

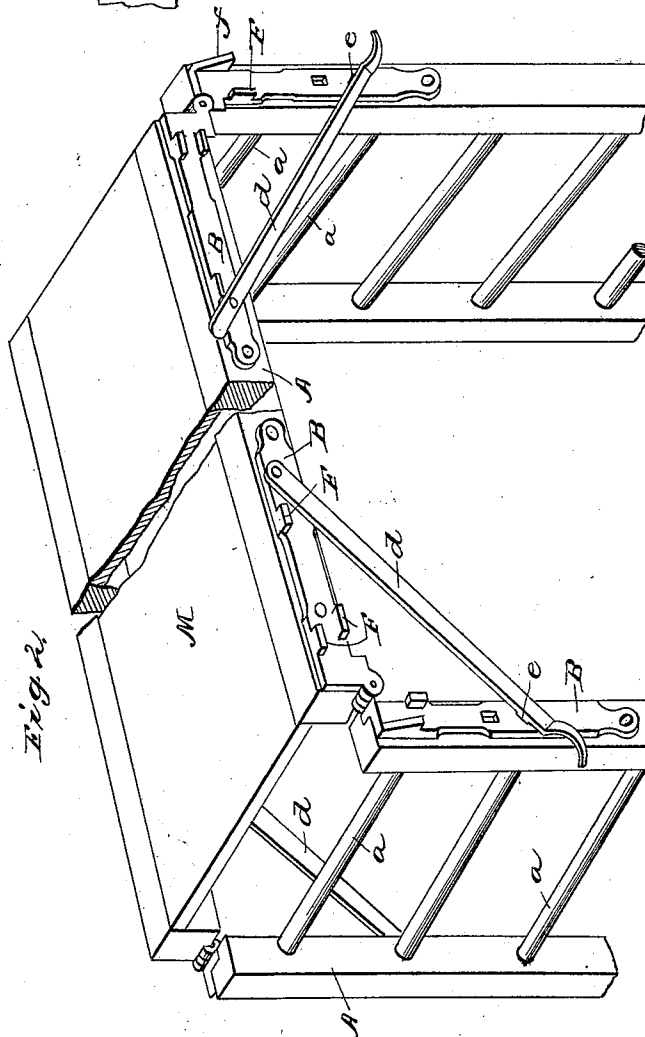
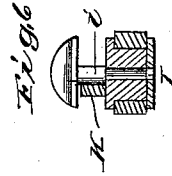
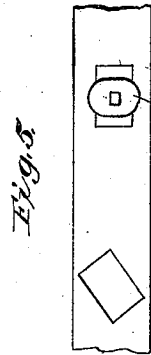
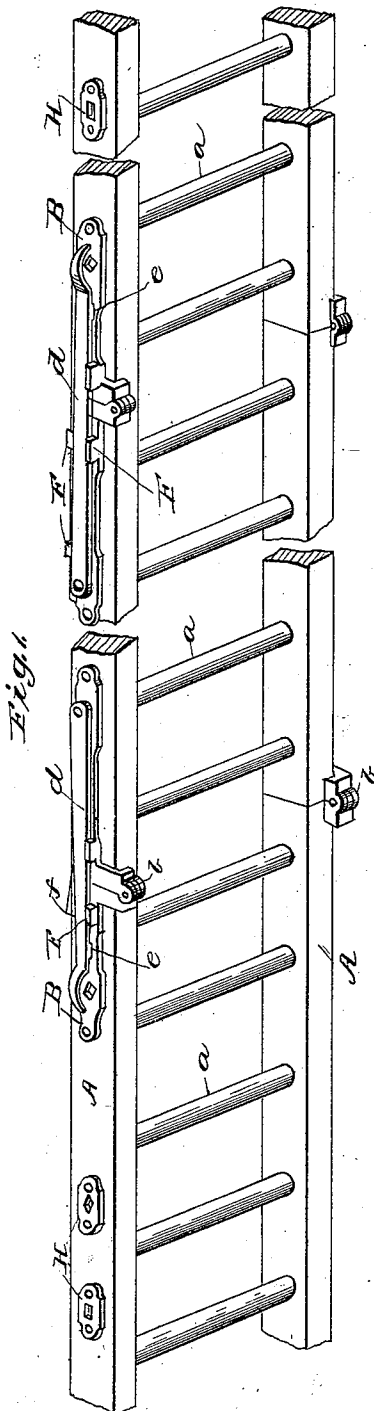
(No Model.)

