

No. 646,435.

Patented Apr. 3. 1900.

H. R. LAMB & V. HOXIE.
DIE FOR JOINING INTERSECTING WIRES.

(Application filed Aug. 25, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

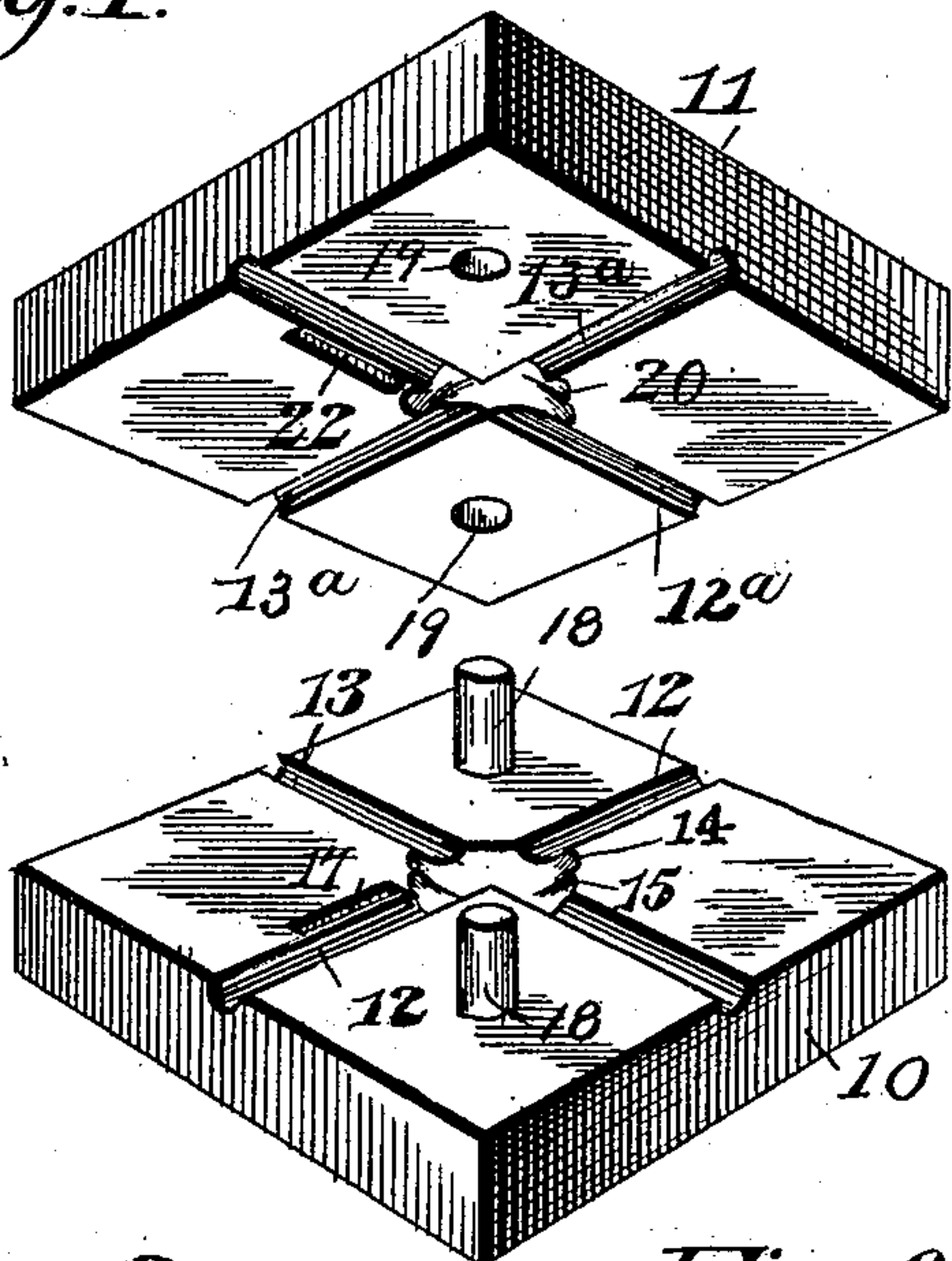


Fig. 2.

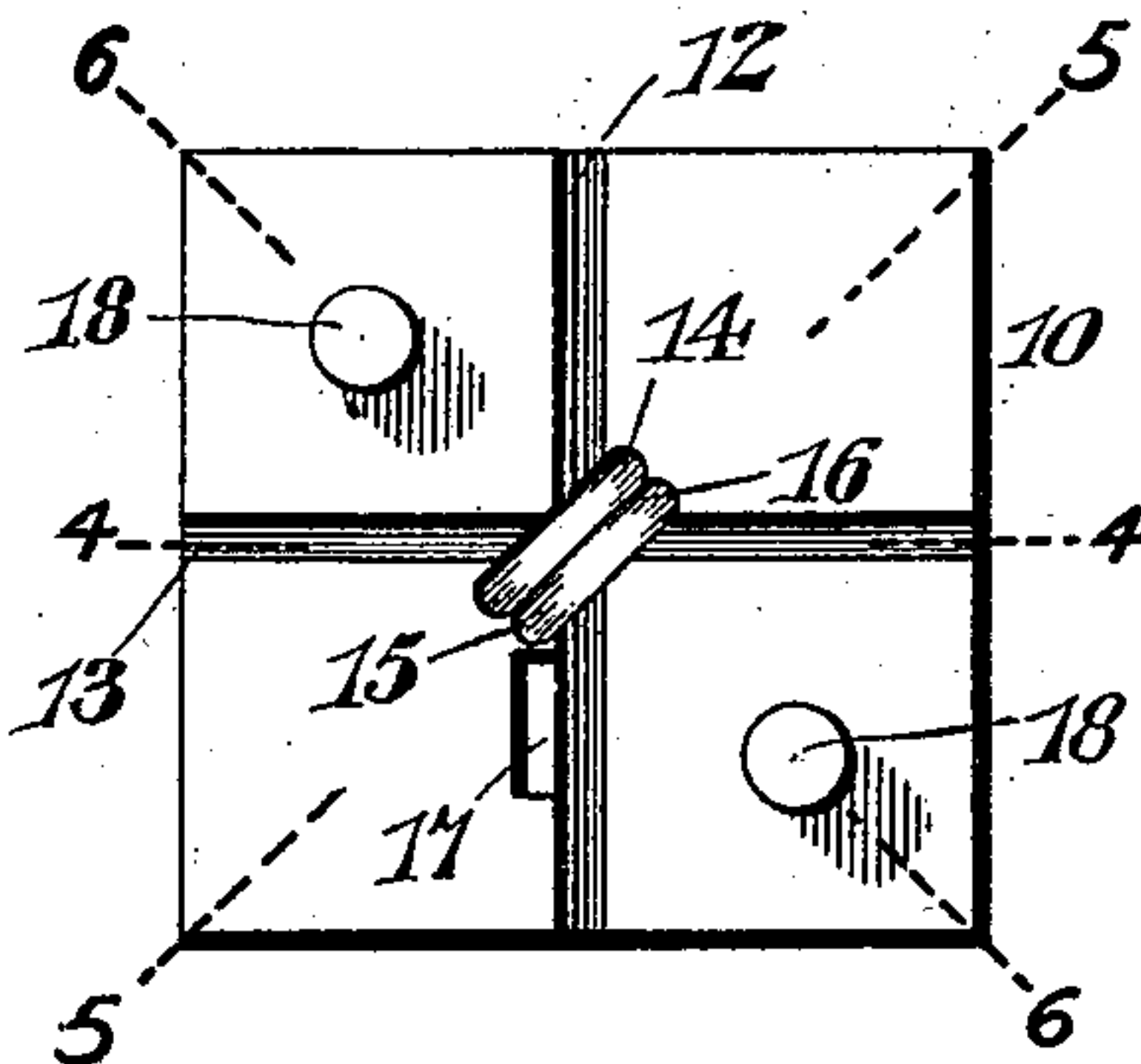


Fig. 3.

