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

(11) Publication number: **0 079 992**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **81305521.7**

(22) Date of filing: **23.11.81**

(51) Int. Cl.³: **D 06 C 3/02**

(43) Date of publication of application: **01.06.83**
Bulletin 83/22

(84) Designated Contracting States: **CH DE FR IT LI NL**

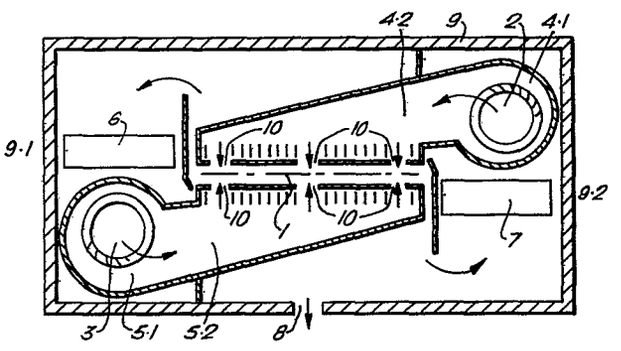
(71) Applicant: **PRIMATEX MACHINERY PRIVATE LIMITED, Dhanrajmahal Chatrapati Shivaji Maharaj Marg, Bombay 400 039 Maharashtra (IN)**

(72) Inventor: **Vasant Vyankatesh Apte, 2/25 Vishnu Prasad M.G. Road, Villa Parle (East) Bombay - 400 057 (IN)**

(74) Representative: **Burrington, Henry William et al, Bernier & Burrington 9 Staple Inn, London WC1V 7QH (GB)**

(54) Process and apparatus for drying wet textile fabrics.

(57) In a process and apparatus for drying wetted textile fabric the known use of dry air to dry the fabric is replaced by the use of superheated steam at about 150 °C.



EP 0 079 992 A1

PROCESS AND APPARATUS FOR DRYING WET TEXTILE FABRICS

This invention relates to a process for drying wet textile fabrics in a stenter or float-dryer and improvements in or relating to a stenter or float-dryer adapted to carry out the process.

In what follows, the word "stenter" includes a single layer stenter, a multi-layer stenter and a float-dryer, and the word "chamber" includes a plurality of chambers.

A stenter could be defined as a machine essentially comprising (i) a mechanism to feed continuously a wetted textile fabric into a chamber in which (ii) processes such as equalising, finishing or curing are carried out on the moving fabric while it is being simultaneously dried, and (iii) a mechanism for delivering from said chamber dried processed fabric.

A stenter in current use employs dry air as the evaporating medium in its chamber. Good results could be obtained if the drying medium is moistureless air but that is never possible because the drying operation on wetted fabric must produce vapour and the air in the chamber can never be completely dry. However, it has been ascertained that the optimum ratio of air to moisture in the medium circulating in the chamber should be 9:1 by weight. Since evaporation is a continuous process, the said ratio will be

fluctuating and in course of time, it is bound to fall below the optimum. It then becomes necessary to exhaust some of the medium from the chamber. As a result of the partial exhausting of the medium, a slight vacuum is created resulting in the sucking in of fresh air from gaps at the entry and exit of the fabric into and from the chamber. The fresh air has to be raised to the temperature of 150° C. The temperature of the exhausted medium is around 130° C. There is thus a distinct loss and expenditure of heat energy.

It is an object of this invention to minimise the aforesaid loss and expenditure of heat energy. This is achieved by substituting for the hot air, super-heated steam which will save a considerable amount of heat energy. This change of medium does not involve injection of steam into the chamber because the evaporation of the moisture of the fabric itself will produce continuously the requisite quantity of steam but it has to be heated to a temperature of about 150° C. Over and above the saving of heat energy, this change makes it possible :-

(a) to maintain uniform temperature,

(b) to obtain increased production,

(c) to improve the handling quality of the fabric, and

(d) to prevent yellowing of the fabric.

According to the present invention a process for drying wetted textile fabric of the kind which comprises passing the wetted fabric through a stenter, is characterised in that as the wetted fabric passes threugh the stenter it is subjected to superheated steam at a temperature of about 150° C., the superheated steam being generated by evaperation of the moisture in the wetted fabric.

The chamber design has to be modified because of the change of medium from hot air to superheated steam.

The known current stenter has a chamber provided with longitudinally aligned heat radiators, each radiator being located in the vicinity of a linear plurality of suction fans, each fan being located in a circular fan-housing opening into a tapering rectangular tunnel with openings in its side facing the moving fabric. In current stenters, the openings are a plurality of holes.

This invention, however, provides discharge of superheated steam by transverse widthwise jets upon the moving fabric by means of venturi openings running along the sides of each housing, the inner walls of the venturi openings being adapted to form a channel for the return of the steam reflected from the surface of the fabric to the space in the vicinity of the radiators, the steam entering the tunnel being guided into the venturi openings by means of parallelly disposed pendant inclined slats transverse to the venturi openings.

