

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



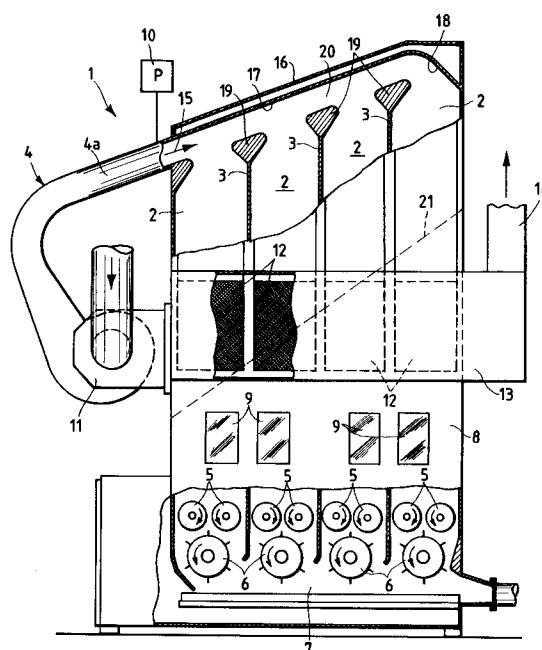
(11) Publication number:

0 485 014 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91202811.5**(51) Int. Cl.⁵: **D01G 23/02, D01G 13/00,
D01G 23/08**(22) Date of filing: **30.10.91**(30) Priority: **06.11.90 IT 2197890**(43) Date of publication of application:
13.05.92 Bulletin 92/20(84) Designated Contracting States:
CH DE FR GB LI(71) Applicant: **FRATELLI MARZOLI & C. S.p.A.**
Via Durante, 1
I-25036 Palazzolo sull'Oglio Brescia(IT)(72) Inventor: **Pezzoli, Luigi**
Vicolo Duranti, 1
I-25036 Palazzolo Sull'Oglio-Brescia(IT)
Inventor: **Vezzoli, Emilio**
Vicolo Duranti, 1
I-25036 Palazzolo Sull'Oglio-Brescia(IT)(74) Representative: **De Carli, Erberto et al**
ING. BARZANO' & ZANARDO MILANO S.p.A.
Via Borgonuovo, 10
I-20121 Milano(IT)(54) **Mixing structure for staple material, especially cotton staples.**

(57) In a mixer (1) having adjacent vertical bins (2), provided with a duct (4) for supplying the material in a current of air, the feed direction of the material slopes upwards and the bins (2) are of a height gradually increasing in the feed direction of the material. The angle of inclination is preferably between 10° and 70°. The material is delivered to the mixer by a fan (11) and arrives in the various bins (2) with substantially the same degree of compaction.

Fig.1**EP 0 485 014 A1**

This invention relates to a mixing structure for staple material, especially cotton staples.

In the case of conventional mixers having a plurality of adjacent vertical bins, wherein the fibrous material drawn from a series of bales arranged alongside one another is supplied in a current of air to the upper inlet of the mixer, from where it is distributed to the individual bins, the bins are generally filled to different levels, wherein those bins closest to the feed side of the material have a higher level of material and this level gradually decreases towards the final bin, i.e. the bin furthest away from the feed side.

However, the system of distributing the material to the various bins, generally effected by mechanical means, e.g. a belt conveyor provided with transverse elements for taking up the material, which gradually carry the material towards the various bins, also involves perceptible rarefaction of the material as it approaches the final bin, so that, in addition to having an increasingly lower level, the material is also decreasingly compact from one bin to the next. Consequently, the material has a different degree of compaction at the outlet of the various bins, where feed and mixing rollers are disposed, thus resulting in non-homogeneous mixing, wherein quantities of material originally having the same characteristics are mixed together in different states at the outlet of the bins. In order to obtain more homogeneous mixing, it has already been proposed to use a mixer in which the various vertical bins are provided at the bottom with deflecting walls, at graduated heights, and a horizontal or substantially horizontal conveyor is disposed below the bins, adapted to advance the material from the bottom of the bins in horizontal layers, or almost, towards the delivery rollers of the mixer, disposed one above the other (see Swiss Patent No. 511 951). In this manner, the material from the various bins is forced to move along paths of different lengths, quantities of material combined in very different ways arriving at the outlet at the same time. However, this type of mixer has the disadvantage of greater overall dimensions as a result of the horizontal or substantially horizontal deflection of the paths of the material. Moreover, in the final phase of the paths, the transportation conditions for the material taken directly from the conveyor are substantially different from those for the subsequent material, increasingly further away from the conveyor, which is removed from the material underneath by means of friction. Therefore, once again, this can lead to different degrees of compaction of the material arriving at the delivery rollers.

