Oct. 11, 1932. E. R. POWELL 1,881,932

PROCESS OF FORMING SELF BAKING INSULATION BLOCKS

Filed Aug. 24, 1928

FIG. 1

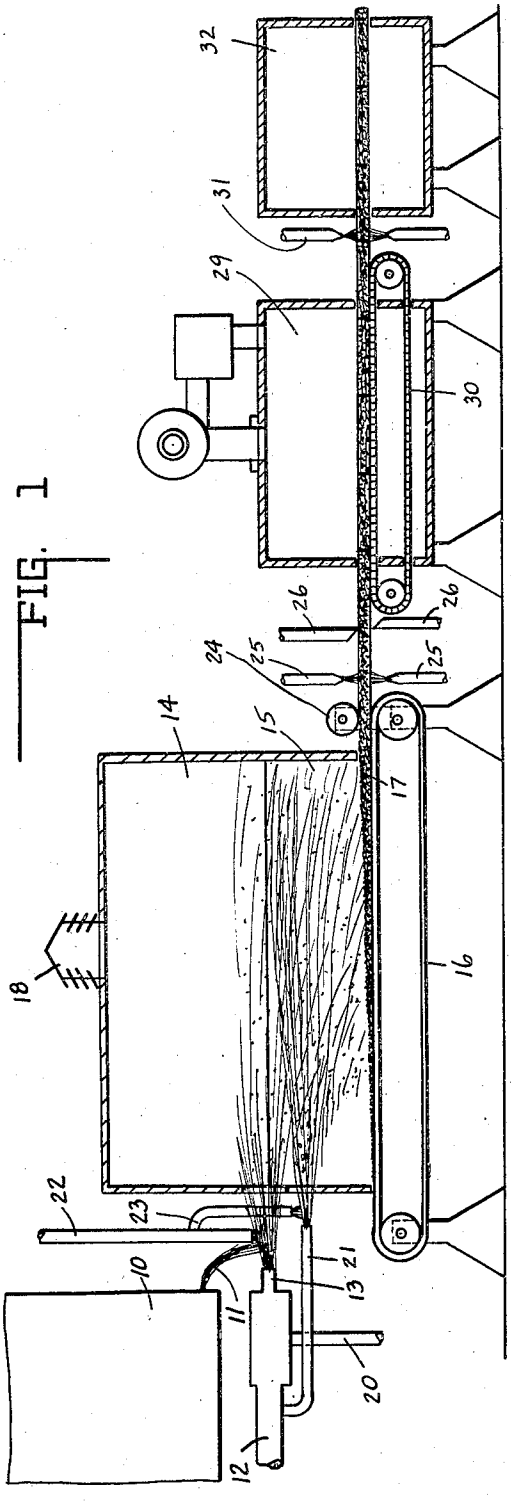


FIG. 3

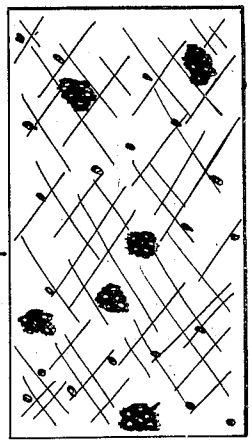
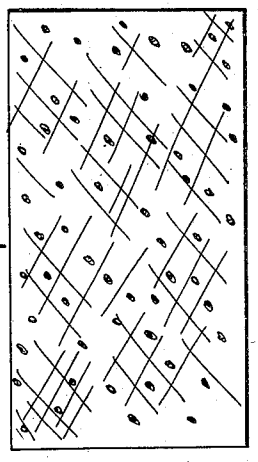


FIG. 2



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UNITED STATES PATENT OFFICE

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PROCESS OF FORMING SELF BAKING INSULATION BLOCKS

Application filed August 24, 1928. Serial No. 301,849.

This invention relates to a process of producing an insulation block with a minimum of material and handling.

The chief object of this invention is to produce a block which requires merely the ignition of the same at the proper temperature to complete its formation.

The chief feature of the invention consists in incorporating in normally fire-proof fibrous material, such as mineral wool, a diffused combustible constituent, a portion of which has a binding action upon the fibers and a portion of which is combustible under proper conditions, the combustion occurring at a temperature suitable for obtaining the binding action from the remainder of the binder, and there also may be added to the fire-proof fibrous material, such as mineral wool, in addition to the combustible constituent, suitable clay or clays which it will be readily apparent, can be baked, and will be baked in the baking of the block.

Another feature of the invention consists in the formation of a honeycomb or cellular skeleton which is relatively hard and brittle, and is included in said block, said construction being formed in the baking of said block, the honeycombed portion being formed by the escaping gases, to wit, the volatile constituent of the binder in the baking of the block.

Another feature of the invention, if desired, consists in coating while hot the cellular sheet, or like material with an inorganic coating that diffuses into the cellular spaces to lock the coating to the sheet, etc.

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

In the drawing Fig. 1 is an elongated central sectional view, parts being shown in elevation of one embodiment of apparatus suitable for employing the process. Fig. 2 is a view of the fiber sheet prior to baking. Fig. 3 is a view of the fiber sheet after baking with the cellular structure included therein.

In the drawing 10 indicates a furnace which has a molten discharge stream 11 and associated therewith is a steam line 12 having a nozzle 13, and the blast therefrom discharges into a blow chamber 14 with inclined sides 15 and having a mouth closed by a conveyor 16 upon which the material collects as a sheet 17. The blow chamber also has the usual, or any preferred vent construction 18.

