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3,380,129

EXTRUSION DIE FOR DRAIN TILE CLUSTER

Filed June 29, 1966

3 Sheets-Sheet 2

Fig. 3.

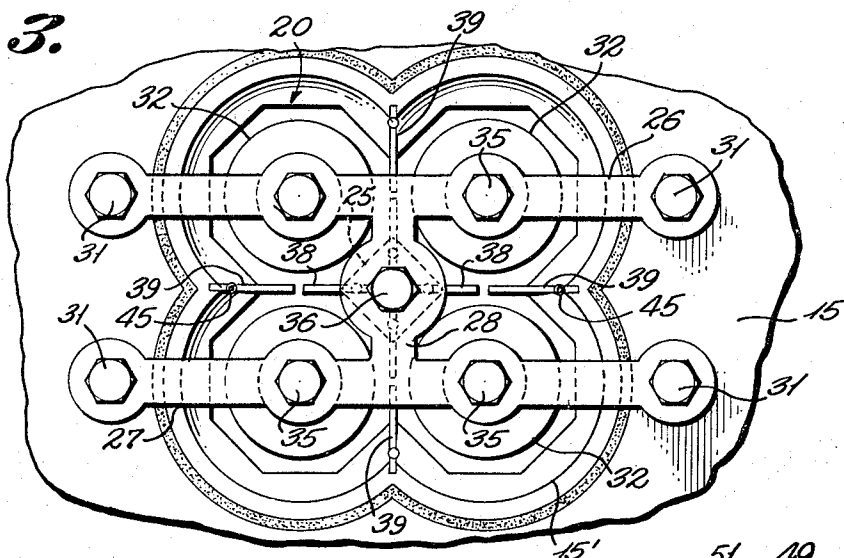


Fig. 5.

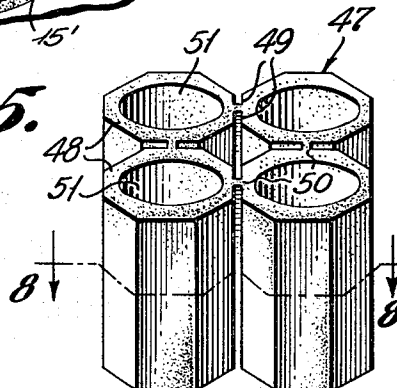
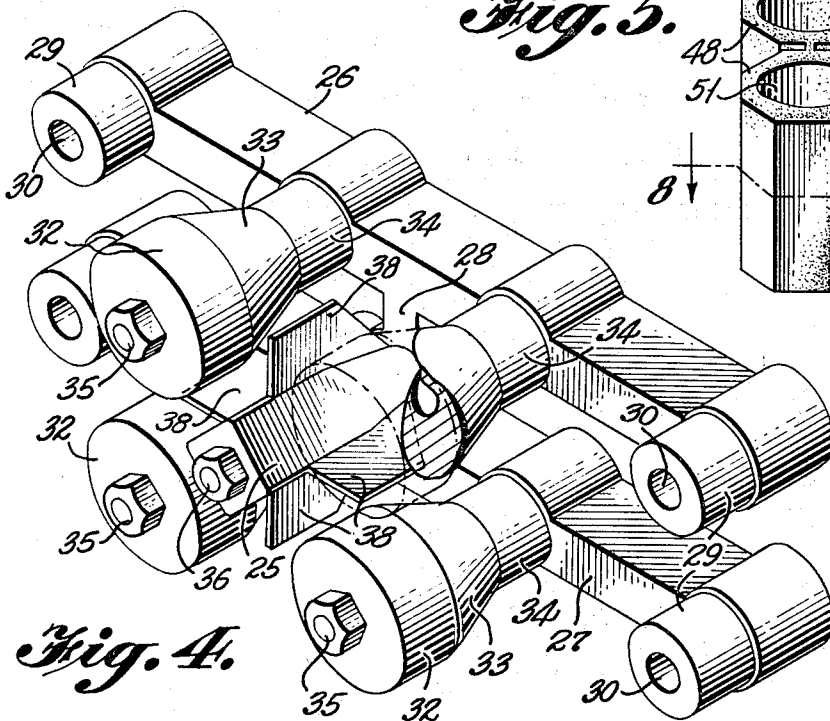


Fig. 4.



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Fig. 6.

