June 8, 1943. R. B. MARSCHKE 2,321,499

FOLDING STAIR

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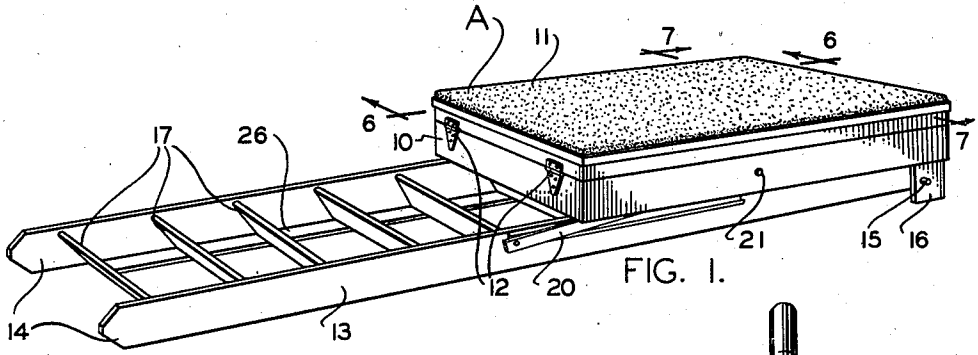



FIG. 1.

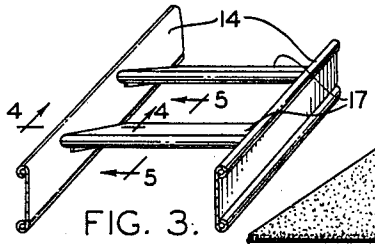



FIG. 3.

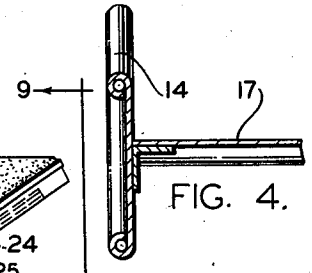



FIG. 4.

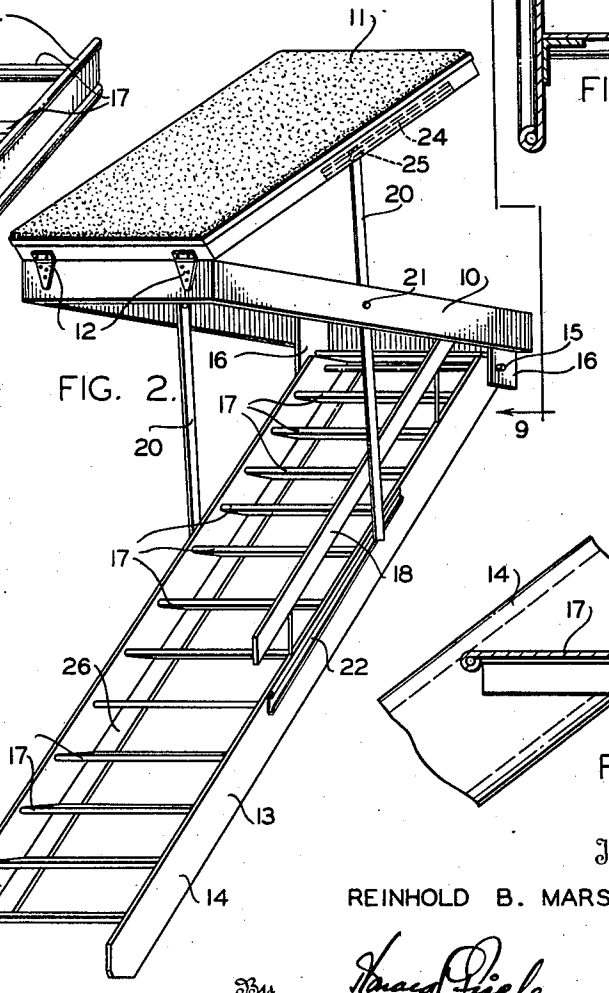



FIG. 2.




FIG. 5.

