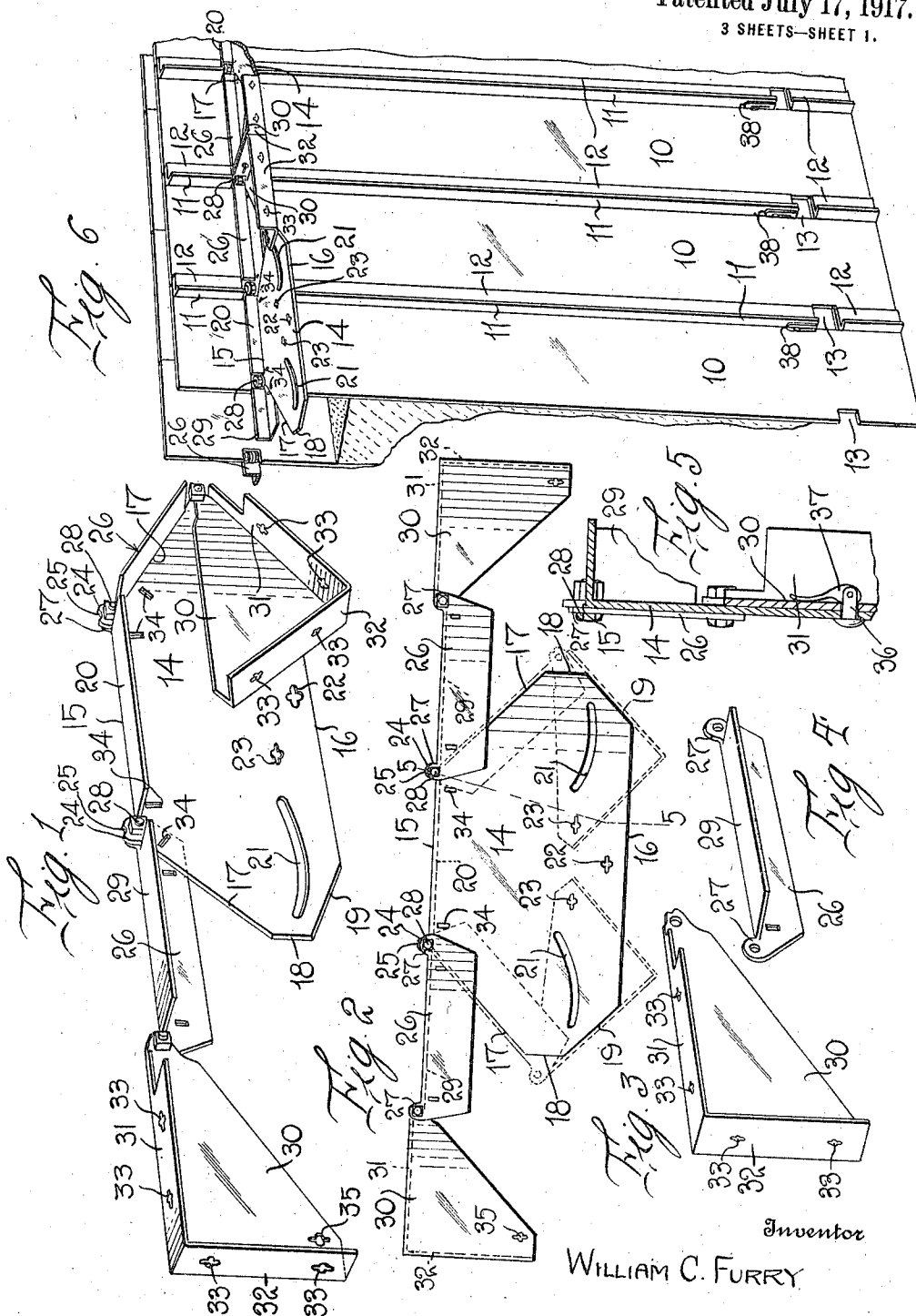


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3 SHEETS—SHEET 1.



