Sept. 2, 1930. A. L. WOODBRIDGE 1,774,582

SPIRAL STAIRWAY

Filed May 12, 1928

Fig. 1.

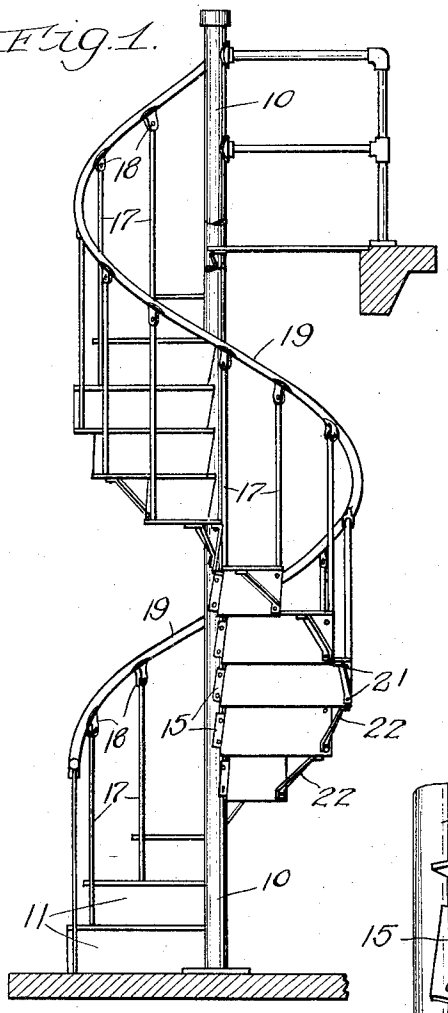


Fig. 2.

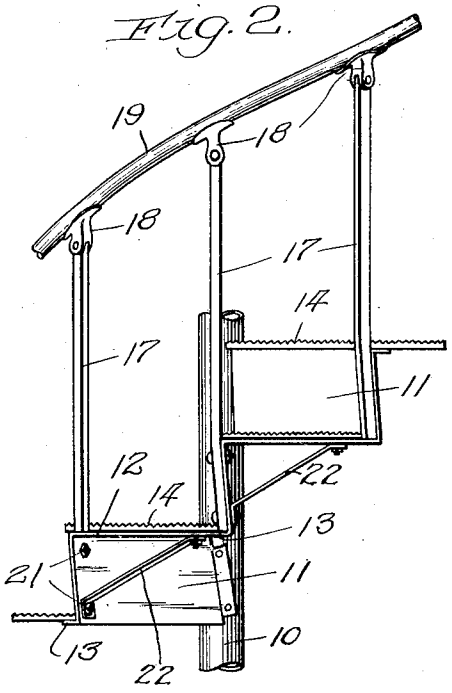


Fig. 3.

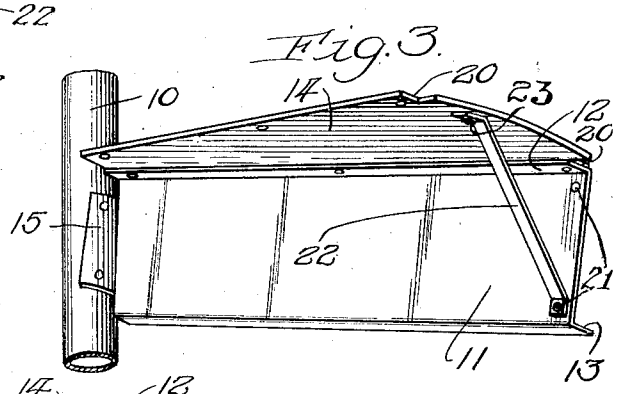
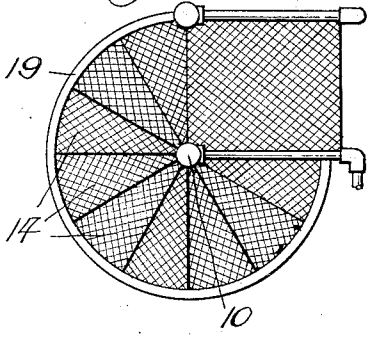


Fig. 5.



