R. T. WALES.

MOLD FOR CONCRETE CONSTRUCTION.

APPLICATION FILED JULY 24, 1915.

1,312,462.

Patented Aug. 5, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

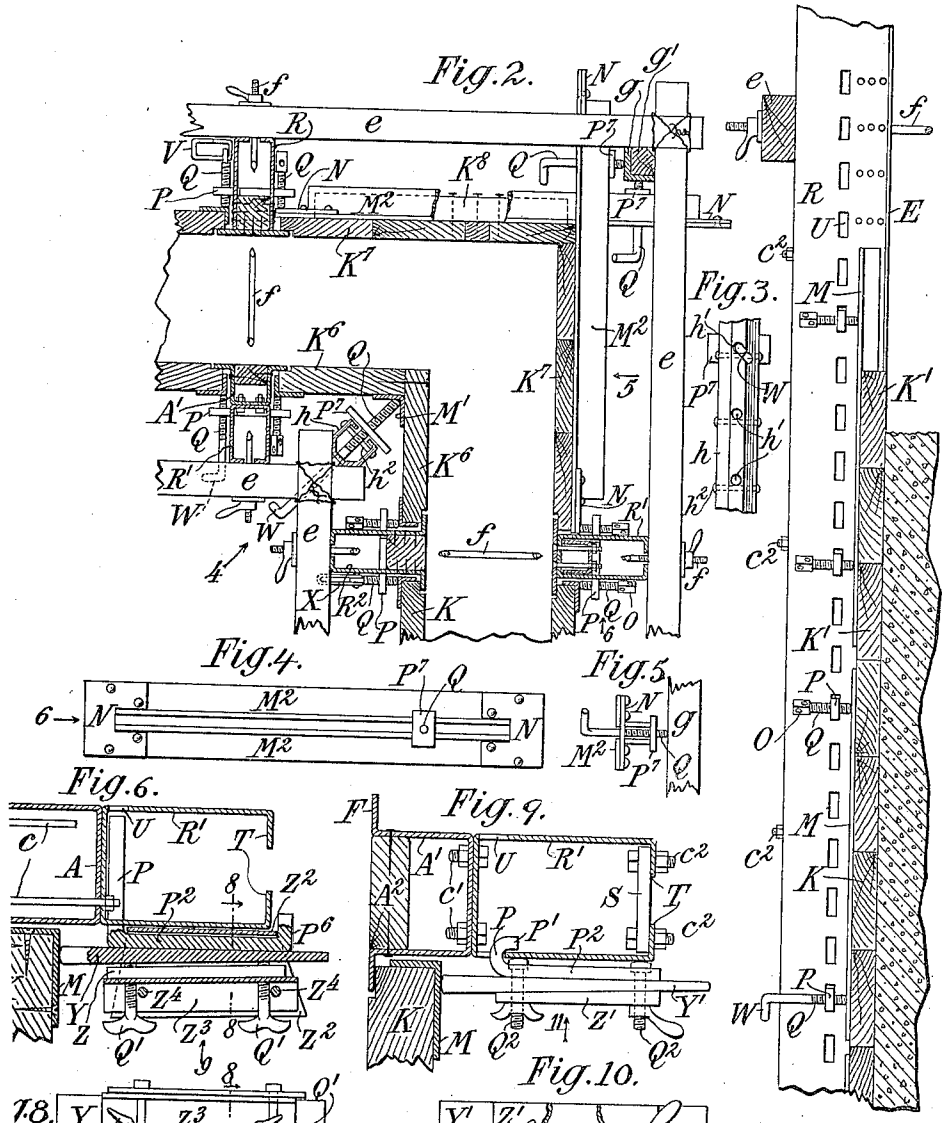


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 9.

Fig. 8.

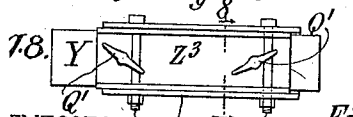
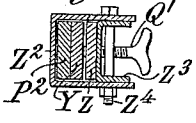


Fig. 10.



