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Webb et al.

[11] **3,901,634**

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[54] **COMPACTOR FOR PRODUCING CEMENT WALL PANELS**

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[52] **U.S. Cl.** **425/115;** 156/39; 264/165; 425/335

[51] **Int. Cl.** **B28b 19/00;** B29d 7/14

[58] **Field of Search** ..... 425/335, 336, 337, 122, 425/115; 264/165, 280; 100/93 RP, 155 R; 156/39; 404/121, 122, 123

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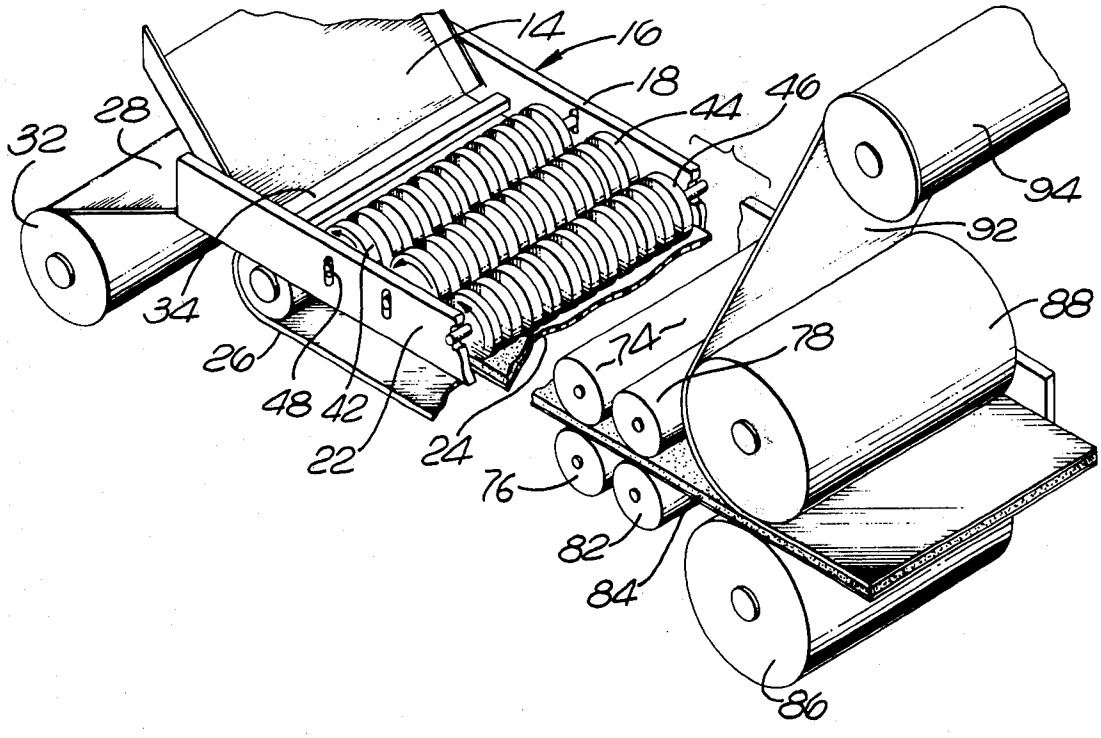
Attorney, Agent, or Firm—Nilsson, Robbins, Bissell, Dalgarn & Berliner

[57] **ABSTRACT**

A compactor for converting a dry, friable cement mix into a concrete panel. The dry, friable mix is inserted into one end of the compactor and the panels produced are removed from the opposite end thereof. A plurality of rotatable members are tandemly spaced along the axis of the compactor and are used to compact the mix as the mix travels along the axis of the apparatus. The compacting means are formed of a series of wheels on each rotatable member which are offset from the compacting means of the adjacent rotatable member in a plane parallel to the axis of the compactor. The rotatable members can be formed of a plural series of wheels or rollers having edges which taper to a center edge. Alternatively, the rotatable members can be formed of a plurality of sheeps foot tampers. The rotatable members can also be formed of an intermix of different types of rollers.