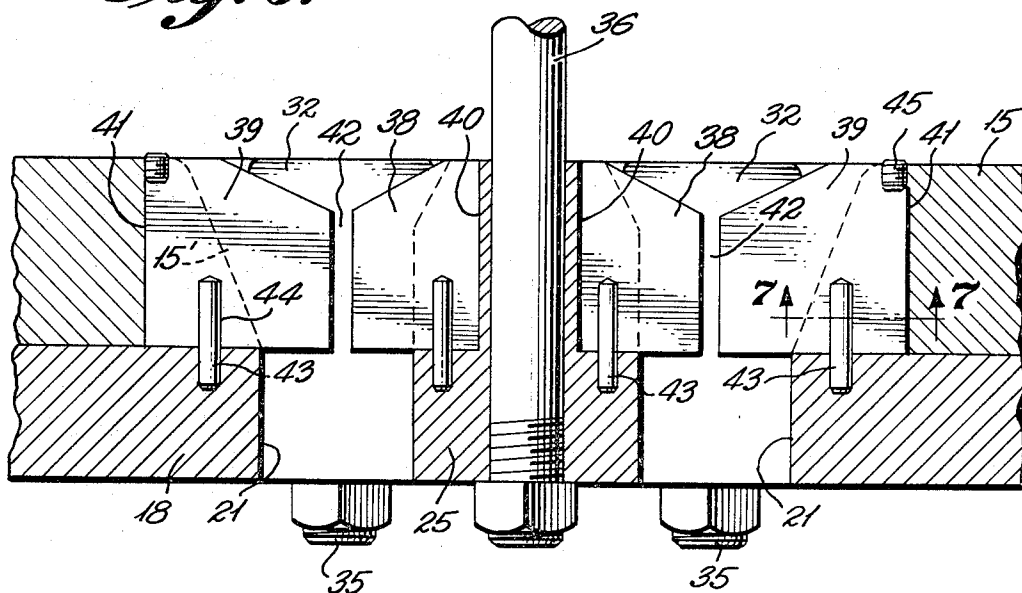


Fig. 7.

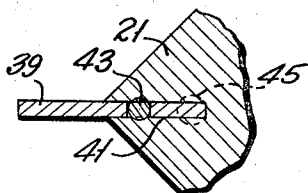


Fig. 8.

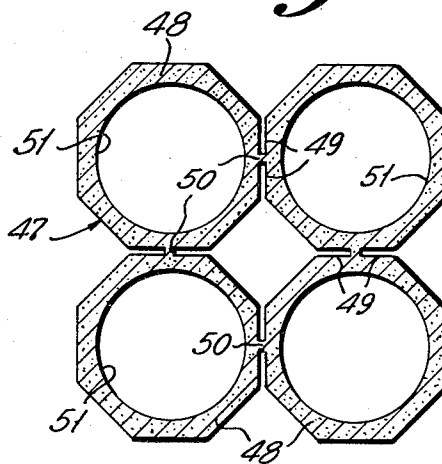
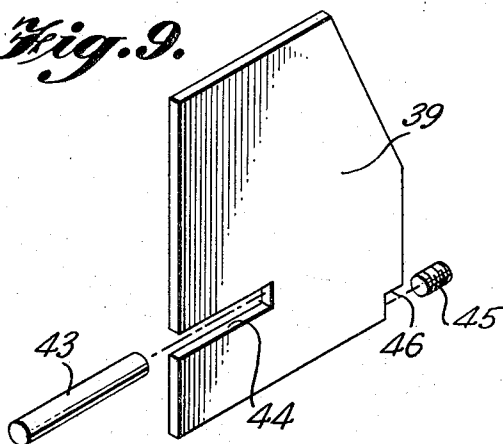


Fig. 9.



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EXTRUSION DIE FOR DRAIN TILE CLUSTER

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1 Claim. (Cl. 25—17)

ABSTRACT OF THE DISCLOSURE

An extrusion die structure particularly for producing a cluster of drain tiles with the individual drain tiles interconnected by thin frangible webs of sufficient strength to stabilize the cluster of tiles during firing in a kiln. After firing, the individual tiles are easily separated by breaking the connecting webs.

This invention relates to an improved extruding die for the production of drain tile and the like.

The principal object of the invention is to provide a die structure which will produce four streams of clay or similar material simultaneously for making a cluster of four connected tiles or pipes of the desired length, said tiles of each cluster being connected by narrow integral webs which are readily frangible after the firing or burning operation in a kiln.

