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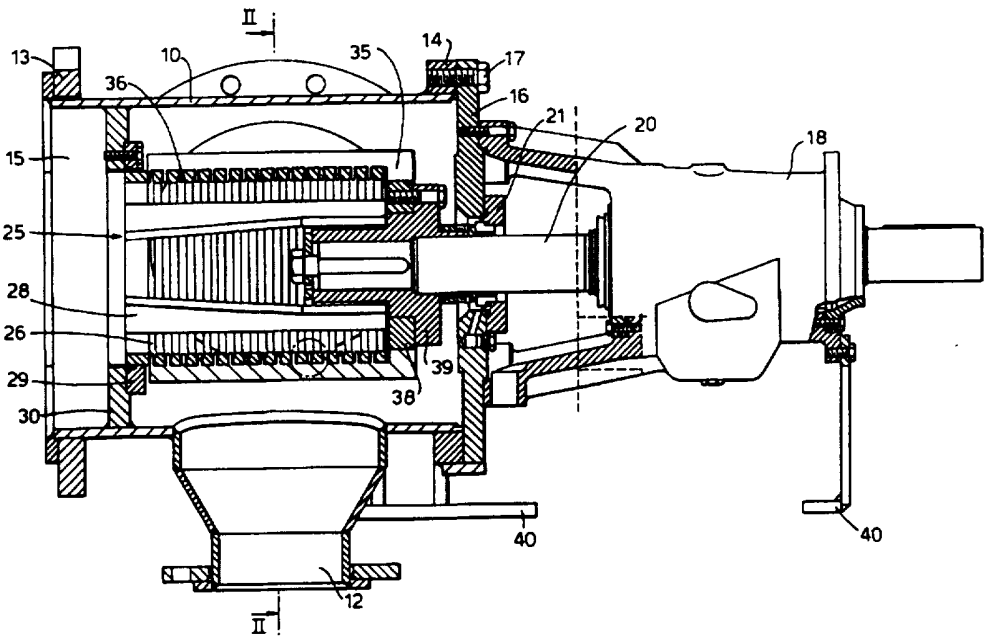

(57) Abstract

Arrangement for separating off undesired particles from a suspension stream, comprising a closed housing (10) with an inlet (11) for the suspension from which particles are to be separated off, an outlet (15) for the treated suspension, and an outlet (12) for undesired particles, a screening drum (25) perforated by a number of circular slits (26), and cleaning members (35) inside the said housing. The arrangement according to the invention is characterized in that the screening drum (25) is arranged to be immovable, and in that the said cleaning members (35) are arranged to rotate along the circumferential surface of the said screening drum (25), and down in the said circular slits (26).

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SEPARATING ARRANGEMENT

Technical field

The present invention relates to an arrangement for separating off undesired particles from a suspension stream in accordance with the precharacterizing clause of Patent Claim 1.

State of the art

It is already known to clean undesired particles, such as knots, stone and tramp material, from pulp suspensions, for example in advance of a pulp press. Many arrangements are provided with rotating screening drums of varying configuration and with fixed cleaning members, such as, for example, the arrangement which is described in SE-B-426 180. This arrangement has a rotating screening drum provided with circular slits and a fixed, comb-like cleaning member, in which arrangement the teeth of the cleaning member fit in the slits. The arrangement is intended primarily for obtaining a sub-stream of finer pulp fibres having passed through the slits of the screening drum, for so-called liner production without undesired particles. The remainder of the suspension stream is conveyed past the screening arrangement. The arrangement functions well for relatively low concentrations (< 5% pulp fibres). In the arrangement according to SE-B-426 180, there is a tendency, at higher concentrations, for the slits in the screening drum to clog up relatively quickly after the cleaning member has passed them, and there are difficulties in conveying the undesired particles off in an appropriate manner.

Brief description of the invention

The object of the present invention is to provide a screening arrangement which can clean

undesired particles from a pulp suspension and in so doing can satisfy stringent requirements both as regards capacity and the possibility of treating the suspension flow at high concentration, and where the undesired particles can be led off from, and collected in a suitable way at, the screening arrangement. This object is achieved by means of an arrangement for separating off undesired particles from a suspension stream in accordance with the characterizing clause of Patent Claim 1.

