United States Patent [19]

Watkins

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[54] **APPARATUS FOR FELTING WAFERS IN WAFERBOARD PRODUCTION**

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Related U.S. Application Data

[62] Division of Ser. No. 318,739, Dec. 27, 1972, Pat. No. 3,851,031.

[30] **Foreign Application Priority Data**

Nov. 24, 1972 Canada 157385

[52] **U.S. Cl.** **425/80;** 222/330; 222/410; 264/109; 425/197; 425/447

[51] **Int. Cl.**[2] **B29J 5/00**

[58] **Field of Search** 425/80, 81, 8, 130, 197, 425/223, 224, 377, 447, 257, 261; 222/330, 410; 264/109

[56] **References Cited**

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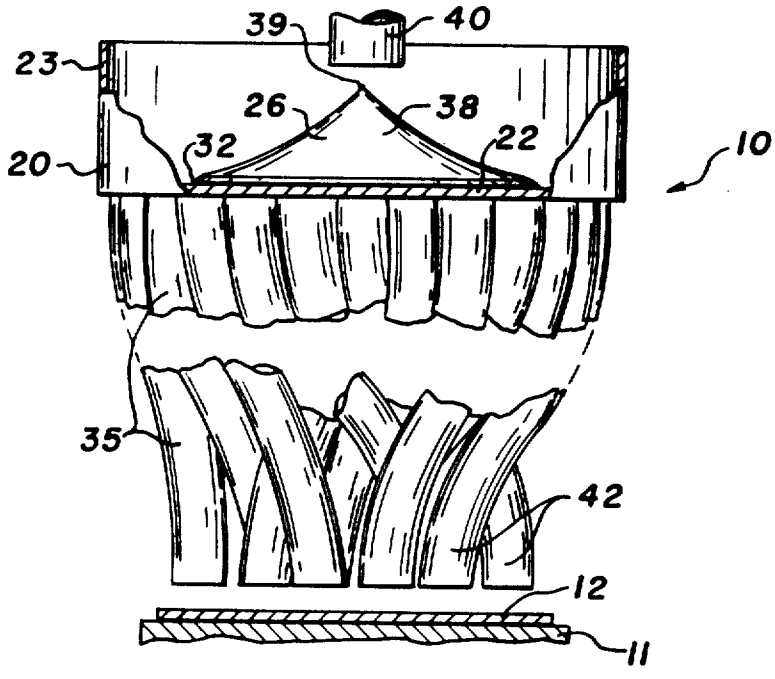
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[57] **ABSTRACT**

Apparatus including a cone mounted for rotation in a container having a peripheral wall and on to which wood wafers are directed. A plurality of tubes having upper ends opening into the container around the cone for receiving wafers as they are thrown off radially from the cone. The opposite ends of these tubes are arranged in a plurality of rows which extend transversely of a path along which supporting plates are moved so that the wafers are deposited on the plates to form mats and are evenly distributed across the plates.

7 Claims, 5 Drawing Figures



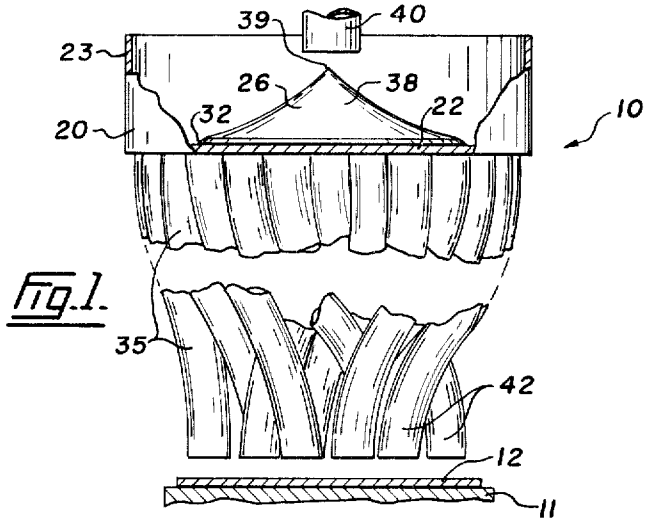


Fig. 1.