Therefore, the object of this invention is to overcome the abovementioned limitations and to obviate the disadvantages currently encountered in

the case of the known mixers, by providing a mixing structure capable of providing substantially homogeneous mixing without any significant increase in the overall dimensions and substantially retaining the greater part of the conventional structure of the mixer.

This problem is solved by a mixing structure for staple material, especially cotton staples, of the type comprising a plurality of adjacent vertical bins, communicating at the top with a duct for supplying the material and provided at the lower outlet with associated mixing rollers adapted to supply the material to a common mixing and conveying delivery channel, means for generating a current of air for the transportation of the material being disposed in the supply duct, characterised in that the feed direction of the material at the inlet of the mixer slopes upwards and that the bins are of a height gradually increasing in the feed direction of the material.

In the case of a structure of this type, the material supplied in a current of air to the inlet of the mixer is driven in a substantially uniform manner into the various bins, wherein there are no mechanical transporting and conveying elements in the ascending path and the current of air for transportation directs all of the material into the interior of the various bins, said material, by virtue of the inclination of the upper part of the mixer, being distributed among the various bins at different levels, as is necessary for true mixing, but substantially with the same degree of compaction, thereby eliminating the disadvantage specified at the outset and making it possible to achieve improved homogenisation of the material at the outlet.

The material advanced upwardly into the mixer by a vertical component may also advantageously be distributed among the various bins to a certain extent as a function of the weight of the staples, wherein the vertical component can have a certain influence owing to the force of gravity, acting in the opposite direction to the direction of movement of the material. In this manner, it is possible to obtain a certain degree of sorting of the material into the various bins, this having an advantageous effect on the results of the final mixing.

Other features and advantages of the invention will be clear from the following description of several preferred embodiments of this invention, illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a side elevation, in part section, of a mixer having a structure according to the invention and

Fig. 2 is a sectional side elevation of the upper part of a mixer having a structure modified with respect to that of Fig. 1.

With reference to Fig. 1, a mixer 1 comprises a plurality of adjacent vertical bins 2, separated by means of dividing walls 3 and communicating with one another at the top and having a duct 4 for supplying the staple material, e.g. cotton staples.

At the lower outlet portion, the bins 2 have associated mixing means, e.g. in the form of pairs of delivery feed rollers 5, below which are disposed mixing rollers 6, in an arrangement known per se. The rollers 5 of each pair are actuated so as to rotate in opposite directions, with the aid of means known per se. Both the rollers 5 and the rollers 6 can be operated at different speeds for the various bins 2, e.g. at a speed gradually decreasing from the bin closest to the feed side to the bin furthest away from the feed side or vice versa, according to a technique which is known per se and which will therefore not be described and illustrated in more detail.

The rollers 5 and 6 supply the material to a common mixing and conveying delivery channel 7, from where the mixed material is drawn into the next machine, e.g. an opener or a carding machine, in the manner known per se.

The opposing lateral walls 8 of the body of the mixer 1 are provided with windows 9 so that it is possible to verify the proper movement of the material inside the bins 2.

A pressure detector 10 is provided in the supply duct 4, at the inlet of the mixer 1. Moreover, means 11 for generating a current of air for the transportation of the material are also disposed in the duct 4. In the case illustrated, this means is an axial-inlet, radial-outlet fan. It is of the known type and is disposed to rotate with the aid of a motor (not shown). The fan draws the material into a current of air, e.g. from a sampler, and delivers it into the mixer 1.

Above the windows 9, the walls 8 of the mixer 1 have perforated portions 12 and associated discharge pipes 13, through which the air delivered by the fan 11 leaves the mixer 1. The discharge pipes 13 converge into one common outlet 14.

