

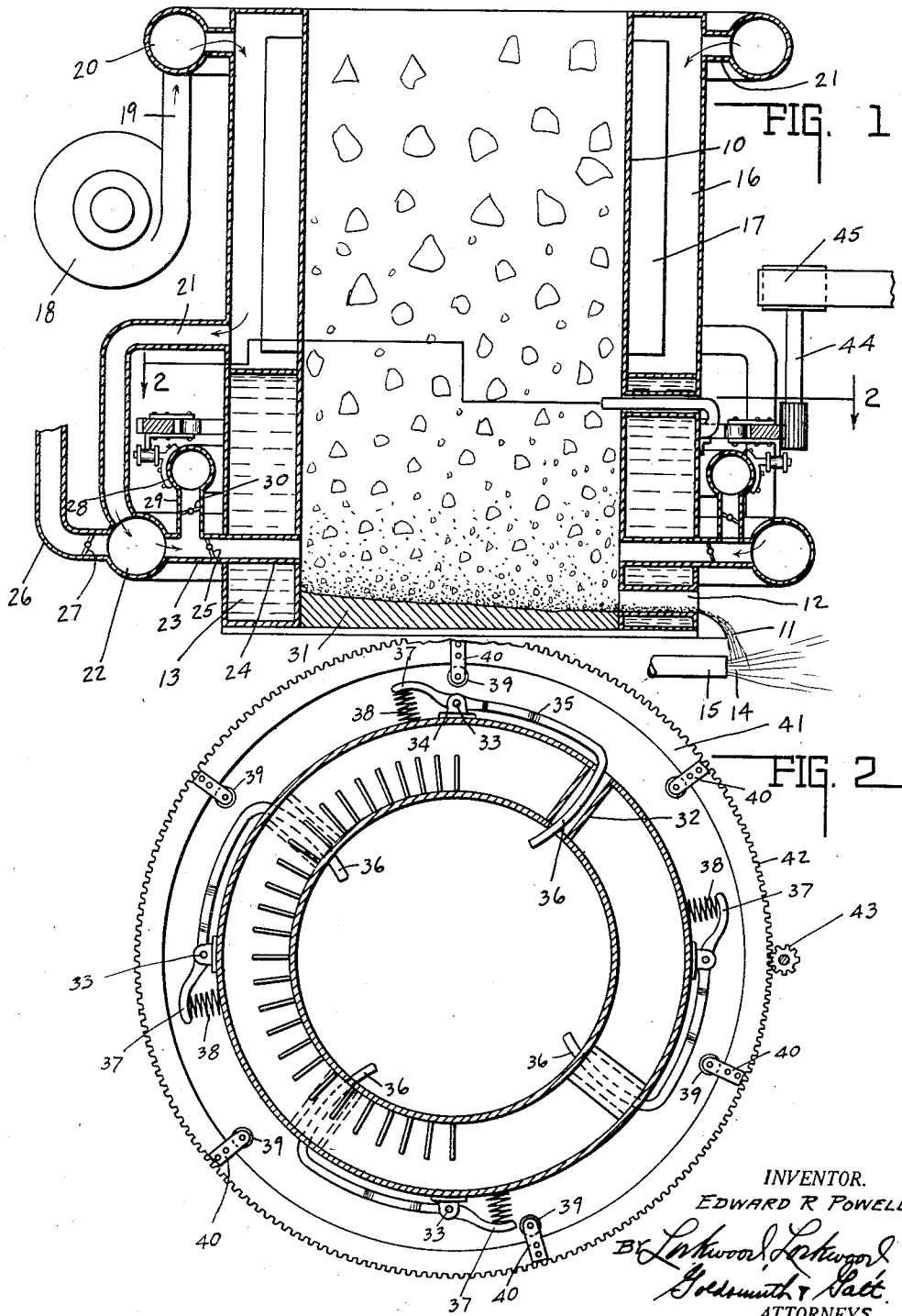
Oct. 20, 1931.

E. R. POWELL

1,828,293

ECONOMIZER FURNACE FOR MINERAL WOOD PRODUCTION

Filed Aug. 3, 1928



UNITED STATES PATENT OFFICE

EDWARD R. POWELL, OF ALEXANDRIA, INDIANA, ASSIGNOR TO BANNER ROCK CORPORATION, OF ALEXANDRIA, INDIANA, A CORPORATION OF DELAWARE

ECONOMIZER FURNACE FOR MINERAL WOOL PRODUCTION

Application filed August 3, 1928. Serial No. 297,216.

This invention relates to the economical production of mineral wool and the uniform production thereof.

The chief object of this invention is to provide a furnace for forming a molten stream of rock or the like which can be blasted into mineral wool, said stream having a more uniform and stable characteristic and being formed in a more economical manner than heretofore possible.

The chief feature of the invention consists in preheating the air, or a portion thereof, used for supporting combustion in the furnace by utilizing a portion of said furnace for such preheating. In this way a higher temperature is obtained and one which may be readily predetermined and controlled.

Another feature of the invention consists in the provision of means for stirring, poking or otherwise agitating the contents of the furnace above the melting point therein to prevent clogging and secure uniform material flow through the furnace.