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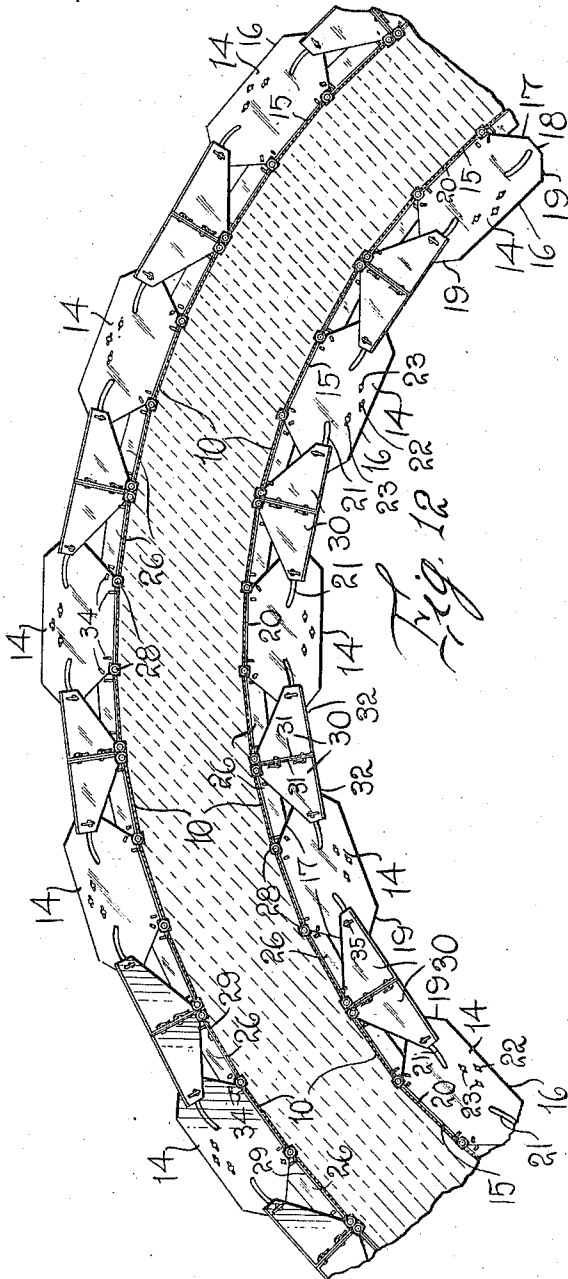


