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ARTIFICIAL STONE

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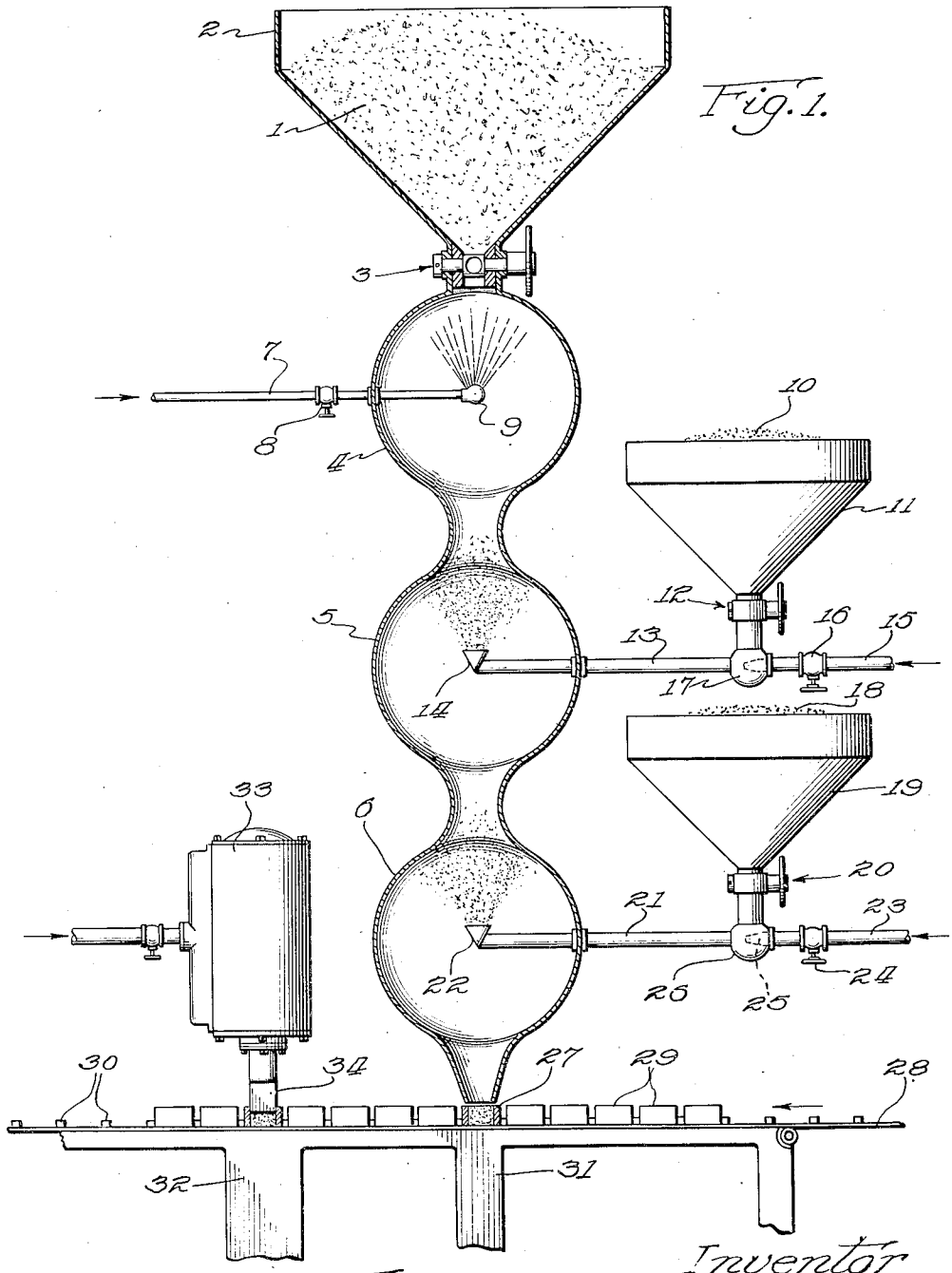
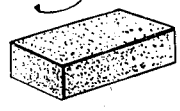


Fig. 1.

Fig. 2.



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ARTIFICIAL STONE

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2 Claims. (Cl. 91—68)

My invention relates to an improved method of manufacturing artificial sandstone comprising sand held together by cementing substance to form compact rock.

The main object of my invention is to produce sand rock in any desired form, such as a brick with high resistance to crushing and which will stand the acid test and have low absorptive powers; and further to provide a method of mixing the sand and the cementitious material which will automatically give the proper mixture to produce the desired characteristics; to provide a method by which the ingredients in measured quantities will be associated in such manner that a physical union of the materials takes place due to the characteristics of the ingredients used; to provide a method by which all of the mixing is done through spraying, and a close bond is obtained by pressure; and to provide a system by which all of the material is mixed while freely falling from elevated hoppers direct to the molds.

An illustrative embodiment of my invention is shown in the accompanying drawing, in which:

Figure 1 is a vertical section of a complete brick-making unit showing mixing chambers in section, with two pivoting hoppers and a press in elevation.

