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

(11) Publication number: **0 599 088 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93117644.0**

(51) Int. Cl.5: **B07B 4/00**, B07B 7/01

(22) Date of filing: **30.10.93**

(30) Priority: **25.11.92 SE 9203535**

(43) Date of publication of application:
01.06.94 Bulletin 94/22

(84) Designated Contracting States:
AT DE ES FR IT SE

(71) Applicant: **SUNDS DEFIBRATOR INDUSTRIES AKTIEBOLAG**

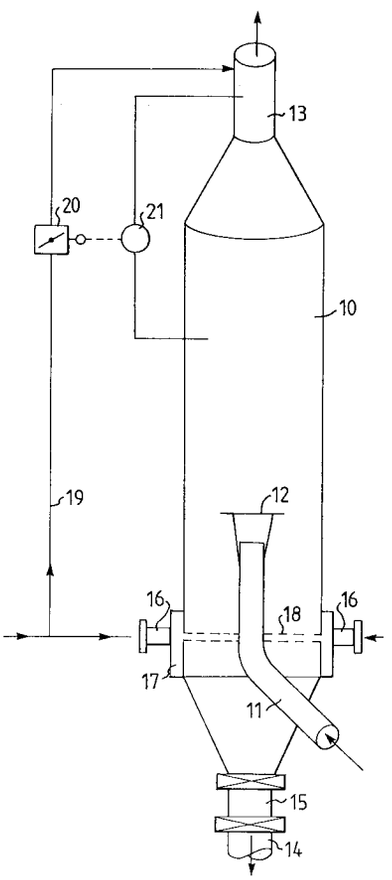
S-851 94 Sundsvall(SE)

(72) Inventor: **Perman, Per**
Oktobervägen 1
S-863 00 Sundsbruk(SE)
Inventor: **Bolt, Peter**
Kungsbackavägen 65
S-857 33 Sundsvall(SE)

(74) Representative: **Sundqvist, Hans**
Sunds Defibrator Industries Aktiebolag
Patents Dept.
Strandbergsgatan 61
S-112 51 Stockholm (SE)

(54) Apparatus for separating heavy particles from a flow of fiber material.

(57) An apparatus for separating heavy particles from an airborne flow of fiber material at the manufacture of fibreboard according to the dry method. The apparatus comprises a vertical cylindric chamber (10) with an inlet (11) for ingoing fiber material and separate outlets (13 and, respectively, 14) for fibers and heavy particles in the top and, respectively, in the bottom of the chamber (10). At least one duct (16) is connected to the bottom of the chamber (10) for the supply of a continuous base flow of air upward through the chamber at such a rate, that it can carry the fibers but not the heavy particles. The inlet (11) for the fiber material is directed upward and centrally located in the lower portion of the chamber (10) above the supply duct (16) for the base flow. A plane horisontal retardation member (12) is provided in connection to the inlet (11) for the fiber material so as to stop the vertical speed of the ingoing fiber flow and to deflect and distribute the fiber flow outward.



EP 0 599 088 A1

This invention relates to an apparatus for separation of impurities from a fiber material at the manufacture of fibreboard according to the dry method. Heavy particles such as shives, splinters, glue lumps, sand, scrap etc. are separated at different occasions in the process.

At the manufacutre of fibreboard according to the dry method at first the raw material, in the form of wood chips, is defibered so that the fibers are exposed. This fiber material is thereafter treated with glue, dried, formed to a fiber mat, compressed and pressed in a hot press. It is essential at this process that impurities and other undesirable heavy particles are removed from the fiber material prior to the forming and pressing process. To sort out such impurities in an economic way is a large problem in the fiber and chip industry. In the course of time great resources have been invested in the development of so-called scrap traps and air separators for this purpose. The result thereof has been apparatuses of increasing complexity and with ever more sophisticated and expensive equipment for their control.

The present invention offers a solution for the aforesaid problems. It relates to a separation apparatus of simple design, which efficiently removes heavy impurities from the fiber material.

The characterizing features of the invention are apparent from the attached claims.

The invention is described in greater detail in the following, with reference to the accompanying figure showing an apparatus according to the invention.

According to the embodiment shown, the apparatus comprises a vertical cylindric chamber 10, to which an inlet 11 for the fiber material is connected. The inlet 11 consists of a pipe, which extends inward to the centre of the lower portion of the chamber 10. The inlet is directed upward, and in front of its mouth a plane horisontal retardation member 12 is located, which is intended to stop the vertical speed of the ingoing fiber flow and deflect the fiber flow laterally. The upper side can be plane or possibly upward tapering.

At the top of the chamber 10 an outlet 13 for accepted fibers, and in the bottom of the chamber an outlet 14 for separated heavy particles (reject) are located. This reject outlet 14 can be provided with a sluice means 15, for example in the form of two tight dampers. In the bottom of the chamber 10, between the reject outlet 14 and fiber inlet 11, ducts 16 are provided for the supply of a continuous and uniformly distributed base flow of gas, for example air. These ducts 16 are connected to an air distribution space 17, which distributes the air symmetrically into the chamber 10 through an adjustable slot 18 extending all about the entire circumference of the chamber 10.