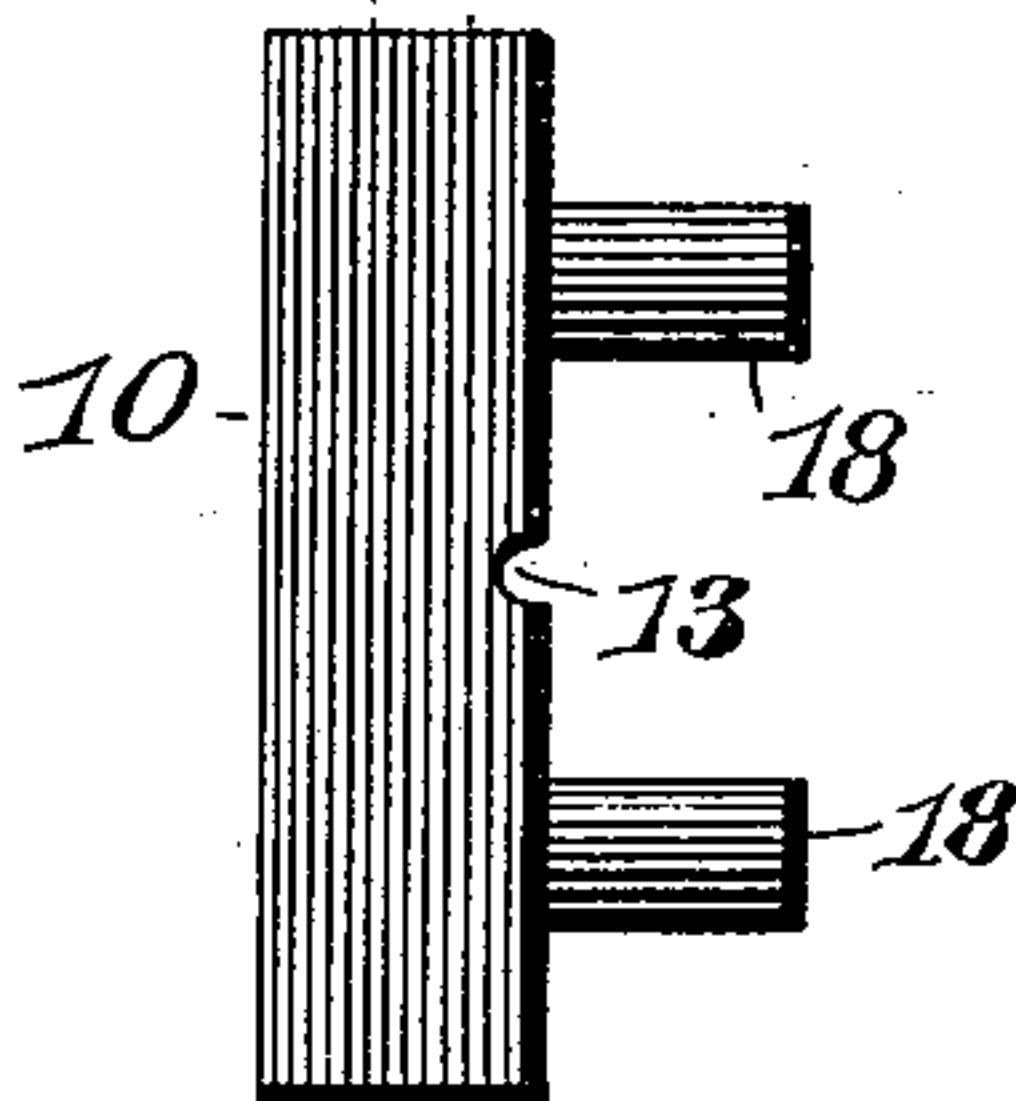


Fig. 8.

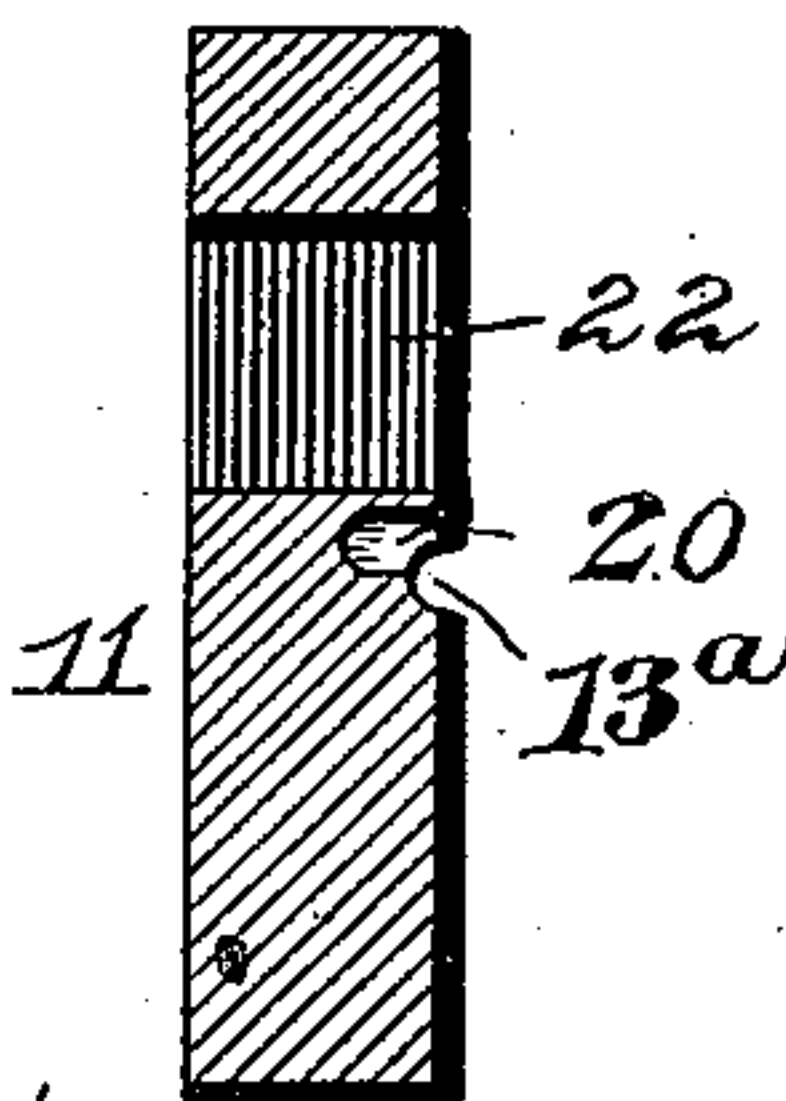


Fig. 4.

