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(54) EQUIPMENT FOR HUMIDIFYING POWDER PRODUCTS

(57) Abstract: The invention relates to an equipment for humidifying flour-type powder products. The device according to the invention consists of a base plate (16) on which two columns (1) are placed. In the upper part of the columns, there is a feed magazine from which the flour is taken and dosed through the rotary selector (2) located in the casing (5) on the upper plate (4). The flour will fall freely on the cone (26) mounted with the arms (9) in the casing (6) and will reach the vanes (22) mounted on the pallet disk (27) which can be rotated and allow the flour to pass through the sieve (18) and then to the humidification chamber formed by the lower part of the casing (6) and the casing (17). The casing (6) provides a vibrating motion through the outer flange (7) which rests on electromagnetic cells (8) mounted circularly on the movable intermediate plate (23). To open the slots between the blades (22), the handwheel (10) is driven, which will transmit the rotational movement to the bevel gears (21) which engage with the toothed crown (20). The rotary brushes (19) receive the rotational movement through the gearing formed by the bevel gears (11) and (24) located under the sieve (18) to ensure a better dispersion of the flour. After passing the flour through the sieve (18) it reaches the humidification chamber where there is a circular pipe (12) with nozzles for spraying water and two mixing arms (14) assembled at the bottom. Wet flour is drained through the gutters (13). The casing (17) is attached to the base plate (16) by the bracket (15).

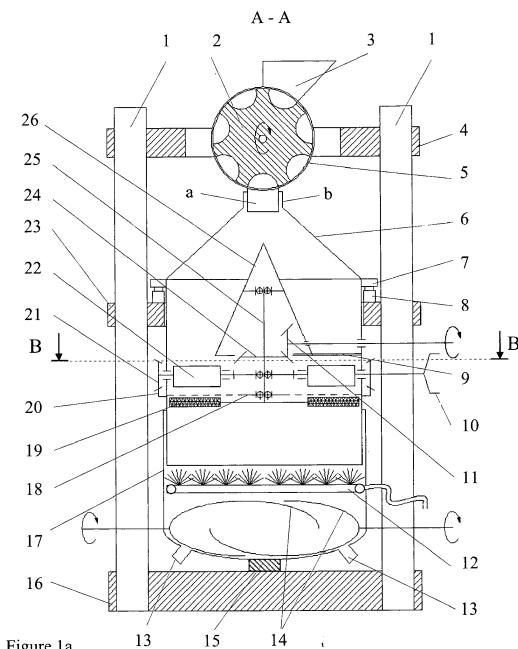


Figure 1a

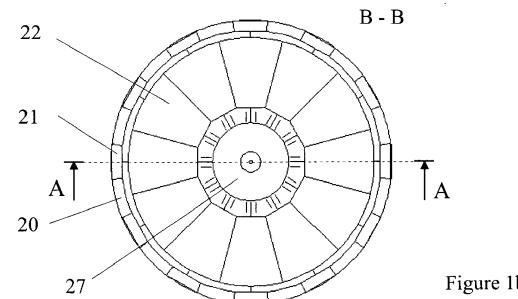


Figure 1b

Description

[0001] The invention relates to an equipment that ensures the humidification of flour-type powder products.

[0002] Various devices for humidifying powdered products are known: (GB1453730) which has the disadvantage that the flour already has high humidity, (JP2006061094) which has the disadvantage of the lack of control elements to ensure a controlled humidity and (US10195572) which has as a disadvantage the possibility of using only products that have a particle size higher than wheat flour to which can be mixed and humidified.

[0003] The technical problem solved by the invention consists in the use of a humidification system for powdered products such as wheat flour which consists of a feed magazine 3 which feeds the rotary selector 2 which performs the dosing of the flour to be humidified. From the rotary selector 2, the flour will enter the loading chamber 6, which is in vibratory motion and will be directed from the cone 25 to the pallets 22 which ensures the controlled passage of a quantity of flour to the sieve 18 which will ensure the flour dispersion to the humidification chamber formed of the casing 17 and the lower cylindrical part of the casing 6. The brushes 19 rotate under the sieve 18, ensuring an intense dispersion of the flour, which will thus occupy a large volume in the existing atmosphere in the humidification chamber, as well as the removal of any particles that adhere to the surface of the sieve 18. Around the base of the humidification chamber, it is a circular pipe 12 provided with high-pressure water spray nozzles which form a misty atmosphere and the water flow is set to ensure the desired moisture content of the flour. The volume of the humidifier chamber can be changed by moving the casing 6 vertically. In the un-ventilated humidification chamber, the water vapor will adhere completely to the falling flour and will be absorbed by it. The moistened flour will fall into the area where the additional homogenization is performed by using the mixing arms 14. After mixing, the moistened flour will be removed through the discharge chutes 13 located at the bottom of the humidification chamber, the casing 17.

