

No. 829,012.

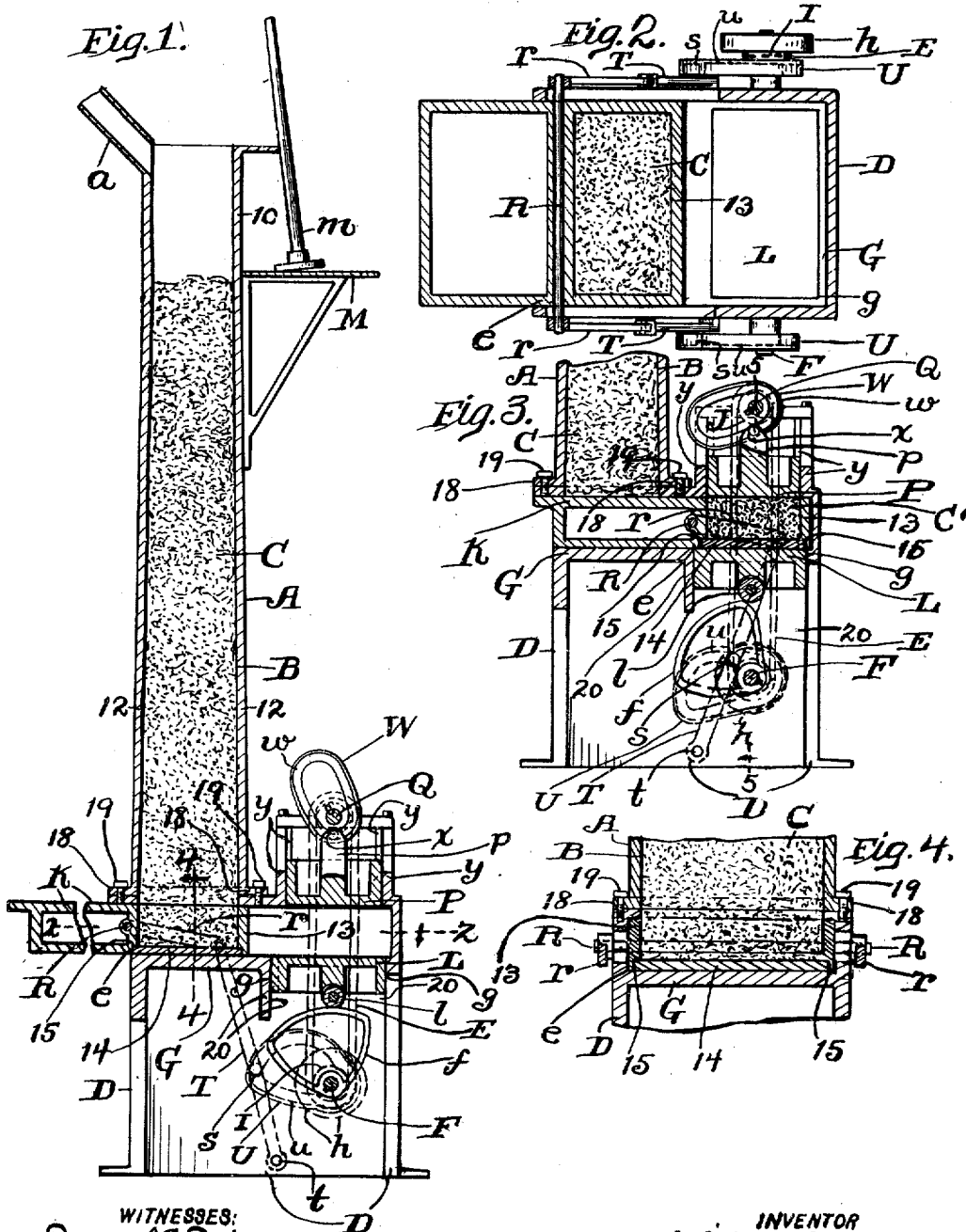
PATENTED AUG. 21, 1906.

W. E. JAQUES.

ART OF MAKING CEMENTITIOUS PRODUCTS OR ARTIFICIAL STONE.

APPLICATION FILED JAN. 2, 1904.

2 SHEETS—SHEET 1.



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Fig. 5.