9 Claims, 6 Drawing Figures



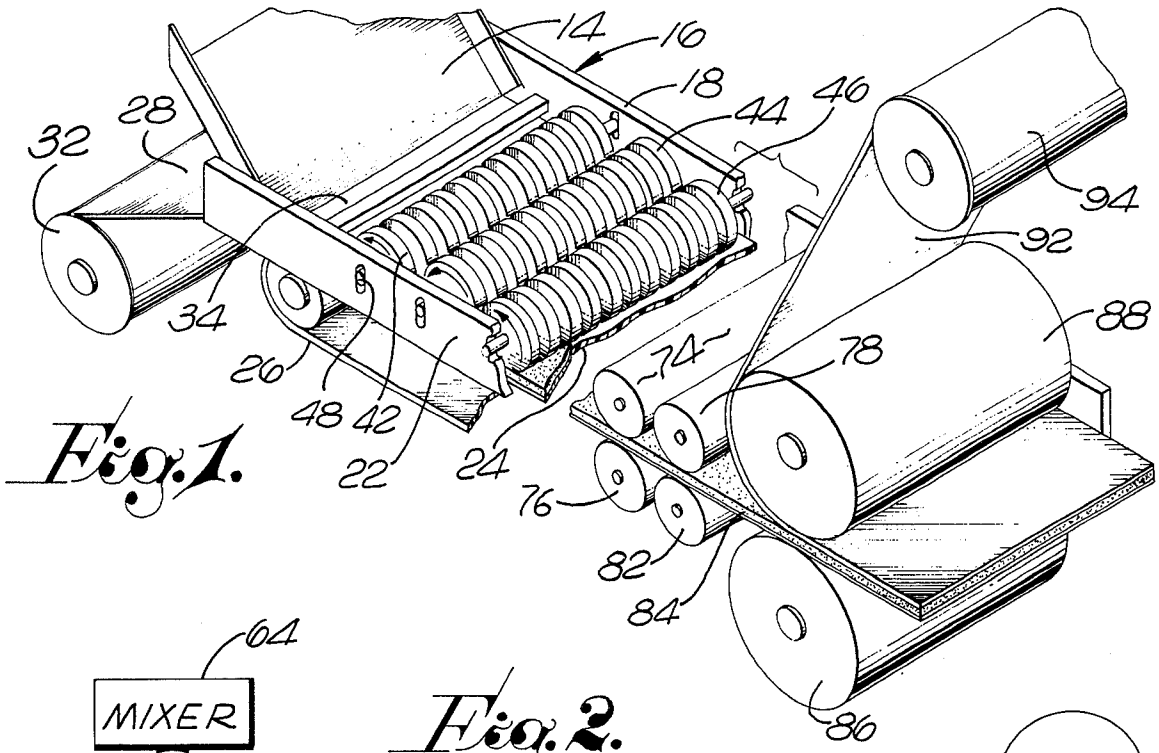


Fig. 1.