A further object of the invention is to provide a die structure which will produce clusters or units consisting of four connected tiles, enabling the clusters to be stacked on kiln cars to a considerable height such as seven feet or seven clusters high, providing the necessary stability to prevent falling or separation of the individual tiles during their travel through the kiln in the burning process.

Another important object is to provide an extrusion die structure for the above-stated purpose which is relatively simple in construction, easy to assemble and disassemble, practical to manufacture, and reliable and efficient in operation.

Other objects and advantages of the invention will become apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a front elevation of an extrusion die embodying the invention;

FIGURE 2 is a fragmentary longitudinal vertical section taken on line 2—2 of FIGURE 1;

FIGURE 3 is a rear elevational view of the die structure taken substantially on line 3—3 of FIGURE 2;

FIGURE 4 is a perspective view of the core of the die structure and core supporting means;

FIGURE 5 is a perspective view on a reduced scale of a cluster of four tiles produced by the invention die;

FIGURE 6 is an enlarged fragmentary horizontal section taken on line 6—6 of FIGURE 1;

FIGURE 7 is a fragmentary vertical section taken on line 7—7 of FIGURE 6;

FIGURE 8 is an enlarged horizontal section taken on line 8—8 of FIGURE 5; and

FIGURE 9 is an enlarged exploded perspective view of a scoring blade employed in the die structure.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of the invention, the numeral 15 designates the main supporting plate or body portion of an extrusion die upon which the other elements of the structure are mounted. The main plate 15 may be circular, as shown, and may form the front closure member of a die housing 16 containing clay or like

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plasticized material to be forced through the mouth of the extrusion die by an extrusion auger 17 of conventional construction within the housing 16. The main plate 15 has a central contoured main outlet opening 15' formed therethrough, as shown.

Mounted upon the front face of the main plate 15 is a forward die plate 18 of generally rectangular configuration, secured rigidly and detachably to the main plate 15 by suitable screws 19. The die plate 18 forms the mouth or outlet of the extrusion die and establishes the exterior contour of each tile in the cluster of four tiles being extruded. Toward this end, die plate 18 has a central opening formed therethrough of the marginal configuration shown in FIGURE 1, registering with the opening 15'. This opening designated generally by the numeral 20 has opposed pairs of inwardly projecting V-shaped lugs 21 at opposite sides thereof and diagonal corner faces 22 and connecting horizontal and vertical faces 23 and 24, FIGURE 1. Collectively, these several faces of the die opening 20 coact with a central rectangular core element 25, FIGURE 1, to impart to the exterior surface of each tile an octagonal shape. The core element 25 will be described in further detail.

The die core structure is carried by a pair of spaced parallel cross bars 26 and 27 connected by an integral web 28, as best shown in FIGURES 3 and 4. The opposite ends of the bars 26 and 27 carry forwardly projecting spacers 29 which abut the rear face of main plate 15 so as to maintain the bars 26 and 27 spaced rearwardly therefrom and parallel thereto. As shown in FIGURE 4, the spacers 29 have openings 30 which receive screws 31, having screw-threaded engagement within screw-threaded openings in the main plate 15. Thus, the bars 26 and 27 form with the plate 15 a rigid structure.

Surrounding the square core element 25 are four relatively large cylindrical core elements 32 having rearwardly tapering conical portions 33, as shown in FIGURE 4. The core elements 32 are centered within the four corner areas of the die mouth or opening 20 and have their forward ends flush with the front face of the die plate 18. The cylindrical core elements 32 are thus positioned to form an interior cylindrical bore in each tile of the cluster of four being produced by means of the die.

Spacer sleeves 34 are interposed between the conical portions 33 and the fronts of the bars 26 and 27, and through bolts 35 serve to rigidly interconnect the core elements 32 and spacers 34 with the bars 26 and 27 as a unit. Thus, these four core elements 32 are supported by the bars 26 and 27 as in FIGURE 4 and in turn the bars are supported upon the main plate 15 through the medium of previously-described bolts 31.

In a very similar manner, the central square core element 25 is connected with the vertical web 28 by another through bolt 36, there being an intervening spacer 37 between the web 28 and the central core element 25. As shown in FIGURE 2, the supporting bars 26 and 27 and the web 28 are disposed immediately ahead of the auger 17 within the chamber or housing 16 and the remainder of the die structure is forwardly of this point.

