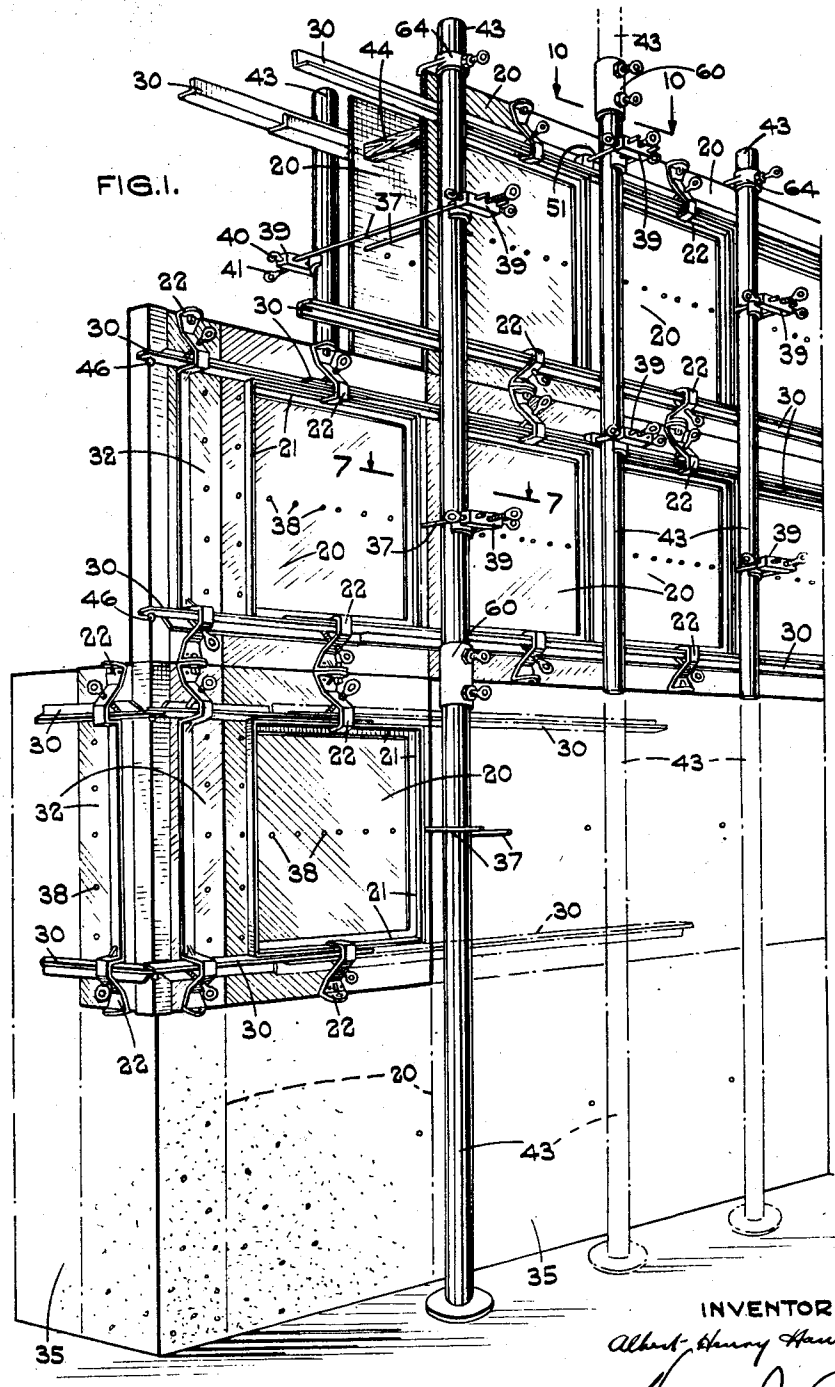
March 5, 1946. A. H. HAWES 2,396,174

FORM FOR THE CONSTRUCTION OF CONCRETE WALLS, BEAMS, AND THE LIKE

Filed June 20, 1944 3 Sheets-Sheet 1

FIG. 1.



