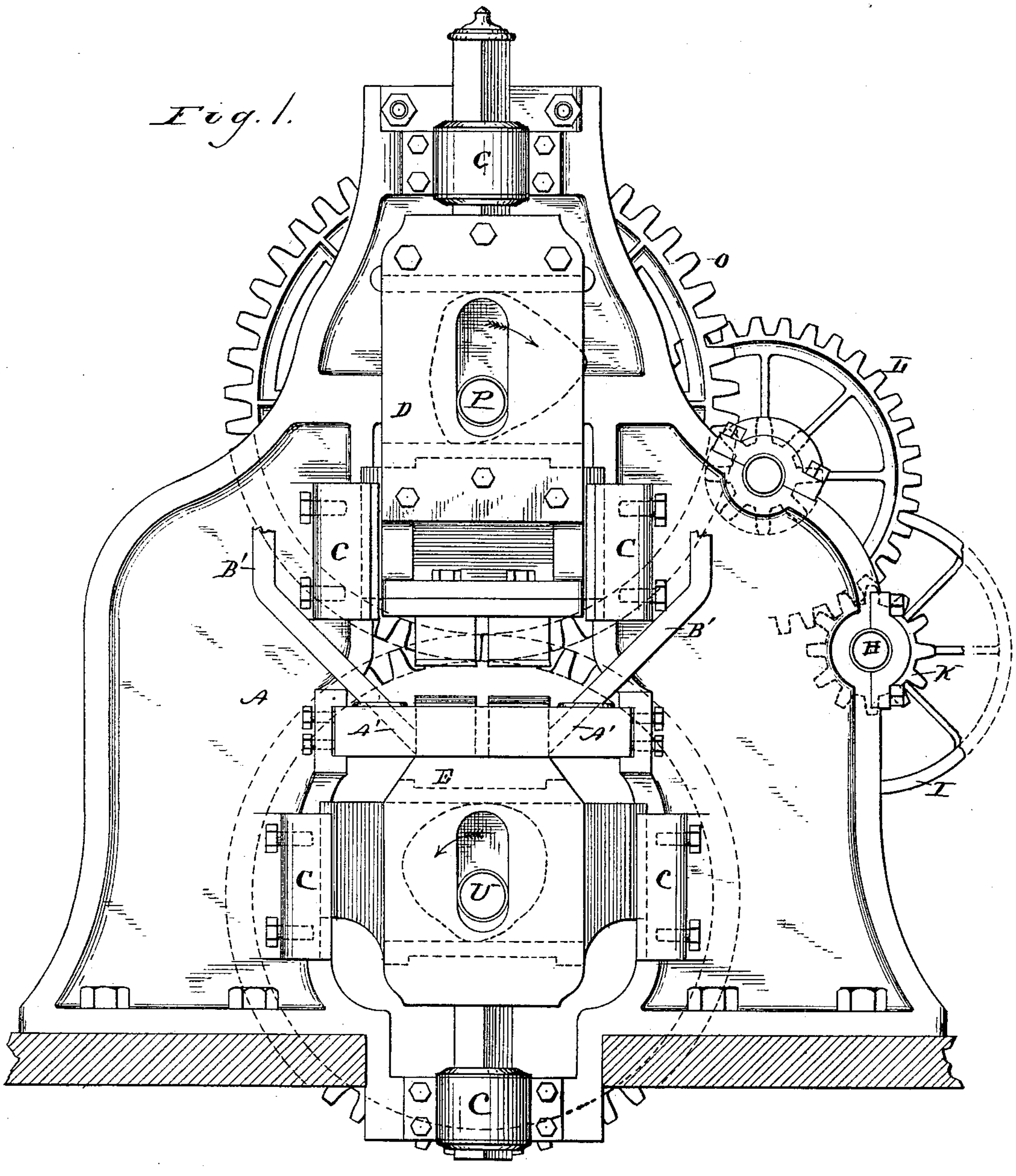
(No Model.) 4 Sheets—Sheet 1.

J. C. ANDERSON.

METHOD OF AND APPARATUS FOR MAKING BRICKS, &c.

No. 348,444. Patented Aug. 31, 1886.