2 Sheets—Sheet 1.

G. HALL.
FOLDING LADDER.

No. 513,012.

Patented Jan. 16, 1894.



Witnesses
J. M. Fowler Jr.
Thomas Durant

Inventor
George Hall
By *Church & Church*
his Attorneys

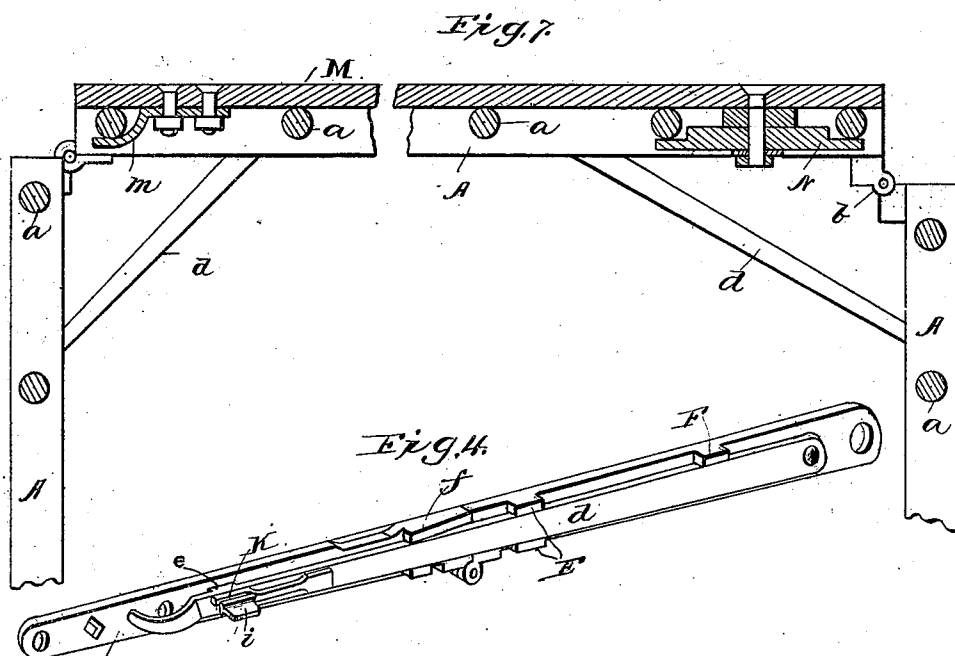
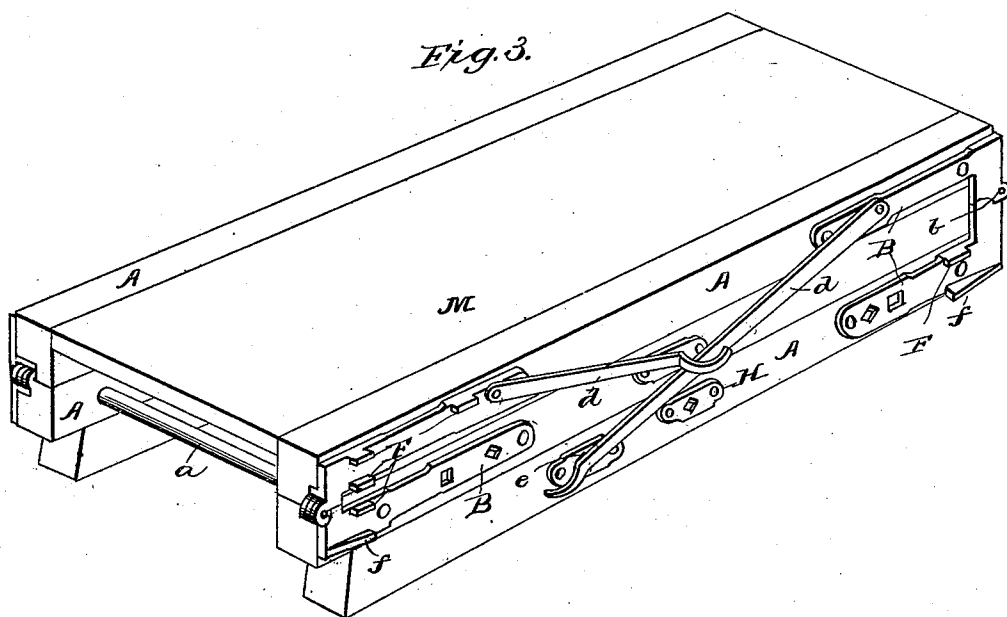
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

GEORGE HALL, OF NEW YORK, N. Y.

