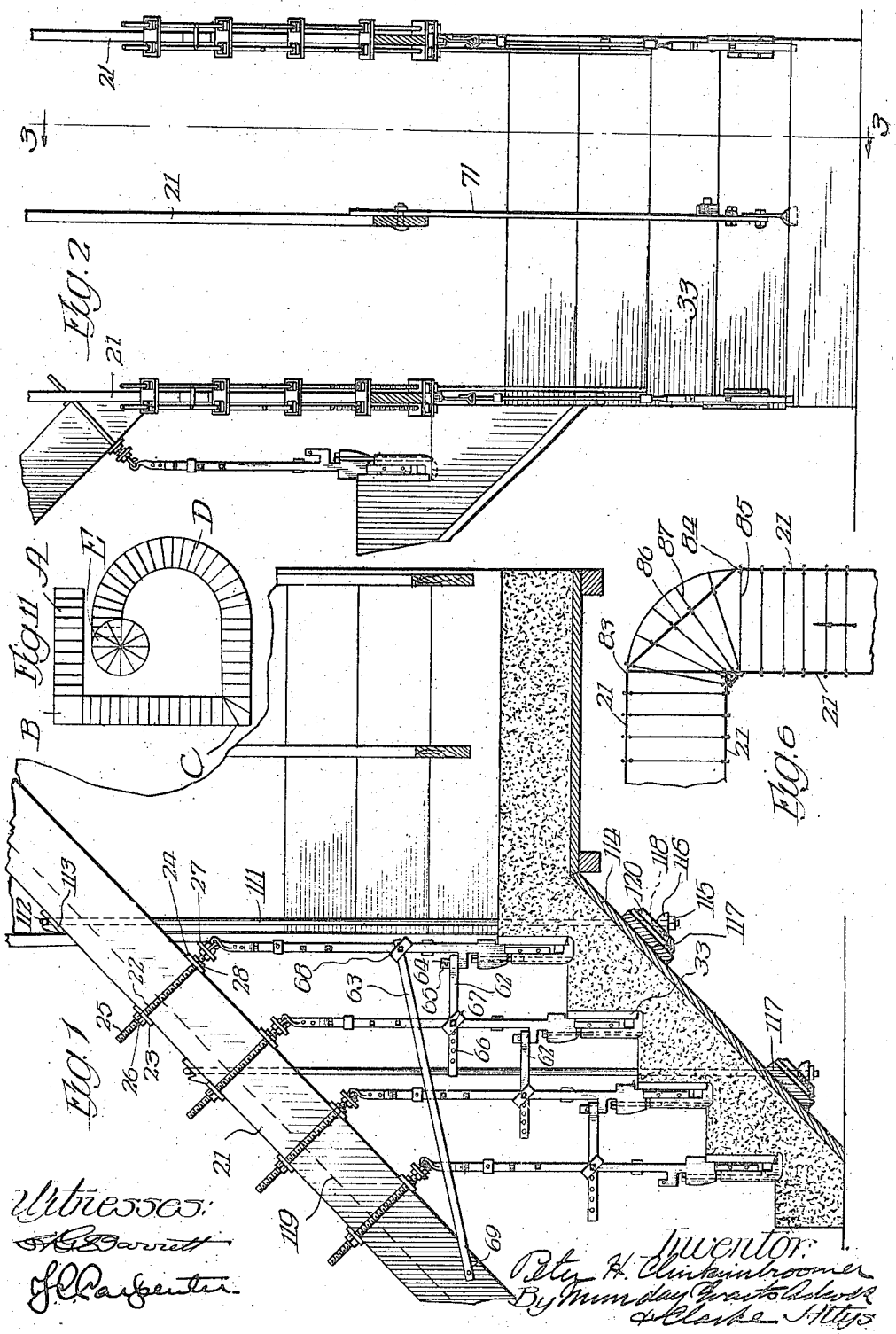
P. H. CLINKUNBROOMER.

