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(54) Sieving device with sieving position and bypass position

(57) A sieve for separating a mixture of particulate material (P) in one or more components of different partical sized, which sieve device is provided with a number of pairs of sieve decks (7, 30), which join each other in a radially outward direction and are rotatable around the same rotation axis and are arranged on top of each other, of which at least the outer parts of each pair are shaped as a hollow cone with a downwardly directed top, whereas below the sieve decks (7, 30) one or more guides (5) for the separate removal of fine and coarse components are arranged, and in which in the middle of each sieve deck a cone shaped distributor (8) with an upwardly directed top is mounted and the supply of the product (P) to be processed takes place adjacent to the centre via a movable inlet tube (4) which is arranged in the upper lid (3) of the body (1, 2) of the sieve device above the cone shaped distributor (8), of which inlet tube the diameter is substantially equal to the diameter of the basis of the cone shaped distributor.

According to the invention the inlet tube (4) of the upper sieve deck (7) is movable between a sieve position and a by-pass position.

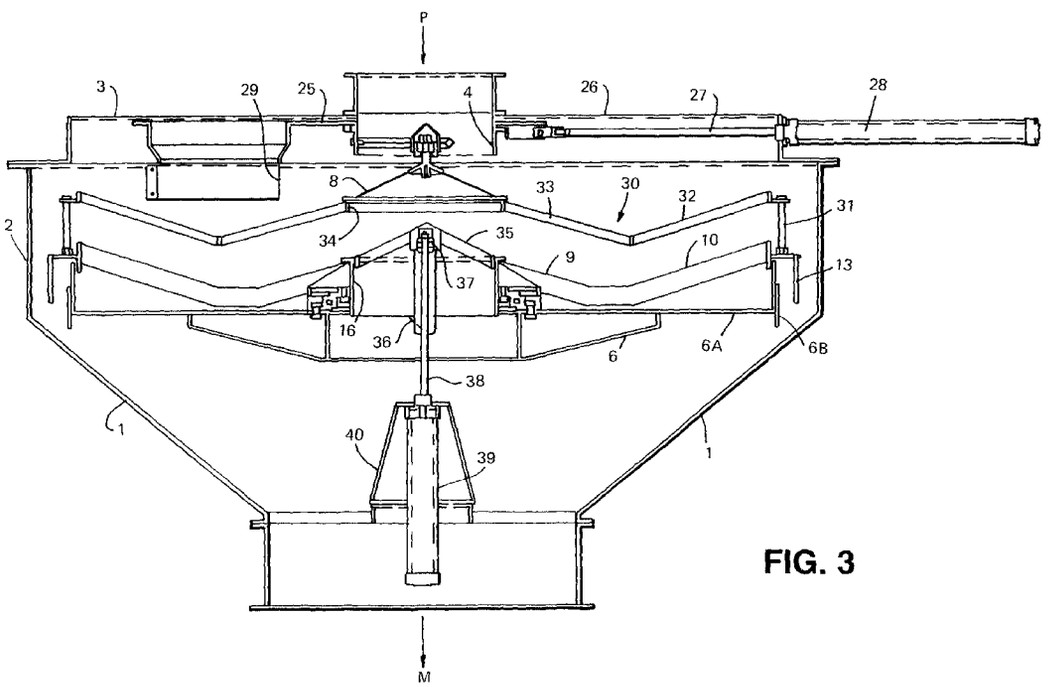

FIG. 3

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Description

The invention relates to a sieve device according to the preamble of claim 1.

A sieve device of this type is known from NL-A-87.00290 for a single deck sieve and EP-B-0.027.296 for a double deck sieve.

In certain cases there is the necessity for putting the sieve device in question out of operation or bypassing it, without the product flowing through is being treated. This can occur when the product to be treated already complies with the specifications sets through an earlier treatment. Also when for operational reasons the facility, of which the sieve device is forming a part, has to be emptied fast, for instance for switching over to another product, or for a clean out. This first product can then be stored untreated or partly treated, to be finished off at a later time.

The object of the invention is providing a sieve device in which the possibility is present of both at a single or at a double deck sieve device to stop the sieve action in a simple way, without a complicated by-pass tubing system being necessary.

This object is reached by the invention, in that the inlet tube is movable between a sieve position and a by-pass position, in which the inlet tube is moved out of the sieve position.

According to a first embodiment in the by-pass position the inlet tube is moved outside the rotation axis.

According to a second embodiment the distributor cone of the upper sieve surface is also movable between a sieve position and a by-pass position, in which it is moved outside the sieve position.

