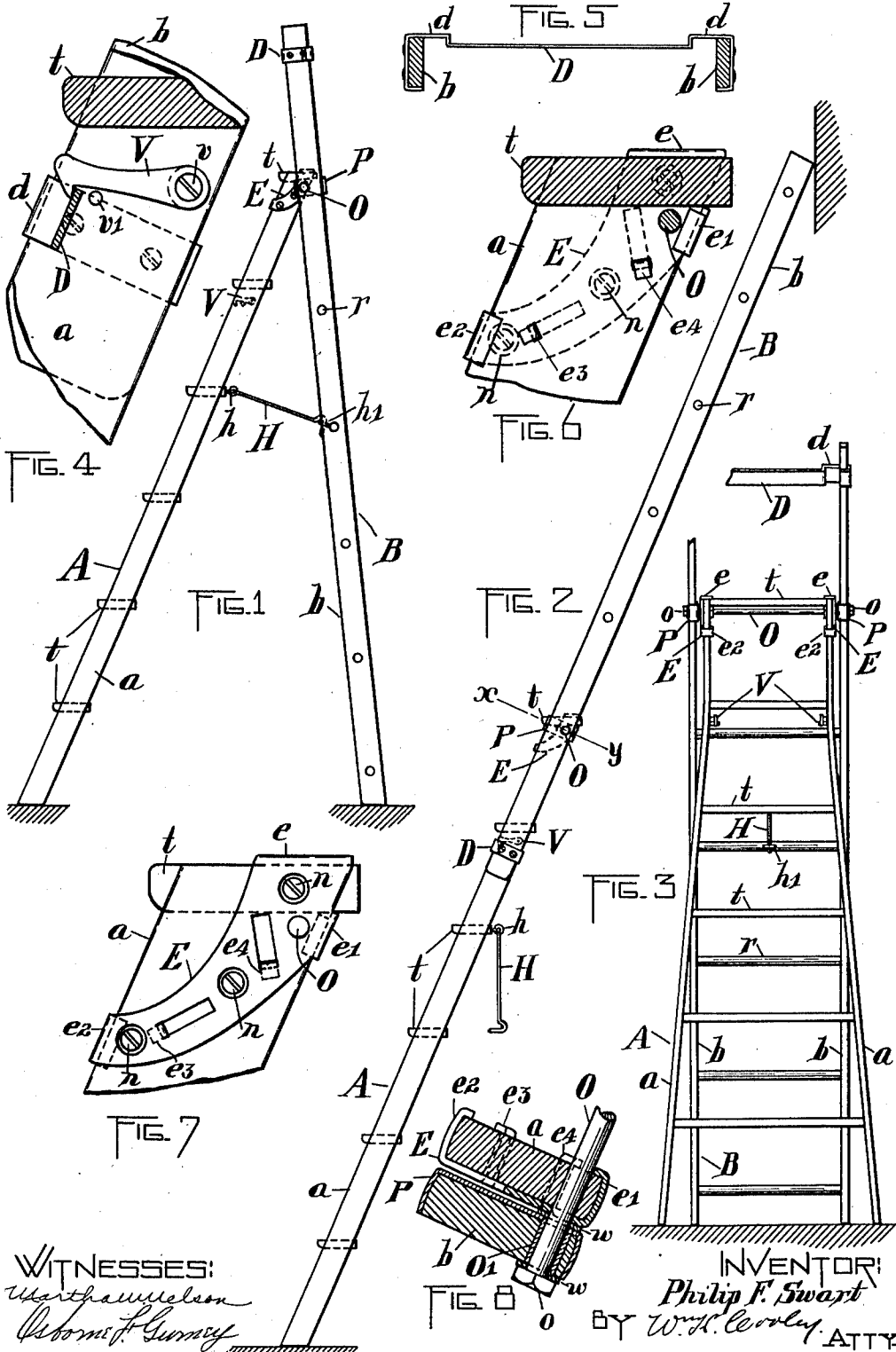


P. F. SWART.
EXTENSION LADDER.
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EXTENSION-LADDER.

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To all whom it may concern:

Be it known that I, PHILIP F. SWART, a citizen of the United States, and a resident of Brockport, in the county of Monroe and State of New York, have invented a new and Improved Extension-Ladder, of which the following is a specification.