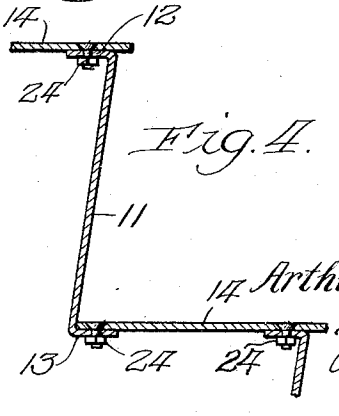


Fig. 4.

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Patented Sept. 2, 1930 1,774,582

UNITED STATES PATENT OFFICE

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SPIRAL STAIRWAY

Application filed May 12, 1928. Serial No. 277,116.

This invention relates to a spiral stairway and has special reference to a spiral stairway of a unitary metal construction.

More particularly this invention relates to a spiral stairway comprising a central upright, risers stamped and formed of a single sheet of metal and directly connected to the central upright, treads cast of any suitable material such as iron and secured to the risers, and railing supports secured to the faces of the risers and having no connection with the other elements of the construction. In this invention it has been the purpose to obtain a novel construction which would enable the removal and replacement of any element therein in case of damage without disturbing the remainder of the installation. Also in case a new location for this stairway should be desired, or for any other reason it is necessary to dismantle and reset the stairway, it may be done with a minimum amount of time and labor.

Heretofore, it has been usual to provide a tread having sleeves, collars, hubs, etc., secured thereto which of necessity must be slipped over the end of the upright support. It is apparent that in case a replacement is necessary at an intermediate point, it may be necessary to disassemble the entire stairway. In other instances, split bearings have been employed and it has been necessary to assemble these bearings to the risers and later to assemble this construction on the upright, thereby consuming an excessive amount of time and labor.

The present invention contemplates the use of a plurality of risers stamped and formed of a single sheet of material and having provisions whereby the risers may be directly attached to the central upright. This construction of course minimizes the amount of time and labor necessary in its assembly and lessens the cost of manufacture. Further, all the elements of the construction have been standardized so that it is possible to manufacture in large quantities for use in any installation; as for example, the treads may be employed in either a right-hand or left-hand stairway; the railing supports are made up in standard lengths and have two holes drilled therein of a predetermined spacing to be used in any installation regardless of the height of the riser; and the railing may be sized and curved according to the installation before being shipped from the factory, all of which minimizes the amount of time and labor required at the time of installation, and minimizes the cost of production at the factory.

One of the objects of this invention is to provide a spiral stairway in which the treads of the stairway are of uniform design for either a right-hand or left-hand stairway.

A further object of this invention is to provide a spiral stairway in which the treads of the stairway are cast of any suitable material such as iron.

A further object of this invention is to provide a spiral stairway in which the treads are of uniform size for use in any installation, and regardless of the height of the riser.

A further object of this invention is to provide a closed riser spiral stairway.

A further object of this invention is to provide a spiral stairway in which the risers are stamped and formed from sheet metal with a minimum of waste.

A further object of this invention is to provide a spiral stairway in which the risers are inclined from a vertical plane which permits of a wider tread in a limited space thereby affording more toe room, and also permitting the use of the same tread for both right and left-hand spirals.

A further object of this invention is to provide a stairway in which the tread may be of a minimum weight and strength due to the tread being carried on the top flange of the front riser and on the top of the lower flange of the riser next above which also increases the strength and safety of the stairway since the treads rest on top of the flanges and are not suspended on bolts, screws, or rivets therefrom.

A further object of this invention is to provide a stairway in which each of the risers is secured directly to the main support.

A further object is to provide a stairway that can be conveniently built upwardly from

the bottom in a practically completed condition, whereby no scaffolding or auxiliary supports are required for the workmen or materials in the erection of the stairway, the completed portion thereof progressively serving the purpose of a support for men and materials as the work of erection proceeds.

A further object of this invention is to provide a spiral stairway which is efficient, safe, durable and capable of being economically manufactured in large quantities or on a production basis for use in various installations.

Further objects and advantages will be apparent from the description and drawings forming a part of this specification to which reference may now be had for a more complete understanding of the nature and scope of this invention, in which drawings:

Figure 1 is a front elevational view of the spiral stairway as embodied in this invention;

Fig. 2 is an enlarged elevational view of a portion of the same;

Fig. 3 is a perspective view of a portion of the spiral stairway;

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 1; and

Fig. 5 is a top plan view of the entire structure.