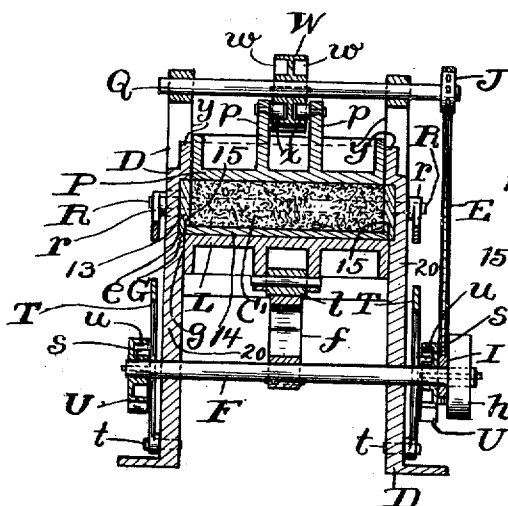
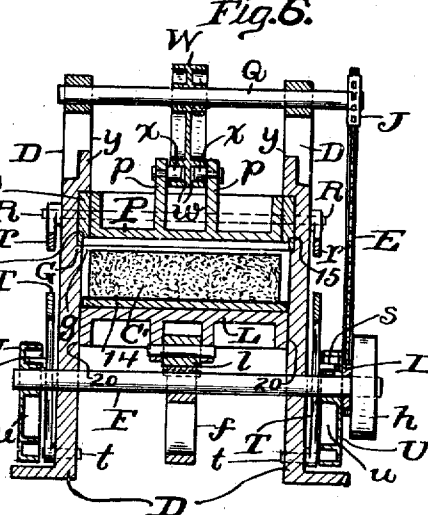


Fig. 6.



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ART OF MAKING CEMENTITIOUS PRODUCTS OR ARTIFICIAL STONE.

No. 829,012.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed January 2, 1904. Serial No. 187,518.

To all whom it may concern:

Be it known that I, WILLIAM E. JAKUES, a citizen of the United States of America, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in the Art of Making Cementitious Products or Artificial Stone; and I 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 pertains to make and use the same.

This invention relates to improvements in the art of making cementitious products or artificial stone, and pertains more especially to an improved method or process of making cementitious bricks or products by first forming a vertically-arranged moist and unset cementitious column of predetermined dimensions cross-sectionally and utilizing the weight of the said column in compacting the materials composing the column, then removing blocks or sections successively from the lower end of the said column, then permitting the said blocks or sections to harden to render them suitable for use, and then, if desired, cutting or subdividing the said blocks or sections into bricks or the like.

One object of this invention is to closely compact the particles of the moist and unset cementitious mass formed for the manufacture of cementitious products or artificial stone and to accommodate the use of material that is wet enough and to supply the said mass to the interior chamber or passage-way of a vertically-arranged tubular material-conducting shaft having the cross-sectional dimensions required to form a predetermined number of bricks or the like by the subdivision of the blocks or sections successively removed from the lower end of the cementitious column formed in and by the said shaft.

Another object is to utilize the weight of the cementitious column within the material-conducting shaft to compact the particles forming the said column and to remove blocks or sections successively from the lower end of the said column and to add enough fresh cementitious material to the upper end of the column to accommodate the successive removal of blocks or sections from the lower end of the column.

Another object is to permit the lower end of the cementitious column in order to form the block or section next to be removed

from the lower end of the said column to descend into the interior chamber of a drawer having a removable pallet-forming bottom and to snugly fill the said chamber and be confined upon the said bottom or pallet, then to sever and remove the compacted mass contained in the said chamber horizontally from the remainder of the column and supporting the said remainder during the removal of a block or section from the lower end of the column.

Another object is to mechanically tamp the material as it is added to the upper end of the cementitious column.

Another object is to desirably, efficiently, and economically operate upon an adequately wet and unset cementitious mass and to employ enough cementitious slurry or cement and moisture to incase with cement or cementitious substance each particle of sand in the mass, and not only each particle of sand as contained in the original mass, but also each subdivision of the particles of sand broken up during the compacting of the mass within the shaft, so as to cause any naked surfaces resulting from such breaking up of particles of sand to be coated with cement or cementitious substance.

With these objects in view and to the end of realizing other advantages hereinafter appearing this invention consists in the steps or process hereinafter described, and pointed out in the claims.

My invention broadly comprises the formation of an upright column of moist and unset cementitious material, adding to one end of the column to lengthen the latter, and severing and removing sections successively from the opposite end of the said column to form cementitious products.

In the accompanying drawings, Figure 1 is a side elevation, largely in vertical section, of apparatus suitable for use in carrying out my improved process, and portions are broken away in this figure to reduce the size of the drawings. Fig. 2 is a top plan in section on line 2 2, Fig. 1. Fig. 3 is a side elevation, largely in section, of the lower portion of the apparatus and illustrates the removal of a block or section from the lower end of the cementitious column. Fig. 4 is a vertical section on line 4 4, Fig. 1, looking in the direction indicated by the arrow. Fig. 5 is a vertical section on line 5 5, Fig. 3, looking in the direction indicated by the arrow. Fig. 6 is

a vertical section corresponding with Fig. 5, except that in Fig. 6 the block or section severed and removed from the lower end of the cementitious column is shown lowered.