Fig. 7.



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2 SHEETS—SHEET 2.

Fig. 11.

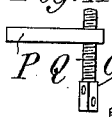


Fig. 12.

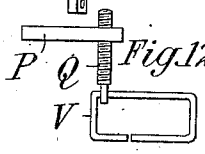


Fig. 13.

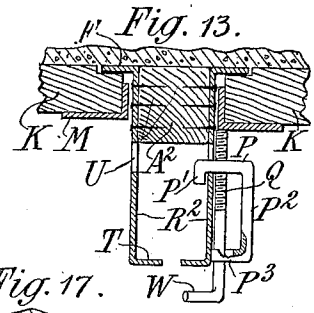


Fig. 14.

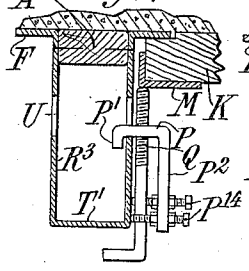


Fig. 15.

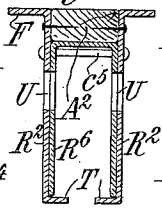


Fig. 16.

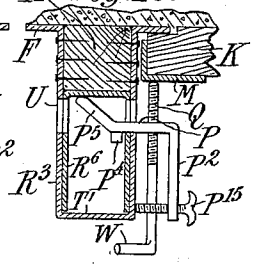
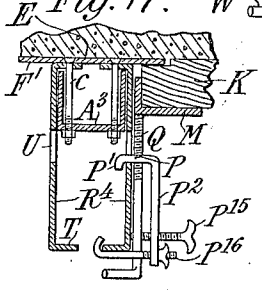


Fig. 17.



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ROWLAND T. WALES, OF SEWAREN, NEW JERSEY.

MOLD FOR CONCRETE CONSTRUCTION.

1,312,462. Specification of Letters Patent. Patented Aug. 5, 1919.

Application filed July 24, 1915. Serial No. 41,683.

To all whom it may concern:

Be it known that I, ROWLAND T. WALES, a citizen of the United States of America, residing at Sewaren, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Molds for Concrete Construction, of which the following is a specification.

This invention provides certain improvements in molds for use in building structures of concrete or of similar material, or for facing or covering structures with such material. The particular construction of molds to which these improvements apply embody the following. The plates comprise boards or panels against which the concrete is molded. They are carried by a framework or a series of studs or supports. The studs are secured and held in position by some usual or suitable method for securing and holding such members. The plates are held in position on the supports by means of locks which engage the supports. Plates are adjustable and movable relatively to the studs and into and out of position without affecting the studs. They are likewise adjustable and movable without affecting adjoining plates, except in special cases. Each lock is both adjustable and removable relatively to both plates and studs and without moving studs and other locks or other plates than those immediately held by it. Such a construction permits using the same plates and locks repeatedly in different parts of the same framework of supports before a job is completed. It also permits the taking down of the supports (after stripped of plates) and using the same supports again in another part of the job. While two stud supports are in any one position, a plate can be used between them repeatedly at successively higher levels, each removal of the plate being made after the concrete behind it has become sufficiently hard. The construction of molds described in the foregoing has the following advantages.

1. Uses less mold material on a single job.

2. Uses the same mold material repeatedly and without destruction on successive jobs.

3. Is erected and dismantled quickly and with the minimum labor.

4. Permits easy placing and supporting of any iron reinforcement within the mold space before the plates are locked in position. Therefore the plates or boards do not obstruct the workmen, and the several rods or parts of the reinforcement can be handled and fastened separately, directly and accurately into their final positions.

5. Possesses all the advantages of panel molds without sacrificing the strength and accuracy possible by using studs and joists as in other molds.

