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(54) Method and apparatus for processing cotton bales for removing fungi and micro-organisms therefrom.

(57) The method comprises the step of continuously processing the cotton bales (7) by microwaves of set frequency and power.

The apparatus (1) substantially comprises a microwave processing tunnel (3) supplied with cotton bales by a conveyor belt (2) and including microwave generating units (9) for processing the bales,a processed bale removing conveyor belt (4) being moreover provided for removing from the tunnel the processed cotton bales.

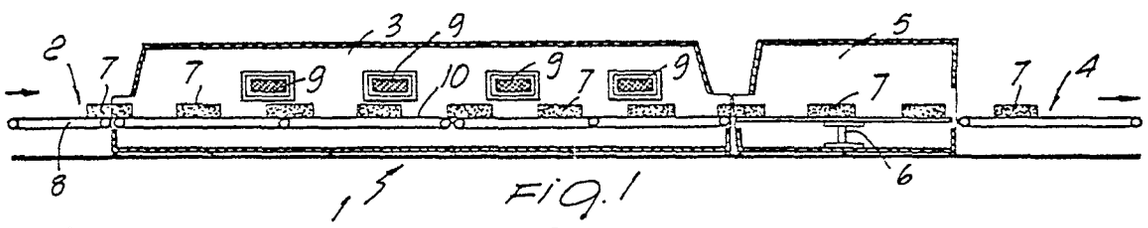

Fig. 1

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METHOD AND APPARATUS FOR PROCESSING COTTON BALES FOR REMOVING FUNGI AND MICRO-ORGANISMS THEREFROM

BACKGROUND OF THE INVENTION

The present invention relates to a method and an apparatus which have been specifically designed for processing cotton bales to remove fungi and micro-organisms therefrom.

As is known cotton fields are generally arranged in very moist and hot regions and,because of this,fungi and micro-organisms are inevitably present in the cotton.

Since cotton is generally used for making fabrics as well as cotton-wool and the like materials which must have very high purity properties,it is actually necessary to process cotton in such a way as to remove therefrom all of the polluting substances,such as the above mentioned fungi and micro-organisms.

SUMMARY OF THE INVENTION

Thus, the main object of the present invention is to solve the above mentioned problem by providing a method for processing cotton bales to safely remove therefrom fungi and micro-organisms.

Another object of the invention is to provide such a method which processes high amounts of cotton with a very high hour yield and a perfect removal of fungi and micro-organisms,without negatively affecting the textile properties of the processed cotton.

Another object of the invention is to provide such a method which affords the possibility of processing pressed cotton bales of conventional shapes and size.

Yet another object of the invention is to provide an apparatus for carrying out the inventive method which apparatus is very simple construction-wise and can be made starting from easily available component and materials.

According to one aspect of the present invention,the above mentioned objects as well as yet other objects,which will become more apparent hereinafter,are achieved by a method for processing cotton bales for removing fungi and micro-organisms therefrom,characterized in that said method comprises the steps of continuously conveying pressed cotton bales to a processing tunnel,microwave radiating said bales in said tunnel with set frequency and power microwaves and discharging processed bales from said tunnel.

According to a further aspect of the invention the pressed cotton bales can be subjected,in said tunnel,to a combined processing by microwaves and cooling air to cool the outer surfaces of said cotton bales.

The apparatus for carrying out the above defined method comprises a loading platform consisting of an endless conveyor belt thereon the pressed cotton bales are successively arranged.

This conveyor belt conveys the pressed cotton bales to a processing tunnel therein there are arranged,according to any suitable set arrangement,a plurality of microwave generating units for microwave radiating the individual cotton bales conveyed to the tunnel,the cotton bales processed by microwave power and optionally by cooling air being discharged from the tunnel by means of a discharging conveyor belt.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will become more apparent from the following detailed description of a preferred embodiment thereof with reference to the accompanying indicative but not limitative drawings,where:

figure 1 is a partial cross-section front view illustrating the apparatus for carrying out the cotton bale processing method according to the invention;

figure 2 is a top plan view of the subject apparatus;

figure 3 shows a pressed cotton bale which can be processed by the method and apparatus according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is based on the discovery that as cotton fibres,in bale form,are processed by microwaves,the textile properties of the fibres are not affected,while polluting substances such as fungi and micro-organism are destroyed.