5 Referring to the said drawings, A designates a vertically-arranged hollow column, shaft, or tube, which will hereinafter in this specification be referred to as a "shaft."

10 The interior chamber or passage-way B of the shaft A extends from the upper extremity to the lower extremity of the shaft. The shaft A is of any suitable height and is preferably high enough to enable the weight of the moist and unset cementitious material, 15 which is fed into the upper end of the shaft, to compact the cementitious mass within the shaft and bring the particles composing the mass into such juxtaposition to each other as to form a mass which is practically non- 20 porous. I have obtained very desirable results with a shaft A six feet high. The passage-way B at its upper end and at one side communicates with a feed-spout *a*, by and through which suitably-prepared cementitious material is fed to the said passage-way. 25

The upper portion 10 of the shaft A between the upper extremity of the shaft and at a point a short distance below the said extremity is preferably uniform in cross-section, 30 whereas opposite side walls of the remainder of the said shaft, as shown in Fig. 1, diverge slightly downwardly to the lower extremity of the shaft where the latter is adapted to discharge into the interior chamber of a drawer *e*, which is movable laterally in a 35 horizontal plane next below the said shaft. It will be observed that the shaft A is gradually enlarged, therefore, toward its lower end, and the passage-way B at the lower extremity of the shaft has the cross-sectional dimensions required to form a predetermined number of bricks on edge. A cementitious 40 column C is shown formed within the shaft A.

The drawer *e* may be actuated by hand or 45 in any other approved manner. The drawer *e* is formed by a case 13, whose interior chamber is open at the top, and the bottom of the said chamber is removable downwardly, as will hereinafter appear, forming a pallet 14, 50 which in its drawer-bottom-forming or upper position closes the said chamber from below and engages rabbets 15, formed in the lower end of the case 13, as shown in Figs. 1, 3, 4, and 5. The interior chamber of the drawer 55 *e* has the dimensions required to hold a cementitious block or section capable of being subdivided into a predetermined number of bricks on edge and is in line or out of line vertically with the shaft A, according as the 60 drawer is in one or the other of its two positions. The drawer *e* rests and is movable upon a stationary table G, which is arranged just far enough below the lower and discharging extremity of the shaft A to accom- 65 modate the interposition of the said drawer

between the said extremity and the said table. The interior chamber of the drawer *e* and the discharging extremity of the passage-way B exactly correspond in dimensions horizontally and are in exact registry 70 when the drawer is in position in line vertically with the said shaft. Suppose the drawer *e* is quadrangular in plan and is large enough in dimensions horizontally and deep enough vertically to hold a cementitious 75 block or section divisible into eight ordinary bricks on edge. The interior chamber of the drawer would then be four inches deep vertically, about sixteen inches long, and eight inches wide, and the discharging extremity of 80 the passage-way B of the shaft A would then in dimensions horizontally measure about sixteen inches one way and eight inches the other way. The drawer *e* when in position 85 registering with the passage-way B, as shown in Figs. 1 and 4, forms a downward extension of the said passage-way and permits the cementitious column C, formed in and by the shaft A when the said column is not supported 90 at the lower end of the shaft, to descend by gravity into and fill the drawer, and the slight downward enlargement of the said passage-way facilitates the descent of the said column by gravity. The downward enlargement of the passage-way B is exaggera- 95 tively shown in Fig. 1. The drawer *e* is provided at one side and at the top with a cut-off-forming gate K, which is arranged in a horizontal plane.

The stationary table G is provided at one 100 side of the shaft A with an opening *g*, extending vertically through the said table and just large enough in dimensions to render it capable of receiving a vertically-reciprocating table L, and the stationary framework D of 105 the machine, which bears the stationary table G, is provided with vertically-arranged guides 20 for the movable table L. The latter is provided at its under side with a roller *l*, which engages the peripheral cam-forming 110 surface of a cam-wheel *f*, operatively mounted on a horizontally-arranged shaft F, which is supported from the framework D and operatively provided with a driving-wheel *h*, to which power is applied in any approved 115 manner.