This invention provides certain new and useful improvements pertaining to the construction described in the foregoing. Some of the objects accomplished by these improvements are as follows:—

1. Improvements in locks which assist in holding them in position and which give them maximum strength with minimum weight.

2. Improvements in studs which are suited to the locks.

3. An improved corner stud, corner lock and corner plate holder which conjointly permit the use of loosely constructed corner plates and permit varying the size of said plates for the outside corners of walls of different thickness.

4. An improved inside corner stud adapted to use conjointly with the improved corner lock.

Various metal shapes are suitable for manufacturing the studs and may be selected according to availability or economy and depending on the character of work for which they will be used. A number of examples are illustrated herein, all of which embody essential features of this invention. Likewise the locks, their different parts and other parts of the invention may be varied in construction or in combination according either to requirements or to economy in manufacture. A number of examples are illustrated herein, all of which embody essential features of this invention.

The following is a general description of the several figures in the accompanying drawings and without their details. While reading this description it should be understood that any line on one figure which indicates the plane of a sectional view illustrated by another figure is marked with an arrow to show the direction of the view illustrated by the other figure.

Figure 1 is a transverse vertical section through plates and concrete and shows the various parts assembled including plates, locks, a stud, and both a tie rod and a stringer for holding the stud in position.

Fig. 2 is a horizontal section through the mold at a corner of the wall and at a level to which the concrete has not yet been filled. It shows stringers, tie rods, studs, locks, plate ends, an inside corner and an outside corner stud, corner locks, corner plates and outside corner plate holders.

Fig. 3 shows a rear side elevation of an inside corner stud by looking toward Fig. 2 as the arrow marked (4), it showing part of a lock in position on this stud.

Fig. 4 is an outside elevation of an outside corner plate holder, by looking toward Fig. 2 as the arrow marked (5) and with everything removed from view except a lock engaging this plate holder.

Fig. 5 shows an end elevation of the same outside corner plate holder by looking toward Fig. 2 as the arrow marked (6) and with everything removed from view but a part of the corner stud near it and the lock connecting it with the corner stud. The same view of the corner plate holder is obtained by looking toward Fig. 4 as the other arrow marked (6).

Fig. 6 shows in large scale a horizontal section through one of the improved studs and a plate end. It also shows one form of the lock adapted for use with the improved stud and partly cut away in the drawing. This lock possesses the same essential features of locks shown in the other figures.

Fig. 7 is a vertical section through the lock in Fig. 6 on the line (8) in either Fig. 6 or Fig. 8.

Fig. 8 is a side elevation of the same lock, looking toward Fig. 6 as the arrow marked (9).

Fig. 9 shows a horizontal section through a stud with a wood face adapted for leaving a rough concrete, plaster holding surface, also another form of the lock similar to that of Fig. 6 and possessing the same essential features of the locks shown in the other figures, a plate end being also shown in horizontal section.

Fig. 10 is a side elevation of the lock in Fig. 9 looking toward Fig. 9 as the arrow marked (11).

Fig. 11 is a plate lock, the screw of which is adapted to be turned by a nail and may therefore fit close into a stud. There are three like it shown in smaller scale in Fig. 1, and five in Fig. 2.

Fig. 12 is another plate lock, adapted to fit close into a stud, it being operated with a sliding ring. There is one like it shown in smaller scale in the upper left of Fig. 2.

Figs. 13, 14, 15 and 16 are horizontal sectional views showing studs which have a wood face against the concrete to form a rough, plaster holding surface thereon, a wood face being also desirable for nailing thereto various strips, stay blocks and other parts within the mold space. The stud in Fig. 13 comprises Z bars nailed to a wood member. In Fig. 13 is shown a plate lock which is suited to heavy loads. It is stronger than the locks in the preceding figures, but is heavier and slower to operate because the screw must traverse a greater distance to release it. In Fig. 14 is shown a lock quite similar to the lock in Fig. 13. In Fig. 16 is shown a lock with maximum strength and suited to the heaviest loads. It is shown engaging a plate at a safe distance inwardly of the plate edge. Fig. 17 is similar to Figs. 13, 14 and 16.