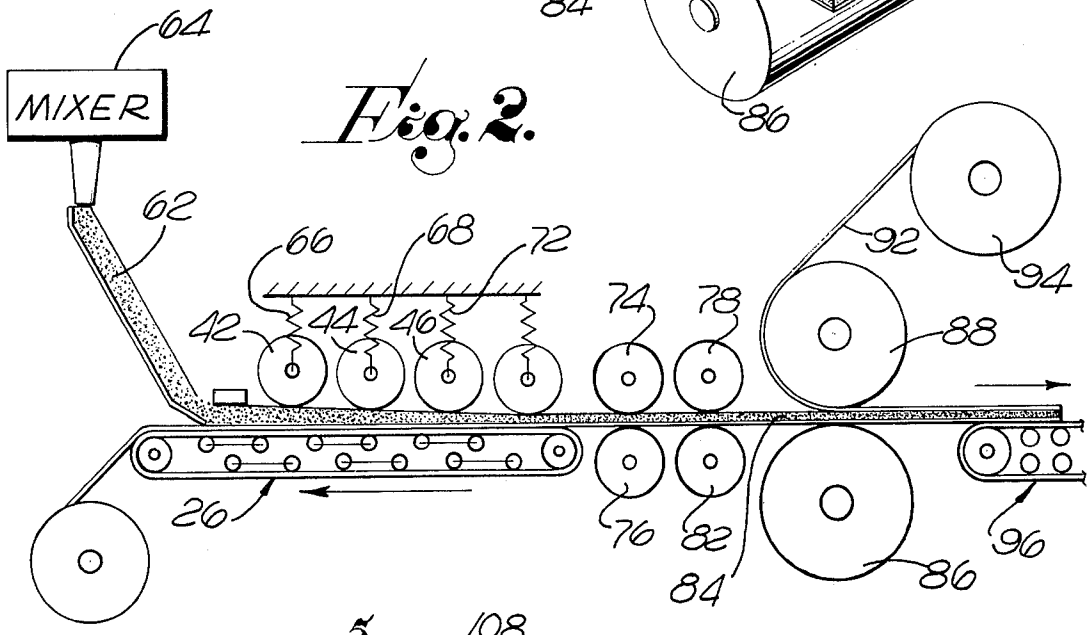


Fig. 2.

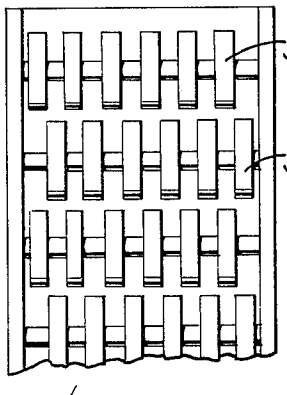


Fig. 3.

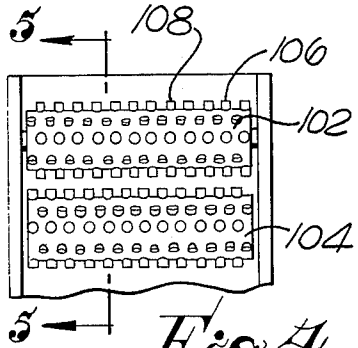


Fig. 4.

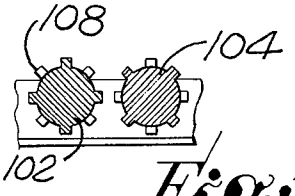


Fig. 5.

Fig. 6.

COMPACTOR FOR PRODUCING CEMENT WALL PANELS

THE FIELD OF ART

The field of art to which the invention pertains includes the field of cement mix compactors, particularly with respect to a compactor which can produce cement panels from a dry, friable mix.

BACKGROUND AND SUMMARY OF THE INVENTION

In the conventional method of manufacture of cement panels, a slurry containing the cement mix and a liquid is moved onto an assembly line where rollers or platens are used to produce a desired thickness of the cement panel. The panel is then dried by means of a kiln or other heating apparatus. When the mix is finally dried, the desired cement panel is produced. Alternatively, water may be added to the dry mix on the assembly line. In such operations, it is necessary to add the desired minimum amount of water so that the desired panel is produced. However, it is still necessary to dry the material in order to produce the desired wall panel. While wet cement mix can be utilized to form panels without drying by means of a kiln or heat, the time required for the panel to be in a form where it can be moved and handled may take many hours.

Known prior art includes U.S. Pat. Nos. 1,859,853; 2,051,452; 2,631,381; 2,985,219; and 3,516,882.

In contrast to the state of the art apparatus for manufacturing cement panels, the present invention utilizes a dry, friable cement mix which is compacted to form the desired panel. The apparatus enables wall panels of variable thicknesses to be produced. Only low heat to set adhesives for cover sheets is required and the panel which is formed, is movable upon completion of the compaction of the dry mix, so that it can be stored in a desired place and utilized shortly thereafter.

The advantages of this invention, both as to its construction and mode of operation, will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partly broken away, of a compactor in accordance with the present invention;

FIG. 2 is a schematic, side view of the compactor of FIG. 1;

FIG. 3 is a top view of the compactor of FIG. 1, partly broken away, illustrating the roller components of the compactor;

FIG. 4 is a top view of an alternative arrangement of the roller components which can be utilized in the compactor of FIG. 1;

FIG. 5 is a sectional side view of the roller components of FIG. 4, taken along the line 5—5 thereof; and

FIG. 6 is a view of an alternative arrangement of roller configuration which can be used in the compactor of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, there is shown an exemplary

embodiment of a compactor for producing cement panels constructed in accordance with the principles of the invention. The compactor produces the cement panels from a dry, friable cement mix which is fed into an input feed tray 14 from a mixer.

