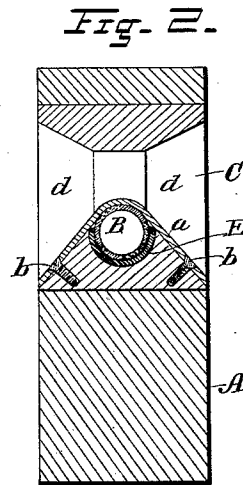
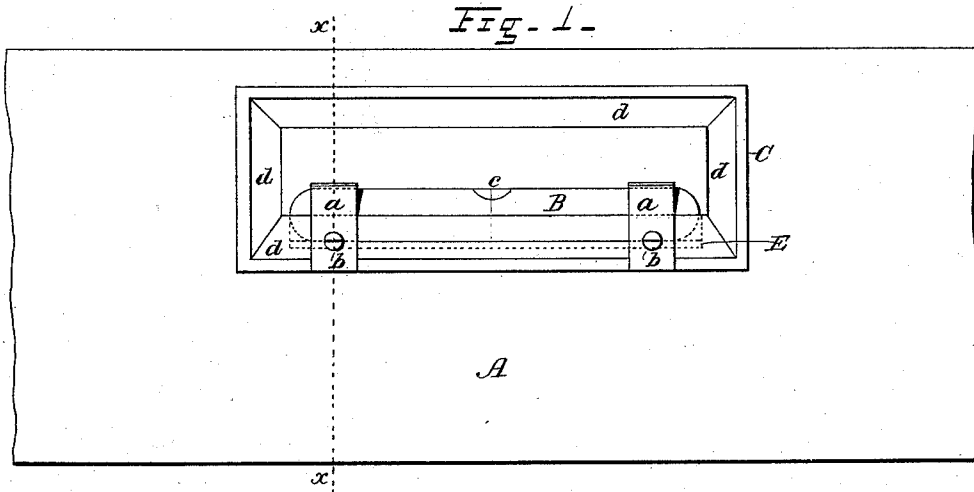


(No Model.)

E. LEWIS & F. ARMSTRONG.  
SPIRIT LEVEL.

No. 401,843.

Patented Apr. 23, 1889.



Witnesses.

*H. Q. Crosby.*  
*J. W. Blair.*

Inventors  
*E. Lewis and*  
*F. Armstrong*

By their Attorney *Wm. L. Patton*

# UNITED STATES PATENT OFFICE.

EVAN LEWIS AND FREDERICK ARMSTRONG, OF KINGSTON, PENNSYLVANIA.

## SPIRIT-LEVEL.

SPECIFICATION forming part of Letters Patent No. 401,843, dated April 23, 1889.

Application filed January 9, 1889. Serial No. 295,897. (No model.)

*To all whom it may concern:*

Be it known that we, EVAN LEWIS and FREDERICK ARMSTRONG, both citizens of the United States, residing at Kingston, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Spirit-Levels; and we do declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to an improvement in spirit-levels, and more particularly to means for securing the spirit-tube in place on the stock of the level.

Heretofore it has been usual to embed the glass spirit-tube in a mixture of plaster-of-paris and water, the plaster being thus rendered semi-fluid. This plastic composition becoming hard by the ultimate evaporation of the water secures the tube rigidly in place. It requires dexterity only acquired by practical experience to properly "set" a spirit-tube in the wooden level-stock, as it must be given a very accurate adjustment with regard to its air-bubble so as to locate the latter directly at the center of length of the tube when the stock is in a true horizontal plane. The embedding of a spirit-tube in plaster-of-paris, as just stated, is also objectionable, from the fact that the tube is liable to be fractured from percussion, as the contact of the tube with the plaster and the latter-named with the level-stock is inelastic. Consequently accidental shocks sustained by the instrument in use—such as falling from an elevation—will be liable to crack the spirit-tube and render the level useless until a new tube is substituted for the broken one.

The primary object of our present invention is to provide a convenient device for holding the spirit-tube in place on a level-stock, which, from its manner of construction, will facilitate the embedding accurately of said tube, while a sufficient degree of elasticity is afforded to obviate fracture of the same from shock or percussion of the stock.