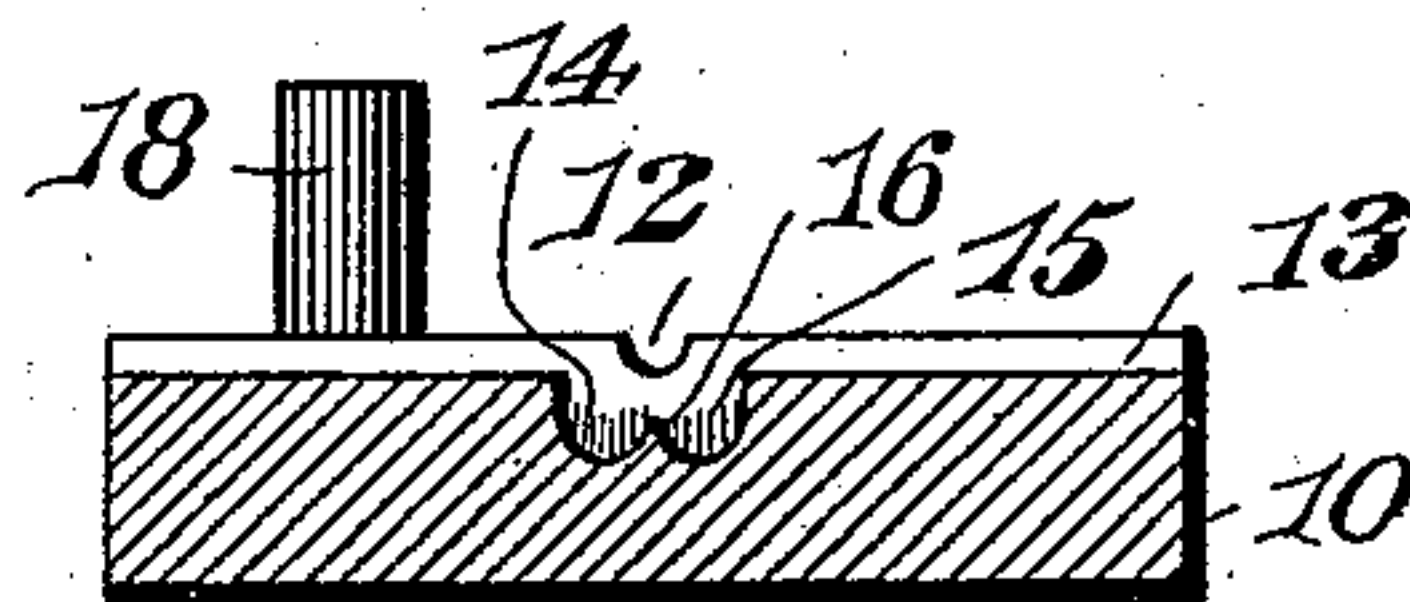


Fig. 5.

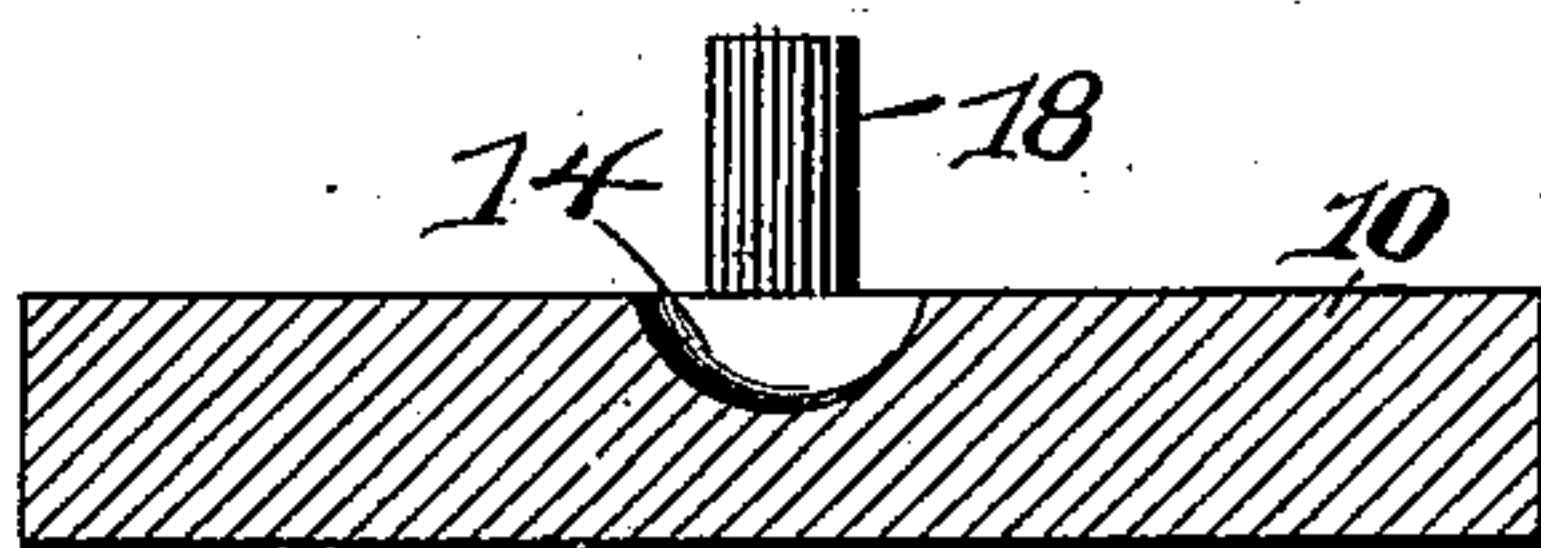


Fig. 6.

