F. F. LANDIS.

MACHINE FOR THE MANUFACTURE OF CONCRETE PRODUCTS.

APPLICATION FILED AUG. 17, 1905.

995,690.

Patented June 20, 1911.

2 SHEETS—SHEET 1.

Fig. 6.

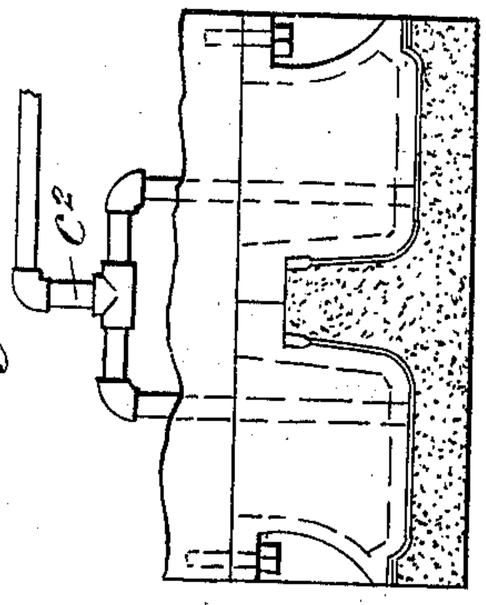


Fig. 1.

Fig. 5.

Witnesses

H. A. LaVarre.

Wm. J. McNally.

Inventor

Frank F. Landis,

By E. W. Bradford.

Attorney

F. F. LANDIS.

MACHINE FOR THE MANUFACTURE OF CONCRETE PRODUCTS.

APPLICATION FILED AUG. 17, 1905.

995,690.

Patented June 20, 1911.

2 SHEETS—SHEET 2.

Fig. 2.

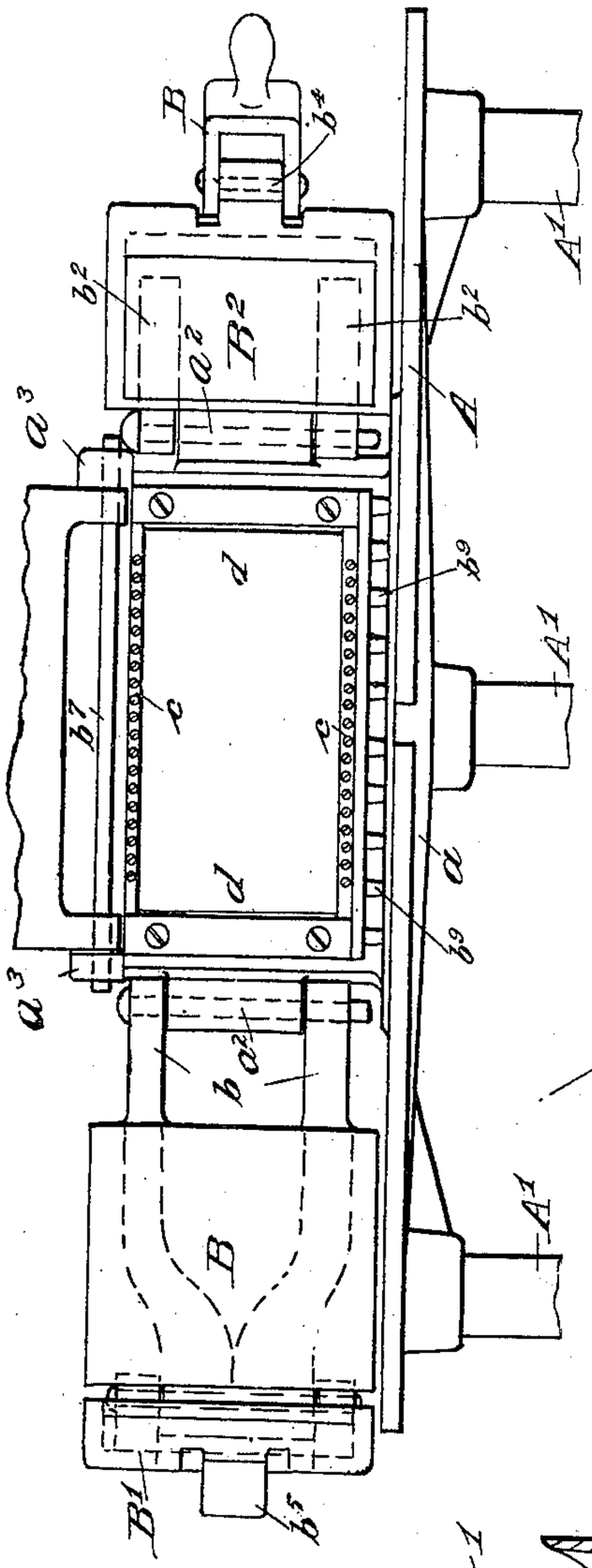


Fig. 3.

