June 4, 1929. C. E. NORTON 1,715,859

BRICK DIE FRONT

Filed Feb. 29, 1928 3 Sheets-Sheet 1

Fig. 1.

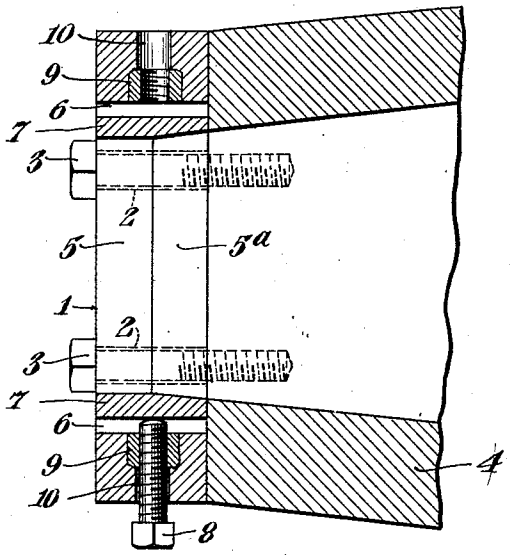


Fig. 2.

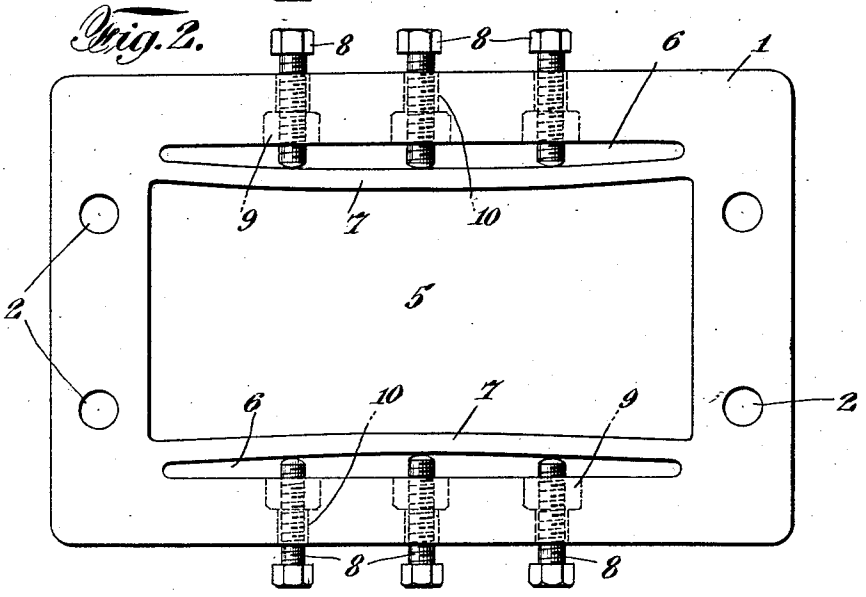
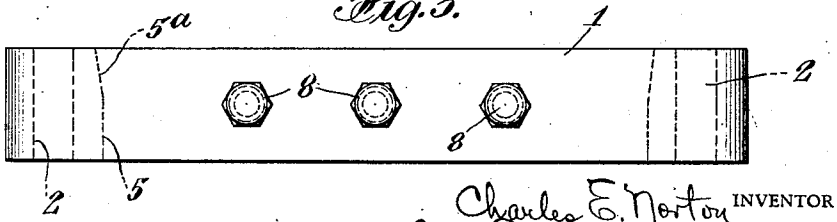


Fig. 3.



