Sept. 29, 1925. 1,555,750

J. R. O'DONNELL

STAIR CONSTRUCTION

Filed Dec. 24, 1924 3 Sheets-Sheet 1

Fig. 1.

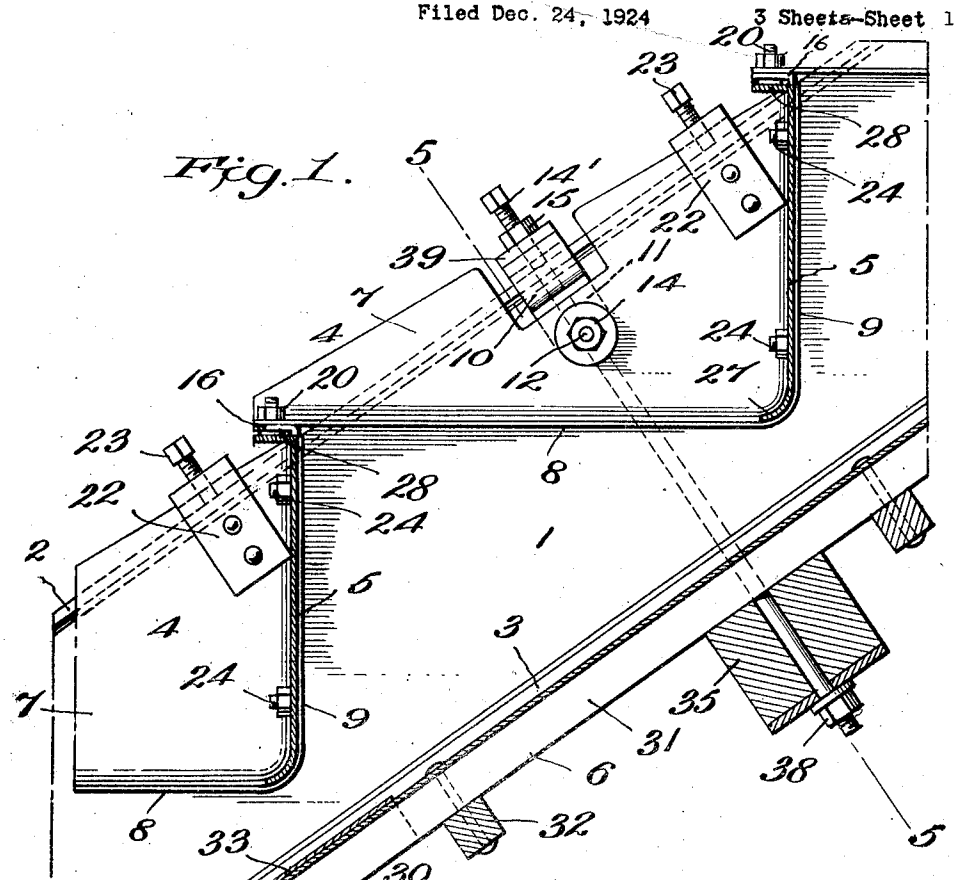
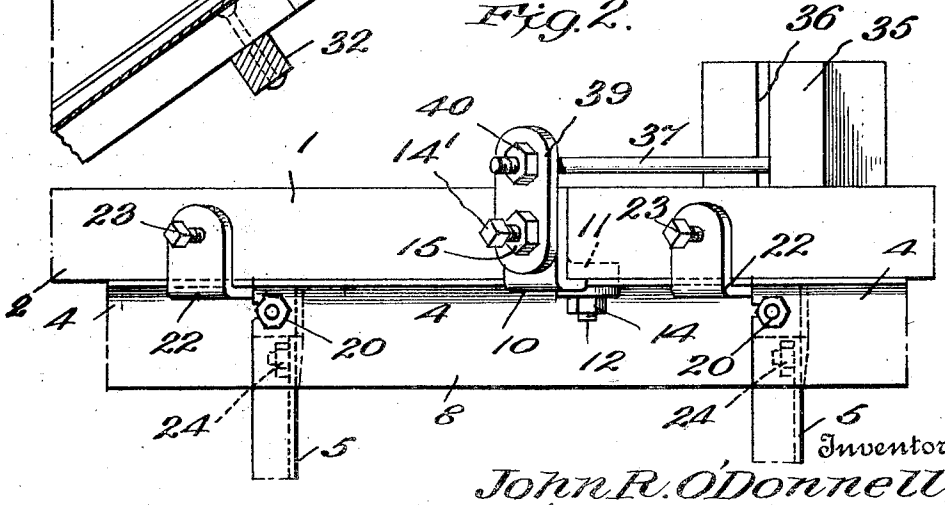


Fig. 2.