Description of the figures in the drawings

The arrangement according to the invention will be described in detail below in connection with a preferred embodiment and with reference to the attached drawings, in which

Figure 1 shows a side view, in partial cross-section, of the arrangement according to the invention,

Figure 2 shows a cross-sectional end view taken along the line II-II in Figure 1,

Figure 3 shows a detailed view of the screening drum according to a preferred embodiment, and

Figure 4 shows a detailed view of one of the cleaning combs according to a preferred embodiment.

Preferred embodiment

The arrangement according to a preferred embodiment of the invention which is shown in Figures 1 and 2 consists of an essentially cylindrical housing 10 with a centre line C. The housing is provided with an inlet 11 for the suspension which is to be treated, which inlet 11 is placed approximately in the middle of the housing 10, and, along the periphery of the housing

at a distance from the inlet, an outlet 12 for the particles which have been removed. The outlet 12 is arranged facing vertically downwards. The inlet and outlet are preferably offset by 90° along the periphery of the housing, but other configurations are also possible.

The housing 10 is provided at each end with flanges 13, 14 which are mounted fixed in a suitable manner. One end 15 of the housing is open and functions as an outlet for the treated suspension. The end 15 is connected with the aid of the flange 13 to a conduit system (not shown) for onward transport of the suspension. The other end of the housing 10 is provided with an end wall plate 16 which is fastened releasably on the flange 14 of the housing, with the aid of screws 17 for example. A bearing member 18 is mounted on the end wall plate 16, and this bearing member 18 is also releasable. A drive shaft 20, which is rotatably mounted in the bearing member 18, extends through the centre of the end wall plate 16 and some distance into the interior of the housing, its axis of rotation preferably coinciding with the centre line C of the housing. The drive shaft 20 is sealed off from the end wall plate 16 with the aid of a suitable sealing member 21. The drive shaft 20 is made to rotate with the aid of a suitable drive arrangement (not shown).

A screening drum 25 (Figure 3), which is designed as a cylinder whose circumference is perforated by circular slits 26, is arranged in such a way that its centre line coincides with the axis of rotation of the drive shaft 20. The slits 26 are preferably shaped in such a way that their width slightly increases radially inwards in order to counteract clogging. The inward widening can be about

3° for each slit wall. The screening drum 25 is provided with radially inwardly directed spokes 28 for holding together the annular portions 27 between the slits 26. One end of the screening drum 25 is provided with a flange 29 for releasable mounting on an annular securing member 30 which is arranged in a fixed manner on the inner wall of the housing closely adjoining the outlet 15 for the treated suspension.

The arrangement is also provided with cleaning members 35 (Figure 4) in the form of cleaning combs with a number of teeth 36 which extend downwards in the slits 26 of the screening drum 25. These cleaning combs 35, of which there are two in the preferred embodiment, are mounted diametrically opposite on a bracket 38. This bracket 38 is mounted releasably on a holder member 39 which is in turn mounted releasably on the end of the drive shaft 20. In the preferred embodiment, the cleaning combs 35 are designed essentially as an L profile lying on its side, with one limb of the L being directed inwards and arranged first in the direction of rotation R (Figure 2) seen when the cleaning combs are mounted. Recesses have been formed in this inwardly directed limb for the purpose of receiving a number of teeth 36. The design is such because the cleaning combs are subjected during operation to high bending moments since they are secured on the holder 38 only at their one end. The teeth 36 are preferably provided with a bevel at their front edge, as seen in the direction of rotation R.

The arrangement is preferably provided with supports 40 for mounting on a base plate, for example.

The functioning is as follows. With the aid of the drive shaft 20 which is connected to a drive arrangement (not shown), the cleaning combs 35, which

are two in number in the preferred embodiment, are made to rotate about the circumferential surface of the screening drum 25, counterclockwise in Figure 2, and with the cleaning teeth 36 in the slits of the screening drum. The cleaning combs 35 are preferably placed diametrically opposite each other in order to obtain an even load on the drive shaft 20. The suspension which is to be treated, and which contains undesired particles such as knots, stone and tramp material, enters the housing via the inlet 11. Since the cleaning combs 35 rotate around the circumferential surface of the drum 25 with the teeth 36 down in the slits 26, they keep these continuously open for the liquid and the fibres in the suspension which can pass through the slits 26 in the screening drum 25 and out through the outlet 15. The undesired particles are of such a size, however, that they cannot pass through the slits, and instead are cleaned away by the cleaning combs 35 and drop by force of gravity down through the outlet 12 for reject material and down into a vertical pipe-like collection container (not shown). The container can be arranged with valves for discharging at suitable intervals. Alternatively, it can be arranged with a discharging arrangement of the revolving door type with compartments or cells.