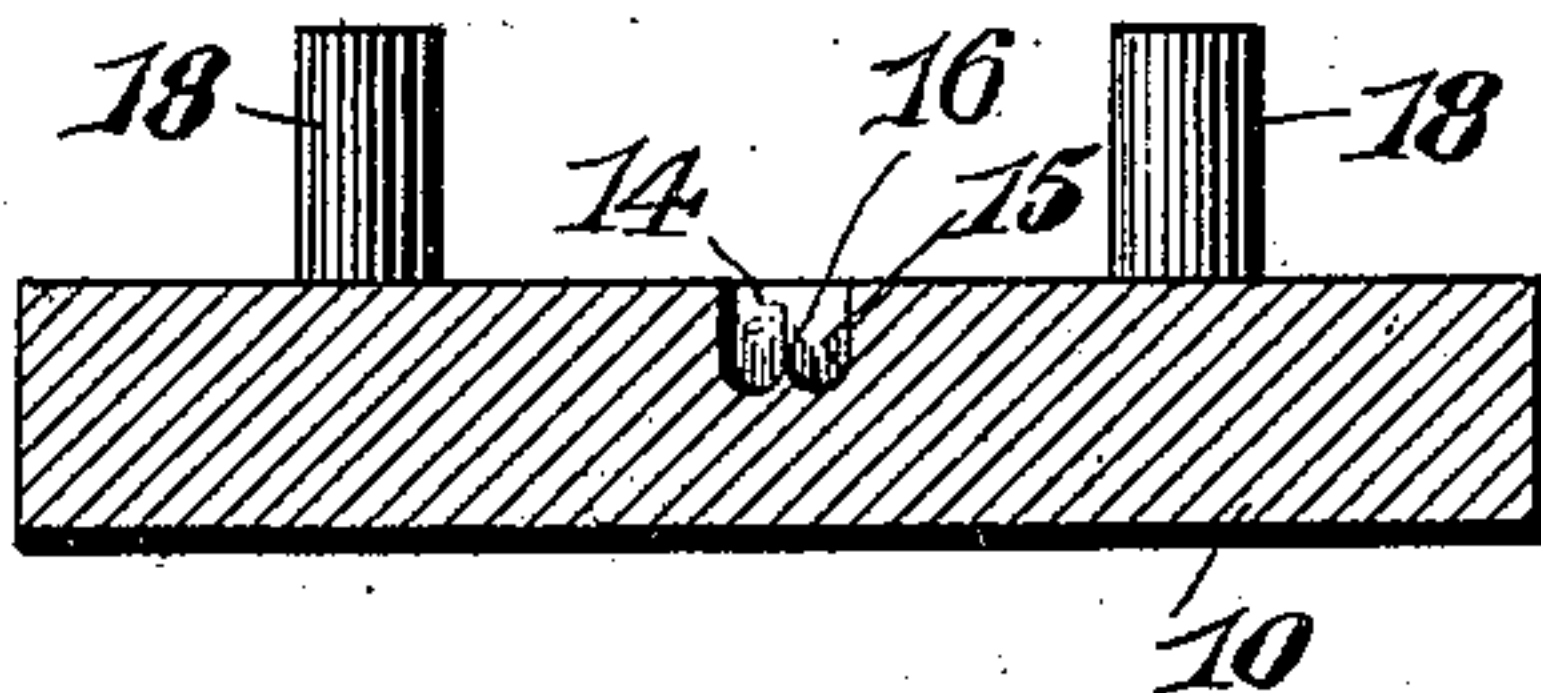
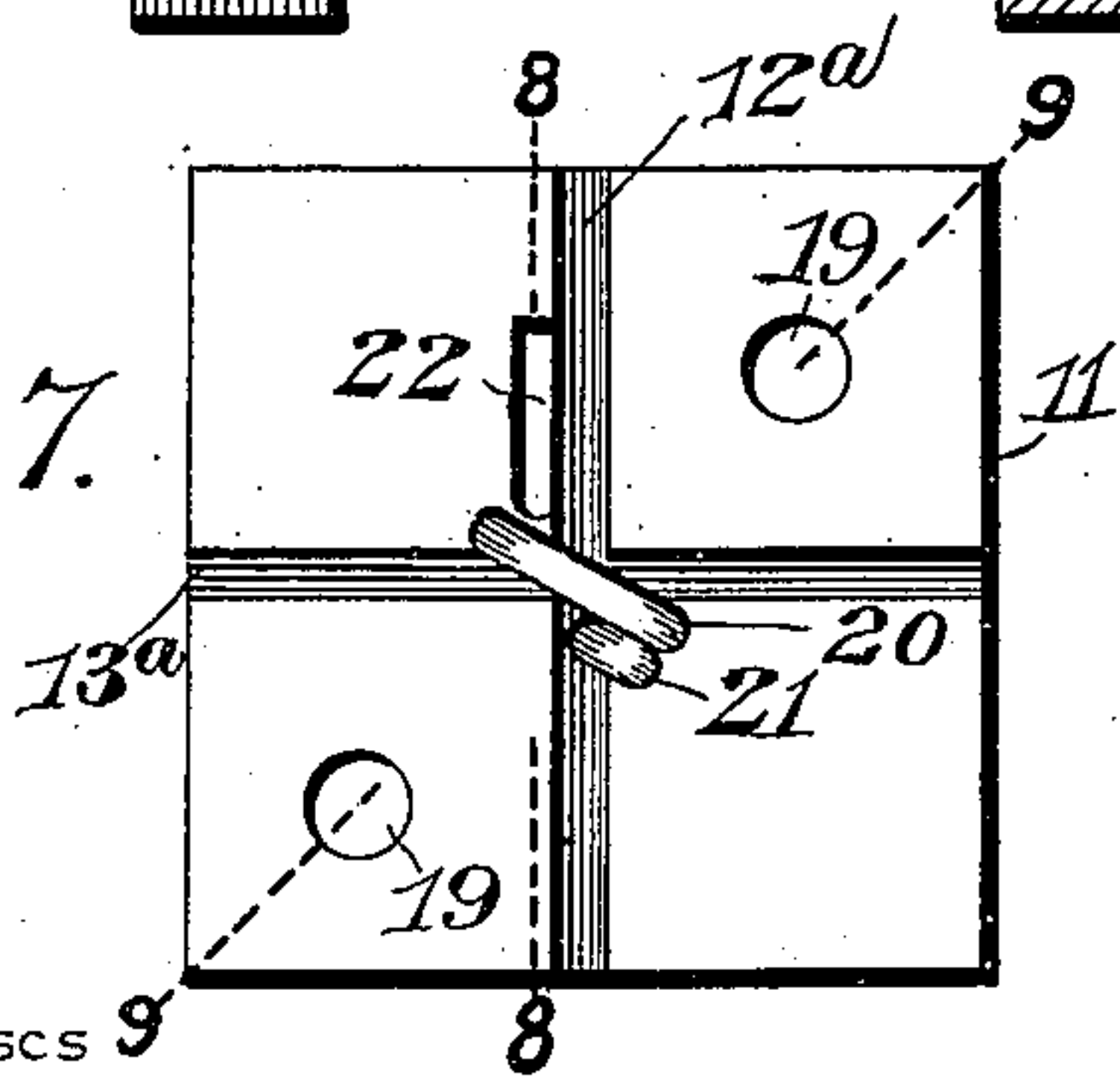


Fig. 7.



Witnesses 9

8

Jas. K. McClathran
Chas. S. Hoyer.

Hiram R. Lamb Inventors
By their Attorneys, Vernon Hoxie

C. A. Snow & Co.

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2 Sheets—Sheet 2.

Fig. 9.

