

No. 683,337.

Patented Sept. 24, 1901.

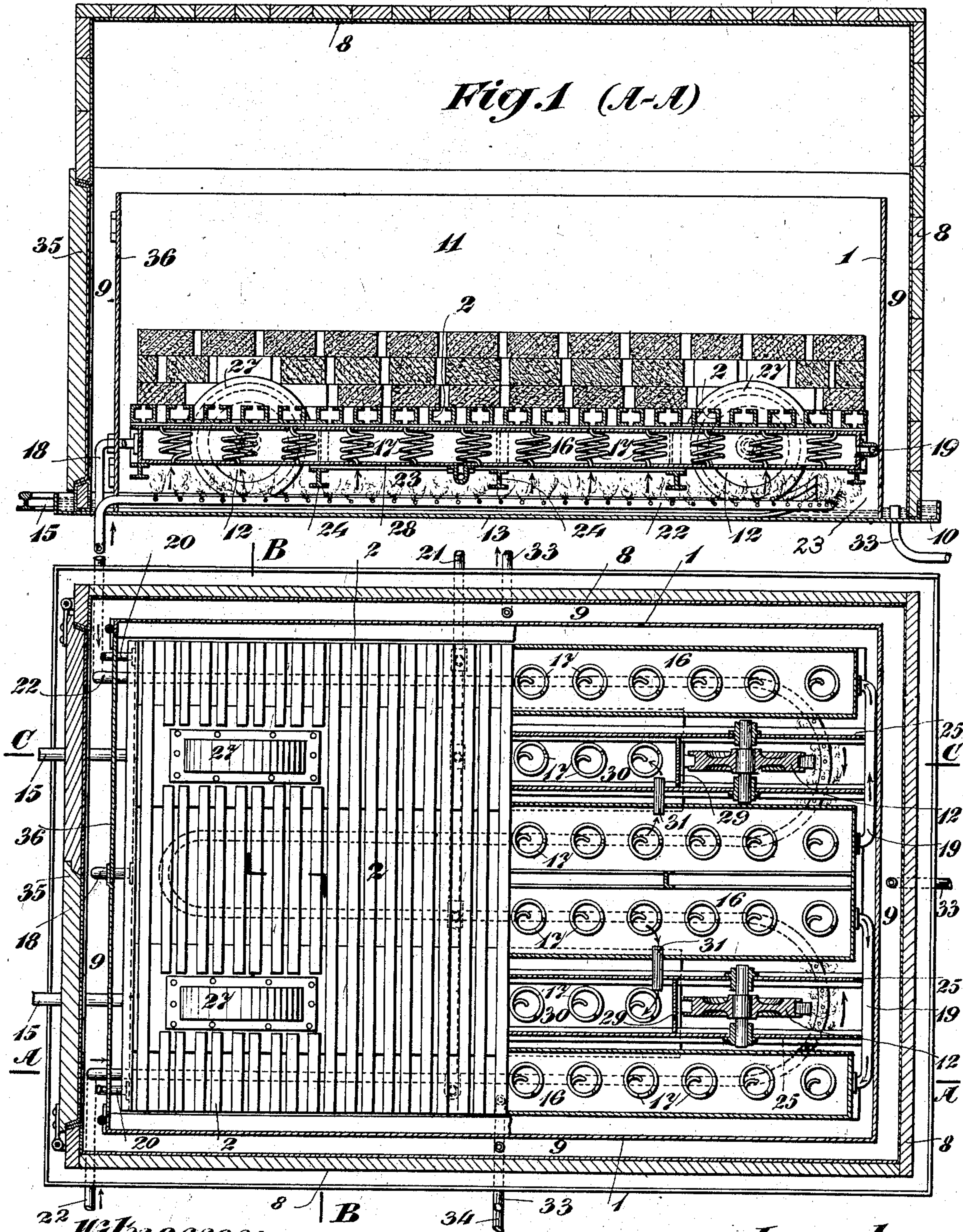
W. SCHULTHESS.

PROCESS OF MAKING ARTIFICIAL SANDSTONE.