The dry friable mix which can be used in the compactor of FIG. 1 is preferably uncalcined gypsum, i.e. the dihydrite. However, any of the known or commonly used construction materials can be used, provided that the mix has sufficient fines so that the particles will adhere to each other when relatively dry, i.e. containing 15 to 30 percent water by weight. Examples include clay, cement, adobe soil, and the like. Ten weight percent fines, or more, of about 100 mesh or smaller is satisfactory.

A lightweight aggregate can be added for its strength, insulative and/or fire-resistive properties. Such materials include vermiculite, perlite, pumice, diatamaceous earth, shale, or the like. Preferably, the lightweight aggregate can be added up 10 to 15 percent of the total mix, although amounts of from 5 to 25 percent can be added. A small amount of water for the aggregate, e.g. 15 to 30 percent of it's weight may be added, if needed for adhesion. An adhesive can also be added, if desired, such as starches, water soluble resin, or the like. Examples include A. E. Staley corn starch, American Cyanamid urea, Philadelphia quartz, sodium silicate, or the like. Such adhesives can be added in amounts of 2 to 10 percent of the total amount of the mix.

The dry, friable cement mix from the tray 14 is fed into one end of the trough 16. The trough 16 contains a pair of side walls 18 and 22 which are interconnected by a base bottom wall 24. A conventional drive conveyor belt 26 is driven so that it moves along the top surface of the base bottom wall 24 from the input end of the trough 16, where the dry, friable mix from the tray 14 is fed. A bottom cover sheet 28 is fed from a roll 32 and moves along the axis of the trough 16 adjacent the top surface of the conveyor belt 26. The mix is moved on top of the bottom cover sheet 28 and a screed arm 34, adjacent the tray 14, provides an initial desired level of mix.

Spaced along the longitudinal axis of the trough 16 are a plurality of compactor rollers formed, in the drawing, of first, second, and third sets of rollers 42, 44, and 46. For ease of illustration, only three sets of compactor rollers are shown in FIG. 1, but a greater number can be provided. More or less sets of compactor rollers can be utilized, depending upon the desired amount of compaction of the mix which is necessary, and normally is determined by the material being utilized. Each set of rollers 42, 44 and 46 are formed in a plane perpendicular to the longitudinal axis of the trough 16 and are inserted by means of pins 48 into the side walls 18 and 22 of the trough, enabling the compactor rollers to be freely rotatable in the direction shown by the arrows.

As can be seen in FIG. 3, each of the compactor roller sets 42, 44 and 46 contain a plurality of wheels 52, with the wheels of adjacent rollers being offset from each other in a plane parallel to the axis of the trough 16. Referring to FIG. 2, the cement mix 62 is fed from a mixer 64 into the trough 16, where it travels progressively down the trough along the axis thereof between the roller sets 42, 44, 46, etc. and the bottom cover sheet 28 positioned adjacent the conveyor belt 26. The roller sets 42, 44 and 46 may be spring biased, shown

schematically by means of springs **66, 68** and **72,** respectively, so as to adjust the pressure applied by the rollers to the mix. As the mix moves down the conveyor belt, the mix is compacted to nearly the desired thickness by the rollers. It should be noted that each successive roller set **42, 44** and **46** is positioned with its outer surface closer to the conveyor belt **26,** so that as the mix travels, the final thickness of the panel is reached.

After the mix is compacted by the roller sets **42, 44** and **46,** the product passes a first pair of smoothing rollers **74** and **76,** and a second pair of smoothing rollers **78** and **82** positioned along the longitudinal axis of the conveyor. The first smoothing rollers **74** and **78** abut the top surface of the mix, whereas the second smoothing rollers **76** and **82** are positioned beneath the bottom surface of the cover sheet **28** and adjacent thereto. The smoothing rollers **74, 76, 78** and **82** are adjustable by means (not shown) so that the final thickness of the panel can be formed. In addition, the smoothing rollers **74, 76, 78** and **82** are used to assure that a smooth surface is formed on the upper and lower sides of the panel. The mix, now in the shape of a panel **84,** then travels past a pair of finishing rollers **86** and **88.** One finishing roller **86** is positioned adjacent the bottom surface of the cover sheet **28** and a top surface cover sheet **92** from a roller **94** is wound around the other finishing roller **88** and positioned adjacent the top surface of the panel **84.** The final shaped panel **84** is then moved by means of a conveyor system **96** to a final storage area where the wall panel can be stored until used.

