W. J. DE BAS.

PROCESS OF PRODUCING ARTIFICIAL STONE.

APPLICATION FILED DEC. 14, 1918.

1,390,244.

Patented Sept. 6, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

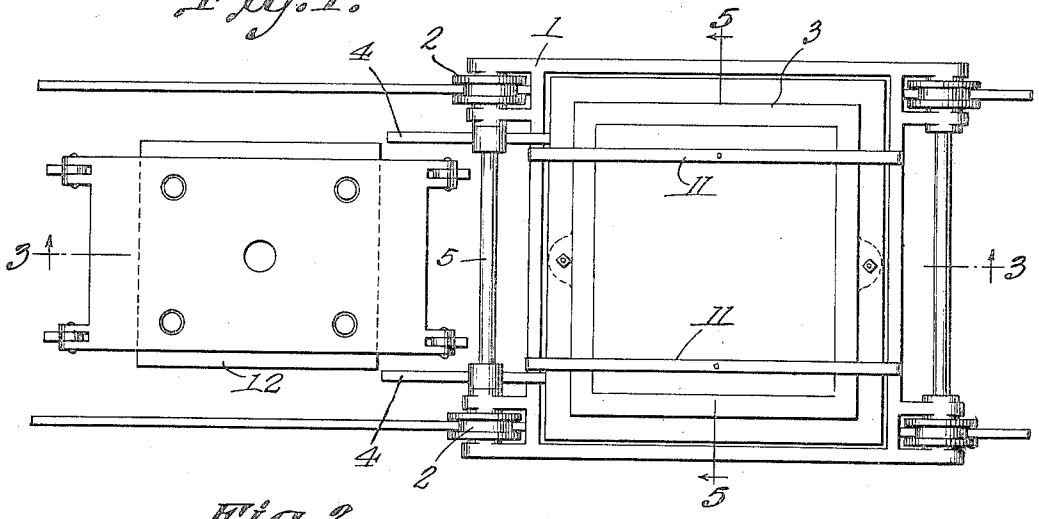


Fig. 2.

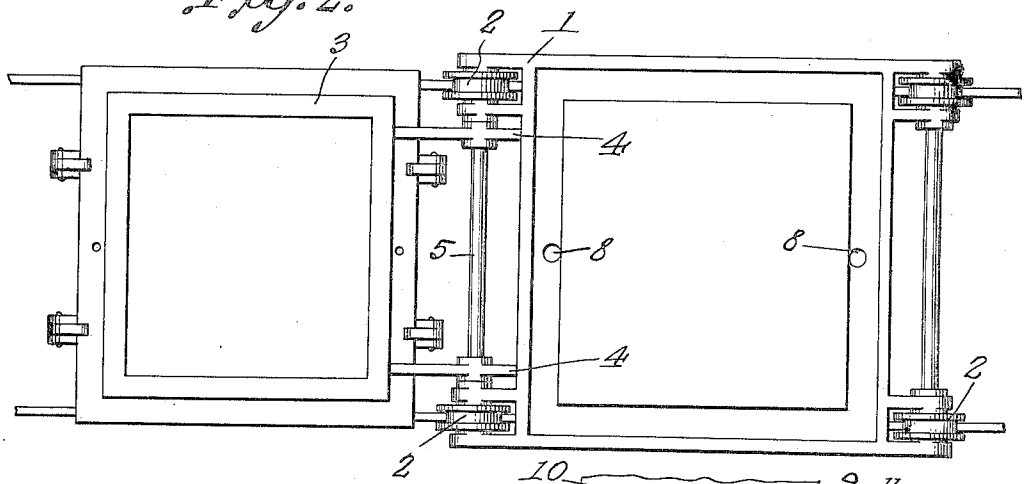
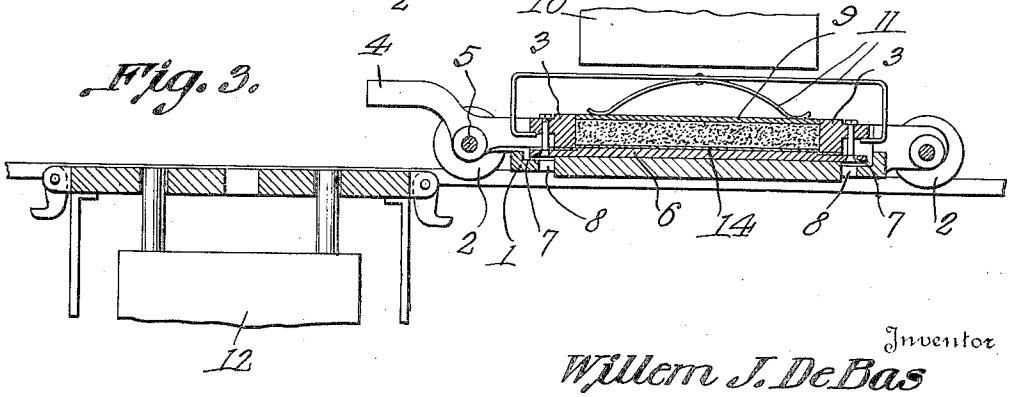


Fig. 3.