Inventor

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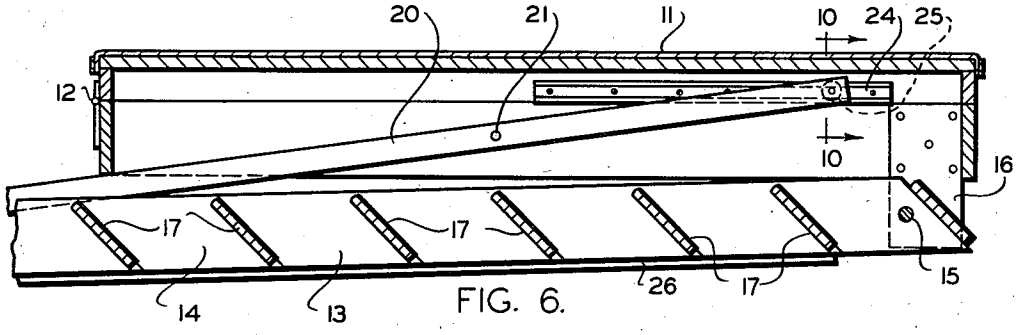



FIG. 6.

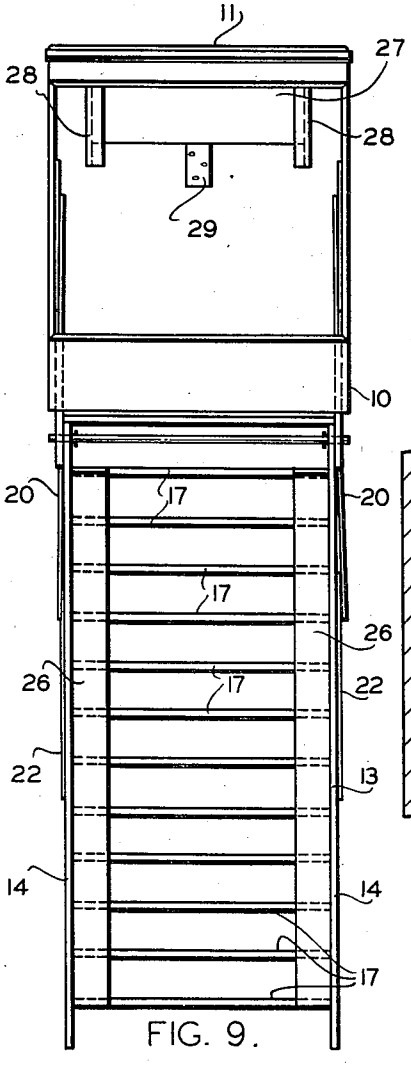



FIG. 9.

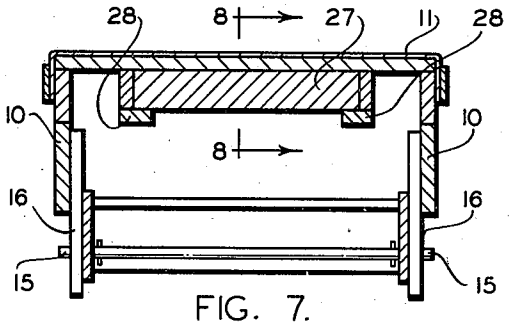



FIG. 7.

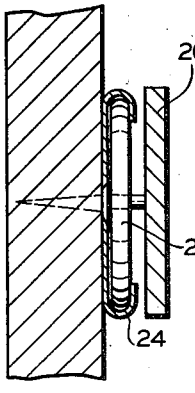



FIG. 10.

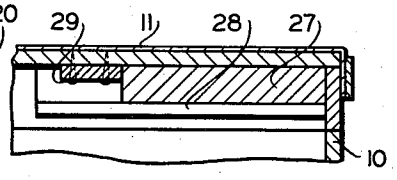



FIG. 8.

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Patented June 8, 1943

2,321,499

# UNITED STATES PATENT OFFICE

2,321,499

## FOLDING STAIR

Reinhold B. Marschke, St. Paul, Minn.

Application September 11, 1941, Serial No. 410,421

3 Claims. (Cl. 228—50)

My invention relates to a utility stairs wherein it is designed to provide a simple inexpensive construction with a small number of parts for a stairway where the stairway swings up out of the way, leaving the space below free for use.