This invention relates to extension ladders and more especially to that class of extension ladders in which the lower section comprises a step ladder, and in which there is provided supporting means adapted to support the step ladder at its upper end in the usual way and adapted also to form an extension of the ladder so as to practically double the length thereof when used as an ordinary ladder with its upper end engaging against any suitable support for holding the ladder in place.

An important purpose of my present invention is to provide an extension ladder of the above character in which the parts are so connected together that they may be moved to relative positions adapting them to use as an extension ladder with the parts extending in substantial alinement to avoid the serious objection found in such structures where the upper sections, when used as an extension ladder, are out of alinement, with the upper section either to the rear or in front of the lower section. For this reason I provide connecting means adapted to permit of the parts being relatively positioned to form a step ladder and also permitting their movement to relative positions to comprise an extension ladder but with the parts in alinement and with the lower ends of the sides of the upper section engaging outside of the upper ends of the sides of the lower section.

Another important purpose of my invention is to provide a connecting means between the sections of the ladder permitting them to occupy the just above mentioned relative positions while at the same time contained entirely within the sides of the sections of the ladder and without any objectionable projections extending either to the front or to the rear of the sides of the ladder when used as an extension ladder. To effect this result it is desirable that the sections of the ladder be connected at points close to their adjacent edges when in relative position to form the step ladder, in order that the connecting strap, which I make use of, at the lower end of the upper

section when used as an extension ladder to sustain the thrust exerted on the parts and to hold them in alinement may not, when the device is used as a step ladder, be in the way of a person standing on the upper step.

Another purpose of my present invention, then, is to provide the sections of such a ladder with a simple, inexpensive, efficient, positive and reliable connecting means of the character just above described.

In carrying out my invention I may, preferably, make use of a step ladder section for the lower section of the ladder, at the upper end of which I provide reinforcing and connecting members adapted to engage around the side members of the step ladder in a way to prevent their splitting and adapted, also, to engage over the upper step in a way to firmly hold the same in place. These reinforcing and connecting members may be secured in place by means of screws. I prefer, however, to provide them with integrally formed flexible tongues adapted to engage through suitable holes therefor in the sides of the step ladder and to be turned down against the inner and adjacent surfaces of the sides of the lower section of the step ladder at their upper ends in such a way as to comprise a sufficient fastening or securing means for the connecting member, whereby the connecting members at the upper end of the lower section may be secured in place without the use of screws by simply bending the inwardly extending tongues over and downwardly on the inner surfaces of the sides of the step ladder.

Coöperating with the connecting members at the upper ends of the lower section of the step ladder I provide connecting straps or plates engaging around the edges and across the insides of the upper side members at the points where the connections are to be made with the lower section. The parts of the ladder are pivotally connected by a bolt extending through these last named plates and the connecting and reinforcing plates at the upper end of and just under the upper step of the lower section. Across the lower end of the upper section, when in position to form an extension ladder, I provide a strap engaging around and extending across and between the sides of the upper section and adapted to engage part way around the sides of and extend across the front of the lower section just under the first step below the upper step thereof.

The accompanying drawings illustrating my invention are as follows,—

Figure 1 is a side view of the ladder when used as a step ladder. Fig. 2 is a side view of the ladder when used as an extension ladder. Fig. 3 is a front view of the ladder as seen from the left with reference to Fig. 1. Fig. 4 shows the latch mechanism for holding the parts in extended position. In this figure the first step below the upper step is seen in section and the strap engaging around the lower end of the upper section of the ladder, when in extended position, is seen in section and the latch is seen in engagement with this strap for holding the parts of the ladder in extended position. Fig. 5 is a transverse sectional view of the outer ends of the upper section and shows the strap engaging around, across and between the same. Fig. 6 is a vertical sectional view of the upper end of the lower section of the ladder, and shows the method of securing the connecting means at the upper end of the lower section as seen from the inside of the ladder. Fig. 7 shows a part of the lower end of the lower section of the ladder with the right hand connecting member secured in place thereon. Fig. 8 shows, in a transverse sectional view taken through the sides of the ladder on the line $x-y$ of Fig. 2 and at the point of their pivotal connection, the relative arrangement of the parts for pivotally connecting the upper and lower sections of the ladder. Similar parts are designated by similar reference characters throughout the several figures of the drawings.