The same letters without indexes and the same letters with the same indexes indicate like parts in different figures or in different combinations. Similar parts and closely related parts are indicated by the same letters where possible, but with different letter indexes.

The following marks indicate details of a stud:

A in Fig. 6 is a sheet metal member located between the lock holes U and the mold space and is adjacent the ends of the plates K.

A^1 in Fig. 9 is like A and also has flanges adjoining the mold space for holding the plates.

A^2 in Figs. 9 and 16, is a wood member adjoining the mold space.

A^3 in Fig. 17 is a sheet metal member located between the lock holes U and the mold space and inclosed on its lateral sides within the stud.

C, C^1 and C^2 in Figs. 1, 6, 9, 13 and 17 are bolts for holding parts of a stud together.

C^5 in Fig. 15 are rivets for holding the opposite lateral sides of a stud together.

E in Figs. 1, 6 and 17 indicates a metal plate on the side of the stud adjoining the mold space. Its lateral extensions F^1 constitute flanges on the stud which prevent the plates K from entering the mold space and keep cement from entering between the stud and the plates K.

F are flanges equivalent to F^1 described under E.

F^1 are flanges described under E.

R, R^1, R^2, R^3 and R^4 in Figs. 6, 9 and 13 to 17 inclusive are sheet metal members giving strength to the stud and having holes U through which the stud is engaged by locks.

S (see Fig. 9), is one of several like bars or plates connecting the flanges T at different points distributed longitudinally of a stud. These points are at the several bolts C^2 shown on the stud R in Fig. 1.

T in Figs. 6, 9, 13, 16, and 17 are flanges on the outward side of a stud from the mold space. They contribute strength to the stud and also constitute a means for holding P^{16} as shown in Fig. 17.

U (see Figs. 1, 6, 9 and 13 to 17 inclusive) are holes in the lateral sides of a stud through which it is engaged by plate holding locks.

The following details are illustrated for holding the studs in position. See Figs. 1 and 2.

e are stringers holding the studs at proper distances from each other longitudinally of a wall.

f are tie rods which hold the studs adjacent the mold space. One rod *f* generally passes through two studs directly opposite each other as shown and through the corresponding stringers *e* outside of which they are shown secured by a nut or other means. Wires are often used instead of tie rods.

The following reference characters indicate details of locks adapted to engage a stud and hold the plates in position. See principally in Figs. 1, 2, 6 to 14 inclusive, 16 and 17. Some of the details appear also in other figures to which reference will be made when necessary.

P is a bar or member which transmits the load to a stud. In Fig. 6 it also prevents the lock from swinging out of position because it bears within the stud against a surface of R^1 in Fig. 6. This surface extends longitudinally within the stud and faces outwardly of the mold and may be engaged throughout its length at any point. The point at which P engages this surface is at a greater distance from the entrance to the hole U engaged by the lock than the latter is from the point where P receives the load. It thus gives a great leverage to hold the lock in position and also power to carry the load.

P^1 is a lug on P and extends transversely of the path by which the lock enters and leaves the stud. It prevents a lock from moving laterally of a stud and out of engagement with it.

P^2 is an arm on P and P^3 is an arm on P^2. They prevent a lock from swinging out of position and from bending Q at P. P^2 extends outwardly of the mold.

P^3 (see Fig. 13) is an arm on P^2. P^3 extends and presses laterally toward the stud at a greater distance from the point at which P receives the load than is the hole U or the point at which P transmits the load to the stud. This gives the lock great leverage to maintain its position and power to carry the load and prevents bending of Q at P. In Fig. 13 P^3 is shown partly cut away to show that it has a slot to admit Q and extends on both sides of Q to the stud.

P^4 is a lug on P equivalent to P^1 already described. In Fig. 16 it is a head of a screw and extends outwardly of the mold.