The mineral fiber, such as glass wool or the like, may be suitably impregnated with a suitable binder material having a fiber binding constituent and a combustible constituent, such a material being the combination of asphalt flux or crude oil together with soda ash, silicate of soda, or a milk of plastic clay.

One method of impregnating the fiber with the combustible binder and fuel material is to inject the same in the blast containing the fiber at the time of formation of the latter. Relatively complete diffusion is thus obtained and substantially uniform diffusion also obtains.

Herein the pipe 12 and nozzle 13 constitute an injector for a line 20 adapted to supply crude oil or other suitable petroleum constituent for binding and combustion, or powdered fuel for combustion alone. If desired the same material may be supplied by line 21 which would be after the fiber had been formed. The silicate of soda might be supplied by line 22 prior to or substantially at the time of formation of the fiber, and, if desired, line 23 might be associated with line 21 to supply a mixture subsequent to the formation of the fiber rather than at the time of the formation of said fiber. Thus it is not necessary to supply the binder and combustible material to the fiber at the time of making the same, but it may be poured or discharged on to the stream of mingled fiber and air just after the two are mixed.

The belt collected strip of material is passed under a felting roll 24, and, if desired, the upper and lower surfaces of the strip may be supplied with a coating material, by the opposed nozzles 25, and such a material is clay in combination with water probably in colloidal form. To form sheets or blocks of predetermined length suitable shears 26 or equivalent strip severing devices may be employed.

Following the aforesaid, the strip, blocks or sheets are passed into and through an oven 29, the sheets being supported by an open work conveyor construction 30 so that the hot gases are passed through or around the sheet. The temperature therein is such (usually but not necessarily between 700 and 800 degrees) that the combustible portion of the binder ignites by spontaneous combustion and continues to burn until it burns out substantially all the combustible portion of the sheet leaving the binding portion behind and in cellular formation such as shown in Fig. 3.

If desired, the baked material may be suitably coated by opposed spray nozzles 31 with a binder and coating material such as sodium silicate or similar inorganic material which, when it hits the hot strip, sheet or the like, will readily diffuse throughout the same and will, by capillary attraction, unite the fiber together and coat the surface of the sheet or block. The coated sheet is passed into and through a cooler 32 which solidifies the binder and cools the sheet with the fibers in united relation.

The temperature in the heater 29 is sufficient to unite the combustible portion of the binder mix and to maintain said temperature sufficiently long to burn out the major combustible portion of the binder, and following such heating the remainder is in calcined condition, and the whole block is in a baked condition. The total binder content will usually run about thirty percent but forty percent is not excessive and the invention is not limited to any specific percentage.

Figs. 2 and 3 represent highly magnified idealized conditions and are included to show clearly the actual change that forms in the material.

While the process has been described as being of block or sheet form, the invention is not so restricted, since the fiber sheet impregnated with the binder mix can be formed into rolls and the individual rolls subjected to the ignition temperature and the rolls baked and calcined as aforesaid, after which and upon collection, the roll may be slit longitudinally to form pipe coverings.

The invention claimed is:

1. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with an inorganic binding material and a combustible material, shaping the mixture, and then subjecting the shaped mass to a temperature sufficient to ignite the combustible material.

2. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises blowing molten mineral material into fibers and admixing with the blown fibers an inorganic binding material and a combustible material, shaping the mixture, and then subjecting the shaped mass to a temperature sufficient to ignite the combustible material.

3. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with an inorganic binding material and a hydro-carbon, shaping the mixture, and then subjecting the shaped mass to a temperature sufficient to ignite the hydro-carbon.

4. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises blowing molten mineral material into fibers and admixing with the blown fibers an inorganic binding material and a hydro-carbon, shaping the mixture, and then subjecting the shaped mass to a temperature sufficient to ignite the hydro-carbon.

5. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with sodium silicate and a combustible material, shaping the mixture and then subjecting the shaped mass to a temperature sufficient to ignite the combustible material.

6. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with clay and a combustible material, shaping the mixture and then subjecting the shaped mass to a temperature sufficient to ignite the combustible material.

7. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises blowing molten mineral material into fibers and admixing with the blown fibers an inorganic binding material and a combustible material, permitting the mixture to continuously deposit in the form of a sheet, continuously withdrawing the sheet thus formed from the deposition zone and passing it into a heating zone maintained at a temperature sufficiently high to ignite the combustible material.

8. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises blowing molten mineral material into fibers and admixing with the blown fibers an inorganic binding material and a hydro-carbon, permitting the mixture to continuously deposit in the form of a sheet, continuously withdrawing the sheet thus formed from the deposition zone and passing it into a heating zone maintained at a temperature sufficiently high to ignite the hydro-carbon.

9. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with an inorganic binding material and a combustible material, shaping the mixture, applying a coating of inorganic material to the surface of the shaped mass, and

then subjecting the shaped mass to a temperature sufficient to ignite the combustible material.

10. A method of manufacturing self-sustaining units such as blocks and the like of mineral fibers which comprises mixing the fibers with an inorganic binding material and a combustible material, shaping the mixture, and then subjecting the shaped mass to a temperature sufficient to ignite the combustible material and thereafter applying a coating of inorganic material to the ignited mass.

In witness whereof, I have hereunto affixed my signature.

EDWARD R. POWELL.