Depending on what is to be screened off from the suspension, the circular slits 26 of the screening drum are designed with an appropriate width such that the undesired particles cannot pass through the slits and into the interior of the drum, where it is desired that only accepted suspension should be present.

When dismantling the cleaning combs from the screening drum, the combs are turned so that they are horizontal. The fastening screws 17 of the end wall

plate are then unfastened, and the bearing unit 18, with the end wall plate 16, the drive shaft 20 and the cleaning combs 35, is lifted about 60 mm (Figure 2). In this way, the teeth of the cleaning combs are released from engagement with the screening drum, and the entire unit can be withdrawn from the housing, to the right in Figure 1.

By virtue of the design of the arrangement, the slits 26 in the screening drum 25 are kept open longer, and a more even distribution of the accepted pulp is achieved. Since the passage area is thus kept greater, the drop in pressure is less and, consequently, the pump demands lower. The rotating cleaning combs also generate a "mixing" and movement in the housing which counteracts clogging, i.e. the function of the arrangement is less sensitive to variations in consistency and flow. In addition, the arrangement is completely closed and can therefore operate without admission of air and without any foaming resulting from admission of air, which could lead to operating disruptions.

It will be understood that the arrangement according to the present invention is not limited to the embodiment which has been described, and that it can instead be modified within the scope of the patent claims which follow. Thus, the arrangement can be provided with a plurality of cleaning combs, preferably in diametrically opposite pairs, so that an even loading of the drive shaft 20 is obtained. In addition, the cleaning combs 35 can be formed in a number of different ways, for example by welding the teeth onto a square rod.

Patent Claims

1. Arrangement for separating off undesired particles from a suspension stream, comprising a closed housing (10) with an inlet (11) for the suspension from which particles are to be separated off, an outlet (15) for the treated suspension, and an outlet (12) for undesired particles, a screening drum (25) perforated by a number of circular slits (26), and cleaning members (35) inside the said housing,
c h a r a c t e r i z e d i n that the screening drum (25) is arranged to be immovable, and in that the said cleaning members (35) are arranged to rotate along the circumferential surface of the said screening drum (25), and down in the said circular slits (26).

2. Arrangement according to Claim 1,
c h a r a c t e r i z e d i n that the cleaning members (35) are at least two in number, and in that these are arranged in pairs disposed diametrically opposite each other on the circumferential surface of the screening drum (25).

3. Arrangement according to either of the preceding claims, c h a r a c t e r i z e d i n that the cleaning members (35) are in the form of combs whose teeth (36) protrude down into the slits (26) of the screening drum (25).

4. Arrangement according to Claim 1,
c h a r a c t e r i z e d i n that the outlet (12) for undesired particles is arranged vertically under the said housing (10).

5. Arrangement according to Claim 1, characterized in that the inlet (11) for the suspension which is to be treated is arranged on the side of the housing (10), and in that the outlet (15) for the treated suspension is arranged at one narrow end of the housing.

6. Arrangement according to Claim 1, characterized in that the said housing (10) is essentially cylindrical, in that the said screening drum (25) is arranged fixed on the inner wall of the housing, in that the narrow end of the housing opposite the outlet for the treated suspension is provided with an end wall plate arranged with bearing members, in that a drive shaft (20) is mounted in the said bearing members, which drive shaft extends into the said housing and whose axis of rotation coincides with the centre axis of the screening drum (25), and in that the said cleaning combs (35) are arranged at the inner end of the said drive shaft in such a way that they can be moved about the circumferential surface of the screening drum (25) upon rotation of the drive shaft, with the teeth (36) of the said cleaning combs (35) down in the slits (26) of the said screening drum (25).

Fig.1.

