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[54] APPARATUS FOR DEPOSITING COMMINUTED MATERIALS UPON TRAVELING CONVEYING MEANS

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **241/60,** 19/155, 241/73

[51] **Int. Cl.** **B02c 19/00**

[58] **Field of Search** 241/42, 44, 60, 73, 79.1, 138, 241/3; 19/155, 156.3, 156.4; 264/112, 113, 121; 118/308–312

[56] **References Cited**

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2,665,851 1/1954 Strehlow 241/73

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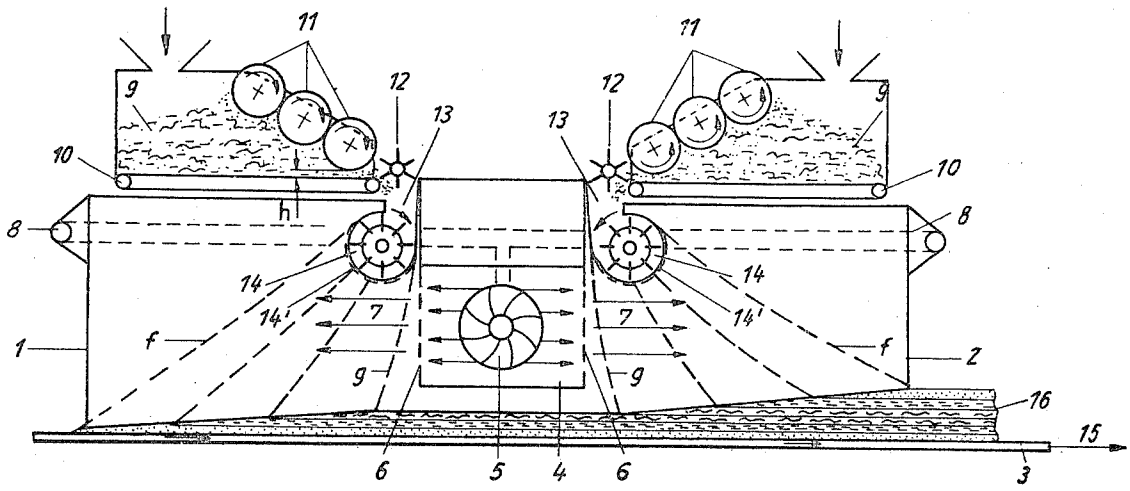
Assistant Examiner—Gary L. Smith
Attorney—Craig, Antonelli and Hill

[57] **ABSTRACT**

An apparatus for producing chip or fiberboards in which specific amounts of loose chips or fibers are fed continuously into at least two chambers in each of which these chips or fibers are broken up into small particles by means of a comminuting mechanism and are intimately mixed with each other and thrown through substantially horizontally extending dispersing air currents and in the first chamber at different angles in a direction opposite to the direction of travel of a conveyor belt or the like passing through the chambers in a horizontal direction near the bottom of the chambers, and in the following chamber at different angles in the opposite direction, i.e., in the direction of travel of the conveyor belt, so that in the first chamber at first the finest particles are deposited on the belt and thereafter progressively coarser particles upon the finer particles, while in the following chamber at first the coarsest particles and thereafter the progressively finer particles are deposited on the particles which were previously deposited.