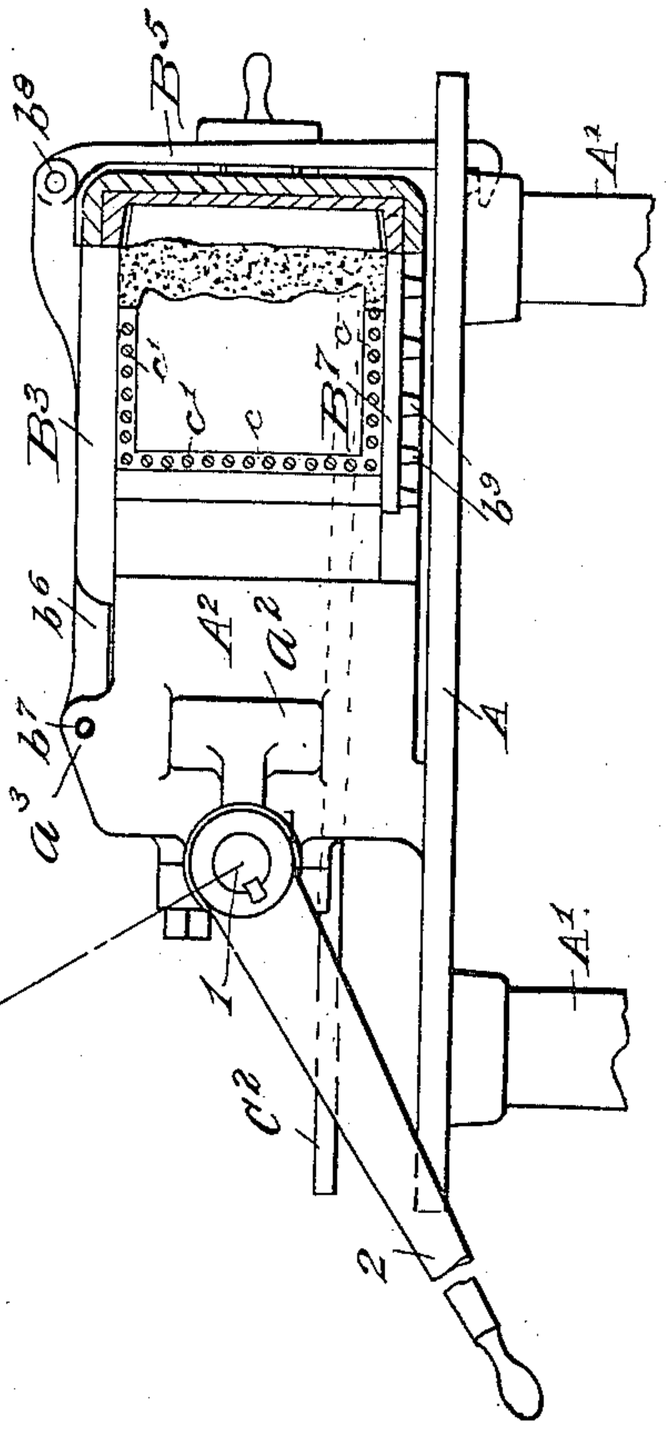
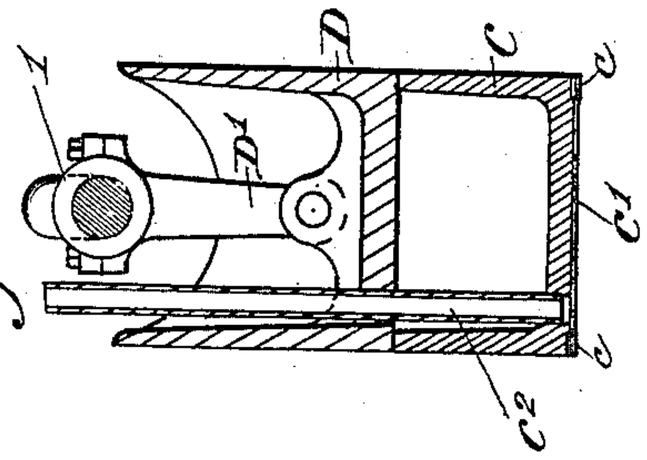


Fig. 4.