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Fig. 4.

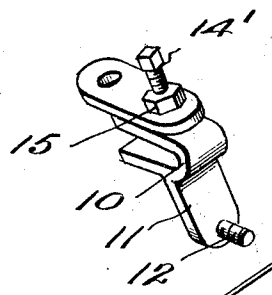


Fig. 3.

Fig. 5.

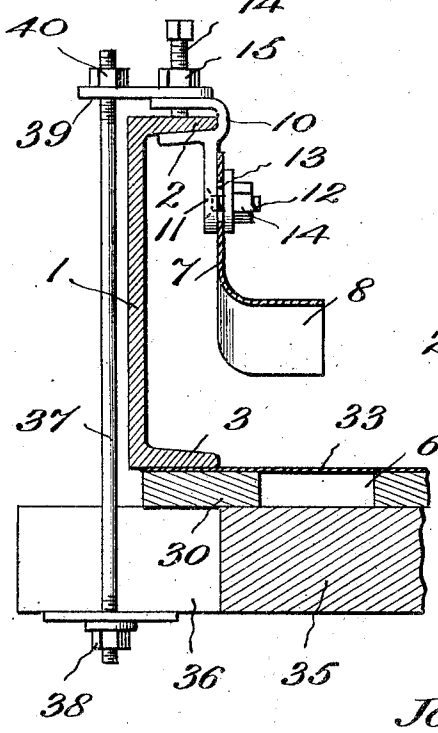
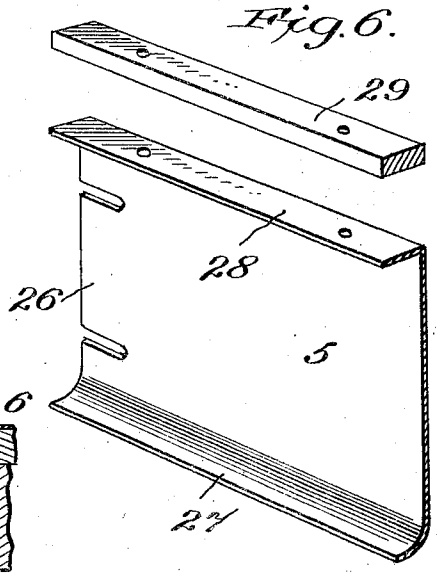


Fig. 6.



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Fig. 7.