4 Claims, 3 Drawing Figures



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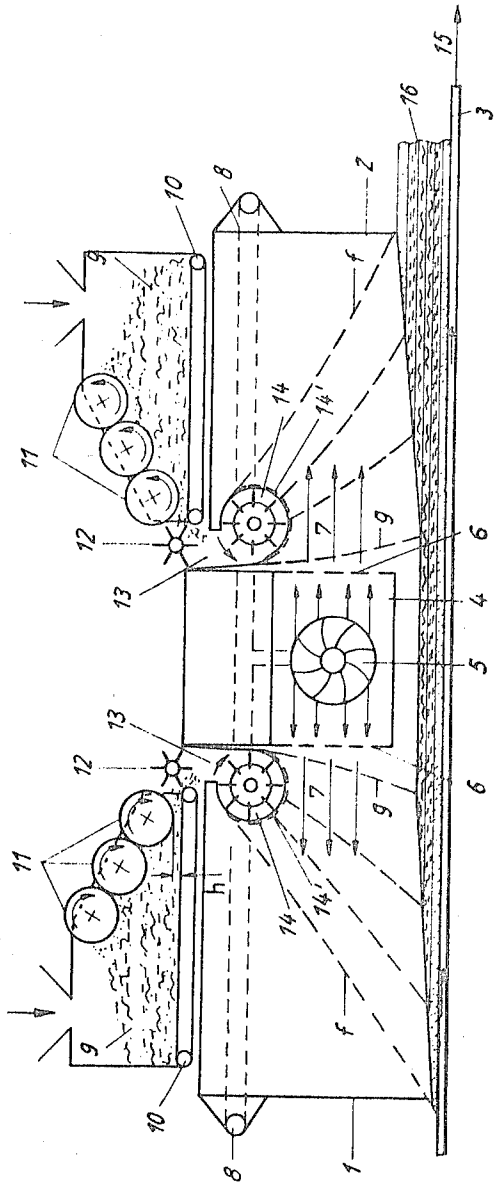

Fig. 1

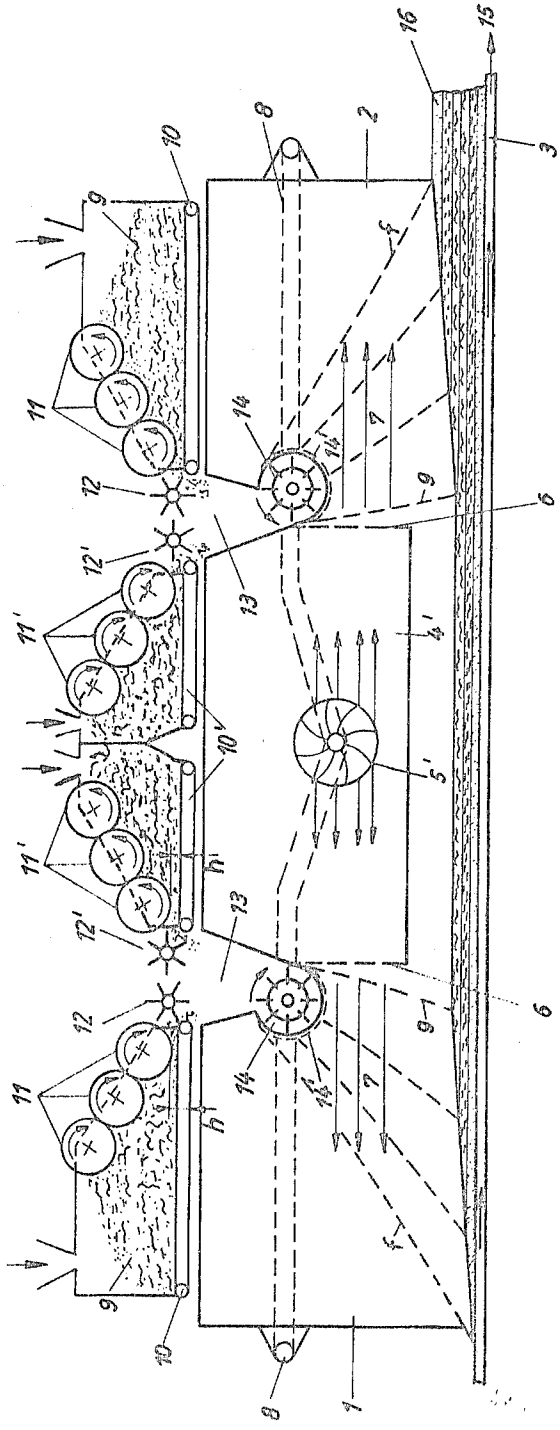
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Fig. 2