Fig. 12

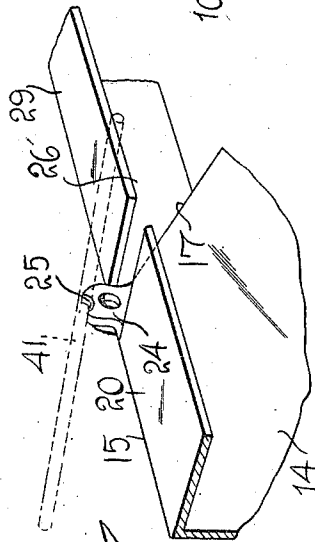


Fig. 7

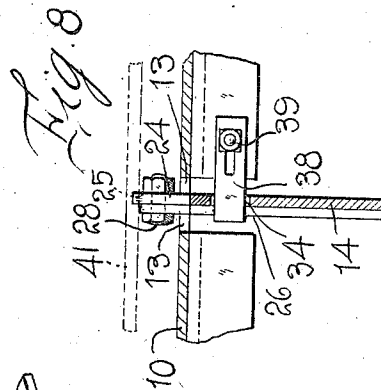


Fig. 8

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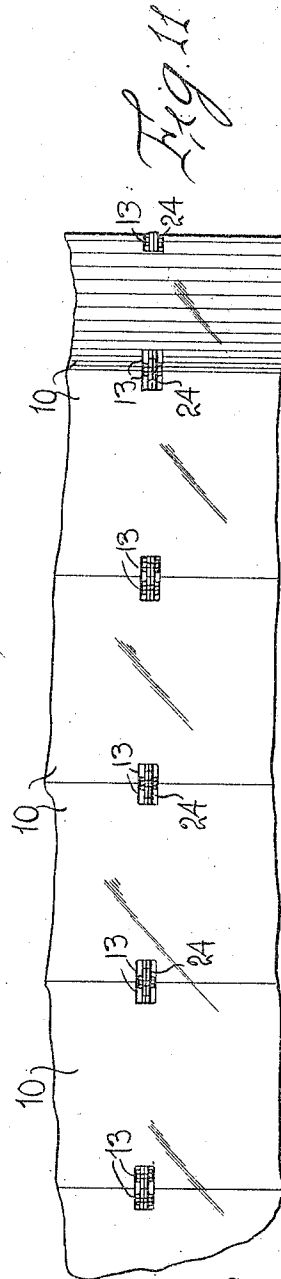
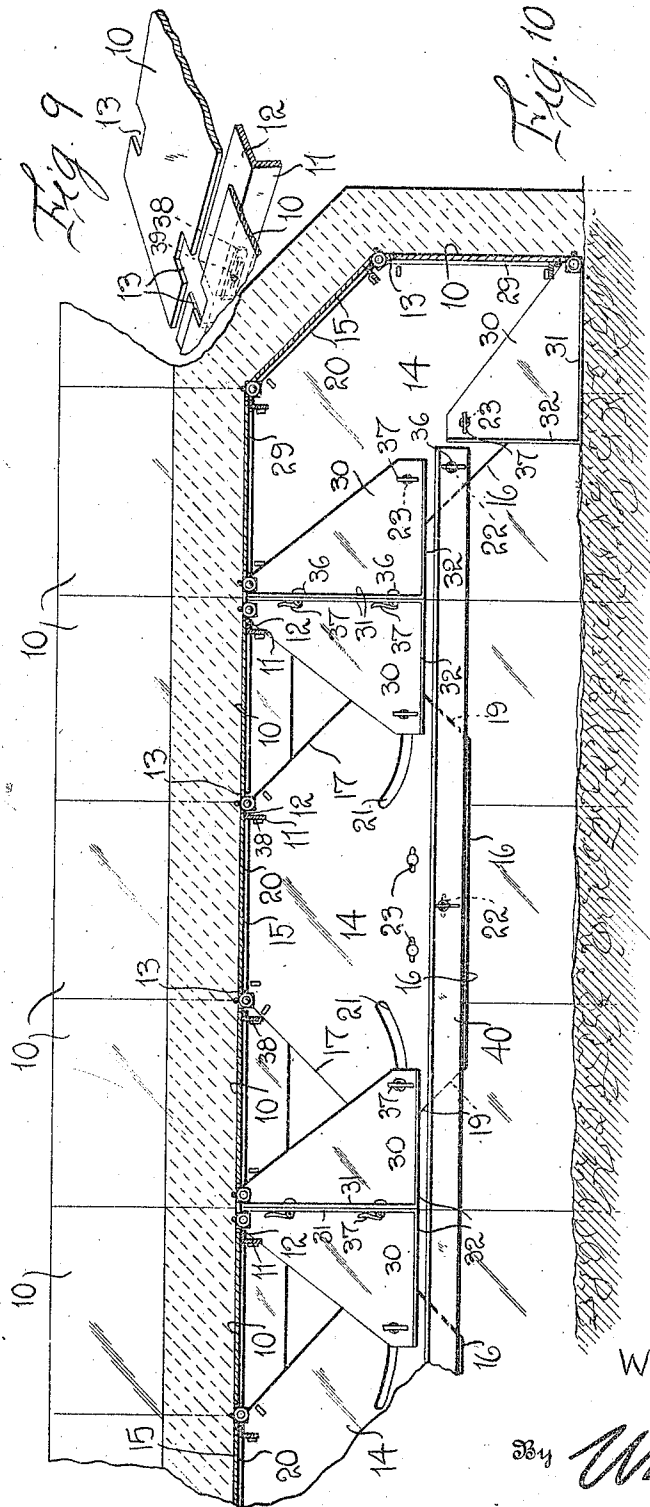
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UNITED STATES PATENT OFFICE.

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MOLD FOR FORMING CONCRETE STRUCTURES.