[0004] Flour humidifier equipment provides the controllable moisture required for the use of flour in subsequent treatment processes before it is used to make the dough and eliminates the disadvantages of using non-hydrated flour.

[0005] The technical problem solved by the invention consists in the hydration of the flour at a certain humidity content, which subsequently allows the application of heat treatments that modify the characteristics of the starch and the functional-technological properties of the flour and the obtaining of flour products with improved nutritional properties.

[0006] The equipment for humidifying flour-type powder products according to the invention has the following advantages:

- by humidifying the flour, additional hydration is en-

sured and the possibility is given to the subsequent application, for the hydrated flour, of a heat treatment that will determine the modification of flour characteristics and the increase of the product's quality;

- 5 - a controlled dispersion of the flour is carried out to ensure the desired humidity;
- by controlling the amount of flour entering the humidification chamber, the volume of the humidification chamber, and the flow of water under high pressure, controllable humidification of the flour is ensured.

[0007] An embodiment of the invention is given below in connection with Figures 1a and 1b which show:

- 15 - Figure 1a, longitudinal section by equipment;
- Figure 1b, cross-section through equipment.

[0008] The equipment according to the invention comprises three work areas: the feeding area; dispersion zone and humidification, homogenization, and elimination zone, Figure 1a, section A-A.

[0009] The feeding area is formed by the feeding magazine 3 which allows the flour to fall into the rotary selector 2, assembled in casing 5. Provided at the bottom with a cylindrical tube a, the rotary selector 2 has the axis mounted in the upper plate 4, plate that can move in the vertical direction, on columns 1. The flour will fill the quantitative dosing cavity formed by casing 5 and the rotary selector 2 and will fall freely in the dispersion zone through the cylindrical tubing which forms a telescopic connection with casing 6 through its upper tube b. The tubing formed by cylinders a and b forms a telescopic joint.

[0010] The dispersion zone consists of casing 6 which comprises in the upper part a cylindrical tube b into which the tube a enters, a frustoconical part, and a cylindrical lower part. The casing 6 has on the outside a circular flange 7 which rests on a group of electromagnetic cells 8 which ensures a vibrational movement of the entire assembly in the casing 6. The electromagnetic cells 8 are placed circularly on the intermediate plate 23 which can move vertically on columns 1. Inside casing 6 it is a cone 26 which is assembled by the casing through the equidistant arms 9. Cone 26 ensures the first dispersion of flour and protection of the gear consisting of the bevel gears 11 and 24 which receive the rotational movement from the outside and transmit it to the brush arms 19. Inside the casing 6 is mounted a blade holder disc 27.

[0011] On the disc there are mounted, through bearings, the blades 22 which receive the rotational movement from the bevel wheels 21 in contact with the bevel gear ring 20 mounted on the outside of the casing 6. By actuating the handwheel 9, one of the sprockets 21 will rotate which will cause the blade disc 27 to rotate on the central axis 26, causing the slots to open between the blades. By rotating the disc 27 the gears 21 in contact with the toothed ring 20 will cause the blades 22 to rotate, the

slots to open, and the flour to pass through the blades to ensure the flour dispersion, Figure 1b section B-B, and sliding it through the sieve **18**. Due to the vibrating motion generated by electromagnetic cells **8** and the rotational movement of the brushes **19** an intense dispersion of the flour that will occupy the volume in the humidification chamber is ensured.

[0011] Casing **6**, located inside casing **17**, forms a telescopic joint with it, and by simultaneously moving vertically the upper plate **4** and the intermediate plate **23** together with the casing **6**, on columns **1**, the volume of the humidification chamber is changed. Casing **17** is supported through the support **15** on the base plate **16**.