According to a third embodiment in the by-pass position the distributor cone of the upper sieve surface is also moved outside the rotation axis.

Preferably a first by-pass tube is mounted in the rotation axis in the place of the inlet tube and the distributor cone, said by-pass tube having the same diameter as the inlet tube and substantially the same height as the distance between the inlet opening in the upper lid and the basis of the cone. In this way in the by-pass position the first by-pass tube bridges the distance between the inlet opening in the upper lid and the basis of the cone, through which the product P flows unprocessed through the sieve device.

It is remarked, that from US-A-4.231.861 a pyramidal widening and thereafter pyramidal narrowing fixed sieve device is known for removing foreign material from grain. Between the sieve screens a gap is present for the transfer of the grain to be sieved from the upper to the lower pyramid. The inlet flow is directed through a fixed inlet tube without conical distributor to a central inlet tubing, which can be controlled be means of a sliding platevalve at around a third part of the height in such a way, that a greater or smaller percentage of the inletflow can be led to the sieve screens or can by-pass these sieve screens.

The invention will now be ellucidated with reference to the drawing of the accompanying embodiments.

Fig. 1 shows a vertical axial cross-section over a first embodiment of a rotating sieve device according to the invention, comprising a single sieve surface that is in the normal sieve position.

Fig. 2 shows on an enlarged scale the sieve device according to Fig. 1, in which the single sieve surface is in the by-pass position according to the invention.

Fig. 3 shows at the same scale as Fig. 1 a vertical axial cross-section over a second embodiment of a rotating sieve device according to the invention, provided with two sieve surfaces lying on top of each other, which are both in the normal sieve position.

Fig. 4 shows the sieve device according to Fig. 3, in which the upper sieve surface is in the by-pass position, such as in Fig. 1, and the lower sieve surface in the normal sieve position.

Fig. 5 shows the sieve device according to Fig. 3, in which both the upper and the lower sieve surface are in the by-pass position.

According to Fig. 1 the sieve device comprises a sieve body, of which the lower part has the hopper shape of a hollow, truncated cone-caing 1 with a downwardly directed top. On the hopper 1 a cylindrical upperpart 2 is mounted, that is closed at the upper-side by a round lid 3. In the centre of the lid 3 a round opening is present, in which a short inlet tube 3 is arranged. An outlet opening 5 is present at the lower side of the body.

In the body 1, 2 a single rotating sieve deck, generally indicated with 7, is carried on a support structure 6. This sieve deck 7 comprises from inside to outside a central distributor cone 8, and the ringshaped sieve deck parts 9 and 10. The basis of the distributor cone 8 has about the same diameter as the inlet tube 4. Between the basis of the distributor cone 8 and the lower edge of the short inlet tube 4 there is some distance. Thus a passage is left free for the product P to be processed. This product is taken in through the inlet tube 4 and is spread over the sieve deck parts 9 and 10 by the distributor cone 8. The inner ringshaped sieve surface 9 that joins the distributor cone 8 has the shape of a hollow cone casing having an upwardly directed (imaginary) top. The ringshaped outer sieve surface 10, which joins the sieve surface 9 with a bend, has also the shape of a hollow cone casing having a downwardly directed (imaginary) top. A round hoop 11 is mounted at the outer edge of the sieve surface 10. At about the middle of the height of the hoop 11 the one horizontal flange 12 of a corner profile is fastened, of which the other flange 13 extends substantially vertically downward and covers the round hoop 6B of the support structure 6 with an ample play.

The flat bottom 6A is mounted on the fixedly arranged support structure 6 below the sieve surface 7 for catching the material that has passed through the sieve deck 7. From this bottom 6A this material is removed through the hopperwall 1 in a way which is not further

shown.

In this embodiment the rotating drive of the sieve deck 7 is given by a (not shown) friction wheel that runs against the flange 13. In this respect there is referred for example to EP-B-0.090.471.

According to Fig. 2 in the sieve position the distributor cone 8 rests with an edge flange 14 on the edge flange 15 of a by-pass tube 16 which is fixedly mounted in the seeving deck 7. In this way this tube 16 rotates together with the sieve deck 7 and is rotatingly supported with a bearing 17 in the non-moving support 6 of the sieve deck 7. By friction the flange 14 on the distributor cone 8 is rotatingly driven by the flange 15 of the by-pass tube 16. The cone 8 carries at its stop a shaft tenon 18. The shaft tenon 18 joins with a shoulder into a reduced part 19 on which a bearing 20 is mounted. Thereafter the shaft tenon 18 joins with a second shoulder a screw thread part 21 on which a blocking nut 22 is screwed.