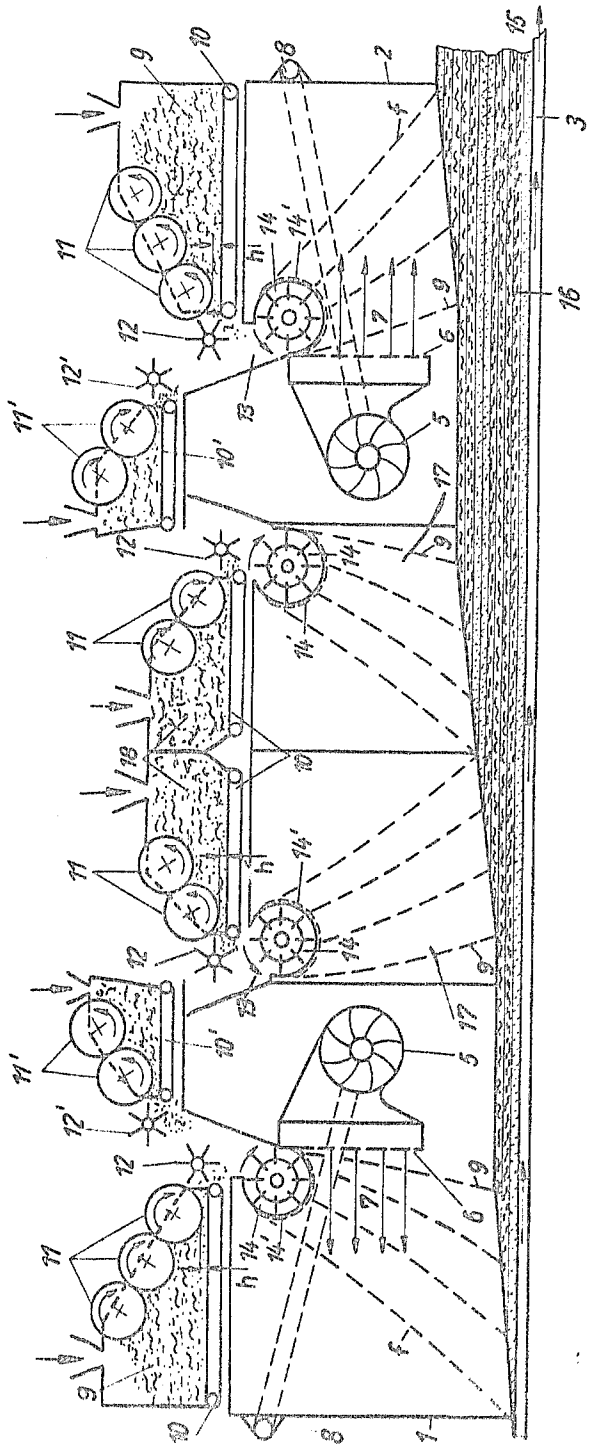

Fig. 3

APPARATUS FOR DEPOSITING COMMINUTED MATERIALS UPON TRAVELING CONVEYING MEANS

The present invention relates to an apparatus for depositing comminuted materials and especially fibrous materials upon traveling conveying means. More particularly the invention relates to improvements in a known type of this apparatus which is provided with at least two depositing or spreading chambers which are located above the conveying means and into which individually adjustable air currents are conducted first in the direction opposite to the direction of travel of the conveying means and thereafter in the direction of travel of the conveying means. Above and near the inlet openings for the air currents, each of these chambers is further provided with an opening through which the material after passing over one or more proportioning and feeding devices and over one or more loosening devices is inserted into the respective depositing or spreading chamber. If the quantity of comminuted materials which is to be deposited within a certain period of time is relatively large or if low-grade materials are to be employed which do not require any special treatment before being deposited, additional spreading positions may be provided between the spreading chambers for depositing additional or low-grade materials upon the materials which are already deposited upon the moving conveying means in the preceding spreading chamber.