In the current stenter, the exhaust is located in the top of the chamber. This position of the exhaust is not desirable when the drying medium is changed from air to superheated steam. Being lighter than air, the steam tends to rise to the top of the chamber leaving some air at the bottom. Furthermore, the medium in the chamber contains the vapour of oil or wax used in finishing the fabric, the condensation of which near the exhaust in the top of the chamber would produce droplets which might fall on the running fabric and damage it.

This invention, therefore, provides an exhaust opening or openings in the bottom of the chamber. The bottom location of the exhaust openings ensure the complete removal of air from the chamber. With the change of medium in the chamber to superheated steam, the possibility of the pressure inside the chamber exceeding

the safety level cannot be ruled out. This invention accordingly provides each of the exhaust openings with a damper adapted to operate only when the pressure inside the chamber exceeds the safety level. The damper is actuated by a mechanism which is in turn actuated by a signal from a photoelectric cell which becomes activated only when the level in a manometer limb connected to the chamber goes down beyond the safety level.

How the invention may be carried out will now be described with reference to the accompanying drawings in which:

Figures 1 and 2 show schematically a single layer stenter in sectional elevation and plan;

Figures 3 and 4 show schematically a multi layer stenter in sectional elevation and plan.

Figures 5 and 6 show schematically a float-dryer in sectional elevation and plan;

Figure 7 is a section of the chamber Y taken along the line AB in Figures 2, 5 and 6;

Figure 8 is a similar view to Figure 7 showing a section of the chamber Y taken along the line CD in Figure 3;

Figures 9 and 10 illustrate respectively in perspective and plan a part of a tapering tunnel connected to the fan-housing; and

Figure 11 illustrates schematically the operation of the damper in the exhaust to the chamber.

X, Y and Z indicate respectively in each of the Figures 1 to 6 the fabric feeding mechanism, the chamber and the fabric delivering mechanism. This invention is concerned with only the chamber Y in each of the illustrated machines, the same numerals being used to indicate identical parts performing identical functions in all the figures of the drawings.

Referring to Figure 7, 1 indicates the fabric sheet passing

through the chamber Y. In the Figures 1 to 6, 1a indicates the wet fabric entering the chamber Y 1b the dry processed fabric delivered from the chamber Y and 9 indicates the vertical section of the walls of the chamber Y along the sectional line AB. The chamber has an exhaust opening 8 at its bottom. The fabric 1 is partially dry after its passage from the entry to the line AB. It is being further dried by superheated steam which is made to circulate in the chamber Y by means of fans 2 and 3 located inside the fan-housings 4.1 and 5.1 and the truncated tunnels 4.2 and 5.2 respectively. The tunnels have the openings 10 facing the fabric 1. The vapour produced by the evaporation of the moisture in the fabric 1 and the steam reflected from the fabric 1 proceed to the space surrounding the radiators 6 and 7 located in the chamber Y near its walls 9.1 and 9.2 respectively. The fans 2 and 3 are located below and above the radiators 7 and 6 respectively. The arrows in Figure 7 show the direction of the circulation of the medium.

Figure 8 is a duplication of Figure 7 with this difference that the fabric 1 is moving in the opposite directions in the upper and lower halves of the figure.

Referring to Figures 9 and 10, 10 indicates the linear venturi openings in the tunnel 4.2 or 5.2 with the channel 11 between them. Immediately below the channel 11 are a series of parallel pendant slats 12.

Referring to Figure 11, a manometer 13 is connected to the chamber Y. The arrows 14 indicate the position of a photo-electric cell. A signal from the photoelectric cell actuates the motorized drive 15 of the damper 16 in the exhaust opening 8.

The wetted fabric 1a is fed into the chamber Y where it is dried by superheated steam produced by the heating elements or

radiators 6 and 7. The superheated steam is sucked in by the fans 2 and 3 through the opening in the fan housings 4.1 and 5.1 and pushed into the tunnels 4.2 and 5.2 from where the superheated steam is jet-discharged against the fabric 1 (a stage between 1a and 1b) and is reflected along with vapour along the channel 11 towards the radiators 6 and 7 where it is heated to the requisite temperature and goes through the same cycle as described. The steam entering the tunnels 4.2 and 5.2 is pushed into the gaps between the pendant slats 12 and therefrom into the venturi openings 10 from where the steam is discharged in a linear jet against the fabric 1. In practice, there is a plurality of fans 2 (or 3) linearly disposed and corresponding tunnels 4.2 and 5.2 respectively. It is however possible for one fan to feed two or three tunnels by the requisite arrangement of fan-discharge ducts. Such an arrangement will increase space between the fans making increased suction possible.