The fiber material to be screened is supplied through the inlet pipe 11 in the form of an airborne fiber flow with a flow rate of 15-45 m/s. The fiber flow meets the retardation member 12, which stops the vertical speed of the fiber flow and deflects and distributes the fiber flow outward. The upwardly directed continuous base flow of air then catches up the fiber material, and a stable, substantially highly uniform and even flow is obtained quickly, which implies the possibility of a restricted height of the chamber 10. Acceptable fibers are carried by the base flow, while heavy particles with a higher fall rate drop down to the bottom of the chamber. This reject is discharged via the dampers of the sluice means 15.

The acceptable fibers are moved upward by the upward air flow. By adjusting the air flow by means of a by-pass shunt 19 with an air damper 20 controlled by a scanning device 21 for the pressure drop between the chamber 10 and outlet 13, the separation process and fiber transport can be controlled in a simple and efficient way. The circular shape of the chamber 10 yields an air flow distributed across the cross-section. The slot 18 of the air distribution space 17 causes the ingoing air to be directly distributed across the entire cross-section. This in its turn prevents a strong local turbulence, and the risk of separated particles being sucked along is at a minimum.

The separation apparatus is particularly suitable for use in a process for making fibreboard, where air transports the fiber material from defibration via gluing and drying to forming. Heavy particles such as undefibered material and lumped glue, resin and latex particles etc. must be removed in some way. The present invention renders it possible to separate these impurities rapidly and efficiently. The separation process can be easily controlled, and the apparatus can be located in a suitable place, preferably between drying and forming, in existent installations as well as in new ones. The accepted fibers are continued to be transported from the outlet 13 of the chamber 10, for example to a fiber bin or a forming arrangement.

The separation process is very sensitive to variations in temperature and air humidity and, therefore, an automatic control of the air flow rate is essential and in many cases a prerequisite for a successful result. This problem has been solved by the apparatus described above. The air flow to the base flow, thus, is controlled in that a minor air flow is shunted the chamber 10 through the duct 19 where the flow is adjusted by means of the damper 20. This damper is controlled by the scanning device 21 for the difference pressure between the chamber 10 and the outlet 13. The adjustable slot 18 yields a low air rate with the possibility of local

adjustment of the air flow for a uniform distribution about the entire circumference. As transport air for the fibers to the fiber inlet 11 and as a base flow preferably air is used, the largest part of which is taken from the vacuum boxes of the forming arrangement, i.e. the transport air which is separated at the forming of a fiber mat on an air-pervious support.

A separate fan preferably is provided for the transport of air/fibers to the chamber 10. The separation apparatus thereby can be located in any optional place between the fiber drier and the forming arrangement.

The invention, of course, is not restricted to the he scope of the invention idea.

Claims

1. An apparatus for separating heavy particles from an airborne flow of fiber material at the manufacture of fibreboard according to the dry method, comprising a vertical cylindric chamber (10) with an inlet (11) for ingoing fiber material and separate outlets (13 and, respectively, 14) for fibers and heavy particles in the top and, respectively, in the bottom of the chamber (10) and at least one duct (16) being connected to the bottom of the chamber (10) for the supply of a continuous base flow of air upward through the chamber at such a rate, that it can carry the fibers but not the heavy particles, **characterized** in that the inlet (11) for the fiber material is directed upward and centrally located in the lower portion of the chamber (10) above the supply duct (16) for the base flow, that a plane horisontal retardation member (12) is provided in connection to the inlet (11) for the fiber material so as to stop the vertical speed of the ingoing fiber flow and to deflect and distribute the fiber flow outward.

