

Aug. 27, 1929.

F. T. HEATH

1,725,959

EXTRUDING DIE

Filed Dec. 14, 1926

2 Sheets-Sheet 1

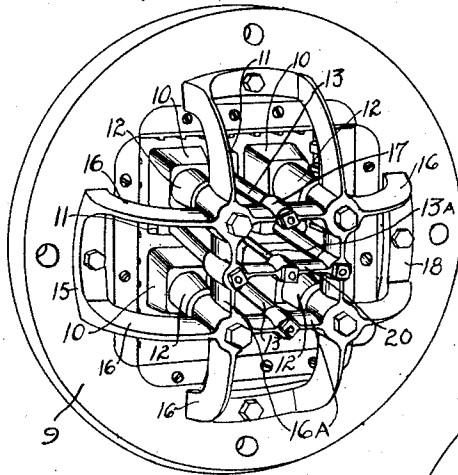


FIG. 1

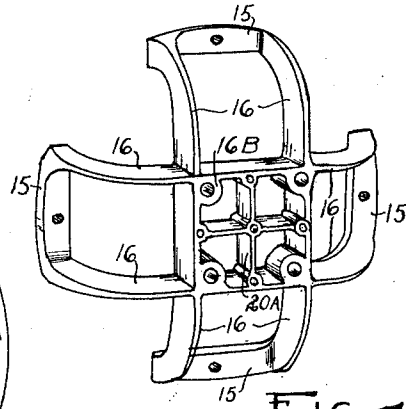


FIG. 4

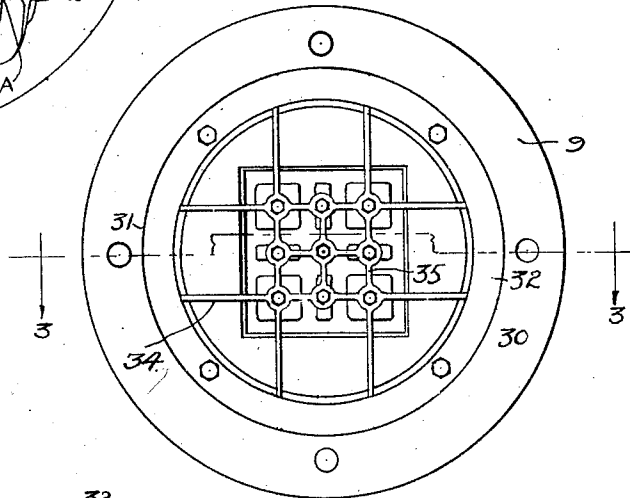


FIG. 2

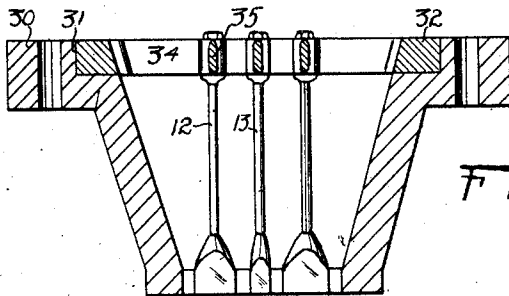
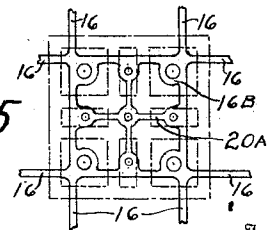


FIG. 3

FIG. 5



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FIG.-6

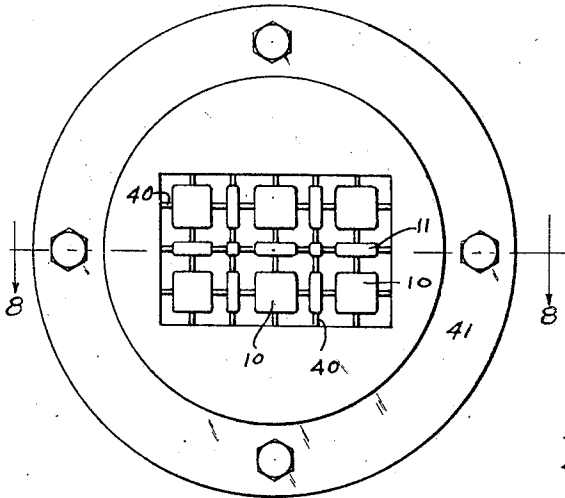
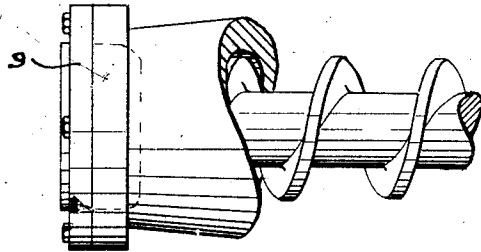