CLAIMS

1) A process, for drying wetted textile fabric, of the kind which comprises passing the wetted fabric through a stenter is characterised in that as the wetted fabric passes through the stenter it is subjected to superheated steam at a temperature of about 150° C., the superheater steam being generated by evaporation of the moisture in the wetted fabric.

2) A stenter, for drying wetted textile fabric, of the kind which has one or more fans located in a fan-housing and adapted to entrain air along one or more tunnels connected to the housing and openings in each tunnel through which air is dischargeable against wetted fabric carried on a moveable conveyor through a chamber of the stenter and having one or more exhaust outlets to the chamber characterised in that: the stenter has means to generate superheated steam at a temperature of about 150° C. to dry the fabric.

3) A stenter as claimed in claim 2 characterised in that the openings comprise venturis (10).

4) A stenter as claimed in claim 3 characterised in that the venturi (10) openings are mutually parallel and each one comprises an elongated jet, there being a channel (11) between adjacent

venturi openings (10) to collect steam.

5) A stenter as claimed in claim 4 characterised in that there is a plurality of mutually parallel slats (12) positioned to guide steam from the associated tunnel (4.2, 5.2) towards the venturi openings (10).

6) A stenter as claimed in claim 2 characterised in that each of the exhaust outlets (8) is in the bottom of the chamber (Y).

7) A stenter as claimed in claim 6 characterised in that each exhaust outlet (8) is provided with a damper (16) which is adapted to be normally closed but to be opened when the pressure in the chamber exceeds a predetermined level.

8) A stenter as claimed in claim 7 characterised in that each damper (16) is connected to a motorised drive (15) the operation of which is considerable by a pressure sensitive device (13, 14).

9) A stenter as claimed in any one of claims 2 to 8 characterised in that one fan (2,3) is adapted to feed a plurality of tunnels (4.2, 5.2) by an arrangement of fan discharge ducts.

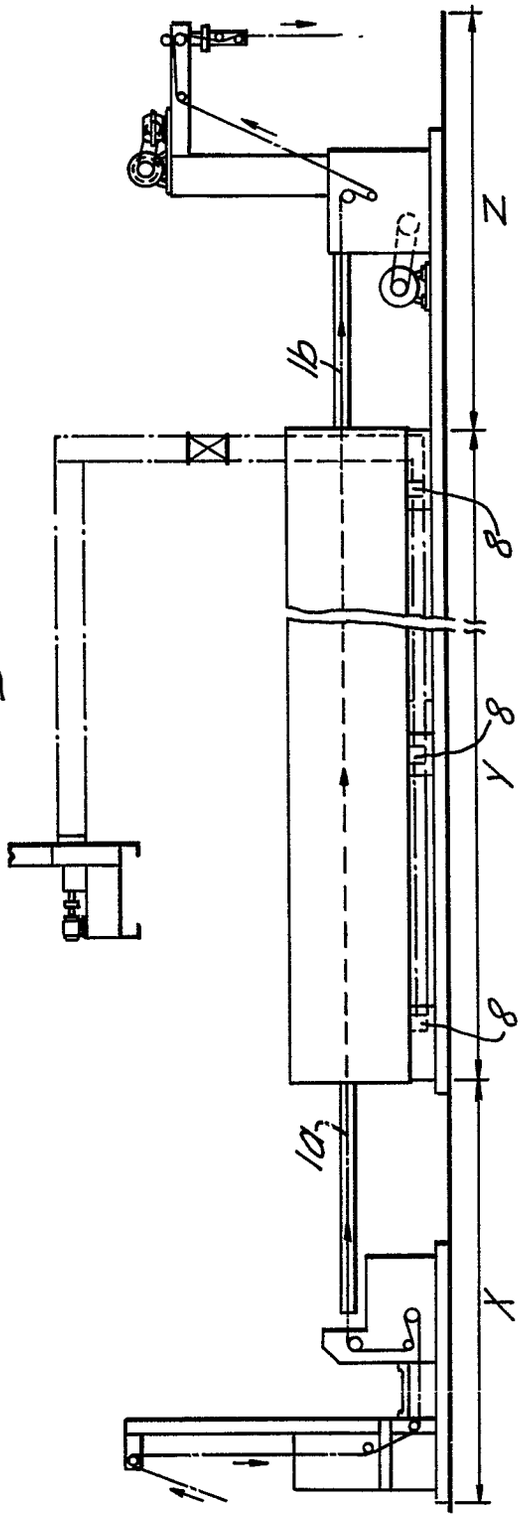


Fig. 1.

