May 9, 1950 J. A. RICE 2,507,349

MIXING AND AERATING MACHINE

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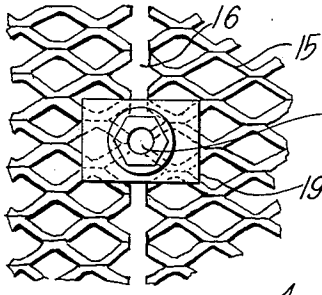


Fig. 5.

Fig. 1.

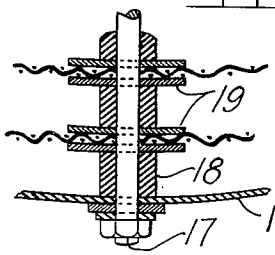


Fig. 4.

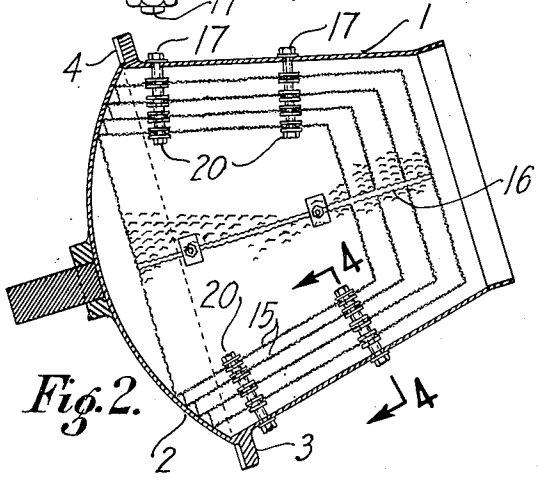


Fig. 2.

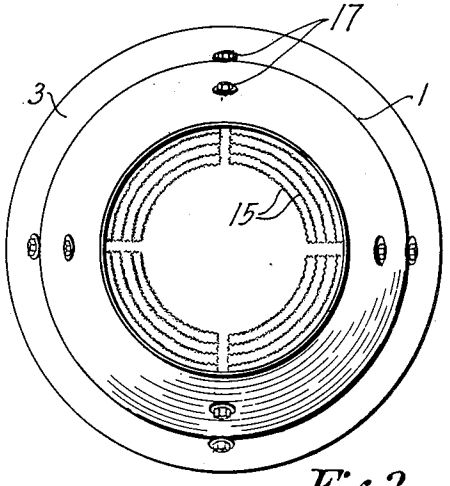


Fig. 3.

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MIXING AND AERATING MACHINE

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10 Claims. (Cl. 259—175)

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The present invention relates to improvements in a Mixing and aerating machine intended particularly for the production of cellular concrete, and its principal object is to provide a machine of the character described that is simple in construction, effective in operation and may be constructed at relatively small expense so as to be available for use even for limited building operations.

More particularly my invention is intended for use in connection with a conventional type of rotary mixer in which a frusto-conical drum is rotated on an inclined axis.

The materials employed in my cellular mixture are cement and water, or cement, sand and water, to which mixture is added a special compound serving the purpose of incorporating air cells into the mixture to produce a light-weight, cellular concrete.

In carrying out my invention it is necessary to incorporate a large amount of air into the mixture during the mixing process, and my machine is particularly intended to serve this purpose.

It is proposed for this purpose to provide a plurality of frusto-conical screens of progressively diminishing size in concentric relation with the drum, the screens being built up into a unitary structure and being made to revolve as such, either with a drum or with a central shaft revolvable in the drum.

The principal object of the screen assembly is to cause the material to climb with the ascending side of the screen structure and to drop from a certain elevation through the various screens upon the bottom of the drum, resembling a water fall, whereby a large amount of air is entrained in the mixture and thoroughly distributed through the latter.

Further objects and advantages of my invention will appear as the specification proceeds, and the novel features of my invention will be fully defined in the claims attached hereto.

The preferred form of my invention is illustrated in the accompanying drawing, in which

Figure 1 shows a side view of my mixing and aerating machine, with the drum disposed in vertical position,

Figure 2, an axial vertical section through the drum in inclined or working position,

Figure 3, an end view of my drum,

Figure 4, a sectional detail view taken along line 4—4 of Figure 2, and

Figure 5, a fragmentary inside view of a portion of the screen structure.

While I have shown only the preferred form of my invention, I wish to have it understood that various changes and modifications may be made within the scope of the claims attached hereto without departing from the spirit of the invention.

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Referring to the drawing in detail, the drum 1 of my invention may be of conventional form and is here shown as being frusto-conical, its smaller end being open and its larger end being closed by means of a spherical cap 2 so as to form a material-retaining pocket when the drum is positioned with its axis horizontally. The cap has an external flange 3, the lower face of which is toothed to form a gear 4 adapted for operation by a pinion 5 to impart rotary motion to the drum. The inner face of the cap is concave to increase the material-retaining capacity of the drum pocket.

The drum is supported by means of an axial shaft 6 projecting outwardly from the cap and being revolvable in the hub 7 of a yoke 8 having two opposing journals 9 revolvable in bearings 10 mounted on suitable standards 11. The pinion 4 is mounted on a shaft 12 which latter is revolvable in one of the journals 9 and is operated by a pulley 13 suitably connected to a driving motor.

