

Sept. 22, 1931.

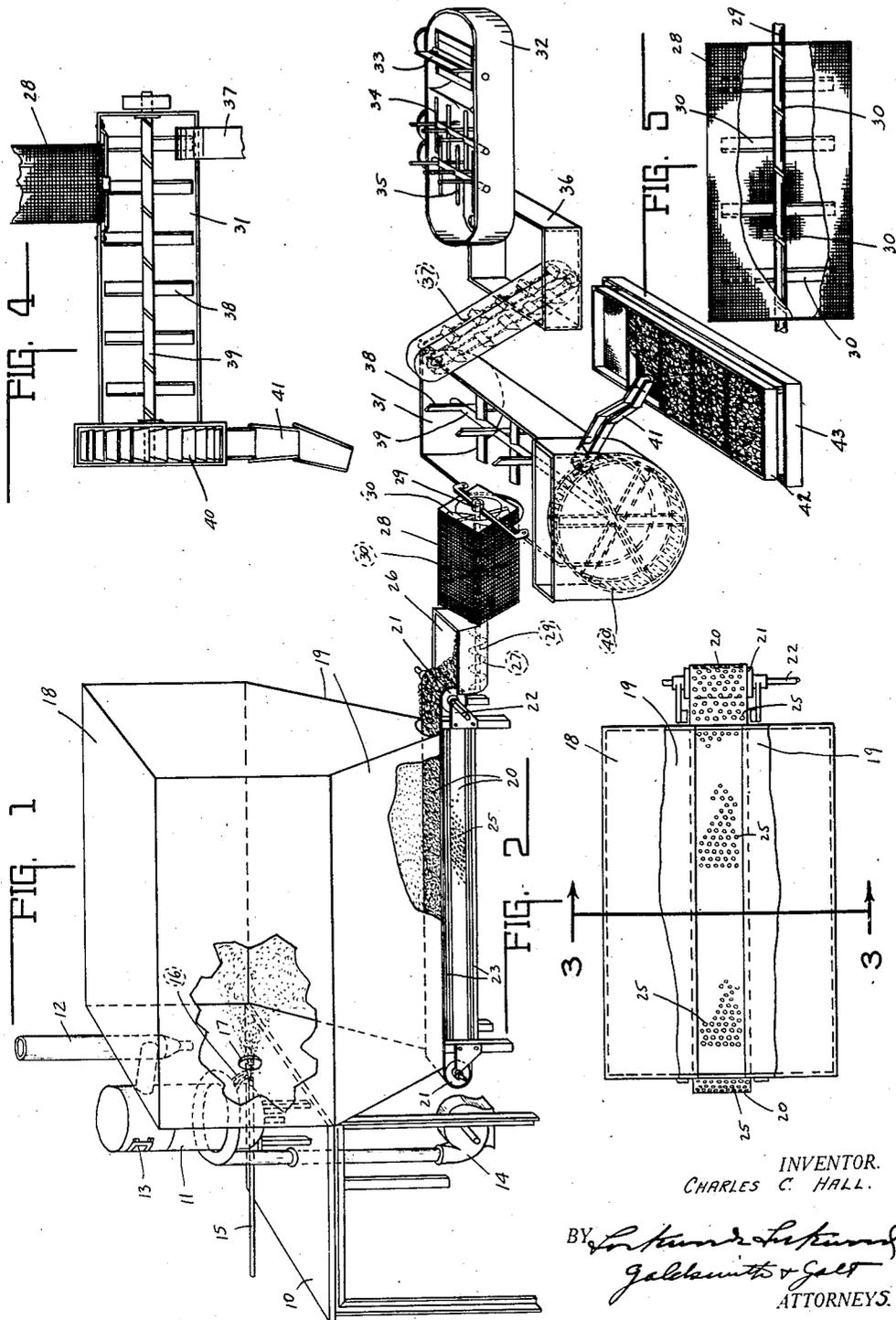
C. C. HALL

1,824,430

APPARATUS AND PROCESS OF TREATING MINERAL WOOL.

Filed Nov. 25, 1927

2 Sheets-Sheet 1



INVENTOR.  
CHARLES C. HALL.

BY *Lockwood & Lockwood*  
*Jelks & Galt*  
ATTORNEYS.

Sept. 22, 1931.