The bearing 20 is received into a round cavity 23 of a rod 24, of which the other end is fixedly mounted on the inside of the non-moving inlet tube 4.

The upper edge of the non-rotating inlet tube 4 is fastened into sled 25 which is movable in straight guides 26 that have been fastened on the body lid 3. The pistonrod 27 of a double acting, lineair motor 28 is fastened on the one end of the sled 25. This lineair motor is preferably an air cylinder 28, but could also be a hydraulic cylinder or possibly operate electrically. The long by-pass tube 29 is fastened at the other end of the sled 25 at a short distance of the inlet tube 4. The sled 25 is moved from left to right in Fig. 1 by the operation of the lineair motor 28. Hereby the first sub-assembly, formed by the inlet tube 4 with connections and the distributor cone 8 is slid to the right side. The first long by-pass tube 29, that forms a second sub-assembly and together with the first sub-assembly an assembly, then comes in the place of this first sub-assembly and joins the second fixed by-pass tube 16. In this way the sieve deck 1 is bypassed, no material P comes onto the sieve deck parts 9 and 10, but falls unsieved through the by-pass tubes 29 and 16 into the hopper 1, from which it is removed as finished product F (in a way not further shown).

In Fig. 3 on the same scale as in Fig. 1 a vertical axial cross section is shown over a second embodiment of a rotating sieve device according to the invention. This one is provided with two rotating sieve decks lying on top of each other, which are both in the normal sieve position.

The lower deck 7 has been executed in substantially the same way as in Fig. 1 and Fig. 2, but supports with the edgeflange 13, the edgeflange 31 of the upperdeck, generally indicated with 30, in which a short bypass tube 31 is centrally mounted.

This sieve deck 30 comprises just as the sieve deck 7, going from inside to outside, a central distributor cone 8, and the ringshaped sieve deck parts 33 and 34, which extend substantially parallel to the upperlying sieve deck parts 9 and 10.

Above the short by-pass tube 34 the assembly of Fig. 1 is again movable back and forth under control of the lineair motor 28, between the sieve position shown in Fig. 3, and the by-pass position of the upperdeck 30 shown in Fig. 4 and 5.

According to Fig. 3 in the sieve position the distributor cone 35 of the lower sieve deck 7 joins with its outer edge to the edgeflange 15 of a by-pass tube 16 which is fixedly mounted in the sieve deck 7. The distributor cone 35 carries a (non-shown) lug which is rotatingly driven by the boss 36 on the by-pass tube 16. The cone 35 carries at the lower side of its top a bearing 37 for the upper end of the non-rotating piston rod 38 of a second double acting hydraulic cylinder 39. This cylinder 39 is mounted on a fixed support structure 40 that is connected with the body 1. The distributor cone 35 forms a second assembly with the bearing 37, the piston rod 38 and the cylinder 39. Under control of the second cylinder 39 this second assembly is movable back and forth between the sieve position, shown in Fig. 3 and 4, in which the lower sieve deck 7 is operable, and the by-pass position, shown in Fig. 5, in which the lower sieve deck 7 is by-passed and not operable.

In Fig. 5 the upper sieve deck 7 is also by-passed, thus the complete sieve device is not operable and the product P which is led in can fall through unprocessed.

The invention is not limited to the shown embodiments, but also covers all variants thereof.

Instead of a rectilineair movement the first main assembly can also make a curved or circular movement. With a single sieve deck, such as in Fig. 1 and 2, of the first main assembly only the sub-assembly with a long by-pass tube 29 can be used with its own motor control in combination with the second assembly having the vertically up and down movable distributor cone 35. Furthermore the distributor cone 8 can be made vertically movable instead of horizontally, such as the second distributor cone 35.

Claims

1. A sieve for separating a mixture of particulate material (P) in one or more components of different partical sizes, which sieve device is provided with a number of pairs of sieve decks (7, 30), which join each other in a radially outward direction and are rotatable around the same rotation axis and are arranged on top of each other, of which at least the outer parts of each pair are shaped as a hollow cone with a downwardly directed top, whereas below the sieve decks (7, 30) one or more guides (5) for the separate removal of fine and coarse components are arranged, and in which in the middle of each sieve deck a cone shaped distributor (8) with an upwardly directed top is mounted and the supply of the product (P) to be processed takes place adja-

cent to the centre via a movable inlet tube (4) which is arranged in the upper lid (3) of the body (1, 2) of the sieve device above the cone shaped distributor (8), of which inlet tube the diameter is substantially equal to the diameter of the basis of the cone shaped distributor, characterized in that, the inlet tube (4) of the upper sieve deck (7) is movable between a sieve position and a by-pass position.

