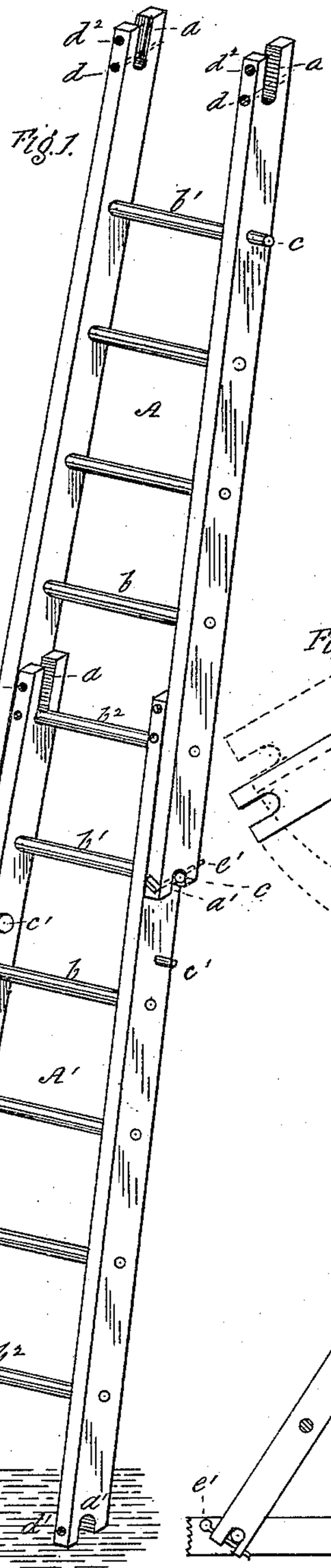
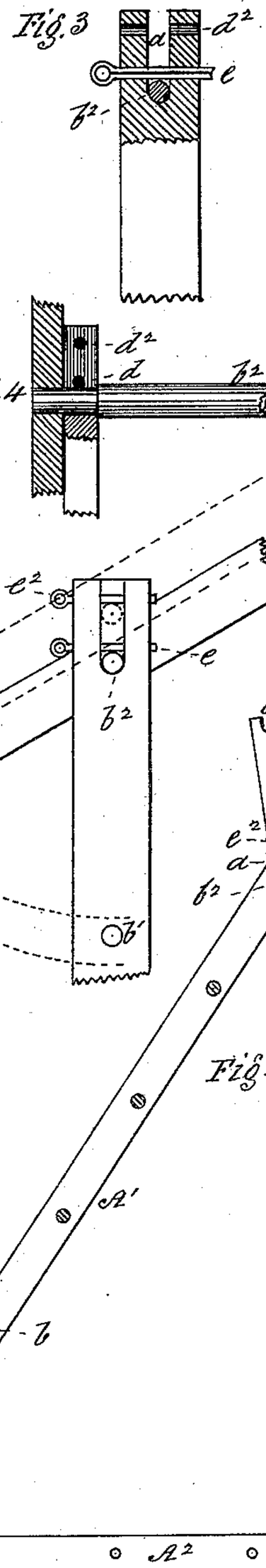
(No Model.)

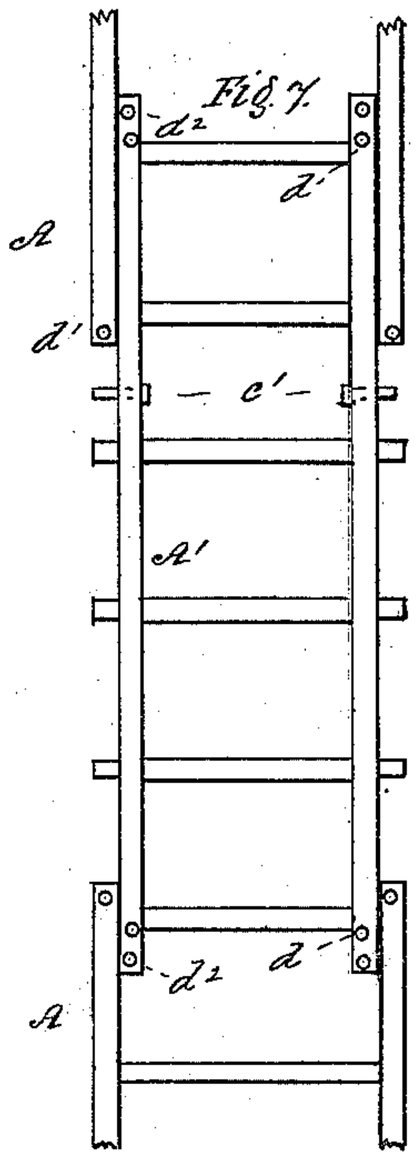
P. T. GATES.