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Filed June 20, 1944 3 Sheets-Sheet 2

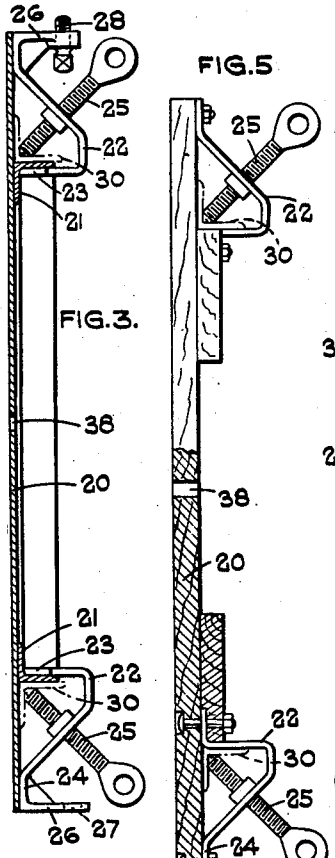


FIG.3.

FIG.5.

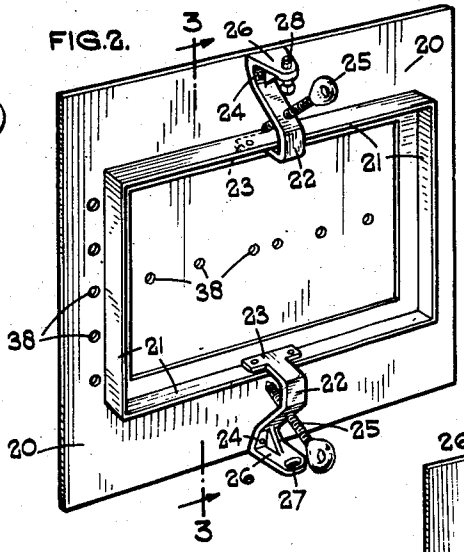


FIG.2.

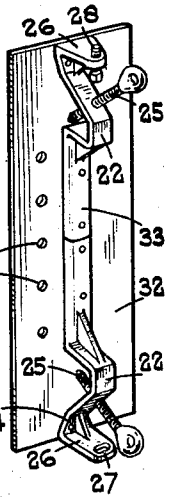


FIG.4.

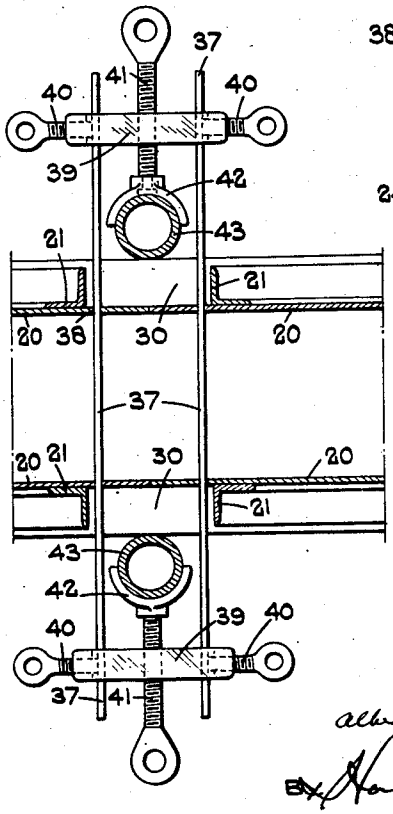


FIG.7.

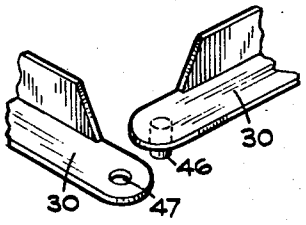


FIG.6.

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FORM FOR THE CONSTRUCTION OF CONCRETE WALLS, BEAMS, AND THE LIKE

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FIG.8.