Inventor

Willem J. DeBas

By Norman J. Whitaker

his Attorney

W. J. DE BAS.

PROCESS OF PRODUCING ARTIFICIAL STONE.

APPLICATION FILED DEC. 14, 1918.

1,390,244.

Patented Sept. 6, 1921.

2 SHEETS—SHEET 2.

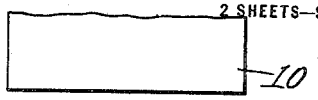


Fig. 4.

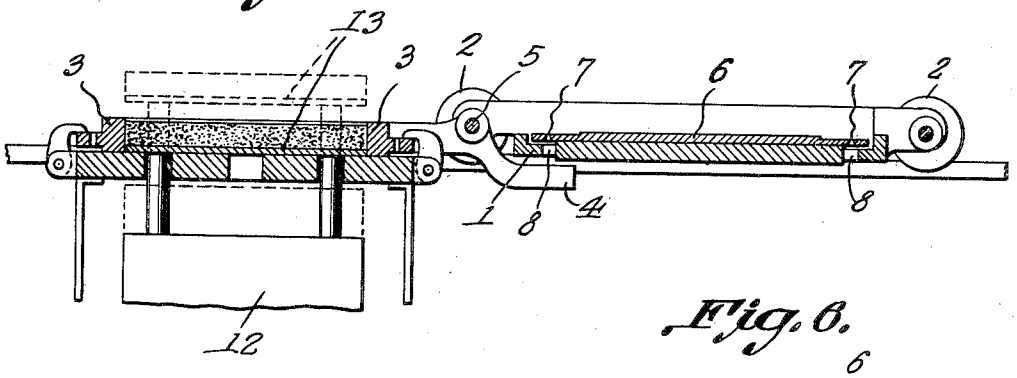


Fig. 6.

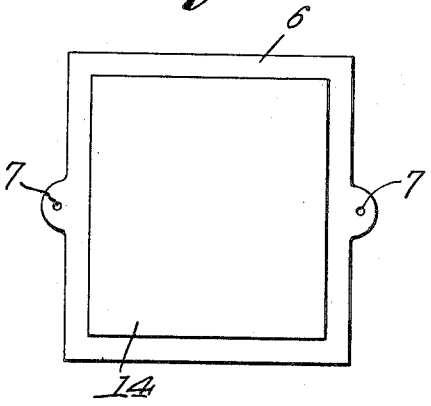


Fig. 5.

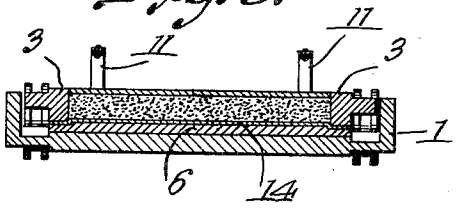
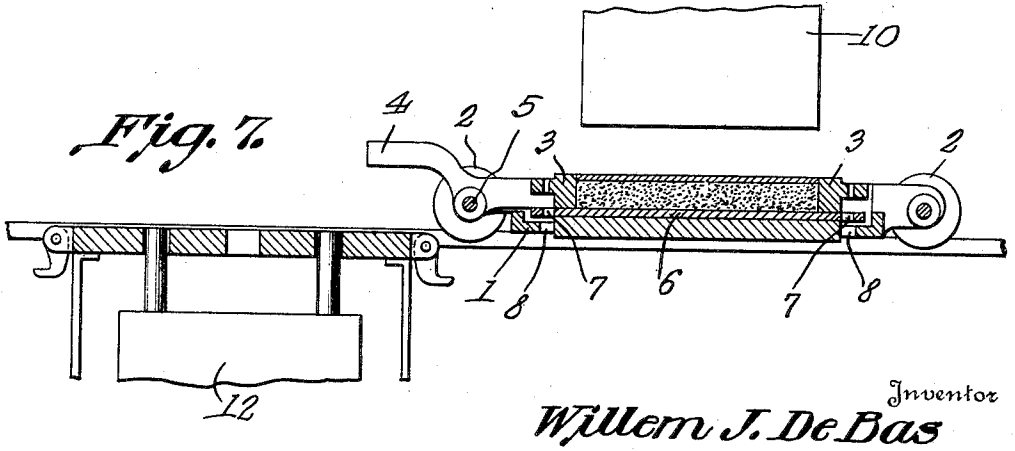


Fig. 7.