FOLDING LADDER.

SPECIFICATION forming part of Letters Patent No. 513,012, dated January 16, 1894.

Application filed May 10, 1893. Serial No. 473,702. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HALL, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Folding Ladders; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of his specification, and to the letters of reference marked thereon.

This invention relates to that class of ladders which are adapted to be folded within their length, either to reduce their bulk, or to form them into other useful devices, such as scaffolds, for instance, and the object of the invention is to provide a strong and efficient locking mechanism for the sections whereby they may be held in any desired position either extended, partially folded to form a scaffold or entirely folded to be stored away or transported.

The invention consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described and pointed out particularly in the appended claims.

Referring to the accompanying drawings: Figure 1 is a perspective view of the ladder extended. Fig. 2 is a similar view with the same folded to form a scaffold. Fig. 3 is a similar view with the sections folded up into the most compact form. Fig. 4 is a perspective view of one of the locks on an enlarged scale. Fig. 5 is a rear elevation of the metal parts showing the turn button. Fig. 6 is a detail section of the same. Fig. 7 is a section showing the platform.

Like letters of reference in the several figures indicate the same parts.

The ladder itself may, if desired, be formed in accordance with any ordinary plan, that is to say, with side pieces A and rounds or steps a secured therein in any approved manner. Instead, however, of forming the side pieces in long continuous lengths, I now divide them into sections, hinging the sections together by means of hinge joints, which will allow one section to fold over the other, as shown in Fig. 3.

Hinges may be employed of ordinary construction, but I prefer to employ hinge joints

connected with and forming part of metallic side pieces B, extended along the ladder on each side of the joint, and connected rigidly thereto by bolts passing away through to the inside. One of the hinges is formed so as to allow its end section to fold in close to the center section while the other is formed with angle arms b, which allow its end section to fold in over and parallel with the first end section. In addition to utilizing these metallic side pieces as the leaves for the hinges, they are utilized as members through the medium of which the sections may be rigidly locked in any adjusted position. For this purpose, relatively wide but thin arms d are pivotally connected at one end to one or the other of the leaves of each hinge and a lug or projection e preferably squared on the outer or free end of the arm, is adapted to enter one or the other of a series of recesses or sockets in the ladder in proper relative adjustment. Obviously, when the sections are adjusted at approximately right angles to each other, the movable arms will occupy a diagonal position, as shown in Fig. 2, and will constitute braces, and when the ladder is straightened out, as shown in Fig. 1, such movable arms will lie parallel with the side pieces and hold the same rigidly in place.

By making the movable arms relatively wide and thin they may be easily sprung outward so as to be disengaged from the recesses or sockets, and at the same time, will be sufficiently strong to withstand all the strains to which a ladder is likely to be subjected in ordinary usage, and in order that the side pieces may afford additional strength and security for the movable arms, lugs F F, are located on adjacent ends of the plates, in position to receive the arms between them when the ladder is straightened out. Thus, the said movable arms may be left between the lugs F F on the hinge section to which they are pivotally connected, and when the end sections of the ladder are straightened out, the arms will be automatically raised by the inclines f on the lugs F of the end sections, and will drop into position between the lugs, and with the projections in the appropriate sockets, thus holding the ladder rigidly in ex-

tended position and removing all tendency of the same to collapse when subjected to lateral strains.

To hold the ladder securely in folded position, additional or supplemental socket pieces H are secured at intermediate points on the end sections, with which pieces the projections on the arms are adapted to engage when brought to the position indicated in Fig. 3, when the ladder may be handled as a compact solid bundle.