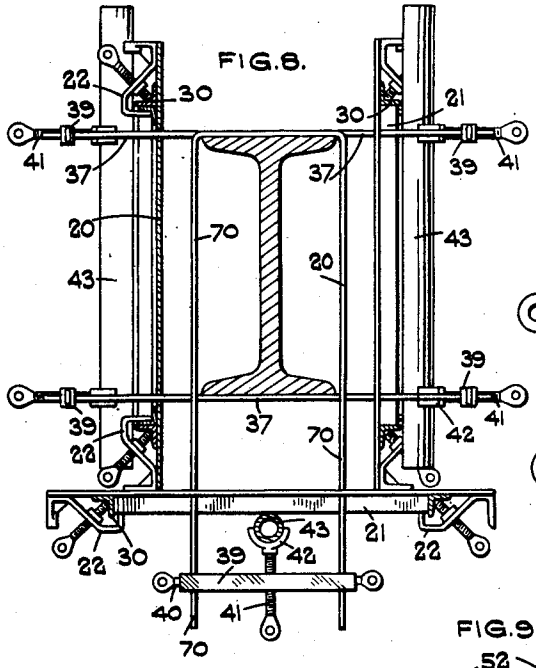


FIG.11.

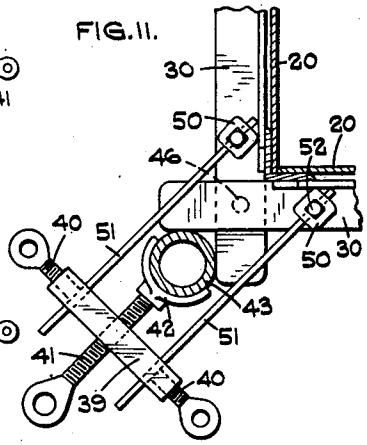


FIG.9.

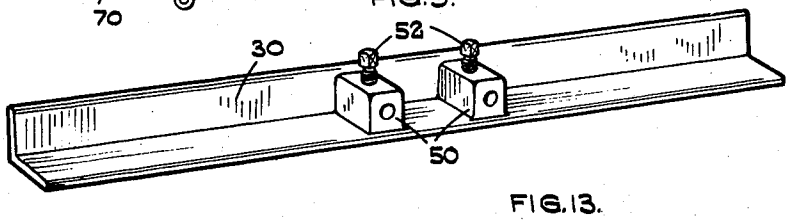


FIG.10.

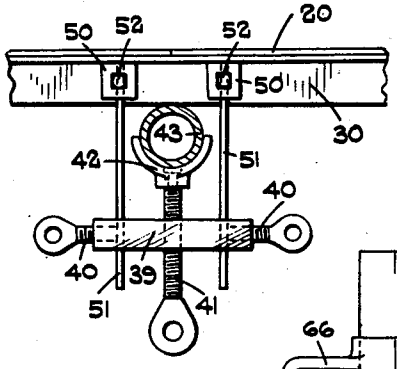
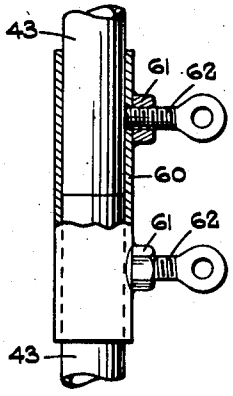


FIG.13.



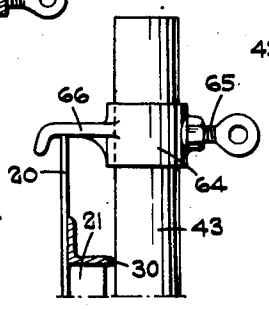


FIG.12.

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Patented Mar. 5, 1946 2,396,174

UNITED STATES PATENT OFFICE

2,396,174

FORM FOR THE CONSTRUCTION OF CONCRETE WALLS, BEAMS, AND THE LIKE

Albert Henry Hawes, Erdington, Birmingham, England, assignor to C. Bryant & Son, Limited, Birmingham, England, a British company

Application June 20, 1944, Serial No. 541,161
In Great Britain May 24, 1943

8 Claims. (Cl. 25—131)

This invention comprises improvements in the construction of concrete or similar walls, beams and the like and has for its object to provide an improved form of shuttering arranged in the form of units which can be assembled so as to produce walls, beams and the like of any length, height or thickness.