Inventor

Willem J. De Bas

By Norman J. Whitaker

his Attorney

UNITED STATES PATENT OFFICE.

WILLEM JACOBUS DE BAS, OF THE HAGUE, NETHERLANDS.

PROCESS OF PRODUCING ARTIFICIAL STONE.

1,390,244. Specification of Letters Patent. Patented Sept. 6, 1921.

Application filed December 14, 1918. Serial No. 266,790.

To all whom it may concern:

Be it known that I, WILLEM JACOBUS DE BAS, manufacturer, residing at The Hague, Kingdom of the Netherlands, have invented certain new and useful Improvements in a Process of Producing Artificial Stone, for which I have filed applications in Netherlands, filed Apr. 2, 1917, No. 8024 Ned; Germany, filed July 24, 1918; Hungary, filed Aug. 9, 1918; France, filed Sept. 23, 1918; Sweden, filed Oct. 5, 1918; Denmark, filed Sept. 6, 1918, and of which the following is a specification.

Processes are already known for the construction of slabs or blocks or objects of other shape from artificial stone, for example from a mixture consisting of cement and sand, in such a manner that the surface layer, in the production of slabs of artificial stone, is worked up in a pasty condition, and a further development of this process is also known by means of which the veinings, mottlings or other markings of the natural stone are imitated in these artificial stone slabs or blocks.

These above mentioned known processes are carried out as follows:—The bottom of the mold which serves for the construction or molding of the slabs or blocks of artificial stone is covered with a plate of mica or aluminium. The design (veining, mottling or other marking) is then modeled in cement or other artificial stone mixture, by hand or by means of stencil plates, on this mica or aluminium foundation. The mold is then filled up with the filling mixture and the block is finally compressed at the high pressure of about 250 kilograms per square centimeter.

In the finished slabs or blocks or other artificial shapes fastened to the wall or floor, that side of the artificial slab which during production rested on the mica or aluminium plate is the decorative surface turned toward the spectator, while in slabs or blocks the filling mixture forms the back of the same which is built into the floor or the wall.

These known processes are, however, inseparable from the disadvantage that the patterns proper to the natural stone and characteristic of the same, or those which occur in mosaic or tessellation, cannot be reproduced in these artificial stone mixtures in a manner which imitates in a natural manner the most diversely constituted patterns of the natural stone, so that the objects constructed in accordance with these known processes always exhibit the appearance of an artificial product with hard lines.

Now the subject-matter of the present invention resides in a process which overcomes these disadvantages and renders possible the construction of a product which exhibits in its pattern the markings and veining of the natural stone, and insures the softness of line with imitation true to nature.

The characteristic features of the process are as follows:—

First. That, as opposed to the methods hitherto employed, according to which the pattern is artificially modeled in the ground mixture, in consequence of which the lines produced always have a stiff or set appearance, the pattern is according to the present invention produced by the deposition, by throwing or squirting, on a foundation in a pasty condition the color of which corresponds to that of the veining, marbling or other pattern to be reproduced, of a mixture, likewise in a moist or pasty condition, to which have been added those colors that are to produce the ground color of the artificial stone, so that the liquid or pasty coloring materials of the foundation and those of the mixture thrown or squirted thereon run into each other in a natural manner. By this natural running one into the other there is then actually produced a pattern which corresponds to that of the natural stone and which is not so hard and stiff in pattern as are the slabs in which the markings are formed by rigidly defined and rigidy modeled contours of the cement mixture.

Second. A further characteristic feature of the present invention consists in the fact that on this double layer, consisting of the colored ground layer and the second layer squirted or thrown thereon and consisting of artificial stone mixture and coloring material, there is deposited the mixture which serves to fill the mold, and that the whole is compressed twice or several times in succession.

The result attained by this is that the first or ground layer—the color of which as already mentioned corresponds to the coloring of the pattern to be reproduced—is penetrated by the coloring layer which has been thrown or squirted thereon; and this penetration or diffusion is increased by the fact

that according to the present invention the mixture is twice or repeatedly compressed.