Witnesses.

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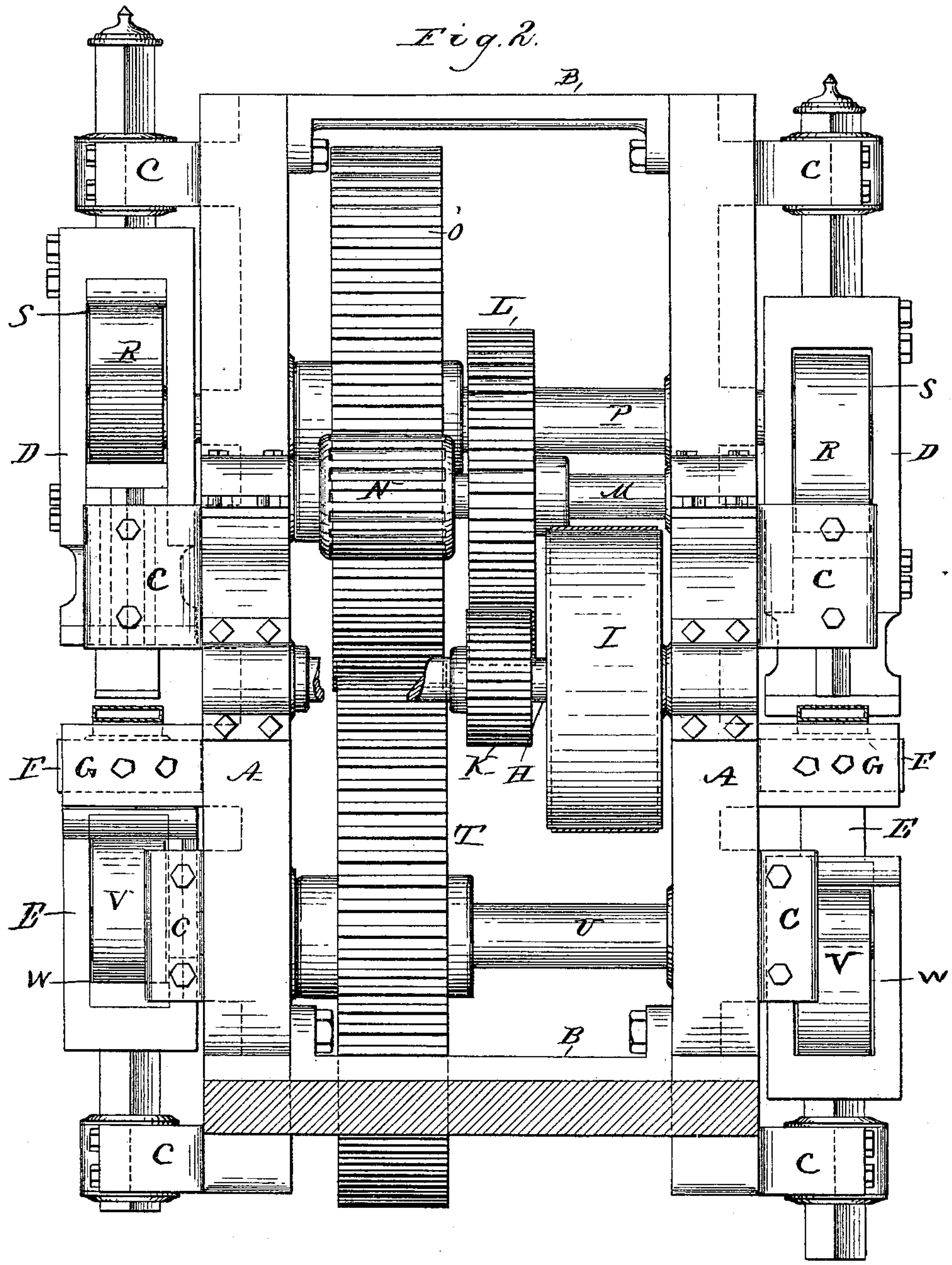
Fig. 2.



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METHOD OF AND APPARATUS FOR MAKING BRICKS, &c.

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Fig. 3.