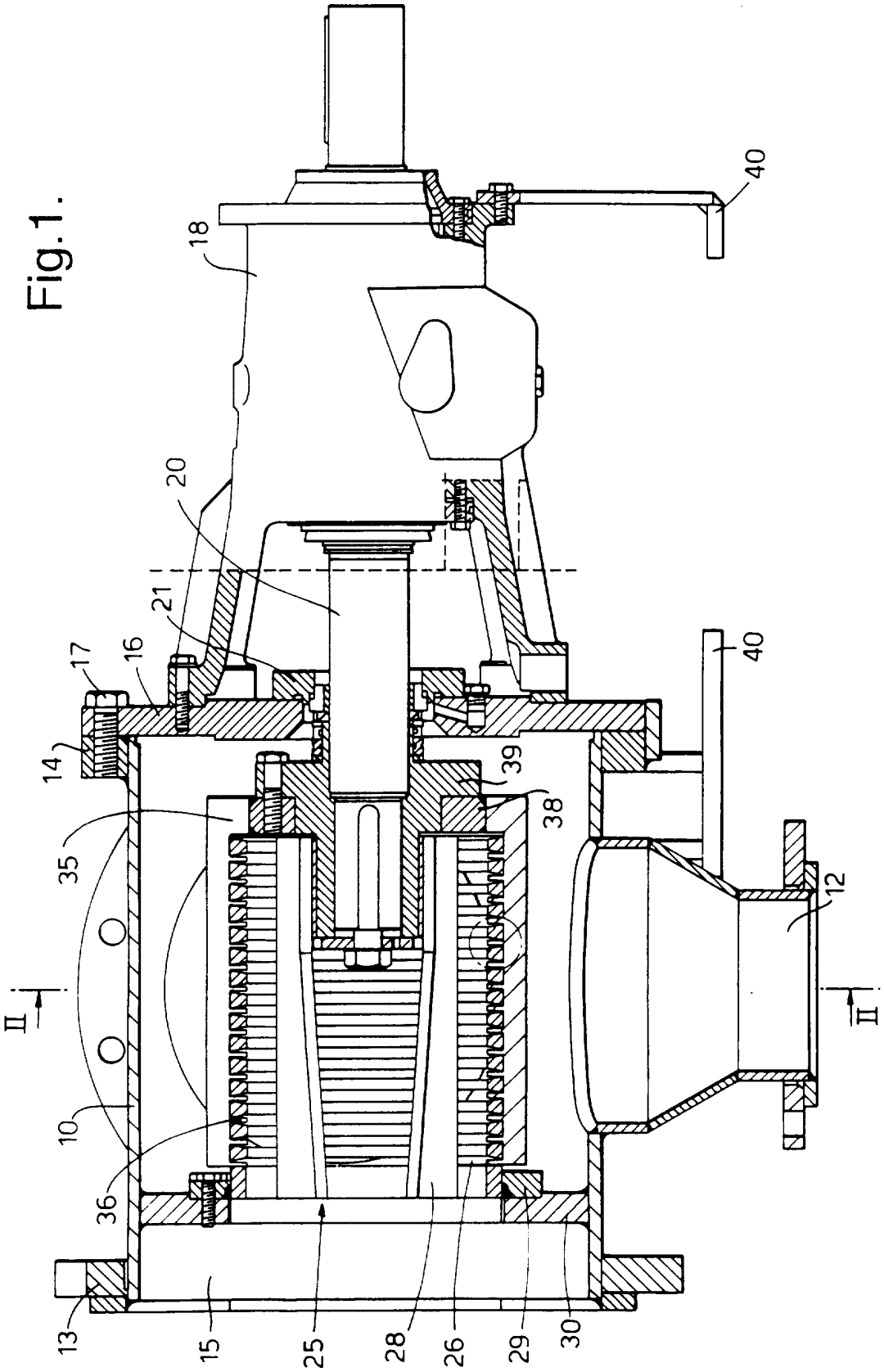


Fig.2.