Third. The third characteristic feature consists in the fact that the process is carried out in stages with upwardly stepped pressures or pressures increased step by step, that is to say, that the second and subsequent compressions are each higher than the one next preceding.

Fourth. Observation has taught that the coloring tones are somewhat forced back into the interior of the pasty mixture. Now the further characteristic feature of the invention consists in the fact that in order to make the color tones stand out distinctly and forcibly and in order to attain sharp color tones the surface layer is stripped off; that is to say a thin skin of the same is removed.

Both the first ground layer and also the layer thrown or squirted thereon are formed of an artificial stone mixture, cement and sand for example. To both are then added the coloring materials which are to serve for the imitation of the desired color of a natural stone. Herein, as already mentioned, the color which is added to the lowest layer in the block, which lowest layer forms in the finished product the top side or that surface which is turned to view, serves for the production of the marking or other pattern of the artificial stone, while the coloring material which was added to the mixture squirted or thrown thereon serves for the formation of the ground color of the artificial stone.

The fact that, according to the present invention, one works with a pasty, that is to say, a moist surface or ground layer, as opposed to the known methods that are carried out with a dry surface or dry ground layer, necessitates the adoption of another method of working and the employment of other mechanical contrivances for carrying out the process. This is to be explained by the fact that the moist surface or ground layer adheres to the bottom plate and must be released therefrom in a special manner if the molded object (slab, block or the like) which is to be produced is to be maintained in a perfect condition.

This release may, in accordance with the present invention, be accomplished in various ways, by the arrangement, for example, of a bottom plate capable of moving backward and forward which after the first compression is appropriately moved slightly backward and forward in relation to the side walls, or by the employment of a cloth or an auxiliary surface consisting of a yielding, elastic material impervious to water, of rubber, for example, or oilskin, linen, silk, cotton or the like with which the bottom plate of the compression mold is covered before the deposition of the pasty artificial mixture, which auxiliary surface is then clamped tight between the bottom plate and the side walls of the mold.

The advantage of the employment of this yielding auxiliary surface consists in the fact that it is easily loosened from the mixture after the first compression of the same and can be removed from the block without any risk or injury to the compression by stripping it off like a skin after turning over the mold to the extent of 180 degrees and after the removal of the bottom plate.

Experiments have shown that a mold the bottom of which is covered with a plate of mica or aluminium cannot be employed at all for carrying out the process in accordance with the present invention because on the removal of this plate after the first compression such large portions of the surface layer would be torn away with it that any repair of the same would no longer be possible.

The danger also arises that, with the employment of such high pressures as are needed by the present invention, the mica plate may break and portions thereof penetrate into the block.

Below are explained more in detail by way of example two methods of working the process in accordance with the present invention, and in the accompanying drawing is illustrated a compression mold which can be employed for carrying out the process.

Figure 1 is a top plan view showing the mold in closed or press engaging position,

Fig. 2 is a top plan view showing the mold in open position,

Fig. 3 is a longitudinal section on line 3—3 of Fig. 1,

Fig. 4 is a similar view showing the mold in open position,

Fig. 5 is a section on line 5—5 of Fig. 1,

Fig. 6 is a detail of the bottom plate, and

Fig. 7 is a longitudinal section showing a slightly modified form of the invention.

1 represents the cradle on which rests the mechanical compression mold and which can be moved into the press by means of rollers 2.

3 represents the side walls of the mold forming a frame. This frame can be turned about the shaft 5 by means of the stirrup or lever 4. 6 indicates the bottom plate of the compression mold which has holes 7 that lie opposite to the openings 8 arranged in the bottom of the cradle 1.

First example of working the process.

In this example is to be described the process for the construction of slabs or blocks with a surface layer exhibiting sharply defined patterns.

The bottom plate 6 is first covered with a yielding auxiliary surface 14 impervious to air and the frame 3 is set on the bottom in such a way that this auxiliary surface is

clamped tight between the frame and the bottom plate. Then (as opposed to the processes hitherto in use in which the veinings are modeled in the artificial stone mixture on the bottom of the compression mold in the design which the finished product is to exhibit) the formation of the veining or pattern is according to the present process—without regard to the final form of the markings or veining of the artificial stone slab or block or other molded shape to be constructed—effected in such a manner that there is first deposited on the bottom of the compression mold a thin pasty mixture to which is imparted, by the addition of appropriate colors, the coloring which the veinings or other patterns in the finished product are to exhibit.