Charles E. Norton INVENTOR

BY

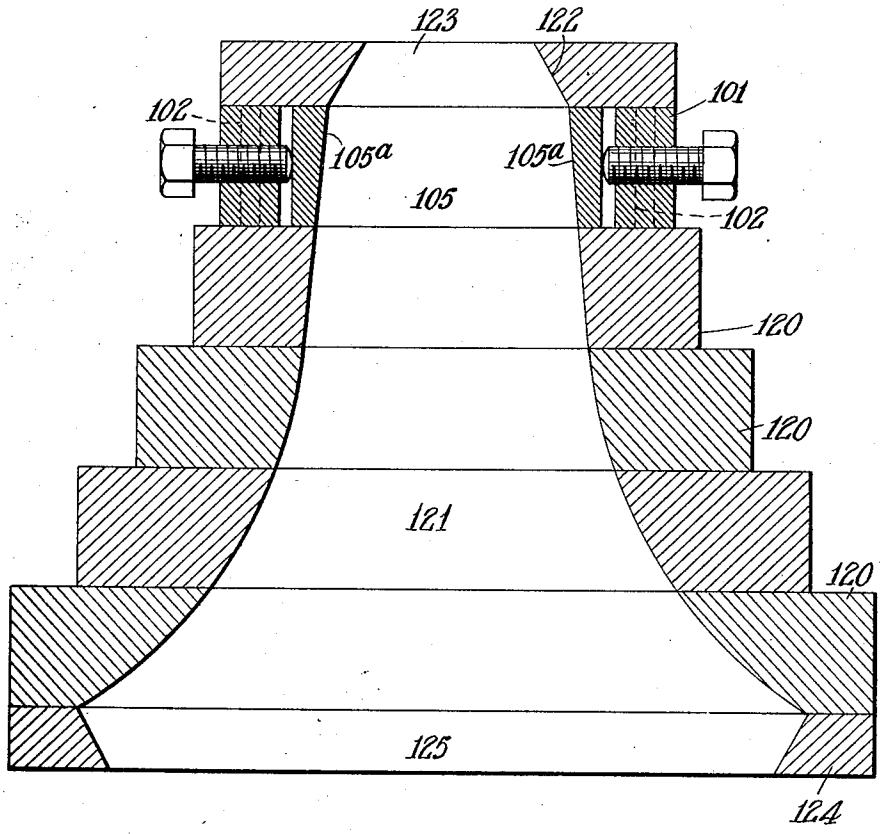
Louis Prevost Whitaker ATTORNEY

June 4, 1929. C. E. NORTON 1,715,859

BRICK DIE FRONT

Filed Feb. 29, 1928 3 Sheets-Sheet 2

Fig. 6.



Charles E. Norton, INVENTOR

BY Louis Prevost Whittaker

ATTORNEY

June 4, 1929. C. E. NORTON 1,715,859

BRICK DIE FRONT

Filed Feb. 29, 1928 3 Sheets-Sheet 3

Fig. 4.

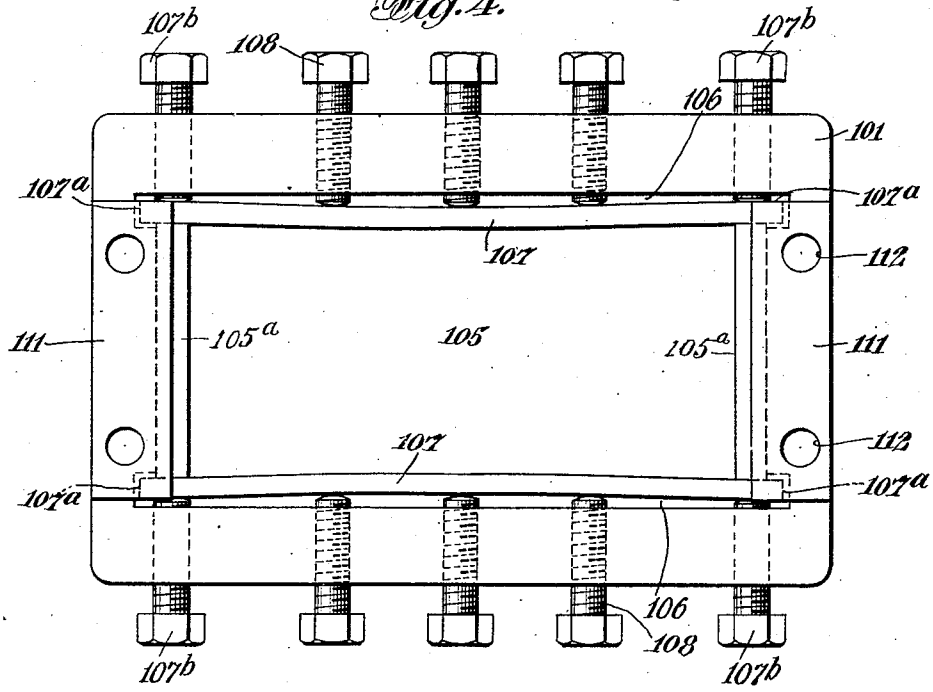
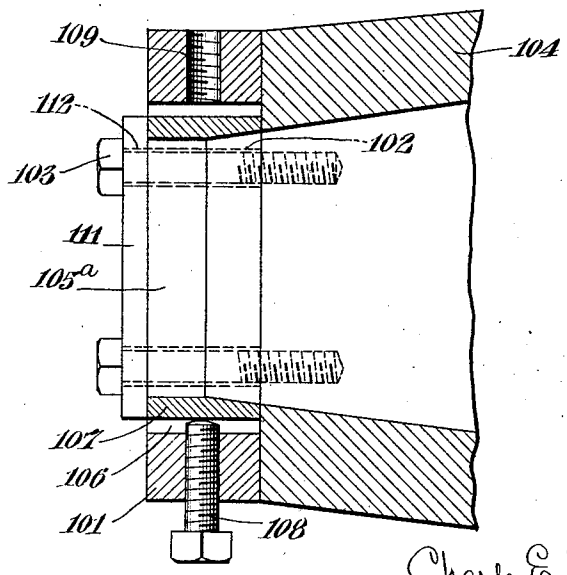