1,233,567.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM C. FURRY, a citizen of the United States, residing at Tecumseh, in the county of Pottawatomie and State of Oklahoma, have invented certain new and useful Improvements in Molds for Forming Concrete Structures, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to molds for forming concrete structures and particularly to molds formed of a series of units which may be adjusted to various positions and adapted to be used for forming various structures.

15 One general object of the invention is to provide a form or mold particularly adapted for molding culverts or like structures and in this connection to so construct the mold that the culvert may be formed with a flat floor or crown having downwardly extending pairs of abutments at approximately right angles to the floor or at any other desired angle, or the sections so changed that arched culverts may be formed with any
25 desired degree of curvature.

A further object is to so construct the units that they may be used for molding either straight or curved walls.

30 Still another object is to provide for ready engagement or detachment of the several parts of the mold or form from each other and for their ready adjustment and in this connection to provide for quickly and effectively interlocking the mold sections with
35 each other.

A further object of the invention is to provide in connection with a plurality of pallets of like structure, a plurality of bracing units, each unit being so constructed
40 that a plurality of faces are provided for the attachment of the pallets and each unit being further so constructed that the angular relation of the pallets to each other may be changed.

45 Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein—

50 Figure 1 is a perspective view of one of the bracing units;

Fig. 2 is an elevation of the bracing unit shown in Fig. 1, looking from the other side of the unit and showing in dotted lines an

angular arrangement of the wings of the unit relative to each other;

Fig. 3 is a perspective view of the triangular wing of one unit;

Fig. 4 is a perspective view of one of the connecting links of the unit;

Fig. 5 is a sectional view on the line 5—5
of Fig. 2;

Fig. 6 is a perspective view of two sets of pallets constituting lagging with the bracing units connected to the upper ends of the
pallets;

Fig. 7 is a fragmentary perspective view of one of the triangular wings and the connecting link of a unit showing the manner of supporting the reinforcing rods;

Fig. 8 is a fragmentary sectional view through a bracing unit and a portion of the lagging or pallet strips, showing the manner in which the lagging is interlocked with the bracing units;

Fig. 9 is a fragmentary perspective view of a portion of the lagging and its angle iron showing the locking device thereon;

Fig. 10 is an elevation showing my mold sections applied to the construction of a flat culvert;

Fig. 11 is a fragmentary top plan view of the construction shown in Fig. 10;

Fig. 12 is a horizontal sectional view showing my devices as applied to the construction of a circular wall such as the wall
of a tank or silo.

My improved molding devices consist of a series of pallet or lagging strips and a series of bracing units to which the strips are attached and by which the strips are connected. The molding face or pallet of the mold is formed by strips of sheet metal designated 10 (see Fig. 6), each strip (which may conveniently be about 8½ inches in width and 6 feet in length) being formed adjacent one margin with a flange 11 preferably formed by a small angle iron, the flange 12 of which projects slightly beyond the edge of the strip 10 so as to form a seat for the next adjacent strip. Each strip and the flange of the angle iron is cut away as at 13 at its opposite edges and at a distance from its opposite ends to provide for engagement with the flanges of the bracing units which will now be described.