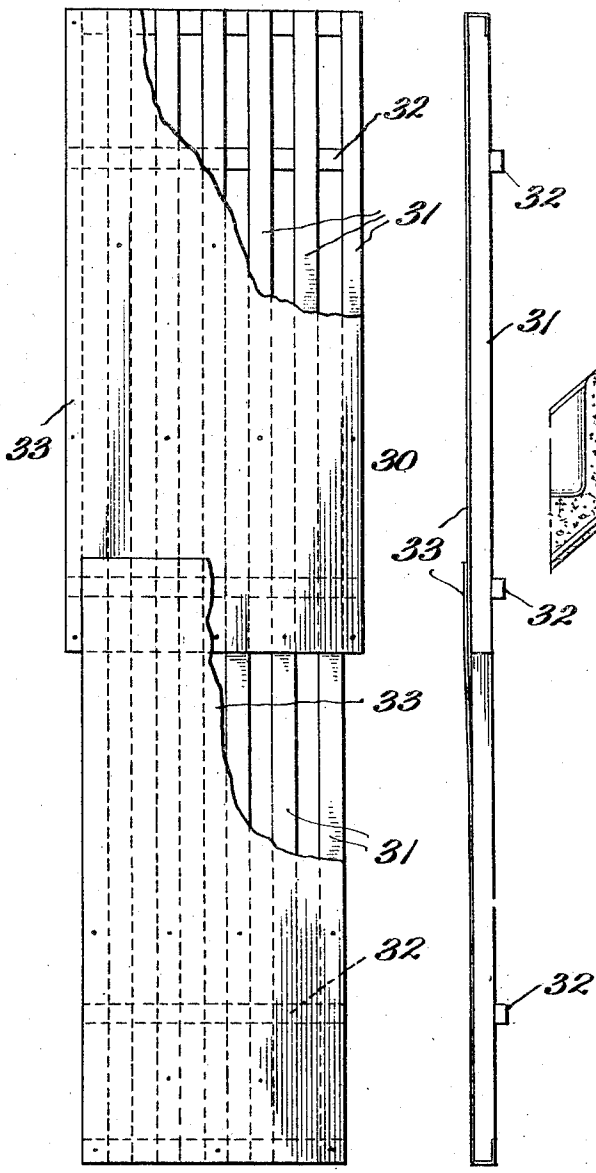


Fig. 8.

Fig. 9.

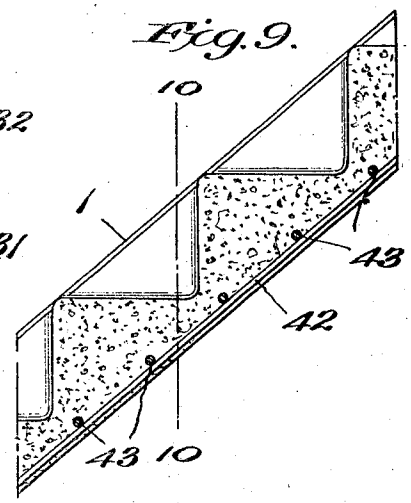
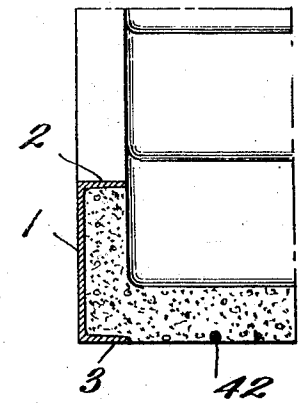


Fig. 10.



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Patented Sept. 29, 1925. 1,555,750

UNITED STATES PATENT OFFICE.

JOHN ROBERT O'DONNELL, OF BROOKLYN, NEW YORK.

STAIR CONSTRUCTION.

Application filed December 24, 1924. Serial No. 757,878.

To all whom it may concern:

Be it known that I, JOHN ROBERT O'DONNELL, citizen of the United States, residing at Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Stair Constructions, of which the following is a specification.

The invention relates to a stair construction employing both structural steel and structural reinforced concrete elements as carrying members, all so combined as to produce a more economical and otherwise more satisfactory fireproof stair than other existing types of all steel or composite structures.

The general object of this invention is to refine the type of stair construction disclosed in my previous Patent No. 1,427,276 dated August 29, 1922, so as to effect a substantial saving in time, labor and expense.

Another object of the invention is to provide a more complete and connected mould form capable of variable simple and practical adjustment and which can be set up and taken down in a relatively short time.

The present invention recognizes the possibility of using a combination of structural or pressed steel strings with inwardly projecting flanges, in conjunction with continuous monolithic reinforced concrete steps molded at opposite sides into the strings. In this way the steps are supported in part by the flanges and in part by the continuous section of reinforced concrete beneath the treads.

The invention thus involves a combined structural steel and reinforced poured-in-place stair construction, in which the steel members, besides entering into the permanent structure, act as part of the form-work, in conjunction with the adjustable cheek pieces, extensible riser-forms and floor-forms supported upon the strings, and preferably constructed substantially as hereinafter described.

In the accompanying drawings, forming a part hereof:

Figure 1 is a vertical horizontal sectional view through a portion of the form-work.

Figure 2 is a top plan view thereof.

Figure 3 is a detail perspective view of one of the side forms or cheek pieces with a portion of one of the riser forms connected thereto.

Figure 4 is a detail perspective view of one of the cleets for supporting the cheek pieces and floor forms.

Figure 5 is a cross sectional view taken on the line 5—5 of Figure 1.

Figure 6 is a detail perspective view of a portion of one of the riser forms and extension pieces separated therefrom.