For carrying out the inventive method,several types of microwave generating units have been tested and it has been found that optimum results could be obtained by using microwave generating units adapted to provide microwave beams having a frequency of 2,450 MHz with powers from 0.3 to

20 Kw.

With reference to figure 1,therein there is illustrated a possible embodiment of an apparatus for carrying out the method according to the invention,this apparatus1comprises three main components,i.e a loading conveyor belt 2,a processing tunnel 3 and an unloading conveyor assembly 4.

The pressed cotton bales,in particular.are conveyed successively one by one,or in parallel rows,by means of the loading conveyor belt 8,in the direction of the arrow,to the inlet of the cotton bale processing tunnel 3,inside of which there are arranged a plurality of microwave generating units,indicated at the reference number 9,which are so arranged as to cover a broad radiating region,that is the conveying path of the cotton bales.

In an actually made prototype system,the loading conveyor assembly supported thirty cotton bales and operated as a supply and microwave dampening system.

More specifically,the cotton bales loading system consisted of a bearing frame of stainless steel with a size of 15,000 x 2,000 x 1,100 mm.

The tunnel 3 consisted of an inner conveyor slat belt,indicated in the drawing at the reference number 10,with polythetrafluoroethylene (PTFE) supporting members,not shown,of the reinforced low loss type,in order to prevent said supporting members from excessively heating.

The tunnel supporting structure was made of AISI 304 stainless steel and defined a multimode microwave heating chamber.This tunnel or oven also comprised a forced air cooling assembly.

The microwave generating assembly,which is the core of the method and apparatus according to the present invention,comprised,in this embodiment,ten microwave generating units of the MW 1540/03 type,the microwaves having a frequency of 2,450 MHz and a microwave power varying from 300 to 1,100 Watts,with ten additional microwave generating units of the MW 1540/01 type having a fixed microwave power of 1,200 Watts,and supplied from the mains at a voltage of 220V,50Hz.

The apparatus also included an unloading conveyor slat belt having substantially the same characteristics as the loading belt.

With the disclosed prototype apparatus or system,7,000 kg/day of cotton fibres have been process ed,with a corresponding processing speed of 300 Kg/hour.

The overall size of the system was of 42,500 x 2,400 x 2,700 mm;in particular the length was of 42,500 mm,the width of 2,400 mm and the useful height at the inlet of the tunnel of 800 mm;the tunnel was lined by a thermally insulating mat and means for automatically adjusting the microwave power were provided,as well as several inspection doors.

The processed bales consisted of pressed cotton bales and two bales types,different in volume,density and weight were processed.

More specifically,the first cotton bale type had a volume of 0.553 m^3,a net weight of 185 Kg and a density of 334.5 Kg/m^3;whereas the second type had a volume of 0.705 m^3,a net weight of 220 kg and a density of 312 Kg/m^3.

The moisture of both types was of about 6%.

In this connection it should be pointed out that the above indicated bale types are conventional cotton bales,which can be directly processed as supplied by the bale supplyer.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof,it should be apparent that the disclosed embodiment is susceptible to several modifications and variations all of which will come within the spirit and scope of the appended claims.

Claims

1- A method for processing cotton bales for removing fungi and micro-organisms therefrom,characterized in that said method comprises the step of continuously conveying pressed cotton bales to a processing tunnel,microwave radiating said bales in said tunnel with set frequency and power microwaves and discharging processed bales from said tunnel.

2- A method according to claim 1,characterized in that said method further comprises the step of processing said bales by cooling air.

3- A method according to claim 1,characterized in that said method further comprises the step of processing said bales by microwaves and cooling air simultaneously.

4- A method according to claim 1,characterized in that said frequency of said microwaves is from 500 to 4,500 Mhz.

5- A method according to claim 4,characterized in that said frequency is 2,450 MHz.

6- A method according to claim 1,characterized in that said power of said microwaves is from 10 watts to several hundreds of watts.

7- An apparatus for carrying out the method according to claim 1,characterized in that said apparatus comprises a cotton bale loading assembly to convey cotton bales to be processed to a processing tunnel,a plurality of microwave generating units in said tunnel and a processed cotton bales unloading assembly for removing processed cotton bales from said tunnel.

8- An apparatus according to claim 7,characterized in that said microwave generating units extend to a spaced relationship through said tunnel.

9- An apparatus according to claim 7,characterized in that at least an air generating unit is arranged in said tunnel.

10-An apparatus according to claim 7,characterized in that said apparatus further comprises,at said tunnel outlet region,a cotton bale cooling assembly.