Referring now more particularly to the drawings, the circular stairway comprises a central upright 10, preferably made of a three inch steel pipe. The risers 11 are preferably stamped from a single sheet of metal and are formed with an upper flange 12 and a lower flange 13, said flanges being disposed substantially at right angles to the body of the riser and transversely of the axis of the central upright 10. These risers are secured directly to the central tubular upright 10, are supported thereby, and extend radially therefrom and round about the same in spiral formation. The treads 14 are preferably cast of a suitable material such as iron and rest on the top of the upper flange 12 of the front riser and on the top of the lower flange 13 of the rear riser so as to be exteriorly detachable.

As shown more particularly in Fig. 4, the riser 11 is inclined with respect to a vertical plane. In order to secure the riser 11 to the tubular upright support 10, a projection or flange 15 is formed preferably integrally with the riser and is of such a shape as to conform with the contour of the upright. It will be noted particularly in Fig. 3 that this flange has a peculiar curvature, due to the fact that the support 10 and riser 11 do not occupy the same vertical planes. Flange 15 is held to the support preferably by means of screw bolts 16, and these bolts not being in a vertical plane with respect to the tubular member, afford a stronger construction.

A railing support 17, having two holes of a predetermined spacing, is secured to the face of the riser 11 and at the outer end thereof by means of screws and bolts projecting through the spaced holes in the railing support 17 and extending through the riser 11. This support is inclined at its lower end to fit the inclined surface of the riser and extends vertically from the upper end of the riser to be secured at the upper end of the support to a pivotal bracket 18, which latter is in turn fixed to the railing 19. The railing 19 is preferably formed of a one and one-half inch pipe and the railing support 17 is preferably formed of a three-fourths of an inch square rod, although it is to be understood that this device is not to be limited to these specific dimensions, they being merely for illustrative purposes.

The tread 14 is provided with notches 20 on each outer corner. The lower end of the railing support 16 rests on the flange 13 and engages one of the notches of the lower tread 14 and also engages the other of the notches 19 in the upper tread 14. The risers 11 are provided with holes of the same predetermined spacing as exists in the support 17 and bolts 21 are inserted therethrough to fasten the supports to the risers. A brace 22, fastened at one end by the lower bolt 21 to the riser, extends to be fastened at its upper end to the tread 14 at a point near the outer edge thereof and adjacent to one of the notches 20. A bolt 23 extends through the tread and the upper end of the brace 22 to secure the same together, the head being preferably countersunk in the tread in order to be removable from the upper side thereof. Screw bolts 24 fasten the edges of the treads to their respective flange heads.

In erecting and installing the stairway, the parts having been previously fabricated in the shop and shipped to the place of installation, the central column is first erected and secured at the top and bottom. The bottom and lower risers are then successively attached to the column and the treads dropped into position on their supporting flanges of the risers and are bolted in place. Each step is thus completed from the bottom up. As the height of the completed steps increases, these completed steps are used by the workmen as a support from which to continue the erection thus requiring no scaffolding or the like. The railing supports are then applied, and the railing itself put in position and secured to the railing supports or uprights.

The construction is thus extremely simple and important advantages result. The risers being attached to the central column after its erection, it is not necessary to slip collars, sleeves, hubs, etc., over the end of the column before or after erection. The column as erected is devoid of all extraneous members

and thus is less difficult to transport, handle, and erect and renders unnecessary the time, care, labor and annoyance of applying such devices to the column.

The risers being individually attached, repairs may be made and broken or injured treads or other parts replaced without disassembling the whole stairway. Castiron treads are uniformly used in these stairways as the treads are of irregular shape and the waste would be too great if they were cut from sheet metal. Being of castiron the treads may be damaged by having heavy articles dropped on them, particularly during the erection of the building. By this construction, however, they may be readily and individually replaced.

The support of the treads continuously along their front and rear edges by the two flanges of the risers, and the fact that they do not perform any individual supporting function in the stairway structure, enables them to be made comparatively thin and light, thus reducing the weight of the installation as a whole, making less weight to be handled in manufacture, shipping and installation, and resulting in an economy of material, time, labor and expense all around.

