Sept. 8, 1964 W. C. LYONS 3,147,531

FORM FOR RECESSED CONCRETE STAIRWAY

Filed Aug. 23, 1963 4 Sheets-Sheet 1

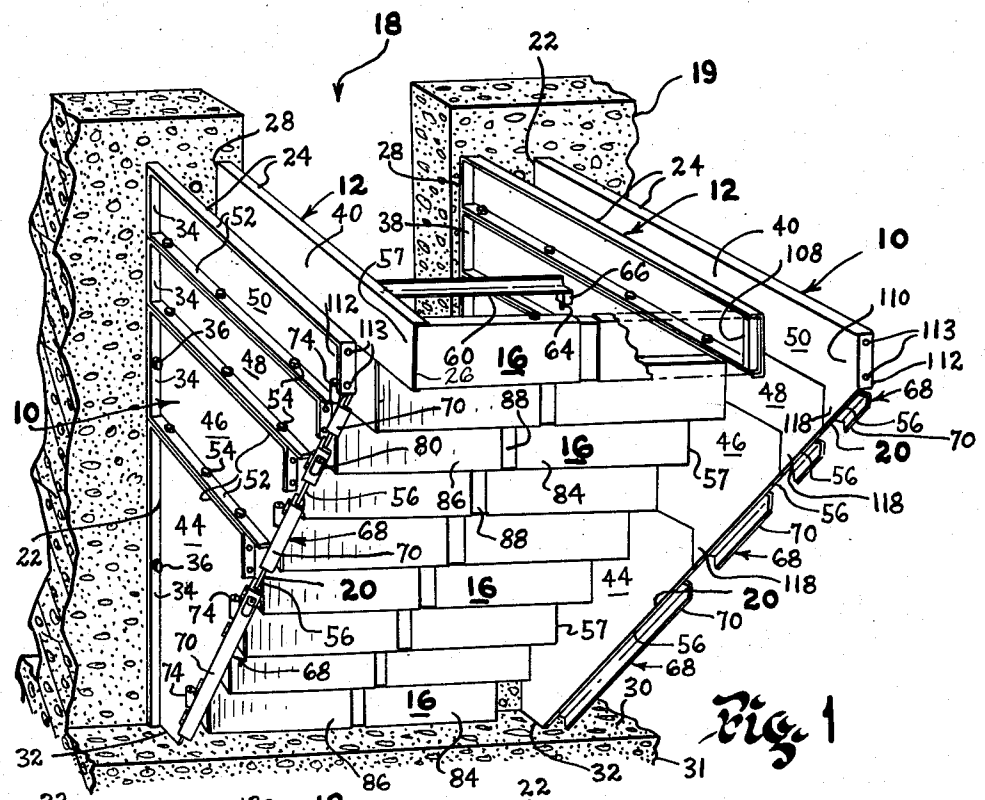


Fig. 1

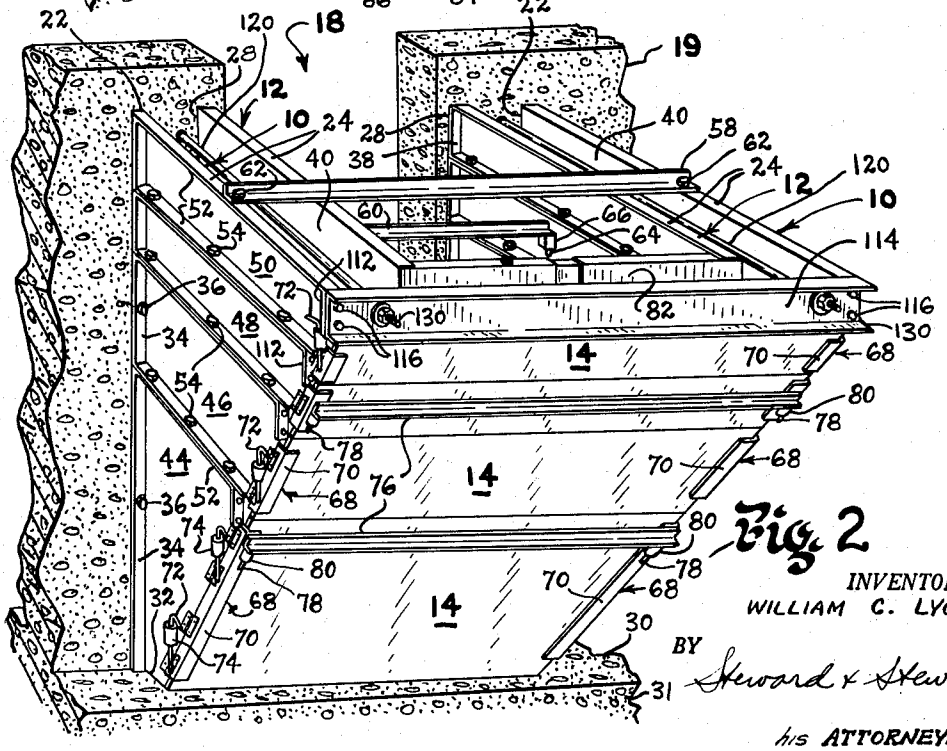


Fig. 2

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FORM FOR RECESSED CONCRETE STAIRWAY