It is a feature to provide a cover which closes the opening so that the cover may provide a floor to walk over where the stairs is built into a balcony. The cover may also provide a roof where the stairs is built to lead up onto the roof of a building. Furthermore, it closes the stair opening leading from one floor to another when the cover is in closed position.

When my utility stairs is folded, the stairway is folded up against the bottom of the stairway opening and being in a single unit projects beyond one end of the same, whereas, the cover is down closing the stair opening.

It is also a feature to provide a utility stairway wherein the cover acts to balance the stairway so that a light touch up or down on the cover from above or on the steps from below, will operate the stairway into or out of operating position. This feature is accomplished by slidably connecting the stairway stringers with the cover by a pair of unitary or straight arms which are pivoted between their ends to the stairway opening casement and the ends of which arms are slidably connected to the stairway on one end and to the cover on the other end.

It is also a feature to provide a stairway of a unitary nature wherein the same consists of the stairway opening casement which fits in the opening made in the roof or ceiling and hingedly connecting one end of the stairway to one end of the casement slightly below the casement proper so that the stairs when folded will lie parallel to the bottom of the stairway opening casement.

This stairway may be made of metal so as to act as a fire escape when desired, or may be made of wood, and is adapted for basements, flat roofs, garage attics, storerooms, barns, or any place where there is no room for a built-in stationary stairway and where the stairway can be exposed to the eye from below. Furthermore, a stairway of this character is designed of an economical construction with rigidity and full utility as required by any stairway, yet is foldable up out of the way and the cover closes automatically as it balances with the stairway in folding up the stairway to its compact out of the way position.

These features, together with other details and objects will be more fully and clearly hereinafter set forth.

In the drawings forming a part of this specification:

Figure 1 is a perspective view of my utility stairway, folded up in a unit with the cover closed on top of the stairway opening casement and the stair proper extending approximately parallel to the bottom of the casing.

Figure 2 illustrates a perspective view of my stairway in open position.

Figure 3 illustrates a perspective detail of a section of the stairway when made of metal.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a section on the line 5—5 of Figure 3.

Figure 6 is a longitudinal section on the line 6—6 of Figure 1.

Figure 7 is a cross section on the line 7—7 of Figure 1.

Figure 8 is a section on the line 8—8 of Figure 7.

Figure 9 is a view taken on the line 9—9 of Figure 2, looking toward the open cover and the back of the stairway when in open position.

Figure 10 is a section on the line 10—10 of Figure 6, in enlarged form, showing the roller connection between the ends of the arms and the guideway in which the roller runs.

My utility stair A is made up in a unit which can be folded into a compact state as illustrated in Figure 1. When the stair is folded in this manner, it can be shipped to the customer in this compact manner. Thus my utility stair A is designed to be delivered to the customer in complete assembled form, ready to be installed wherever the user wishes.

The stair unit A is formed with a casement 10 for the stair opening in the roof or ceiling of the building, the casement 10 forming the finishing means to extend around the opening and providing the passageway from one level to another through which a person would walk when using my utility folding stair.

I provide a cover floor 11 which is hinged at 12 to one end of the casement 10 and which is adapted to close the top of the casement and the stair opening when the cover is lowered against the casement.

The stairway 13 of my utility stair is formed with a pair of straight rigid stringers 14, the free ends of which project beyond one end of the casement, while the other ends of the stringers are pivotally secured at 15 to depending brackets 16 which are secured to and extend down from the end of the casement opposite to the hinges 12. Thus the cover floor 11 is hinged on one end of the casement and the stair 13 is hinged onto the

other end of the casement. The steps 17 of the stairs 13 extend between the stringers 14.

The stringers 14 may be made of metal as well as the steps 17 as illustrated in Figures 3, 4 and 5, to provide a fire escape stairway where it is desired. However, for ordinary use, I have found that a wooden stair unit is practical and for some purposes is better because it is lighter in weight and may easily be installed in places where wooden stairways are preferred.