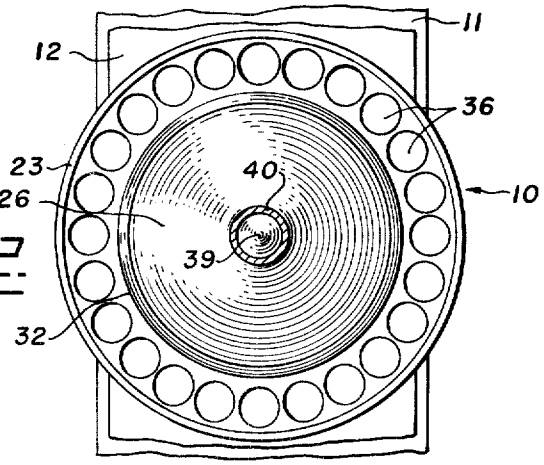


Fig. 2.

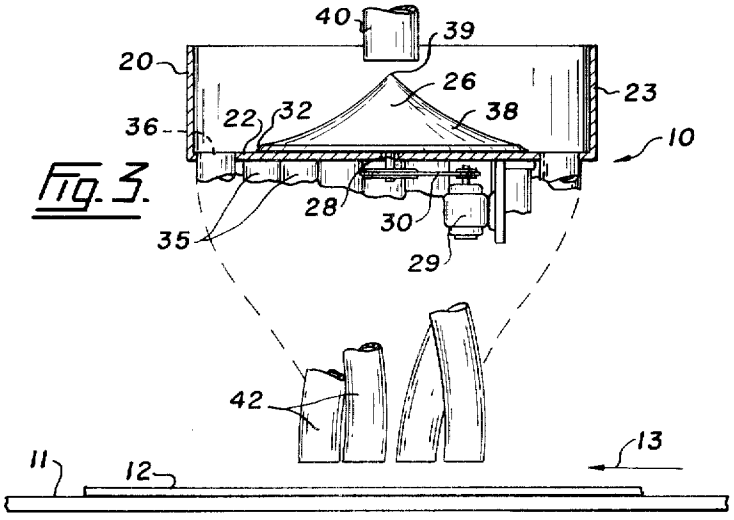


Fig. 3.

Fig. 4.

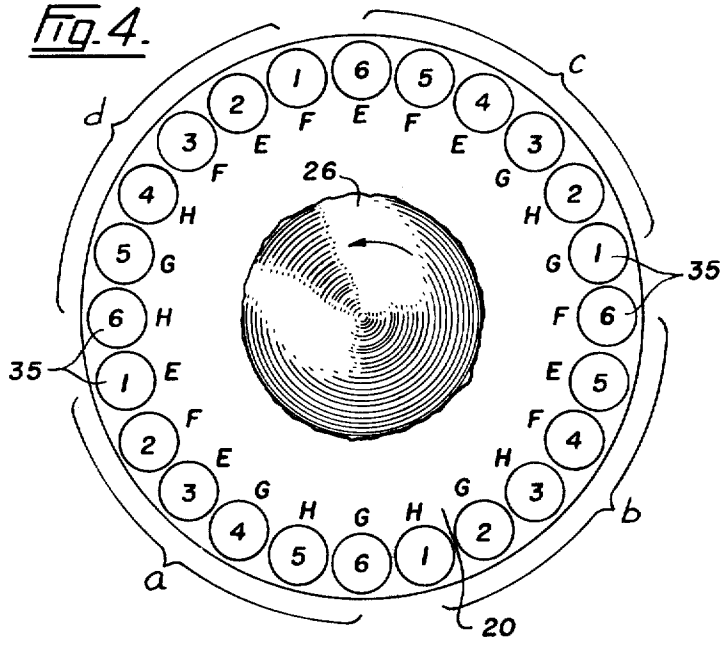
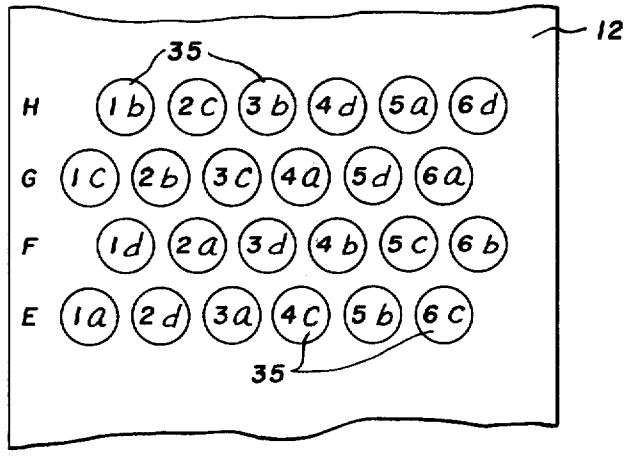