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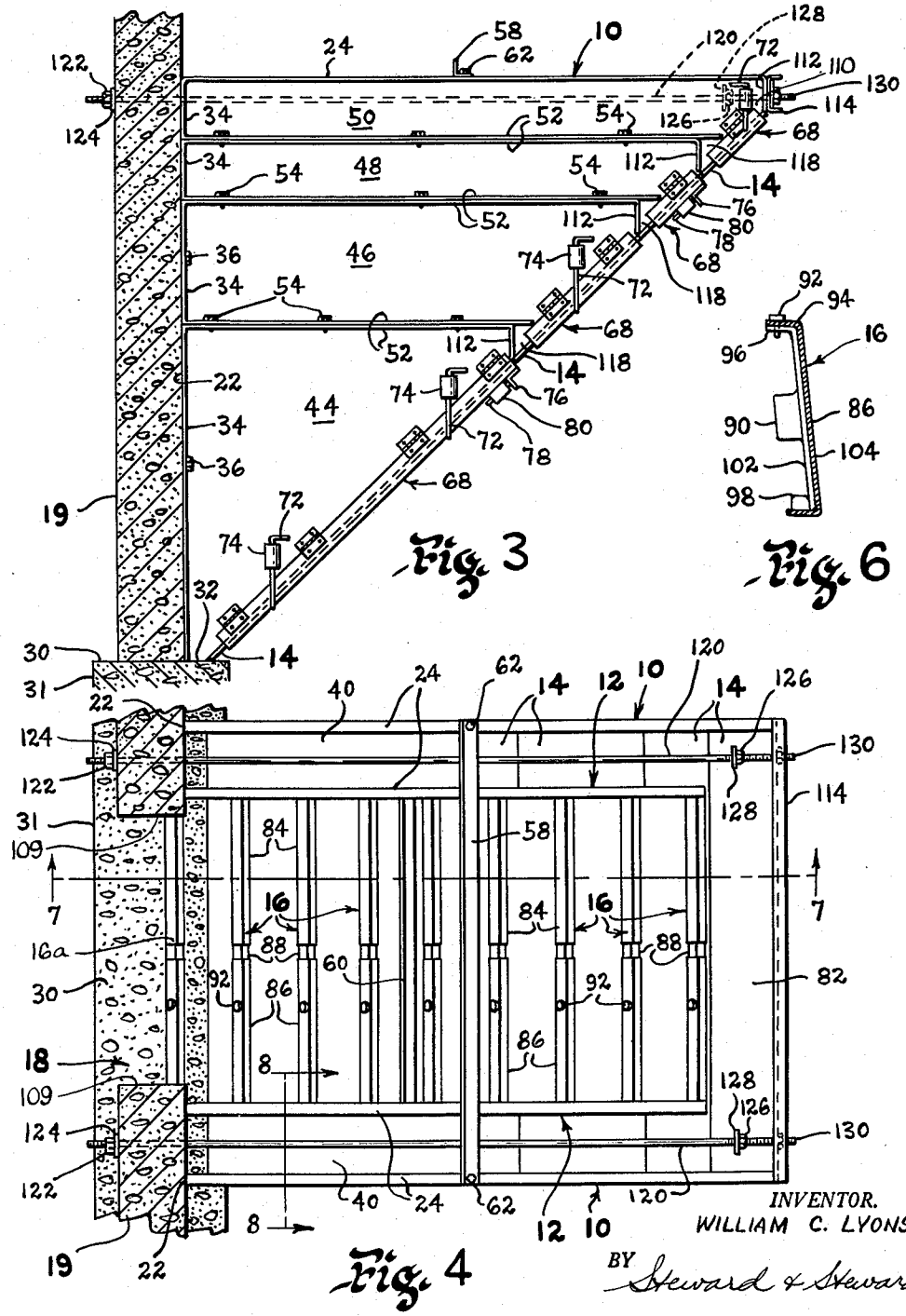