In place of the compactor roller sets **42, 44** and **46** formed of wheels **52,** the embodiment of FIG. **4** illustrates an alternative arrangement for compacting the mix. In FIG. **4,** a plurality of rollers **102** and **104** each contain a plurality of sheeps feet tampers **106** positioned thereon, so that alternated series of sheeps feet are staggered and offset along the longitudinal axis of each compactor. The sheeps foot tamper arrangement enables side compaction to occur as the mix is compacted by the bottom surface **108** of the sheeps foot as well as between adjacent sheeps feet.

FIG. **6** illustrates another arrangement wherein the compactor rollers contain discs **112,** each of which taper to an outer edge **114,** thus forming angular side surfaces **116** between the outer edge, and the central portion of the disc **112.** In such an arrangement, an angular force from the side surfaces **116** can be directed to the cement mix to provide desired compaction.

It should be understood that particular arrangements illustrated are exemplary and that other arrangements of the compactor rollers can be made, dependant on the cement mix being utilized. It should be further understood that the rollers could be a combination of the rollers illustrated in FIGS. **1, 3, 4** and **6.** Experimentation can determine the optimum combination of rollers for desired compaction of any particular mix. For example, good compaction was found to occur when three roller sets of sheep's feet of the type illustrated in FIG. **4,** followed by five roller sets of offset wheels of the type illustrated in FIG. **3** was utilized with dihydrite cement.

In addition, the rollers can be made interchangable so that as the material of the cement mix is changed, the types of rollers utilized can also be varied. Moreover, adjustment of the rollers can be made, so that their separation will provide the desired thickness of a panel. In addition, panel wire or steel mesh can be fed into the compactor between the bottom cover sheet **28** and the cement mix, so as to provide a reinforcing member. The compactor as shown has been utilized to provide panels of variable thickness from three-eighths inch to 2½ inches. However, panels of lesser or greater thickness could also be formed by the compactor.

We claim:

1. Apparatus for converting dry cement mix into concrete panels comprising:

means for inserting said cement mix into one end of said apparatus;

means for compacting said dry cement mix comprising:

a plurality of rotatable members tandemly spaced apart along the axis of said apparatus and a generally planar surface movable along the axis of said apparatus; and

means for continuously feeding a flexible sheet onto said planar surface;

said rotatable members having relative laterally offset surfaces with respect to the surfaces of an adjacent rotatable member in a plane parallel to said axis for directly contacting said mix so as to compact said mix between said rotatable members and said flexible sheet as said mix travels along the axis of said apparatus.

2. Apparatus in accordance with claim **1** wherein each of said rotatable members are formed of a plural series of wheels.

3. Apparatus in accordance with claim **2** wherein said wheels have edges which are tapered to an outer center edge thereof.

4. Apparatus in accordance with claim **1** wherein said rotatable members are formed of a plurality of sheeps foot tampers.

5. Apparatus in accordance with claim **4** wherein said sheeps foot tampers are formed of rows on said surface, with sheeps foot tampers of adjacent rows being offset from each other.

6. Apparatus in accordance with claim **1** wherein said rotatable members are spring biased so as to form a panel of desired thickness.

7. Apparatus in accordance with claim **1** wherein said generally planar surface comprises a conveyor belt movable along the axis of said apparatus.

8. Apparatus in accordance with claim **1** and further comprising a pair of rotatable smoothing rollers in opposing aligned relationship sandwiching therebetween said dry cement mix and said flexible sheet.

9. Apparatus in accordance with claim **1** wherein each of said rotatable members are formed with plural discrete surface regions constituting said relative laterally offset surfaces.

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