

G. H. Ellis,

Ladder.

No. 112,697.

Patented Mar. 14, 1871.

Fig. 1.

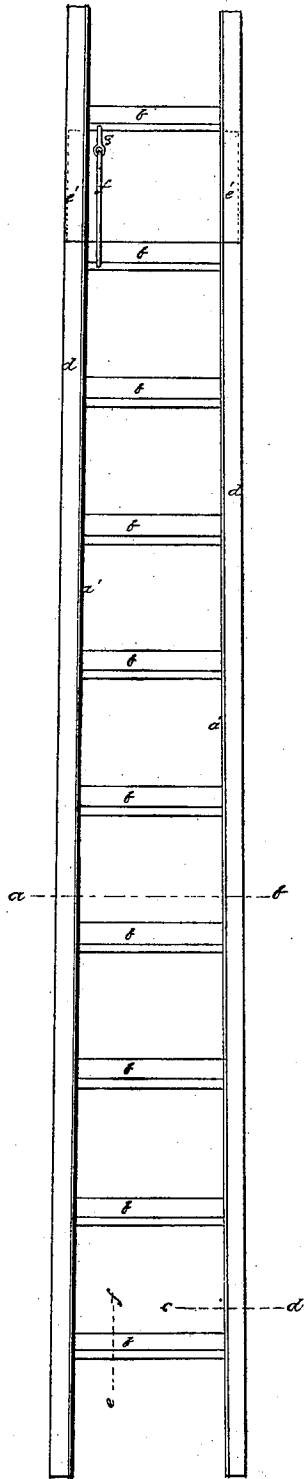


Fig. 2.

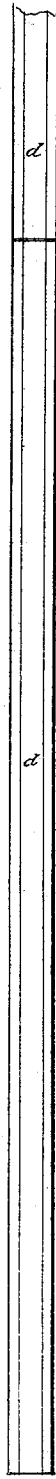


Fig. 3.

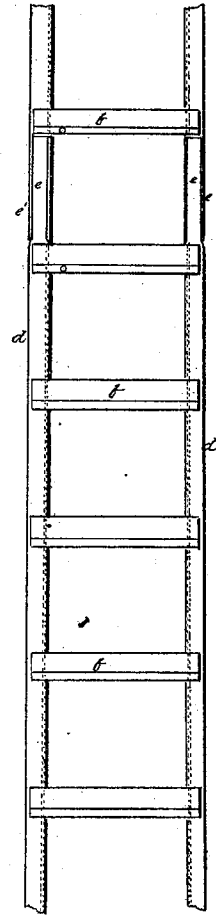
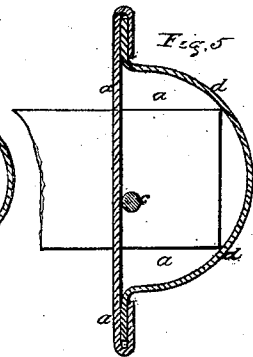
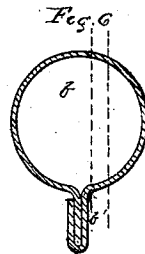
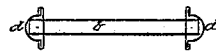


Fig. 4.



Witnesses.

J. P. ...

George Henry Ellis.

# United States Patent Office.

GEORGE HENRY ELLIS, OF LONDON, ENGLAND, ASSIGNOR TO AUGUSTUS SALEM DIMSDATE AND EDWARD BOVINE LOVELL, OF SAME PLACE.

Letters Patent No. 112,697, dated March 14, 1871.

## IMPROVEMENT IN LADDERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all to whom these presents shall come:

Be it known that I, GEORGE HENRY ELLIS, of the city of London, in the county of Middlesex, England, engineer, have invented certain "Improvements in Ladders;" and that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known, and of the usual manner of making, modifying, and using the same.

To make my invention easily understood, I will proceed to describe the same by reference to the accompanying drawing, in which—

Figure 1 is a front elevation of a length of ladder constructed according to my invention, with part of another length jointed thereto;

Figure 2, side elevation of same;

Figure 3, part sectional elevation;

Figure 4, a cross-section on line *a b* of fig. 1;

Figure 5, a cross-section of pillar on line *c d* of fig. 1; and

Figure 6, section of a round or step on line *e f* of fig. 1.

Figs. 1, 2, 3, and 4 are drawn to a scale of one inch and a half to the foot, and figs. 5 and 6 full size.

Similar letters are used in all the figures to represent similar parts.

I prefer to make these ladders in lengths of about seven feet, and proceed in the following manner:

I form the sides *a' a'*, of the pillars *a*, of pieces of plain or galvanized sheet-iron, steel, zinc, or other suitable metal, by preference of plain sheet-iron.

In the sides *a' a'* are made, in any suitable manner, holes of the proper shape for receiving the ends of the rounds or steps *b b b b*.

The rounds are made circular, with a web or flange, *b'*, at the bottom, out of one piece of metal, as shown in section at fig. 6, the ends being made slightly tapering, if desired.

Near the ends of each round a hole is made for the purpose hereinafter described.

The ends of the rounds are driven into the holes made in the sides *a' a'* of the pillars; and a rod, *c*, fig. 5, (shown also in dotted lines, figs. 3 and 6,) is then passed through the said holes in the ends of the

rounds, from top to bottom, which are thus securely fixed to the sides *a' a'* of the pillars and prevented from turning.

The semicircular parts *d d* of the pillars are now applied, the edges of the sides *a' a'* being turned, bent, or lapped over the flanges of the semicircular pieces *d d*, as shown in fig. 5.

The junction of the different lengths of ladder is effected by male and female sockets, so that the ends of each length will fit into or over the ends of the next lengths, as shown in fig. 3, in which the upper ends *e* of the pillars are shown made smaller, so as to fit into the lower ends *e'* of the next length.

If required, the ends of each length are provided with suitable hoops or collars, to give additional strength and security to the joints.

The slide joints are stopped by and supported upon the ends of the top rounds of each length, as shown.

The lengths of ladder being made of plain sheet-iron may be afterward galvanized, by which means any interstices at the joints will be thoroughly closed or soldered.

For securing the lengths firmly together, I employ a hook, *f*, fig. 1, suspended to the link or S-piece *g*, fixed to the bottom round of each length.

The hook *f* takes into a hole in the top round of the length below, thus firmly securing the two lengths together; or a small slide-bolt, pin, or other contrivance may be employed for securing the lengths together.

Having now described my invention,

What I claim is—

A sheet-metal ladder formed of the hollow pillars *a a*, connected in lengths, in combination with the hollow rounds *b b* and the rods *c c*, constructed substantially as herein described.

In testimony whereof I, the said GEORGE HENRY ELLIS, have hereto set my hand and affixed my seal this first day of April, one thousand eight hundred and seventy.

GEORGE HENRY ELLIS. [L. s.]

Witnesses:

J. H. COLSON,

G. F. REDFERN.