Fig. 2 is a perspective of a pressed sandstone brick.

My improved method of obtaining uniform mixtures to obtain maximum strength is obtained by placing sand 1 in a hopper 2 having an outlet valve 3. The sand drops successively through three communicating spherical compartments 4, 5 and 6. Into the upper spherical compartment 4 steam is admitted through a pipe 7 having a control valve 8 terminating near the center of the compartment 4 in a distributing spray nozzle 9. Cementitious material 10 is introduced into the second spherical compartment 5 from a hopper 11 provided with an outlet controlling valve 12 through a pipe 13 which terminates near the center of the second compartment in a spray nozzle 14. The cementitious material is forced through the spray nozzle by air pressure supplied through the pipe 15 and controlled by valve 16. The air pressure pipe 15 terminates in a globe housing 17 forming an air ejector.

Fine ground material 18 is forced into the lower spherical compartment 6 from a hopper 19 having a valve 20. Through a pipe 21 which terminates near the center of the compartment is a spray nozzle 22. The flow of the ground material is forced by air pressure supplied through a pipe 23 having a control valve 24 and a nozzle 25 which terminates in a globe housing 26 forming an air ejector. The mixed materials fall directly into a mold 27 which is supported in receiving position on a traveling belt 28. Similar molds 29—29 are carried on a belt positioned between spacers 30 fastened to the belt. The belt is supported on a platform 31. One of the platform supports 32 is capable of sustaining high pressure, and above the support 32 is placed a hydraulic press 33 having a plunger head 34 which coacts with the mold.

In the form shown, the molds are designed to form pressed sandstone brick, as shown in Fig. 2. In operation, sand is placed in the upper hopper with control means to provide an even flow of the sand from the hopper, as for example, at the rate of two thousand pounds per hour. The moistened content of the sand in the hopper is carefully determined. Since substantially two hundred pounds of Portland cement is to be evenly distributed over the sand grains, and the total water content of the sand must be between sixty and seventy percent of the weight of cement used in order to obtain maximum strength, provision is made to insure the proper amount of water. In case the water content of the sand is three percent, then there are sixty pounds of water in the sand, and it is only necessary to add seventy pounds of water to have a total of one hundred and thirty pounds of water, which is equivalent to sixty-five percent of the amount of cement used.

The steam flow is regulated to deliver seventy pounds of steam per hour when the original water content of the sand in the hopper is three percent. Since the sand is at a lower temperature, the water vapor distributed by the nozzle in the upper steam compartment is condensed on the sand, and the sand on leaving the compartment will carry one hundred and thirty pounds of water per ton of sand.

Experience has proved that moisture is retained by sand grains without dripping, up to approximately ten percent of the weight of the sand.

In the second spherical compartment, the sand grains are dropped into an air spray which performs two functions: one is to maintain separation of the sand particles, and the second is to deliver two hundred pounds of Portland cement per hour. Since the surface of the sand particles is covered with moisture, the cement is immediately incorporated with and distributed over the surface of the sand grains.

In the third compartment, any one of a number of fillers can be used, providing that the material has been ground to a fineness approaching that of the Portland cement used. Best results are obtained when the amount of filler is almost exactly equal to the weight of the Portland cement. The ground filler may be made from Pyrites, slag, ground glass, ground rock such as Dolomite, or cinders, preference being given to those fillers which have the greatest resistance to crushing. The filling material, however, must be free from organic matter.

Both the Portland cement and the ground filler are sprayed into the compartments through suitable nozzles under air pressure. The combination of steam or water vapor, and the air pressure provides a small amount of pressure at the outlet of the lowest compartment. Throughout the mixing process the material is freely falling through the compartments from the sand hopper to the mold. The mold stands on a belt which is timed to intermittently move and which moves as fast as the molds are filled. When a filled mold reaches the hydraulic press, the material in the mold is compacted by the press.

With the flow of the ingredients under control, it is possible under this process to obtain a very uniform mixture, which is not unmixed by puddling, jolting or jarring, or any other performance tending to classification of the materials comprising the mixture.

The perfect mixture obtained through substantially automatic delivery means economy in the cost of cementitious material used, economy in man-power required, and since the mixing is done while the materials are falling through and in closed space, power driven mixing equipment is not required. The flow of materials having been properly set, the only labor required is that of supplying the hoppers with materials, maintaining a supply of steam and compressed air, and the operation of the presser to compact the material in the molds.

In the operation of the device here disclosed, using two thousand pounds of sand per hour, mixing therewith two hundred pounds of Portland cement, adjusting the total water content to one hundred and thirty pounds, and the addition of two hundred pounds of ground filler, results in the manufacture of about four hundred sandstone brick per hour per unit.

I claim:

1. The method of coating separated sand particles with a water film, spraying cementitious materials on said water film, and spraying finely divided filler over said moistened cementitious material.

2. The method of maintaining separation of the sand particles and coating the separated sand particles with a water film, spraying cementitious material on said water film and spraying finely divided filler over said moistened cementitious material.

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