MOLD FOR CONCRETE CONSTRUCTION.

APPLICATION FILED MAR. 8, 1915.

1,239,462. Patented Sept. 11, 1917.

2 SHEETS—SHEET 1.



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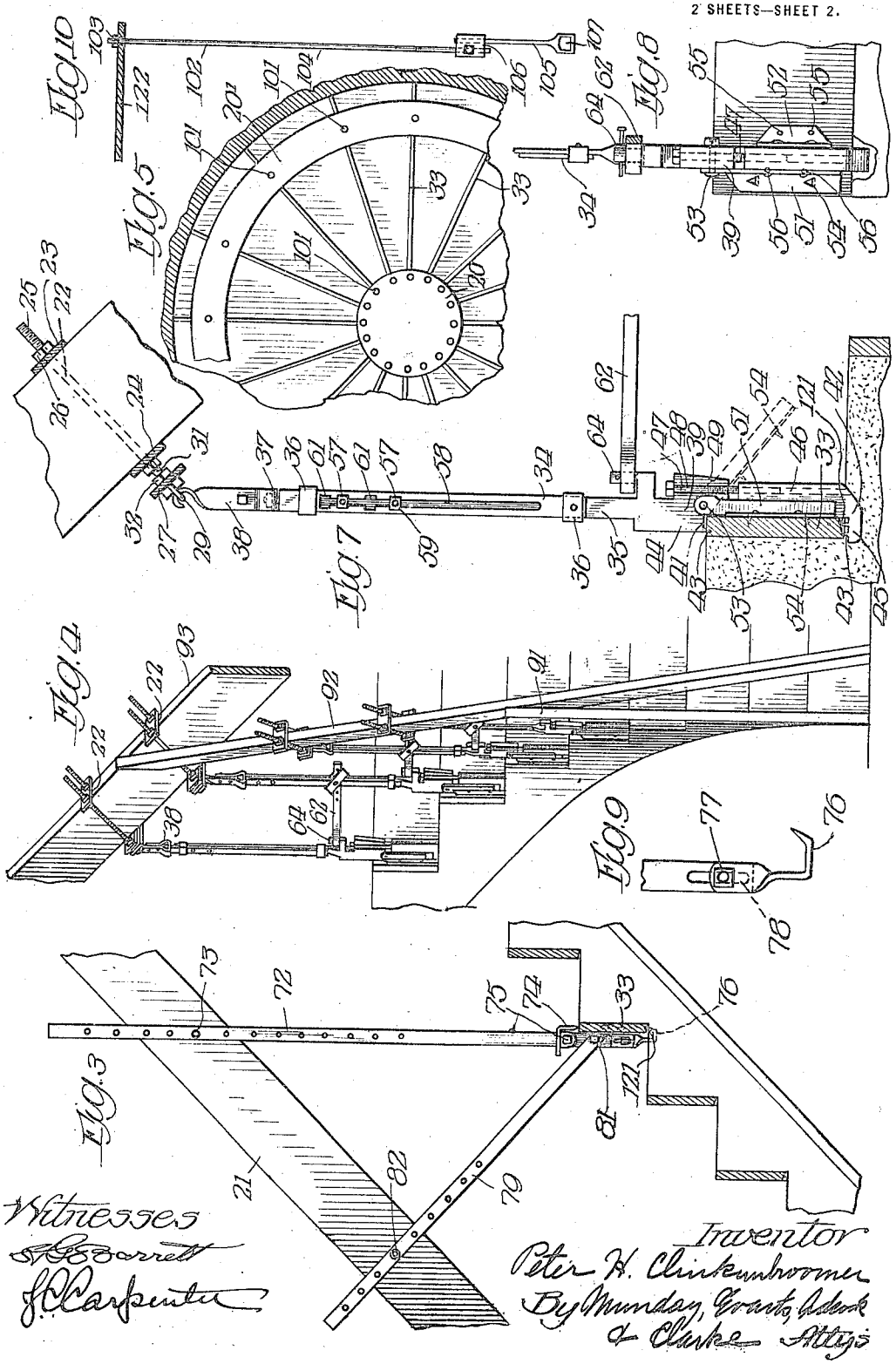
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

PETER H. CLINKUNBROOMER, OF EVANSTON, ILLINOIS.