The risers being inclined to the rear, ordinarily one inch, gives an inch wider tread than the standard tread and affords more toe room, which is of considerable advantage in spiral stairways where the space is necessarily limited. Moreover, in such stairways, it is desirable that the treads overhang the risers about an inch at the front edge. The standard requirement is that there be twelve treads to the complete circle.

It is also of advantage to make the tread the same for both right and left-hand spirals. In this construction by inclining the risers, and securing the railing supports to the risers instead of to the treads, and notching the corners of the treads, the tread is capable of use with either right or left-hand spiral stairways while preserving the front overhang and the wider tread. The tread thus becomes a satisfactory standard for all stairways having the same length of step, a matter of evident importance to the manufacturer and economy to the purchaser.

In such stairs, the riser or height of the steps varies with the requirements of the particular installation, and this is taken care of in this invention by the risers, which, being cut or stamped and formed from sheet metal, may be made to vary in height according to the particular requirements.

The risers are closed preventing one from seeing between the steps and preventing the feet of the user from being caught therein, thus adding to the safety of the stairway and the feeling of security one has in using it.

The end flange, which is secured to the central column, is preferably formed integral with the body of the riser, so that extra parts, brackets, or attachments are unnecessary, and the manufacture and erection are correspondingly simplified and the appearance of the completed stairway is enhanced. These risers may be made as strong as desired, usually they are formed from No. 12, 14 or 16 gauge steel plate, and serve the multiple purpose of forming the risers of the steps, the supporting brackets for the structure from the central column and the front and rear edge supports for the treads.

After an upper riser is secured in position, the tread is merely laid or dropped into position on the two flanges by which its weight is carried, while the securing bolts are put in place and tightened. This construction further permits of the treads being exteriorly detachable. It is thus not necessary to lift it up into position and to hold it there from beneath the structure and over the heads of the workmen while the securing bolts are inserted and tightened. The work of erection is therefore less strenuous and more conveniently carried out. By this arrangement, also, the load carried by the tread is not supported on a few bolts which may eventually be sheared by use as would be the case if the tread were suspended from beneath, and thus is much stronger and safer besides being easier to install and maintain.

The steps of the stairs thus comprise only the two parts or members, the risers and treads; the one, the treads, are standard and alike for all stairs, the other, the risers, are the same types for all stairs. The problems of manufacture are thus reduced to a minimum, the shipment of materials is facilitated, and the work of erection is correspondingly simplified and reduced, the workmen having only a few pieces to apply quickly, become skilled and rapid in the work, and a cheaper class of labor may be utilized.

The railing supports or uprights, being merely bolted to the front of the risers and not passing through or being attached to the treads, are quickly and easily applied. The bolt holes at their lower ends are of standard location for all stairs, regardless of the height of the risers, and being of standard length, they may be fabricated for stock and used as required. They are not bent at the point adjacent the top of the riser, until the height of risers for the particular stairway is known, but otherwise are standard for all stairs including both right and left spirals and may be manufactured and stocked in advance.

When these uprights or supports are applied, the previously bent railing is placed and adjusted in position and the uprights secured thereto. This railing may be bent in the shop also where suitable machinery for the purpose is at hand, and therefore, larger pipe such as one and one-half inch pipe may

be used, whereas if it is necessary to do the work of bending at the installation, a much smaller pipe must be used and it is then bent only with great difficulty. The larger pipe makes the railing stronger, and the structure as a whole more rigid and enduring and of better proportions and appearance.

The parts of the complete structure are few in number and simple in design. When erected and bolted together a strong, rigid stairway is produced. It is comparatively light in weight, and economical to manufacture, install and maintain. Furthermore, a closed riser spiral type of stairway is secured without the addition of extra parts and a wider tread than normal is provided.

Cast treads made from a single pattern may be used for all stairs, whether right or left-hand and regardless of the height of the riser. I prefer, also, to make the upper surface of the treads with diamond-shaped protuberances corresponding in form, location and size to the diamonds in the so-called "diamond plate steel" of commerce of which practically all such spiral stairway platforms are made.

While but a single embodiment of this invention is herein shown and described, it is to be understood that the invention is not to be limited to that specific structure since various modifications may be apparent to those skilled in the art without departing from the spirit and scope of this invention, and therefore, the same is to be limited only by the scope of the appended claims and the prior art.