Fig. 3

Fig. 6

Fig. 4

Sept. 8, 1964 W. C. LYONS 3,147,531

FORM FOR RECESSED CONCRETE STAIRWAY

Filed Aug. 23, 1963 4 Sheets-Sheet 3

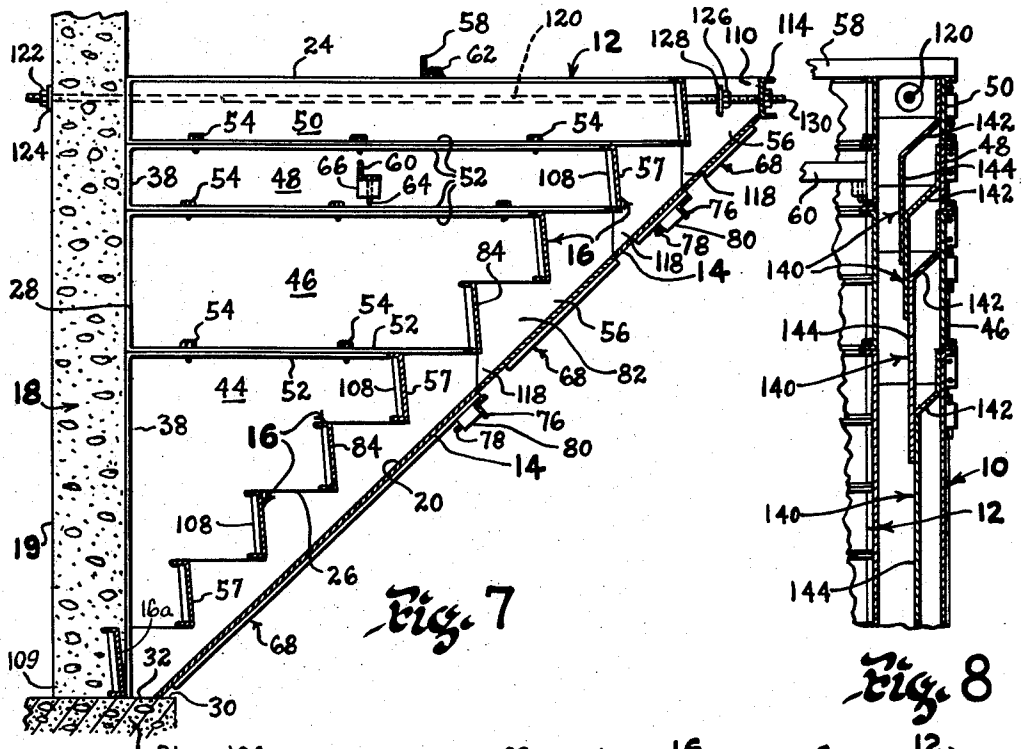


Fig. 7

Fig. 8

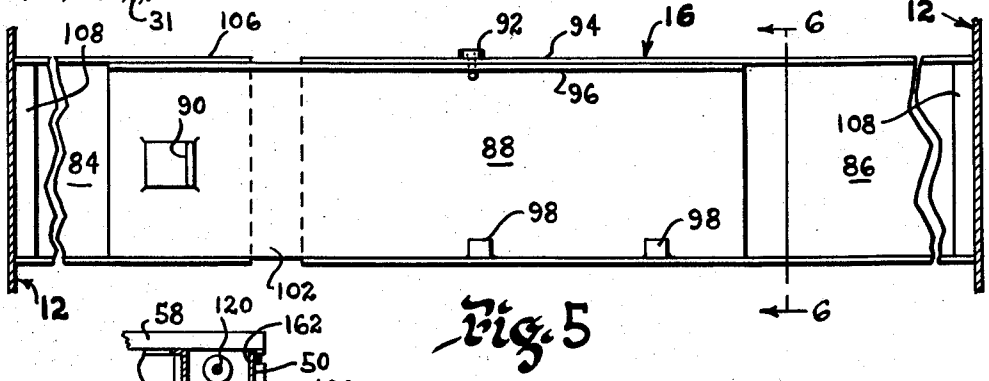


Fig. 5

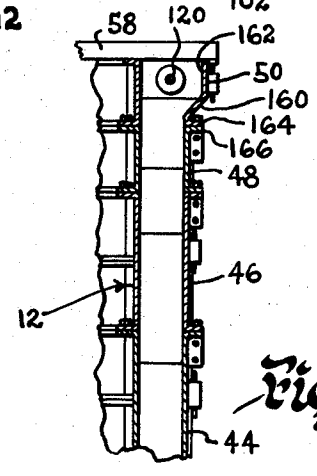


Fig. 9

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FORM FOR RECESSED CONCRETE STAIRWAY

Filed Aug. 23, 1963 4 Sheets-Sheet 4

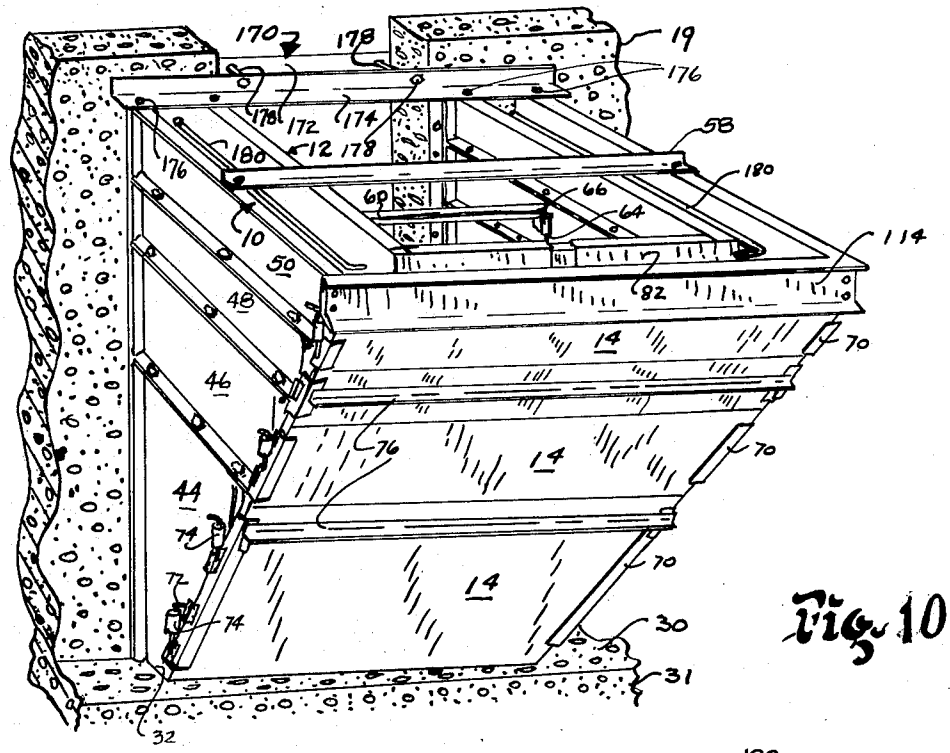


Fig. 10

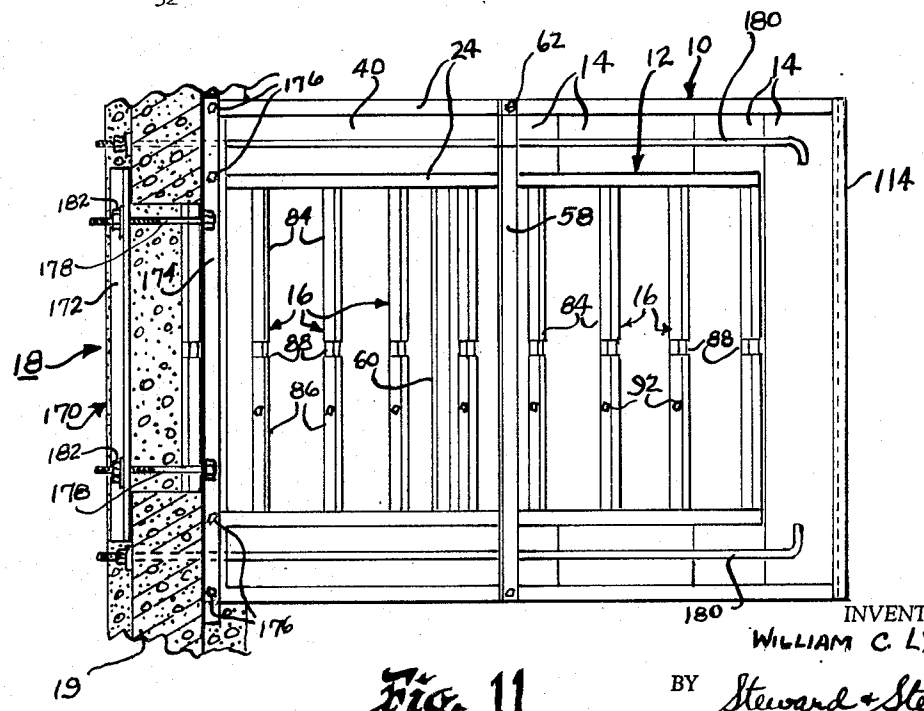


Fig. 11

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United States Patent Office 3,147,531 Patented Sept. 8, 1964