MOLD FOR CONCRETE CONSTRUCTION.

1,239,462. Specification of Letters Patent. Patented Sept. 11, 1917.

Application filed March 8, 1915. Serial No. 12,728.

To all whom it may concern:

Be it known that I, PETER H. CLINKUNBROOMER, formerly a subject of the King of Great Britain and having heretofore renounced my allegiance thereto, have officially signified my intention of becoming a citizen of the United States, residing in Evanston, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Molds for Concrete Construction, of which the following is a specification.

My invention relates in general to concrete construction and has more particular reference to the construction of stairs of concrete and like materials.

One of the principal objects of my invention is the provision of a stair form adapted for the construction of concrete stairs of all of the general types, as for instance straight stairs, that is, stairs consisting of steps leading in a single direction from one level or platform to the next higher, curved stairs, that is, stairs consisting of a series of steps leading from one level or platform to the next higher about a curve which extends either from end to end of the stairs or only through a part thereof, and spiral or cylindrical stairs, that is, stairs consisting of steps arranged at succeeding heights radially about a common center.

It is generally the custom to construct forms for stairs of concrete and the like by providing a supporting platform inclined or shaped to determine the under surface desired and to provide temporary wooden riser-determining members, hereinafter referred to merely as risers, for convenience, which are held in place by being fast to or embedded in the walls at the sides or by being held in place by stringers or other suitable boards cut away to form a plurality of large notches on their under sides, one wall of each notch being vertical and corresponding in height to the raise of the riser. Both of these methods of positioning the risers have been the source of considerable annoyance, waste of time and consequent expense in the past which this invention has for its aim to eliminate. The method of securing the risers in place first described frequently resulted in inaccurately constructed steps, it having been found practically impossible to position the risers by embedding them in the side walls or by securing them to the sides of the form if no walls existed within a quarter or a half inch of accurate placement, particularly when this operation is performed by the ordinary workman or mechanic available. The result of the use of this manner of securing the risers resulted in the production of an uneven and frequently unsightly stairs and it had the decided further disadvantage that occasionally the temporary wooden risers became loosened or dislodged before the stair-forming material had finally set, requiring thereafter the expenditure of considerable money to reconstruct the stairs in whole or in part. The objection to the second manner described for securing the risers in place is chiefly the difficulty of removing the risers after the body material of the stairs had set. As is well known to those skilled in the art, concrete stairs are constructed by first filling in as quickly as possible the body of the complete stairs and then after this material has set and before it is dry the surfacing material is applied. This is ordinarily performed by workmen beginning at the top and working toward the bottom, removing successive risers as they finish the tread and riser surfaces of the steps, the temporary wooden risers below the steps being finished, serving to support the workman or workmen finishing the steps above them. The removal of these risers has required the sawing of the stringers with a small saw or some equally awkward operation to permit the removal of the riser.

It is a principal object of this invention to provide a riser which may be readily removed and which may be accurately positioned without the expenditure of the considerable time and effort heretofore generally necessary.

A further object of the invention is to provide such a riser which, with all of its retaining members, can be readily moved out of the way of the workmen as they finish successive steps of the stairs.

Prior to my invention the manner of positioning the risers has necessitated the waste of much material, both of the risers themselves and of boards and the like required for their positioning. Indeed the expedients heretofore used for securing the risers in place have frequently rendered it necessary that all of the riser supporting structure provided for the forming of single or series of stairs, be wasted, the forms used for one building rarely being capable of use in

another. It is also an object of this invention to provide riser holding means which will have a universal application and which will not be damaged by usage so that they may be used again and again with slight and simple adjustment.