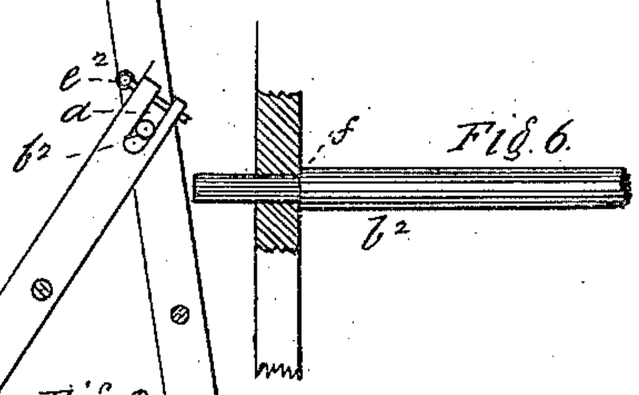
COMBINED EXTENSION AND STEP LADDER.

No. 317,987. Patented May 19, 1885.









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UNITED STATES PATENT OFFICE.

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COMBINED EXTENSION AND STEP LADDER.

SPECIFICATION forming part of Letters Patent No. 317,987, dated May 19, 1885.

Application filed February 19, 1885. (No model.)

To all whom it may concern:

Be it known that I, P. TENNEY GATES, of the city of New York, in the county and State of New York, have invented an Improved Combined Extension and Step Ladder; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in extension-ladders such as are adapted to be also used for step-ladders and for forming scaffolds or platforms, the object being to simplify the construction thereof and to render them capable of being very easily and quickly arranged or adjusted to be used for either of the above-mentioned purposes. More particularly, this invention is an improvement on Letters Patent Nos. 301,980 and 303,721, heretofore granted to me; and by means of my present improvement I dispense with the spring-clutches therein described and prevent longitudinal displacement by means of improved appliances, hereinafter particularly described.

In the accompanying drawings, Figure 1 represents a sectional or extension ladder with my improvement. Fig. 2 is a side elevation of the same arranged as a step-ladder. Figs. 3, 4, 5, 6 are detail views; and Fig. 7 is a modification of the form of the ladder provided with my improvement.

Similar letters of reference indicate the same parts in all the figures.

A A′ A² are separate sections or lengths of a ladder, having slots *a a′* at their upper and lower ends, respectively, to receive the rungs of adjoining sections. The rung *b′* of one section, which fits into the slot *a′* of the adjoining section, has projecting ends *c*, which enter said slots when the lengths are put together. This construction I do not claim as part of my present invention, except as hereinafter described.

My improvement consists in the means employed for connecting the several sections A A′ A² so as to prevent them being drawn apart lengthwise, and to permit them to be placed at any desired angle relatively with each other, so as to form either a continuous ladder, (each length of which may be set at any desired angle to those adjoining it,) or a step-ladder, or a scaffold or platform. For this purpose I provide perforations *d* at the upper end of each side piece of each section, adapted to receive pins *e*, and a similar perforation, *d′*, at the lower end of each side piece of each section, which receives a similar pin, *e′*. The said perforations are bored through the side pieces at right angles to the rungs. The pins *e*, when inserted into said perforations *d*, pass over the top of a rung, *b²*, when the latter is inserted into the slot *a*, thereby preventing the connected sections being drawn apart lengthwise, as indicated in Figs. 1, 2, and 7, and by this means spring-clutches and other complicated devices are dispensed with. The pins *e′*, when inserted into the perforations *d′*, pass underneath a rung, *b′*, of the lower section. At the upper end of each section are also provided perforations *d²*, similar to those above described, and placed at some distance above the perforations *d*, the purpose of which will be presently described.