As illustrated in the drawing, the structure of the mixer in its upper part is such that the feed direction of the material at the inlet of the mixer, indicated by the arrow 15, slopes upwards and the bins 2 are of a height gradually increasing in the feed direction of the material in the mixer 1. The mixer 1 therefore has an inclined top 16, the interior thereof defining a guide surface 17 for the material in the sloping feed direction of the said material. This surface is connected by means of a portion 18 to the wall of the final bin 2. The dividing walls 3 end at the top in profiled deflection surfaces 19 known per se, but succeeding one another in a sloping line parallel to the feed direction of the material, so as to define, together with the

top 16, a sloping feed channel 20, the inlets to the various bins 2 having gradually decreasing levels departing from the bottom of said channel. The transverse inlet sections of the various bins 2 at the surfaces 19 can be of identical size, as illustrated, or they can be of gradually varying size, e.g. gradually decreasing from the bin 2 closest to the feed side to the bin 2 furthest away from the feed side.

The path 4a of the supply duct external to the mixer 1 is advantageously directly connected thereto, and it also slopes with a degree of inclination equal to that of the feed direction of the material into the mixer 1, so that the material is delivered into said mixer without being subjected to deflection and the entire section of the material can enter the mixer in the same state, resulting advantageously in uniform distribution of the material throughout the various bins 2.

The angle of inclination of the feed direction, or of the channel 20 and the duct path 4a is preferably between 10° and 70°, according to the nature and quality of the material to be mixed.

In the case of the structure described and illustrated, the staple material is delivered in a substantially uniform manner into the various bins 2, so that there is an almost equal degree of compaction in each bin 2, irrespective of its distance from the feed side. This inclined arrangement results in the material being disposed at different levels in the various bins 2, thereby creating the conditions for true mixing of different quantities of material, obtained by the successive removal of different qualities of material from the original bale.

The fan 11 is advantageously controlled as a function of the pressure detected by the pressure detector 10, so as to maintain constant and optimum feed conditions. Other conditions being equal, the level of material in the bins 2 can be modified by varying the speed of the delivery feed rollers 5 and the associated mixing rollers 6. E.g. by gradually increasing the speed of the rollers 5 and 6 of the bins 2 closest to the feed side compared to those furthest away from the feed side, it is possible to obtain a more inclined arrangement (indicated by the broken line 21) of the level of material in the various bins 2, thereby varying the characteristics of the mixing.

According to a variant of the invention, illustrated in Fig. 2, the upper part of the mixer 1 can be provided with a cover 23 hinged on to the body of the mixer and capable of being fixed in different angular positions, defining the same inclination as that of the feed direction of the material 2. In this case, the duct path 4a is connected to the fixed part of the duct 4 by means of a flexible connection 4b. As a result of the fact that it is possible to

vary the inclination of the inlet, it is easier to adapt one mixer to the material being treated, in order to obtain different mixing results according to the requirements.

As will be noted, a mixer having a structure according to the invention involves only a modest increase in the overall dimensions, virtually only with respect to its height, and therefore in the direction posing fewest problems, so that it is possible by simple and inexpensive means to achieve more uniform feeding of the bins and thus improved homogenisation of the material.

Claims

1. Mixing structure for staple material, especially cotton staples, comprising a plurality of adjacent vertical bins, communicating at the top with a duct for supplying the material and provided at the lower outlet with associated mixing rollers adapted to supply the material to a common mixing and conveying delivery channel, means for generating a current of air for the transportation of the material being disposed in the supply duct, characterised in that the feed direction of the material at the inlet of the mixer slopes upwards and that the bins are of a height gradually increasing in the feed direction of the material.
2. Structure according to claim 1, characterized in that the supply duct has a path external to the mixer having a degree of inclination equal to that of the feed direction of the material inside the mixer.
3. Structure according to claim 1 or claim 2, characterized in that the angle of inclination of the feed direction is preferably between 10° and 70°.
4. Structure according to one of the preceding claims characterized in that the mixer has a cover hinged on to the body of the mixer and capable of being fixed in different angular positions.
5. Structure according to one of the preceding claims characterized in that the lateral walls of the bins are at least partially perforated for the discharge of the air for conveying the material.
6. Structure according to one of the preceding claims characterised in that a pressure detector is disposed in the supply duct, upstream of the said means for generating a current of air,

and that said generating means is controlled as a function of the pressure detected by the said pressure detector.

7. Structure according to claim 1, characterised in that the mixing rollers of the various bins can be operated at different speeds.
8. Structure according to one of the preceding claims characterised in that the bins have different inlet sections at the top, preferably gradually decreasing from the bin closest to the feed side to the bin furthest away from the feed side.