A further object of this invention is the provision of means for supporting the entire stair form from above the stair level through the utilization of adjustable and readily removable supporting elements, thereby eliminating the necessity of providing any considerable false-work beneath the stairs and much simplifying the entire form and its installation.

An additional object of the invention is the provision of a stair of which a minimum number of elements or members must be accurately positioned, these elements being so constructed and arranged that such positioning may be readily accomplished with little chance of error, the parts of the whole form being so constructed and arranged that these members having once been placed the other members of the form will take automatically accurate positions with respect thereto.

A still further object of the invention is the provision of a stair form in which the risers will be firmly secured in place before and during the formation of the stairs so that the workmen may stand and walk upon them without danger of evil results.

Other objects and advantages of the invention will be apparent as it is better understood from the following description when considered in connection with the accompanying drawing illustrating a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a sectional view of a concrete stair in the course of construction in a form embodying my invention;

Fig. 2 is a front elevation of the same shown partially in section;

Fig. 3 is a section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 shows a partial view of another portion of said stairs;

Fig. 5 shows a top plan view of a third portion of the same;

Fig. 6 is a diagrammatic view of a fourth portion thereof;

Fig. 7 is an enlarged side elevation of one of the side clamps;

Fig. 8 is a front elevation of the same;

Fig. 9 is a partial enlarged view of an end of one of the center clamps;

Fig. 10 is a side elevation of one of the supporting rods employed in the portion of the stairs shown in Fig. 5; and

Fig. 11 is a diagrammatic plan view of a tower stairs selected in order to show general application of my invention.

For the purpose of illustrating my invention I have shown it embodied in preferred apparatus and shown in its application, it being understood that the various portions all form a part of one general stair-case, such for example as is frequently provided in monuments and the like where there is a straight entrance stairs turning at right angles with the platform, ascending a few stairs further and then turning in a wide curve, as shown in Fig. 4, and from there merging into an ascending spiral, as seen in Fig. 5. The complete arrangement is shown diagrammatically in Fig. 11, in which it will be understood that the part A is the straight entrance portion of the stairs turning at B, as shown in Figs. 1 and 2, and again at C, as indicated diagrammatically in Fig. 6, and again at D with a long curve, as shown in Fig. 4, which merges at E into the ascending spiral shown in Fig. 5. The various portions of the stairs require no change in the structure in the form parts but merely a slightly different arrangement of the supports and the addition in some instances of further members. Throughout the entire structure supports from above are provided to sustain the forms and these supports consist of stringers 21 and plates 20 and 20′, from which members to be later described depend and engage both the temporary under supporting parts and the risers, it being considered in the present instance that the sides of the stairs are determined by concrete or other suitable walls which, as they form no part of the present invention, are not shown upon the drawings. The stringers 21 may be arranged in a variety of ways, depending upon convenience and the particular form of the stairs or stair sections to be constructed. In the stairs shown on the drawing, the stringers for the straight stair sections rest on suitable supports at their ends. These supports may be either succeeding floor levels or they may be provided by tightly securing the ends of the stringers to suitable walls or indeed they may be provided in any desired fashion. In Figs. 1 and 2 it will be noted that three such stringers are provided which are arranged in parallelism and inclined to the horizontal at the angle of the stairs. The two outer stringers 21 in Figs. 1 and 2 carry a plurality of stringer clamps 22, one on each stringer for each riser, these clamps being spaced apart at appropriate distances to bring the riser which it supports, as will be later described, to desired position. The stringer clamps 22 in the present instance each comprise a top plate 23 and bottom plate 24 and two connecting bolts 25 passing through the plates 23 and 24 and upon opposite sides of the stringer, nuts 26 being provided to firmly secure the clamp in position. An eye-holding adjusting plate 27 is positioned upon the bolts 25 beneath the bot-

tom plate 24, suitable lock nuts 28 being provided on bolts 25. This plate carries an eye 29 having a threaded stem 31 extending through the plate 27 and held in place by a nut 32 (Fig. 7). As will be later described, the lock nuts 28 are provided to permit adjustment of the plate 27 to bring the eye to proper position if the stringer to which the clamp is secured be warped or out of line at the clamp receiving portion for other reasons.

