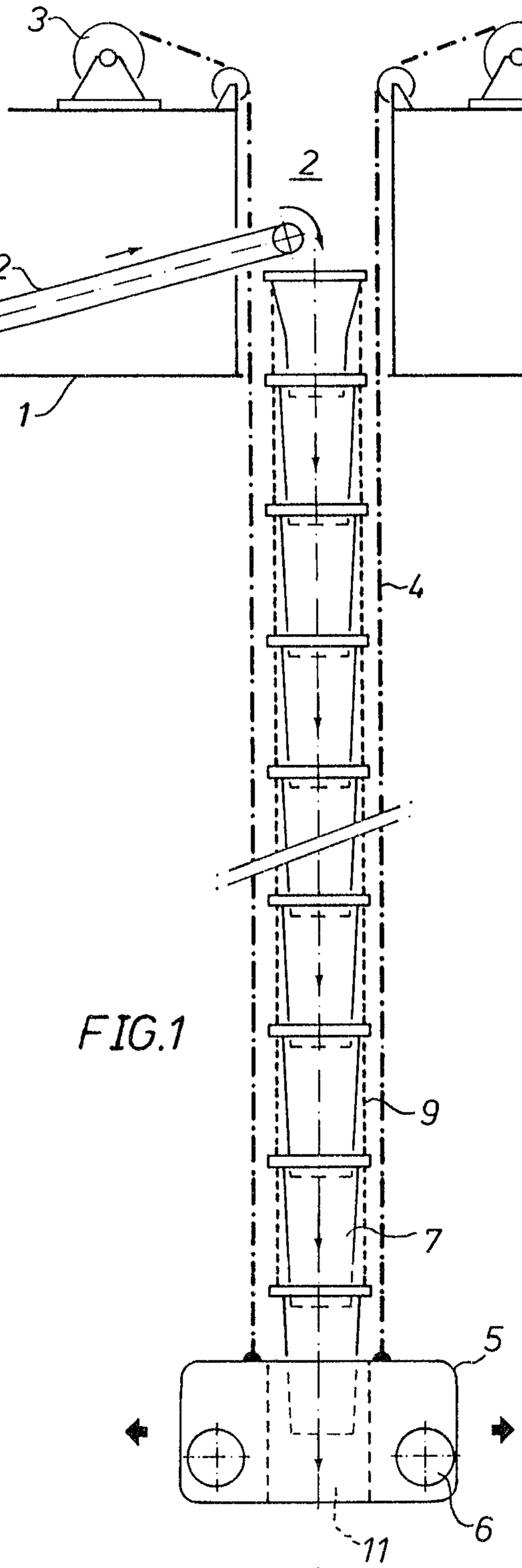


FIG.1

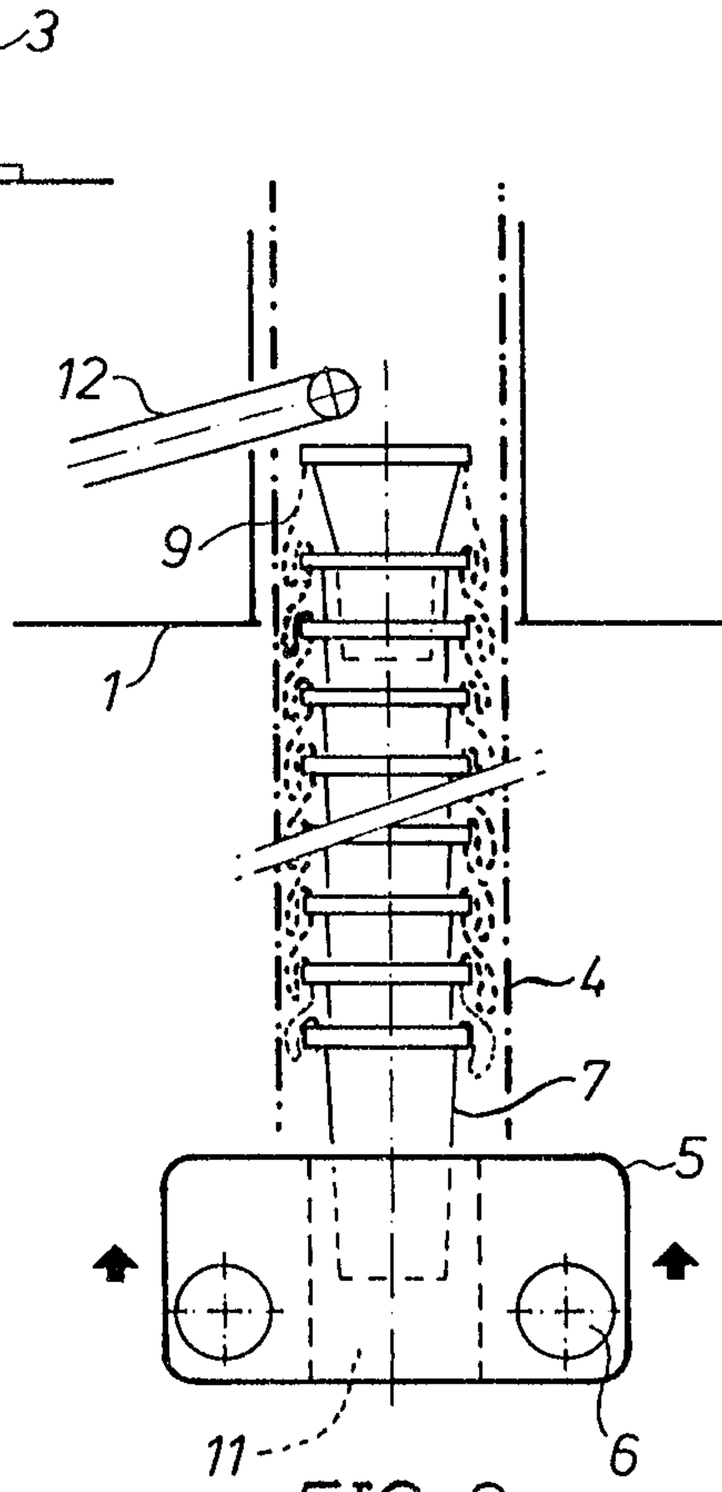


FIG.2

