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2,584,669

TILE FORMING MACHINE

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Fig. 1

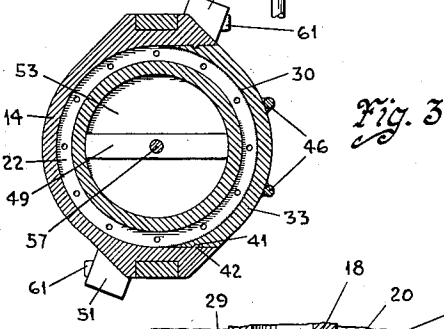
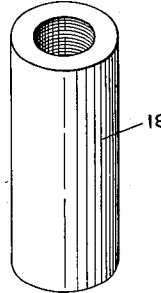
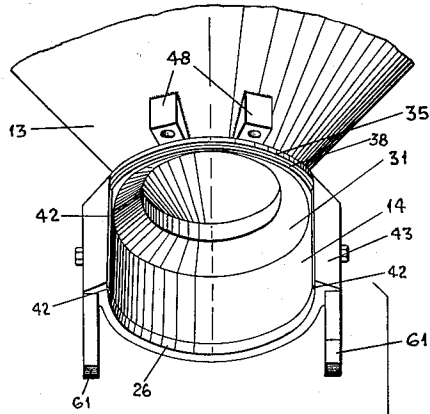
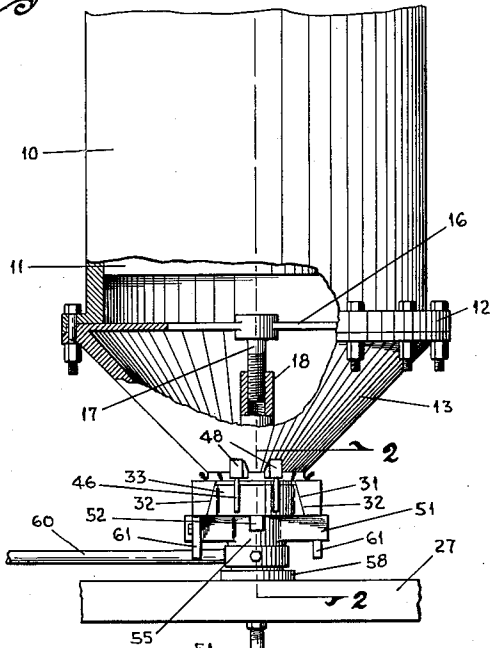


Fig. 4

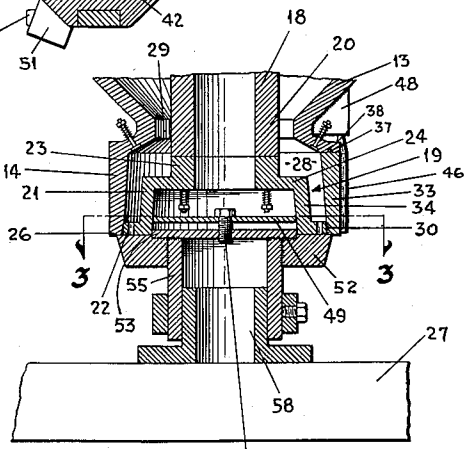
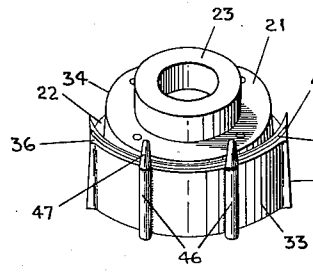


Fig. 2

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# UNITED STATES PATENT OFFICE

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## TILE FORMING MACHINE

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5 Claims. (Cl. 25—39)

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This invention relates generally to tile forming machines and in particular to a forming machine for making elbow tile.

Elbow tile is commonly used in water and sewage systems. This tile is generally formed with about a ninety degree angle bend having a socket portion at one end. In forming the elbows by machines now in general use, appreciable length has been required in the elbow to obtain the ninety degree angle bend due to the construction of the forming dies. This length of the elbow is oftentimes objectionable in the installation of the elbow in a pipe system because of the additional space required in making a ninety degree angle connection. As a result, ninety degree elbows of short length are generally made by hand whereby their cost to the ultimate user is materially increased.