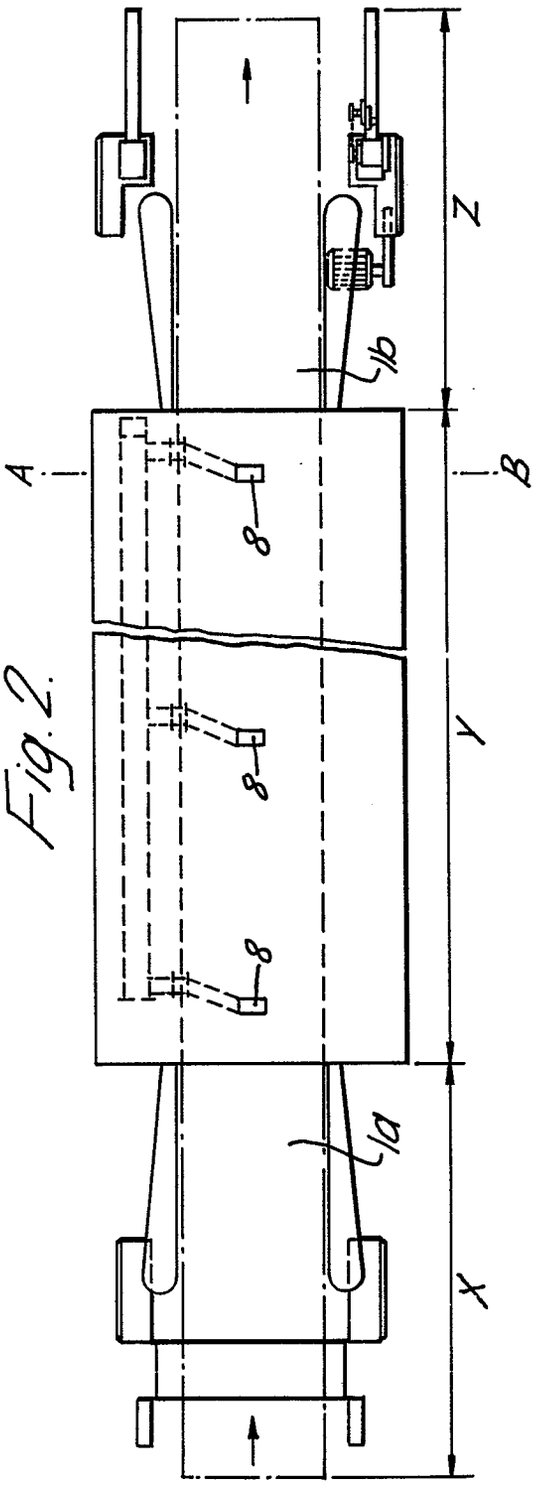


Fig. 2.

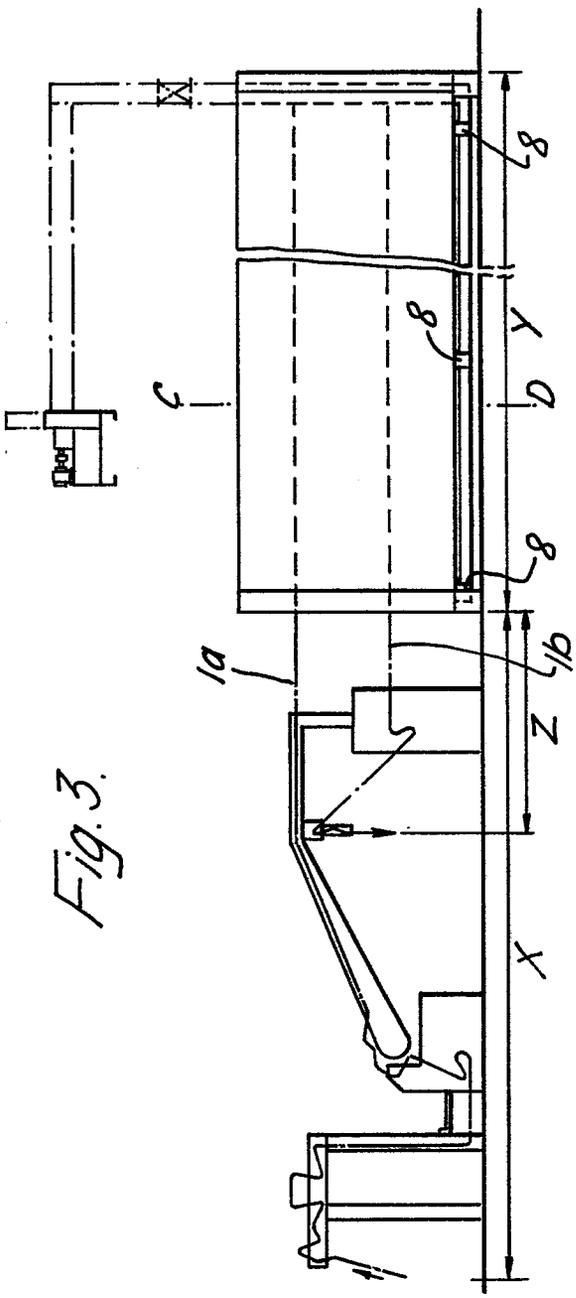


Fig. 3.