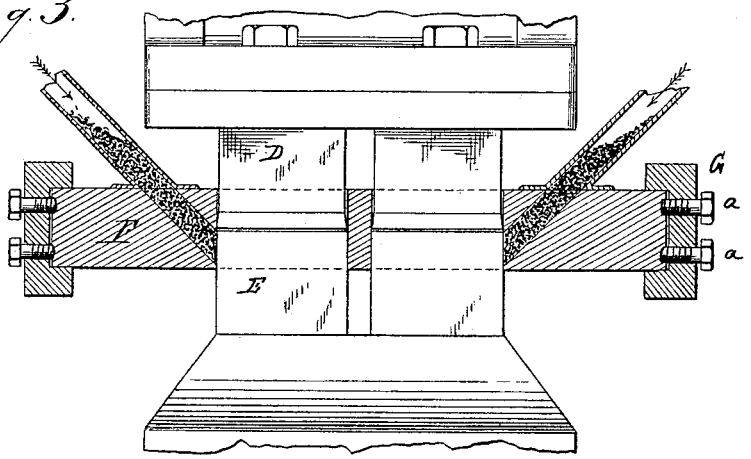


Fig. 4.

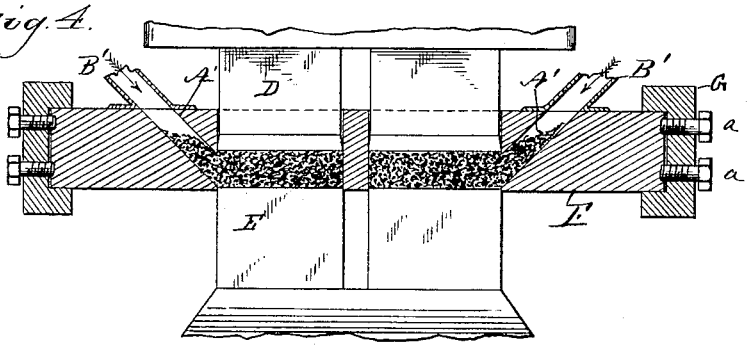
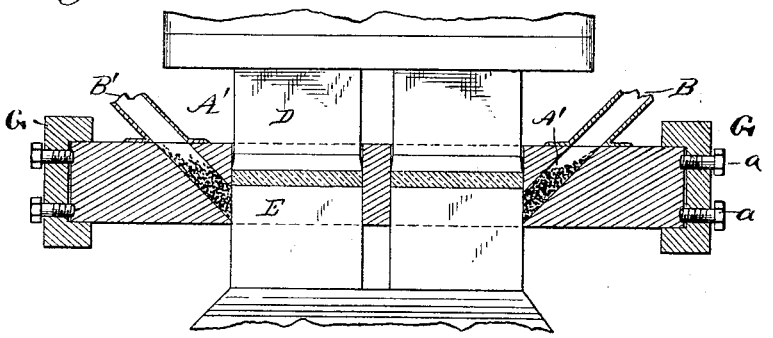


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

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METHOD OF AND APPARATUS FOR MAKING BRICKS, &c.

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Fig. 6.

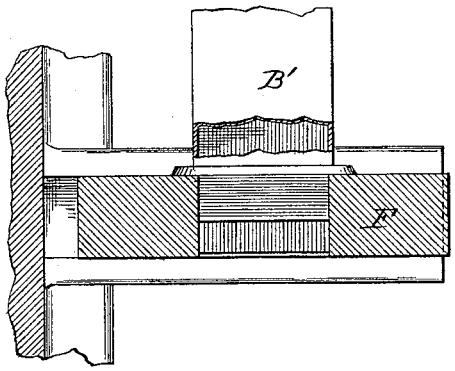

Fig. 7.

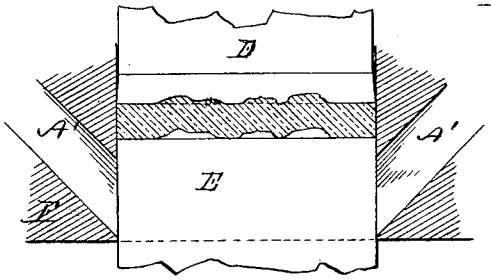

Fig. 9.