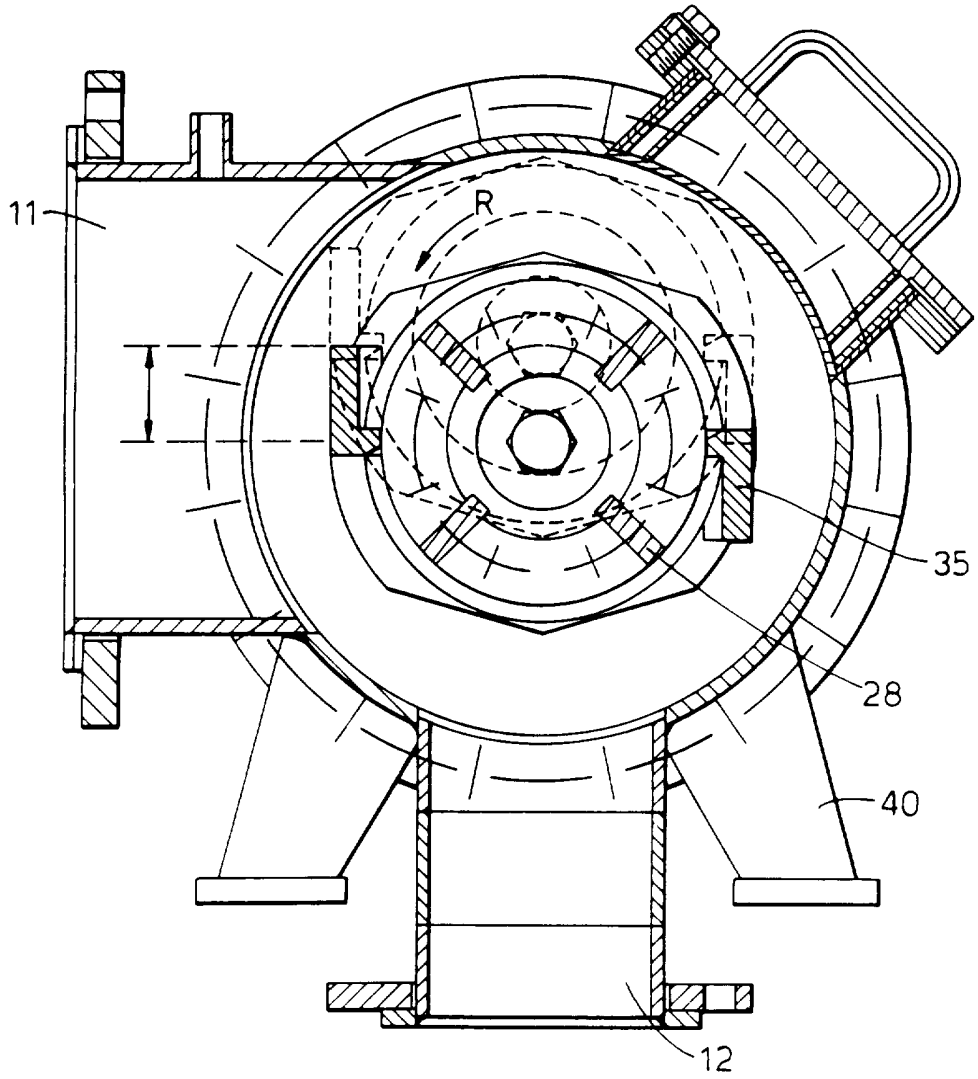


Fig.3.