Referring to the drawings,—A is the lower section of the ladder having the side members a and the steps or treads t secured therein in the usual way.

At B is seen the rear or upper section of the ladder having the side members b and the rungs r secured therein in the usual way. At the upper end of the lower section and on each side thereof there is provided a reinforcing and connecting member E having a flange e at its upper end adapted to engage over the upper tread and having a similar flange e^1 adapted to engage around the rear edge of a side a and to be formed down against the sides thereof as indicated in Figs. 6, 7 and 8. A similar flange e^2 is seen at the lower end of each member E adapted to engage around the front edge of a side a and to be similarly formed down against the inner side thereof. Tongues e^3 and e^4 are carried by and formed integrally with the members E and are adapted to engage through holes therefor in the sides a and to be bent over and flattened down against the sides thereof so as to hold the members E in place. It will at once be seen that the flanges e^1 and e^2 on the plates E prevent the sides A from splitting at their

upper ends while the flanges e serve to hold the upper step t in place and as an aid in holding the parts in relative position screws n may be used as indicated.

The reinforcing and connecting plates E are formed in pairs, as will at once be understood, and each one is provided with a hole therethrough just under the upper step t of the lower section A to receive the connecting rod O later to be described.

A connecting plate P is secured on and near the upper end of each side member b of the rear section B. These plates extend across the inner faces of the sides b and have flanges on the ends thereof for engaging over the edges of the sides b and each may be held in place by means of screws or rivets, not shown. Through each of these plates P there is provided a hole for receiving the connecting rod O which extends through the sides B, the plates P, the reinforcing and connecting members E and between the side members A just under the upper step t .

The connecting rod O comprises a bolt of substantially the usual construction of sufficient length to engage through the parts in the manner above described. It will at once be seen that the plates E cannot be forced together by the operation of the bolt O and the usual nut o on either or each end thereof, but, in order to prevent an undue binding action between the sections of the ladder, I prefer to provide a ferrule O^1 on each end of the bolt O extending through the sides B and the plates P and abutting at one end against a washer w , located between the plates E and P for the purpose of separating them slightly, and at its other end against a washer w under the head or nut o at the end of the bolt O.

For holding the parts in proper relative position when used as a step ladder and to prevent their spreading a hook H may be connected by means of the usual screw eye h to the rear side of one of the steps or treads t of the lower section and a screw eye h^1 may be secured to one of the rungs r more nearly opposite thereto in the rear or upper section. I prefer that this hook H be inclined somewhat as indicated in order to prevent disengagement thereof by a forcing of the parts together at their lower ends.

When the parts are in extended position, as indicated in Fig. 2, for the purpose of preventing the upper section from swinging downwardly, latches V are provided which are pivoted by means of screws v , as seen, against the insides of the sides a and held in proper position to be engaged by the connecting central portion of the strap D by means of suitable pins v^1 secured in the sides a . The strap D has offsets d therein adapted to receive and engage over the front edges of the sides a of the lower section. The strap D is

also extended across the outer surfaces and around the rear edges of the sides *b* of the upper section. The strap D then operates with the connecting member, already described, to sustain the thrust on the parts when used as an extension ladder and it may also be grasped by the hand of a person standing on the ladder when working with the other hand at a considerable distance from the ladder and on either side thereof in the same way that a rung of an ordinary ladder is similarly used. When the device is used as a step ladder a person standing on the upper step may lean against the strap D and the upper ends of the sides *b* which it will be seen extend somewhat above the upper step *t*.

It is believed from the foregoing description of the construction and operation of the several parts of my extension ladder that no further explanation thereof is called for herein.