It is an object of this invention, therefore, to provide an improved forming machine for elbow tile.

A further object of this invention is to provide an elbow forming machine which is capable of making an elbow having a ninety degree turn within an over-all length much less than is now made by commercially available forming machines.

Another object of this invention is to provide a forming die for elbows of a construction such that short elbows can be manufactured on a production basis and as economically as long as elbows are now being manufactured.

A feature of this invention is found in the provision of an elbow forming machine having an outer die shell and an inner die member, in which a separate portion of the outer die shell is integrally formed with the inner die member for movement therewith into and out of assembly relation with the outer die shell. On removal of the inner die member from the outer die shell, the opening in the outer die shell for receiving the separate outer die portion, provides a space through which the elbow being formed can be turned in its passage outwardly from the forming machine.

Another feature of this invention is found in the provision of an elbow forming machine in which an outer die shell has a cut-away portion, and with the portion removed from the cut-away portion, being rigidly mounted on an inner die member for movement therewith into and out of assembly relation with the outer die shell. The removed portion, in such assembly, fits within the cut-away portion to complete the outer die shell, and recesses and ribs thereon coact

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with recesses and ribs on the outer die shell to seal the junction zone between the removed portion and the outer die shell against the outward passage of issue. The removed portion is independently locked with the outer die shell against lateral movement relative thereto, and is releasably locked with the inner die member in assembly relation with the outer die shell.

Further objects, features and advantages of this invention will appear from the following description when taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevational view of an elbow forming machine embodying the die construction of this invention, with certain parts being removed and other parts being shown in section for the purpose of clarity;

Fig. 2 is an enlarged sectional view as seen along the line 2—2 in Fig. 1 showing the outer die shell and inner die member of the forming unit in assembly relation;

Fig. 3 is a transverse sectional view taken along the line 3—3 in Fig. 2; and

Fig. 4 is an exploded perspective view of the elbow forming die unit of this invention.

With reference to the drawings, the die unit of this invention is illustrated in Fig. 1 in assembly relation with an elbow forming machine having an upright clay pot or cylinder 10 provided with an associated mud head or piston 11. Secured from the lower end 12 of the cylinder 10 is an outer die shell 13 of a flared shape converging inwardly toward its lower end and terminating in a tubular outlet portion 14. Extended transversely across the upper end of the outer die shell 13 is a spider member 16 of an open construction having supported therefrom in a centrally located position a threadable stem 17 for threadably engaging a sleeve or core bell 18. The lower end 20 of the core bell 18 (Fig. 2) projects within the outlet portion 14 in a concentrically spaced relation therewith.

Receivable within the outlet portion 14 is an inner die member, designated generally as 19, having a body member 21 of a substantially inverted cup shape integrally formed with a laterally extended annular flange 22 on its peripheral rim and with an upwardly projected annular wall 23 on its bottom or base portion 24. The annular wall 23 is of a size corresponding to the core bell 18 so that when the inner die member 19 is received within the outlet portion 14, in assembly relation with the outer die shell 13, the wall 23 is engageable with the lower end 20 of the core bell 18 so as to constitute a down-

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ward extension thereof. In this assembly the lateral flange 22 is received in close contact with in the bottom end 26 of the outlet portion 14, so as to close such outlet.

The inner die member 19 is supported for movement into and out of assembly relation with the outer die shell 13 by the provision of means including a cross-head unit, indicated generally at 27, which is actuated for up and down movement by suitable means (not shown) and adapted to be locked against downward movement when the inner die member 19 is within the outer die shell 13.