(Application filed June 23, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

Bethlen

W. Sommers

Inventor:

Walter Schulthess.

by *Henry M. Allen*



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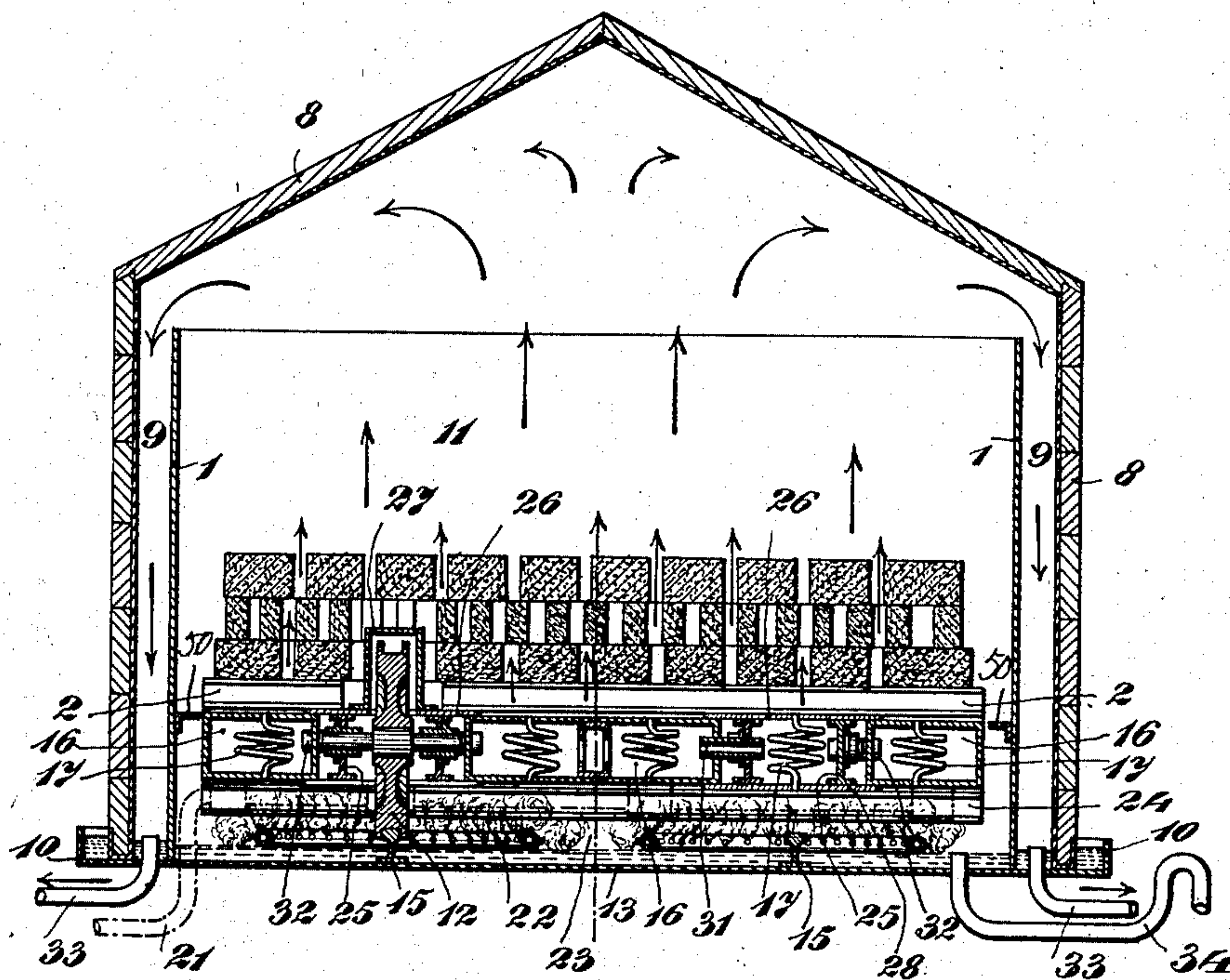
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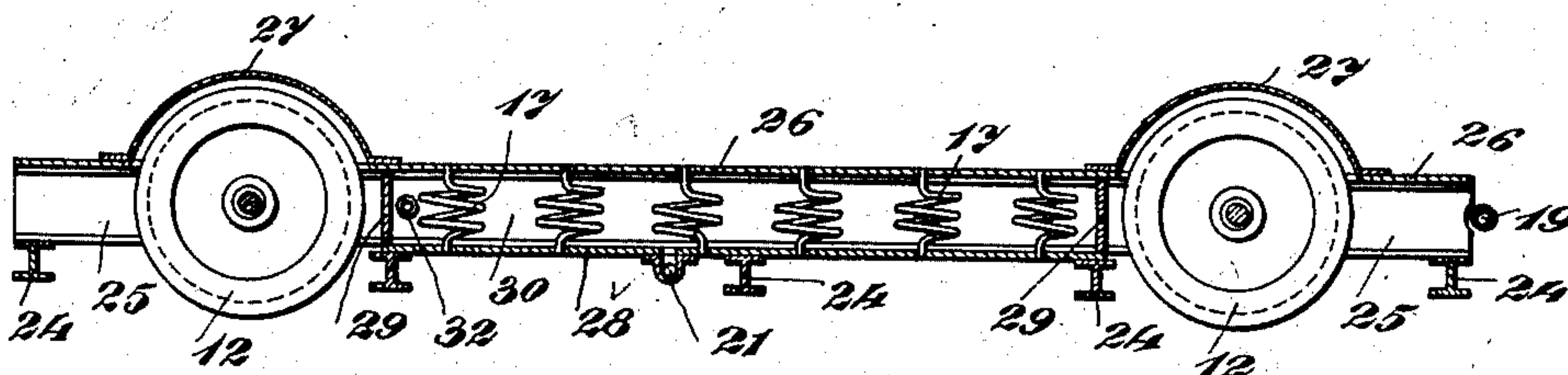
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2 Sheets—Sheet 2.