Figure 7 is a top plan view of the floor form with parts broken away for clearness.

Figure 8 is a side elevational view thereof.

Figure 9 is a vertical longitudinal sectional view through a portion of a completed stair and

Figure 10 is a vertical sectional view taken on the line 10—10 of Figure 9.

In my previous patent the sides of the stairs between the tread and riser portions could not be formed simultaneously with the treads and risers. After the concrete was sufficiently set, the complete stair form was removed leaving recesses between the tread and riser portions which were later filled by inserting small concrete blocks therein. This procedure was very undesirable as it required expensive mason work in a later operation.

With this invention, this objectionable feature is overcome, and all of the concrete can be poured monolithic and the stairs completed in one operation.

Referring to the drawings in detail, 1 designates the inclined strings which may be of standard channel iron, pressed steel sections, or of a built up section. They are disposed with their upper and lower flanges 2, 3 projecting inward. Between these strings are supported side-forms 4, riser-forms 5 and an inclined floor-form 6 is secured beneath the side and riser-forms.

The side-forms 4, are known as cheek pieces in the trade, are movable and are secured to the inner sides of the top flanges 2. They are triangular in shape and are designed and positioned so as to lie in the angles between the treads and risers of the stairs to be constructed. The cheek pieces 4 are formed of sheet iron and comprise a side section 7 from which project an inwardly disposed horizontal bottom flange 8 and a vertical rear flange 9.

As shown in Figure 5 each of the cheek pieces 4 are held suspended from the upper flange 2 and in spaced relation to the inner sides of the risers by means of a bracket 10. The bracket is provided with a downwardly

disposed projection 11 having a projecting bolt 12 for passing through an opening 13 in the side section of the cheek piece. The bolt together with a nut and washer 14 on the front end thereof provides a means for movably securing the cheek piece to the bracket 10. A set screw 14', threaded through an opening in the horizontal portion of the bracket, and provided with a lock nut 15 completes a clamp whereby each cheek piece is secured to the string.

In my previous patent the triangular blocks were separately secured to the strings in spaced relation to each other and with no definite or positive spacing between them. In the present invention, however, the side forms, or cheek pieces, are connected to each other, as shown in Figures 1 and 2, thus permitting a means of attaching one riser to the other in series and making positive treads as to width.

Each of the cheek pieces is provided on the inner upper end of its vertical flange 9 with an adjustable bracket 16. A bolt 17 projecting from the inner face of the flange and through a vertical slot in the lower portion of the bracket, together with a nut 19 on the front end of the bolt, provides a means for securing the bracket to the cheek piece in a vertically adjustable position. A bolt 20 passing through the upper end of the bracket is provided for engaging the slotted forward end 21 of the horizontal flange 8 of the companion cheek piece. A nut on the end of the bolt provides a means for securing the cheek-pieces in horizontal adjusted relation for permitting the formation of stair treads of various widths.

Another bracket 22 is secured to the cheek piece at the upper side end of the side section 7 and this bracket has an upper outwardly projecting horizontal portion arranged to overlie the top flange of the string. An adjusting screw 23 threaded through an opening in the upper portion of the bracket to bear against the top of the flange, provides a means for vertically adjusting the cheek piece and the riser-form 5 connected thereto. Through this adjusting feature the riser-forms may readily be brought to a level when the whole mould-form is being set up and any irregularities in the strings, such as that due to bending in shipment, may be compensated for.

The rear flanges 9 of the cheek pieces afford means for connecting the riser-forms thereto. These flanges are provided with forwardly projecting bolts 24 for engaging the horizontally slotted ends 26 of the riser-forms 5. Nuts on the ends of the bolts provide a means for securing the riser-forms to the cheek pieces, and it is obvious that through such connection the riser forms may be set for the formation of stairs of various widths.

The riser-forms are also formed of sheet iron and are provided with an outwardly projecting curved horizontal bottom flange 27 and an outwardly projecting straight horizontal top flange 28.

Vertical extension of the riser forms is secured by means of strips 29, see Figure 6, to be added as by bolting to the top flange 27, and by utilizing a suitable number of the supplementary sections 29 the riser-forms can be built up to the desired height.