FIG.-7

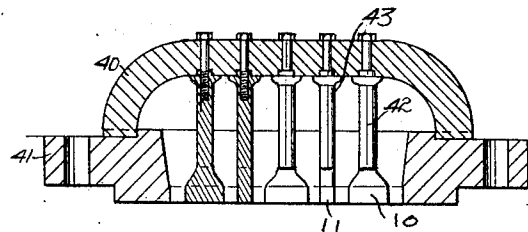


FIG.-8

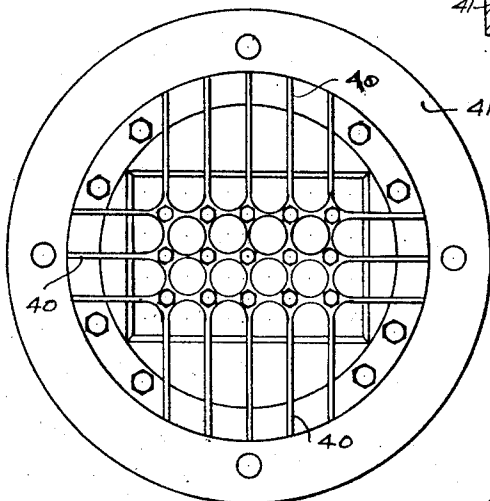


FIG.-9

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EXTRUDING DIE.

Application filed December 14, 1926. Serial No. 154,788.

This invention relates to dies for forming ceramic products and more particularly to extruding dies for forming hollow building blocks.

5 The general object of my invention is the provision of a die incorporating a novel bridge structure for supporting the die cores in a rigid manner while affording a substantially uniform passage for the material being
10 extruded through the die throat whereby a uniform density throughout all the zones of a cross section of the extruded column may be obtained.

More specically my invention is directed to
15 the provision of an improved form of core suspension for extruding dies of the character referred to which will not offer concentrated frictional resistance to the clay movement as it enters the die throat and wherein such frictional resistance is distributed throughout the
20 uniformed column of moving clay as it enters the die.

Other objects of my invention will hereinafter be set forth in the following description referring to the accompanying drawings illustrating several forms thereof. The essential characteristics are summarized in the claims.

In the drawings, Fig. 1 is a perspective view
30 of an unattached die for extruding hollow building blocks, as viewed from the bridge end of the die; Fig. 2 is a plan view of a modified form of bridge construction for supporting the cores of the die illustrated in Fig. 1;
35 Fig. 3 is a cross section of the die structure shown in Fig. 2; Fig. 4 is a perspective view of a bridge member for supporting the cores of the die slightly modified relative to the bridge which is illustrated in Fig. 1; Fig. 5 is
40 a diagrammatic view showing the relation of the core supporting points of the bridge structure as shown in Fig. 4, relative to the effective core cross sections; Fig. 6 is a fragmentary view of the extruding end of an auger machine with a flat die embodying features of my
45 invention placed thereon; Fig. 7 is a front view of a modified form of die structure; Fig. 8 is a cross sectional view taken substantially along the line 8—8 of Fig. 7; and Fig. 9 is
50 another form of bridge construction shown in plan as viewed from the throat end of the die structure.

It has been the practice heretofore to support the core members of an extruding die
55 for forming hollow building blocks upon a bridge comprising a single cross member

bearing at each end thereof within the die throat in the case of converging dies or upon the die flange of flat dies. In some forms of hollow tile and building blocks, such a core
60 bridge has been found to be satisfactory, but where a hollow building block having a large percentage of void area in its cross section and particularly of the load-bearing type, is to be extruded, a comparatively large number of
65 cores are required in the die structure. If such cores are supported upon a bridge having only two bearing points on the die, an overhang core suspension results in supporting certain of the cores in offset relation to
70 such a bridge, with the result that either an extremely heavy bridge is required to rigidly support the cores with an attendant obstructing of the movement of the clay from the
75 auger to the die throat, or if the bridge is constructed sufficiently light not to obstruct the ready flow of clay through the die throat rigidity is sacrificed then the possibility of the effective ends of the cores having a floating movement at the die mouth is greatly in-
80 creased.

My invention therefore, contemplates a bridge structure which will avoid the necessity of using a bulky bridge structure and I
85 propose to distribute the bridge bulk so that it may form a web structure which will not offer localized resistance to the clay flow which may serve to properly guide the clay to the die voids to obtain rigidity of core support. Such a bridge structure may comprise rela-
90 tively thin webs of metal preferably unitarily formed to extend across the rear end of the die transversely of the die and substantially at right angles to each other, whereby a plurality of unaligned bearing points between
95 the bridge and the die proper are obtained, thus relieving the die throat proper, of all obstructions other than the shank extensions of the cores.