*Fig. 2. (B-B)*



*Fig. 4. (C-C)*



*Witnesses:*

*W. H. L.*

*W. H. Summers*

*Inventor:*

*Walter Schultness*

*by J. W. O. W.*



# UNITED STATES PATENT OFFICE.

WALTER SCHULTHESS, OF ZURICH, SWITZERLAND.

## PROCESS OF MAKING ARTIFICIAL SANDSTONE.

SPECIFICATION forming part of Letters Patent No. 683,337, dated September 24, 1901.

Application filed June 23, 1899. Serial No. 721,666. (No specimens.)

*To all whom it may concern:*

Be it known that I, WALTER SCHULTHESS, a citizen of the Republic of Switzerland, residing at Zurich, Switzerland, have invented certain new and useful Improvements in Processes of Making Artificial Sandstone, (for which I have filed patents in Hungary on the 26th of May, 1899, application No. 7,947; in Great Britain on the 24th of May, 1899, No. 10,904; in Austria on the 15th of May, 1899; in Germany on the 15th of May, 1899; in France on the 15th of May, 1899, application No. 276,800; in Belgium on the 15th of May, 1899, application No. 112,051, and in Italy on the 15th of May, 1899;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

My invention has relation to the art of making artificial stone, and more especially to the manufacture of artificial sandstone composed of sand and pulverized slaked lime.

In the manufacture of artificial stone from sand and lime compounds the compound has before my invention been subjected either to the action of steam under pressure or to the action of hot water in order to form the calcium silicate necessary to the binding of the compound. In the use of steam or hot water it has been deemed essential to use the steam or water under sufficient pressure, so as to more readily permeate the composition. It has also been proposed to use steam or hot water whether under pressure or not. I have, however, discovered that the temperature of the steam is an essential factor in the formation of the calcium silicate by the reaction of heat and moisture upon the silicic acid and lime and that the pressure of the reacting fluid has nothing whatever to do with said reaction, and to this end I superheat the steam and cause it to react upon the stone composition at atmospheric pressure. In this manner I not only obtain a thoroughly agglomerated final product, but am enabled to expedite the reaction and reduce the cost of pro-

duction, and also to use apparatus of greater simplicity than those heretofore used.

The invention consists, therefore, in the mode or process of producing the necessary reactions to form calcium silicate by exposing the previously-molded green blocks to the action of superheated low-pressure steam—that is to say, to the action of saturated steam at about atmospheric pressure and at a temperature above that of steam at atmospheric pressure—i. e., above 100° centigrade. The temperature of saturated steam at atmospheric pressure at the sea-level is, as is well known, 100° centigrade, so that this temperature will necessarily vary according to the altitude at which the process is or may be carried out.

The invention may be carried out in any desired manner. I have, however, devised an apparatus whereby the process can be carried out effectually, conveniently, and economically, and which I will now describe, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of said apparatus on the line A A of Fig. 3. Fig. 2 is a cross-section on line B B of said Fig. 3 looking from right to left. Fig. 3 is a horizontal section taken in part on a line above the truck and in part on a line through the truck body or platform, and Fig. 4 is a longitudinal section through said truck on line C C of Fig. 3.