As thus far explained, the forming machine is of a commercially available type and in the forming of elbow tile and assuming the inner die member 19 in assembly relation within the outer die shell 13, clay is forced from the cylinder 10 by the piston 11 within the space 28 to form the socket portion of the elbow. The inner die member 19 is then dropped downwardly out of the outer die shell 13 and the piston 11 is moved downwardly in the cylinder 10 to extrude clay through the space 29 about the lower end 20 of the core bell 13. During this last mentioned extrusion process, the socket formed at the end of the tile, within the space 28, is manually gripped and the turn in the elbow is formed by bending the tile upwardly as it passes outwardly from the lower end 26 of the outlet portion 14. It is seen, therefore, that the curvature of the ninety degree turn is determined by the length of the outlet portion 14. Stated otherwise, the bending of the tile to form a ninety degree angle turn must be delayed until sufficient clearance is afforded with the lower end 26 of the outlet portion 14.

To provide for a shorter bend in the elbow being formed, the present invention contemplates the cutting away of a portion of the side wall of the outlet portion 14, as indicated at 31 in Figs. 1 and 4. This cut-away portion 31 is of a substantially trapezoidal shape with the ends 32 thereof diverging in a downward direction. An outer die portion 33, removed in the process of forming the cut-away portion 31, is rigidly secured as by welding, indicated at 35, (Figs. 2 and 4) to one side of the lateral flange 22 on the inner die member 19 at a position opposite the body member 21. This outer die portion 33 is of an arcuate contour and arranged in a concentrically spaced relation with a part of the side wall 34 of the cup-shaped body member 21.

The upper side 36 of the outer die portion 33 is formed with a longitudinally extended rib 37 for reception within a mating recess 38 formed in the outer die shell 13 in the upper side wall 35 of the cut-away portion 31, as shown in Figs. 2 and 4. In like manner, the end faces 39 of the outer die portion 33 are formed with recesses 41 for receiving therein associated ribs 42 formed on the end walls 43 of the cut-away portion 31.

The tapered construction of the outer die portion 33 facilitates its being fitted within the cut-away portion 31 and the coating recesses 41 and ribs 42, and the coating recess 38 and rib 37, function both as guide members and as sealing members at the junction zone of the outer die portion 33 with the outlet portion 14, to prevent the outward passage of issue or clay from the assembled die unit. This coating assembly relation of the recesses and ribs functions further as a means for locking the outer die portion 33 against lateral movement relative to

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the outlet portion 14. To further hold the outer die portion 33 against such lateral movement, there is provided on the portion 33 a pair of upright locking pins 46 having tapered upper ends 47 which are receivable within respective sockets 48 mounted on the outer die shell 13 at a position adjacent the upper or inner end of the outlet portion 14.

In order to assemble the inner die member 19 and outer die portion 33 as a unit, relative to the outer die shell 13, and to releasably lock such unit in its assembly position, there is provided means including a flat bar member 49 extended transversely of, and within the inverted cup-shaped member 21, at a position adjacent the peripheral flange 22 (Figs. 2 and 3). A locking member, indicated generally as 50, includes a tubular body member 55 integrally formed with radially extended oppositely arranged pairs of bearing members 51 and 52, with the members 51 being of a longer length than the members 52 for a purpose to appear later.

Carried on the top side of the tubular body member 55 is a flat disc member 53 of a size to be guidably received within the rim portion of the inverted cup-shaped body member 21 to a position such that the peripheral flange 22 of the body member 21 is rideable on the radial bearing members 51 and 52. The guide or disc member 53 is formed with a center threaded opening 56 for threadably receiving a pivot or bolt member 57 which is extended through the bar member 49. The tubular body member 55 is rotatably mounted about a stub shaft 58 mounted on the cross-head 27 and the locking member 50 is rotated as a unit about the shaft 58 by the provision of a manually actuated handle or lever 60 suitably secured to the body member 55.

Thus, in the assembly of the inner die member 19 and the outer die portion 33 within the outer die shell 13, the portion 33 is positioned below the cut-away portion 31 so as to be received therein on upward movement of the cross-head 27. With the inner die member 19 received within the outlet portion 14, the outer die shell 13 is completed by the reception of the portion 33 within the cut-away portion 31. Concurrently with this assembly, the locking pins 46 are received within the sockets 48, the rib 37 is received within the recess 38, and the ribs 42 are received within the recesses 41.