[0012] Inside the casing **17** forming the humidification chamber it is the circular pipe **12** provided with high-pressure water spray nozzles and two mixing arms **14**, driven in a rotating motion from the outside, used to further humidified flour homogenization. In the lower part of casing **17** there are located the gutters **13** for draining the moistened flour.

REFERENCES

[0013]

1. Naganobu Hayabusa, Treatment of flour. Patent GB 1453730
2. Tamaki Kinji, Water-adding apparatus. Patent JP 2006061094
3. Brigham Hatch, Bryan Stratton, Mixing chamber. Patent US 10195572

Claims

1. Equipment for the humidification of powdered products, consisting of a base plate **(16)** on which there are placed two columns **(1)** supporting two movable plates, an upper plate **(4)** and an intermediate plate **(23)** **characterized in that**, in the upper part of the columns **(1)** there is a feeding warehouse **(3)** from which through the rotary selector **(2)** located in the casing **(5)** located on the upper plate **(4)**, the flour is taken that will fall freely on the cone **(26)** mounted with the arms **(9)** in the casing **(6)** which is in vibrating motion and will reach the vanes **(22)** mounted on the pallet carrier disc **(27)** which by rotating the vanes form slots that allow the flour to pass to the sieve **(18)** and then in the casing **(17)** where it is moistened through spray nozzles provided on the circular pipe **(12)** and then homogenized by the mixing arms **(14)** after which the moistened flour is discharged through the gutters **(13)**.
2. The equipment for humidifying the powder products according to claim 1, **characterized in that** the vibrational movement of the casing **(6)** is ensured through the flange **(7)** which rests on electromagnet-

ic cells **(8)** mounted circularly on the movable intermediate plate **(23)**.

3. Equipment for humidifying powdered products according to claim 1, **characterized in that** the hand-wheel **(10)** is operated to open the slots between the blades **(22)** which will transmit the rotational movement to the bevel gears **(21)** which engage the gear **(20)** and to ensure a better dispersion of the flour, the rotating brushes **(19)** are driven in a rotating motion from the outside by the gear formed by the bevel gears **(11)** and **(24)** assembled under the sieve **(18)**.
4. Equipment for humidifying flour-type powdered products according to claim 1, **characterized in that** the flour undergoes three working areas: feeding; dispersion; humidification, homogenization, and removal of damp flour from the equipment through gutters **(13)**.