Witnesses

H. J. LaDarre.

W. J. McNally.

Inventor

Frank F. Landis,

By Elw. Bradford

Attorney

UNITED STATES PATENT OFFICE.

FRANK F. LANDIS, OF WAYNESBORO, PENNSYLVANIA.

MACHINE FOR THE MANUFACTURE OF CONCRETE PRODUCTS.

995,690. Specification of Letters Patent. Patented June 20, 1911.

Application filed August 17, 1905. Serial No. 274,527.

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States, residing at Waynesboro, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Machines for the Manufacture of Concrete Products, of which the following is a specification.

"Artificial stone" or concrete blocks, and like products, are being largely used in the building and other arts but are commonly found objectionable because of the fact that most of such products, manufactured by the known processes and machines, contain imperfections and are uneven in density and strength, causing the same to crack or crumble in spots. Such imperfections are caused because of the fact that in the ordinary process of manufacture the concrete has not been subjected to a uniform pressure throughout all parts of the mass while being molded.

My said invention relates, therefore, to an improved method and machine for the manufacture of concrete or artificial stone products, and it consists in certain devices and arrangements of parts whereby a uniform pressure may be brought to bear and exerted against all parts of the mass of concrete to form the product with its outside face or faces in fixed sides of the mold of the form required to impart the design desired to said outside face or faces, and in an expeditious and effective manner, all as will be hereinafter more fully described and claimed.

In the accompanying drawings I have illustrated a machine for the manufacture of artificial stone building-blocks wherein my invention is employed. It will be understood, however, that said machine is only one of many forms wherein the invention may be employed for the manufacture of concrete or artificial stone products, of any form or nature.

In said drawings, Figure 1 represents a top or plan view of a building-block machine shown with the top open, Fig. 2 an end elevation of the same as seen when looking in the direction indicated by the arrows from the dotted line 2—2 in Fig. 1, the sides of the mold being shown open as indicated by dotted lines in said Fig. 1, Fig. 3 a view partly in side elevation and partly in section as seen when looking in the direction indicated by the arrows from the dotted line 3—3 in Fig. 1, the adjacent hinged side of the mold being omitted, Fig. 4 a detail central horizontal section on the dotted line 4—4 in Fig. 1, Fig. 5 a detail view illustrating the effect of the employment of my said invention, and Fig. 6 a detail view illustrating a modified form.

In said drawings the portions marked A represent the bed plate of the machine, B, B′, B^2, and B^3 the several parts composing the sides of the press or mold, C the former and D the plunger.

The base plate A is of suitable form and is provided with strengthening ribs *a* to afford the necessary strength and rigidity thereto. It is supported upon posts A′, or in any suitable manner. Upright plates or side pieces A^2 are formed or secured upon the top surface of said bed plate in position to support the hinged parts and the bearings for the operating shaft and to serve as guides for the plunger, as will be presently described. A crank-shaft 1 is mounted in suitable bearings *a′* on the outer end of said upright plates A^2 and is provided with a lever 2, keyed thereon, by which it may be operated.

The side pieces B and B^2 of the mold proper are hinged one to each of said upright plates A^2, by means of arms *b* and b^2, which engage protecting lugs a^2 and are hinged thereto by pintles *b′* extending through said lugs on said upright plates and suitable perforations in said arms. The end plate B′ of the mold proper is hinged to the plate B by means of suitable interengaging ears and a vertical pintle b^3 which extends therethrough.