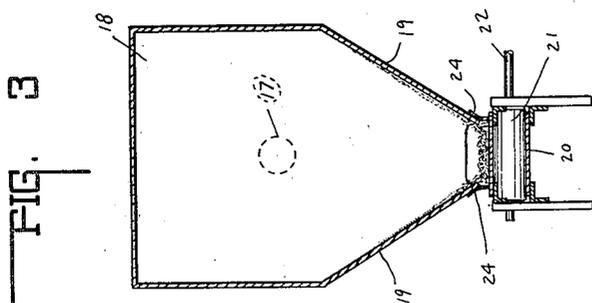
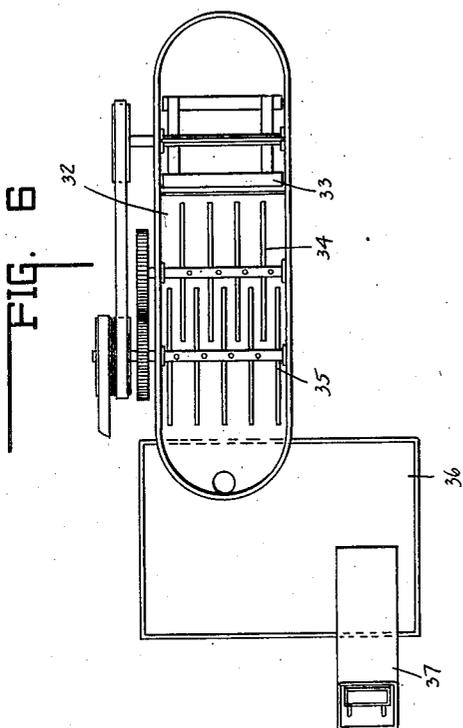
C. C. HALL

1,824,430

APPARATUS AND PROCESS OF TREATING MINERAL WOOL

Filed Nov. 25, 1927

2 Sheets-Sheet 2



INVENTOR.  
CHARLES C. HALL.

BY  
*Leopold Lukens*  
*Goldschmidt & Gold*  
ATTORNEYS.

# UNITED STATES PATENT OFFICE

CHARLES C. HALL, OF ALEXANDRIA, INDIANA, ASSIGNOR, BY MESNE ASSIGNMENTS,  
TO BANNER ROCK CORPORATION, OF ALEXANDRIA, INDIANA, A CORPORATION OF  
DELAWARE

## APPARATUS AND PROCESS OF TREATING MINERAL WOOL

Application filed November 25, 1927. Serial No. 235,443.

This invention relates to an apparatus and process of treating mineral wool so as to incorporate a water-proofing binder therewith in such manner as to make insulating blocks or slabs of such material. Such material is known in the trade as the product of the Banner Rock Products Company by the name "Rock Cork".

In the manufacture of rock cork in accordance with the procedure that has been followed for many years, the rock, a form of argillaceous limestone, is first melted and the melted rock as it runs from the melting equipment is first hit with either a high pressure air jet or steam jet and shredded into fibers. This product, known as rock wool, is mixed in a special vat with a binder that secures the fibers into permanent position. This material is then molded into different shapes and thicknesses, and is then dried and trimmed, in which condition it is ready for the market. During the drying step a hard uneven crust forms on the surfaces of the molded shapes, which renders necessary the trimming operation consisting of a removal of the crust by suitable planing devices, such as saws.

In producing such material, which may be termed water-proofed mineral wool, difficulty has heretofore been had in eliminating the shot and in causing the water-proofing binder to properly adhere to the fibres. Further difficulty has been had in mixing the proper weights of wool and water-proofing binder.

The principal object of this invention resides in the process and apparatus for incorporating the water-proofing binder in the wool. This is accomplished by first mixing the binder with a paper or wood pulp so that the result is such that the binder will remain in contact with the wool and not separate to any appreciable amount with the water when drained. The binder is not an emulsion or in solution but comprises a coating on the pulp. If it were an emulsion, the excess water drained from the wool would carry the binder away to a large extent and, in drying, the water would bring the binder to the surface. By means of this invention,

the water which drains away from the treated wool when formed, is practically clear and the binder remains mixed and in intimate contact thruout the fibres.

Another feature of the invention resides in the means for raising the binder and fibre and straining the water therefrom sufficiently so as to permit the material to flow, but do away with such excess of water as would cause the fibres to be washed away. This arrangement gives the material the proper consistency when discharged into the forms.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a perspective view of the apparatus with parts thereof broken away. Fig. 2 is a plan view looking down upon the hopper and conveyor belt. Fig. 3 is a section taken on the line 3—3 of Fig. 2. Fig. 4 is a plan view of the mixing vat. Fig. 5 is a plan view of the tumbler with a portion thereof broken away. Fig. 6 is a plan view of the mixing tank for the water-proofing binder.

In the drawings there is shown a platform 10 having mounted thereon a furnace 11 provided with the usual stack 12 and opening 13 for receiving a charge of fuel and mineral such as rock. Below the platform there is provided a blower fan 14 for applying air for supporting the combustion. The compressed air or steam pipe 15 is provided for discharging a blast of air under high pressure immediately below the discharge spout 16 of the furnace thru which the molten material flows. The blast of air or steam is discharged directly against the stream of molten material so as to blow it into fine fibres,—as now commonly practiced in the art. The fibre or wool thus formed is discharged by the high pressure of the air or steam thru the port 17 in the adjacent end of the blow chamber 18. The blow chamber is a relatively large closed room having sloping hopper-like sides 19 at the lower portion thereof, and below the port 17. Said chamber is preferably built on a steel frame formed of supporting metal lath provided with a coat of Portland cement mortar or metal so as to