Fig. 5.



Charles E. Norton INVENTOR

BY

Louis Prevost Chittaker ATTORNEY

Patented June 4, 1929. 1,715,859

UNITED STATES PATENT OFFICE.

CHARLES E. NORTON, OF BRADFORD, PENNSYLVANIA, ASSIGNOR TO HANLEY COMPANY, OF BRADFORD, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BRICK-DIE FRONT.

Application filed February 29, 1928. Serial No. 257,876.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which show two forms in which I have contemplated embodying the invention, selected by me for purposes of illustration, and the said invention is fully disclosed in the following description and claims.

My invention consists in an improved die plate which may be employed in connection with a brick machine, or auger machine, in which a column of clay of the desired rectangular cross-section is forced through the opening in the die front in a continuous stream and is afterwards severed into individual sections or bricks. The discharge passage of the brick machine leading to the die front, and portions of the die front itself, are usually made inclined to the axis of the passage, so that the clay or plastic material is compressed in all directions as it is forced to and through the discharge opening in the die front. The stream of clay is usually of oblong shape, having its greatest diameter in horizontal direction. As the column of clay issues from the restraining influence of the die front it will expand somewhat, and there is a tendency for the central portion of the column to expand more than the outer portions, and this increased expansion of the central portion tends to relieve itself in the direction of the shorter diameter of the column. Thus, if a die of oblong cross-section and perfectly rectangular is employed, the cross-section of the column which issues from it will not be truly rectangular, but will be of greater vertical diameter in the center than at the sides, that is to say, the upper and lower faces of the column will be slightly curved outwardly, and this configuration will be imparted to the individual bricks severed from the column. This is a well known difficulty in brick making, and efforts have been made to overcome it by making the upper and lower edges of the die front aperture slightly convex transversely of the column, so that as the column issues, it will be slightly concave on the top and bottom faces, and as it expands the greater expansion in the central portions will bring it approximately to a rectangular cross-section. It is difficult to ascertain the exact curvature or convexity of the upper and lower faces of the die for a particular material, and even when the desired curvature or convexity is accurately specified it is extremely difficult to obtain dies by the ordinary methods of casting which will correspond exactly with the specifications, and they usually vary therefrom materially. As the amount which the column of clay, or other plastic material expands varies materially with variations in the clay and variations in moisture, and other conditions, and as these variations occur more or less continuously during the operation of the machine, it is impossible to construct a die front with rigid convex faces which will at all times insure the production of a clay column having a true rectangular cross-section.