Fig. 8.

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UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF HIGHLAND PARK, ILLINOIS.

METHOD OF AND APPARATUS FOR MAKING BRICKS, &c.

SPECIFICATION forming part of Letters Patent No. 348,444, dated August 31, 1886.

Application filed January 20, 1886. Serial No. 189,174. (No model.)

To all whom it may concern:

Be it known that I, JAMES C. ANDERSON, a citizen of the United States, residing at Highland Park, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in the Method of and Apparatus for Making Bricks, Tiles, and other Articles, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in the method of and apparatus for manufacturing bricks, tiles, and other articles, where dry clay or other dry powdered substances are to be pressed into form.

The object of my invention is to produce articles of uniform density or compactness, whether such articles are of uniform or of unequal thickness; and to this end my invention consists in the method hereinafter described of filling the molds with the material to be pressed by means of a vacuum, as will more fully appear, whereby the requisite amount of clay or other material is forced into the molds, and the inequalities in the face of the plungers or dies or in the molds, if there be such, are filled with the material before the compression takes place.

My invention consists, further, in certain novel features in the mechanism employed, and in the details of construction, which will be fully described hereinafter, and pointed out in the claims.

Figure 1 is a side elevation of my improved machine. Fig. 2 is an end view of the same. Fig. 3 is a sectional view of the molds with the plungers therein and the ducts through which the material is fed to the molds, said ducts being closed by the lower plungers. Fig. 4 is a view similar to Fig. 3, showing the lower plunger in its lowest position, and the mold-cavities filled with the material to be compressed into form. Fig. 5 is also a sectional view of the molds and plunger with the article pressed into form between the plungers. Fig. 6 is a sectional view of the mold and the duct through which the material is fed to the mold. Fig. 7 is a sectional view of the mold feed-ducts and plungers similar to Fig. 5, the article shown therein being of unequal thickness. Fig. 8 is a sectional view of a tile having ornaments in relief. Fig. 9 is a front or face view of the article shown in Fig. 8.

In the process of molding articles from dry clay, powder, or other dry powdered material, as heretofore practiced, great difficulty has been experienced in feeding the clay into the molds evenly and in the proper quantity, and the universal method employed is to feed the clay into the molds by gravitation while the upper plunger is withdrawn from the mold-box.

Devices have been employed to prevent the undue packing of the clay into the mold; but in all the practice is to simply fill the mold-box even full and then bring the compression plunger or plungers into action. This method serves well for molding articles presenting level surfaces of uniform thickness; but when it is desired to mold or form such articles of uneven or ornamental surfaces with raised or depressed portions, this method is objectionable, and, in fact, impracticable, where any degree of boldness of figure is required, for the reason that the clay powder must be fed into and distributed in the mold to conform to the elevations and depressions of the design in exact isometrical thickness throughout the entire surface of the mold-cavity, or, in other words, the clay-powder, when fed into the mold-cavity before the pressure is applied, must represent a fac-simile in outline of the article after the pressure has been applied, and as the clay powder or other powdered material does not obey the law of liquids under pressure, and the pressure being exerted from two directions, the charge of the dry material must be equally distributed, or the article after it is pressed will be over-pressed and laminated in some parts, while at other points it will be found that not enough pressure has been exerted to press the article uniformly and prevent the same from breaking or crumbling, or from checking or warping during the burning operations. For example, if I desire to press a plain article, by the old method of feeding the clay, one inch in thickness, it would be necessary to fill the mold-box of two inches in depth even full of the powdered material, the two plungers or dies being plain throughout their entire surface, and the article produced would represent a flat slab of

uniform density throughout; but should I desire a raised figure on the tile or other article of an equal thickness and density with or without a corresponding cavity on the lower side, the clay or other powdered material, when filled in the mold, would represent three inches at that point before the pressure, and after the pressure the article would be two inches thick at that point, the clay having been forced into one-half its former space at the first point, and to two thirds its space at the other point, and should the top die or plunger be provided with a raised portion to register with the lower die or plunger, and thus make a corresponding indentation on the other side of the article, the pressure at the latter point would then be too great. I have therefore invented a method and mechanism by which I am able to supply the clay or other material to the mold-cavity in even quantities and in exact contour of the design of the figure to be molded.