The lagging formed by the strips 10 is

braced and held in proper position by a series of bracing units, one of which is shown in Fig. 1. Each of these units consists of a main plate 14 which has parallel upper and lower edges 15 and 16 respectively, the edge 15 being shorter than the edge 16. The ends of the plate 14 are cut away at an angle of 45° to the edge 15 and divergently with relation to each other as at 17. The ends then extend at right angles to the edge 15 as at 18 and then extend at right angles to the edges 17 and intersect the edge 16 as at 19. The upper edge 15 of the plate 14 is formed with the laterally projecting flange 20 and the plate 14 adjacent the end edges 18 is formed with the curved slots 21. The middle of the plate adjacent the edge 16 is formed with a medially disposed double key hole slot 22 and above this slot and on each side thereof are formed the double key hole slots 23. At the upper edge of the plate 14 at the junction of the edge 15 with the edges 17 there are formed the perforated ears 24, the upper ends of these ears, as illustrated in Fig. 7, being formed with seats 25 for the reception of reinforcing rods. Pivottally connected to the ears 24 are the linking members 26 which are angular in section, as shown clearly in Fig. 4, and which are provided at opposite ends with the upwardly divergent ears 27 which coact with the ears 24 and are connected thereto by bolts 28. The flanges 29 of these ears are adapted to lie flat against the edges 17 of the plate 14, as shown in full lines in Fig. 1 and in dotted lines in Fig. 2, and pivottally connected to the extremities of these links are the triangular wing plates 30, these plates having the flanges 31 and 32 disposed at right angles to each other and to the plane of the plate. These flanges 31 and 32 are formed with double keyhole slots 33. The plates 14, links 26, and the wing plates 30 are also formed with slots 34 whose purpose will be later stated. The triangular wing plates 30 are also provided with keyhole slots 35 adjacent the outer corner of each plate, these slots 35 coacting with the curved slots 21 or with the slots 23, as will hereafter appear. Preferably bolts of the pattern shown in Fig. 5 are used for adjustably connecting the wing plates 30 to the main plate 14 and for detachably connecting the units to each other. These bolts are designated 36 and each bolt consists of a shank having a head at one end adapted to be inserted through the keyhole slot and turned and at its other end bifurcated and formed with a cam lever 37.

For the purpose of detachably connecting the lagging strips 10 to the flanges 20 and 29 by means of the slots 34, each of the flanges 11 adjacent the notches or cut away portions 13 of each lagging strip is provided with a sliding bolt (see Fig. 8), this

bolt being designated 38. Each bolt is slotted and through the slot passes a bolt 39 which holds it in position. By means of these sliding bolts 38 the lagging strips may be interlocked with the bracing units in the manner illustrated in Fig. 8. I do not wish to be limited to this means, however, of connecting the lagging strips 10 to the bracing units as they may be bolted to the bracing units by ordinary bolts. I believe the construction illustrated in Fig. 8 to be preferable however, for one reason above others that the locking devices are below the level of the concrete which is disposed upon or against the lagging strips and, therefore, so there is no danger of these bolts interlocking with the concrete.

With the lagging strips as described and the units constructed as described it is possible to form a large variety of concrete structures. Thus in Fig. 6 I illustrate how these devices may be applied to constructing a straight wall such as the wing wall of a culvert, or the wall of a house or other like structure. In this case two sets of lagging strips are used, disposed in spaced relation to each other and braced upon their outer faces by the units composed of the members 14, 26 and 30. In this case the members 14 and 26 are extended so as to form an approximately straight surface bearing against the lagging strips and the flanges 31 of the wings 30 of one unit are detachably bolted to the flanges 31 of the wings of the next adjacent unit. In this case bracing or tying members designated 40 (see Fig. 10) may be detachably connected by bolts passing through the keyhole openings 23 of the several units and the triangular wing members 30 are detachably connected to the main plate 14 by means of bolts passing through the keyhole slots 35 and through the slots 21. This arrangement of the unit is particularly well illustrated in Fig. 10. The lagging strips are of course connected to the several units by means of the sliding bolts 38, as shown in Fig. 8, and reinforcing rods 41 may or may not be used as found necessary, these reinforcing rods being disposed in the seats 25, as illustrated in Fig. 7.

In Figs. 10 and 11 I illustrate the manner in which the mold sections may be arranged to form a relatively shallow flat-arched culvert. In this case the lagging strips 10, which are to form the floor or top of the culvert, are arranged horizontally and the bracing units beneath them are arranged vertically, these bracing units constituting centering for supporting the lagging strips or pallets. At the ends and in order to form the angle between the floor or top of the culvert and the abutments thereof, one of the units is arranged, as shown to the right of Fig. 10, with the flanges 29 of the links 26 disposed against the edges 17 and