The stairway 13 may be provided with a hand rail 18 which may extend along the upper portion of the stair or as may be desired. The stringers 14 are connected to the cover 11 so that the stairway 13 is connected as a unit to the cover by means of a pair of lever arms 20 which are pivotally secured to the casing between their ends at 21 and the free ends of which are slidably connected in the longitudinal tracks 22 which extend along the sides of the stringers 14 and in which the roller 23 runs. The rollers 23 are secured to the free ends of the levers 20 and ride freely in the tracks 22. By this means, the lower ends of the lever 20 are connected to the stair stringers 14. The upper ends of the levers 20 are connected to the longitudinally extending tracks 24 by the rollers 25 which are carried by the upper ends of the levers 20. The tracks 24 are secured extending longitudinally along the inside of the cover floor 11. Thus the upper ends of the levers 20 are connected in the same manner as the lower ends to the cover 11. By the levers 20 the stairway 13 is connected to the cover 11 so that when the free end of the stair is raised, the cover will be lowered against the casement 10 and when the stair 13 is lowered, the cover 11 will be raised. I provide longitudinal extending brace members 26 which extend along the back of the steps 17 and adjacent the stringers 14, and thus I provide a rigid stairway 13 which will be firm and rigid in operation.

The stairway may be counter-balanced by means of the weight 27 which may be made of concrete, or any other suitable heavy material and which is held in place by the brackets 28 on the ends of the same. A cleat 29 holds the weight 27 in position from sliding out of the brackets 28. It will be apparent that a larger or smaller weight 27 may be slid in place in the brackets 28 and the cleat 29 adjusted to the proper position to hold the weight 27 in place. Thus I provide a variable weight means for counter-balancing the cover floor 11 and the stair 13. It is desirable that the stair 13 balance with the cover 11 so that the cover 11 may be easily raised without too much effort and at the same time the free end of the stairway 13 may be lowered or raised, or by engaging the stairway from below, the same may be drawn down into operating position and at the same time the cover raised.

In designing my stair as a unit, I had in mind providing a utility stair of a small number of parts where the stair stringers 14 are formed of a single piece so as to provide rigid sides to the stairway 13 and yet providing a stairway which would fold up and act to open or close the cover 11 automatically.

My utility stair is designed to provide an economical stairway unit which can be completed in the factory and shipped to the consumer at a reasonable price. Thus I have provided the simple straight levers 20, the ends of which ride in the tracks 22 and 24 which also act to permit the stair to be easily operated. When the stairway is folded up as illustrated in Figures 1 and 6, it is held rigidly as a unit with the free ends of the stringers 14 up out of the way or along the ceiling of the building. When the stairway is down, it is firm and rigid and acts virtually as a built-in stairway to provide a means of walking from one floor to another. Simplicity is of primary importance in my utility stair.

I claim:

1. A utility stairway comprising a casement stair opening adapted to encase the opening through the building from one floor to the other, a cover floor hinged to one end of the top of said casement, a stair hinged to the other end of the bottom of said casement, a pair of tracks carried by said cover, a pair of tracks carried by said stair stringers, and a pair of straight levers pivoted to said casement between their ends and having their ends slidably connected in said track means carried by said cover and said stair stringers.

2. A unit stairway, casement, and cover foldably connected together, including a casement adapted to form a finishing means around the stairway opening, a cover hinged to said casement and acting as a floor above the stairway opening when closed, a stairway including a series of steps rigidly secured to one-piece straight stringer members, a stair railing attached to one of said stringer members, a pair of tracks carried by said stringer members, a pair of tracks carried by said cover, straight bar levers pivotally secured between their ends to said casement and having their ends supported in said tracks on said stair and in said cover with an antifriction pivotal connection means, whereby said stairway is counterbalanced by and connected to said cover and when said cover is closed caid stairway is folded up to said casement.

3. A stairway including a casement for the stair opening, a stairway hinged to said casement having straight rigid stringers for the full length of said stairway, a cover floor hinged to said casement, a pair of tracks carried by said stringers, a pair of tracks carried by said cover, a pair of rigid bars pivoted to said casement and having their ends slidably connected in said track means carried by said cover and said stair stringers, said rigid bars causing said stair stringers and said cover to operate in unison and to permit the stairway to be easily operated without slamming.

REINHOLD B. MARSCHKE.