The apparatus comprises a housing 8, constructed of a material that is a poor conductor of heat, and is provided with a gable-roof and lined throughout with sheet metal, said roof serving to direct the water of condensation to the vertical walls and thence to the floor 13 of the housing. The floor 13 is preferably made of sheet metal laid on a suitable foundation (not shown) and is longer and wider than the housing 8, which is merely set thereon, and said floor has a vertical encompassing flange 10, so as to hold sufficient water within and about the said housing to form a seal at the foot thereof, the excess of water being drained from within the housing and from the encompassing channel through gooseneck-pipes 34 and 33, respectively. The



housing 8 has a gate 35 and is divided by a casing 1, open at top, into two concentric chambers 9 and 11, the latter chamber constituting the steaming-chamber and the former a mere encompassing channel to conduct the water of condensation to the floor 13, said internal chamber 11 being provided with a gate 36, facing the gate 35 of housing 8. On the floor 13 are laid track-rails 15 for the wheels 12 of a truck, on which the green previously-molded blocks of sandstone are piled, preferably on cross-rails 2, U-shaped in cross-section, said rails and the blocks piled thereon being suitably spaced to form passages for the superheated steam issuing from the truck platform or body, as hereinafter explained. The body or platform of the truck is of slightly-less length and width than the length and width of the chamber 11, to the vertical walls of which are secured angle-plates 50, Fig. 2, which, together with said platform, serve to divide the casing 1 into the steaming-chamber 11 above the truck and into a steam-receiving chamber 23 below said truck, said angle-plates 50 fitting around the truck-platform sufficiently close to prevent as much steam as possible from escaping from the chamber 23 around said platform. In the chamber 23 are arranged perforated coils of pipe 22, whose terminals are connected with a suitable source of low-pressure steam-supply for supplying steam of a temperature of about 100° to chamber 23. The truck-body is a sheet-metal casing, the lower or bottom plate or plates 28 of which are secured to cross-girders 24, carried by longitudinal girders 25. The truck-platform is divided longitudinally by vertical partitions into superheating-chambers 16, a similar chamber 30 being formed on the line of the wheels 12 between each pair of such. In said chambers 16 and 30 are arranged superheating-coils 17, whose terminals are secured in the upper and lower platform-plates 26 and 28 and open into the receiver-chamber 23 and steaming-chamber 11, the wheels 12, which project above the truck-body, being housed in at top, as shown at 27, and have their bearings in the longitudinal girders 25, which also serve as partition-walls for the contiguous superheating-chambers 16, as clearly shown in Fig. 3. The chambers 16 are connected in pairs by pipes 19, while the chambers 30 are connected with contiguous chambers 16 by pipes 31, a heating medium of a sufficiently higher temperature to superheat the steam as it flows from chamber 23 through coils 17 into chamber 11 being supplied to the central chambers 16 through pipe 18, whence it flows through pipes 19 to the outer chambers and through pipes 31 to the chambers 30 and out of said outer chambers 16 through pipes 20, there

being an auxiliary supply-pipe 21 in communication with the superheating-chambers to supply the same with a superheating fluid.

The operation of the described apparatus may be briefly described as follows: Steam at atmospheric pressure, hence at a temperature of 100° centigrade or below, according to altitude at which the process is carried out, is supplied to chamber 23 and a superheating medium to the chambers 16 and 30. The steam as it flows through the coils 17 becomes superheated without increasing its pressure and flows from the coils among the green blocks of artificial sandstone composition, reacting upon their constituents to form calcium silicate, and thereby bind said constituents. If the composition from which the blocks are molded consists, essentially, of calcium carbonate and is therefore deficient in silicic acid, I add the latter in suitable proportions, so as to produce the necessary amount of calcium silicates.

I do not claim herein the apparatus for carrying out my process, as this forms the subject-matter of a divisional application, filed June 4, 1900, Serial No. 19,060.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In the art of making artificial stone from compounds containing silicic acid and calcium hydroxid (slaked lime) the improvement which consists in subjecting the previously-molded compound in a confined space to the action of low-pressure superheated steam, for the purpose set forth.

2. In the art of making artificial stone from compounds containing silicic acid and calcium hydroxid (slaked lime), the improvement which consists in subjecting the previously-molded compound in a confined space to the action of superheated steam at about atmospheric pressure, for the purposes set forth.

3. In the art of making artificial stone from compounds containing silicic acid and calcium hydroxid (slaked lime), the improvement which consists in heating steam of normal temperature to a temperature above 100° centigrade, allowing such steam to expand to about atmospheric pressure into a confined space containing the previously-molded compound, and subjecting the latter to the action of the superheated steam at about atmospheric pressure for a suitable length of time, for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

WALTER SCHULTHESS.

Witnesses:

MOROTZ VEITH,  
A. M. LIEBERKNECHT.