It will be observed that the stationary table G surrounds the path of the movable table L, and the relative arrangement of the parts is such that the movable table in its up- 120 per position is flush on top with the stationary table; that the removable pallet 14 rests upon the stationary table or upon the movable table, according as the drawer *e* is actuated into the one or the other of its positions 125 upon the stationary table; that the cut-off K covers the passage-way B from below when the drawer is in position with the pallet 14 resting upon the movable table L, as shown in Figs. 3 and 5, and that the said cut-off sup- 130

ports the cementitious column C as soon as the drawer *e* during the actuation of the drawer begins to move from under the shaft A; that the movable table L and the opening 5 formed in the stationary table for the reception of the movable table are large enough in dimensions to cover the pallet from below when the drawer is actuated into its position over the movable table, so that the laden 10 pallet when the drawer is in position over the movable table is ready to be lowered with the movable table to accommodate the removal from the drawer of the pallet and the compacted cementitious mass or product 15 contained in the drawer.

The release of the cementitious product from the drawer *e* during the discharge of the product downwardly from the drawer may be facilitated by a plunger P, capable of 20 movement vertically and arranged to enter the chamber of the drawer from above when the drawer is in position over the path of the movable table.

In Figs. 3, 5, and 6, C' designates the cementitious block or section removed from the column C. The arrangement of the parts is such that in the lower position of the movable table L the laden pallet 14 is free to be removed from between the guides 20 and 30 from in under the drawer and to accommodate the placing upon the said table of an unladen pallet to be elevated into position, forming the bottom of the drawer upon again elevating the movable table into its 35 upper position, whereupon the complete drawer is moved into position below and into line with the shaft A.

Mechanism shown for actuating the drawer *e* comprises two links *r*, arranged at opposite 40 ends, respectively, of the drawer. The links *r* are operatively attached to the upper ends of upright levers T, which are arranged at opposite sides, respectively, of the path of the drawer and fulcrumed horizontally at their 45 lower ends, as at *t*, to the stationary framework D. The levers T are provided with rollers *s*, which engage cam-forming grooves *u*, formed in cam-wheels U, operatively mounted upon the shaft F. The links *r* are 50 horizontally pivoted, as at R, to and longitudinally of the drawer *e*, below the inner end of the cut-off K.

Mechanism shown for operating the plunger P comprises a shaft Q, arranged horizontally above the path of the said plunger 55 and operatively provided with a cam-wheel W, which has cam-forming grooves *w*, engaged by rollers *x*, with which the upwardly-projecting stems *p* of the plunger P are provided. The plunger P is guided during its 60 vertical reciprocation by vertically-arranged guides *y*, which are formed upon or rigid with the stationary framework D of the machine. The shaft Q is operatively connected 65 with the shaft F by an endless chain E, en-

gaging two sprocket-wheels I and J, operatively mounted on the shafts F and Q, respectively.

The vibration of the shaft A, except at its lower extremity, is not objectionable, but 70 rather desirable; but to positively prevent displacement of the said shaft at its lower extremity, out of line with the drawer *e* when the said drawer is in position to receive a compacted cementitious mass, the shaft A is 75 provided at its lower extremity and externally with flanges 18, which are bolted or otherwise rigidly secured, as at 19, to the stationary framework D. The shaft A is shown provided externally of its upper portion 80 with a platform M, and a tamping device *m* (shown resting upon the platform) may be used by an operative or attendant, (not shown,) who, standing on the platform, can by means of the said device tamp the fresh 85 cementitious material added to the upper end of the cementitious column C during my improved process.

The arrangement of parts and the trend of the cam-forming surfaces of the different 90 cam-wheels of the apparatus are such that the actuation of the drawer *e*, table L, and plunger P are accurately timed; that the said drawer is in one of its positions, as already indicated, in registry with the passage-way 95 B; that the pallet-forming bottom of the said drawer is in position upon the table L in the other position of the drawer, as already indicated; that the cut-off K supports the cementitious column C when the drawer is actuated from in under the shaft A; that the least 100 projection of the cut-off in under the passage-way B is sufficient to support the column C, and that therefore the said cut-off is arranged externally of, but just outside of, 105 the said passage-way when the drawer is in its material-receiving position at the lower end of the said passage-way; that the plunger P is not employed as a plunger for the purpose of compressing or compacting the 110 cementitious material because the cementitious mass within the drawer is already adequately compacted; that the said plunger is employed only for the purpose of assisting the release of the compacted mass from within 115 the case 13 of the drawer during the descent of the laden pallet with the table L, and that the said plunger in its upper position is ready to move downwardly into the chamber of the drawer when the drawer is actuated 120 onto the said table, but does not begin to descend until the drawer has been actuated into its position upon the said table, whereupon the plunger and the said table descend 125 together.