2. A sieve device according to claim 1, characterized in that in the by-pass position the inlet tube (4) is moved outside the rotation axis.

3. A sieve device according to claim 1 or 2, characterized in that, the distributor cone (8) of the upper sieve deck (7) is also movable between a sieve position and a by-pass position.

4. A sieve device according to claims 1, 2 or 3, characterised in that, in the by-pass position also the distributor cone (8) of the upper sieve deck (7) is moved outside the rotation axis.

5. Sieve device according to one or more of claims 1 through 4, characterised in that, a first by-pass tube (29) takes the place in the rotation axis of the inlet tube (4) and the distributor cone (8) which by-pass tube (29) has the same diameter as the inlet tube (8) and substantially the same height as the distance between the inlet opening in the upper lid and the cone basis, the one and the other such, that in the by-pass position, the first by-pass tube (6) bridges the distance between the inlet opening in the upper lid (3) and the cone basis, by which the sieve deck (7) is by-passed and the product (P) flows unprocessed through the sieve device.

6. A sieve device according to one or more of claims 1 through 5, characterised in that, the inlet tube (4) and the distributor cone (8) of the upper sieve deck (7, 30) are connected to a first sub-assembly.

7. A sieve device according to one or more of claims 1 through 6, characterised in that, the first sub-assembly (4, 8) and the first by-pass tube (29) are connected to a first main-assembly (4, 8, 29), that is movable between the sieve position and the by-pass position.

8. A sieve device according to one or more of claims 1 through 7, characterized in that, the first main-assembly (4, 8, 29) is movable in guides (26) that are fastened to the lid (3) of the sieve device.

9. A sieve device according to one or more of claims 1 through 8, characterized in that, the first main-assembly (4, 8, 29) is movable with a lineair movement in guides of the body.

10. A sieve device according to one or more of claims 1 through 9, characterized in that, the first main-assembly (4, 8, 29) is horizontally displaced between the sieve position and the by-pass position by a first double action lineair motor (28).

11. A sieve device according to one or more of claims 1 through 10, provided with at least two sieve decks (7, 30), characterized in that, a second by-pass tube (16) is mounted in the rotation axis of the lower sieve deck (7), which second by-pass tube (16) has substantially the same diameter as the first by-pass tube (29) and in the by-pass position joins with the first by-pass tube (29).

12. A sieve device according to one or more of claim 1 through 11, characterized in that, the distributor cone (35) of the first sieve deck (7) being part of a second main-assembly (35, 38, 39), which is vertically movable in the rotation axis between a sieve position and a by-pass position, in which the distributor cone (35) is placed at some distance below its sieve position and leaves a passage opening free in the middle of the sieve surface.

13. Sieve device according to one or more of claims 1 through 12, characterized in that, the second main assembly (35, 38, 39) is vertically displaced between the sieve position and the by-pass position by a second double acting lineair motor (39).

14. A sieve device according to one or more of claims 1 through 13, characterized in that the lineair double acting motor (28) being an air, hydraulic or electrical motor.