the triangular wings 30 so disposed that the bolts passing through the slots 35 are at the inner ends of the slots 21. The flanges 31 of the member 30 in this case give a relatively firm support for the bracing members on the ground. It will be understood of course that other bracing members may be attached so as to form downwardly extending abutments of greater length than that shown in Fig. 10 if so desired. If desired also, the bracing rod 40 as previously stated may be attached to the several units so as to hold them in firm position. When the bracing members are in place and the lagging or pallet strips are interlocked with the bracing members, the concrete is to be placed upon the top of the lagging strips and against the end walls formed thereby in the usual manner and, after the concrete is hardened, the bracing strips and the lagging members are removed. In Fig. 12 I show an arrangement of the lagging strips and bracing units which will permit the construction of a circular wall such as the wall of a silo, water tank, etc. In this case the linking members 26 are arranged in the desired angular relation to the edge 15 of the member 14 so as to give the proper degree of curvature and then the end or wing members 30 are bolted in place so as to hold the members 26 at the proper angle to the edge 15 of the member 14. The outer mold for the wall is formed in the same manner but the bracing members are reversed with relation to the bracing members on the inner face of the wall and the bolts which pass through the slots 35 of the wing members 30 are disposed at the extreme outer ends of the strips 31, thus giving a reëntrant curvature to the lagging or pallet strips as illustrated clearly in Fig. 12. While I have illustrated three adaptations of my molding units to the formation of three different structures, I wish it understood that other structures may be as easily formed and that the units are adapted to many other different uses than those illustrated and described. Inasmuch as the locking strips or pallet strips are all of one size and the bracing units are also all of one size, it is possible to combine these units to any desired extent to form structures of widely differing dimensions and the several elements of the bracing units may be changed in their angular relation so as to secure any desired degree of curvature or to make structures which have perfectly straight or flat faces.

It will be noted that the links 26 have flanges which are directed in the same direction as the flange on the upper edge of the main member of the bracing unit and that these strips operate upon one face of this main member while the triangular end members operate on the opposite face of the main member but have flanges extending in

the same direction as the flanges on the linking members, these flanges acting to strengthen the end pieces as well as permitting the end pieces to be abutted against each other and fastened to each other.

It is also to be noted that the bracing units composed of the members 14, 26 and 30, together with the lagging strips 10, form centers or centering devices which may be used in masonry construction as well as a form for concrete and that the bracing units may be used as centering members and other forms of lagging applied thereto in the building of structures of masonry or concrete.

While I have illustrated what I believe to be the best form of my invention, I do not wish to be limited to the details of the construction as these may be varied in many ways without departing from the spirit of the invention.

Having described my invention, what I claim is:

1. A bracing unit for supporting lagging comprising a main member, linking members pivotally connected to the ends of the main member for movement in the same plane as the main member, and end members pivotally connected to the outer ends of the linking members and movable in the same plane, the edges of said end members being formed with flanges whereby the end members of one unit may abut against the end members of the next adjacent unit and be connected thereto, and means whereby the end members and the linking members may be held in a plurality of angular relations to the edges of the main member and to each other.

2. A bracing unit for supporting lagging comprising a main member having its ends angularly cut to provide edges divergent with relation to each and at an angle to the longitudinal edge of the main member, links pivoted to the main member at the extremities of one longitudinal edge of the main member, end members pivoted to the extremities of the links, and means whereby the end members may be adjustably connected to the main member at a plurality of points to thereby dispose the end members and the links in various angular relations to the longitudinal edges of the main member.

3. A bracing unit for supporting lagging comprising a main member, linking members permanently pivotally connected thereto for movement in the plane of the main member, and end members pivoted to the ends of the linking members and having such detachable adjustable connection at their outer ends to the main member that they and the linking members may be held in a plurality of angular relations to the edges of the main member and to each other.