3,147,531

FORM FOR RECESSED CONCRETE STAIRWAY

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Filed Aug. 23, 1963, Ser. No. 304,281
10 Claims. (Cl. 25—118)

The invention relates generally to forms for concrete stairways and, more particularly, to a form for a recessed concrete stairway intended to provide outside access to interior building areas wholly or partly below grade.

At the present time there are several ways of fabricating recessed concrete stairways. In one method two parallel side walls, and an end wall that joins the outer ends of the side walls, are first cast in place. The side walls extend outwardly from the foundation of the building in a direction normal to the foundation and downwardly to the footings. The two side walls, and the end wall joining the outer ends of the side walls, thus define a rectangular pit. A concrete floor is then poured inside the pit end wooden or metal stairs are installed so as to extend between the top of the pit and the floor.

In another method the two parallel side walls are poured as before but the end wall is not. The area between the two parallel side walls is backfilled with dirt that is sloped at an angle approximating the slope of the stairs for the stairway. Concrete stairs are then cast over this sloping backfill.

In still another method the stairway and its side walls are precast in lightweight concrete sections that are assembled at the building site. Wooden stairs are then installed in suitable openings precast into the side wall sections.

All of the above enumerated methods have serious disadvantages of one sort or another.

The first two methods, in which the parallel side walls are first cast in place, are disadvantageous because the stairway is not completed at one time but must be done in two or more operations. This means that the workmen must return to the site a second time to complete the stairway. The time required to install the stairway and its cost are, accordingly, substantially increased. Another drawback of these two methods is that the side walls extend beyond the area that is normally excavated and additional excavating must be done to accommodate the walls. Furthermore, the rectangular shape of the side walls results in the side walls extending a substantial distance outwardly beyond the stairs which slope diagonally inward toward the foundation. Accordingly, a greater amount of concrete is required for the side walls than would otherwise be necessary. The first and third methods are further disadvantageous in that the stairs are not made of concrete but are made either of wood or steel. Wood and steel stairs require more maintenance than concrete stairs. Finally, the last mentioned method is less desirable because the use of precast sections does not result in a strong integral structure.

The present invention has for its general object the provision of a form for a recessed concrete stairway that is not subject to the disadvantages enumerated above in connection with presently known methods of fabricating recessed concrete stairways.

More specifically, the present invention has for its object the provision of a form for a recessed concrete stairway that can be easily assembled and disassembled at the building site. Another object of the invention is to provide a stairway form that will permit the complete concrete stairway to be poured in one operation. Still another object of the invention is to provide a form for a recessed concrete stairway that will not require additional excavation at the site and that will be economical as to the amount of concrete required for the stairway. A further object of the invention is to provide a basic form for a

recessed concrete stairway that is readily adaptable for use with stairways of varying size.

Briefly, and in general, the invention comprises a first and second pair of side walls that are adapted to be disposed parallel to each other at opposite sides of an access opening in the building foundation so as to define two suitable voids for the side walls of the stairway to be poured. The side walls of the form are substantially triangular, and preferably right triangular, in shape, although this latter configuration is not essential, and are adapted to be disposed with one of their edge portions extending along the slope of the stairway to be formed, that is, closely adjacent or parallel to a line tangent to the nosings of the stairs of the completed stairway. Accordingly, two contiguous edge portions of the side walls are so formed that the angle therebetween corresponds to the angle made by the slope of the stairway and a vertical axis. By reason of this construction the placement of one edge portion of the side walls against the foundation wall of a building disposes the other of said contiguous edge portions along the slope of the stairway.

The bottom of the form is closed off by one or more closure plates including rectangular bottom plates that extend across those edge portions of the first pair of side walls that are disposed along the slope of the stairway. The plates are adapted to be removably fastened to the side walls adjacent these edge portions. A plurality of rectangular cross pieces are provided and these cross pieces are adapted to be disposed substantially vertically between the second pair of side walls at points adjacent those edge portions disposed along the slope of the stairway. Each cross piece is adapted to be removably secured to the side walls. Inasmuch as the rectangular bottom plate and the rectangular cross pieces are intended to form a void defining the tread, riser and back sections of the stairs, those edge portions of the second pair of side walls disposed along the slope of the stairway are formed to correspond to the tread and riser sections of the stairs. Suitable means for removably receiving the cross pieces are provided adjacent the riser portions of the side walls.

For the purpose of illustrating how the invention may be practiced several embodiments thereof are shown in the drawings and will be described in detail hereinafter. However, the foregoing general description of the invention, and the detailed description to follow, are by way of example only and are not intended to define or restrict the scope of the invention. The claims appended hereto are relied upon for that purpose.

In the drawings:

FIG. 1 is a perspective view of a preferred form of the invention with the bottom portion of the form removed to show the inner construction;

FIG. 2 is a perspective view similar to that of FIG. 1 showing the form with the bottom portion in place;

FIG. 3 is a side elevational view of the form shown in FIG. 2;

FIG. 4 is a plan view of the form shown in FIG. 2;

FIG. 5 is a front elevational view, partly in section, showing a cross piece of the form;

FIG. 6 is a sectional view taken on the line **6—6** in FIG. 5 looking in the direction of the arrows;

FIG. 7 is a sectional view taken along the line **7—7** in FIG. 4 looking in the direction of the arrows;

FIG. 8 is a transverse sectional view through a wall of a modified embodiment of the form;

FIG. 9 is a transverse sectional view through a wall of still another embodiment of the invention;

FIG. 10 is a view, similar to FIG. 2, showing a modified arrangement for securing the form to a foundation wall; and

FIG. 11 is a plan view of the form shown in FIG. 10.