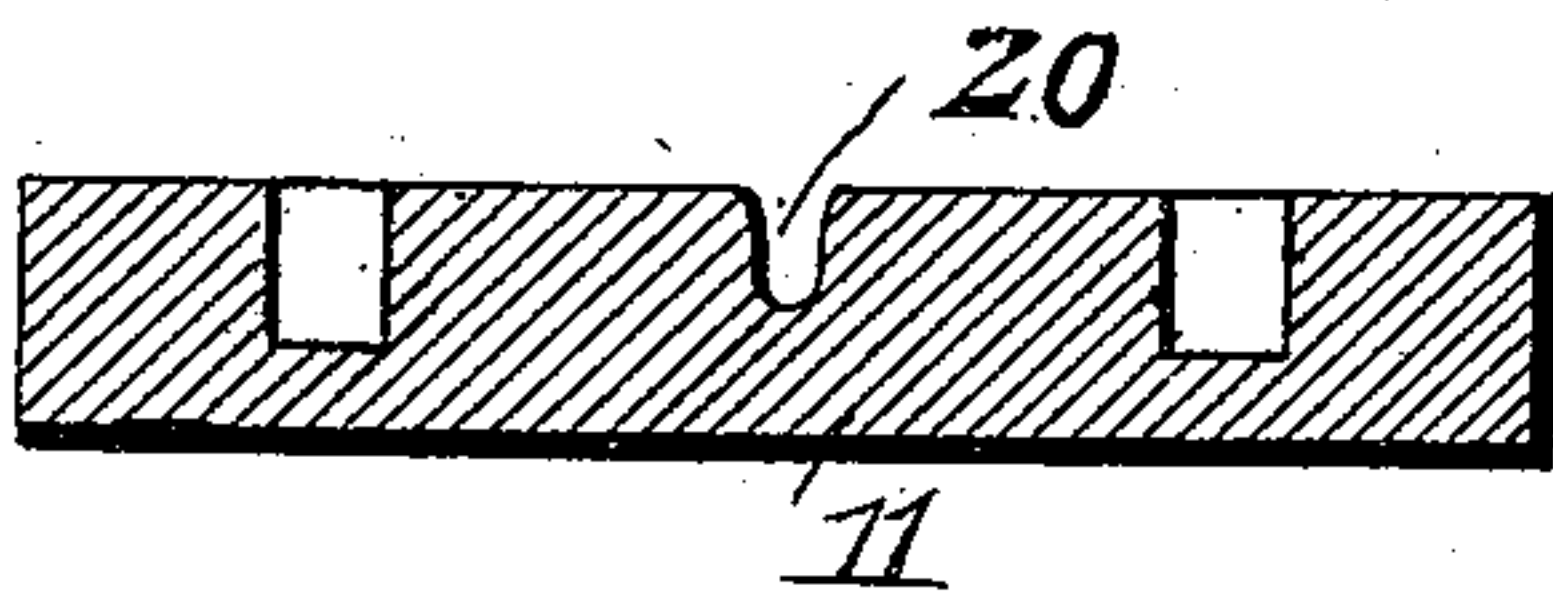


Fig. 10.

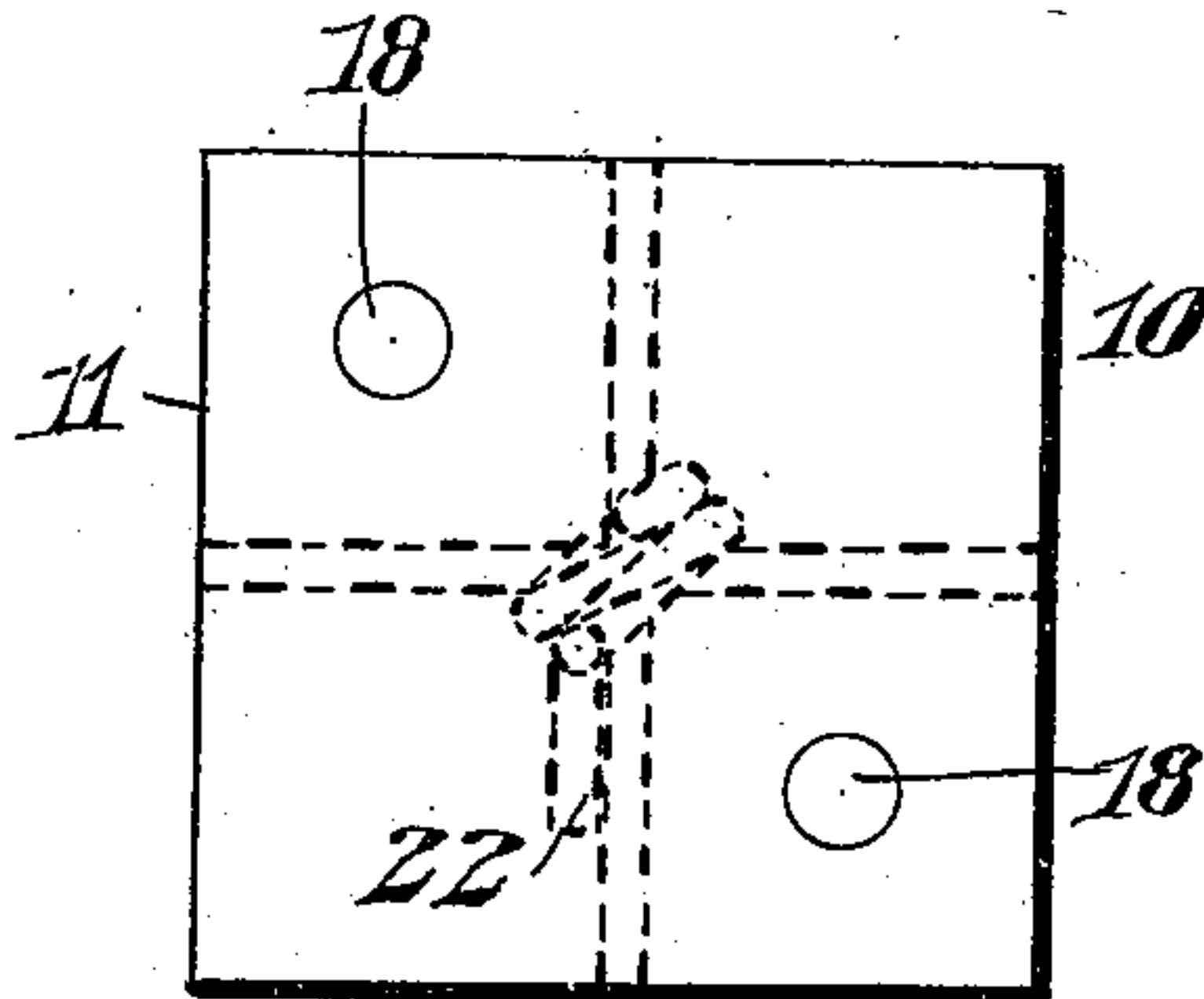


Fig. 11.

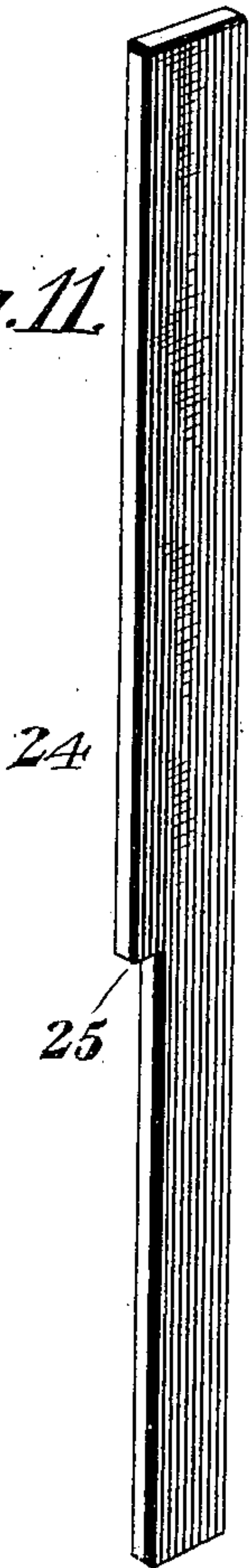


Fig. 12.



Fig. 13.