P^5 in Fig. 16 is an arm on P and prevents a lock from swinging out of position because it extends inwardly of the mold and because it bears against a surface within a stud in the same manner as described for P in Figs. 6 and 17.

P^6 in Fig. 6 is a lug which prevents Z^2 sliding off of P^2 when the screws Q^1 are loosened.

P^7 in Figs. 2, 4 and 5 is part of a corner plate lock. It is a short bar traversed through its center by the screw Q. On an inside corner of the mold it transmits the load to the inside corner stud *h*. On an outside corner of the mold it receives the load from the plate holder (M^2N).

P^{14} in Fig. 14, and

P^{15} in Figs. 16 and 17 are screws which accomplish the same object as P^3 in Fig. 13 already explained under P^3 but P^{14} and P^{15} are adjustable. P^{14} is in the form of a bolt held to P^2 by jam nuts and P^{15} traverses P^2. Two screws similar to P^{15} may be located on a single lock in a similar manner as P^{14} in Fig. 16.

P^{16} in Fig. 17 is a bent rod threaded at one end and having a nut. The bent end is inserted in the back of a stud and the other end passes through a slot in P^2 and is secured rigidly thereto by tightening the nut.

Q is a screw which traverses P inwardly and outwardly of the mold for resisting pressure outwardly of the mold at any position in the range of its movement inwardly and outwardly of the mold. The load is transmitted by Q to P and by P to a stud or to a joist at a point very close to Q. The leverage of the load is therefore very short, and therefore gives power to the lock.

Q^1 in Fig. 6 are screws which traverse Z and clamp Y laterally and thereby accomplish the same object as the screws Q in the other figures. Y receives considerable range of movement by a very short movement of Q^1. Q^1 is therefore operated quicker than Q, but Y does not transmit the load to P as close to the stud or joist as Q does in the other figures. This modification is therefore preferable for rapid work and lighter loads than the locks in the other figures which have a screw Q. Y may be fastened securely in any position within its range of movement inwardly and outwardly of the mold. At any such position it will resist outward pressure which is a feature possessed also by Q in the other figures.

Q^2 in Fig. 9 are screws in the form of bolts with nuts which traverse them. The nuts clamp Y^1 laterally and thereby accomplish the same object as the screws Q in other figures. Y^1 receives a considerable range of movement by a very short movement of the nuts. Q^2 and Y^1 are therefore almost equivalent to Q^1 and Y of Fig. 9 but cannot be as tightly clamped because of greater friction in turning nuts. It makes a more simple and cheap combination suitable for some work. The holes in P^2 in Fig. 9 are shown countersunk to receive the heads of

the bolts Q^2 and also to prevent them from turning.

O in Figs. 1 and 11 is a head on Q with holes for receiving a nail by which Q is turned. This head permits fitting the lock close to the lateral side of a stud.

V, W and X in Figs. 12, 13 and 2 respectively are handles for turning Q. V is a sliding ring and X is a clevis swinging on Q.

Y in Fig. 6 is a bar which is adjustable into different positions inwardly and outwardly of the mold as explained above with Q^1. It holds plates K in position. It is preferably tapered as illustrated and outwardly of the mold, so that it will wedge tighter if it starts to move.

Y^1 in Fig. 9 is a bar acting similarly to Y. It is preferably tapered as illustrated for the same reason as given for Y.

Y^5 in Fig. 10 are slots in Y^1 for admitting the bolts Q^2.

Z in Fig. 6 is a bar or plate traversed by screws Q^1 and holds them against Y.

Z^1 in Fig. 9 is a bar or plate tapered to match Y^1 and to give a surface parallel to the face of the nuts on the bolts Q^2.

Z^2 and Z^3 in Figs. 6, 7 and 8 are sheet metal channels held together by the bolts Z^4 and inclosing Z, Y and P^2 so that Y can be clamped against P^2 by turning Q^1.

The following reference characters indicate details which pertain to plates.