Fig. 5.



APPARATUS FOR FELTING WAFERS IN WAFERBOARD PRODUCTION

This is a division of application Ser. No. **318,739** filed Dec. **27, 1972,** now U.S. Pat. No. **3,851,031**

This invention relates to apparatus for felting wood wafers in the production of waferboard.

Although this invention is primarily concerned with the felting of what is known in the trade as "wafers", it can equally be used for felting wood flakes, wood particles, wood chips and the like, and the term "wafer" is intended to include all of these.

In the production of waferboard, wood wafers are deposited upon caul plates or the like to form a mat of substantially uniform thickness and density. The caul plates are moved into a hot press where the wafer mats are compressed under heat and pressure to produce waferboards of predetermined thicknesses.

The thickness of the wafers used in the manufacture of waferboard, is in the order of **0.010** to **0.060** inch. This means that errors in placement of only a few wafers can cause a large change in the thickness of the panels. The pressing operation can compensate to some extent for variations in the number of wafers or in the variations in the mat size. However, this will result in variations in the density of the panel produced, and this density change can seriously affect the strength properties of these panels.

It is well known in the industry to use levelling rolls for maintaining a constant volume of wafers or particles in the mats. However, these levelling rolls are only sensitive to metering by volume, while the bulk density of the mat of particles can vary considerably, resulting in variations of density and of thickness of the panel produced. In waferboard production, a panel thickness tolerance of plus or minus **0.030** inch is the maximum which can be tolerated for such uses as roof sheathing, sub-floors or underlayment.

The present invention overcomes these problems by applying the wafers at a multitude of points on to the forming line while still maintaining the uniform structure of the mat.

Apparatus for felting wafers in the production of waferboard in accordance with this invention comprises a container having a peripheral wall, a cone mounted for rotation in the container centrally thereof, power means for spinning the cone, means for directing a stream of wood wafers on to the cone, conveying means for moving supporting plates along a path spaced below said container, and a plurality of tubes having upper ends opening into the container and arranged around the cone, said tubes having lower ends arranged in rows extending transversely of said path and across the width of the supporting plates, said tubes distributing the wafers evenly on to the moving plates across the width thereof to form thereon felted mats of predetermined thickness and density. The wafers are generally fed at a uniform rate of the cone but by the very nature of the production of these wafers and the wafers themselves there is bound to be variations in the feed rate or the density of the wafers being fed to the apparatus at any given time. The spinning cone spreads out or directs the wafers to the upper ends of the tube so that changes in the rate of feed do not materially affect distribution of the wafers. The wafers are mainly directed against the apex of the cone but if the discharge is a little off the center, the arrangement of the upper and lower ends of the tubes is such that there still is an even distribution of the wafers across the mats being formed.