What I claim is:

1. A combined step and extension ladder comprising two members adapted to be pivotally connected and means for pivotally connecting them with the sides of the upper section engaging outside of, overlapping and in substantial alinement with the sides of the lower section when in extended position, such pivotal connecting means comprising a reinforcing and connecting plate on each side of the lower section at its upper end, each provided with a flange adapted to engage over the upper step of the lower section of the ladder and also with flanges adapted to engage, one around the front edge and the other around the rear edge of the corresponding side member; a strap or plate engaging across the inside and around the edge of each side member of the upper section near its lower end and each such last named plate or strap pivotally connected with the corresponding reinforcing and connecting plate on the lower section at a point within the side members.

2. A combined step and extension ladder comprising two members adapted to be pivotally connected and means for pivotally connecting them with the sides of the upper section engaging outside of, overlapping and in substantial alinement with the sides of the lower section when in extended position, such pivotal connecting means comprising a reinforcing and connecting plate on each side of the lower section at its upper end, each provided with a flange adapted to engage over the upper step of the lower section of the ladder and also with flanges adapted to engage, one around the front edge and the other around the rear edge of the corresponding side member; a strap or plate engaging across the inside and around the edge of each side member of the upper section near its lower end and each such last

named plate or strap pivotally connected with the corresponding reinforcing and connecting plate on the lower section at a point within the side members by means of a rod or bolt extending through all of such side members and such reinforcing and connecting plates.

3. A combined step and extension ladder comprising two members adapted to be pivotally connected and means for pivotally connecting them with the sides of the upper section engaging outside of, overlapping and in substantial alinement with the sides of the lower section when in extended position, such pivotal connecting means comprising a reinforcing and connecting plate on each side of the lower section at its upper end, each provided with a flange adapted to engage over the upper step of the lower section of the ladder and also with flanges adapted to engage, one around the front edge and the other around the rear edge of the corresponding side member, such connecting plates provided also with integrally formed and flexible flanges engaging through holes therefor in and flattened down against the insides of the corresponding side members; a strap or plate engaging across the inside and around the edge of each side member of the upper section near its lower end and each such last named plate or strap pivotally connected with the corresponding reinforcing and connecting plate on the lower section at a point within the side members.

4. A combined step and extension ladder comprising two members adapted to be pivotally connected and means for pivotally connecting them with the sides of the upper section engaging outside of, overlapping and in substantial alinement with the sides of the lower section when in extended position, such pivotal connecting means comprising a reinforcing and connecting plate on each side of the lower section at its upper end, each provided with a flange adapted to engage over the upper step of the lower section of the ladder and also with flanges adapted to engage, one around the front edge and the other around the rear edge of the corresponding side member, such connecting plates provided also with integrally formed and flexible flanges engaging through holes therefor in and flattened down against the insides of the corresponding side members; a strap or plate engaging across the inside and around the edge of each side member of the upper section near its lower end and each such last named plate or strap pivotally connected with the corresponding reinforcing and connecting plate on the lower section at a point within the side members by means of a rod or bolt extending through all of such side members and such reinforcing and connecting plates.

5. A combined step and extension ladder

comprising two members adapted to be pivotally connected and means for pivotally connecting them with the sides of the upper section engaging outside of, overlapping
5 and in substantial alinement with the sides of the lower section when in extended position, such pivotal connecting means comprising a reinforcing and connecting plate on each side of the lower section at its upper
10 end, each provided with a flange adapted to engage over the upper step of the lower section of the ladder and also with flanges adapted to engage, one around the front edge and the other around the rear edge of
15 the corresponding side member; a strap or plate engaging across the inside and around the edge of each side member of the upper

section near its lower end and each such last named plate or strap pivotally connected with the corresponding reinforcing
20 and connecting plate on the lower section at a point within the side members and a member carried by the upper section adapted to engage across the front edges of the sides
25 of the lower section and to cooperate with the pivotal connecting means to sustain the thrust on the ladder when the parts are in extended position and releasable means for holding the parts in extended position.

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Witnesses:

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