The risers 33 are shown in the figures in operative position and each is held by a pair of riser holders to be now described, which holders are engaged at their upper ends in the eyes 27 of two companion clamps or hangers 22. In the present embodiment of the invention these holders or hangers are all of identical construction and a description of one of them will apply to the others. Referring more particularly to Fig. 7 it will be noted that the holders or hangers, which form sustaining or supporting means for the risers, comprise a pair of arms 34 and 35 held together by clamps 36, one of these arms, 34, being secured by a swivel connection 37 with a hook member 38 engaged in an eye 29. The lower arm 35 carries a riser clamp 39 which engages an end of the riser 33. This clamp is provided with jaws 41 and 42 which engage the upper and lower edges respectively of the riser, suitable teeth 43 being preferably provided to enter the riser and tightly hold it in place. The upper jaw 41 is fixed with respect to the member 35 and is constituted of a shoulder 44 from which its tooth 43 extends. The jaw 42, however, is removable and consists in the present instance of a head 45 carrying teeth 43 and an upwardly extending shank 46 into which is threaded a securing bolt 47, this bolt taking into a slot 48 extending lengthwise of a shoulder 49 upon the back of the arm 35. The arm 35 may, if desired, also be provided with wings 51 and 52. The wing 51 is pivotally mounted at 53 upon the arm 35 and is provided with teeth 54 adapted to enter the face of the riser remote from the step. The wing 52 is perforated at 55 for the reception of nails which may be driven into the riser if desired and similar apertures 56 can be provided in the wing 51. However, the wings may be omitted or they may be used without the lower jaws 42 in light work.

The parts 34 and 35 which constitute the main support are made adjustable longitudinally with respect to each other in order to obviate any necessity of providing the stringers 21 at accurate heights above the stairs under construction, and also in order that risers may be positioned around turns without requiring nicety of location of the stringers and also without requiring the provision of supporting means or riser holders of numerous lengths to meet different conditions. The clamps 36, while probably sufficient to hold the two parts or arms of the support together, may be aided or replaced by a slotted clamping connection shown in Fig. 7, which connection consists of threaded studs 57 provided in one part, as in the part 35, and taking through a slot 58 in the other part, nuts 59 being provided to turn down against the outer face of the part 34. If desired, the ends of the studs may be upset slightly after the nuts are in place, in which event the slot is enlarged as at 61 to permit passage of the nuts through the part 34 when it is desired to separate the arms.

The depending holders or hangers and the risers are held in fixed relation by being clamped together with links 62 and by braces 63. On the part 35 of each support is provided an upwardly extending, preferably cylindrical, stud 64 over which may be threaded an eye 65 of the link 62. This link extends outwardly over the next lower step and passes the next succeeding pair of arms 34 and 35 to which it is secured by clamp 67 embracing the link and embracing also the arms 34 and 35. The link may or may not be provided with apertures 66 for the reception of a clamping screw. The chief purpose of making the studs 64 cylindrical is to enable the links to assume proper relations with the next riser supports where the stairs are built around a curve or corner, as seen in Fig. 4 and as indicated diagrammatically in Fig. 6.

Braces such as indicated at 63 are provided in number to suit the desire of the particular user and extend at intervals from riser supports to the stringer, each being clamped at 68 to a riser support and secured to the stringer by a nail or otherwise as at 69.