By: Abers, Gereshin & Parr

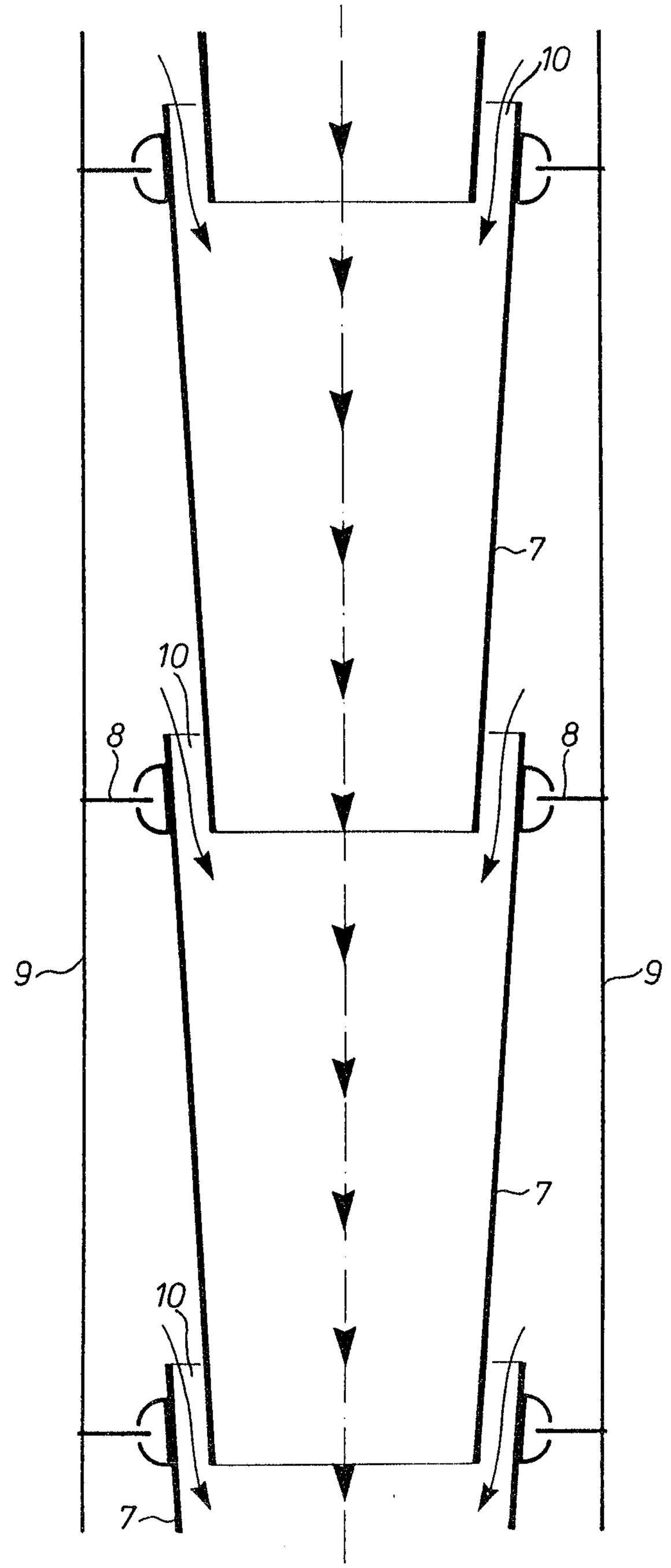
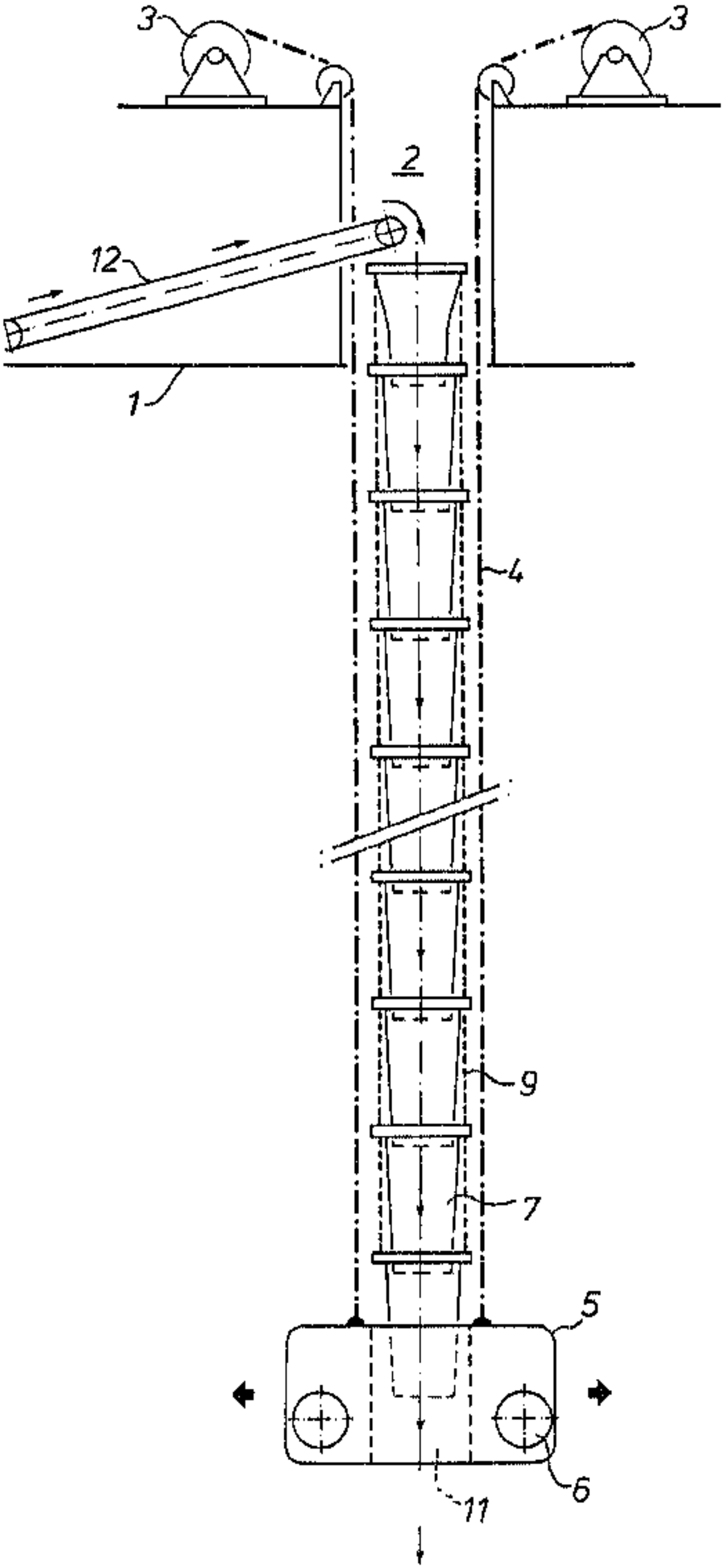


FIG. 3

By: Kopels, Bereskin & Parr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