The essential parts of the mechanism which I employ for compressing the articles into form do not differ from the mechanism shown, described, and claimed in my Patents No. 213,085, of March 11, 1879, and No. 276,549, of May 1, 1883; but in order to give a complete and accurate description of this invention all the parts will be fully described and referred to by the proper letters of designation.

A indicates the sides of the machine, and are secured together at the top and bottom by brace rods or bars B, so as to form a rigid support for the operating parts of the machine. The outer sides of the side pieces, A, are provided with brackets C, which serve as guides for the upper and lower plungers, D and E, respectively, one of each being located on the outside of the machine and adapted to work within the mold-boxes F, secured in brackets G by means of the bolts *a*.

H is a shaft, mounted in suitable bearings in the sides of the machine, on which is secured the band-pulley I, and by which means power is imparted to the other operating parts of the machine. The shaft H is provided with the pinion-wheel K, which meshes with the pinion-wheel L on the shaft M, said shaft being provided with a small pinion-wheel, N, which meshes with the pinion-wheel O on the shaft P. The shaft P extends through the sides of the machine, and is provided with the cams R, which work in the slots S, formed in the plungers D, and by which means the plungers are operated to compress the material in the molds, essentially as described in the patents hereinbefore referred to. The cams R are placed on the shaft P in reverse direction, so that when one of the plungers D is being forced down to compress the clay or other material in the molds the plunger on the other side of the machine is being raised to allow the article just formed to be ejected from the mold. The cams R are so formed and timed with the other operating parts of the machine that a variable pressure is exerted on the material to be compressed, so that the air will have an opportunity to escape.

The function and operation of these cams are fully described in my Patent No. 276,549, and need no further mention in this application. The pinion-wheel O meshes with a similar wheel, T, on the shaft U, the ends of said shaft being also projected through the sides of the machine, and are provided with cams V, which work in the slots W of the lower plungers or dies, E. These cams V are also placed in reverse direction, to co-operate with the cams R in compressing the material in the molds, and are so formed that the lower plungers or dies, E, will be carried up as the upper plungers or dies are being raised, thus keeping the upper plunger in contact with the article until the upper plunger is out of the mold, when said plunger is readily removed from the newly-formed article, thus preventing checks or cracks in the article by the force of suction, as would be the case if the upper plungers were removed from the article while still in the mold.

As before mentioned, F are the die-boxes or molds, and are, by preference, cast in one piece, and adapted to be readily removed from the brackets or supports G. The die-boxes or molds F are made of sufficient depth to allow the feeding or charging ports A′ to be formed therein and enter in the sides thereof. These feeding-ports connect with the gravity feeding-spouts B′, which in turn are connected to supply the spouts fed from the reducing mechanism. (Not shown.)

In order to fill the molds with the material to be compressed, it will be necessary to refer again to the action of the dies or plungers. After both the upper and lower plungers have been raised so as to eject the brick, tile, or other article from the mold, and when sufficient time has elapsed to have the article removed, the upper plungers descend until they come in close proximity with the lower plungers or dies, when both plungers move down into the mold until they reach the point shown in Fig. 3, when the top plunger comes to a stop, and the lower plunger is rapidly moved downward past the feed spouts or ducts A′, until it reaches the lower portion of the mold, or to the point shown in Fig. 4, thus producing a vacuum in the suddenly-produced intervening space between the plungers or dies, and at the same time opening the ports to the feed-spouts, when the powdered material will rush into the vacuum thus produced to fill the molds evenly, and all interstices that may be formed in the faces of the plungers. As soon as the molds are filled, the two plungers or dies are impelled upward by the contour of their respective cams, but maintaining the same relative distance apart until the lower plunger or die comes above and shuts off the clay-ports, as shown in Fig. 5, when the upper plunger is impelled downward upon the powdered material within the mold, and compresses it to a partial degree of solidity, when the pressure