4. A bracing unit for supporting lagging

- comprising a main member having a flange on one edge, linking members each having a flange on one edge and pivoted to the ends of the main member for swinging movement in the plane thereof, end members pivoted to the ends of the linking members and having flanges, and means for adjustably connecting the free ends of the end members to the main member at a plurality of points whereby to hold the end members and linking members in various angular relations to the flange of the main member.
5. A bracing unit for supporting lagging comprising a main member having its ends angularly cut to provide edges at right angles to each other and at angles of 45° to the opposite longitudinal edges of the main member, links pivoted to the main member at the extremities of one longitudinal edge of the main member and having a length equal to this longitudinal edge, end members pivoted to the extremities of the linking members, and means whereby the end members may be adjustably connected to the main member at a plurality of points to thereby dispose the end members and the linking members in various angular relations to the longitudinal edges of the main member.
6. A bracing unit for supporting lagging comprising a main member having its ends angularly cut to provide edges at right angles to each other and at angles of 45° to the opposite longitudinal edges of the main member, one of said longitudinal edges of the main member being formed with an angularly extending flange, links pivoted to the extremities of said last named longitudinal edge and having flanges along one edge thereof, triangular end members pivoted to the extremities of the links and having one edge formed with a flange, and means for adjustably connecting the free ends of the triangular end members to the main member at a plurality of points whereby to adjust the angle of the linking members and end members with relation to the flanged longitudinal edge of the main member.
7. Means for molding concrete structures comprising a plurality of lagging strips, each strip being formed with a flange and each strip and flange being cut away at its edges at a plurality of points, a bracing unit coacting with said strips comprising a main member having its ends angularly cut to provide edges at right angles to each other and at angles of 45° to the opposite longitudinal edges of the main member, one of said longitudinal end members being formed with a longitudinally extending flange of the same length as the width of a lagging strip, links pivotally connected to the main member at the ends of said flange for movement in the same plane as the main member, each of said strips being angular in cross section to provide a flange, approximately triangular ends members each pivoted at one corner to the extremity of one of the linking members and each having one edge flanged, means for holding the end members against the face of the main member in a plurality of adjusted positions, and means for interlocking the lagging through the flanges of the main and linking members, said means comprising slidable bolts mounted on the flanges of the lagging, the main and linking members being provided with openings through which said bolts may pass.
9. A bracing unit for supporting lagging comprising a main member having parallel side edges and having its ends angularly formed to provide edges at right angles to each other and at angles of 45° to the opposite longitudinal edges of the main member, one edge of the main member being laterally flanged and the member being provided adjacent the opposite margin with a central perforation and two lateral perforations and with oppositely disposed curved slots, linking members angular in cross section pivoted to the upper corners of the main member and having a length equal to the adjacent angular side edges of the main member, triangular end members each having two of its edges flanged and each pivoted at one corner to the free end of the adjacent linking member and at its opposite corner formed with a perforation adapted to coact with the perforations and slots in the main member, fastening means adapted to be disposed through the perforations and slots to hold the members in adjusted positions, and flanged lagging strips adapted to

be disposed on the flanges of the main and linking members and having means to interlock with said members.

10. Means for molding concrete structures comprising bracing units having upwardly extending ears, each of said ears having a seat formed in its end and adapted to support a reinforcing rod, and lagging strips detachably engaged with the edges of said
10 bracing units below the level of said seats.

11. Means for molding concrete structures comprising a plurality of bracing units composed of sections, the sections having projecting pivoted ears, the ears being
15 formed with reinforcing rod supporting seats, and lagging strips detachably connected to the edge faces of said units below said seats.

12. The combination with a bracing member, of a lagging member disposed upon the bracing member in a plane at right angles to the plane of the bracing member and having a flange disposed at an angle to the plane of the lagging member, said flange
25 being cut away to fit over the edge of the bracing member, and a slidable bolt on the flange adjacent said cut away portion, the

bracing member being provided with a passage for the reception of said bolt whereby to detachably hold the lagging member
30 upon the bracing member.

13. A bracing unit for supporting lagging comprising a main member having a flange on one edge, linking members each having a flange on one edge and pivoted to
35 the ends of the main member for swinging movement in the plane thereof, triangular end members pivoted to the ends of the linking members and each having a flange along one edge and extending from the
40 hinged end of the end member toward the free end thereof, and means for adjustably connecting the free ends of the adjustable member with the main member at a plurality
45 of points whereby to hold the end members and linking members in various angular relations to the flange of the main member.

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

WILLIAM C. FURRY.

Witnesses:

FREDERIC B. WRIGHT,
M. R. WILSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."