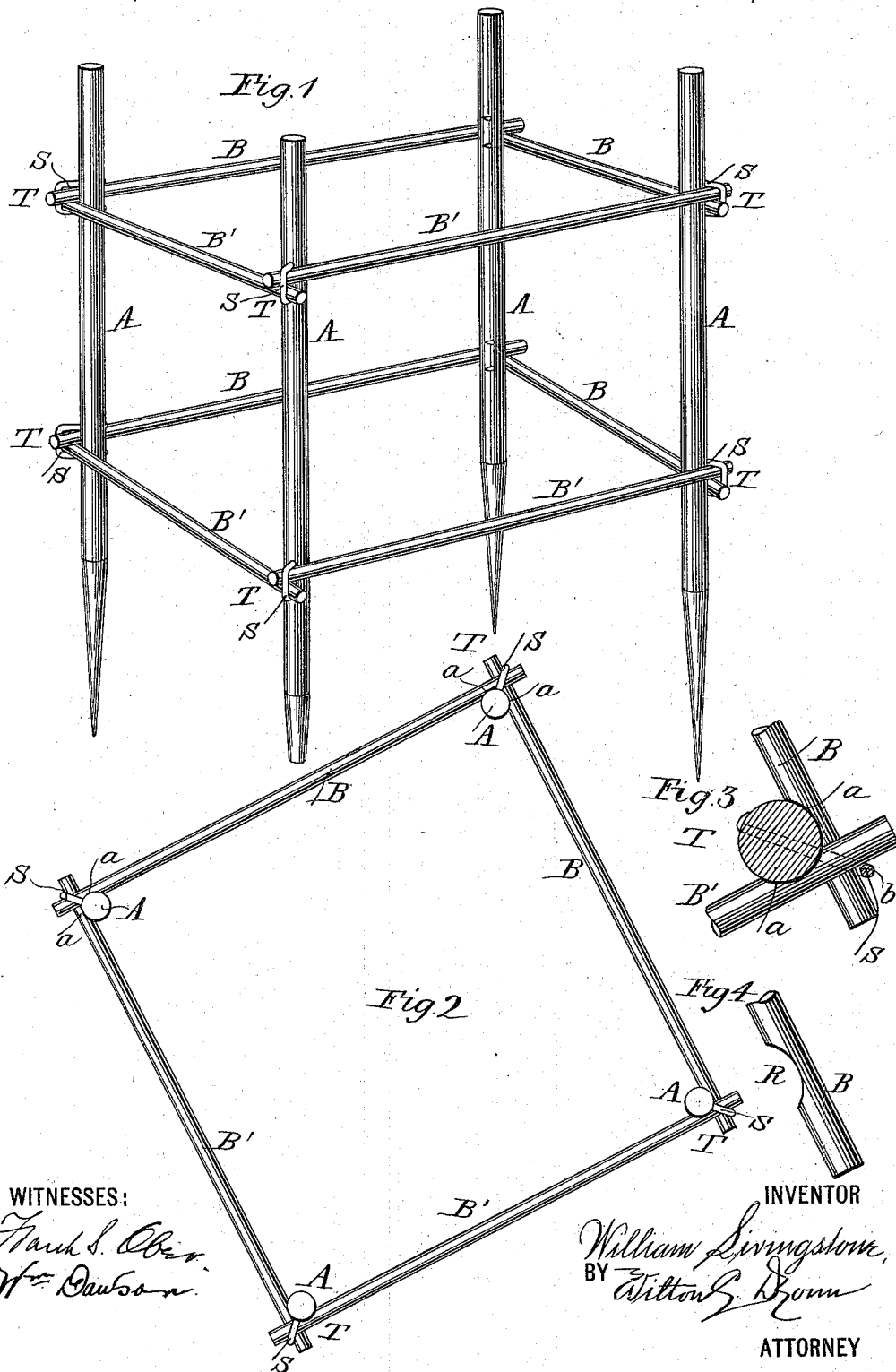


(No Model.)

W. LIVINGSTONE.
TIE JOINT.

No. 530,281.

Patented Dec. 4, 1894.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM LIVINGSTONE, OF FLUSHING, NEW YORK.

TIE-JOINT.

SPECIFICATION forming part of Letters Patent No. 530,281, dated December 4, 1894.

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To all whom it may concern:

Be it known that I, WILLIAM LIVINGSTONE, a citizen of the United States, residing at Flushing, in the county of Queens and State of New York, have invented certain new and useful Improvements in Tie-Joints; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a tie-joint for the upright and horizontal members of frames, and for binding together parts, sides or sections made up of the said members to form structures which shall be capacitated to hold themselves together, thereby dispensing with the usual permanent extraneous fastenings and adapting the structures to be taken apart or to pieces, or leveled and the members which make up the frames separated for packing, storage, transportation, &c.