Referring to the drawings:

Figure 1 is a perspective view of the shuttering assembly as used in the building of a wall.

Figure 2 shows one of the shuttering plates.

Figure 3 is a section at 3—3 in Figure 2.

Figure 4 shows a plate of shorter length.

Figure 5 is a part section similarly taken to Figure 3, but showing the plate made of wood.

Figure 6 illustrates the method of joining two angle members for securing the plates, as used at corners.

Figure 7 is a section at 7—7 in Figure 1 showing the means of fixing and adjusting the plates to determine the thickness of wall to be produced.

Figure 8 shows the manner of using the shuttering for covering a beam.

Figure 9 shows an alternative form of angle iron support and wire fixings.

Figure 10 is a section at 10—10 in Figure 1.

Figure 11 shows a method of securing the extremities of two angle irons to a scaffold pole at a corner.

Figure 12 shows a means for retaining the upper portion of a scaffold pole when the lower portion has been removed.

Figure 13 shows the method of joining two scaffold poles end to end so that the lower one may be removed without disturbing the upper one.

According to this invention, the shuttering comprises plates 20 of metal, wood or other material, say two feet square, reinforced by angle-section metal 21 secured to the plates, the outer surfaces of the webs of the angle being nearest to the edges of the metal plate. These perpendicular webs may be conveniently at a distance of two inches from the vertical edges of the plate and four inches from the horizontal edges. The plates may be further reinforced by T section strips disposed vertically along the plate and midway of its length and extending vertically between the two angle-section members.

When metal plates are used the angle-section members are preferably welded to the plates. When wooden plates are used they may be screwed to the plates, the wooden plates being illustrated in Figure 5.

These plates are provided with clamping devices 22 which conveniently comprise a strip of metal one extremity 23 of which is welded to the inner surface of the projecting web of the angle-section member 21, the other extremity 24 lying along the surface of the metal plate extending to the edge thereof with an intermediate portion disposed at an angle of 45°, this intermediate portion having a tapped hole which receives a headed locking screw 25. The extremity of the metal strip adjacent the edge of the plate is bent upwards at right angles as 26 and is provided with a spigot or socket having an axis parallel to the plate. The plate is thus provided with a socket at its lower edge and a spigot at its upper edge, or vice versa as shown in the drawings the socket is in the form of a hole 27 and the spigot in the form of an adjustable screw 28, the retraction of which facilitates the removal of one plate without removing the plate next above it.

These plates are assembled to form the shuttering on the two surfaces of a wall which is to be formed of concrete, and they are joined horizontally by loose angle-section members 30 which may extend for the full length of a wall or for the length of several plates. These angle-section members fit against the angle members 21 on the plates i. e. with the outer walls of the angle-sections in contact, and they are secured together by the aforementioned clamping screws. Where the loose angle-sections do not extend for the full length of the wall, the ends of adjacent angle-sections overlap and are collectively secured to the plate.

For use with a wall of an odd number of feet in length a plate 32 may be used of a narrow width, one foot, which is similar to the one previously described. Such a plate is shown in Figures 1 and 4 and is reinforced with a single strip 33 the clamping device used being of the form previously described.

To provide for walls of a length which are not an even number of feet in length the plates may be fixed with their edges overlapping each other.

In practice, two rows of plates are assembled, one above the other, engaging by the afore-mentioned spigots and sockets and the concrete is poured to a depth slightly greater than that of the one plate. The lower row of plates are then removed and assembled above the upper row and the process repeated until the full height of the wall is reached.

In Figure 1 an assembly is illustrated in which the lower row and most of the second row of plates have been removed after forming the wall 35 and parts of the second and third rows of

plates are shown in position. It will be appreciated that there is a similar assembly of plates on the opposite side of the wall.