Such a bridge structure may be embodied
100 in a variety of forms. An example of one form which I have found to be quite satisfactory for supporting cores when extruding a clay column square in cross section and having four major and five minor voids is illus-
105 trated in Fig. 1 wherein I show four major core members 10 and five minor core members 11 formed with reduced shanks 12 and 13 respectively, affording attachment to a metallic web structure comprising a bridge
110 15 secured to the inner flange face of the flat die member 9. The bridge as shown, is

formed to have parallel arch-shaped portions 16 extending in pairs substantially at right angles to each other and joined by bearing pedals or feet 18. The spacing of the ribs 5 may be such that they converge or meet at substantially the center points of the major core shanks 12 at which points they are sufficiently enlarged to afford the forming of proper openings to receive the shanks of the major cores 10. The intermediate portions 10 16^a of these parallel extending ribs are provided with slight enlargements 17 whereby proper openings may be formed therethrough at these points for supporting the shanks 13 of the minor cores 11. A central rib 20 spans 15 two of the arch ribs 16 and may also be provided with an enlargement affording the formation of a proper opening for the reception of a central minor core shank 13^a.

In Fig. 6, I show the adaptation of my improved bridge and flat die to an auger machine. The bridge structure is illustrated as extending into the converging barrel of the auger machine, which is the type of machine 25 to which the die structure and bridge structure shown in Figs. 1 and 4 are particularly adaptable. It will be noted that the die has no converging throat, and that therefore the functioning of the ribs comprising the bridge becomes quite important in directing the clay 30 to the die voids.

It will be noted in Fig. 1 that the major cores are supported directly upon the arched ribs at the points of intersection thus permitting the ready flow of the clay thereabout 35 and into contact with the shanks of the cores before the material has actually been subjected to a die throat compression, and these cores are supported on the die proper in a direct manner without any overhang relative to the bridge structure or to each other. It 40 will also be noted that such a bridge frame can be of a very light rib structure, thus avoiding concentration of bulk characteristic of the single transverse bridge with consequent obstruction to the uniform flow of the clay being forced through the die mouth. Furthermore the rib structure described serves to bring about a more uniform density 45 in the extruded column in that the final cleavage action of the ribs upon the mass of clay as it enters the die throat serves to proportion and direct the clay to the die voids.

In Fig. 4, I show a perspective view of the bridge structure slightly modified over the form shown in Fig. 1, with like parts designated with like numerals. In this form however, the ribs 16, are spaced apart a distance greater than the spacing of the ribs 50 shown in the bridge structure in Fig. 1 so that they may intersect at points noncoincident with the core shank centers. The enlarged portions 16^b of the ribs which provide sufficient metal for the core shank openings are

in the nature of inside fillets at the intersections of the major ribs. Two intermediate ribs 20^a are shown at the central intersection of which a proper bore enlargement is provided for supporting the central minor core shank. At the intersection of these intermediate ribs with the major ribs 16, enlargements are provided in the form of fillets affording proper bores for receiving the shanks of the minor cores 11. This arrangement of ribs serves to direct more clay to the center of the die and is an example of the variability of my invention to meet specific conditions without departing from the spirit thereof.

In Figs. 2 and 3, I show a flat bridge structure adaptable to auger machines having flat heads and embodying in some respects, the features of the bridge structure shown in Fig. 1. In this form of bridge structure, however, the die 30 is counterbored at the throat end, as shown at 31, to receive an annulus 32 of the bridge and with which the ribs may be integrally formed.

This form of bridge is particularly adaptable to auger machines equipped with flat die ends and the counterbore 31 therefor, should be of sufficient depth to receive the bridge annulus or ring 32 which may have a thickness corresponding to the desired depth of the transverse core shank supporting ribs 34 and 35. It will be particularly noted in Fig. 3 that by reason of the central supporting of the core shanks, the shanks may be comparatively small relative to the effective cores, thus presenting to the converging mass of clay being forced through the die throat, a distributed resistance. It will be apparent that this form of die bridge may be subject to variation in rib arrangement to proportion the clay flow. For example the ribs if desired may be slanted to direct the clay flow as experience may dictate.

In Figs. 7 and 8, I show my bridge structure adapted to a die for extruding rectangularly shaped columns, the building block thus formed having six major voids of uniform cross section and the intermediate voids dimensionally uniform. The arched ribs 40 may bear on a flat die 41 in the manner described, and the spacing of the ribs may be determined by the desired spacing of the major core shanks 42 and the minor core shanks 43 respectively. In Fig. 9, a bridge structure is disclosed in a plan which is grid-like in form and which is an illustration of the manner of spacing the ribs supporting the core shanks 42 and 43 shown in Fig. 8.