The object of my present invention is to provide a die having flexible portions defining the discharge aperture through which the column issues, and to provide in conjunction therewith, adjusting means whereby these flexible portions may be flexed to such desired extent that a column issuing therefrom when expanded, will be truly rectangular. The device may be employed as a die front for a brick machine or auger machine, and the said adjusting devices are preferably arranged on the exterior of the die front within easy access of the operator, so that the said flexible portions of the die front may be adjusted from time to time while the machine is in operation, and whenever desirable and to any desired extent, to insure the production of a column having a true form in cross-section, as variations in the plastic material may necessitate. The die plate may also be employed in connection with a brick machine and adjusted while the machine is in operation to determine the proper mean convexity for the die with the material being used, and an integral rigid die can then be made with the same convexity. I prefer to employ a similar die made sufficiently larger to allow for shrinkage of the cast metal, and employed as a part of the core box used for preparing the core for casting the integral rigid die of the desired convexity, and obviously the adjustable die forming part of the core box can be accurately adjusted to correspond with the adjustment of the adjustable die used on the brick machine, which has been adjusted while the machine was in operation, as before described, to determine the proper convexity for the material being handled, so that the

integral rigid dies made by the use of the core box will have exactly the same predetermined convexity.

Referring to the accompanying drawings, Fig. 1 is a cross-sectional view of a die embodying my invention, showing it forming part of the die of a brick machine.

Fig. 2 is a front elevation of my improved die, detached.

Fig. 3 is a top plan view of the same.

Fig. 4 is a front elevation of a die embodying a slight modification of my invention.

Fig. 5 is a view similar to Fig. 1 showing the die in section and showing it as forming part of the die of a brick machine.

Fig. 6 is a sectional view of a core box showing my improved die embodied therein.

In Figs. 1, 2 and 3, 1, represents a die plate embodying my invention and comprising in this instance a casting of some hard material, as chilled iron, or white cast iron, for example, and provided with apertures, 2, for receiving attaching screws, 3, by which it is attached to the main body, 4, and forming therewith the die for a brick machine, or auger machine. The die, *i*, is provided with a forming aperture, indicated at 5, the inner faces of which are inclined, or beveled, outwardly toward the rear face of the die front, as indicated at 5^a, for a portion of their width or for their entire width, as preferred, the edges of the opening, 5, being ground to a very smooth finish. Certain of the sides of the discharge opening, 5, are flexible. In this instance the flexible portions are provided by slotting the casing, 1, parallel to such edge portions. In this instance, in which a column of oblong cross-section suitable for the production of standard bricks is shown, I provide the die plate, 1, adjacent to the upper and lower edges of the aperture, 5, with transversely disposed slots, indicated at 6, 6, of substantially the width of the aperture, 5, leaving the upper and lower flexible portions, 7, 7. The die plate is also provided with one or more adjusting screws, indicated at 8, for engaging the flexible portions, 7, of the die plate, and imparting a greater or less convexity to the inner faces of said flexible portions, which I have somewhat exaggerated in Fig. 2 for purposes of illustration. I prefer to employ a plurality of adjusting screws, 8, located at different points transversely of the die plate, as shown, in order that the desired inward bulge, or convexity, of the flexible portions may be obtained, and in order that the said flexible portions may be fully supported by the body of the die plate against the outward pressure of the clay column passing therethrough when used as part of a brick machine die. Where the die plate is a casting of very hard material, I find it convenient to insert a plurality of threaded nuts, indicated at 9, on cores, for example, in a well known way, in the mold in which the die plate is cast, so that the nuts will be embedded in the casting exterior to the slots, 6, 6, and will have their threaded portions in alignment with the cored apertures, 10, to permit the ready insertion of the screws, 8, which can be screwed into the nuts until their end portions come in contact with the flexible portions, 7, of the die front. By adjusting these screws, 8, which may be done while the clay is actually issuing from the die plate, where the plate is used as part of a brick machine die, the flexible portions may be so adjusted that when the column leaves the die plate and expands, it will be truly formed, and the faces formed by the flexible portions of the die front, which will be slightly concave when the column leaves the die front, will expand so as to bring these faces into an accurate plane. It is perfectly obvious that while we have shown two opposite edges of the die front provided with flexible portions and adjusting means therefor, any desired number of edges may be so provided, and the invention is applicable to die fronts having discharge openings of different cross-sections, where this may be found advantageous, or desirable. In connection with an ordinary brick machine the distortion of the lateral vertical faces is not ordinarily appreciable, and it is, therefore, sufficient to provide the upper and lower edges of the die plate aperture with the flexible adjustable portions, as herein shown and described.