A desirable cementitious mass used in making cementitious products or artificial stone by my process is a concrete or composition or compound having hydraulic cement or cementitious substance, sand, and water as in- 130

gredients. The cement and water are first mixed together, so as to form a cementitious slurry, using in said operation more water and more cement than is necessary to effect a setting and hardening of the resulting product. Then the cementitious slurry is added to the sand, ground-rock material, or any similar material—such, for instance, as ground slag—which may be substituted for or added to the sand or rock material, and then the cementitious slurry and the sand or material substituted therefor or added to the sand are thoroughly mixed together.

I would here remark that by the word “sand” as employed hereinafter in this specification I mean not only sand as this word is ordinarily understood, but any material—such, for instance, as cinders and crushed slag or rock material, artificial or natural—which is suitable for use with the cementitious slurry. I use, preferably, about one part of the cementitious slurry, by weight, to two parts of sand. In any event I use more moisture and more cementitious substance than necessary for the number of particles in the original mass of sand used. The mixture of the full quantity of water or moisture with the cement or cementitious substance before the addition of the sand causes each particle of the cement or cementitious substance to be incased by water or moisture, and a thorough mixing of the cementitious slurry and the sand causes each particle of the sand to be incased by the cementitious substance. I would remark also that before commencing to remove cementitious blocks or sections successively from the lower end of the cementitious column C the cut-off K is permitted to remain in or brought into its closing or operative position until the shaft A has been filled with cementitious material, and the weight of the cementitious column C is utilized in compacting material composing the blocks or sections successively removed from the cementitious column. The compacting and feeding of the material within the shaft A may be mechanically assisted by tamping upon the upper portion of the cementitious column C. The fresh material added to the upper end of the column C is preferably tamped upon its addition to the said column.

In operating upon a cementitious mass composed of sand, cement, and water the particles of sand and cementitious slurry, especially when the cementitious slurry contains more liquid than necessary for incasing all of the particles of the sand of the original mass, are quite readily displaced upon each other, and my cementitious mass is therefore unlike plastic clay, which possesses a degree of plasticity and tenacity not possessed by the said cementitious mass.

As the solid particles of the cementitious column C, being formed by and within the

shaft A, are more closely compacted as they descend it is obvious that any quantity of cementitious slurry remaining free in the mass—that is, not already employed in permanently incasing particles of sand with cement—will during the descent of the mass be spread or distributed and caused to reach and coat any surfaces which escaped being previously coated and any new surfaces newly formed upon particles of sand which have resulted from a breaking up of particles of sand during the compacting of the solid particles of the mass within the said shaft.

I would here remark that cement which has not yet set is readily broken or severed, and consequently the blocks or sections successively removed from the lower end of the cementitious column readily separate from the remainder of the column. The laden pallet 14 is conveyed to and left in any convenient place until the material composing the block or section upon the said pallet has set, and the said block or section is allowed to set for several hours, whereupon the said section is cut or subdivided into bricks, and the resulting bricks or subdivisions are removed and stacked in any convenient place to permit them to harden, and are preferably allowed to harden for about a week before they are deemed suitable for use.

The apparatus hereinbefore described and employed in carrying out the process which constitutes the subject-matter of this application forms the subject-matter of a contemporaneous application filed simultaneously with this application.

What I claim is—

1. An improvement in the art of making cementitious products or artificial stone, consisting in the formation of a laterally-supported moist and unset upright cementitious column high enough to render the weight of the material in the column capable of compacting the material in the column to the extent required to form the product to be made; successively removing sections from the said column at the transversely larger end of the shaft, and adding fresh moist and unset cementitious material to the cementitious column at the opposite end of the shaft.

2. An improvement in the art of making cementitious products or artificial stone, consisting in the formation of an upright moist and unset cementitious column containing enough moisture and cement or cementitious substance to incase every particle of sand in the said column with cement or cementitious substance and high enough to render the weight of the material in the column capable of compacting the material in the column to the extent required to form the product to be made; removing sections successively from one end of the said column, and adding like cementitious material to the column at the other end of the column.

3. An improvement in the art of making
cementitious products or artificial stone, con-
sisting in the formation of an upright cemen-
titious column high enough to render the
5 weight of the material in the column capable
of compacting the material in the column to
the extent required to form the product to be
made; removing sections successively from
one end of the said column and adding fresh
10 moist and unset cementitious material to the

column at the other end of the column, then
permitting the separated sections to set, then
subdividing said sections, and then permit-
ting the subdivisions to harden.

In testimony whereof I sign the foregoing 15
specification in the presence of two witnesses.

WILLIAM E. JAQUES.

Witnesses:

C. H. DORER,
G. M. HAYES.