As will be best seen in FIGS. 1, 2 and 4, the preferred

embodiment shown in the drawings comprises a first and second pair of side walls **10**, **10** and **12**, **12**, respectively, one or more closure plates that include the bottom plates **14**, **14** and a plurality of cross pieces **16**, **16**. The pairs of side walls **10**, **10**, and **12**, **12** are each disposed on opposite sides of an access opening or doorway **18**, formed in the vertical wall **19** of the foundation of a building. The second pair of side walls **12**, **12** are interposed between the first pair of side walls **10**, **10** and at a distance corresponding to the maximum desired thickness of the walls of the concrete stairway that is to be poured. One or more bottom plates **14**, **14** extend across the edge portions **20**, **20** of the outer pair of side walls **10**, **10** and serve as a support for the back of the stairway to be poured. The cross pieces **16**, **16** extend between the second pair of side walls **12**, **12** and serve to define the front edge of the riser portions of the stairs for the stairway.

An important aspect of the invention is that the pairs of side walls **10**, **10** and **12**, **12** are substantially triangular, and preferably right triangular, in shape. Inasmuch as the slope of the stairway, as represented by an imaginary line tangent to the nosing of the stairs of the stairway, makes an acute angle with a vertical axis, the area between the stairway and the vertical foundation wall is roughly triangular in shape. By reason of their triangular shape the side walls **10**, **10** and **12**, **12** of the form span this area without extending outwardly from the foundation wall any farther than is necessary. This not only saves additional excavation when installing the stairway, but more importantly saves the cost of a substantial volume of concrete that is otherwise required as in conventional stair wells.

The first pair of side walls **10**, **10** are, accordingly, each provided with two contiguous edge portions **20**, **22** so disposed as to form an angle therebetween that corresponds to the angle made by the slope of the stairway to be poured and a vertical axis. Disposition of one of these edge portions **22** against the vertical wall **19** of the foundation thus automatically disposes the other contiguous edge portion **20** parallel, or substantially parallel, to the stairway's slope. Where the side walls are right triangular in shape, as is preferred, the third edge portion **24** will be disposed horizontally with respect to the foundation.

Similarly, the second pair of side walls **12**, **12** are substantially triangular in shape and are each provided with two contiguous edge portions **26**, **28** (see FIG. 7) that are so disposed as to be against the foundation wall **19** and along the slope of the stairway, respectively. In the case of the side walls **12**, **12** one contiguous edge portion **26** is preferably formed to correspond in shape to the tread and riser portions of the stairs for the stairway. Thus, when the other of said contiguous edge portions **28** is disposed against the vertical wall **19** of the foundation the edge portion **26** is disposed so as to coincide with the slope of the stairway.

In this manner one edge portion **20**, **26** of each side wall is disposed along the slope of the stairway, either coincident therewith, as in the case of the edge portions **26**, **26**, or closely adjacent and substantially parallel thereto, as in the case of the edge portions **20**, **20**. If the side walls **10**, **10** and **12**, **12** are right triangular in shape the edge portions **20**, **20**, **26**, **26** disposed along the slope of the stairway will be the longest edge portions of the side walls.

The first pair of side walls **10**, **10** are adapted to rest upon the upper laterally extending top surface **30** of the footing **31** for the foundation wall **19** and for this purpose are provided with short flat bottom edge portions **32**, **32**. In addition, the side walls **10**, **10** are adapted to be removably secured to the vertical foundation wall **19** and are provided with flanges **34**, **34** along the edge portions **22**, **22**. The flanges **34**, **34** may be removably secured to the wall **19** in any suitable manner, as by anchoring screws as is shown at **36**, **36**.

The second pair of side walls **12**, **12** are adapted to be removably secured to the foundation wall **19** and, like the first pair of side walls **10**, **10**, are provided with flanges **38**, **38** along thhe edge portions **28**, **28**. Suitable fastening means, such as C-clamps (not shown), hold the side walls **12**, **12** in place against the wall **19**. Both pairs of side walls **10**, **10** and **12**, **12** are disposed parallel to and spaced from each other so as to define suitable voids **40**, **40** for the side walls of the stairway.

Another important aspect of the invention is that the form is adaptable for use in forming stairways of varying size. Thus, the first and second pairs of side walls **10**, **10** and **12**, **12** in the preferred embodiment of the invention are intended to be put together in sections. The number of sections in each side wall depends on the length of the run of the stairway to be poured. As will be seen from the drawings the side walls **10**, **10** and **12**, **12** are each made up of lower substantially triangular shaped sections **44**, **44** upon which one or more substantially rectangular sections **46**, **48**, and **50** are mounted, the number of added sections depending on the size of the desired stairway. Thus, for example, if the stairway is intended for a split-level home, only the lower sections **44**, **44** of the first and second pairs of the side walls **10**, **10** and **12**, **12** would be used. If the stairway is intended for a home with a basement of usual depth, then the first rectangular sections **46**, **46** would be added to each side wall. If greater depth is required, then the second and third rectangular sections **48**, **48** and **50**, **50** may be added as required.

Each section of the side walls **10**, **10** and **12**, **12** is provided with a flange **34** at the edge portions **22**, **22** abutting against the foundation wall **19** so that the section may be removably secured to the wall. The triangular lower sections **44**, **44** are also provided with flanges **52**, **52** across their top edge portions while the rectangular sections **46**, **48** and **50** have similar flanges **52**, **52** along both top and bottom edge portions. When the sections are placed on top of each other, the flanges **52**, **52** abut. Fastening means in the form of machine screws **54**, **54** pass through the abutting flanges **52**, **52** and hold the sections together.