When the parts are in closed position, as shown by whole lines in Fig. 1, they are locked together by a locking device B^4 pivoted to the side plate B^2 by means of a pintle b^4 and formed with a loop which is adapted to engage the projecting ear b^5 on the outside corner of the end plate B′. The top B^3 of the mold proper is also pivoted to the upper edges of the uprights A^2 by means of arms b^6 and pintles or a hinge rod b^7, which may pass through suitable ears a^3 on said uprights and a perforation in each of said arms. Said top plate has a hasp or locking arm B^5 pivoted to its outer end by means of a pintle b^8, and is adapted to pass

down over the end of the mold and engage under the lower edge of the bed-plate through a notch a^4 therein, as shown most clearly in Fig. 1. A curing plate B^7 is preferably mounted in the bottom of the mold and consists of a metal plate supported upon a series of tapered lugs b^9 cast on its under side and ground to provide an even and level support for said curing plate. It will be understood of course that said sides B, B′ and B^2 and the top B^3 of the mold proper may be of any form desired. When of the character shown in Fig. 1, B′ and B^2 may contain a matrix, as indicated, of any form or design to impart the desired shape to the outside surface of the block, or other article to be molded. They may, however, be smooth plates, as B, if preferred, or of any other preferred shape or design.

The former C is a hollow casting of suitable thickness to afford the needed strength and to give approximately the desired shape to the interior, or back side, of the block or other article to be formed. Upon its outside surface is mounted a sheet of rubber or other flexible material C′ preferably elastic, which will normally fit tightly upon said former and is secured thereto by means of narrow strips of metal c around its edges and screws c', inserted therethrough to clamp said rubber firmly to said former. A pipe C^2 is tapped through said former near its center and is provided with two branches C^3 and C^4, one of which, C^3, leads to a fluid pressure pump, or other fluid pressure supply, and is adapted to discharge between the face of said former and said flexible sheet C′ attached thereto, and the other, C^4, is adapted to serve as a discharge pipe. Said pipes C^2, C^3 and C^4 are connected by a three-way valve C^5, by which the pipe C^2 may be connected to either the fluid pressure supply or the discharge. A suitable connection C^6 is connected to said valve by which it may be operated from the operative end of the machine.

The plunger D is connected by pitmen D′ with the cranks of the crank-shaft 1 and is thus adapted to be reciprocated by means of lever 2. It is connected to former C by screws d extending through its outer edge and thus carries said former back and forth with it. It is provided with an opening for pipe C^2, as shown.

In operation the sides B, B′ and B^2 of the press or mold are closed and secured as shown by whole lines in Fig. 1. The curing plate B^7 is placed in position in the bottom of said mold, supported evenly and firmly upon the top of the bed plate A by means of lugs b^9 on its underside. The crank-shaft 1 is turned by lever 2 to a position to draw the former C farthest out of the mold, as indicated by the dotted line in Fig. 3. Said mold is then filled with concrete between said former C and its sides, said concrete being then stroked off even with the top edges of the sides. The top plate B^3 is then closed and secured by the bar B^5 as shown in Fig. 3. The lever 2 is then drawn down to the position shown by whole lines in Fig. 3, which operates through the cranks and crank-shaft to force the plunger D and said former C against the concrete, compressing said concrete from a loose state to an irregular density and giving it substantially the form which it is desired that it shall have.

Thus far the operation is not widely different from that of many other concrete block machines. But concrete is not plastic and will not compress evenly under pressure from a rigid form. It is composed of cement, sand and broken stone, all of which are gritty and offer great resistance to the shifting of particles upon each other to allow the mass to become of even density throughout. In fact the particles will resist shifting until crushed, which weakens the product. The block cannot, therefore, be given an even or uniform density and strength by such an operation. When placed in the mold the mass of concrete will be more compact and dense in some places than in others and as it is not plastic and its particles will not shift or yield evenly the block can receive only such compression from a rigid form as is allowed by the more dense portion of the mass or that portion capable of offering the greatest resistance to the pressure, leaving other portions porous and weak. By covering the bearing face of the form C with the sheet of flexible material C′, preferably rubber, as above described, this difficulty is overcome, as after the former C has been forced into the material by means of lever 2, by opening valve C^6 the fluid pressure, from whatever source provided, is allowed to flow through the pipe C^2 to between said former C and said flexible material. As will be readily understood, the pressure may be such as is required for the particular work in hand and varied or regulated to suit the work to be done, the best results being attained by a pressure that will give to the article the maximum density without crushing the stone particles, as the strongest and most durable product is thus secured. In some instances less pressure will be sufficient than in others. The fluid under the required pressure flowing through pipe C^2 passes to between said flexible sheet C′ and the former, expanding said flexible sheet and compressing the material in every place where it will yield in any direction, under the pressure applied, throughout its entire area, until a density is reached at every point that will resist said pressure. As will be understood, it is immaterial in what direc-

tion said material yields as the rubber diaphragm being flexible and elastic will exert its pressure against the material along the lines of the least resistance. The result is a block, or other article, of exactly uniform density and strength in all its parts and all directions. When the operation is finished, the valve C^6 is turned to open pipe C^2 into discharge pipe C^4 when the elastic sheet will contract against the surface of the former and expel the fluid.