The means for adjusting the plates so as to give the desired wall thickness consists of wires 37 which pass right through the wall space and through holes 38 in the plates, the ends of the wires projecting beyond the plates. The openings in the plates for the wires may be horizontally elongated and may be of considerable length in the special overlapping plate previously referred or as shown in Figures 1 and 2 a series of holes may be provided in a horizontal row to compensate for the overlap and there may be a series of holes in a vertical row to enable the wires to be inserted at any desired height in relation to the plate. The horizontal row of holes further permits the wires to be in any desired relation to the plates.

The ends of the wires are engaged by a tie cramp 39 having a pair of holes through which the wires pass and which are locked by screws 40 having their axes parallel to the wall plates. This cramp has a screwed hole at right angles to the plane of the plates and receives a screw 41 the end of which is reduced to engage with a pressure piece 42 of channel section, the screw being free to rotate in the pressure piece.

To secure the plates in vertical alignment vertical tubes 43 are employed of a length greater than the depth of the plates and they contact with the loose angle members which bind the plates in a horizontal direction, this assembly being particularly shown in Figures 1 and 7.

The pressure piece carried by the cramp screw embraces one of these tubes and by tightening the screw the tube is pressed against the angle members and draws the wires taut. By inserting a distance piece such as 44 in Figure 1 between the two walls of plates a wall thickness corresponding with that of the distance piece is obtained and the distance piece can then be removed.

Instead of using vertical tubes channel-section bars may be used with a flat or other suitable pressure piece on the cramp screw and operating in a similar manner.

To construct walls in two different vertical planes the angle-section retaining members have their horizontal webs extending beyond their vertical webs as seen in Figures 1, 6 and 11, one end being provided with a vertical spigot 46 and the other end with a vertical socket or hole 47, the spigots and sockets being engaged, and used with two wall assemblies as above described.

To construct beams as by forming concrete around a metal girder, two rows of plates are used one on each side of the girder with the wires above and below the metal girder as seen in Figure 8. To close the base of the beam space wires 70 may be placed over the top of the girder with their extremities extending downwardly and passing through a base plate and being secured by cramping devices similar to those previously described, and designed to force the base plate into contact with the lower edges of the side plates.

After the walls have been completed the wires may be drawn out or their projecting extremities may be cut off.

In producing a soffit similar mechanism is used to that previously described. As seen in Figure 11 the angle members are cut away at their ends and passed one across the other with a vertical peg on one end passing through a hole in the other member. The scaffold pole is erected so as to be within the right angle formed by the overlapping extremities of the angle members and the lugs 50 on these angle members are disposed at a similar angle so as to present two parallel wires one on each side of the scaffold tube, and when the fitting is operated in manner previously described the overlapping ends of the angle members are drawn into close contact with the scaffold tube and a firm structure is provided and on this the necessary shuttering plates of the form previously described is mounted for producing a soffit.

The shuttering is also adapted for use in building walls partly from prefabricated blocks or with prefabricated surface tiles or for covering an existing wall in which cases wires cannot be conveniently passed through the wall. In such cases the wall is formed or completed by pouring concrete between the shuttering and the assembled blocks or existing wall, whilst when surface tiles are used they are assembled against the face of the shuttering and the concrete poured so as to form a wall within the tiles which are of course secured to the surface of the wall. Further it is not necessary to have wires passing through the walls at every point where the shuttering is secured and for these purposes an alternative fixing is provided and shown more particularly in Figures 9 and 10.

The angle members for positioning the shuttering plates are provided with lugs 50 having horizontal holes for receiving wires or rods 51, the inner ends of these wires being secured to the lugs by set-screws 52, the outer extremities of the wires passing through holes in a crossbar 39 and being similarly secured by set-screws 40. The centre of this crossbar is provided with a screwed hole which receives a locking screw 41 which carries a saddle piece 42, adapted to partially encircle the scaffold pole 43. The outer end of these screws 40, 41 are provided with means for rotating it such as an eye-piece so that it can be operated by a tommy bar.

In practice, the scaffold poles are erected, the shuttering plates assembled, wires inserted and secured and the locking screw operated so as to draw the angle member into close contact with the scaffold tube thereby firmly securing the shuttering in position for use.