The portion of the stairs shown in Figs. 1 and 2 may be considered to be of considerable width and it is sometimes thought desirable to provide means for retaining the wooden risers in true position and thereby prevent warping or bending of the risers in use. To this end the central stringer 21 is provided and center riser supports 71, best shown in Figs. 3, 8 and 9 are provided. It will be understood, however, that these riser supports may be used in light and cheap work in place of the supports already described. This support consists of a single supporting arm 72 nailed or otherwise secured at 73 to the stringer 21 and depending vertically downwardly to adjacent the riser 33. It carries a clamping upper jaw 74, which is merely a pointed element held slidingly upon the supporting arm 72 and held in place by a bolt 75. The supporting arm carries at its end a lower jaw 76, which

is also merely a pointed element having a pivotal connection at 77 with the lower end of the supporting arm 72. The lower end of the supporting arm 72 is preferably slotted at 78 to provide an additional means of adjustment to accommodate risers of varying depth. A brace 79 pivotally secured at 81 to the lower portion of the supporting rod 72 is nailed or otherwise secured at 82 to the stringer, as wide an angle as possible being established between the brace 82 and the supporting arm 72.

In Fig. 6 the arrangement of the stringers for the right angle turn of continuous steps is shown. The two stringers 21 being provided as before, above and beneath the curve. It will be noted that the left-hand stringer 21 is extended to the right-hand wall of the stairs beyond the curve as indicated at 83, while the right-hand stringer 21 below the curve may be terminated at any point 84 above the upper parallel riser 85 beneath the curve. A cross stringer 86 is provided to support the outer ends of the risers 87 on the curve, the inner ends of these risers being supported from the stringer 21, either extending up to or up from the curve.

When the stairs reach the point indicated at D which is the point where they pass around a wide curve, a number of stringers 91, 92 and 93, etc. are provided, these stringers extending in any suitable fashion to bring them over proper points of support, it not being considered necessary, however, that these stringers position the clamps at the ends of the risers, it only being required that they be sufficiently near the ends to insure against bending of the ends of the risers. Only one side of the wide curve of the stairs is shown, it being understood that the other side is supported in similar manner. The swivel connection between the riser supports and the hook members permit the stringer clamps 22 to be always positioned upon the stringers in the same manner, and the clamping jaws brought to proper relation by turning relatively thereto and the cylindrical formation of the studs 64 on the lower supporting arm permit the links 62 to come into desired position.

Where the stairs are in spiral form I prefer to replace the stringers by riser hanger supports consisting of plates 20 and 20′, as seen in Fig. 5. One of these plates 20 is of circular form and is disposed over the vertical or central axis of the spiral portion of the stairs and the plate 20′ is of annular form, preferably arranged concentrically with the plate 20. These plates are apertured at 101, the apertures in each plate corresponding in number and position with the risers 33. Through each aperture 101 a riser hanger supporting member 102 is positioned. This member consists, in the present instance, of two rods 104 and 105 adjustably connected together by a clamp 106. The upper rod 104 passes through an appropriate aperture 101 where it is held by a nut 103 and the lower rod 105 carries an eye 107 in which the upper end or hook of the riser hanger may be engaged in the manner described in connection with the clamps 22. In other respects the arrangement of the risers and the riser hangers is similar to that already described in connection with the other parts of the stairs.

My invention contemplates the support of the entire stair form from the stringers or plates and to this end I provide rods 111 which are hooked at their upper ends at 112 and engage over the stringers or through the apertures 101. The rods depend and extends through the temporary floor 114 provided to determine the under surface of the stairs. The lower ends of these rods carry semi-cylindrical blocks 116 which are held in place by nuts 115. The blocks 116 take into appropriate recesses 118 in washers 120 which are adapted to bear against the floor or form supports 117. The rod of course extends through the floor forming materials, through the floor and through the floor supports 117. The block 116 establishes a full faced contact between its washer 120 and its retaining nut 115, bringing all parts thus into full faced engagement.