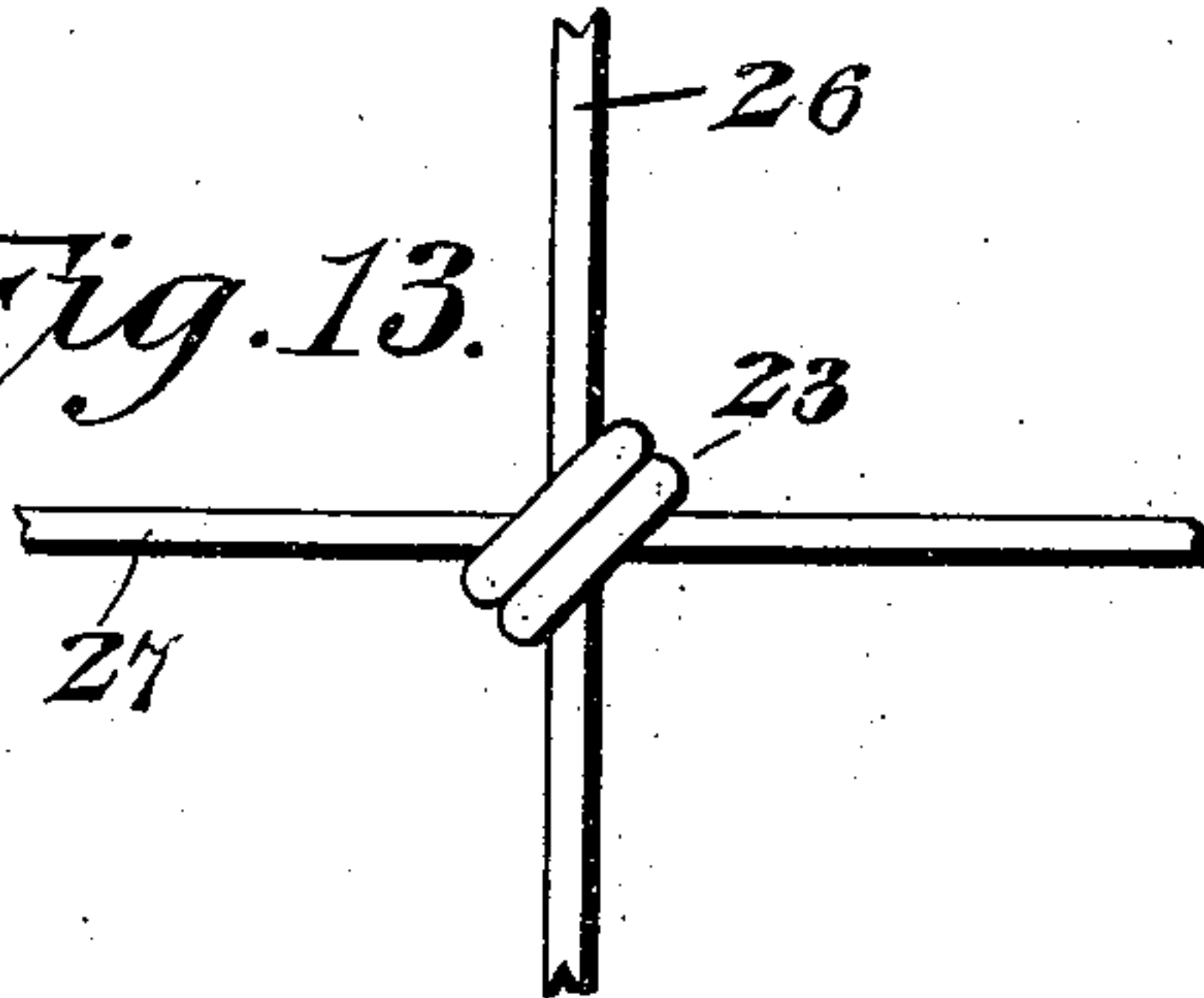


Fig. 14.

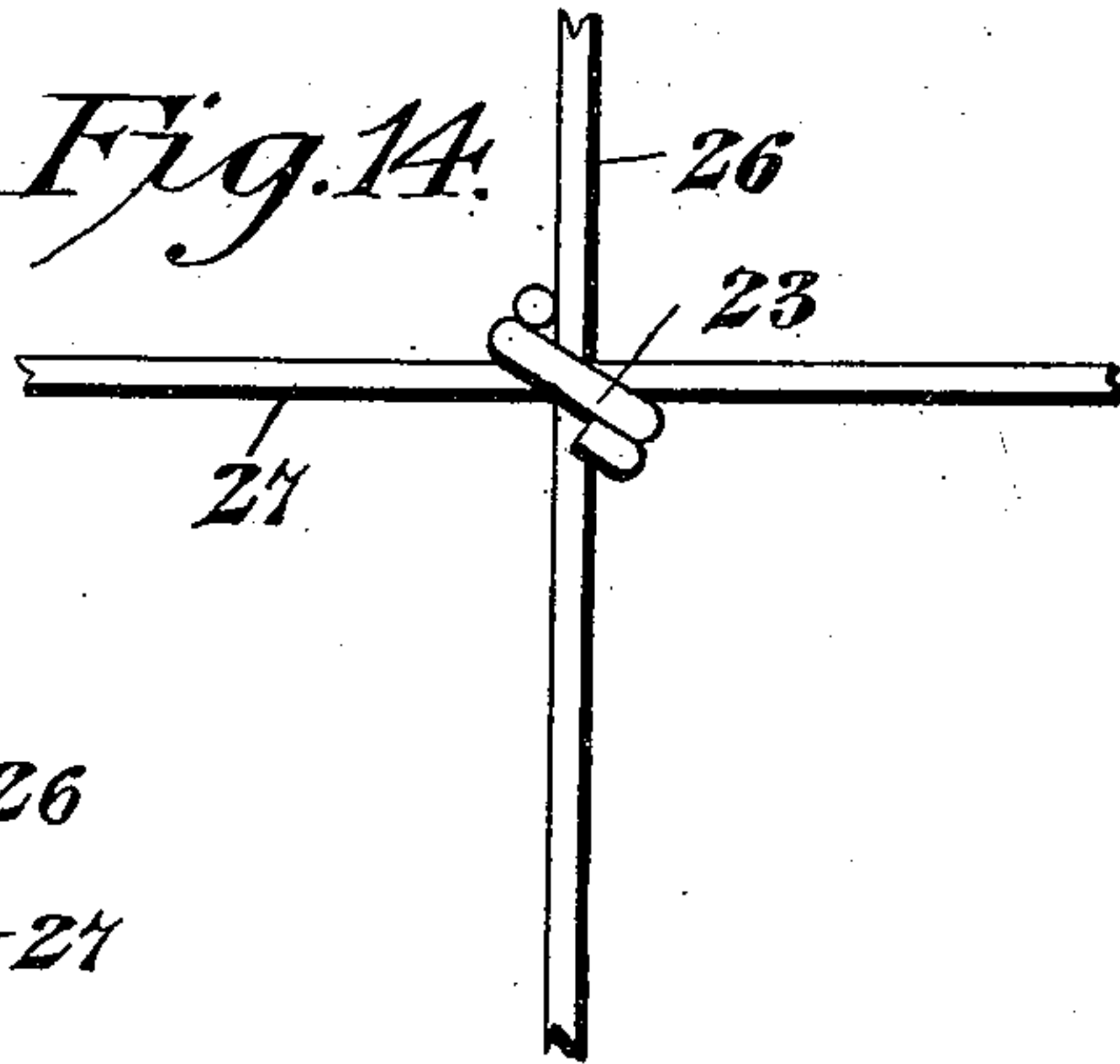
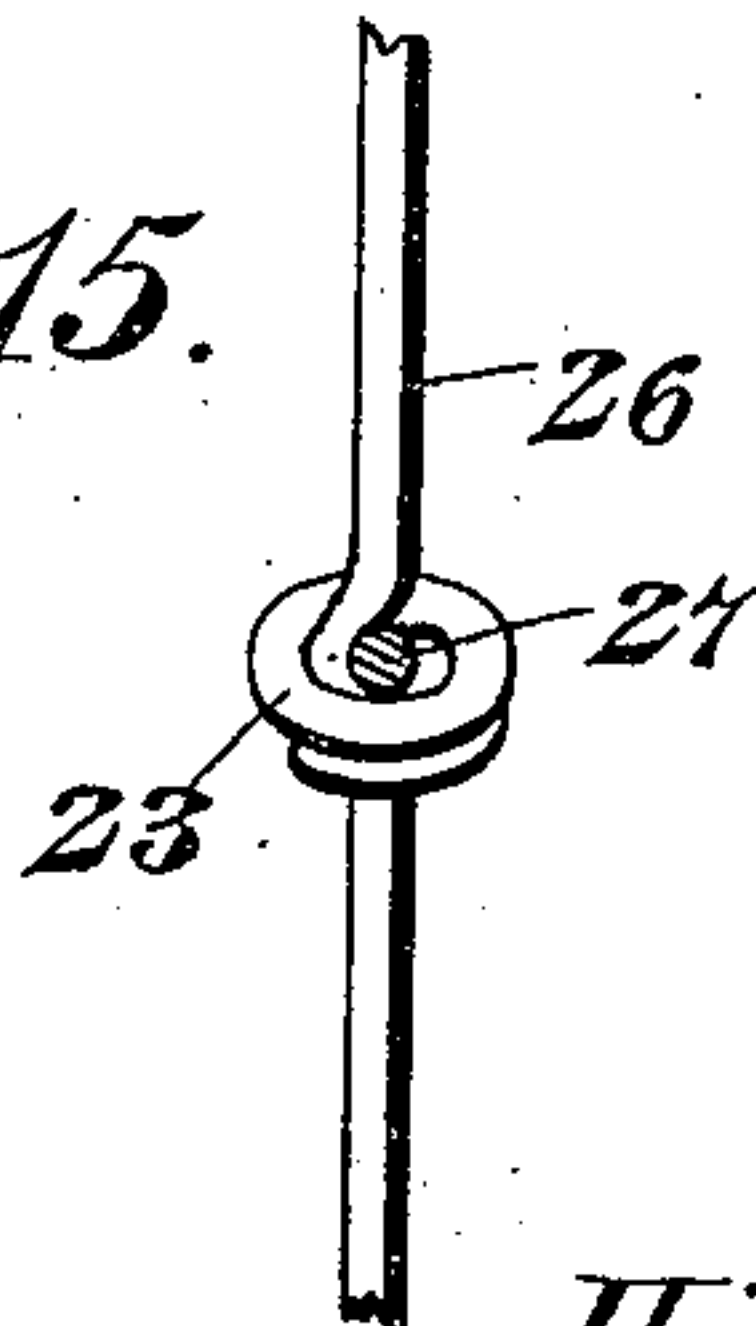