K (see Fig. 1 near bottom) is a plate in the form of a panel comprising four boards held together and reinforced by the angle M, one wing of the angle being out of sight.

K^1 (in Fig. 1 above K) are boards not connected and which are shown held in position by an angle M against which they bear but to which they are not fastened.

K^6 in Fig. 2 is an inside corner plate reinforced by an angle iron M^1.

K^7 in Fig. 2 are vertically extending boards or plates on the outside corner of the wall. They are fastened loosely together in panels by horizontal strips K^8 which are nailed loosely to them so that the horizontal width of the panels may be easily varied by adding or removing boards of different widths. Walls of different thickness require these corner plates or panels to be of correspondingly different widths, but the same plate holders comprising the angles M^2 may be used to hold plates or panels of different widths.

The reference characters in the following indicate details which are not explained in the foregoing groups. Some others are also explained.

M^1 in Fig. 2 is an angle iron explained with K^6.

M^2 in Figs. 2, 4 and 5 are angle irons partly explained with K^7. They appear in better detail in Figs. 4 and 5. Two of them are held together by the connecting plates N and thus form an outside corner plate holder with a space betwen the two angles and extending nearly their full length. In Fig. 2 they are each shown held at one end by an ordinary plate lock which bears against the part N. They are held near the other end by a corner plate lock QP^7, the screw of which bears against the angle iron g of the outside corner stud or support $g\ g^1$. The central part g^1 of $g\ g^1$ can be of wood. $g\ g^1$ is shown supported in turn in the crotch formed by the stringers $e\ e$. $g\ g^1$ is a support for the outside corner plate locks, plate holders and plates. The corner plate lock QP^7 is adjustable longitudinally of the corner plate holder M^2N, to any point on it within a given range. It is also adjustable longitudinally of a corner support or stud $g\ g^1$, to any point within a given range.

h (see Figs. 2 and 3) is an inside corner stud. In Fig. 2 it is shown supported in a crotch formed by stringers $e\ e$.

h^1 (see Fig. 3) are holes in h for receiving Q of the locks.

h^2 are rivets on which Q is supported when the locks are loose. These rivets h^2 are each disposed just below the level of a hole h^1.

Any detail, element or part shown on apparatus illustrated in any one figure in the drawings may be added to apparatus illustrated in the other figures wherever applicable, to accomplish the same purpose therein. Such use of elements in different apparatus applies conjointly with the apparatus illustrated in this application and in my copending application Serial No. 802,867 November 25, 1913, my United States Patent No. 1,211,901 pertaining to molds for concrete construction. Any such element may also be eliminated from the apparatus where illustrated when unnecessary for some work.

The erection and removal of the mold can be speeded by using wing nuts in many places where ordinary nuts are shown. At permanent connections it is preferable in some cases to weld instead of using bolts or rivets, and in other cases either rivets or bolts are suitable.

In work which does not require extensible joists and where joists of a given length can be used indefinitely in new positions, such as in constructing subways, a stud can be used in place of a joist.

I claim as my invention:—

1. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs and locks holding the plates in position adjacent the mold space, said locks being adjustable longitudinally of each said stud, a

lock having a member which is movable and adjustable into positions toward and from the mold space, said lock having another member which engages a stud through one of said holes and presses outwardly of the mold at the entrance to said hole, the lock also pressing on the lateral side of the stud at a point located at a greater distance from said entrance than the distance between said entrance and the first said member, the lock thus maintaining its position by an effective leverage which also gives it power to carry the load.

2. A mold for concrete comprising a series of supports, plates held adjacent the mold space by means which extend from a lateral side of each said support and which receives the load at one point, transmits it to the support at another point and presses against said lateral side at another point which is at a greater distance from the mold space than the second said point, said means being adjustable relatively to both the supports and the plates.