This assembly of the inner die member 19 with the outer die shell 13 is releasably maintained by manipulating the lever 60 so as to rotate the locking member 50 relative to the inner die 19 to a position at which the outer ends of the radial projections 51 are received within hook members 61 (Figs. 1, 3 and 4) carried in oppositely arranged positions on the outlet portion 14. The engagement of the projections 51 with the hooks 61 thus positively locks the inner die member 19 against movement downwardly out of the outer die shell 13, with the outer die portion 33 being rigidly maintained in assembly relation with the outer die shell 13 as previously described above.

On forming of the socket portion of the elbow tile within the space 28, the handle 60 is manipulated to release the projections 51 from engagement with the hooks 61, after which the inner die member 19 and outer die portion 33 are dropped downwardly as a unit in a supported position on the cross-head 27. The cut-away portion 31 thus provides a space through which the elbow being formed can be immediately bent up-

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ward during its extrusion through the space 29 about the lower end of the core bell 18. As a result, a sharper bend in the elbow is attained with the same facility as was previously afforded in the manufacture of elbows having a much longer length and a greater bending radius. By virtue of this die construction, elbows have been formed which are as much as six inches shorter in length than previous machine formed elbows.

Although the invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes can be made therein which are within the full intended scope of this invention, as defined by the appended claims.

I claim:

1. A forming machine for making elbow tile having a socket portion at one end including an upright outer die shell with a reduced lower outlet portion of a tubular shape having a cut-away side portion, a movable inner socket forming die member movable axially into and out of said outlet portion and integrally formed with an outer die portion of a size and shape corresponding to said cut-away portion so as to be received in a mating relation therein, and means for releasably locking said inner die member within said outlet portion of the outer die shell.

2. A die unit for forming elbow tile including an outer die shell having a tubular outlet portion with a side portion thereof cut away, a movable inner die member movable axially into and out of said outlet portion including an outer die shell portion of a size and shape corresponding to said cut-away portion so as to be fitted within said cut-away portion to complete said outer die shell, when said inner die member is in a moved position therein, and means for releasably locking said inner die member against axial movement within said outer die shell.

3. A die unit for forming elbow tile including an outer die shell having an outlet of a tubular shape, a core bell supported in said shell in a concentrically spaced relation with said outlet, said outlet having a side portion thereof cut away, a movable inner die member movable axially into and out of said outlet having a core portion arranged relative to said core bell so as to constitute an extension of said core bell when in a moved position within said outlet, an outer die portion fixed on said inner die member and of a size and shape corresponding to said cut-away portion so as to be fitted within said cut-away portion to complete said outer die shell when said inner die member is within said outlet, coacting portions on the side wall of said

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cut-away portion and on said outer die portion for sealing the adjoining surfaces therebetween, and means for releasably locking said inner die member within said outlet against axial movement.

4. A die unit for forming elbow tile including an outer die shell with a movable outlet, an inner die member vertically movable into and out of said outlet, said outlet having a side portion thereof cut away, an outer die shell portion rigid on said inner die member and of a size and shape corresponding to said cut-away portion so as to fit in a mating relation within said cut-away portion, when said inner die member is in a moved position within said outlet, to complete said outer die shell, coacting recesses and rib members on said outer die portion and on the side wall of said cut-away portion for sealing the junction therebetween, means for releasably locking said outer die portion against lateral movement out of said cut-away portion, and means for releasably locking said inner die member against vertical movement within the outlet of said outer die shell.

5. A die unit for forming elbow tile including an outer die shell having an outlet, an inner die member vertically movable within said outlet to close the same, said outlet having a side portion thereof cut away, with said cut-away portion being of a substantially trapezoidal shape having the side walls thereof diverged toward the outer end of said outlet, an outer die portion rigid on said inner die member and of a size and shape corresponding to said cut-away portion so as to be fitted therein to complete said outer die shell when the inner die member is moved within said outlet, coacting means on said outlet and outer die portion for sealing the junction zone therebetween, means for locking said outer die portion against lateral movement relative to said outlet, and means for releasably locking said inner die member within said outer die shell.

JOSEPH A. BRYANT.

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