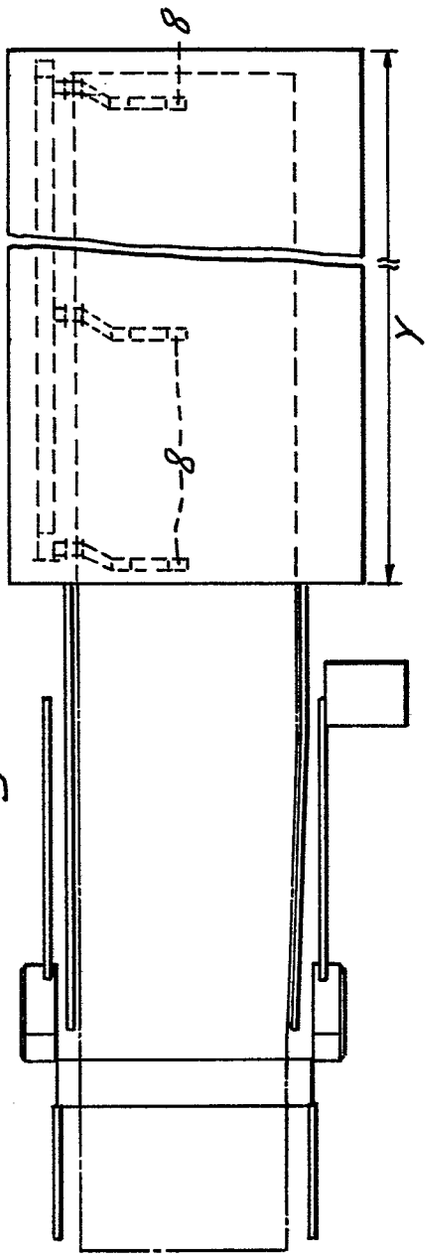


Fig. 4.

Fig. 5.

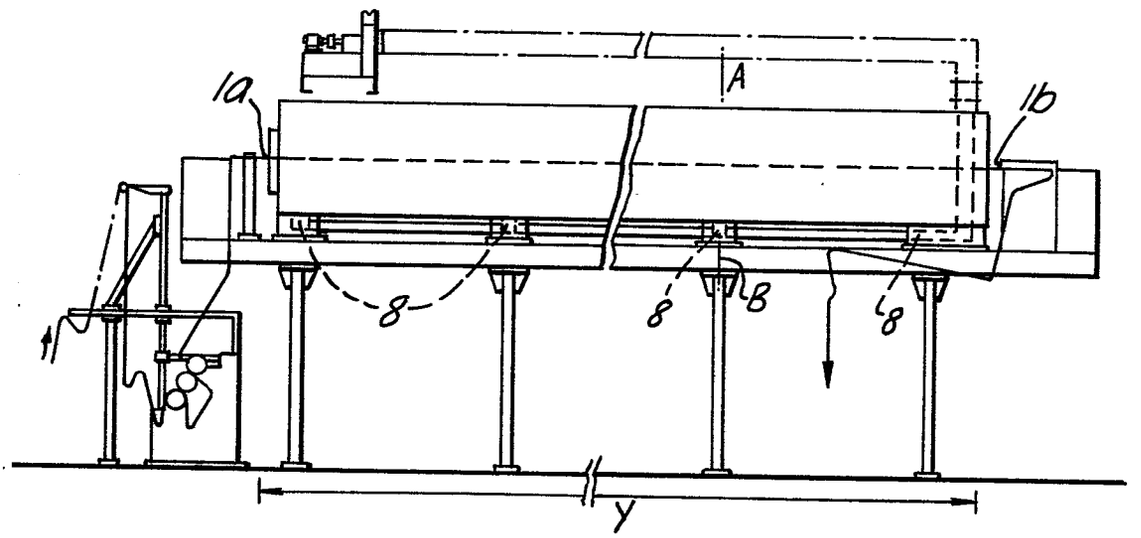


Fig. 6.