give it a smooth glazed finish on the inside. This assists in preventing the wool from adhering to the sides. The bottom of the hopper is open and a conveyor belt 20 is positioned below the same to receive the wool which is blown into the chamber. The conveyor belt is supported by and driven thru the medium of the end pulleys 21, one of which is driven thru the driving shaft 22 operated by any suitable source of power. Intermediate the pulleys the belt is supported by the longitudinally extending frames or tracks 23 so as not to sag below the bottom edge of the hopper. Suitable sealing flaps of resilient material 24, such as canvas, burlap or the like, hangs from each side of the hopper walls 19 so as to drag upon the belt and prevent the wool from escaping but at the same time preventing frictional contact between the side walls of the hopper and the belt.

The conveyor belt may be formed of woven wire cloth, perforated sheet metal or any other suitable material,—the belt shown herein being of sheet metal provided with a plurality of perforations 25. Such belt supports and carries the wool fibres but allows the greater portion of the shot discharged into the chamber to pass thru the perforations while the wool is still in its light and fluffy state such as to most readily permit separation of the shot.

The mineral wool is discharged from the end of the chamber 18 by the belt 20 into a trough 26 having a worm screw feed 27 which forces it into the tumbler 28. Said tumbler is rectangular in cross-section and rotates with the shaft 29, which is driven from the shaft of the screw feed 27 by means of suitable gear connections with the drive shaft 22. The tumbler is covered with wire screening which permits any shot that may have been carried thru to be tumbled out of the rock wool and passed thru the screening. At the same time the spiral blades 30 mounted upon the shaft 29, and which rotate with the tumbler, cause the tumbled fibres to be worked toward the discharge end thereof. The wool fibres finally freed of shot are caused to drop from the tumbler into the mixing vat 31. This vat is maintained with sufficient water to cause the fibres to freely float and flow therein.

In order to incorporate the water-proofing binding material, such as paraffin, bituminous materials, waxes or gums in the fibres as heretofore explained, such material, in a liquid state, is placed into the mixing tank 32 together with sufficient paper or similar pulp to cause the liquid water-proofing binder and pulp to mix into a semi-plastic state. The mixing is accomplished by means of the stirring paddle 33 and the mixing paddles 34 and 35. The semi-plastic mass of liquid binder

and pulp flows into the hopper 36 and is elevated therefrom by the elevator buckets 37 and dumped into the end of the mixing vat 31,—the same end of the vat in which the wool is discharged. The binder is then thoroly mixed with the fibre of the wool while in the water contained in the vat, by the mixing paddles 38 mounted on the rotating shaft 39. These paddles are so formed as to not only mix the binder in the fibres, but to gradually move them toward the discharge end of the vat.

The discharge end of the vat is enlarged to receive a bucket wheel 40, the buckets of which are screened or perforated to permit the water to pass therethru so as to drain the mixed wool and binder as it is elevated. The resultant mixture, freed of the greater part of the water, is discharged by the wheel 40 into the chute 41, where it flows downwardly into the forms 42. Said forms are provided with screened bottoms so that any further water freed from the mass as it settles in the forms will be caught in the drain pan 43.

The mineral wool fibre is then in condition wherein the binder and pulp has been so mixed therewith as to thoroly impregnate or bind the fibres. Furthermore, the greater part of the water has been drained and the treated fibres settle in a mass and are thereupon passed thru suitable drying ovens for removing the remaining water and moisture. The water-proofing binder and wool fibres are then firmly held together in a solid mass in the desired form ready for installation after the conventional trimming operations as insulating blocks or slabs of the type known to the trade as "Rock Cork". By the incorporation of pulp with the water-proofing binder before mixing with the fibres of the mineral wool, the water-proofing material is caused to become a part of the mass rather than be separated or brought to the surface thereof by the water.

The invention claimed is:

1. The process of treating mineral wool, consisting in first mixing a quantity of water-proofing material into a semi-plastic state with pulp, discharging same into a mixing vat containing a quantity of water and mineral wool fibre, and thereafter agitating the contents of said vat and delivering the material therefrom after a thoro mixing and with the greater portion of the water removed.

2. A process of treating mineral wool, comprising mixing in an excess of water substantially shot free mineral fiber and fibrous pulp admixed with a water-proofing binding material, discharging the watery mixture into a drainage vessel, and thereafter drying the drained mixture.

3. The process of manufacturing insulating material which comprises first forming an admixture of a pulp of cellulosic material and a bituminous substance, mixing the admixture with an aqueous suspension of mineral wool, and thereafter forming blocks or slabs of insulating material from the mass of mineral wool fibers, pulp, and bituminous material by separating the water therefrom.

5  
10 In witness whereof I have hereunto affixed my signature.

CHARLES C. HALL.

15

20

25

30

35

40

45

50

55

60

65