This mixture consists of cement and sand or other suitable materials which are stirred up with water and to which are added suitable coloring materials appropriate to the markings desired.

On to the layer thus formed is then forcibly thrown, or squirted a second mixture which likewise consists of a suitable artificial stone mixture, the same for example as the first, to which second mixture, however, there are added those colors which are to form the ground color of the finished plate. The throwing or squirting of the second layer is preferably accomplished by means of metallic brushes, the form and size of which is appropriately selected according to the form and size of the veinings or other pattern to be reproduced.

These two layers form the surface layer of the wall slabs, blocks or other molded shapes to be constructed. After this surface layer has been formed in the compression mold in the manner described, the latter is filled up to the necessary height with powdery mortar and then preferably covered with a covering plate 9 which fills up the compression mold or the frame 3, and the mold is, either with or without the employment of this plate, subjected to a suitable high pressure, from 100 to 200 kilograms per square centimeter for example. After the pressing has been effected the compression mold is removed from the press 10, wheeled out for example, a covering plate is put on to the mixture if such a plate was not employed during the process of pressing, and the block is turned over by the help of this press plate. This turning over is for the purpose of exposing the surface layer which in the finished product is turned to view, and of improving it by grinding, planing, cutting or stripping it off or subjecting it to any other suitable treatment according as practice may render necessary.

Stripping off is particularly desirable in all cases where it is a question of obtaining a product with a sharp pattern. Without such stripping (cutting or grinding off) of the surface layer, markings are obtained of a more blurred or flat tone and color.

In order that when the frame 3 is turned over the block may be retained in the frame, the covering plate may be subjected to the influence of appropriately strong springs 11. For the purpose of stripping the surface layer the frame 3 together with the covering plate of the block situated therein and the auxiliary surface are turned through 180 degrees by means of the stirrup or lever 4 in such a manner that the covering plate comes to lie at the bottom and that the auxiliary surface rests on the frame. This can then be stripped off like a skin so that the surface layer is brought into view and can be further treated as desired.

In the case of the employment of a covering plate subjected to the influence of the springs 11 the block will in consequence of the yielding and compressibility of the auxiliary surface be pressed out upward by the action of the springs 11, so that it becomes possible to remove the thin layer from the surface layer. If, however, a covering plate is employed which is not subjected to the influence of the springs 11, or if these springs 11 employed in connection with the covering plate are not sufficiently strong, the block must in its inverted position be elevated by an appropriately arranged second press plunger 12 in such a manner that its upper surface will project slightly above the frame and can then be stripped or ground off.

The technical effect which is attained by the throwing or squirting of the second colored layer forming the ground tone of the artificial stone or the like which is to be produced consists in the fact that this layer to a great extent displaces the first and actual ground mixture and sucks it up into itself, thus giving rise to a pattern in the finished product characteristic of the natural stone, mosaic or tessellation, and imitating nature in a most illusive manner. The sharply defined pattern is in reality forced back from the extreme outer surface more toward the interior of the material and in order to bring this into view the above mentioned stripping or grinding off of a thin layer of the extreme outer surface layer is necessary.

After the removal of this thin outer layer by stripping, cutting, planing or the like, the frame together with the contained block is again turned back through 180 degrees so that the covering plate 9 again rests on the frame.

The springs 11 acting on the covering plate are now removed and the mold is a second time introduced into the press where the block is subjected to a second compression at a pressure of some 200 to 300 kilograms per square centimeter.

The process is therefore worked with upwardly stepped pressures or pressure increased step by step.

All irregularities caused at the outer surface of the surface layer by stripping or the like are removed by this second compression.

At the second compression the employment of the auxiliary surface is in general no longer necessary because there is in general no further danger of a portion of the block adhering to the press plunger.

After the completion of the second compression the compression mold is again removed from the press, and the block if necessary again covered with a covering plate, and again turned through 180 degrees so that the surface layer is again placed uppermost with the compression mold resting on the second press plunger arranged by the side of the first. The block is then covered with a plate of glass 13, is pressed upward out of the frame, and after another reversal through 180 degrees the block is removed from the machine with the glass plate and is allowed to rest on the glass plate until it has reached the necessary degree of setting.

Second example of working the process.

