

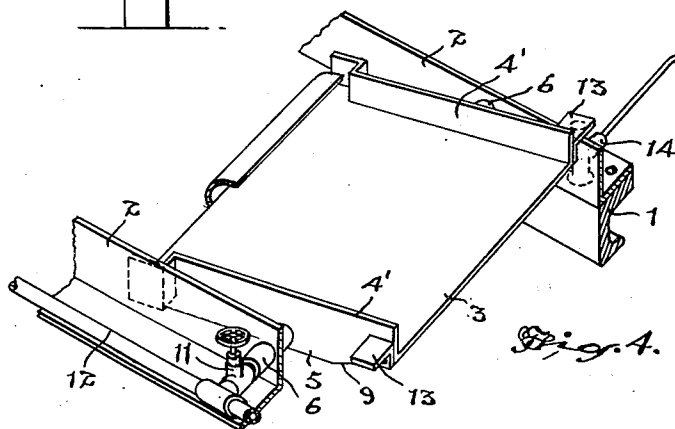
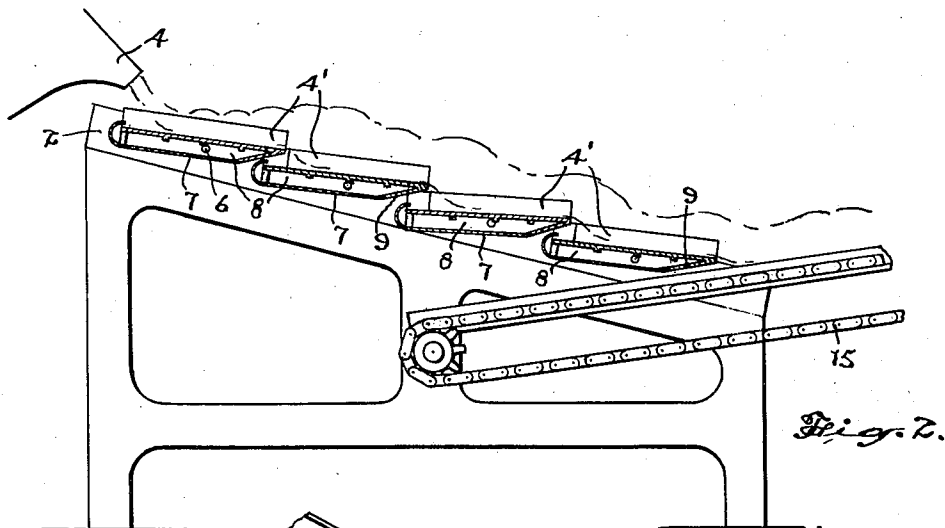
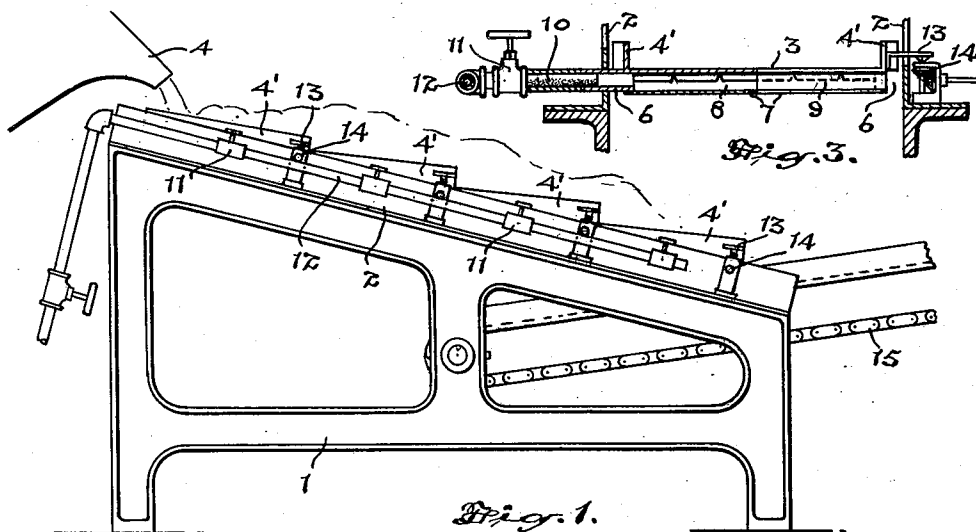
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2,212,962

MEANS FOR PUFFING SLAG

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UNITED STATES PATENT OFFICE

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MEANS FOR PUFFING SLAG

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2 Claims. (Cl. 49—14)

The principal objects of the invention are to accomplish the economical production of a uniformly puffed light weight cellular slag particularly adapted for use in the manufacture of heat insulating units, avoiding the formation of solid glassy or coagulated masses and further to provide a structure which may be accurately controlled to produce uniform results with slag of varying temperature and mineral constituents.

10 The principal features of the invention consist in the novel method of subjecting the molten slag to the successive application of a liquid puffing medium in controlled quantities and in the novel construction of apparatus whereby the
15 puffing liquid is directed into contact with the slag in its movement over a series of inclined surfaces and the puffed product is conducted from the puffing zone by a moving carrier so as to allow time for the dissipation of the water of crystallization and to prevent dumping or coagulation.

In the accompanying drawing, Figure 1 is a side elevational view illustrating a preferred form of apparatus for carrying same into effect.

25 Figure 2 is a longitudinal mid-sectional elevation of the structure illustrated in Figure 1.

Figure 3 is an enlarged cross sectional detail of one of the adjustable sections of the "chute" for puffing the slag.