Fig. 15.



Witnesses

*Jas. K. McLaughlin
 Chas. S. Hoyer.*

*Hiram R. Lamb Inventors
 By their Attorneys, Vernon Hoxie*

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

HIRAM R. LAMB AND VERNON HOXIE, OF ADRIAN, MICHIGAN, ASSIGNORS
TO THE LAMB WIRE FENCE COMPANY, OF SAME PLACE.

DIE FOR JOINING INTERSECTING WIRES.

SPECIFICATION forming part of Letters Patent No. 646,435, dated April 3, 1900.

Application filed August 25, 1899. Serial No. 728,479. (No model.)

To all whom it may concern:

Be it known that we, HIRAM R. LAMB and VERNON HOXIE, citizens of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented a new and useful Improvement in Dies for Wire Fabric, of which the following is a specification.

This invention relates to dies for interlocking the cross-wires of wire fabrics intended principally for fencing purposes and is designed to facilitate the application of straight lengths of tie-wires to the intersecting or cross wires and insure the firm union of the several wires at the joint and economizing thereby time in the operation of joining the wires and effecting speed in the manufacture of the wire fabric by increasing the productive capacity of machines for this purpose and also materially reduce the expense of such manufacture.

The improvement consists in coacting dies having grooves in opposite portions to receive straight lengths of tie-wire and produce close spiral ties diagonally across the cross-wires adapted to be held in seat-grooves formed in the opposite die-faces at angles to each other, the tie-wire grooves being located in the opposite die-faces in diagonal planes having a slight angular variation and combined with a plunger for feeding and forcefully threading the tie-wire lengths into the ties, whereby a firm lock for the cross-wires is obtained.

The invention further consists of a pair of dies having coinciding faces with seat-grooves to hold the cross-wires therebetween and diagonally-disposed tie-wire grooves which conjointly serve to produce a spiral former for lengths of tie-wire which are fed thereto in straight position, combined with a plunger for holding and regularly feeding the said tie-wires.

The invention further consists of other constructions, arrangements, and combinations of the several parts, which will be more fully hereinafter described and claimed.

The preferred embodiment of the invention is illustrated in the accompanying drawings and susceptible of a wide range of modification within the scope of the claims.

In said drawings, Figure 1 is a perspective

view of the improved coacting dies, showing one above the other and with the upper die turned out of position to display its working face. Fig. 2 is a plan view of the prime or lower die. Fig. 3 is an end elevation of the same. Fig. 4 is a section on the line 4 4 of Fig. 2. Fig. 5 is a section on the line 5 5 of Fig. 2. Fig. 6 is a section on the line 6 6 of Fig. 2. Fig. 7 is a plan view of the companion or upper die. Fig. 8 is a transverse section on the line 8 8 of Fig. 7. Fig. 9 is a similar section on the line 9 9 of Fig. 7. Fig. 10 is a diagrammatic view of the two die-faces when in operative relation. Fig. 11 is a detail perspective view of the plunger. Fig. 12 is a detail view of the length of tie-wire. Fig. 13 is a plan view of the cross-wires shown joined by the tie-wire in the present form of dies. Fig. 14 is a view similar to Fig. 13 looking toward the opposite side of the said parts. Fig. 15 is an end elevation of the arrangement of wires shown by Fig. 13.

The corresponding parts in the several views are indicated by similar numerals of reference.

The numerals 10 and 11, respectively, designate the prime and companion dies, having in working faces thereof seat-grooves 12 and 13 and 12^a and 13^a. These seat-grooves are disposed at an angle to each other, and the grooves 12 and 13 of the die 10 are intersected at the center by parallel tie-wire grooves 14 and 15, diagonally arranged and of equal length, being of considerable depth and continuous. The two grooves have a common opening outwardly through the face of the die, and their individuality is established by a central converged rib 16, as clearly shown by Figs. 4 and 6, which is located inwardly from the face of the die a greater distance than the extreme depth of the seat-grooves 12 and 13. A plunger channel or opening 17 extends through the thickness of the die adjacent to one of the terminals of the tie-wire groove 15 and close to one marginal edge of the seat-groove 12. At diagonally-opposite points dowel-pins 18 also project from the working face of the die 10 and are adapted to be seated in openings 19, similarly disposed, when the two dies are brought together in the

die 11. The grooves 12^a and 13^a are also intersected at the center fully by a diagonal tie-wire groove 20 and partially by an approximately-half tie-wire groove 21, parallel to the groove 20 and terminating at its inward extremity with the marginal edge of the groove 12^a opposite that which it crosses. These grooves 20 and 21 are also deeper than the grooves 12^a and 13^a, and closely arranged to the extremity of the groove 20 opposite that to which the half-groove 21 is adjacent a plunger-channel 22 opens into the die-face and extends parallel with the groove 12^a, a part of the one margin of the said latter groove and the channel 22 coinciding. The channel 22 is longer than the channel 17 a distance equal to the gage or diameter of the tie-wire lengths 23 or the difference in the width of the body of the plunger 24 and the reduced extremity thereof formed by a recess 25 in one edge to provide a seat for the said tie-wire arrangement.