According to the second example the process is characterized by the fact, that in order to guard against the adhesion of the block to the bottom of the compression mold, the bottom is arranged to be horizontally movable in the compression mold. In order to accomplish the second or repeated compression of the still unset material, which as already explained is an essential condition for the complete penetration of the two superposed color-containing layers, the block must after the first and each subsequent compression be loosened from the bottom of the compression mold in order to guard against adhesion and injury. According to the second method of working this loosening is effected simply by the lateral movement of the bottom, the compression frame being stationary, or by the displacement of the frame of the compression mold if the bottom is stationary, or finally by making bottom and compression frame movable one against the other.

This second process is preferably employed when it is not intended to produce slabs or blocks with sharp patterns; as for the production of the latter the reversal of the block after the first compression and the stripping off of its upper layer is necessary. But in order to render this possible the yielding surface according to the first example of working is preferably employed. The process is very much simplified by the second method and in practice it is worked in the following manner:

After the bottom plate has been laid on the cradle 1 and the frame 3 deposited on this plate, the mold thus formed is filled in the manner described in the first example and covered with a covering plate; the cradle, bottom plate, frame and covering plate, and the mixture to be molded contained between them are then introduced into the press and compressed at a pressure of from 100 to 200 kilograms per square centimeter. After the first compression rods are put through the openings 7 and 8 of the cradle and the bottom plate 6, by means of which the latter is repeatedly moved backward and forward in relation to the frame 3.

The bottom plate 6, which in this example of working is not fastened to the frame 3, remains on the cradle and does not turn with the frame. The slab, which after being turned through 180 degrees rests on the cover plate, is now by means of the second press plunger pressed upward out of the mold together with the cover plate, and can be left to set.

The movement of the bottom plate 6 may take place while the compression mold is in the press; the removal of the mold from the press is not necessary for this purpose and the movement can be imparted thereto as soon as the compression mold ceases to be under pressure. After the completion of the backward and forward movement of the bottom plate 6, and of the loosening of the slab thereby effected, the latter is compressed a second time, but this time at an increased pressure, 200 to 300 kilograms per square centimeter for example, and this pressure can in case of need be repeated at the same or a greater intensity. The slab is then ready for setting.

The slab thus constructed already possesses so much solidity that it may be turned over with the bottom plate. This is effected in the following manner: After the reduction to atmospheric pressure the frame 3, with the covering plate attached thereto, and with the slab, is first turned through 180 degrees by the help of the stirrup or lever 4, so that the slab with the covering plate rests on the above mentioned second press plunger arranged by the side of the first, the surface layer being thus brought uppermost.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for imitating the veinings, mottlings and other markings of natural stone, mosaic and tessellation in slabs and blocks from artificial stone, the said slabs or blocks being made of cement and sand with a surface layer, worked up in a pasty condition, and which consists in applying to the bottom of the mold an elastic yieldable fabric, impervious to water and air, and in applying to the said fabric a thin

layer of cement, containing the colors of the veinings and mottlings to be produced, and which consists further in throwing or squirting a paste of cement containing the colors of the fundamental color, consisting further in applying another layer of cement, forming the back part of the slab or block, submitting the said mass to two or more pressing actions, removing after the first pressing action the said fabric.

2. A process for imitating the veinings, mottlings and other markings of natural stone, mosaic and tessellation in slabs or blocks from artificial stone, the said slabs or blocks being made of cement and sand with a surface layer, worked up in a pasty condition, and which consists in applying to the bottom of the mold an elastic yieldable fabric, impervious to water and air, and in applying to the said fabric a thin layer of cement, containing the colors of the veinings and mottlings to be produced, and which consists further in throwing or squirting a paste of cement containing the colors of the fundamental color, consisting further in applying another layer of cement, forming the back part of the slab or block, submitting the said mass to two or more pressing actions, removing after the first pressing action a thin skin of the surface layer for causing sharply to appear the veinings, mottlings and other markings of the stone, slab or block.

3. A process for the production of artificial stone having the characteristic markings of the natural product, the feature of which is that on to a pasty mixture, to which are added such colors as are intended to impart the color graduations of the pattern to be reproduced, there is thrown or squirted a similar pasty mixture which contains those colors that are to form the ground color of the artificial stone mixture to be reproduced, after which the mixture is compressed twice or more often for the purpose of causing the complete penetration and diffusion of the colors, and stripping off a thin outer layer of the material after the first compression thereof and prior to the second compression in order to make the color-tones that have been forced back into the interior of the mixture stand out more sharply and become more clearly defined.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLEM JACOBUS DE BAS.

Witnesses:

H. SCHRAMDEFONG,

C. L. W. RESTEREN.