After the wall has been erected to a certain height the lower plates may be removed and assembled at a higher level and some of the lower portions of the scaffolding tubes may also be removed and used at a higher level.

To facilitate the removal of the sectional lengths of scaffolding tube, whether disposed horizontally or vertically, a special fitting is used of the form shown in Figure 13 comprising a long sleeve 60 having an interior bore corresponding with the exterior of the scaffold tube and provided with two or more bosses 61 one near each end of the above and each receiving a locking screw 62. This sleeve fits over and overlaps abutting ends of two scaffold tubes which are secured together by a locking screw engaging each tube length. Where it is required to remove the length of scaffolding tube the fitting to be released is slidden along the one tube, thereby permitting the removal of either tube with a movement perpendicular to its length.

As an additional security when removing a length of scaffolding tube a fitting of the form shown in Figure 12 may be used and which comprises a socket 64 fixed to the scaffolding tube

by a screw 65 and having an arm 66 which overlaps the top edge of the plate and which when fixed prevents the tube falling in relation to the shuttering.

Alternatively there may be two parallel arms one above the other or one arm slotted at the end which engages with a securing angle piece to prevent vertical movement between the tube and the shuttering. The slot is so shaped that it will disengage from the angle member when the fitting is rotated around the tube.

Instead of using angle section members for joining the plates, tubes rods or other members may be used.

What I claim then is:

1. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, bars extending along said panel to align a longitudinal row of said plates, means provided on said plates for forcing said bars into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips.

2. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate and collectively forming a rectangular frame whose sides are parallel to, but spaced somewhat inwardly of, the edges of said plate, bars extending along said panel to align a longitudinal row of said plates, means provided on said plates for forcing said bars into simultaneous engagement with the outer faces of said plates and the adjacent sides of the reinforcing frames thereon.

3. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, angle section bars extending along said panel to align a longitudinal row of said plates, and means provided on said plates for bringing the flanges of said angle-section bars into simultaneous engagement with outer faces of said plates and the sides of said reinforcing strips, respectively.

4. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, bars extending along said panel to align a longitudinal row of said plates, means provided on said plates for forcing said bars into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips, and loops fixedly connected to said plates and embracing said bars when the latter are engaged with said plates and reinforcing strips as aforesaid.

5. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, loops fixedly connected to each of said plates medially of said opposed edges thereof, bars passed through said loops and extending along said panel to align a longitudinal row of said plates, and set-screws mounted in said loops and operable to force said bars into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips.

6. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, loops fixedly connected to each of said plates medially of said opposed edges thereof, angle-section bars passed through said loops and extending along said panel to align a longitudinal row of said plates, and set-screws mounted in said loops and adapted to engage in the angles of said bars, the flanges of the latter being thereby forced into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips.

7. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, bars extending along said panel to align a longitudinal row of said plates, means provided on said plates for forcing said bars into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips, supporting members adapted to be disposed transversely of said bars, means for maintaining the bars associated with two superposed longitudinal rows of said plates in engagement with said supporting members whereby the latter serve to align said rows, and further means provided at the edges of said plates adjacent said reinforcing strips, whereby two superposed plates may be maintained in alignment prior to the attachment of the upper of such plates to its aligning bars.

8. Shuttering for use in the construction of walls, beams and the like from concrete or like material, comprising a plurality of rectangular plates assembled together in edge-to-edge relationship to form a panel, reinforcing strips provided on the outer face of each plate adjacent to, but spaced inwardly of, two opposed edges thereof and extending parallel to said edges, brackets fixedly connected to each of said plates medially of said opposed edges thereof, corresponding parts of said brackets being interengageable for the purpose of aligning plates in superposed relationship and other corresponding parts of said brackets being of loop form, bars passed through the looped parts of said brackets and extending along said panel to align a horizontal row of said plates, and set-screws mounted in the looped parts of said brackets and operable to force said bars into simultaneous engagement with the outer faces of said plates and the sides of said reinforcing strips.

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