Fig.1

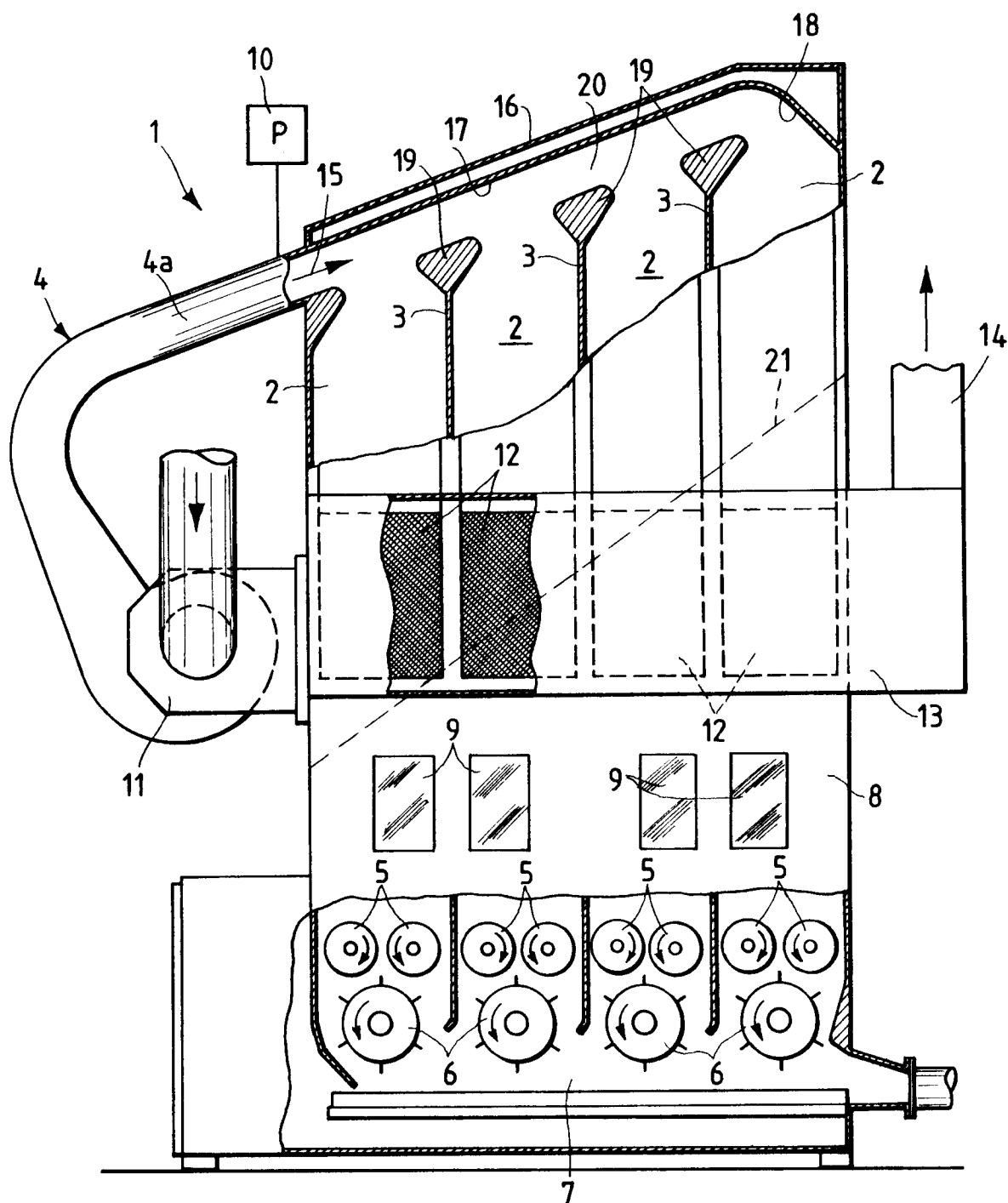
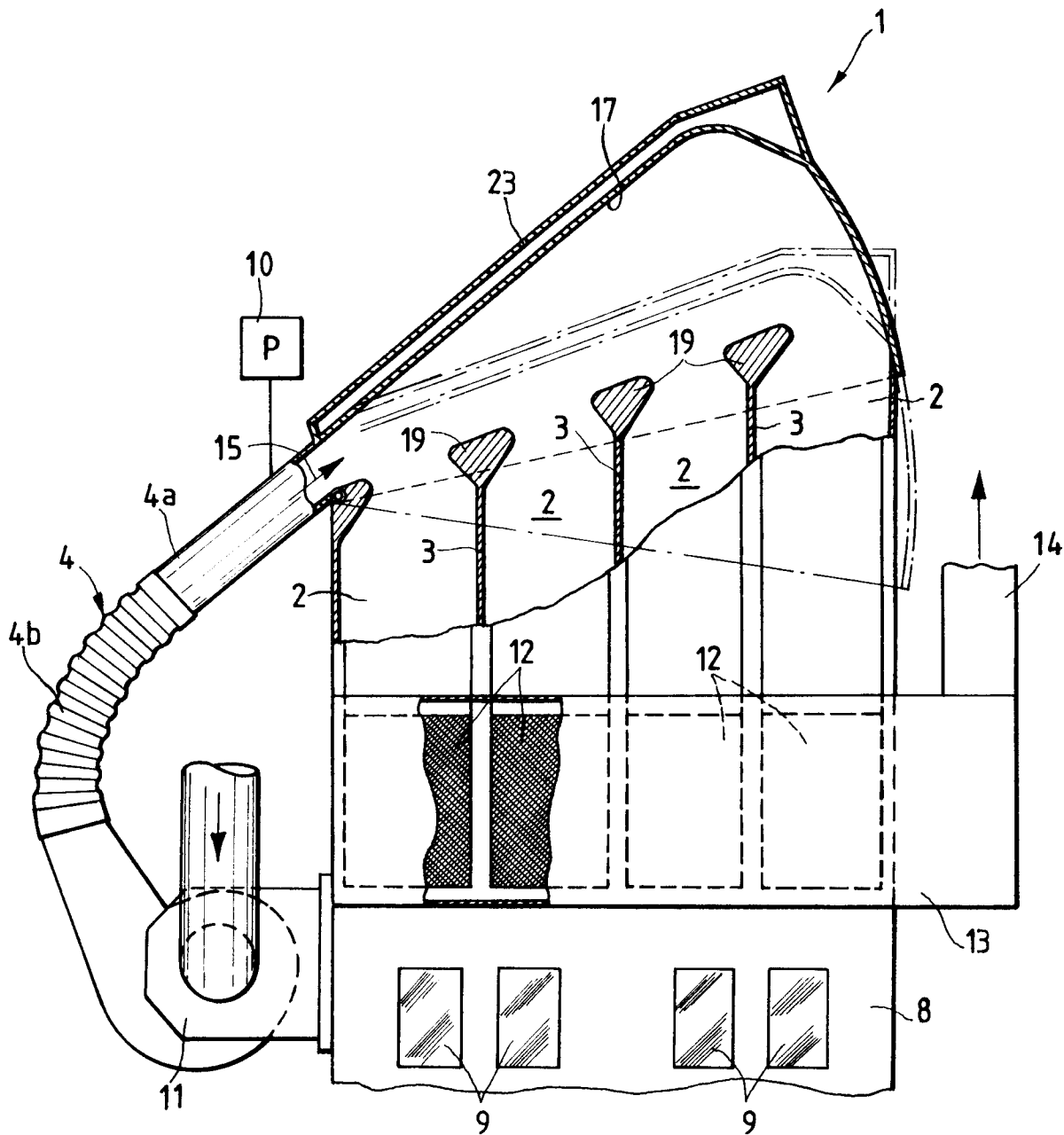


Fig.2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 20 2811

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)
X	FR-E-80 675 (LAROCHE, R.) * page 2, left column, paragraph 4 - page 2, left column, paragraph 5; figure 1 * ---	1	D01G23/02 D01G13/00 D01G23/08
A	DE-A-2 939 968 (TEMAFA GMBH) * page 8 - page 9; figure 1 * ---	1	
A	GB-A-1 295 455 (MASCHINENFABRIK RIETER A.G.) ---		
A	FR-A-2 518 586 (TRUETZSCHLER GMBH & CO. K.G.) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D01G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 FEBRUARY 1992	Examiner MUNZER E.
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			