In Fig. 5 the result of the operation is illustrated more clearly than in the other figures. At the left of said figure the flexible diaphragm, the concrete and the former are shown as before the fluid pressure has been applied, and at the right in said figure the flexible diaphragm and concrete are shown in their changed positions, while the fluid pressure is applied. It will be noticed that the concrete material has yielded under the pressure unevenly along its inside surface. This is because the mass of material in the mold was of varying density and pressure-resisting power at different points. The result is a block, or other article, with a rough or uneven interior surface. But such a surface is not objectionable and therefore does not detract from the value of the block, or other article. On the other hand, the walls of the block, or article, being of uniform density, dry evenly and become uniformly hard and durable.

In Fig. 1 I have indicated by a dotted line, a short distance from the surface of the former, the position of said former after the initial or mechanical pressure has been applied through lever 2 and crank-shaft, and by another dotted line inside said first one, the irregular surface of the inside of the block after the fluid pressure has been applied. It will be understood, of course, that the form varies in each block as it is not possible to place the concrete mass in the several molds so that it will be of corresponding density and resisting power in all its parts. When the pressure has been applied, sufficiently, the valve C^6 in pipe C^2 is turned to cut off the pressure and permit the fluid to discharge, when the elastic diaphragm C' will contract against the surface of the former and expel said fluid automatically. The mold can then be opened up and the block with the curing plate upon which it rests is removed and placed in position to dry and harden.

In Fig. 6 I have shown a modification designed for forming building blocks of the form known as T-blocks, wherein the pipe C^2 has two branches adapted to discharge the fluid under pressure on both sides of the central rib of the block. The form is provided with two diaphragms, one on each side of said central rib instead of a single diaphragm as shown in the other figures. Many other modifications may be necessary in the manufacture of different forms of blocks, and other articles of various forms, as will be readily understood.

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

1. In a machine for the manufacture of concrete products, the combination of a mold within which the concrete may be packed and the product shaped, formed with an open side, a movable former adapted to shape the back side of the concrete product and mounted in said open side, a flexible diaphragm mounted over the face of said former, a fluid pressure supply pipe extending through said former to discharge between its face and said flexible diaphragm, and means for controlling the flow of a fluid pressure through said pipe, substantially as set forth.

2. In a machine for the manufacture of concrete products, the combination of a mold for shaping the exterior of the product, a former for giving general shape to the interior of the product, means for moving said former into the mass of concrete in said mold, a flexible diaphragm over the face of said former, and a fluid supply pipe leading through said former to discharge between its face and said diaphragm, substantially as set forth.

3. In a machine for the manufacture of concrete products, the combination of a mold, an adjustable former connected with an operating eccentric-shaft, means for operating said shaft to force said former against the concrete, a flexible diaphragm secured over the face of said former, and a fluid pressure supply pipe leading through said former to discharge against said diaphragm, substantially as set forth.

4. A machine for the manufacture of concrete products comprising a frame, a mold therein formed with a face and four surrounding sides of the form which it is desired to impart to the finished product the side opposite the face side being open whereby the material from which the product is to be formed may be introduced through said open side and packed in said mold, a movable former adapted to shape the backside of the product and mounted to move in and out of said open side, means for moving said former whereby said material may be pressed by said movement into the form desired, a flexible diaphragm mounted over the face of said former, a fluid pressure supply pipe extending through said former to discharge betwen its face and said flexible diaphragm, and means for controlling the flow of the fluid pressure through said pipe whereby after the product has been pressed

into form by the movement of said former it may be still further compressed to an even density by the introduction of a fluid pressure between the face of said former and said flexible diaphragm, substantially as set forth.

In witness whereof, I, have hereunto set my hand and seal at Waynesboro, Pennsylvania this 18th day of July, A. D. nineteen hundred and five.

FRANK F. LANDIS. [L. S.]

Witnesses:

CLARENCE E. MENTZER,

CHAS. B. CLAYTON.