Although the sections **46**, **48** and **50**, are, in the main, rectangular in shape, it will be observed that each extends outwardly from the foundation wall **19** a greater distance than the section immediately below it. Also, the lower outermost edge portions **56**, **57** of the sections **46**, **48**, **50** are at an angle with respect to the foundation wall, the angle being such as to dispose the edge portions **56**, **57** coincident to the angled edge portions **20**, **26**, on the triangular lower sections **44**, **44**. The addition of each section, therefore, serves to maintain the substantially triangular shape of the side walls.

If desired, strengthening means may be provided for maintaining the relative dispositions of the side walls during the pouring of the concrete. As is shown in the drawings, these means may comprise anti-spreader bars **58**, **60** that are pinned to one or the other pair of side walls **10**, **10**, **12**, **12**. In the above-described embodiment of the invention one such anti-spreader bar **58** is shown extending across the top edge portions **24**, **24** of the first pair of side walls **10**, **10** while a second anti-spreader bar **60** is shown extending between the second pair of side walls **12**, **12**. The upper bar **58** is secured to the side walls **10**, **10** by pins **62**, **62** that are dropped through suitable openings (not shown) in the top edge flange **52** of the top sections **50**, **50**. The lower bar **60** is secured to the side walls **12**, **12** by similar pins **64**, **64** on the underside of the bar that are dropped through suitable openings (not shown) in blocks **66**, **66** welded, or otherwise affixed to, a pair of sections of the side walls **12**, **12**. Other bars may be added, if required.

As stated above, the longest edge portions **20**, **20** of the first pair of side walls **10**, **10** are inclined at an angle that corresponds to the angle made by the slope of the

stairway and a vertical axis. This inclination disposes the edge portions **20, 20** and **56, 56** along the slope of the stairway to be poured, that is, parallel to and closely adjacent the stairway's slope. The edge portions **20, 20** and **56, 56** extend farther outwardly from the wall than the corresponding edge portions **26, 26** and **57, 57** on the second pair of side walls **12, 12** and serve to locate the plane of the back of the stairs of the stairway. One or more rectangular bottom plate sections **14, 14** extend across the edge portions **20, 20, 56, 56** of the side walls **10, 10** and close off the underside of the form.

The bottom plate sections **14, 14** are removably secured to the side walls **10, 10** by any suitable fastening means. In preferred form these means may, as shown, comprise one or more angle brackets **68, 68** that are hingedly secured along each edge portion **20, 56** of the side walls **10, 10**. When the bottom plate sections **14, 14** are placed against the edge portions **20, 56** of the side walls, the brackets **68, 68** are swung inwardly toward each other until the outer flanges **70, 70** thereof overlap the bottom plates and hold them in position. The brackets **68, 68** are maintained in their holding position by L-shaped rods **72, 72** that are slidably mounted in blocks **74, 74** on the side walls **10, 10**. In their lowermost positions the rods **72, 72** extend downwardly below the edge portions **20, 56** to prevent the hinged brackets **68, 68** from swinging back and releasing the bottom plates **14, 14**.

Anti-spreader bars may also be provided at the underside of the form if desired. Two such bars **76, 76** are shown, and like the anti-spreader bar **60** between the second pair of side walls **12, 12**, the bars **76, 76** are provided with a pair of pins **78, 78** that slidably drop in suitable openings in the blocks **80, 80** fixedly mounted on two of the angle brackets **68, 68**.

As is best seen in FIG. 7, the longest edge portions **26, 26, 57, 57** of the second, or inner, pair of side walls **12, 12** are formed in a shape corresponding to the treads and risers of the stairs for the stairway. The rectangular cross pieces **16, 16** extend between the side walls **12, 12** and are removably received by the side walls at points adjacent the riser portions thereof. The cross pieces **16, 16** are, thus, disposed substantially vertically and serve to define with the bottom plates **14, 14** a void **82** corresponding in shape to that of the stairs.

In the illustrated embodiment shown, each cross piece **16** is longitudinally adjustable and for this purpose comprises two channel-shaped halves **84, 86** one of which **(84)** is welded or otherwise fixed to an angle-shaped intermediate section **88** that slides relatively to the channel member **86**. Slidable adjustment of the channel member **84** is effected through movement of an upstanding lug **90** fixed to the intermediate member **88**. Adjustment of the cross pieces **16, 16** to the proper width is maintained by a pin **92** that drops through corresponding holes in the flanges **94, 96** at the top edges of the intermediate member and channel member, respectively, when the holes are in register. A pair of small lugs **98** on the bottom flange **100** of the channel member **86** maintain the web portions **102, 104** of the members in slidable engagement. Joinder of the cross pieces **16, 16** to the side walls **12, 12** is accomplished by hanging the upper flanges **96, 106** of the channel members **86, 84** on suitably shaped pieces of bar stock **108, 108** fixed to the inner surfaces of the side walls **12, 12**. The lowermost cross piece **16***a*, in the embodiment shown, extends between the opposite sides **109, 109** (FIG. 4) of the doorway **18** rather than between the side walls **12, 12** where the front edge of the lowermost step starts inside of the doorway.

This arrangement leaves a space between the channel members **84, 86** that is filled with concrete when the stairway is poured. However, this space is only as thick as the gauge of metal used in the channels and does not prevent withdrawal of the cross pieces. If desired, a filler piece can be inserted so that the front of the stairs will be flush all the way across.