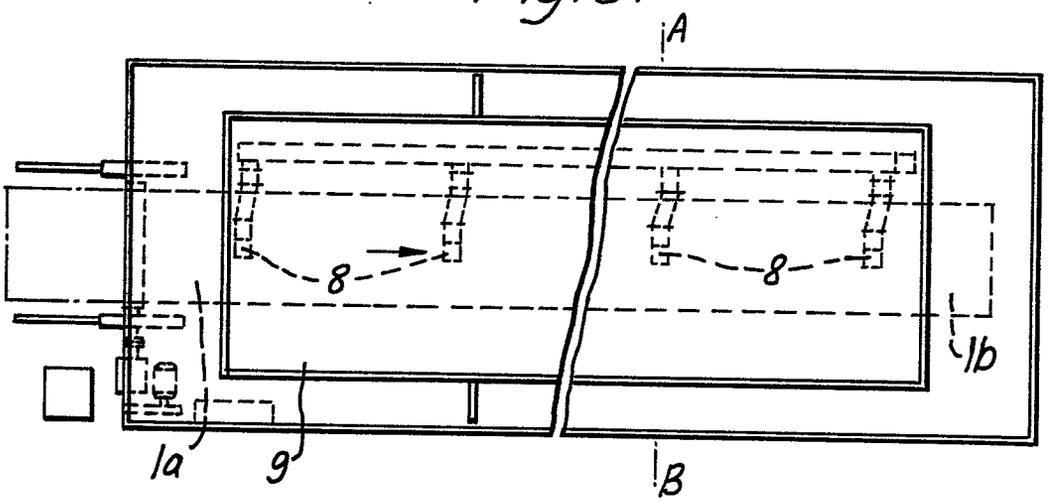


Fig. 7.

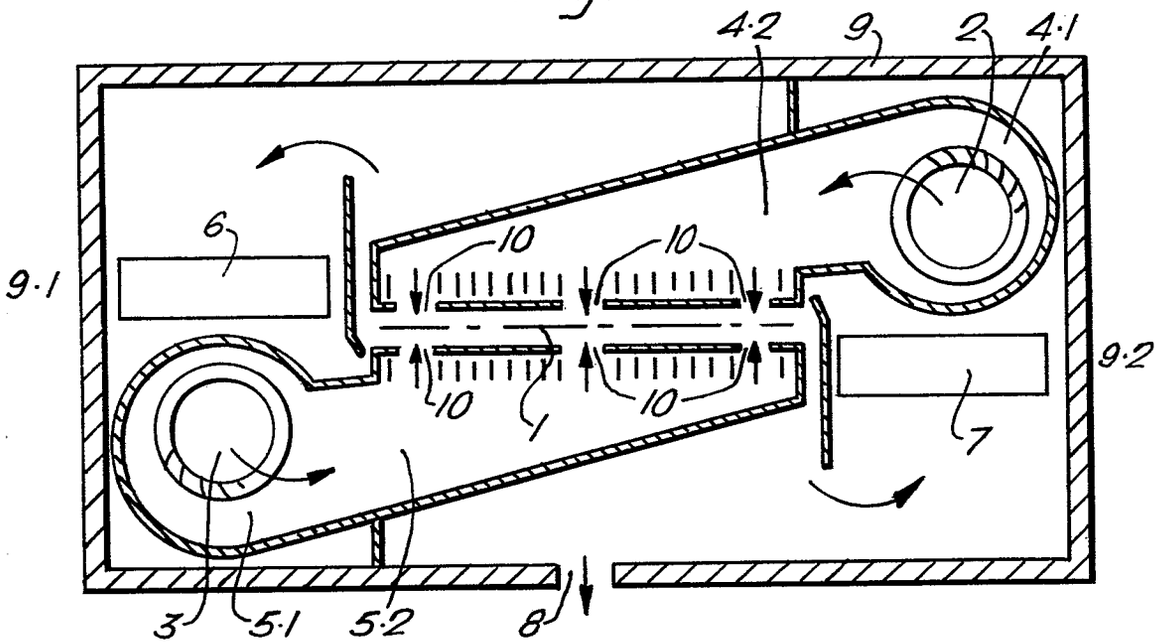


Fig. 9.

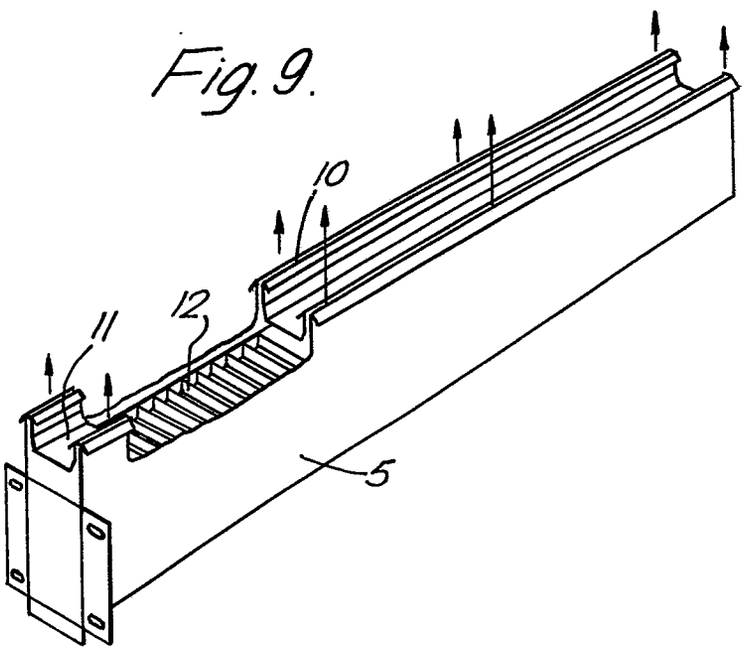


Fig. 8.