One feature of the invention whereby high temperatures are obtained (thereby providing for high silica wool production) is utilizing air for furnace cooling instead of water since the latter is limited under suitable pressure to about 215 degrees while air cooling can be run up to 1000 degrees without much difficulty.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

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

In the drawings Fig. 1 is a vertical central sectional view of the invention. Fig. 2 is a transverse sectional view taken on the broken line 2—2 of Fig. 1, and in the direction of the arrows.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

In the drawings 10 indicates a wall of a

vertical retort or furnace suitable for the manufacture of mineral fiber, commonly known as mineral wool. The materials utilized in the furnace are air for supporting combustion, coke and rock or equivalent ingredients for melting to form a satisfactory molten stream, which subsequently is changed to fiber by a steam or air blast. The stream 11 discharges from the opening or tap hole 12 formed in the lower part of the furnace. The lower part of the furnace is water jacketed as at 13, and the water which cools the furnace at this point is utilized for forming the steam blast 14 discharged from nozzle or supply line 15.

In the present form of the invention the upper portion of the furnace is air jacketed as at 16 and extending into the same are a plurality of radially arranged heat fins 17. A fan 18 pumps cold air through conduit 19 to a header or bustle pipe 20 which has a plurality of communications 21 with the upper end of the air chamber 16, a plurality and preferably a similar number of discharge pipes 22 lead from the lower end of said air chamber and discharge into a lower heater or bustle pipe 22. A suitable number of pipes 23 discharge therefrom directly into the lower part of the furnace as at 24, and each discharge is controlled by a valve 25. If there is too much heated air a waste or vent 26 controlled by valve 27 permits the excess to escape. To control the temperature of the air supplied through pipe 24 it may be necessary to admit cold air, and said cold air is supplied from a header or bustle pipe 28 which communicates with each of the pipes 23 as at 29 and each communication is controlled by a valve 30.

With the foregoing mechanism the amount of air and the temperature of the same supplied to the furnace can be closely regulated. Furthermore the waste heat of the furnace is utilized to preheat the air.

One result of the foregoing construction is that the heat is applied directly where most desired, that is near the bottom of the furnace to insure a hot molten stream. If the molten stream is too cold, the material formed is of such character as to be practically useless,

therefore the temperature of the stream 11 is important for obtaining the maximum uniform production of good fiber. While the temperature can be controlled in this manner to a certain extent, another factor entering into the production of a uniform molten stream, or rather the rate of production of said stream is the constant falling of the material through the furnace toward the stream bed 31. To insure a substantially constant rate of flow of the ingredients a mechanism is provided for preventing dragging or jamming with resultant intermittent flow and nonuniformity on the stream. Furthermore the use of higher temperatures permits the fusion of more stable and more refractory material compositions such as high silica wool.

The furnace at a short distance above the stream bed is provided with openings 32 which extend through the wall and through the jacket chamber surrounding said wall and herein each opening 32 is shown extending through the water jacket. Pivottally supported at 33 on bracket 34 carried by the furnace is a lever 35 which has an angular arm 36 of arcuate outline concentric with pivot 33. Arm 36 is oscillated about pivot 33 and reciprocates in and out of passage 32. A suitable number of these pokers for poking the ingredients in the furnace is provided, and herein mechanism is also provided for mechanically actuating the same and preferably in successive relation.

The lever 35 has an extension 37 which serves as a cam and also as a spring retainer for spring 38. Normally spring 38 tends to project the arm 36 into the furnace. Engagement of the cam 37 by the roller 39 carried by bracket 40 in turn adjustably mounted on ring 41, in the rotation of said ring tilts the lever 35 to withdraw the arm 36 in opposition to spring 38. When the roller 39 passes over and beyond lever 37 the spring 38 becomes effective and the arm is projected into the furnace for poking purposes. Should a large piece of rock or coke be immediately in front of the opening, the spring will permit the arm to remain slightly projected to such a degree until such time as the arm can be fully projected into the furnace by the clearance of the obstruction, said arm assisting in the movement thereof.

The brackets 40 may be suitably arranged about periphery of the carrier ring 41 and preferably they are spaced a different angular distance apart than the angular distance of spacing between the lever contacts 37 so that no other poker arm will be actuated while another one is being actuated and the followers and connection may be so positioned relative to each other that they are progressively actuated about the circumference of the furnace. The carrier ring 41 may be suitably mounted for relatively anti-

friction and confined rotation, and the exterior periphery of said ring may carry the gear teeth 42 which mesh with pinion 43 carried by shaft 44 driven by a suitable power unit 45. Any other suitable power unit from that shown may be substituted.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

The invention claimed is:

1. In a furnace for the production of mineral fibre, the combination of a retorting chamber, means intermittently projectable into said chamber for agitating the charge therein, said means comprising an agitating arm, means normally constraining said arm for oscillation in one direction, and other means for intermittently actuating said arm for movement in the opposite direction.

2. In a furnace for the production of mineral fiber, the combination of a retorting chamber, and means intermittently projectable into the said chamber for agitating the charge therein, said means comprising a plurality of devices each including an agitating arm, means normally constraining said arm for oscillation in one direction, and other means for intermittently actuating said arm for movement in the opposite direction.

3. In a furnace for the production of mineral fiber, the combination of a retorting chamber, a plurality of means intermittently projectable into said chamber for agitating the charge therein, a plurality of movable means for reciprocating said intermittently projectable means and a common driven member adapted to move said plurality of means.

4. In a furnace for the production of mineral fiber, the combination of a retorting chamber having cooled passages thereto, a plurality of means intermittently movable into said chamber for agitating the charge therein, said means being projectable into said chamber through said cooled passages and comprising agitating arms and means for operating said agitating arms, and a common driven member for carrying said last-named operating means.

In witness whereof, I have hereunto affixed my signature.

EDWARD R. POWELL.