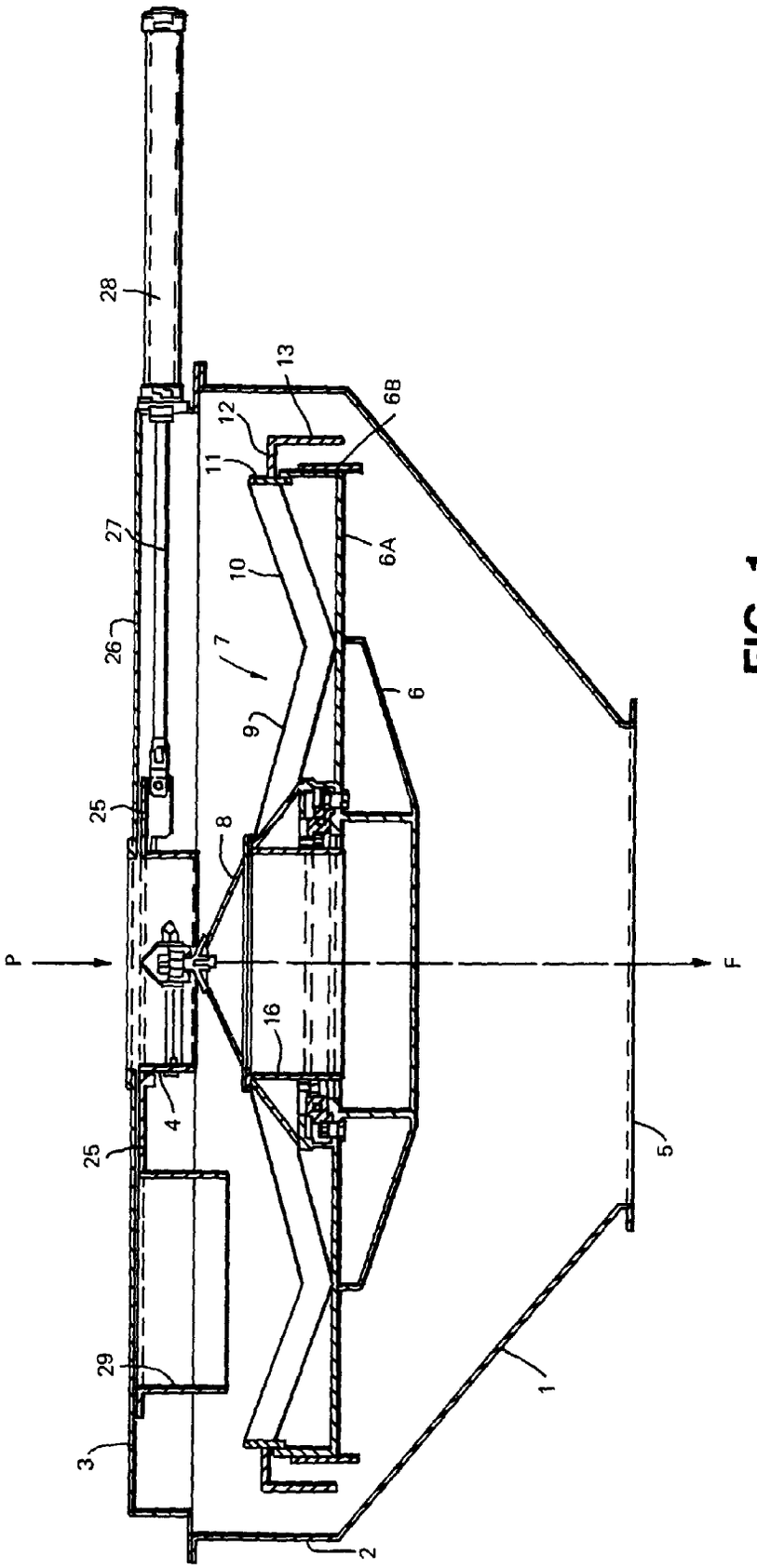

FIG. 1

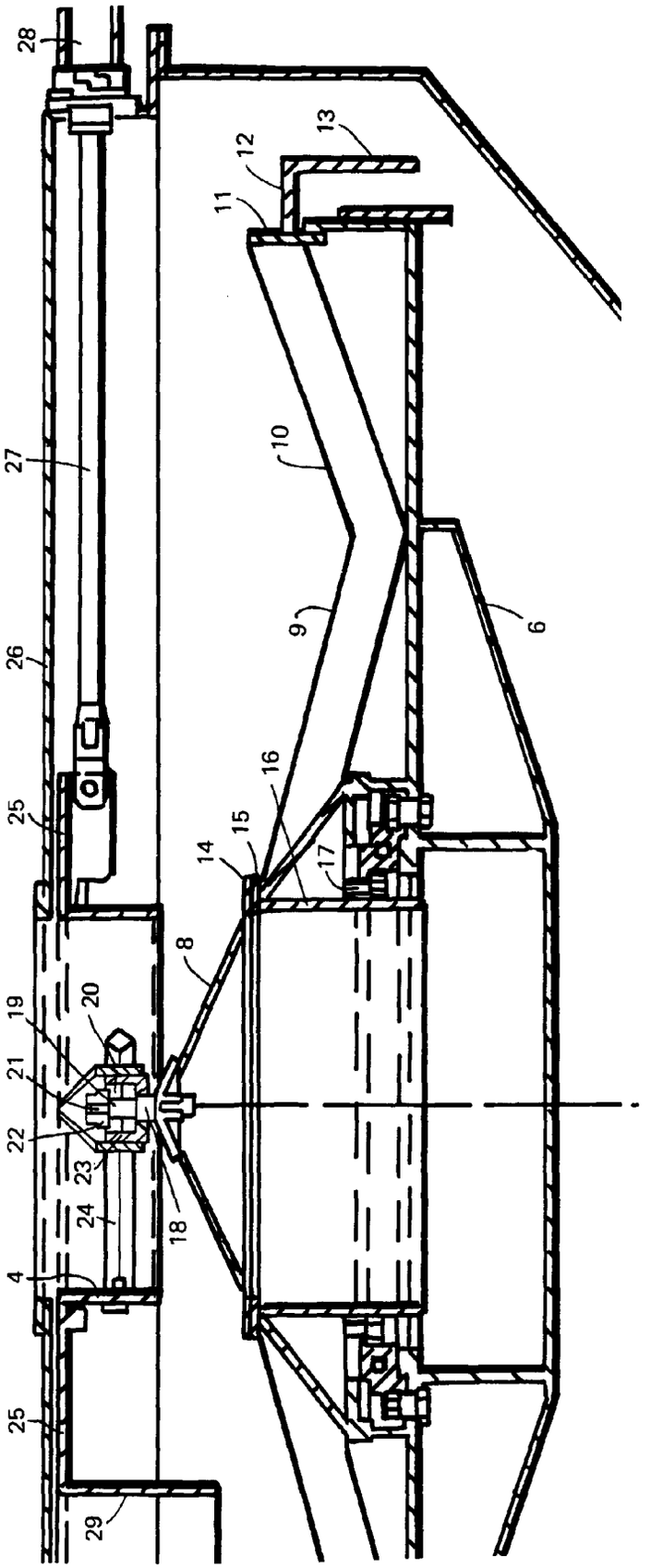

FIG. 2