Each section of the first, or outer, pair of side walls **10, 10** has a straight edge portion **110** at its outer and uppermost end. The edge portions **110, 110** are disposed substantially vertically and are provided with flanges **112, 112**. Suitable openings **113, 113** (FIG. 1) are provided in the flanges so that a channel-shaped cross plate **114** may be removably fastened thereto. The cross plate **114** corresponds in depth to that of the edge portions **110, 110** and serves to define the upper back portion of the stairway. Thus, the cross plate **114**, like the bottom plates **14, 14** constitutes another closure plate for the form. Only one cross plate **114** is provided and the cross plate is secured to the uppermost sections of the side walls **10, 10** (whichever section that may be) by suitable fastening means, such as the bolts **116, 116** that are passed through the openings **113, 113** in the flanges **112, 112**. In the embodiment shown in FIGS. 1 to 3, the cross plate **114** is secured to the sections **50, 50**. To maintain the continuity of the side walls **10, 10** each of the sections **46, 48** and **50** is provided with a small integral triangular portion **118, 118** (FIGS. 1, 3 and 7) that fills the space left open by the vertical straight edge portion **110** in the section immediately below.

Additional fastening means are provided to maintain the form in position against the foundation while the concrete for the stairway is being poured. In the form just described these means comprise two long through bolts **120, 120** that pass through the foundation wall **19** at one end and extend outwardly through the space **40** between the first and second pairs of side walls **10, 10** and **12, 12** respectively to pass through the channel-shaped cross plate **114**. Nuts **122, 122** and washers **124, 124** on the outer ends of the bolts **120, 120** tightly hold the form against the wall of the foundation **19**. A third nut **126** and washer **128** are provided within the form so as to be embedded in the concrete after the stairway has been poured. The outer end portions **130, 130** of the bolts **120, 120** that extend beyond the form may then be cut off without weakening the form.

Erection of the above described form at the building site is accomplished in an easy manner. Because of the triangular configuration of the side walls **10, 10, 12, 12** and the absence of any base portion, no additional excavation need be done. Each of the side walls is made up of the proper number of sections according to the size of the stairway to be poured. The first pair of side walls **10, 10** is placed on the laterally extending top wall **30** of the footing **31** for the foundation and fastened to the wall of the foundation **19** by the anchor screws **36, 36**. The second pair of side walls **12, 12** is then interposed between outer walls **10, 10** on opposite sides of the doorway opening **18** in the wall **19** and fastened to the wall by clamps (not shown). Anti-spreader bars **58, 60** are then positioned in place between the side walls **10, 10, 12, 12** as desired.

The cross pieces **16, 16** are then inserted between the inner pair of side walls **12, 12**, extended until they abut against the walls and hung on the bar stock pieces **108, 108**. Bottom plate sections **14, 14** are placed against the edge portions **20, 56** of the first pair of side walls **10, 10** and secured thereto by means of the hinged angle brackets **68, 68**. Additional anti-spreader bars **76, 76** are secured to the brackets **68, 68** if desired. Finally, the channel-shaped cross plate **114** is attached to the uppermost sections **50, 50** of the outer side walls **10, 10** and the through bolts **120, 120** are passed through the cross plate **114** and the foundation wall **19**.

Concrete is then poured into the voids **40, 40, 82** defined by the form. Since the stairway is completely defined by the form, the entire stairway can be poured in one operation. There is no necessity to provide form sections for the treads of the stairs. By reason of the viscosity of the concrete it will completely fill the form without overflowing over the cross pieces **16, 16**.

The form so used is economical of concrete inasmuch

as the side walls do not extend any farther from the foundation wall than is necessary. However, in order to provide sufficient space to accommodate mounting means for overhead doors for the stairway, the thickness of the side walls of the stairway at the top may be greater than strength considerations require. Accordingly, further economies in the use of concrete may be effected through the use of another important aspect of the invention, although the use of this is not essential to the use of the previously described form arrangement.

As seen in the modified construction shown in FIG. 8, the sections of the first, or outer, pair of side walls **10, 10** may be fitted with inner partitions **140, 140**. The inner partition **140** on each section is formed by a wall section that starts at a distance somewhat below the top of the section and has an inwardly extending portion **142** at a downwardly sloping angle. The wall section then turns downwardly to form an inner portion **144** that is spaced from and parallel to the side wall **10**. Except in the case of the lowermost triangular sections **44, 44** of the side walls, the inner portions **144, 144** extend substantially below the bottom edge portion of the sections **46, 48** and **50** and slightly below the sloping portions **142, 142** of the inner partitions **140, 140** on the next section immediately below. In this manner the upper sloping portion **142, 142** of each inner partition nests, or telescopes, into the inner portions **144, 144** of the inner partition immediately above it. The inner partitions **140, 140** for the lower triangular sections **44, 44** terminate at the bottom of the section.

The effect of the telescopic engagement of the inner portions is effectively to reduce the thickness of the side walls of the stairway to that required solely by considerations of strength. Wider portions of the side walls remain at the top to provide sufficient space to accommodate mounting of any overhead doors that may be placed over the stairway.

A further alternative is shown in FIG. 9. In this embodiment, additional wall thickness is provided only at the uppermost sections **50, 50**. The other sections **48, 46** and **44** are substantially planar so as to form, with the inner pair of side walls **12, 12**, a void of uniform thickness.

The additional thickness at the top of the stairway is provided by forming the topmost sections **50, 50** with inwardly inclined portions **160, 160** at the lower end of the vertical wall portions **162, 162**. A flange **164** is provided at the lower edge of each inwardly inclined portion **160** and rests on a similar flange **166** at the top of the section immediately below it.

This arrangement eliminates the necessity for the inner partitions of the previously described embodiment. The wall sections are, accordingly, lighter in weight. At the same time sufficient thickness is provided to accommodate any overhead doors by selecting a thickness for the lower wall sections that will accommodate the proper size doors for the sections **48, 48**. Inasmuch as the width of the doors decreases as the stairway decreases, such a wall thickness will give sufficient space to accommodate the mounting flanges or equivalent of doors for the sections **46** and **44**.

In the several form constructions thus far illustrated and described, the form is secured to the foundation wall **19** by means of through bolts **120**. Since these bolts remain in the concrete stairway when cast, they serve as reinforcement in the upper shoulders of the concrete when it becomes set, as well as serving to fasten the stairwall to the foundation wall. This arrangement thus has certain advantages.