Figure 1 shows the drum in vertical position, but the drum may be swung in one direction into the tilted position shown in Figure 2, which is the working position and tends to increase the material-retaining capacity of the drum pocket and may be swung into the other direction into reversed position for discharging a load. For turning the drum I provide a handle 14, a suitable stop (not shown) being provided to limit the swinging movement in one direction to working position.

On the inside of the drum I provide a plurality of frusto-conical screens 15 of progressively diminishing size, the screens being mounted coaxially with the drum and shaped to parallel the drum wall, as shown.

In the form illustrated the screens are shown as being fixed to the drum to rotate therewith, but the screens would perform the same function if fixed with respect to a central shaft and made revolvable in a non-rotating drum.

The screens may be made of any suitable material but are preferably made of expanded metal, about ½ inch mesh, with the longer axes of the openings arranged lengthwise.

The drum here shown is approximately 24 inches in diameter at the base, and in a drum of this size I find that the four screens shown are best adapted to serve the purpose. If a larger drum were used, more screens should be provided

in about the same proportion, with the screens occupying substantially one-third of the diameter of the drum at its base.

The screens are preferably spaced about 1 inch apart. If spaced more closely the material is apt to lump and to interfere with the process, and if they are spaced further apart, the machine would lose in efficiency and more time would be required for a given mix.

The screens extend rearwardly to the rear wall of the drum, but at the front end they are preferably progressively foreshortened, as shown, so that, when the drum is in a tilted working position, all the lower screen edges lie in the horizontal plane of the lower edge of the front end of the drum.

Each screen may be made as a complete continuous unit, but for ease of manufacture and convenience of assembly, I preferably make each screen in four separate sections, which may be slightly spaced from one another peripherally, as at 16. The different sections are anchored to the wall of the drum by means of bolts 17 passing through the spaces between the sections, with spacing sleeves 18 interposed between the sections of adjacent screens, and washers 19 interposed between the sleeves so as to bear on opposite sides of the screen sections. Thus the tightening of nuts 20 on the inner ends of the bolts clamp all the screen sections to the wall of the drum in properly spaced relation.

In operation, with the drum in upright or in inclined working position, the material comprising cement, water and compound, or cement, sand, water and compound, is placed into the drum in proper proportions, the drum being filled to a level somewhat below the lower front edge of the drum when the latter is tilted.

The drum is then rotated for mixing the materials. During the rotation the screen assembly raises the material along the ascending side of the drum to a point approaching the top center and the raised material drops through the different screens upon the lower portion of the drum, somewhat resembling a water fall, which causes a large amount of air to be rapidly entrained in the mixture and to be thoroughly distributed through the same. A three-minute run usually is sufficient to finish the product which may then be readily removed by gravity when the drum is tilted in the opposite direction.

I claim:

1. In a mixing and aerating machine for producing cellular concrete, a drum closed at one end and open at its other end, and a screen assembly mounted therein concentrically with the drum, the screen assembly comprising a plurality of screens arranged in spaced relation to the wall of the drum and to each other, with the inner edges of the screens contacting the closed end of the drum and the outer edges progressively receding from the outer end of the drum.

2. In a mixing and aerating machine for producing cellular concrete, a drum closed at one end and open at its other end, means for tiltingly supporting the drum with freedom of rotation on an inclined axis, a screen assembly within the drum and comprising a plurality of spaced screens, the outer edges of the screens being progressively foreshortened to bring the lowest points of said edges into the horizontal plane of the corresponding point at the open end of the drum.

3. A mixing and aerating machine for producing cellular cement, comprising a frusto-conical drum closed at its larger end and open at its smaller end so as to form a material-retaining pocket when the drum is supported with its axis in horizontal position, and a frusto-conical screen assembly mounted therein concentrically with the drum, the screen assembly comprising a plurality of frusto-conical screens arranged in spaced relation to the wall of the drum and to each other and extending to the rear wall of the drum so as to cause comminuted material confined in the pocket to be carried upward by the ascending portion of the screen assembly when the latter is rotated and to be dropped from an elevated position upon the lower portion of the screen assembly.

4. A mixing and aerating machine as defined in claim 3, in which the drum is supported on an inclined axis whereby the material-retaining capacity of the pocket is increased.

5. A mixing and aerating machine as defined in claim 3, in which the closed end is made concave to increase the materal-retaining capacity of the drum pocket.

6. A mixing and aerating machine as defined in claim 3, in which the drum is supported on an inclined axis and in which the closed end is made concave to increase the material-retaining capacity of the drum pocket.

7. A mixing and aerating machine as defined in claim 3, in which the screens are made of expanded metal with the longer axes of the openings arranged lengthwise of the drum.

8. A mixing and aerating machine for producing cellular cement, comprising a drum closed at its rear end and having a reduced throat at its front end to define a material-retaining pocket when the drum is supported with its axis in horizontal position, and a screen assembly mounted in the drum, the screen assembly comprising a plurality of screens arranged in spaced relation to the wall of the drum and to each other and extending to the rear wall of the drum so as to cause comminuted material confined in the pocket to be carried upward by the ascending portion of the screen assembly when the latter is rotated and to be dropped from an elevated position upon the lower portion of the screen assembly.

9. A mixing and aerating machine as defined in claim 8, in which the drum is supported on an inclined axis and in which the rear end is made concave to increase the material-retaining capacity of the drum pocket.

10. A mixing and aerating machine as defined in claim 8, in which the screens are made of expanded metal with the longer axes of the openings arranged lengthwise of the drum.

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