A further object is to furnish a cheap and reliable attachment for a spirit-level and plumb, which will enable an ordinary mechanic to set a new spirit-tube in a level-stock without the use of plaster-of-paris or similar plastic material that sets and becomes rigid and inelastic.

With these objects in view our invention consists in certain features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 is a side view of a portion of a level-stock having our improvement mounted thereon. Fig. 2 is a cross-section of Fig. 1 on the line *x x*.

A is the level-stock, which is preferably constructed of hard wood that is not liable to absorb any considerable amount of moisture when exposed to the elements. This stock should be of sufficient length to subserve its use. The stock is rectangular, having parallel sides. At about the center of length of the level-stock a rectangular metallic frame, C, is embedded in a suitably-shaped mortise formed in the stock. It is important that the top and bottom walls of the mortise just mentioned should be parallel with the corresponding sides of the level-stock, and also that the frame C should be tightly fitted into the mortise, so that it will be held in place by its frictional contact with the walls of this rectangular slot. As will be seen, the frame C has a rectangular opening formed sidewise through it, thus producing two side and two end walls, *d*, that are respectively parallel. All of the walls *d* of frame C are beveled or cut to slope inward from near their outer edges, thus reducing the width of the frame to about the diameter of the spirit-tube B, which will expose this tube on its upper portion more completely, and thus permit the air-bubble in it to be viewed plainly from either side of the frame.

The spirit-tube B is of such relative length that it may be seated in a longitudinal groove formed in the frame C, which groove is semi-circular in cross-section, and of enlarged diameter as compared to that of the spirit-tube, so that a slightly-elastic bedding material, E,

may be interposed between the metal surface of the groove in the frame C and the body of the glass spirit-tube B.

The bedding-piece E may be made of any proper material—such as vulcanized gum sheeting, leather, or cloth—and is of such thickness and stability that it will afford a firm support to the tube B, and yet be sufficiently elastic to neutralize any shock sustained by the wooden stock A, and prevent fracture of the tube B.

The spirit-tube is held in place by two sheet-metal straps or bands, *a*, which are placed over its body near each end, the downwardly-extended ends of said bands being secured by screws *b*, as shown in the figures.

It is necessary that the body of the tube B be made of equal diameter throughout its length, and that the bottom of the groove in the frame C be parallel with the lower side of said frame, so that if the bedding material is of even thickness it will support the tube in its position, when clamped by the bands *a*, approximately level, or in a plane parallel to the top and bottom sides of the level-stock A.

Should there be a slight adjustment required to bring the air-bubble *c* in the center of length of the tube B, when the stock A is located in a horizontal plane, this can be easily effected by introducing one or more liners of writing-paper under the low end of the tube, which can be secured to the frame by adjustment of the bands *a*, as previously described.

The provision of the bands *a* and slightly-elastic bedding E are important features of our present invention, as is also the removable continuous bevel-edged frame C, as by

their use a spirit-tube can be seated and properly secured upon a level-stock without the use of plaster-of-paris or other material which becomes rigid when it sets, and thus renders the spirit-tube liable to breakage from shocks sustained by the level-stock A.

It is apparent that a precisely-similar frame, spirit-tube, and means of securing the tube in this frame may be set in the level-stock near one end of the same in a transverse position, and thus afford means of indicating a vertical position of the level-stock or deviations therefrom.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a level-stock, of a rectangular frame having a rectangular hole formed in it through its sides that are beveled toward the inner edges of the frame, a spirit-tube located in a longitudinal groove of the frame, and two straps that bear on the body of the spirit-tube and are secured near their ends to the frame, substantially as set forth.

2. The combination, with a level-stock and a rectangular frame which is embedded in the stock and having a rectangular hole with beveled sides and a longitudinal groove formed in it, of a spirit-tube, a slightly-yielding bedding-piece, two bands, and screws to secure the bands in place, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

EVAN LEWIS.

FREDERICK ARMSTRONG.

Witnesses:

JAS. A. ARMSTRONG,

ALEX. J. RINGSTROM.