As shown in the drawings, coating pairs of thin blades 38 and 39 are fixedly and removably mounted within the central core element 25 and the main plate 15, respectively so as to cut or score the adjacent tiles of each cluster of four as they are extruded in a manner to leave thin connecting webs between the tiles which are subsequently broken after burning and maintaining the integrity of the cluster during burning and while stacked upon the kiln car. As shown, blades 38 are seated within slots or sockets 40 formed in the four corners of square core element 25, the blades projecting equal distances outwardly of the four corners and terminating just short of the axes of the

adjacent pair of through bolts 35. As shown in FIGURE 1, the blades 38 are spaced 90 degrees apart and the respective opposed pairs thereof are parallel to the faces 23 and 24 of main die opening 20.

In a similar manner, the outer blades 39 are seated within slots 41 formed in the plate 15, FIGURE 6, and are in closely spaced opposed edge-to-edge relation with the blades 38, whereby narrow gaps 42 are formed between each opposed pair of blades 38 and 39. As shown in FIGURES 6, 7 and 9, the several blades 38 and 39 are anchored within their slots 40 and 41 by dowel pins 43 received by slots 44 of the blades. Blades may be held against axial displacement by removable set screws 45 received in corner notches 46 of the blades. Other means of attaching the blades may be employed, if desired.

FIGURES 5 and 8 show the product or cluster of four drain tiles produced by the extrusion die structure. As shown in these figures, when the auger 17 forces the clay or like extrusion material through the die structure in the direction of the arrow in FIGURE 2, the main opening 20 in die plate 18 and the central square core element 25 impart to the cluster 47 the external configuration or cross sectional shape shown in FIGURES 5 and 8. Simultaneously, the pairs of cooperating blades 38 and 39 cut or score the adjacent individual tiles 48 of each cluster at their connected sides, as indicated at 49, leaving only narrow connecting ribs 50 between each pair of tiles in the cluster of sufficient strength to maintain the integrity of the cluster while on the kiln car during the burning of the tiles. Subsequent to this, the individual tiles 48 are easily separated by fracturing the thin ribs 50 or sprues. The formation of the four tile clusters 47 by means of the die renders it possible to stack the clusters of tile on end on the kiln car approximately seven layers deep where the clusters are about one foot long. Were the individual tiles not connected or unitized in the manner shown, they would not be stable on the kiln car and could not be stacked safely to the desired height without the danger of tumbling.

It will be noted by comparing the die structure in FIGURE 1 with the cross section of the cluster in FIGURE 8 that the octagonal exterior shape of each tile 48 is produced by the combined action of the opening 20, center core element 25 and blades 38 and 39. The interior bores 51 of the tiles which are cylindrical are produced by the core elements 32 during the extrusion process.

It is believed that the advantages of the invention die structure should now be apparent to those skilled in the art, without the necessity for a further detailed description.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claim.

I claim:

1. An extrusion die structure for producing a cluster of four temporarily connected drain tiles which may be readily separated after firing of the cluster in a kiln, comprising a main supporting plate having a main outlet opening formed therethrough, a front die plate secured to the forward face of the main supporting plate and having an extrusion opening registering with said main outlet opening, the extrusion opening having a margin which includes pairs of spaced horizontal and vertical surfaces at the opposite sides thereof, diagonal surfaces at the corners of the extrusion opening connecting said pairs and inwardly projecting diagonal surfaces at the sides of the extrusion opening midway between the corners thereof and defining V-shaped projections within the extrusion opening, a square core element disposed centrally within the extrusion opening having side surfaces which are parallel to said corner diagonal surfaces and having corners which are in opposing spaced relationship to said V-shaped projections, four circular core elements within the extrusion opening in circumferentially equidistantly spaced relation and surrounding and spaced equidistantly from said central square core element and spaced equidistantly from the surfaces of the extrusion opening, rigid supporting means for all of said core elements and being secured to said main supporting plate, said V-shaped projections and the corners of the central square core element having slots formed therein with the slots arranged in opposing pairs between the projections and square core element, and a thin blade mounted within each said slot, the blades being arranged in opposing pairs between said circular core elements and spaced equidistantly therefrom and the opposing blades of each pair defining a narrow passage between the edges of the blades causing the formation of thin frangible connecting webs for the tiles of said cluster during the extrusion of the cluster.

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