Both sets of tie-wire grooves 14 and 15 and 20 and 21 have approximately the same depth in their respective dies and are concaved longitudinally to provide opposite curved extremities, which have an inclination toward the working faces of the respective dies. When the two dies are brought together or coincide, the seat-grooves 12 and 13 aline with the similar grooves 12^a and 13^a. One extremity of the tie-wire groove 14 stands over the outer extremity of the half-groove 21 and also over the greater part of the said half-groove. The opposite extremity of the tie-wire groove 14 is in alined contiguity with the one extremity of the tie-wire groove 20, the opposite extremity of the latter registering with the one extremity of the groove 15. The opposite end portion of the said groove 15 is located over the one end of the channel 22, and the wall of said channel at this point is concaved to conform to the shape of that portion of the tie-wire length which is inserted through the same and bears against the said wall in its movement into the dies.

The tie-wires are of a length precisely equal to the former, produced by the arrangement of the grooves 14, 15, 20, and 21, and when fed into the dies and applied to the cross-wires will have two bends or windings on one side of the cross-wires, as shown by Fig. 13, and one bend or winding on the opposite side, the two ends of the tie-wire being drawn in closely, and thereby forming a reduced spiral lock positioned diagonally to both of the cross-wires. In feeding the tie-wire lengths into the dies, one of the same is placed in the recess of the plunger, and the latter moves therewith into the dies from the entrance end of the channel 22. The plunger firmly holds the tie-wire length against the concaved wall of the channel 22, and the parts are all so timed as to their operative relation that the movement of the plunger will begin immediately subsequent to the coincidence of the

die-faces. The operative mechanism for the dies and plunger may be of any character as long as the said dies are regularly brought together and the plunger is given a time reciprocation regularly and relatively to the movement of the said dies. Furthermore, when the tie-wire length is fed into the dies, the foremost end, after the full insertion, abuts against the inner terminal of the half-groove 21, which is abrupt, and said half-groove, extending partially across the seat-groove 12^a, adjacent thereto, will dispose the said foremost end of the tie-wire against the cross-wire occupying in part the groove 12^a, as shown by Fig. 14. The outer terminal of the tie-wire will remain in contact with the shoulder on the plunger provided by forming the recess in the latter and will be brought up close to an opposite portion of the same cross-wire against which the foremost terminal is bent.

In operation the dies 10 and 11 are brought to bear against cross-wires 26 and 27, so that the wire 26 will lie half and half in the seat-grooves 12 and 12^a and the wire 27 similarly disposed in the seat-grooves 13 and 13^a, except at their point of crossing, where each wire will lie wholly in its respective die. As before indicated, when the dies coincide in this manner the inner opposed terminals of the channels 17 and 22 will register. The plunger 24 then has motion imparted thereto and is supplied with one of the tie-wire lengths 23, and the latter is gradually fed into the die through the channel 22. In this condition the tie-wire will be firmly braced at all points and prevented from bending in view of the fact that the tie-wire grooves do not obstruct its advance movement or feed, and initially the foremost end of the tie-wire enters the groove 15 and fully traverses the same and then is directed into and travels through the groove 20 and back through the groove 14 and finally into the half-groove 21, where the foremost end will meet with resistance against further movement and which will be exactly at a time when the plunger will have finished its inward stroke. A close spiral tie-coil is thus produced by the use of a straight length of tie-wire, and a firm joint is formed at the intersecting points of the cross-wires. These cross-wires may be crimped more or less by increasing or decreasing the depth of the seat-grooves therefor, and the tie-wires may be driven by a round plunger equally as well as by a flat one, as shown. It is not necessary that the cross-wires should be disposed at right angles, and the gage of the said cross-wires, as well as the tie-wires, may be varied and each regulated proportionately to the other.

Variations and changes will be incorporated as long as there is no confliction with the essential features of the dies and the gist of the invention, which embodies dies having a spiral former made up of grooves in part in

opposite die-faces and disposed diagonally of the cross-wires and into which straight lengths of tie-wires are fed and bent around the cross-wires by the progressive feed of a plunger carrying the said lengths of tie-wires.

In our pending application, Serial No. 728,480, filed on even date herewith, the description and claims relate to dies having a plunger movable thereinto in the plane of the working faces of the dies and the broad use of a spiral former and feeding straight length of tie-wire to the dies irrespective of the shape of the tie-wire former, and in the present application we make no claim to such generic construction and arrangement of parts.

Having thus described the invention, what is claimed as new is—

1. Coinciding dies having seat-grooves therein to receive cross-wires, and tie-wire grooves closely arranged and diagonally disposed relatively to the seat-grooves, and a plunger movable into said dies and adapted to feed a straight length of tie-wire thereto.

2. Coinciding dies having means for holding cross-wires and grooves closely arranged in diagonal lines thereacross, and a plunger movable into said dies, and adapted to feed a straight length of tie-wire into the dies around the cross-wires.

3. Coinciding dies having means therein for holding cross-wires, and spiral grooves closely arranged in alternation in opposite die-faces and diagonal relatively to the means for holding the cross-wires, and a plunger movable into said dies, and adapted to feed a straight length of tie-wire and thread the same endwise into the dies through the said spiral grooves around the cross-wires.

4. Coinciding dies having means for holding cross-wires, and tie-wire grooves relatively arranged therein, the said dies each having a part of a plunger-channel in the same which is larger in one die than in the other, and a plunger movable into the said dies and having a reduced extremity and adapted to feed a straight tie-wire length inward to the die, the said tie-wire length adding to the width of the reduced extremity of said plunger the

difference in width between the same and the larger channel.

5. Coinciding dies having means for holding cross-wires and crimping the same and also provided with semispiral grooves in alternation in each working face thereof and at varying angles, and a plunger movable into the dies, and adapted to feed a length of tie-wire in straight condition into the said grooves.

6. Coinciding dies having means for holding cross-wires and also provided with diagonal grooves closely arranged at the center and intersecting the means for holding the cross-wires, and a plunger movable into the said dies and adapted to feed a straight length of tie-wire into said grooves.

7. Coinciding dies having means for holding cross-wires intersected at the center by a tie-wire former, and a plunger movable into the said dies and adapted to feed a straight length of tie-wire into the dies.

8. Coinciding dies having working faces with seat-grooves arranged in each at an angle to each other and intersected by diagonally-disposed tie-wire grooves, one die-face having two full-length diagonal grooves therein, and the other a single and a half groove at an angle to the two full-length grooves, the dies also each having a plunger-channel therein, one channel being larger than the other, and a plunger having a reduced entrance extremity movable into the dies, and adapted to feed a straight length of tie-wire into the dies by the reduced entrance extremity thereof.

9. Coinciding dies having means for holding cross-wires and diagonally-disposed tie-wire guides arranged in the plane of intersection of the cross-wires, and a plunger movable to feed a straight length of tie-wire into said dies.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

HIRAM R. LAMB.
VERNON HOXIE.

Witnesses:

W. H. BURNHAM,
HARRIET MONTGOMERY.