An example of apparatus according to this invention is illustrated in the accompanying drawings, in which

FIG. **1** is a cross-section through the supporting plate path and showing the apparatus in elevation,

FIG. **2** is a plan view of the apparatus,

FIG. **3** is a side elevation partly inspection of this apparatus, and

FIGS. **4** and **5** diagrammatically illustrate the arrangement of the upper and lower ends, respectively, of the tubes of this apparatus.

Referring to the drawings, **10** is felting or distributing appparatus in accordance with this invention which is located above a conveyor belt **11** for moving supporting plates, such as caul plates **12,** along a path indicated by arrow **13** beneath apparatus **10.**

Apparatus **10** includes a container **20** suitably supported above conveyor **11** and having a bottom **22** and an annular peripheral wall **23.** A cone **26** is supported in any suitable manner in the container with its base just above the bottom **22.** In this example, the cone is mounted on a vertical shaft **28** which extends through bottom **22** and is rotated in any suitable manner, such as by means of an electric motor **29,** which is operatively connected to the drive shaft by means of a belt and pulley arrangement **30,** see FIG. **3.** The peripheral edge **32** of cone **26** is spaced from container wall **23,** and a plurality of tubes **35** have upper ends communicating with the interior of container **20** through openings **36** formed in bottom **22** and arranged around the cone. It will be noted that the surface **38** of the cone extends downwardly in a curve from the cone apex **39** to the peripheral edge **32** of the cone. Wafers are directed in to the apex of the cone by tube **40.**

Tubes **35** extend downwardly from container **20** and have lower ends **42** that are arranged in four rows E, F, G and H above and extending transversely of the path of travel **13** of the caul plates **12.** By referring to FIG. **5,** it will be seen that each of these rows extends completely across the caul plate so that flakes, wafers or particulate material travelling downwardly from tubes **35** are distributed across the width of the plate.

It is essential to distribute the wafers evenly across each caul plate and to form a mat thereon of uniform thickness and density. This is greatly assisted by the arrangement of the lower ends of the tubes in the rows E to H. In the diagram of FIG. **4,** tubes are numbered **1** to **6,** and there is a group of these tubes **1** to **6** in each quadrant of the circle formed by container **20.** The tubes in the different quadrants are also labelled *a*, *b*, *c* and *d*. The upper ends of the tubes are numbered **1** to **6** in sequence in each quadrant, and the letter of the row in which the lower end of each tube is positioned appears opposite each number. For example, tubes **1***a* to **6***a* have their lower ends opening respectively into rows E, F, E, G, H G. By referring to FIG. **5** it will be seen that row E, for example, includes tubes **1***a*, 2*d*, 3*a*, 4*c*, 5*b*, 6*c*. The reason for this is that should the feed of the wafers get off centre, that is, off apex **39,** or if there is a sudden mass of the flakes directed to container **20,** there still will be an even distribution of the flakes across the mat being formed. Taking the tubes of quadrant *a*, for example, it will be seen that **1***a* is in row E, **2***a* in row F, **3***a* in row E, **4***a* in G, **5***a* in row H, and **6***a* in row G, and these in effect make a line across the mat.

Although the spinning cone **26** tends to distribute the wafers evenly around the upper ends of the tubes even when the feed tube **40** is off centre or there is a sudden mass of flakes directed into the container, this particular arrangement of the lower ends of the tubes helps in the equal distribution of the flakes across the mat. The distribution is always evenly across the mat, although there can be slight differences in the longitudinal direction owing to the fact that the lower ends of the tubes are in different rows and these are spaced longitudinally of the mat. However, the longitudinal spacing is relatively small, and in actual practice mats of uniform thickness and substantially uniform density are formed.