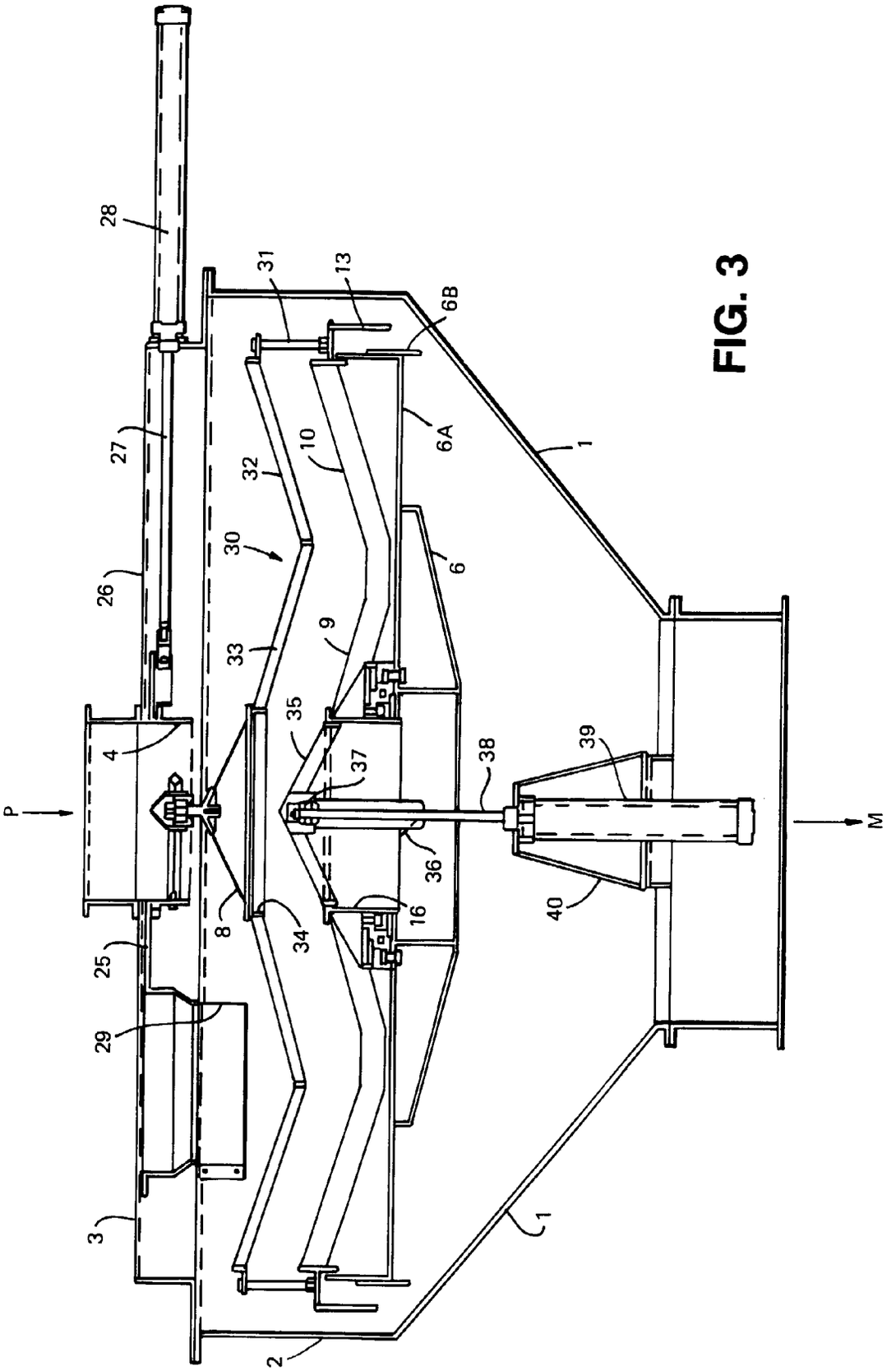
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FIG. 3