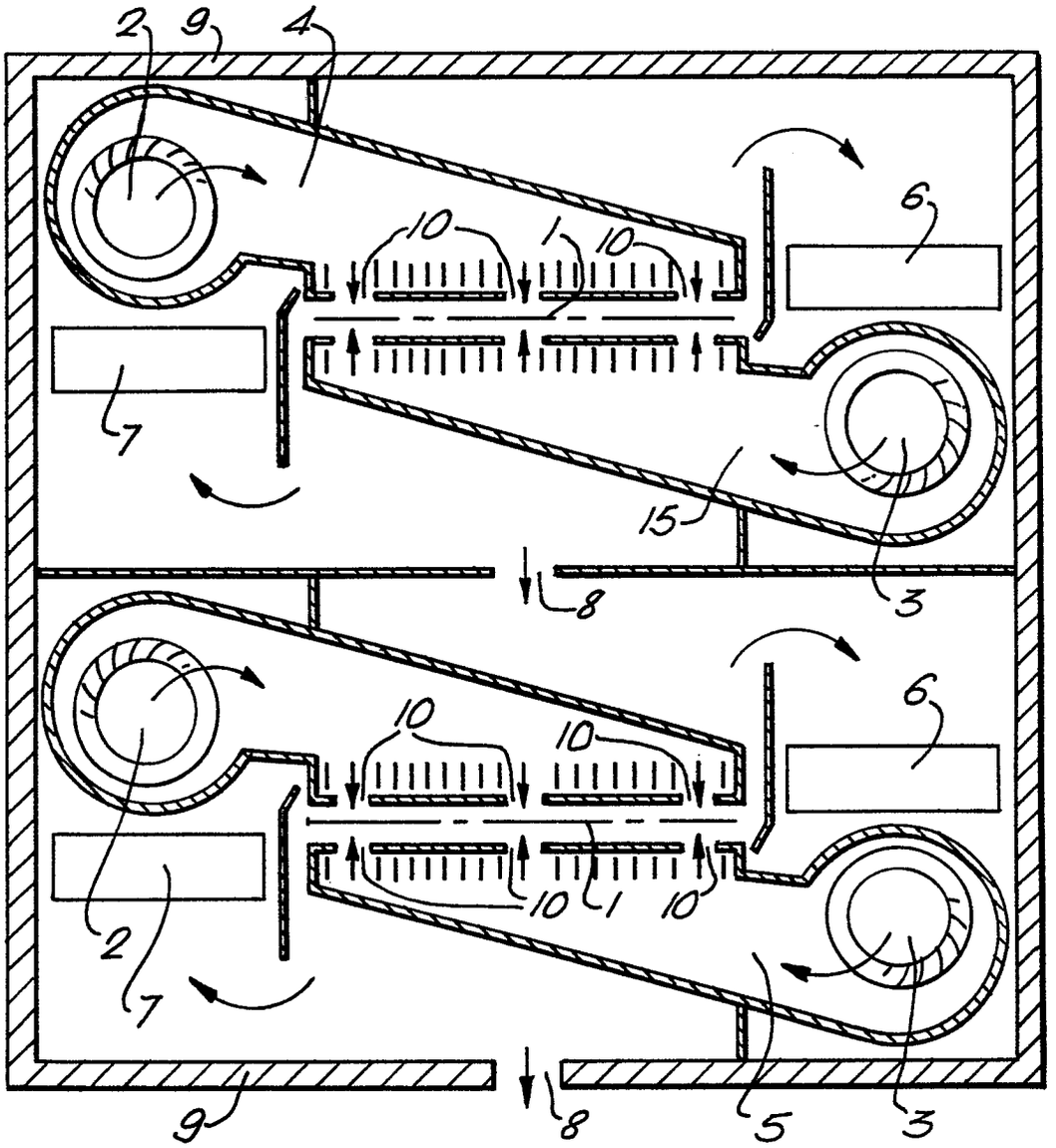


Fig. 10.