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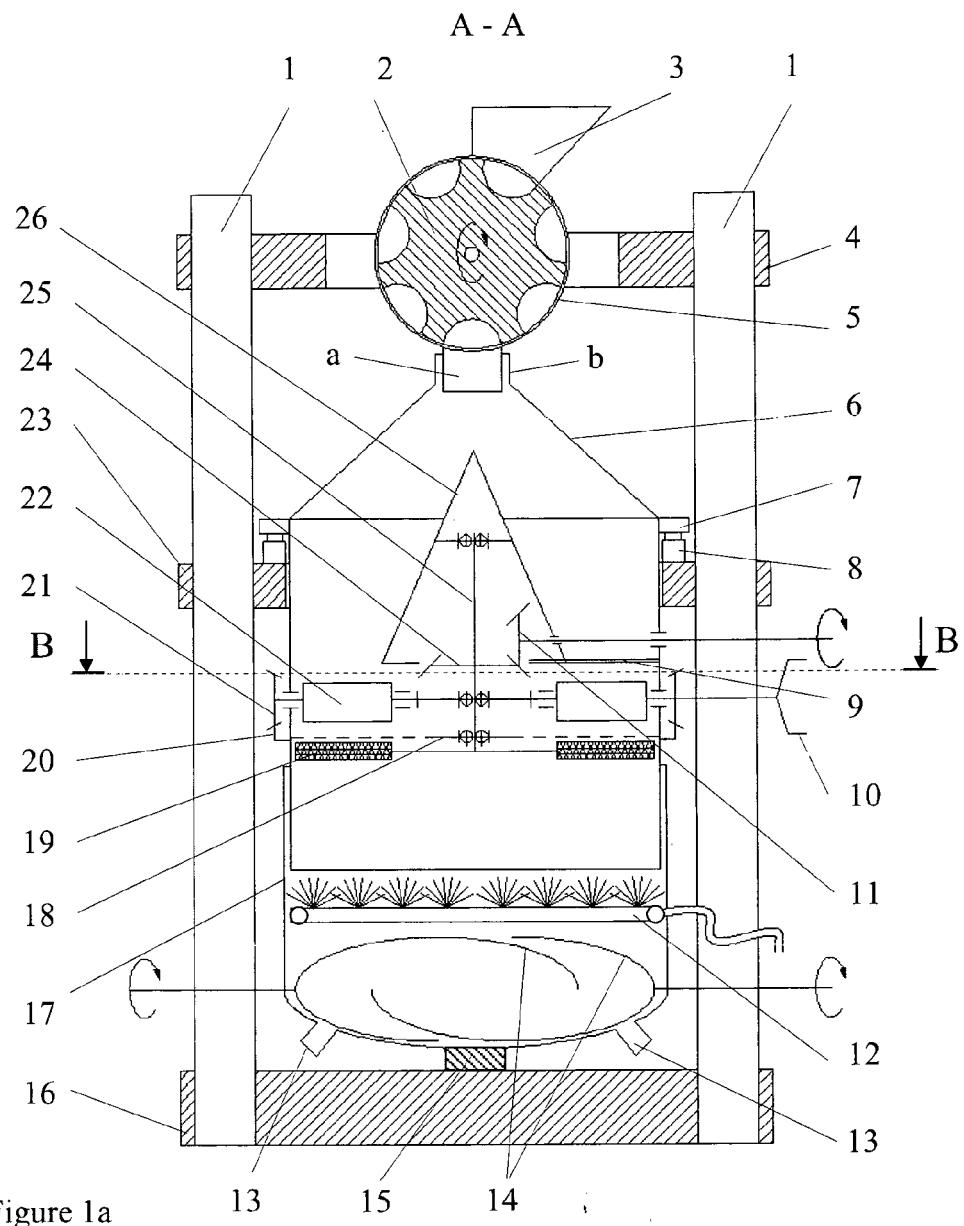


Figure 1a

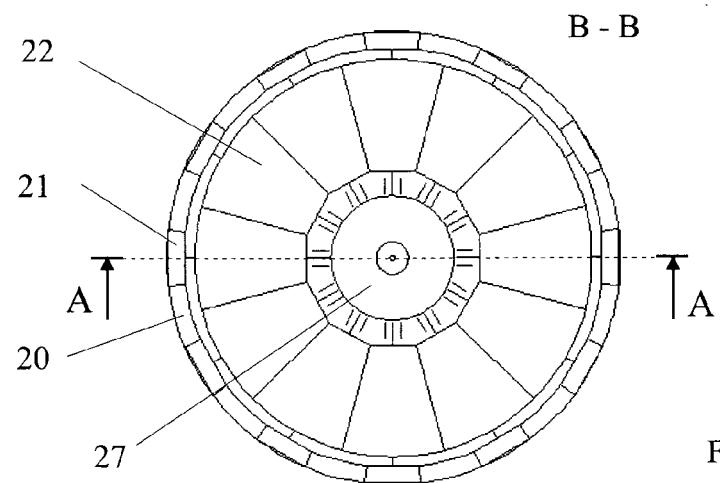


Figure 1b



EUROPEAN SEARCH REPORT

Application Number

EP 22 46 4002

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DOCUMENTS CONSIDERED TO BE RELEVANT									
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)						
10	A GB 367 090 A (AMERICAN MACH & FOUNDRY) 18 February 1932 (1932-02-18) * page 2, lines 42-94; figure 3 * -----	1-4	INV. A23L7/00 B01F25/00 A21C1/06 A21C1/14 B01F23/53 B01F23/50 B01F25/721 B01F27/704						
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50	The present search report has been drawn up for all claims								
55	<table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>Munich</td> <td>7 July 2023</td> <td>Messai, Sonia</td> </tr> </table>			Place of search	Date of completion of the search	Examiner	Munich	7 July 2023	Messai, Sonia
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07-07-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
15	GB 367090	A 18-02-1932	NONE	
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Patent documents cited in the description

- GB 1453730 A [0002] [0013]
- JP 2006061094 B [0002] [0013]
- US 10195572 B [0002] [0013]