I claim:

1. A spiral stairway comprising a central upright, risers secured thereto and extending radially therefrom in spiral formation and having upper and lower lateral flanges, and separate exteriorly detachable treads supported on the top of one of said upper flanges and on the top of said lower flange of said riser next above.

2. A spiral stairway comprising a central upright, risers secured thereto and extending radially therefrom in spiral formation and having upper and lower lateral flanges integrally formed thereon, and separate exteriorly detachable treads supported on the top of one of said upper flanges and on the top of said lower flange of said riser next above.

3. A spiral stairway comprising a central upright, risers radiating therefrom in spiral formation and having upper and lower lateral flanges, said risers having a projecting portion integrally formed thereon for attachment with said upright, and separate exteriorly detachable treads supported on the top of one of said upper flanges and on the top of said lower flange of the riser next above.

4. A spiral stairway comprising a central upright, risers radiating therefrom in spiral formation and having upper and lower lateral flanges, said risers having projecting portions individually detachably secured to said upright, and separate exteriorly detachable treads supported on the top of one of said upper flanges and on the top of said lower flange of the riser next above.

5. A spiral stairway comprising a central upright, risers radiating therefrom in spiral formation and comprising a main body portion having upper and lower lateral flanges thereon, and separate treads supported on the top of one of said upper flanges and on the top of said lower flange of said riser next above, said main body portion being inclined with respect to the axis of said central upright.

6. A spiral stairway comprising a central upright, substantially Z-shaped risers radiating therefrom in spiral formation, and separate individually detachable treads supported on the top of the upper portion of one of said risers and on the top of the lower portion of the riser next above said risers being individually detachable from said upright.

7. A spiral stairway comprising a central upright, substantially Z-shaped risers radiating therefrom in spiral formation, said risers being formed of a single sheet of material and having projecting portions integral therewith for engagement with said central upright and laterally detachable therefrom, and separate individually detachable treads supported on the top of the upper portion of one of said risers and on the top of the lower portion of the riser next above.

8. A spiral stairway comprising a central upright, risers secured thereto and extending radially therefrom in spiral formation and having upper and lower flange members, separate treads supported on and extending beyond the top of one of said upper flanges and on the top of the lower flange of the riser next above, a railing, and supports secured to the outer end of the faces of said risers for supporting said railing, said treads having cut-away portions at their outer corners for providing clearance for said supports whereby any element of said stairway may be detached therefrom without disturbing the remainder of the installation.

9. A spiral stairway comprising a central column, step risers secured thereto and individually detachable and extending radially therefrom in spiral formation, and separate individually detachable treads supported on and between and carried by said risers.

10. A closed riser spiral stairway comprising a central column, spirally arranged steps surrounding the said column each of said steps comprising a closed riser and a separate exteriorly detachable tread, said risers being rigidly secured to said central column

and said treads carried by and between the front and rear risers.

11. A spiral stairway consisting of a series of spirally arranged steps, cast treads therefor, and means for supporting said treads along substantially the entire front and rear edges.

12. A spiral stairway comprising tread supports secured to a central supporting column and having upper and lower flanges, treads supported on the top of one of said upper flanges and on the top of said lower flange next above, railing supports secured to said tread supports, and a railing secured to the upper ends of said railing supports.

13. A spiral stairway comprising a central supporting column, tread supports secured to said column and having a lower lateral flange, treads supported on the top of one of said supports and on the top of said lower flange of said support next above, railing supports secured to said tread supports, and a railing secured to the upper ends of said railing supports.

14. A metal spiral stairway comprising a central supporting column, step risers secured at their inner ends to said column and extending radially therefrom in spiral formation, step treads separate from the risers, each tread extending between the upper edge of one riser and the lower edge of the next adjacent riser and being secured to said risers and supported and carried thereby.

15. A metal spiral stairway comprising a central upright, risers secured thereto and extending radially therefrom in spiral formation and having upper and lower lateral flanges, and separate treads, each tread being supported at its forward edge on the top of one of said upper flanges and at its rear edge on the top of the lower flange of the riser next above.

16. A metal spiral stairway comprising a central supporting column and steps secured to said column and extending radially therefrom in spiral formation, each step comprising a riser and a tread, each of said treads extending between and being supported by two adjacent risers.

In witness whereof, I have hereunto subscribed my name.

ARTHUR L. WOODBRIDGE.