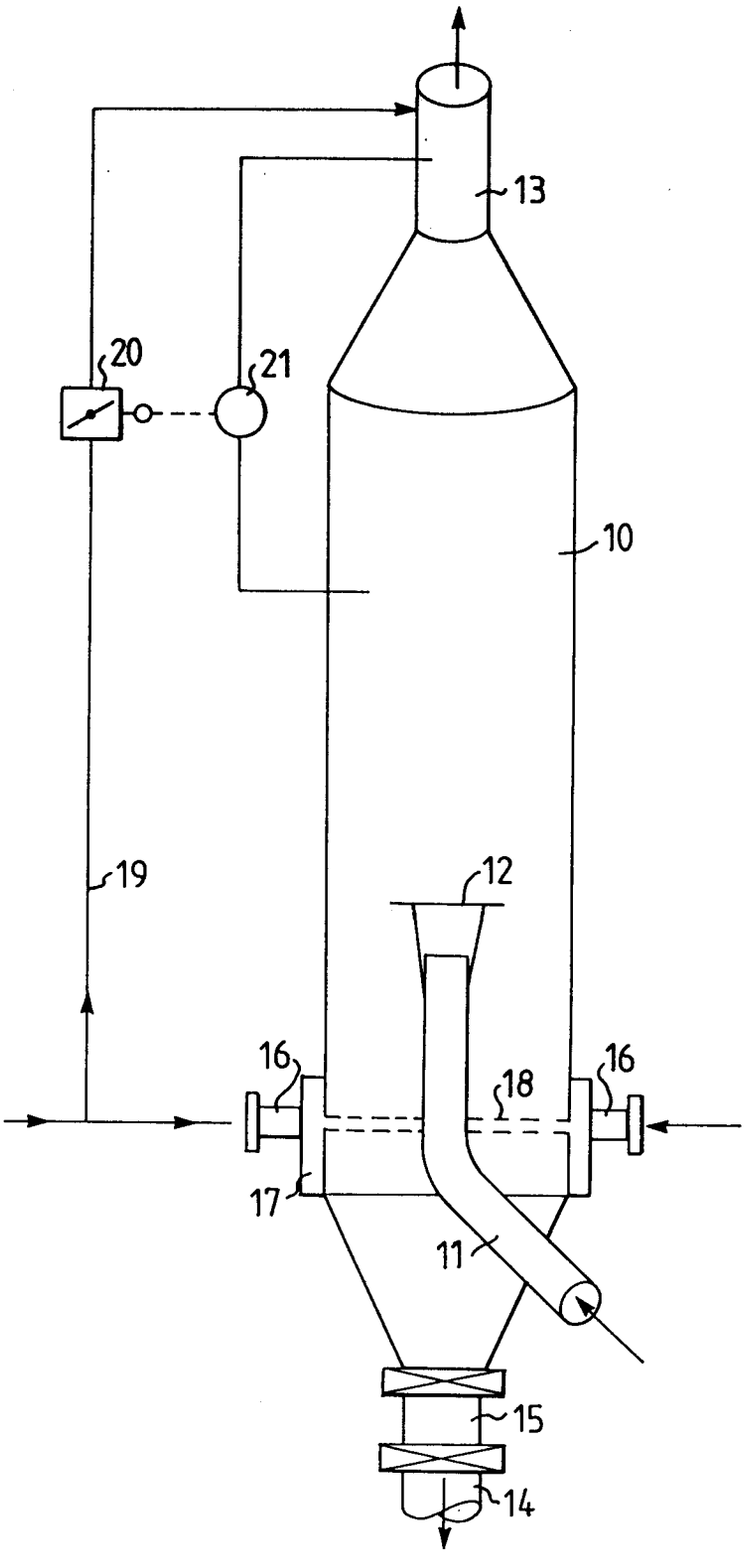
2. An apparatus as defined in claim 1, **characterized** in that the duct (16) for the supply of the base flow of air is connected to an air distribution space (17) at the chamber bottom, which space communicates with the chamber through an adjustable slot (18) extending all about.

3. An apparatus as defined in anyone of the claims 1-2, **characterized** in that a sluice means (15) is connected in the bottom of the chamber (10) for the discharge of the separated heavy particles.

4. An appratus as defined in anyone of the claims 1-3, **characterized** in that it comprises a device for controlling the air flow to the base flow, comprising a channel (19) with a damper (20) for controlled by-pass shunting of a minor part of said air flow past the chamber (10).

5. An apparatus as defined in anyone of the claims 1-4, **characterized** in that a separate fan is provided to supply the air/fiber flow to the fiber inlet (11) in the chamber (10).

6. An apparatus as defined in anyone of the claims 1-5, **characterized** in that it is located in a fiber transport duct between a fiber drier and an arrangement for forming the fibreboard.


13
20
21
10
19
12
16
18
16
17
11
15
14

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 7644.0

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.5)
A	WO, A1, 9205882 (ABB FLÄKT AB), 16 April 1992 (16.04.92) * page 1, line 22 - page 2, line 37, fig * --	1-10	B07B 4/00 B07B 7/01
A	GB, A, 1211292 (E.I. DU PONT DE NEMOURS AND COMPANY), 4 November 1970 (04.11.70) --	1-10	
A	US, A, 1877861 (L.A. HATCH), 20 September 1932 (20.09.32) * figure 2 * --	1-10	
A	US, A, 2766880 (F. SCHAUB ET AL), 16 October 1956 (16.10.56) * column 2, line 1 - line 61; column 3, line 38 - column 4, line 40, figure 3 * --	1,4-6,8	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B07B
A	US, A, 3975263 (ELO), 17 August 1976 (17.08.76) * figure 1, abstract * --	1-10	
A	DE, C, 589578 (KARL SCHUBERT), 9 December 1933 (09.12.33) * figure 1, claim 1 * --	1-10	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	25 February 1994	FRANSSON ÅSA

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 : intermidiate 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 (P0401)

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.5)
A	CH, C, 366725 (MIAG MÜHLENBAU UND INDUSTRIE GMBH), 28 February 1963 (28.02.63) * page 1, line 1 - line 43, fig * -----	1-10	B07B 4/00 B07B 7/01

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
B07B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	25 February 1994	FRANSSON ÅSA

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 : intermidiate 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