Where riser hangers are used embodying my invention, it will be manifest that the risers and the riser hangers may be moved as a unit away from the stairs for the purpose of surfacing the tread and riser surface or the hangers themselves may be merely removed. The lower faces or edges of the risers are cut away at an angle as at 121 to permit finishing the tread of a step before removing the riser next above it. When the riser hanger and clamp shown in Fig. 7 is used it is only necessary to turn the bolt 47 to loosen the lower jaw, remove this lower jaw and in finishing the tread fill the relatively small recess occasioned by its use. In finishing beneath the hanger shown in Fig. 3 it is only necessary to loosen the nut 77, lower the lower jaw and turn it back about its pivotal connection.

If desired, however, the riser may be swung back by removing the links and braces 62 and 63 and swinging the whole back as a unit about its connection with the hanger clamps 22, the hanger shown in Fig. 3 being permitted to move therewith by merely loosening the link or brace 79.

The setting up of the form and its removal is thought not to need particular description. It may be mentioned, however, that if desired a chalk line 119 may be made on the stringers to aid in spacing the riser hanger clamps proper distances apart. The stringers are of course first set up, clamps

and stops placed thereon, the riser hangers engaged with the risers and then secured in the clamps. If the stringers are warped or bent the eye-holding plate 27 may be adjusted accordingly by movement of the bolts 25 and lock nuts 28. The temporary floor may be positioned before or after the risers and it is only necessary to this end to hook the rods 111 in the stops, thread them through the temporary floor supports, position washers 120, blocks 116 and nuts 115 when the floor may be laid in the usual manner.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing any of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:—

1. A form for concrete stairs comprising risers, stringers supported a substantial distance above said risers, and means depending from said stringers and rigidly holding said risers in position, said means being independently movable when the form is in place to permit each riser to be disconnected independently of the others and while said others are in operative position to permit surfacing of the surface behind the riser.

2. A form for concrete stairs comprising risers, rigid supports a substantial distance above said risers, and riser hangers pivotally connecting said risers with said supports, said hangers being adapted to be swung from operative position to permit work upon the concrete surfaces formed behind said risers.

3. A form for concrete stairs comprising risers, rigid supports above said risers and riser hangers pivotally connecting said risers with said support to swing out of operative position to permit work upon the concrete surface formed behind said risers.

4. A form for concrete stairs comprising risers, a rigid support a substantial distance above said risers, riser hangers rigidly holding said risers in position and connected with said support and braces extending between appropriate riser hangers.

5. A form for concrete stairs comprising a stringer disposed a substantial distance above the stairs being constructed, a riser, a readily detachable clamp depending from said stringer and engaging said riser, and a brace for preventing movement of said clamp about its connection with said stringer.

6. A form for concrete stairs comprising a riser, a stringer above said riser, a readily detachable clamp engaging said riser and depending from said stringer, and a brace secured at one end to said clamp and at the other end to said stringer.

7. A form for concrete stairs comprising a riser and a clamp for holding the same, said clamp having jaws adapted to engage the top and bottom edges of said riser, and means for holding said riser and clamp in molding position.

8. A form for concrete stairs comprising a riser, a clamp for supporting said riser, said clamp comprising jaws adapted to engage the top and bottom edges of said riser, the jaw adapted for engagement with the bottom edge being pivotally mounted on the clamp and movable to an inoperative position without accompanying movement of the rest of the clamp or riser.

9. A form for concrete stairs comprising a riser, a clamp for supporting said riser and for holding it in position, said clamp having jaws for engaging the top and bottom edges of said riser, the jaw engaging the bottom edges being removable without affecting the position of said riser or said clamp.

10. A form for concrete stairs comprising risers, stringers disposed above said risers and longitudinally adjustable means for adjusting said risers vertically and supporting them in position.

11. A form for concrete stairs comprising risers, and means for supporting said risers in position, said means comprising clamps adapted to engage the top and bottom edges of said risers, the parts of said clamps engaging the bottom edges of said risers being movable independently to permit surfacing beneath the risers without disturbing the risers and their supporting means.

