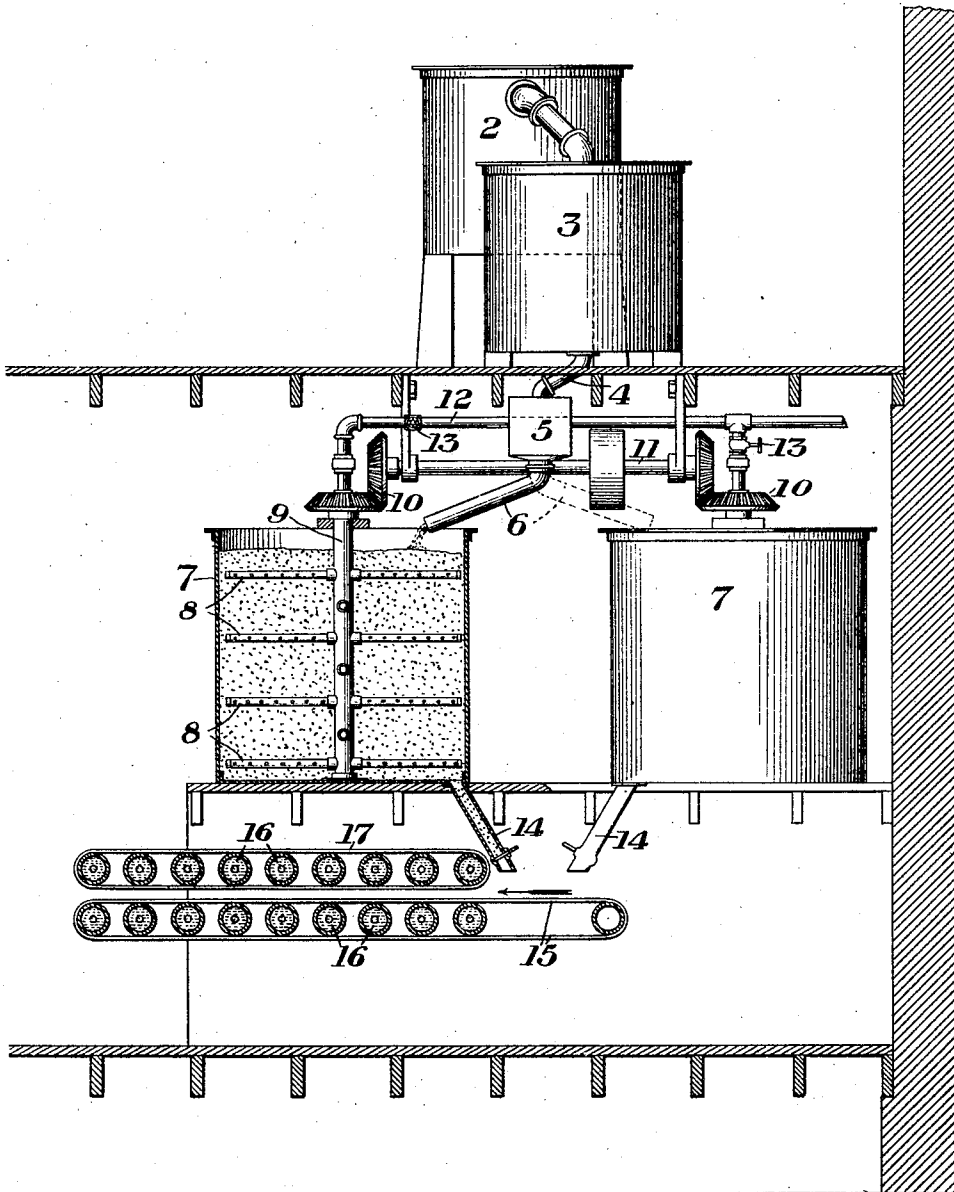


C. P. BYRNES.
HEAT INSULATING MATERIAL.
APPLICATION FILED MAR. 6, 1907.

1,162,450.

Patented Nov. 30, 1915.



WITNESSES

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HEAT-INSULATING MATERIAL.

1,162,450.

Specification of Letters Patent.

Patented Nov. 30, 1915.

Application filed March 6, 1907. Serial No. 360,964.

To all whom it may concern:

Be it known that I, CLARENCE P. BYRNES, of Sewickley, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Heat-Insulating Material, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which the figure is a diagrammatic sectional side elevation showing one form of apparatus for carrying out my improved process.

My invention relates to the manufacture of heat insulating material, and particularly the making of such material from granulated cork or similar material.

The object of the invention is to increase the output of heat insulator from a given amount of cork by aerating the heated mixture of cork and binder, thus producing artificial air cells throughout the mass.