The object of the invention is to provide a tie-joint for frames, structures, &c., in which the elements constituting the joint shall be contained in or form part of the members or pieces that make up the frames and which are adapted to be put together without fitting and secured without extraneous devices.

In the accompanying drawings:—Figure 1 represents in perspective a frame composed of upright and horizontal members or pieces connected together by means of my improved tie-joint and forming a rectangular frame. Fig. 2 is a plan of the frame; Fig. 3, an enlarged detail view of the tie-joint; Fig. 4, an enlarged view of an end of one of the horizontal members showing a notch which forms an element in the tie-joint.

Referring to the drawings, A designates the uprights of the frame work, which may be round in cross-section as shown, or square or of other polygonal figure if preferred or desired.

B B' designate members whose ends are conjoined and tied together and to an upright A. The upright members have staples S inserted in them in line with each course or set of horizontal members which compose the sides, parts or sections of the frame. These staples may be on the exterior surface of the uprights, but in some cases they may be placed inside. As shown in the drawings they are

placed outside whereby the tie-joints are formed on the exterior of the corners of the frame, whereas by placing the staples in an opposite position, that is, projecting inwardly, the tie-joints will fall on the inside of the frame-work. Each of these modes of placing the tie-joint is specially adapted to certain kinds of frames, and one or the other will be used as circumstances and the particular article to be made shall require.

To make the tie-joint T the members B B' are placed horizontally outside (or inside if the staples are so placed) of the uprights A, which form the corners of the frame-work, and the adjoining ends of the said members are passed through the staples one above the other and crossing each other at an angle corresponding to the angle of the sides of the frame to each other. When the adjoining ends of the horizontal members are all passed through the staples of the corner uprights as shown in Fig. 1 each of the said members has two bearing points, viz., against the periphery or adjacent tangential point *a* of the upright, and the inner or keeper side *b* of the staple. Thus as the ends of the members B B' cross each other in the staple, the keeper side *b* is held in the angle between the two ends while the upright is held in the inside angle formed by the two members and a tie-joint is formed between each of the horizontal members and the uprights at the corners. When all the corners are thus formed and two or more lines of horizontal members are connected with the uprights a frame is formed or erected which is strong and self-fastening. The members B B' bear against the points *a b* with sufficient force to give firmness and stability to the joint and thereby to make the frame when completed stiff and rigid.

The application of this invention to the making of articles is illustrated by Fig. 1, the corner uprights being designated by the letters A A A A, and the horizontal members by the letters B B', B B' for each course or line, and the staples by the letters S. As there are two lines of horizontal members two tie-joints T T are formed at each corner or eight in all, and the rectangular frame-work thus formed is a firm, rigid and self-supporting structure. The sides of the frame-work may be tapered if required by making the

horizontal members of the upper or lower planes longer or shorter. By properly adjusting the length of the staples S with respect to the periphery of the uprights, that is, by making the distance from the center of the upright to the inside of the keeper side b of the staple a little less than the distance from the same point to the tangential point a a slight pressure will be required to pass the ends of the members $B B'$ through the staples and the additional friction thus produced and the elasticity of the members will make the joints stronger and the frame more rigid and inflexible. A still firmer and stronger joint can be made by a provision of making the ends of the horizontal pieces $B B'$ at the points of contact with the upright recessed as at R , either circular if the uprights are round, or square if that is the form of the uprights. By this an absolute correctness of making the frame always the same will be attained, and the stiffness and rigidity of the same will be increased by reducing the lateral strain of tearing the horizontal pieces out of their bearing in the staples.

In the case of all the tie-joints shown in Fig. 2, this recess is formed in the pieces $B B'$ as the preferred, though not necessarily the invariable, form. Where used it is obvious that the pieces $B B'$ cannot slip lengthwise and thereby break the joint.

I claim—

1. A tie-joint for frames consisting of an upright provided with a staple projecting radially or diagonally therefrom, and horizontal members having their adjoining ends passed

through the staples from opposite sides of the upright and crossing each other between the staple and upright and bearing against tangential parts of the uprights and the keeper side of the staple, thereby forming angles between which the staples and uprights are held, substantially as specified.

2. A tie-joint for frames consisting of an upright provided with a staple projecting radially or diagonally therefrom, and horizontal pieces having their adjoining ends, which are provided with recesses, passed through the staples at right angles to each other from opposite sides of the upright, and with the recesses embracing the upright, thereby forming angles between which the staples and uprights are held, substantially as specified.

3. A structure composed of corner uprights provided with radially or diagonally projecting staples and horizontal members having adjoining ends passed through the staples in the uprights from opposite sides of the upright and bearing against tangential points of the uprights and the keeper sides of the staples, whereby the staples and uprights of each corner of the structure are held between the horizontal members and the several uprights are bound together by the horizontal members, substantially as specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

WILLIAM LIVINGSTONE.

Witnesses:

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FREDK. HAYNES.