30 Figure 4 is an enlarged part sectional detail of the puffing "chute."

It is well known that by bringing molten slag into contact with limited quantities or a film of water or other suitable liquid the slag will be puffed or transformed into an expanded body with thin crystalline walls enclosing innumerable small cells which is a very poor conductor of heat and therefore forms an excellent heat insulating medium which is a desirable product for
35 heat or sound insulating in building structures and the present invention is directed to the production of a uniform product at low cost.

In the form of the invention herein illustrated a suitable frame 1 is provided with a pair of
45 parallel spaced inclined angle bars 2.

Between the bars 2 are arranged a plurality of tray members 3 which form a "chute" for receiving the molten slag poured from a suitable crucible 4.

50 Each of the trays 3 is of substantially rectangular form and may be constructed of cast iron or steel or may be fabricated of steel plate. The side walls of the trays extend above the tray bottom and form the flanges 4' while the portion

extending below the tray bottom forms the flanges 5.

Trunnions 6 are formed on the flanges 5 about midway of the length of each tray and these trunnions extend through bearing holes in the
5 side bars 2 of the frame so that the trays may be tilted at any desired angle.

Each tray is fitted with a plate 7 extending across between the flanges 5 and forming a chamber 8, the front end of which is closed by a
10 bevelled wall 9 which may be cast as part of the tray or may be formed by the bottom plate. The back end of the plate is curved upwardly and forwardly over the back edge of the tray being spaced slightly thereabove forming a narrow slot
15 extending completely across the back end of the tray.

Each of the trunnions 6 is connected by a flexible tube 10 with a valve 11 mounted on a pipe line 12 mounted on each of the side bars 2. The
20 flexible pipe connections between the valves and trunnions permit a tilting movement of the trays without loosening a joint. These flexible connections are preferably covered by loose metal tubes to protect the flexible material against the heat
25 of the slag being treated and against the burning thereof by particles of hot slag which may fall from the trays.

Each tray is provided with a laterally extending bracket 13 which extends over the flange of
30 the bar 2 at one side of the frame and such bracket is connected to the spindle of a small screw jack 14. By manipulating the screw jacks the relative angle of the slope of the individual trays may be altered to accelerate or retard the
35 flow of the slag thereover.

It will be understood that water or any suitable liquid may be forced through the pipe lines 12 and trunnion connections into the tray chambers 8, the flow being controlled by the valves 11
40 and the liquid filling the chamber 8 is discharged, through the slot formed by the curved back plate, over the surface of the tray.

The molten slag is poured from the crucible 4
45 on to the upper tray and striking the film of liquid it converts the liquid into steam which has the effect of puffing the slag into a highly cellular form. The conversion of the liquid to steam is of course practically instantaneous and it is found that much of the mass of slag poured
50 onto a surface will not be puffed. The slag when thus treated flows over the upper tray and passes on to a second tray, which is stepped down from the discharge edge of the first tray, and it is
55

again subjected to the effect of meeting a film of puffing liquid.

This action is continued over a series of trays of whatever number it may be found desirable to use, a series of four being here shown.

It will be noted that the third tray down from the upper end of the series is arranged at a flatter angle than the other trays. This is to show that the angles may be altered as desired to locally accelerate or retard the flow of the water and slag, and to show that the rate of flow of the partly puffed product may be checked after passing the initial puffing zone or zones.

An endless conveyer belt 15 extends from under the lower end of the puffing trays and the puffed slag passes from the lower tray of the series on to the belt and is carried thereby for any desired distance to permit excess liquid to drain off and for the remaining heat of the slag to effectively dissipate any moisture entrapped in the puffed slag.

The puffed slag passing from the puffing zone contains a considerable quantity of heat which is allowed to dissipate slowly as the slag is carried away from the puffing zone and this slow dissipation of heat has the very desirable effect of annealing or toughening the thin walls of the puffed product.

What we claim as our invention is:

1. Apparatus for use in carrying out an operation of the type in which molten slag is contacted with a liquid capable of vaporizing under the influence of heat contained in the slag and in which vapor produced as a result of contact of the slag and liquid causes swelling of the slag with the production of a porous plastic mass of slag of substantially greater volume than the volume of the liquid slag, which comprises two

or more inclined puffing trays mounted in stepped relationship to permit a mass of slag to flow downwardly thereover from the initial or uppermost tray to the lowermost tray in order to accomplish progressive or multiple stage puffing of the slag, and means for supplying puffing liquid to said trays, the inclination of the initial tray being greater than the inclination of at least one of the lower trays, whereby rapid flow of slag may be accomplished in the initial puffing stage and retarded flow of slag may be accomplished in a subsequent puffing stage.

2. Apparatus for use in carrying out an operation of the type in which molten slag is contacted with a liquid capable of vaporizing under the influence of heat contained in the slag and in which vapor produced as a result of contact of the slag and liquid causes swelling of the slag with the production of a porous plastic mass of slag of substantially greater volume than the volume of the liquid slag, which comprises two or more inclined puffing trays mounted in stepped relationship to permit a mass of slag to flow downwardly thereover from the initial or uppermost tray to the lowermost tray in order to accomplish progressive or multiple stage puffing of the slag, means for supplying puffing liquid in the form of thin films to said trays, and means for selectively adjusting the inclinations of said trays to provide an initial tray having an inclination greater than the inclination of at least one of the lower trays, whereby rapid flow of slag may be accomplished in the initial puffing stage and retarded flow of the slag may be accomplished in a subsequent puffing stage.

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ALFRED H. VANDERBURGH.

CERTIFICATE OF CORRECTION.

Patent No. 2,212,962.

August 27, 1940.

JOHN C. K. STUART, ET AL.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the signature to the printed specification, name of second inventor, for "ALFRED" read --ALBERT--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of February, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.