In carrying out the process, I preferably heat the granulated cork in any manner, as by stirring it in a heated vessel. The heated cork is then mixed with hot or liquid pitch, asphalt, or other suitable binder, and this mixture is aerated by forcing air into the mixture so as to produce a substantially uniform mixture with air cells distributed throughout it. These air cells will be formed by the viscous quality of the binder and the mixture. The mixture may then be fed out and allowed to set, either on a table or carrier, without pressure, or it may be spread or tamped into sheet form, which may be compressed somewhat and held under compression until the binder is sufficiently set to hold the sheet in the compressed form. This compression may be applied by water-cooled rolls, by belts, or other suitable devices.

In the drawings, 2 represents a melting kettle, in which the binder is heated and brought to a liquid condition if it is solid at normal temperatures. From the kettle 2 the binder may be fed into the kettle 3, from which it runs through valved pipe 4 into a measuring device 5. From the measuring device it will be fed through valved pipe 6 into either one of the mixing reservoirs 7, 7. These reservoirs may be heated by steam pipes, steam jackets, or in any other suitable manner. The pipe 6 is arranged to swing to feed the hot mixture into either of the mixing or aerating devices. In the reservoir 7 the binder and cork are intimately

mixed by stirring arms 8 on a hollow rotary shaft 9 driven through bevel gear connection 10 with a rotary shaft 11. The shaft 9 and arms 8 are hollow, and the arms 8 are provided with a series of perforations throughout their length; and compressed air is supplied to the rotary shaft 9 through a pipe 12 connecting with the shaft through a suitable stuffing box device. The supply to each mixer is controlled by suitable valves 13. The compressed air thus introduced will cause a large increase in the volume occupied by the mixture, owing to the providing throughout it of incased air cells which themselves give good heat insulating qualities to the material. After the mixture has been aerated to the desired degree and thoroughly mixed it may be fed out through a valved chute 14 upon a traveling belt 15. The belt 15 moves between two series of water-cooled rollers 16, which are positively driven, and a belt 17 is also preferably used around the upper set of water-cooled rollers. These rollers may be provided with adjustable bearings to give the desired amount of pressure, and the length of the series is preferably such that the binder is cooled sufficiently to become set before the material is released from the pressure. The sheet of cork is therefore held in shape until the binder is sufficiently cold to hold the mixture in the shape imparted to it. The chute 14 is preferably of substantially the width of the belt, or a narrower chute may be used and the material may be spread upon the belt either by a small spreader under which the material passes, or by a tamping device, which may be mechanically actuated. In case tampers are used, a bed plate may be used under the projecting portion of the lower belt to provide backing for the tamping operation.

Instead of obtaining a continuous sheet of heat-insulating material as above described, the material may be fed out from the mixing and aerating tanks either upon a rotary or continuous carrier or into molds. If allowed to cool on a carrier or support as it issues from the aerator, the blocks thus formed may be sawed or otherwise cut up into sheets or parts of the desired size and shape.

If fed into molds, pressure may be applied to give blocks, sheets or shapes of the desired character, and in this case the pressure should be held upon the material until it is

sufficiently cold for the binder to be set, thus holding the mixture in the desired shape with the contained air cells.

The advantages of my invention result
5 from the aerating of the heated mixture of cork or similar material with its binder. The amount of material obtained from a given amount of cork is thus greatly increased, while heat-insulating material of
10 high insulating qualities is afforded, owing to the presence of a large number of artificially formed air cells within the material and held in shape by the chilled binder.

Many variations may be made in the form
15 and arrangement of the apparatus employed. Other material than cork may be employed, the character of binder may be varied widely, and many other variations may be made without departing from my invention.

20 I claim:—

1. A substantially rigid heat insulating structure formed from a plastic mass of organic insulating material mixed with a binder and containing both the air spaces
25 which result from the natural porosity of the material, and also additional air spaces formed by the mechanical injection of air

into the plastic mass prior to its setting, substantially as described.

2. A substantially rigid heat insulating 30 structure formed from a plastic mass of granulated or comminuted cork mixed with a binder and containing both the air spaces which result from the natural porosity of the cork, and also additional air spaces 35 formed by the mechanical injection of air into the plastic mass prior to its setting, substantially as described.

3. As a new article of manufacture, a substantially rigid heat insulating material 40 composed of a porous organic substance mixed with a binder and containing both the natural air spaces of the porous material and also additional air spaces formed therein by the mechanical injection of air into the plas- 45 tic mass prior to its setting, substantially as described.

In testimony whereof, I have hereunto set my hand.

C. P. BYRNES.

Witnesses:

JOHN MILLER,
H. M. CORWIN.