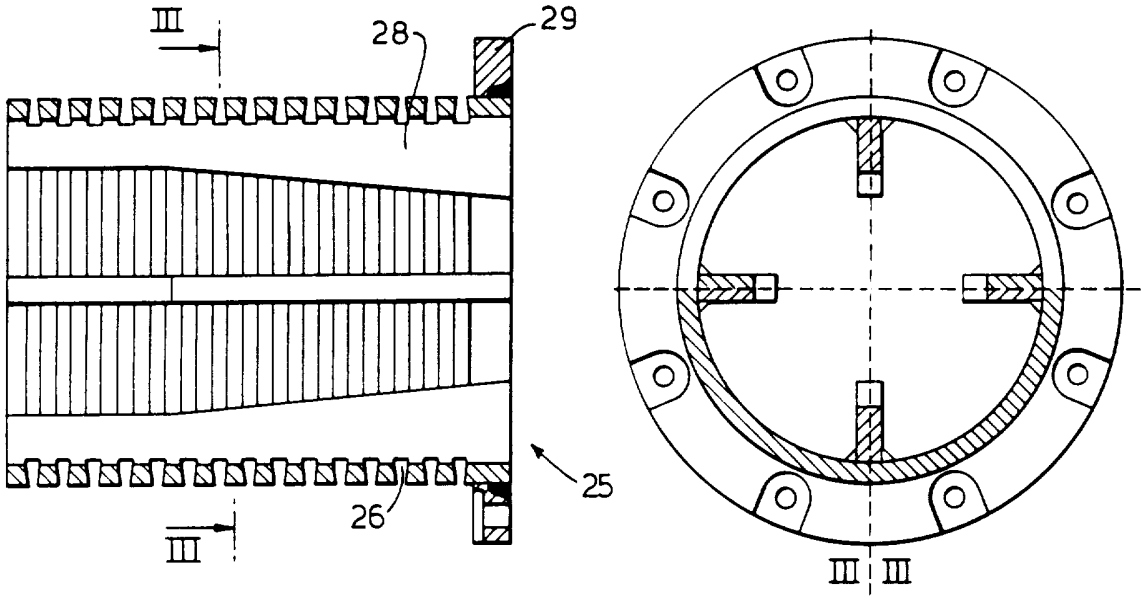
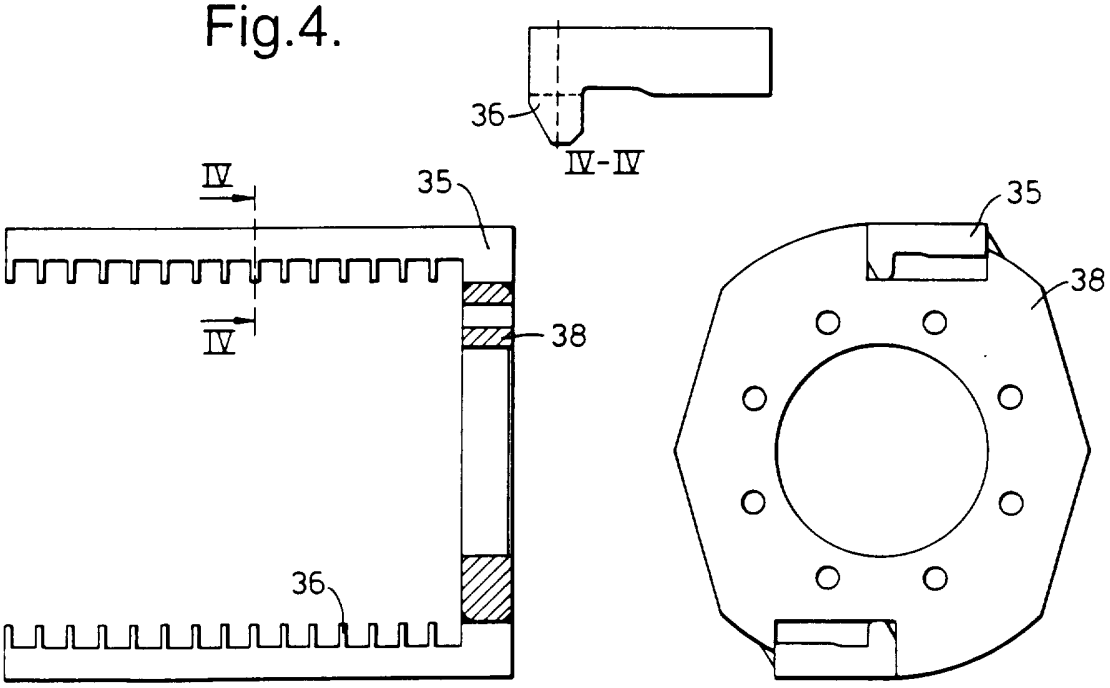


Fig.4.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/01505

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: D21D 5/02 // C02F 1/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: D21D, B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 8404293 A1 (HELLMAN, BÖRJE), 8 November 1984 (08.11.84), page 1, line 28 - page 2, line 12; page 3, line 10 - page 4, line 10, figures 1,2	1-6
A	US 4303508 A (ARNE SKRETTING), 1 December 1981 (01.12.81)	1-6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 8404293	08/11/84	EP-A,A- 0151127	14/08/85
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