In Figs. 4 and 5 I have illustrated a slight modification of my invention in which the flexible portions of the die plate are made separately from the other portions and supported therein. In these figures, 101, represents the main plate or frame formed preferably of soft steel, provided with the central aperture, 105, the lateral vertical faces of which are preferably formed of separate hard wearing strips, 105^a. The flexible portions of the die plate are, in this instance, formed separately, and consist of hard wearing strips, 107, 107, the ends of which engage notches, or recesses, indicated at 107^a, in the main frame, so as to provide a slot, 106, on the outer face of each of said strips, said strips having their ends clamped against the ends of the lateral vertical strips, 105^a, by set screws, 107^b, engaging threaded apertures, in the frame, 101, adjacent to the corner portions thereof, and said strips, 105^a and 107, being further held in place by cover plates, indicated at 111, 111, which may be provided with holes, 112, to register with holes, 102, in the main plate or frame, 101, through which the attaching screws, 103, pass, to secure the die plate of the body portion, 104, of the die, when used as a part of the die for a brick machine. In this instance the upper and lower portions of the die plate are provided with threaded apertures, 109, engaged by set screws, 108, the ends of which contact with the flexible strips,

107, at different points along the same for the purpose of flexing them inwardly to the desired extent, so that the column emerging from the die front aperture will expand to a truly accurate form in cross section. The set screws, 108, may be adjusted while the machine is in operation, where the die plate is used as a part of a brick machine die, to adapt the flexible portions, 107, to the exact conditions existing in the clay column at any particular period, so that, as in the former embodiment of my invention previously described, the die front aperture may be adjusted from time to time, as may be desired, in accordance with any variations in the character of the clay, or other plastic material.

In some cases where the material to be discharged through the die of a brick machine, or auger machine, is of substantially uniform character, good results may be obtained by the employment of a solid or one piece die which has been given the exact predetermined convexity of its inner top and bottom (or other) faces. My improved die may also be employed in the production of such a die, which I will term generally an integral or one piece die, with smaller tolerances than could be otherwise obtained. The preferred manner of use for this purpose is to apply one of my improved die plates to a brick machine, as hereinbefore described, and adjust it while the machine is in operation with the material with which the integral die is to be used, to secure the exact mean curvature convexity desired for the particular material, by adjusting the screws and flexing the flexible portions of the device to the desired extent. The proper convexity or curvature of the opposite faces of the die having been thus accurately determined under working conditions, with the very material to be treated, an integral die may readily be cast in any usual or preferred way, which will have its corresponding faces given the same curvature or convexity. I prefer to accomplish this by providing the core box for the manufacture of the solid die, with a die plate constructed as hereinbefore described and provided with flexible portions and adjusting means, and made sufficiently larger to allow for the shrinkage of the die in casting, so that the said flexible portions can be adjusted accurately to the same curvature or convexity as that of the flexible portions of the die plate used to determine the proper curvature. The core for the solid or one piece die can thereby be readily and accurately formed, so as to produce a solid die, the opposite faces of which will have the predetermined curvature or convexity.

I am unable to employ the identical adjustable die plate used on the brick machine as a part of the core box, owing to the necessity of making proper allowance for the shrinkage of the metal in cooling, in the casting of the solid or one piece die, as will be readily understood.