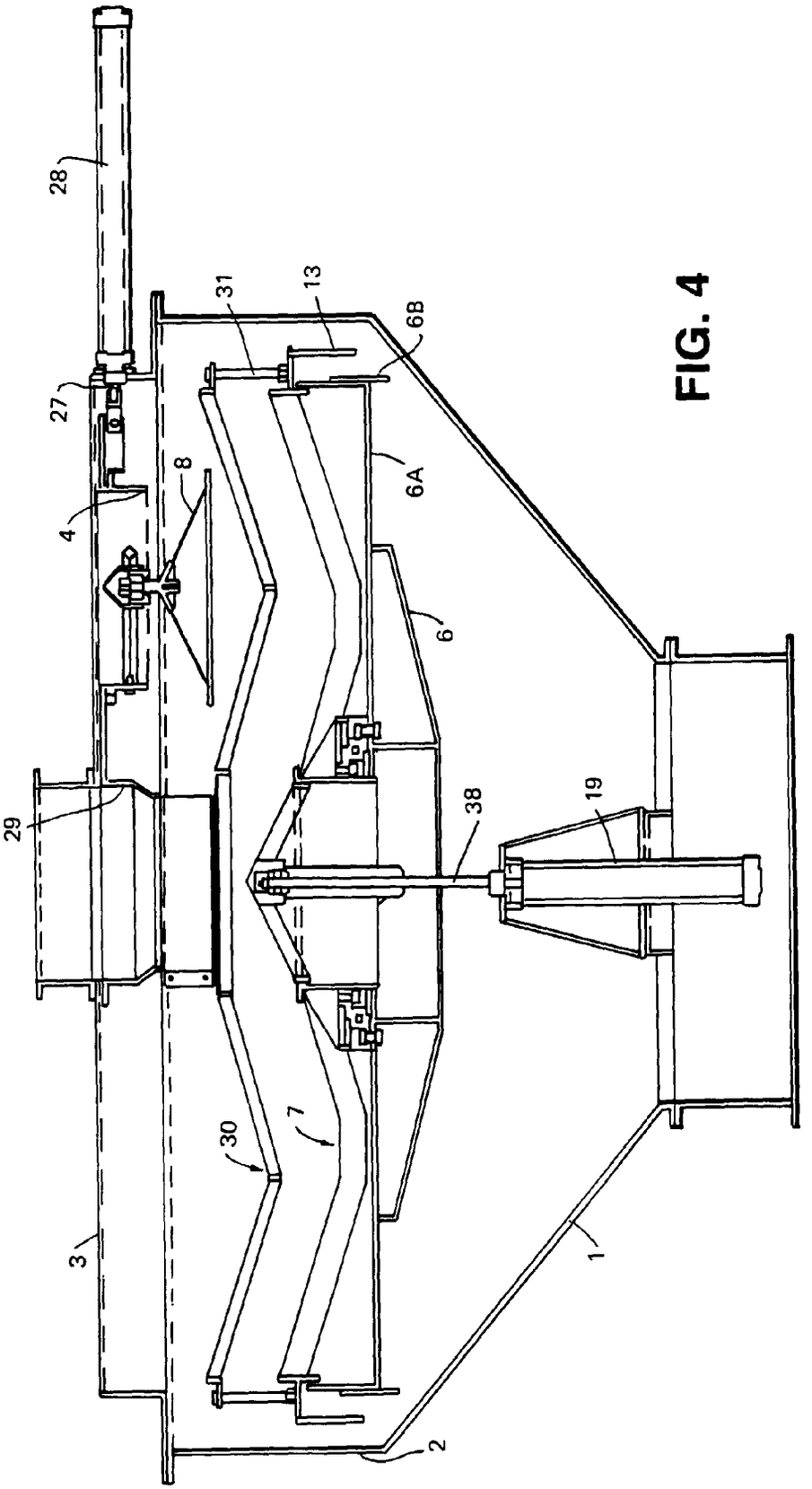

FIG. 4

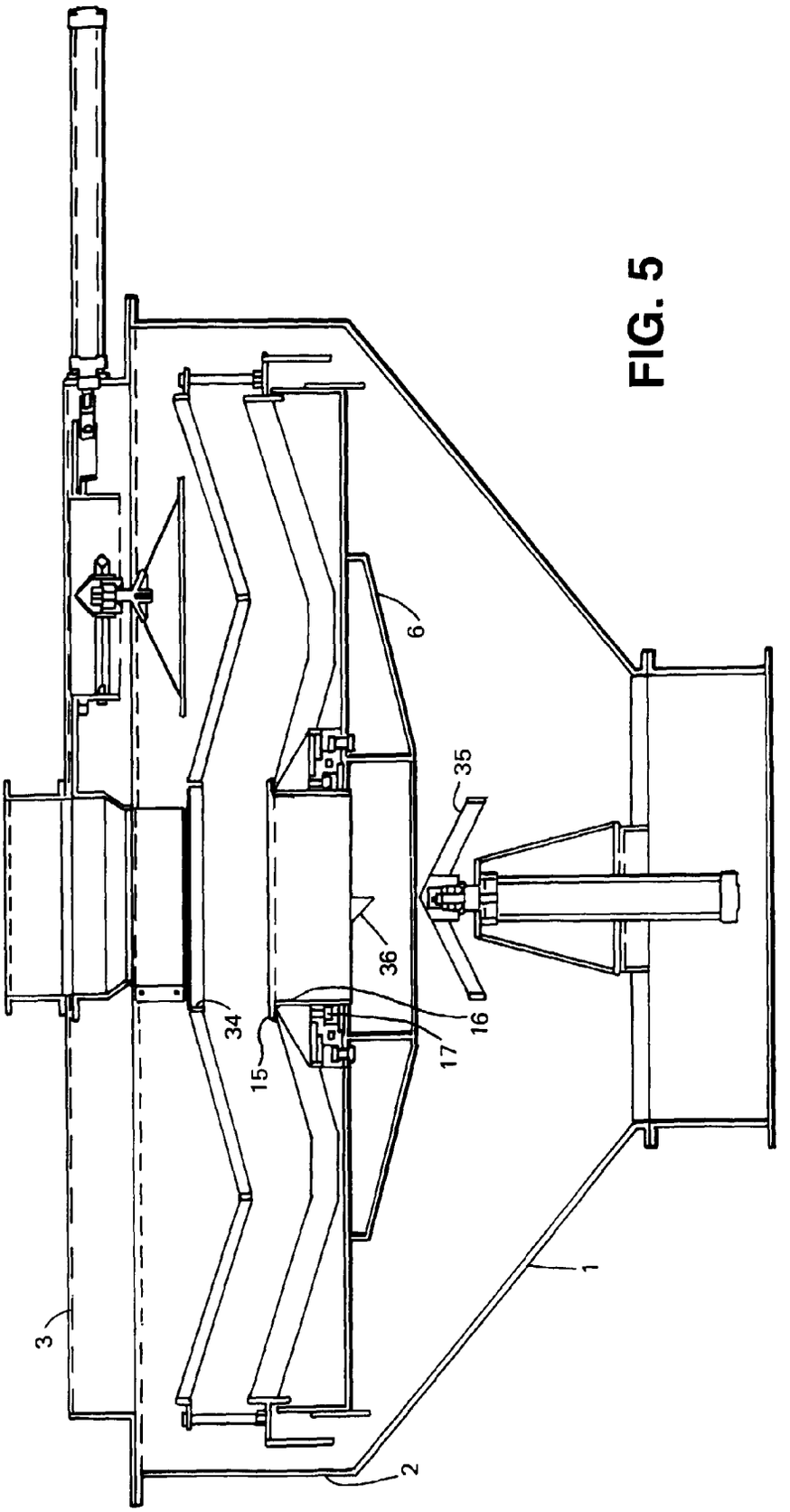

FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 1630

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.6)
A,D	EP 0 027 296 B (COÖPERATIEVE LANDBOUW AAN-EN VERKOOPCOMBINATIE) 13 July 1983 * claims * * figures *	1	B07B1/08
A,D	US 4 231 861 A (S. HANNIE) 4 November 1980 * column 3, line 1 - column 6, line 66 * * figures *	1	
A,D	NL 8 700 290 A (COÖPERATIEVE LANDBOUWBANK MEPPEL) 1 September 1988 * claim 1 * * figure *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B07B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 September 1997	Laval, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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