The floor-form 6 is preferably formed of wood and metal and comprises a pair of telescoping section frames 30, as shown in Figures 7 and 8. Each of the frames comprise a plurality of spaced longitudinal strips 31 held together by the tie pieces 32 and they are arranged so that the strips of one frame will enter between the strips of the other to permit adjustment of the floor-form for constructing stairs of various lengths. Each of the frames 30 is covered with a relatively thin sheet of iron 33, but the sheathing is not secured to one end of one of the frames, so that when the frames are telescoped the sheathing on one frame will overlap that on the other as shown in Figures 1 and 8.

The section-frames 30 are supported on cross-pieces 35, the ends of which extend beyond the sides of the floor form. The said ends are longitudinally slotted, as indicated at 36, to cooperate with hanger rods or bolts 37, which extend downwardly from the upper portion of the strings through the slots 36, beneath which they are provided with nuts 38. Plates, forming brackets 39 are pivotally connected to the brackets 10 by means of the bolts 12. These plates project respectively beyond the outer sides of the strings and are formed with bolt holes adapted to receive the upper ends of the hanger rods 37. By tightening the nuts 40 the cross-pieces 35 are clamped upward against the strings or against the section frames 30. It will be understood that it is not necessary to connect hanger rods adjacent all of the cheek pieces, as it will be sufficient to dispose the cross-pieces 35 at greater intervals. It is preferable to locate the hangers at the outer sides of the strings, as illustrated, but where conditions will not permit of this the plates 39 may be swung inwardly so that the hangers may then pass through the floor.

With the form-work set up, reinforcing rods 42 are arranged longitudinally above the floor and below the riser-forms, and other reinforcing rods 43 are arranged transversely. The concrete is then poured and will flow behind the cheek pieces, thus permitting the stairs to be completed in one operation. When the concrete has had its initial set the riser-forms and cheek pieces may be readily removed without disturbing

the floor form which is not removed until the concrete has finally set.

What is claimed as new is—

1. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, movable cheek pieces secured to said strings in spaced relation to their inner sides and riser forms extending between the strings and secured to said cheek pieces.

2. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, movable flanged cheek pieces secured to said strings in spaced relation to their inner sides and riser forms adjustably connected to the flanges of said cheek pieces.

3. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, a plurality of connected movable cheek pieces, means for securing said pieces in spaced relation to the inner sides of said strings, and riser forms extending between the strings and secured to said cheek pieces.

4. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, a plurality of adjustably connected triangular cheek pieces, means for securing said pieces in spaced relation to the inner sides of said strings and riser forms adjustably connected to said cheek pieces.

5. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, a plurality of flanged cheek pieces, adjustably connected together and adapted to lie at the inner sides of said strings, means for securing said pieces in position and riser forms adjustably connected to the flanges of said cheek pieces.

6. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, a plurality of movable cheek pieces, adjustable brackets mounted on the cheek pieces for connecting them together, and riser forms secured at their sides to said cheek pieces.

7. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction, movable cheek pieces, having inwardly disposed flanges, means for securing said pieces in spaced relation to the inner sides of said strings and riser forms adjustably connected at their ends to the flanges of said cheek pieces.

8. In concrete stair construction, the combination of strings having inwardly disposed flanges, said strings constituting part of the form-work and eventually entering into the permanent construction and means for sustaining forms in position on the strings comprising a bracket engaging the upper flange of said strings, a downwardly disposed projection on the bracket, and movable cheek pieces mounted on the projection and held in spaced relation to the inner sides of said strings.

9. A cheek piece for concrete stair construction comprising a triangular side section having vertical and horizontally disposed flanges and an adjustable bracket mounted on the upper end of the vertical flange.

10. A cheek piece for concrete stair construction comprising a triangular side section having vertical and horizontally disposed flanges and an adjustable bracket mounted on the upper end of the vertical flange and a second bracket mounted on said side section and an adjusting screw on said second bracket.

11. A floor form for concrete stair construction comprising section frames adapted to telescope one within the other and plates covering the frames and adapted to overlap each other when the frames are telescoped.

In testimony whereof, I have signed my name to this specification this 8th day of December, 1924.

JOHN ROBERT O'DONNELL.