In Fig. 6 I have shown a core box which may be formed of wood or other suitable material, as wooden blocks, 120, glued or otherwise united, and provided with an interior tapered recess, 121, having its inner faces of the form and dimensions of the inner faces of the interior of the die to be formed, and to the mold so formed is attached at the smaller end of the recess, one of my improved die plates, 101, having its flexible portions set to predetermined convexities, preferably as ascertained from a similar adjustable die plate on the brick machine, as before described, although of course it may be adjusted arbitrarily from data otherwise obtained, if desired. The interior surfaces of the recess, 121, in the mold, are made to coincide accurately with the adjacent edges, 105ª, of the aperture, 105, in my improved die plate, which are preferably beveled for their full width when used in the core box, as shown in Fig. 6. The core box is completed by the top and bottom pieces, 122, 124, having apertures, 123 and 125, respectively, therein, to form the core prints. By molding a core in the core box, of which my improved die plate forms a part, and using it in casting a one piece die for the brick machine, it must follow that the die so produced will have the inner faces at its discharge end substantially identical with those of my improved die plate, and it is possible in this way to reduce the unavoidable tolerances to a few (say three or four) thousandths of an inch. Where the die plate is to be used in the core box, I prefer to make the plate of soft steel or ordinary gray cast iron, in one piece, similar to Figs. 1, 2 and 3, and the nuts, 9, may be omitted, as the die plate will not be subjected to any appreciable stress or wear. Obviously the die plate will be made sufficiently larger than the one used on the brick machine, to compensate for shrinkage as before stated.

It will thus be seen that my improved die plate can be used as a part of a two-piece brick machine, or auger machine, die, and adjusted to a predetermined convexity of certain of its sides, to produce a column having plane faces after leaving the die, in which case it can be adjusted from time to time to meet variations in the material; it can also be employed to determine the mean or desired convexity of its inner faces for a particular material, by adjusting it on the machine under conditions of actual use; and a similar die plate similarly adjusted can be used as a part of a core box for casting a one piece die having the desired ascertained or otherwise predetermined convexity of its faces, which one piece die can then be used on the brick machine or auger machine, to produce the desired results in the column issuing therefrom, where the material is such that the frequent

adjustment of the convexity of the faces of the die is not required.

What I claim and desire to secure by Letters Patent is:—

1. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, said die having flexible portions for engaging the plastic column, and means for flexing said flexible portions, to produce a column of desired cross-section.

2. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, said die having flexible portions for engaging the plastic column, and adjusting means for engaging said flexible portions and flexing them to the desired extent, to produce a column of desired cross-section.

3. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, said die having flexible portions for engaging the plastic column, said flexible portions having their ends held in fixed relation with the other portions of the die, and adjustable means for engaging said flexible portions between their ends and flexing them to the desired extent, to produce a column of desired cross-section.

4. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, said die having flexible portions for engaging the plastic column, said flexible portions having their end portions held rigidly with respect to the other portions of the die, and a plurality of adjusting devices located at different points transversely of the die and engaging said flexible portions for flexing them to the desired extent and supporting them with respect to the die, to produce a column of desired cross-section.

5. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, said die having flexible portions for engaging the plastic column, said flexible portions being formed separately from the other portions of the die and having their ends rigidly secured with respect to the other portions of the die, and adjustable means for engaging said flexible portions between their ends and flexing them, to produce a column of desired cross-section.

6. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, and having flexible portions at opposite edges of said aperture for engaging the column, said flexible portions having their ends rigidly secured with respect to the other portions of the die, and independent adjustable means for engaging each of said flexible portions between their ends and flexing them, to produce a column of desired cross-section.

7. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, and having flexible portions at opposite edges of said aperture for engaging the column, said flexible portions having their ends rigidly secured with respect to the other portions of the die, and set screws having threaded portions engaging non-flexible portions of the die, said set screws engaging said flexible portions between their ends and at different points longitudinally of said flexible portions for flexing them, to produce a column of desired cross-section.

8. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, and provided with recesses at opposite sides of said aperture, flexible portions forming opposite edges of said aperture and having their ends rigidly supported in said recesses, and adjusting screws having threaded portions engaging the non-flexible portions of the die, said screws engaging said flexible portions between their ends for flexing them, to produce a column of desired cross-section.

9. A column forming die provided with an aperture for the discharge of a column of plastic material therethrough, and provided with recesses at opposite sides of said aperture, flexible portions forming opposite edges of said aperture and having their ends engaging said recesses, cover plates secured to said die for confining the ends of said flexible portions in said recesses, and adjusting devices engaging said flexible portions between their ends for flexing them, to produce a column of desired cross-section.

In testimony whereof I affix my signature.

CHARLES E. NORTON.