For convenience, each of the movable pivoted arms is provided at the end with a hand or finger ring to facilitate the manipulation of the same, and if desired, turn-buttons or catches may be employed to hold the arms in engagement with the sockets, for instance, in Figs. 5 and 6, it will be seen that a turn button or locking device I, is located on the end of the projection on the arm, and a stem *i* passing through the projection and arm and terminating in a finger piece I' is adapted to be turned when the projection is in engagement with the socket piece, so as to prevent its disengagement, and if desired, a spring K may be employed to hold the locking device in one position or the other and also to constitute stops against which the squared portion of the spindle may abut to limit the movement of the locking device in each direction.

When the ladder is folded into the position shown in Fig. 2, so as to constitute a scaffolding, I prefer to employ a platform board M which resting on the rounds of the center section constitutes a secure footboard for a workman, and while a board simply rested on the rounds in the ordinary manner might answer all purposes, still, in the preferred construction, I provide such board with a hook projection *m* on the under side in position to co-operate with one of the rounds and at the opposite end provide a turn-button N which may be turned in beneath the rounds, at that end of the central section, thereby holding the board firmly in place and constituting in effect a rigid, portable scaffolding.

The whole device, it will be seen at a glance, is at once simple, cheap, compact and exceedingly strong, the parts of the ladder when extended, hardly showing that it is capable of being folded, because of the thin and compact construction of the locking and folding mechanisms. When extended, its strength will be found to be fully as great as that of other ladders having continuous side pieces, inasmuch as the wide movable arms are rigidly supported at each end and immediately adjacent the joint on each side; hence, they cannot spring, even should the strain be sufficient to bend the metal of the arms when dependent entirely upon its own inherent strength.

I claim—

1. In a ladder, the combination with the independent sections hinged together, of the relatively wide and thin arms pivotally con-

nected to the side pieces of one section having engaging projections at their free ends, of a series of sockets on the adjacent section for the reception of the projections on the arms, whereby the sections may be held in extended or folded position; substantially as described.

2. In a ladder, the combination with the independent sections hinged together, of the arms pivotally connected to the side pieces of one section, sockets and cooperating projections on the adjacent section and end of the arms for holding the sections in proper relative adjustment, and lugs or projections on the sides of the ladder sections adjacent the ends for holding the arms against transverse movement, substantially as described.

3. In a ladder, the combination with the independent sections hinged together and the plates secured to adjacent ends of said sections, of the arm pivoted to one of said plates on each side and bridging the joint between the sections and the lugs on said plates between which the arms are adapted to fit to hold the sections rigidly in extended position; substantially as described.

4. In a ladder, the combination with the independent sections hinged together and the plates secured to adjacent ends of said sections, one of said plates on each side having sockets therein, of the arms carrying projections at their free ends for cooperation with the sockets, pivoted to one of said plates on each side and the lugs on the plates between which the arms are adapted to fit to hold the sections rigidly in extended position; substantially as described.

5. In a ladder, the combination with the independent sections, the hinges uniting said sections and having plates secured to the sides of adjacent ends of the sections, of the pivoted spring arms secured to one of said plates on each side and bridging the joint between the sections with cooperating sockets for the free end of the arms on the other plates for holding the sections rigidly in extended position; substantially as described.

6. In a ladder, the combination with the independent sections, the hinges uniting said sections, of the plates secured to the sides of adjacent ends of the sections, one on each side having sockets therein, the relatively wide and thin spring arms having projections on their free ends and pivoted respectively to one of said plates on each side and projecting across the joint in position to enter the sockets in the cooperating plate; substantially as described.

7. In a ladder, the combination with the sections hinged together and the plates secured to adjacent ends of said sections one of said plates having sockets formed therein, of the relatively wide thin spring arms pivotally connected to one of said plates on each side and having projections for cooperation with the sockets in the adjacent plate and the supplemental socket pieces secured to the

sides of the ladder for the reception of the projections on the arms when the ladder is folded; substantially as described.

5 8. In a folding ladder, the combination with the two sections hinged together, one of said sections having a socket plate secured thereto, of the relatively wide and thin spring arms secured to the adjacent section with a projection thereon for entering said socket, a

catch on said projection and an operating spindle extending out through the spring arm for manipulating the catch, whereby the projection may be locked within the socket; substantially as described.

GEORGE HALL.

Witnesses:

J. B. CONKLING,
EDWIN C. GEE.