12. A form for concrete stairs comprising risers, supports above said risers, bars extending downwardly from said support and clamps on the lower end of said bars for engaging said risers, holding them in position and supporting them from said supports, each of said bars comprising a plurality of parts adjustable longitudinally with respect to each other to vary the length of said parts.

13. A riser hanger comprising a body and upper and lower riser engaging jaws, the lower of said jaws being removable to inoperative position and from beneath a riser held in said hanger and this without effect upon the other jaw.

14. A riser hanger comprising a body and upper and lower riser engaging jaws, the lower of said jaws being removable to inoperative position and from beneath a riser held in said hanger and this without effect upon the other jaw, and means for holding said riser in said hanger when said jaw is moved to inoperative position.

15. A form for concrete stairs comprising arranged stringers, risers beneath said

stringers, and hangers depending from said stringers and supporting said risers, a riser with its hangers being movable away from said stairs about the connections of the hangers with said stringers a distance to permit surfacing of the stairs.

16. A form for concrete stairs comprising risers, riser hangers and riser hanger supports to which said hangers are pivotally connected, said risers and the hangers connected thereto being movable bodily about the pivotal connection between said hangers and said hanger supports a distance to permit surfacing of the stairs.

17. A form for concrete stairs comprising risers, riser hangers and riser hanger clamps to which said hangers are pivotally connected, said risers and the hangers connected thereto being movable bodily about the pivotal connection between said hangers and said hanger clamps.

18. A form for concrete stairs comprising risers, riser hangers and riser hanger supports a substantial distance above said riser to which said hangers are pivotally connected, said risers and the hangers connected thereto being movable bodily about the pivotal connection between said hangers and said hanger supports, and means for holding said hangers against movement.

19. A form for concrete stairs comprising risers, riser hangers, stringers a substantial distance above said risers, clamps embracing said stringers and supporting said hangers, said clamps being adjustable longitudinally of the stringers and toward and from the stringers to accurately position said risers.

20. A form for concrete stairs comprising risers, riser hangers, stringers a substantial distance above said risers, clamps embracing said stringers, said clamps having top and bottom members adjustable toward and from each other and adjustable together toward and from the connection between said clamps and said hangers to accurately position said risers and to provide adjustments for inaccuracy in said stringers and in the position of said stringers.

21. A form for concrete stairs comprising supports located a substantial distance above the stairs to be constructed, risers, means supporting said risers from said supports, said supports being positioned independently of the riser, the supporting means for the individual risers being adjustable to accurately position the risers when supported from said supports.

22. A form for concrete stairs comprising supports located a substantial distance above the stairs to be constructed, risers, means supporting said risers from said supports, said supports being positioned independently of the riser, the supporting means for the individual risers being adjustable longitudinally of themselves to accurately position the risers when supported from said supports.

23. A form for concrete stairs comprising supports located a substantial distance above the stairs to be constructed, risers, means supporting said risers from said supports, said supports being positioned independently of the riser, the supporting means for the individual risers being adjustable longitudinally of said supports to accurately position the risers when supported from said supports.

24. A form for concrete stairs comprising a support located a substantial distance above the stairs to be constructed, a plurality of risers adapted to be arranged at different distances beneath said support, and riser hangers engaging said support and said risers, said hangers being adjustable to correspond in length to the distance between said support and said risers.

25. A form for concrete stairs comprising a riser, a plurality of supports located a substantial distance above the stairs to be constructed arranged at different distances above said riser, a riser hanger for each support, said hanger being engaged at one end with the support and at the other with the riser.

26. A form for concrete stairs comprising a plurality of supports located a substantial distance above the stairs being constructed and angularly disposed with respect to each other, risers, and riser hangers depending from said supports and engaging said risers.

Signed in the presence of two subscribing witnesses.

PETER H. CLINKUNBROOMER.

Witnesses:

J. C. CARPENTER,

ESTHER ABRAMS.

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