Apparatus of this type as disclosed, for example, by the German Pat. No. 1,061,059, and the German utility Pats. DRGM No. 1,950,816, and No. 1,969,309, are employed for producing a continuous layer of chips for the production of chipboards which contain finer chips near their outer surfaces and coarser chips near their central parts.

Somewhat related to these apparatus are also those for producing hard-fiber boards as disclosed, for example, by the U.S. Pats. Nos. 2,757,115, and 2,940,135. In these apparatus, chopped materials are steamed and thereafter ground into a fibrous mass which, after a binding agent has been added, is dried and deposited in the form of a flat layer upon a conveyor.

In order to simplify and reduce the cost of manufacture of boards as much as possible which are made of comminuted materials, preferably of a fibrous structure, for example, in a manner so that a minimum of expensive apparatus were required, for example, only one heated press, it was found desirable to design an apparatus which would be capable of producing not only chip boards but also hard-fiber boards as well as chipboards containing fibers. An apparatus which complied with these requirements consisted of a continuously operating apparatus for producing a fibrous layer which was provided with an air-permeable layer support and with a preliminary compressor subsequent to this support. This apparatus was inserted into a chip-layer production line in which at a position subsequent to this apparatus a heated press was provided for simultaneously compressing the deposited layer together with a fibrous covering layer on at least one outer side of the deposited layer. One of these apparatus was provided with fiber-layer producing means which extended parallel to the chip-layer production line, with a conventional cutting device for trimming the edges of the layer and severing it into pieces of a certain length, and behind this cutting device with at least one conveyor for moving the fiber-layer sections either before or subsequent to the chip-spreading station into the chip-layer production line in a direction transverse to the direction of travel of the conveyor of the latter. In another apparatus as disclosed by the German Pat. No. 1,206,147, the above-mentioned requirements were fulfilled by providing a continuously operating apparatus for producing a fiber layer which is located above an endless conveyor belt upon which a succession of conveying plates are applied, and by providing subsequent thereto, as seen in the direction of travel, at least one chip-layer producing apparatus and, if desired, subsequent to the latter a preliminary press as well as a trimming and cutting device. As long as such an apparatus is to be employed for producing chip boards which are provided with fiber layers, its dimensions and especially its required length may still be justified. However, such an apparatus is very uneconomical if it is employed only for producing hard-fiber boards or only chipboards since some of the parts of the apparatus are then not required.

It is an object of the present invention to provide an apparatus for depositing comminuted materials and especially fibrous materials which is adapted to produce chip boards as well as hard-fiber boards and also chipboards containing fibers without requiring this apparatus to be altered in any manner, for example, when changing from a production of chipboards to a production of hard-fiber boards.

For attaining this object, the apparatus according to the invention is of the general type as at first described herein which is improved by the provision of additional means for comminuting the material which is fed into each of the two spreading or depositing chambers through the inlet opening of this chamber.

If a depositing apparatus which is designed in accordance with the invention is to be employed in an apparatus for producing hard-fiber boards, this depositing apparatus may be supplied with fibrous materials which, even if they contain lumps or the like, will pass in a finely dispersed condition into the spreading chambers. If, on the other hand, chipboards are to be produced, the fine and coarser chips which are required for this production may be fed into the spreading chambers in the same manner in which the fibrous materials were fed with the result that the chipboards when finished will have smooth outer sides. If these chipboards should also contain fibers, the chips and fibers may be fed to the respective comminuting mechanism either together or separately from each other and they will then be intimately mixed with each other or ground by this comminuting mechanism. For changing the production of one product to that of another, it is therefore no longer necessary to carry out any changes on the apparatus, but only to change the kinds of materials which have to be employed for making one product or the other. The new apparatus has among others the important advantage that by grinding the different materials together, which partly may also be chemically treated in different manners, the finished boards will have better physical properties and be of increased solidity.