Fig. 7 represents a modified form of ladder in which the side pieces of the several sections are parallel with each other, and one section, A′, is made narrower so as to fit within the sides of the adjoining wider sections A A, whereas the sections shown in Fig. 1 are made sloping. My improvement is applicable to both forms.

Fig. 2 represents the sections arranged as a step-ladder. In order to make this adjustment the pins *e* are removed from section A′ and a similar pin, *e²*, is inserted into each of the perforations *d²* in said section A′. This permits the section A to be raised slightly, so that its lower end will clear the projecting ends *c* of the rung *b′*, (see Fig. 5,) to permit said section A to be turned downward, as shown in Fig. 2, and still be retained or prevented from being drawn apart from the section A′. The lower ends of A′ and A may then be secured by means of the slots and pins to another section, A², laid horizontally to form a base and locked to the rungs of the latter. It will be seen that by means of the long slots *a*, in connection with the pins *d* and *d²*, the upper end of A′ can be firmly attached to A, as the round *b* of the latter is inclosed between the two pins *e* and *e²*, while the lower ends of A and A′ are secured to any two of the rounds of A² by means of the pins passed through said ends. A scaffold may also be readily formed by arranging the requisite number of sections at suitable angles to each other and locking them together by

means of the slots and pins in manner similar to that above described. This will readily be understood, and therefore I have not shown such arrangement in the drawings, and further description thereof is not deemed to be necessary.

For forming scaffolds and platforms the form of ladder shown in Fig. 7 is preferred, as, the sides being parallel, the parts can be more readily connected and locked upon any intervening rungs of each.

In the drawings I have shown the top rung of the lower section as the one having projecting ends *c* for the lower ends of the upper section, A, to rest upon; but the second or other rung may be thus formed, if preferred, by leaving off the projections on *b'*, or pins *c'* may be attached to the sides of the ladder to serve as such support.

The preferred form for the pins *e e' e²* is that of a "cotter," as indicated in Fig. 2; but a solid pin or bolt may be employed, if desired.

In Fig. 6 is shown the preferred form of rung, the ends of the same (which pass through the sides of the ladder) being slightly smaller in diameter than the main body thereof, so as to form a small shoulder, *f*, against which the inner surfaces of the sides of the ladder rest, and are thereby held at the proper gage or distance apart.

I do not hereby claim the mode of joining sections of a ladder by means of slots on the lower ends of one section resting upon the projecting ends of the rung of a lower section; nor do I hereby claim, broadly, a sectional ladder adapted to be arranged as a step-ladder or a scaffold; and I may here state that in an application for a sectional ladder now pending in the United States Patent Office I have shown pins passed through the sides of the ladder in manner somewhat similar to that above described, but in combination with other devices not herein shown or described; and I do not hereby claim any of the devices or combinations of devices claimed in said application.

I am aware of the Patent No. 257,411, which shows a slot in the body of one of the side pieces of one section, through which a pin is passed at right angles to the rungs while the extreme end of said section is pivoted to the other section by a fixed pin passing through the side pieces of the latter, and I do not use nor claim that construction, which is open to the objection that said slot materially weakens the section on which it is formed.

What I hereby claim as my invention is—

1. In a combined extension and step ladder, in combination with slots in the ends of the side rails of the sections of the ladder, one or more holes in the projections of the said slots, and pins, substantially as and for the purpose specified.

2. In a combined extension and step ladder, in combination with cylindrical bearings on the outside and inside of the side rails of the ladder, and with unbeveled or straight slots in the ends of the said side rails fitting upon said bearings, one or more pins passing through the projections forming each slot, substantially as and for the purpose specified.

3. In sectional ladder joints, the combination, with a projection fitting into a slot, of a pin located crosswise to the slot and touching the projection, said pin being adapted to be removable, substantially as and for the purpose specified.

P. TENNEY GATES.

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