From the foregoing description of my invention, it will be seen that I provide a bridge structure which; first is adaptable to support a large number of cores without offering a concentrated resistance or unfavorable division of the clay being advanced to the die voids, by distributing the required metal to

withstand the extruding pressures, in the form of a grid or rib structure which is uniformly distributed over the throat end of the die; second that this rib structure may be varied to direct the clay to the die voids in such manner as to effect uniform density in the clay throughout the extruded column and third that my invention is readily adaptable to the so called flat die structure, as well as throat dies wherein a tapered converging throat finally guides the clay to the die voids.

I claim:—

1. A core bridge for an extruding die adapted to carry core members, comprising a plurality of arched intersecting ribs raised from the inner face of the die and affording points of attachment for core members adjacent the points of intersection and offset therefrom.

2. A core bridge for an extruding die comprising arched parallel ribs having their ends bearing on the inner face of the die, said ribs being arranged in groups disposed at right angles to each other and intersecting to form an open grid opposite the mouth of the die where core shanks may be secured.

3. In an extruding die, a die member, a core bridge bearing on the die member about the perimeter thereof and comprising groups of parallel ribs arranged to intersect openings formed at the intersections thereof for the reception of core shanks.

4. A core bridge for carrying core members in an extruding die comprising arched parallel ribs having their ends bearing on the inner face of the die, said ribs being arranged in groups disposed at right angles to each other and intersecting to form an open grid opposite the mouth of the die, and core members secured at the points of intersection in the grid.

5. In an extruding die, a die member, a plurality of large cores and a plurality of small cores, a core bridge, and shanks for the cores secured to the bridge, the core bridge comprising at least two pair of parallel spaced arched ribs disposed at right angles to each other and intersecting to form a rectangle and members joining the said ribs within the rectangle and intersecting each other, the shanks for the large cores being secured substantially at the points of intersection of the ribs with each other and the shanks for the small cores being secured substantially at the points of intersection of the said members.

6. In an extruding die, a die member, a plurality of large cores and a plurality of small cores, a core bridge and shanks for the cores secured to the bridge, the core bridge comprising spaced arched ribs intersecting to form a many sided figure and members joining the said ribs within the figure and intersecting each other, the shanks for the large cores being secured substantially at the points of intersection of the ribs with each

other and the shanks for the small cores being secured substantially at the points of intersection of the said members.

7. In an extruding die for forming hollow blocks the combination of a die having a converging throat, a plurality of core members positioned at the die mouth and having inwardly extending reduced shanks, a core bridge supporting the core shanks, said core bridge being formed of parallel extending ribs intersecting with other parallel extending ribs and affording attachment for the core shanks thereto adjacent to the points of intersection thereof.

8. In an extruding apparatus of the character described, the combination of a die member, a core supporting structure having a plurality of cores independently attached thereto, said core supporting structure comprising a frame work of transversely extending intersecting ribs and affording points of attachment for the core members at or adjacent to said rib intersections.

9. In an extruding die for forming hollow building blocks the combination of a die, a plurality of more members positioned at the die mouth and having inwardly extending shanks, a core bridge supporting the core shanks, said core bridge being formed of parallel extending arched ribs intersecting with other parallel extending arched ribs and affording attachment for the core shanks thereto adjacent to the points of intersection thereof.

10. In an extruding apparatus of the character described, the combination of a die member, a core supporting structure having a plurality of cores independently attached thereto, said core supporting structure comprising an open frame work of intersecting arched ribs and affording points of attachment for the core members at or adjacent to said rib intersections.

11. In an extruding die, a die member, a core bridge bearing on the die member and comprising at least two pair of parallel ribs intersecting to form a square, and fillets disposed in the corners of the square adapted to be bored to receive core shanks.

12. In an extruding die, a die member having a central opening, a core bridge bearing on the die member and spanning the opening therein and comprising at least two pair of parallel ribs intersecting to form a parallelogram, and fillets disposed in the corners of the parallelogram adapted to be bored to receive core shanks.

13. A core bridge for an extruding die adapted to carry a plurality of cores having shanks secured to the bridge, comprising at least two pair of parallel ribs disposed at right angles to each other and forming a central hollow square part spaced from the walls of the die and having places at the corners of the square bored to receive core shanks.

14. A core bridge for an extruding die comprising a rectangular grid spaced from the face of the die and including intersecting members engaging core shanks adjacent the
5 points of intersection, said grid being supported at least at its corners by members disposed at right angles to each other and extending from the grid to the body of the die.
15. A core bridge for an extruding die
10 adapted to carry a plurality of cores having shanks secured to the bridge, comprising two pair of parallel ribs disposed at right angles to each other and forming a central square with parts of each rib constituting one side of the square, and members joining opposite
15 parts of the square, the points of juncture of said members providing places of attachment for said core shanks.
- In testimony whereof, I hereunto affix my signature.

FREDERICK T. HEATH.