The features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIG. 1 shows a diagrammatic longitudinal section of a depositing apparatus according to the invention which is provided with two depositing or spreading chambers between which an air-current generator is provided, and in which the comminuted materials are conducted from each chamber to an associated proportioning and feeding mechanism;

FIG. 2 shows a diagrammatic longitudinal section of another embodiment of the depositing apparatus according to the invention, in which the materials which are to be deposited in each chamber are supplied by two proportioning and feeding mechanisms; while

FIG. 3 shows a diagrammatic longitudinal section of another embodiment of the depositing apparatus according to the invention, in which two additional depositing positions are provided between the two spreading chambers.

In the drawings, in which functionally similar elements of the three embodiments of the invention are designated by equal reference numerals, FIG. 1 illustrates an apparatus which comprises two depositing or spreading chambers 1 and 2 through which a conveyor belt 3 is passed continuously in the longitudinal direction near the bottom of these chambers. The conveying means may also consist of a succession of continuously movable supporting plates and of narrow strips which are loosely placed upon the ends of the adjacent plates so as to cover up the gaps between them. The two chambers 1 and 2 are separated by a chamber 4 in which a blower 6 is mounted which is adapted to blow air currents through screens, registers or the like in opposite substantially horizon-

tal directions into the chambers 1 and 2, as indicated by the arrows 7. In all of the embodiments of the invention as illustrated in the drawings it is assumed that the air currents pass in the conventional manner through the chip material which is fed into the chambers 1 and 2 separately from these air currents and at such a distance from the conveyor belt 3 or the supporting plates that in the vicinity of the latter the chip material will not be affected by the air currents which flow in a continuous circuit as indicated by the air channel 8.

The chip material 9 before being fed into the two chambers 1 and 2 is first fed in a conventional manner to two proportioning and feeding mechanisms which in the present case consist of two endless conveyor belts 10 and rotatable rollers 11, the lowest of which act as doctor rollers which determine the thickness of the layers of the loose material on belts 10 and together with the other rollers tend to return the excess material in the upward direction. When these two layers leave the feeding belts 10, each of them is loosened by a loosening device 12, for example, a pin-studded roller, and the individual components then drop into a chute 13. An apparatus of a type similar to that as so far described is already known in the art for producing chip boards.

According to the present invention, an additional comminuting mechanism 14, for example, in the form of a hammer mill with a screen covering 14', is provided underneath each chute 13. This mechanism further reduces the particle size of the material, also breaks up any possible small lumps, mixes all particles intimately with each other, and passes them in this condition into the two chambers 1 and 2. Due to this fragmentation which is carried out immediately prior to the spreading process, the internal structure as well as the appearance of the boards to be produced will be considerably improved regardless of the types of materials of which they are made. The directions in which the individual particles are thrown from the comminuting mechanisms 14 are indicated in dotted lines. While due to the air currents the finest particles will move substantially along a line *f*, the coarsest particles will move substantially along the line *g* so that at first the finest particles will be deposited upon the conveyor belt 3 while traveling in the direction of the arrow 15. Upon this lowest layer additional layers of an increasing particle size are successively superimposed in chamber 1, while in chamber 2 this order is reversed and at first the coarsest particles and thereafter increasingly finer particles are deposited on each other. The compound layer 16 is then composed on its upper and lower sides of the finest particles, and its particle size increases gradually and continuously toward its center where the coarsest particles will be located.