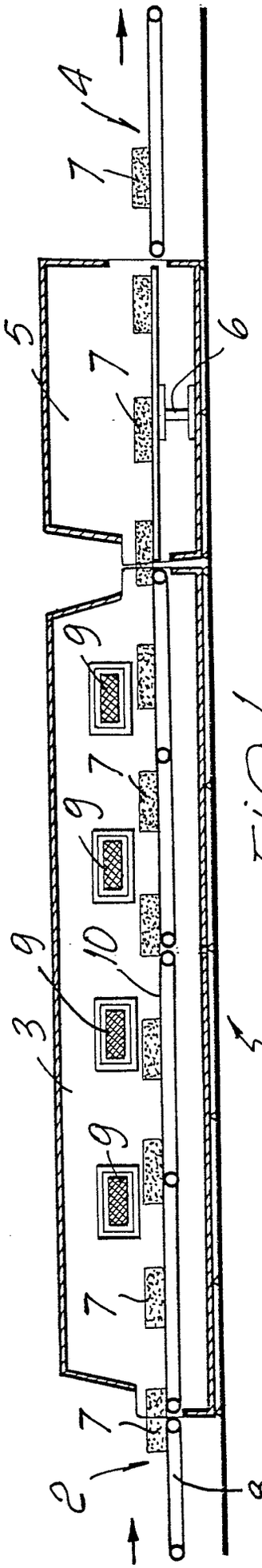

Fig.1

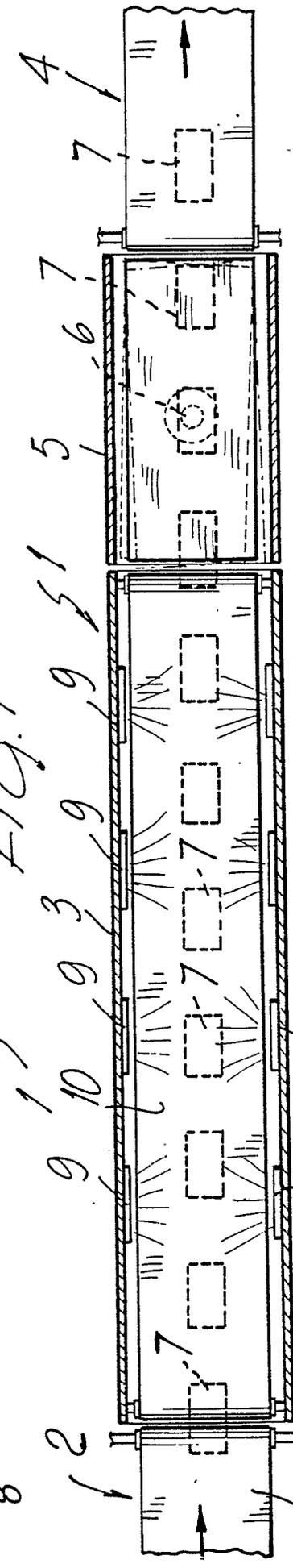

Fig.2

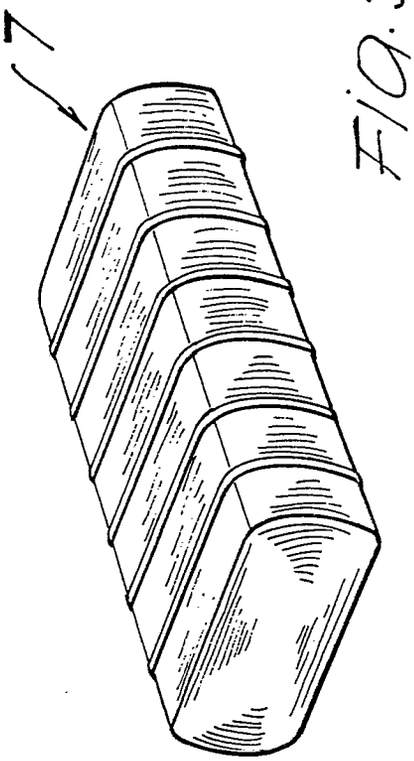

Fig.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 83 0501

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)
E	EP-A-0344729 (MASCHINENFABRIK RIETER AG) * the whole document *	1, 2, 3	D01G37/00 H05B6/78
A	CH-A-557435 (L'OREAL) * column 1-2; figure 1 *	1, 4	
A	DE-A-3538899 (HAUNI-WERKE KÖRBER& CO KG) * column 4; figure 1 *	1	
A	DE-B-1133286 (HADWICH,F.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

D01G
H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 APRIL 1990	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
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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

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