is arrested and a slight recession of the upper plunger or die takes place, as already intimated, to allow the air to escape from the mold. After the air has escaped from the mold the upper plunger is advanced to complete the pressure on the article when it comes to a point of rest, during which time the lower plunger is held at rest by its operating-cam until the full downward pressure of the upper plunger is completed, when it is impelled slightly upward, while the top plunger remains at rest, so as to add the equalizing pressure necessary to the under side of the tile or other article, when both plungers are conjointly moved upward, and the article thus molded is carried up out of the mold-box, the plungers being in contact with the article until the top of the mold is reached, when it is raised a short distance to allow the article to be removed from the lower plunger, which has advanced to the top of the mold-box, thus preventing a suction-vacuum in the mold, which occurs if the top plunger is withdrawn from the article while it is yet inside of the mold-box, and in this way the checking or cracking of the article is prevented. When the lower plunger has reached the top of the mold-box and the top plunger has been raised to its full height, both plungers come to a period of rest, to allow the article to be removed.

In Figs. 7, 8, and 9 I have shown articles formed with raised surfaces, the plungers being provided with cavities or raised portions, as the case may be, to give the desired configuration or ornament to the articles, which, in connection with my method of feeding the dry material to the mold, makes it possible to form articles of unequal thickness, while at the same time they will be of a uniform density throughout.

It will be noticed that by the method of feeding just described the clay or other powdered material is drawn into the mold-box in an even manner, and an exact amount taken in each time, so that the articles, when molded, will be of equal even texture, and when burned at the same heat will be even and uniform in size and free from warpage and checkings incident to the unequal shrinkage of such bodies when molded with variable degrees of porosity and solidity in the same mass. It will also be noticed that the feed spouts or ducts are made practically dust-tight, so that the working parts of the machine are kept practically free from dust, which tends to wear away the parts and destroy the usefulness of the machine.

As before stated, the molds F are detachably secured in the brackets G by means of the screw-bolts *a*, so that they can be readily taken out and others placed in position, so that with the proper adjustment of the plungers articles of any size or kind can be made on the machine.

While I have described my method as specially applicable to clay or other material in a dry state, I do not wish to limit myself to such, as it is obvious that a pasty mass can be fed into the molds by the same method.

It will be apparent that by having the plungers located on each side of the main frame of the machine, and adapting them to be operated alternately, I am enabled to utilize all the power applied to drive the machine, and that the machine can be run more steadily than if only one set of plungers were used, and, furthermore, I am enabled to double the capacity of the machine by making double the quantity of bricks, tiles, or other articles at each complete revolution of the machine.

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

1. In a machine for pressing substances into form, the method herein described of feeding the material into the molds, which consists in forming a vacuum in the mold-box to draw the material to be compressed into the same through suitable ducts or openings, as set forth.

2. In a brick or tile machine, the method herein described of filling the molds with the material to be compressed, which consists in bringing the upper and lower plungers together within the mold and then separating them to produce a vacuum within the mold, which draws the material from the feed spouts or ducts uniformly into the mold-cavity, as set forth.

3. In a machine for pressing substances into form, the molds F, provided with feed-ducts in their sides or ends, as described, whereby the material to be compressed is fed into the molds between the plungers while said plungers are within the molds, as set forth.

4. In a machine for compressing substances into form, the molds F, made from one piece of metal, and adapted to be readily inserted and removed from the machine, as set forth.

5. In a machine for pressing substances into form, the double sets of plungers D and E, located on each side of the machine, and the operating-cams V R, arranged, as described, for moving the plungers alternately, as set forth.

6. In a machine for pressing substances into form, the double sets of plungers and the cams for operating them, located on the outside of the frame or sides A, in combination with the pinion-wheels for operating the cams and plungers located within the sides or frame of the machine, as set forth.

7. In a brick or tile machine of the character described, the shaft P, provided with the pinion-wheel O and cams R, in combination with the pinion-wheel T and shaft U, having the cams V, the cams R and V being adapted to operate the two sets of plungers D and E alternately on each side of the machine, as set forth.

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

J. C. ANDERSON.

Witnesses:
L. W. SINSABAUGH,
WM. H. DE LACY.