It will be understood that the actual arrangement of the lower ends of the tubes may be different from that illustrated in FIG. **5**, but the main thing is that the tubes of each quadrant form a line across the path of travel of the mat, although this line is not necessarily straight across. The advantage of this will be seen from the following. If, for example, there is a larger than usual amount of flakes directed to the adjacent ends of quadrants *a* and *d*, affecting tubes **1** to **3** and **4** of quadrant *a* and tubes **5** and **6** of quadrant *d*, the line would be as follows across the mat: **1***a*E, **2***a*F, **3***a*E, **4***a*G, **5***d*G, and **5***d*H. Thus, no matter where there is a concentration of flakes around the upper ends of the tubes, the discharge at the increased rate will in effect be completely across the path of travel.

The lower ends of the tubes are flexible and not necessarily directly in line behind one another. In some cases it is desirable to move the ends slightly out of position to compensate for small irregularities in the mat. Those can be caused by excessive bending of the tubes thus interfering with the free fall of the wafers after they enter the tube.

In the production of waferboards there usually are a plurality of these felting heads, each head being a container with its tubes, arranged in succession over the path of the supporting plates. For example, there can be four of these heads, in which case the first and fourth heads, with respect to the direction of movement of the plates, direct wafers prepared for the face layers or sections of the waferboards on to the plates, and the second and third heads direct wafers for the inner or core section of the boards. Usually, better quality wafers are used for the face layers.

I claim:

1. Apparatus for felting wood wafers in production of waferboards comprising a container having a peripheral wall, a cone mounted for rotation in the container centrally thereof, power means for spinning the cone, means for directing a stream of wood wafers on to the cone, conveying means for moving supporting plates along a path spaced below said container, and a plurality of tubes having upper ends opening into the container and arranged around the cone, said tubes extending downwardly without extreme bends to lower ends located immediately above the supporting plates moving along the path, said lower ends being arranged side by side in rows extending transversely of said path and across the width of the supporting plates, said tubes distributing the wafers evenly on to the moving plates across the width thereof to form thereon felted mats of uniform predetermined thickness.

2. Apparatus as claimed in claim **1** in which directing means is positioned to direct the wafers on to the apex of the cone.

3. Apparatus as claimed in claim **1** in which the upper ends of said tubes are arranged substantially in a circle around the base of the cone, and the lower ends of the tubes of each quadrant of the circle are arranged in various rows of the tubes.

4. Apparatus as claimed in claim **1** in which the upper ends of said tubes are arranged substantially in a circle around the base of the cone with six tubes in each quadrant of the circle, and the lower ends of the tubes are arranged in four transverse rows with the lower ends of the tubes of each quadrant in various rows.

5. Apparatus as claimed in claim **2** in which the upper ends of said tubes are arranged substantially in a circle around the base of the cone, and the lower ends of the tubes of each quadrant of the circle are arranged in various rows of the tubes.

6. Apparatus as claimed in claim **2** in which the upper ends of said tubes are arranged substantially in a circle around the base of the cone with six tubes in each quadrant of the circle, and the lower ends of the tubes are arranged in four transverse rows with the lower ends of the tubes of each quadrant in various rows.

7. Apparatus for felting wafers in waferboard production, comprising means for moving supporting plates longitudinally along a path, a container above the level of said path and having a bottom and a peripheral wall, a cone mounted for rotation centrally of said bottom and spaced from the peripheral wall, a plurality of tubes having upper ends opening through the container bottom between said cone and the peripheral wall, said tubes being arranged with their upper ends around the cone in consecutive groups and extending downwardly without extreme bends to lower ends located immediately above the supporting plates moving along the path, said lower ends being arranged side by side in rows extending across said path, said rows being spaced apart longitudinally along the path, the lower ends of each of said groups being arranged in various rows, and means for directing wood wafers on to the cone near the apex thereof, said cone flinging the wafers radially outwardly to the upper ends of the tubes to be directed by said tubes on to supporting plates moving beneath the lower ends of the tubes and across the width of said plates to form felted mats of uniform predetermined thickness thereon.

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