3. A mold for concrete comprising a series of supports, plates held adjacent the mold space by means which extend from a lateral side of each said support and which receives the load at one point, transmits it to the support at another point and has a screw which presses against said lateral side at another point which is at a greater distance from the mold space than the second said point, said means being adjustable relatively to both the supports and the plates.

4. A mold for concrete comprising a series of supports, plates held adjacent the mold space by means which extend from a lateral side of each said support and which receives the load at one point, transmits it to the support at another point and presses against said lateral side at another point which is at a greater distance from the mold space than the second said point, said means being adjustable relatively to both the supports and the plates, and having a lug which resists lateral movement from the support by extending transversely of the path of said movement, and thus assists in holding said means in position.

5. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs and locks holding the plates in position adjacent the mold space, said locks being adjustable longitudinally of a stud, each said lock having a member which is movable and adjustable into positions toward and from the mold space, said lock having another member which engages a stud through one of said holes and presses outwardly of the mold at the entrance to said hole, the lock also pressing laterally of the stud against the stud at a greater distance outward from the mold space than said holes and thus maintaining its position by an effective leverage which also gives it power to carry the load.

6. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs and locks holding the plates in position adjacent the mold space, said locks being adjustable longitudinally of a stud, each said lock having a member which is movable and adjustable into positions toward and from the mold space, said lock having another member which engages a stud through one of said holes and having within the stud a lug which extends transversely of the path by which the lock enters and leaves the stud and which prevents the lock from shifting laterally from the stud.

7. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs and locks holding the plates in position adjacent the mold space, said locks being adapted to engage any of said holes perforated through said lateral side of sheet metal and distributed longitudinally of a stud, each said lock having a screw disposed substantially perpendicular to the mold space and held by another member which engages a stud through one of said holes.

8. A mold forming an outside corner for concrete and comprising a corner stud, a lock, a plate holder, a plate, a stud, and means for holding one end of the plate holder at the stud, the lock engaging the plate holder and bearing against the corner stud and being adjustable longitudinally of both plate holder and corner stud, the said plate holder bearing against a plate and preventing it from moving outwardly from the mold.

9. A mold for concrete comprising plates, angle irons and a series of studs, locks engaging the studs and holding the angle irons in position, said angle irons holding the plates in position and being movable relatively to said plates, one wing of each angle iron being adjacent the outer face of a plurality of said plates and the other wing extending from the aforesaid wing toward the mold face and between one of said studs and the ends of said plates.

10. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs, and locks holding the plates in position adjacent the mold space, each lock having a

member movable and adjustable into positions toward and from the mold space, said lock having another member disposed through one of said holes and in contact with the stud at more than one point, said member pressing outwardly of the mold at one said point and laterally of the stud at another said point.

11. A mold for concrete comprising a series of studs adjacent the mold space, each said stud having a lateral side of sheet metal perforated with holes distributed longitudinally of the stud, plates between the studs and locks holding the plates in position adjacent the mold space, each lock having a screw disposed substantially perpendicular to the mold space and held by a member disposed through one of said holes and in contact with the stud at more than one point, said member pressing outwardly of the mold at one said point and laterally of the stud at another said point.

12. A mold for concrete comprising plates, angle irons and a series of studs, locks engaging the studs and holding the angle irons in position, said angle irons holding the plates in position and being movable relatively to said plates, one wing of each angle iron being adjacent the outer face of a plurality of said plates and the other wing extending from the aforesaid wing toward the mold face and between one of said studs and the ends of said plates, the first said wing bearing against said locks.

13. A mold for concrete comprising plates, angle irons and a series of studs having flanges adjacent the mold space, locks engaging the studs and holding the angle irons in position, said angle irons holding the plates in position against said flanges and being movable relatively to said plates, one wing of each angle iron being adjacent the outer face of a plurality of said plates and the other wing extending from the aforesaid wing toward the mold face and between one of said studs and the ends of said plates, the first said wing bearing against said locks.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ROWLAND T. WALES.

Witnesses:
CHAS. LYON RUSSELL,
RENÉ BRUINE.

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