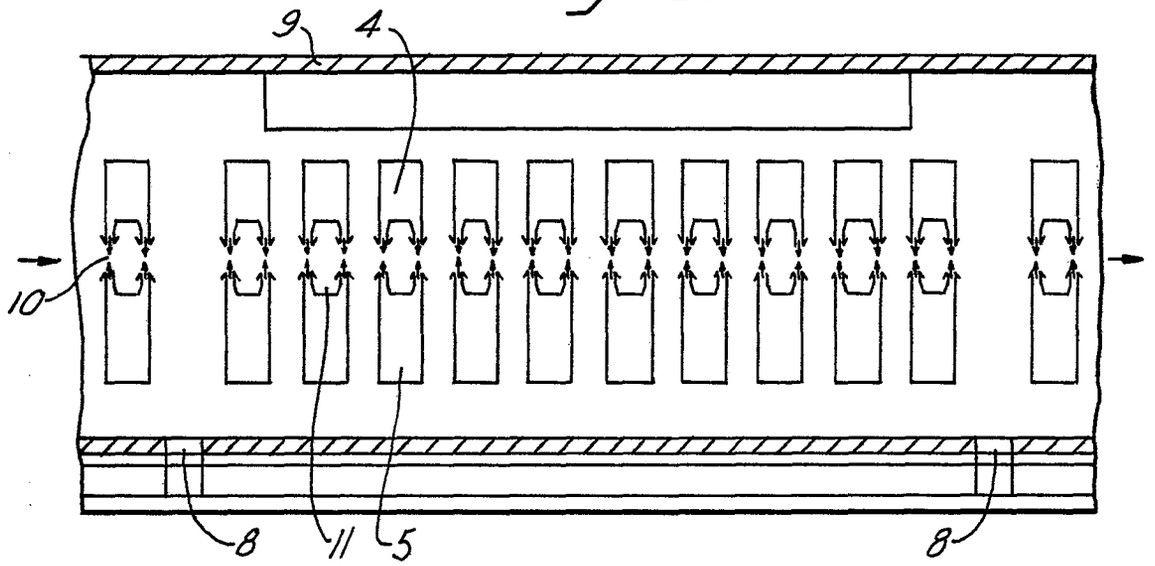
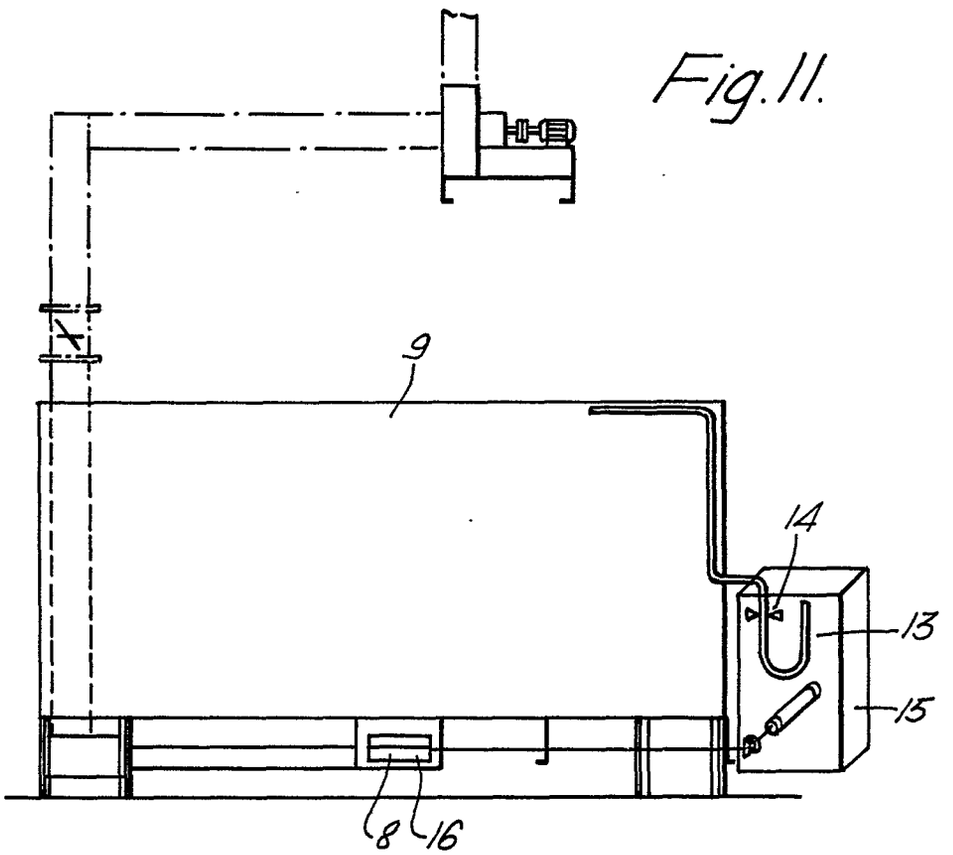


Fig. 11.



European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 81 30 5521

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. ³)
A	US-A-3 015 893 (McCREARY)		D 06 C 3/02
A	US-A-3 408 748 (DOW CHEMICAL)		
A	US-A-3 510 954 (DOW CHEMICAL)		
A	US-A-3 798 785 (CHAMOUTON)		
A	GB-A-2 063 442 (WEBER)		
A	FR-A-1 224 122 (SACM)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

D 06 C
F 26 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26-08-1982	PETIT J.P.

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

EPO Form 1503. 03.82