FIG. 2 illustrates another embodiment of the invention in which the depositing or spreading chambers 1 and 2 are spaced at a greater distance from each other since aside from the proportioning and feeding mechanisms 10, the rollers 11, and the loosening devices 12, this apparatus is provided with additional treating mechanisms which consist of two proportioning and feeding mechanisms 10' which in this case likewise consist of conveyor belts which are movable in the opposite direction to the adjacent conveyor belts 10, and of two rows of rollers 11' each row of which is rotatable in the opposite direction to the rollers 11 of the adjacent row. Chamber 4' is therefore made of a greater length than chamber 4 according to FIG. 1, as seen in the direction of travel of the conveyor belt 3. The size of the blower 5' depends upon the volume of air which is necessary for properly distributing the particles which are to be deposited upon the conveyor belt 3 and upon each other. If the apparatus as illustrated in FIG. 2 is to be employed for producing, for example, chipboards, the material 9 which is to be fed to the two proportioning and feeding mechanisms 10 consists of a normal chip mixture, while the material which is to be fed to the additional proportioning and feeding mechanism 10' consists, for example, of grinding dust or of fibers. These separately fed components are then further broken up into smaller particles and intimately mixed by comminuting mechanisms 14 in the same manner as described with reference to FIG. 1, and are fed into the two outer chambers 1 and 2. If hard-fiber boards are to be produced, materials of different compositions, for example, different kinds of fibrous materials, or fibers and pulverized materials or the like may be supplied to the two sets of proportioning and feeding mechanisms 10 and 10' and then be intimately mixed with each other while passing into the spreading chambers 1 and 2.

The further embodiment of the invention as illustrated in FIG. 3 is similar to that as shown in FIG. 2 insofar as the spreading chambers and their associated elements are concerned. Of course, in place of the spreading chambers and their associated elements as illustrated in FIG. 3 it is also possible to employ such chambers and associated elements similar to those as shown in FIG. 1. Between these spreading chambers 1 and 2, the apparatus according to FIG. 3 is provided with two further spreading positions comprising two chambers 17 each of which is associated with a comminuting mechanism 14 which is supplied with a suitable material 18 through a chute 13. This material 18 may consist of the same or similar components or of different components as those which are supplied to the chambers 1 and 2. Especially suitable is, for example, a chip material which comes from a sawmill where it is regarded as waste, because it may contain many different types of components which will later form the cores of the boards to be produced and therefore does not have to be of the best quality.

From the previous description of the different embodiments of the invention it is to be understood that the various elements of the new apparatus do not have to be of the particular kind as illustrated, but may also be replaced by other elements which are adapted to carry out substantially the same functions. It is also especially advisable to design and arrange the screens or the like which are associated with the comminuting mechanisms 14 in the chambers 1, 2, and 17 in such a manner that the material passing through these screens will enter these chambers in directions which extend as much as possible in the direction of the air currents (as shown in the drawings) so that the individual components will be deposited in as flat a position as possible on the conveyor belt 3 and on each other. This increases the length of the depositing area in both spreading directions and improves the structure of the boards to be produced.

Although our invention has been illustrated and described with reference to the preferred embodiments thereof, we wish to have it understood that it is in no way limited to the details of such embodiments but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed our invention, what we claim is:

1. In an apparatus for depositing comminuted materials first upon conveying means traveling continuously in one direction and then upon each other for the purpose of forming a layer which is adapted to be compressed so as to form chip or fiberboards comprising at least two spreading chambers above said conveying means and having upper inlet openings, means for blowing adjustable air currents in opposite directions above said conveying means and underneath said inlet openings into each of said chambers, and proportioning and feeding means for feeding said materials to at least one loosening device and then through said inlet openings into each of said chambers, the improvement comprising a comminuting mechanism and a screen partly covering the same in each of said chambers underneath said inlet opening for additionally comminuting and intimately mixing said materials and dispersing them into said air currents and through the same before said materials are deposited upon said conveying means and upon each other.

2. An apparatus as defined in claim 1, in which the apertures of said screen which covers said comminuting means in the direction toward the inside of each of said chamber are disposed in such positions that the finally comminuted material passes through said apertures in directions extending from oblique angles to a substantially horizontal direction relative to the plane of said conveying means.

3. An apparatus as defined in claim 1 wherein said comminuting mechanism and said screen are disposed so that the air currents produced by said means for blowing adjustable air currents impinge only upon the lower extremities thereof.

4. An apparatus as defined in claim 1 wherein said at least one loosening device is positioned directly above each of said inlet openings and adjacent to said proportioning and feeding means.

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