A variation of the means for securing the form to the foundation wall is shown in FIGS. 10 and 11 which, although it does not make double use of the form securing means as permanent reinforcement of the stairway it has nevertheless, advantages in respect to facilitating the erection of the form. In the alternate arrangement shown in FIGS. 10 and 11, one man may erect the form by himself whereas the arrangement shown previously is best handled by two men.

Referring to FIGS. 10 and 11, a yoke **170** is provided which straddles the door opening **18** in the foundation on the inner and outer faces of the wall, and to which the side walls **10, 10** and **12, 12** are respectively fastened. Yoke **170** comprises two lengths of angle stock **172, 174** of appropriate length to straddle any size of opening with which the form may be employed. The outer angle **174** must, in addition, be long enough to straddle the full width of the form, since the side walls **10, 10** and **12, 12** are each fastened to the horizontal legs of the angle, as by pins **176** which pass downwardly through the flanges **24** of the respective side walls. The two angles **172, 174**, in turn, are clamped to the opposite faces of the foundation by bolts **178** passing through the vertical legs of angles intermediate the side walls of the access opening.

In erecting this form, the yoke is first secured in proper place on the foundation by measuring up from footing **32** a distance corresponding to height of wall section or sections to be employed. Each side wall **10, 10** and **12, 12** is then made up and placed in position individually by resting its base on footing **32** and then securing the top flange **24** to the yoke angle **174** by a pin **176** so that each side wall of the form is supported in cantilever fashion from the foundation. No intermediate fastening bolts such as bolts **36** are required in this case, although they may be used if desired. When all of the side walls are thus in place, the anti-spreader bar **58** is attached, and the cross pieces **16** and closure plates **14** are likewise assembled, as before. In this instance, since there is no through bolt **120** employed in the form it is necessary to provide an equivalent, such as rods **180**, which are threaded at their inner ends and project completely through and are supported by the foundation wall, extending into the void between the inner and outer walls of the stairway in substantially the same manner as rods **120** used in the previously described arrangement. Rods **180**, however, are not connected to the form at any point. When the concrete poured into the form has hardened and before the form is removed, nuts **182** are run up on the inner threaded ends of rods **180** to take up the load of the cast stairway and clamp it securely to the face of the foundation. Thereafter yoke **170** may be released and the form sections removed.

Various other modifications in respect to details of construction may be made without departing from the inventive concept as defined in the claims. Thus, for example, in place of separate side walls **10** and removable bottom plates **14**, these members can be formed integrally, more particularly by making two halves each consisting of one triangularly shaped outer side wall **10** integrally joined to one half of the back side or bottom plate portion **14**. These two halves may then be secured together along their part line at the back. This arrangement is especially suited to panels formed of fiberglass. The basic concept here disclosed is characterized by the providing of a form which is maintained in place entirely through its contact with the wall of the building foundation. No support from the ground is thus required, and an integral cast concrete stairway is obtained without the additional excavation and concrete required in customary installations heretofore.

This application is a continuation-in-part of my copending application, Serial No. 112,441, filed May 24, 1961, now abandoned.

What is claimed is:

1. A demountable form for a recessed concrete stairway intended to provide outside access to interior building areas wholly or partly below grade having a vertical wall with an access opening therein, said form comprising

(*a*) a first pair of substantially triangular side walls disposed parallel to each other on opposite sides of said opening with one edge portion of each side wall against the vertical wall and a contiguous edge portion of each side wall disposed at an angle corre-

sponding to the angle of the slope of the stairway to be poured,

(*b*) a second pair of substantially triangular side walls interposed between the first pair of side walls on opposite sides of said opening, said second pair of side walls being disposed parallel to said first pair of side walls and spaced therefrom so as to define therewith parallel triangularly shaped voids for the walls of the stairway to be poured, one edge portion of each side wall of said second pair of side walls being disposed along the slope of the stairway to be poured,

(*c*) at least one closure plate fastened to and extending across said contiguous edge portions of the first pair of side walls to close off the back of the form and to serve as a support for the stairway as the poured concrete hardens,

(*d*) a plurality of rectangular cross pieces disposed substantially vertically between said second pair of side walls and removably secured thereto adjacent said one edge portion of each of said second pair of side walls to form the riser portions of the stairway to be poured,

(*e*) and fastening means extending from said vertical wall and making connection with said form adjacent the top thereof to hold the form in place against the vertical wall.

2. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein said fastening means extends from said vertical wall to said closure plate adjacent the top of the form.

3. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein said fastening means comprises a yoke secured to opposite faces of said vertical wall and straddling the access opening therein adjacent the top of said form, and securing means for fastening said triangular side walls to said yoke adjacent the top of the form.

4. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein said one edge portion

of each side wall of the second pair of side walls is shaped to conform to the tread and riser portions of the stairway to be poured.

5. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein said vertical wall has a laterally extending foundation and the first pair of side walls have short edge portions that rest upon said laterally extending foundation.

6. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein said side walls are provided with flanges which are secured to the vertical wall by fastening means.

7. A demountable form for a recessed concrete stairway as set forth in claim 2, wherein said fastening means comprise long through bolts secured at one end to the vertical wall and at their opposite ends to the closure plate.

8. A demountable form for a recessed concrete stairway as set forth in claim 7, wherein said through bolts are provided with additional fastening means to be embedded in the stairway to be poured to hold the stairway against the vertical wall after the form is withdrawn.

9. A demountable form for a recessed concrete stairway as set forth in claim 1, wherein the first pair of side walls is provided with hinged clamping brackets which hold the closure plate to the first pair of side walls and with means for locking the brackets in their plate holding position.

10. A demountable form for a recessed concrete stairway as set forth in claim 9, wherein anti-spreader bars are connected between the side walls.

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