

H. E. WHITE.  
MACHINE FOR EXPANDING METAL.

APPLICATION FILED FEB. 15, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

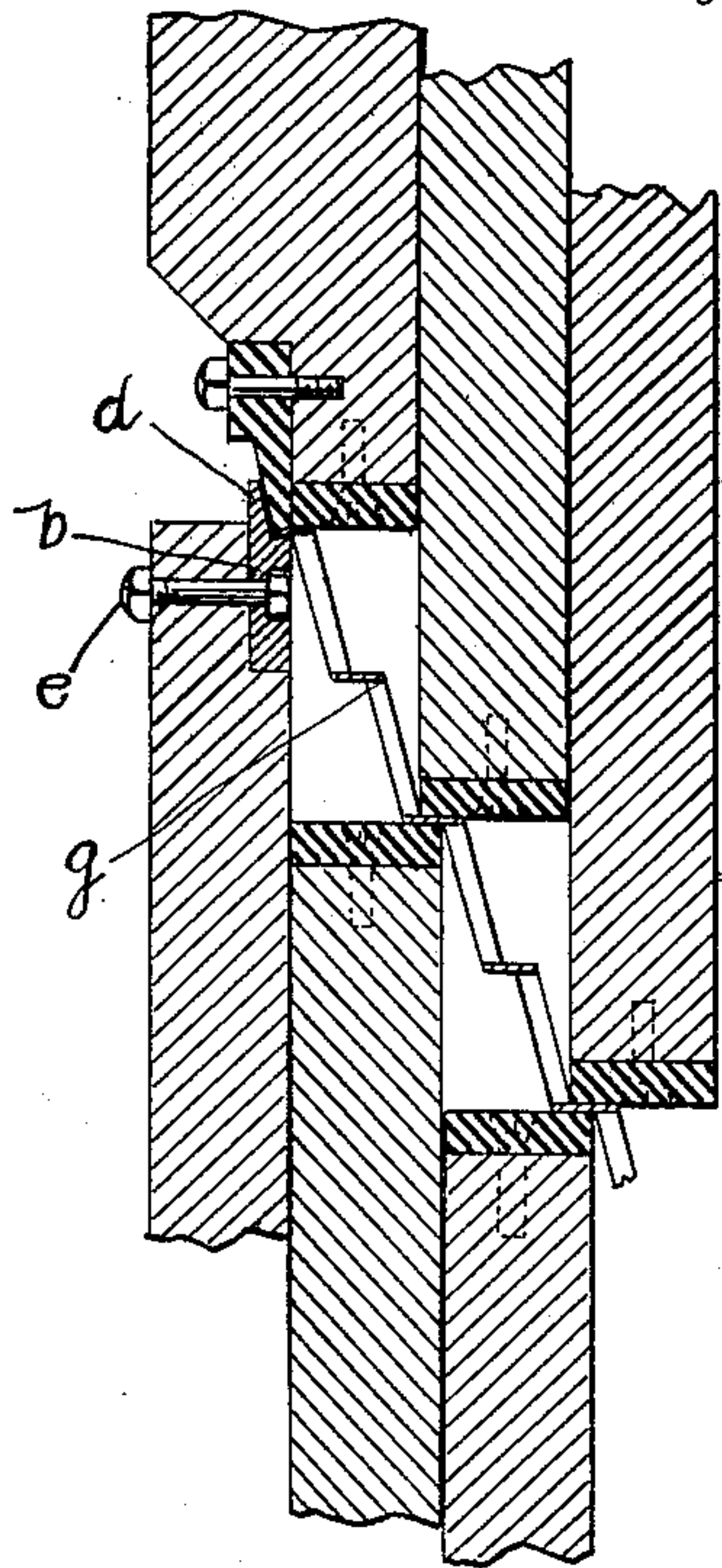
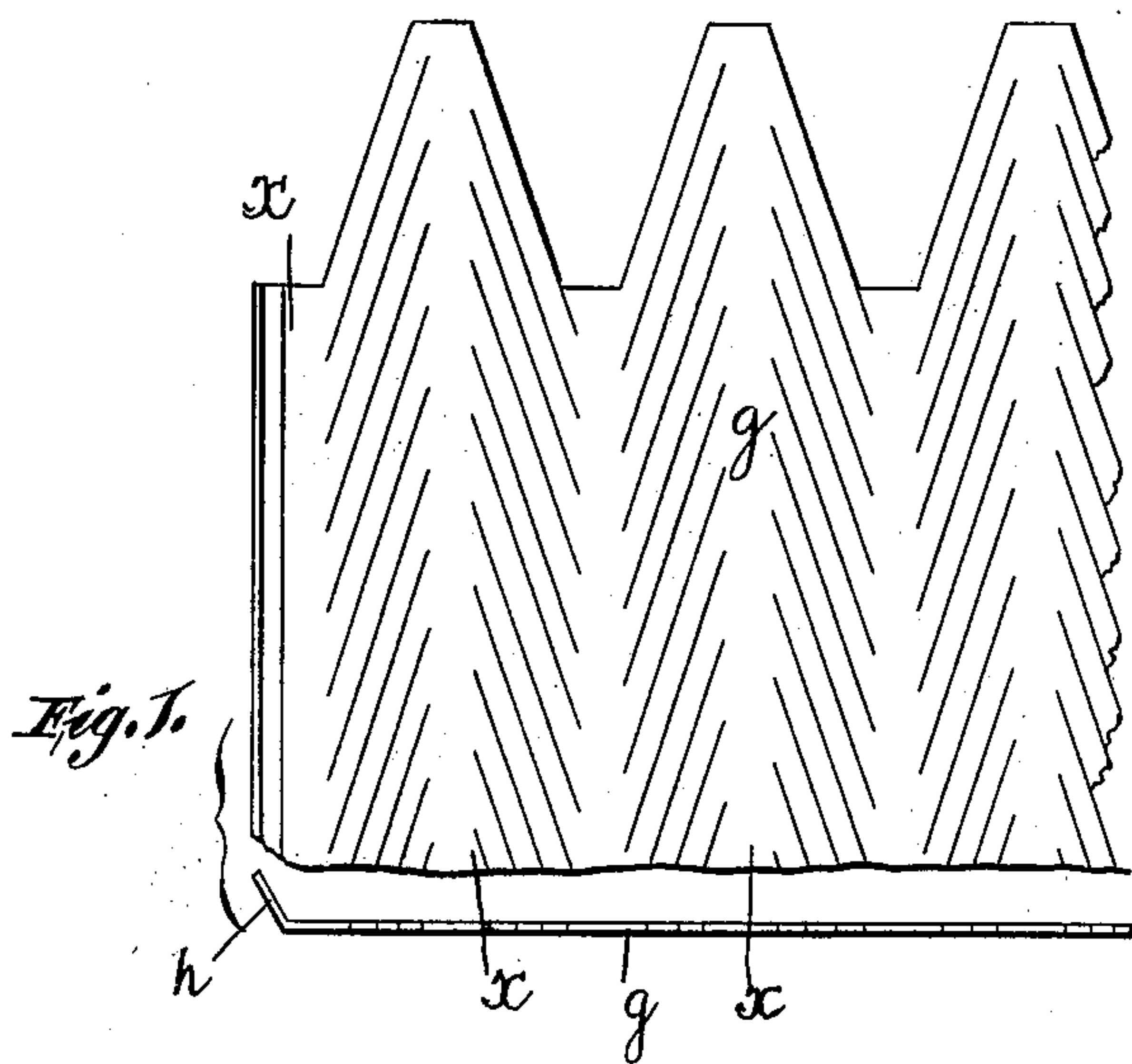


Fig. 3.

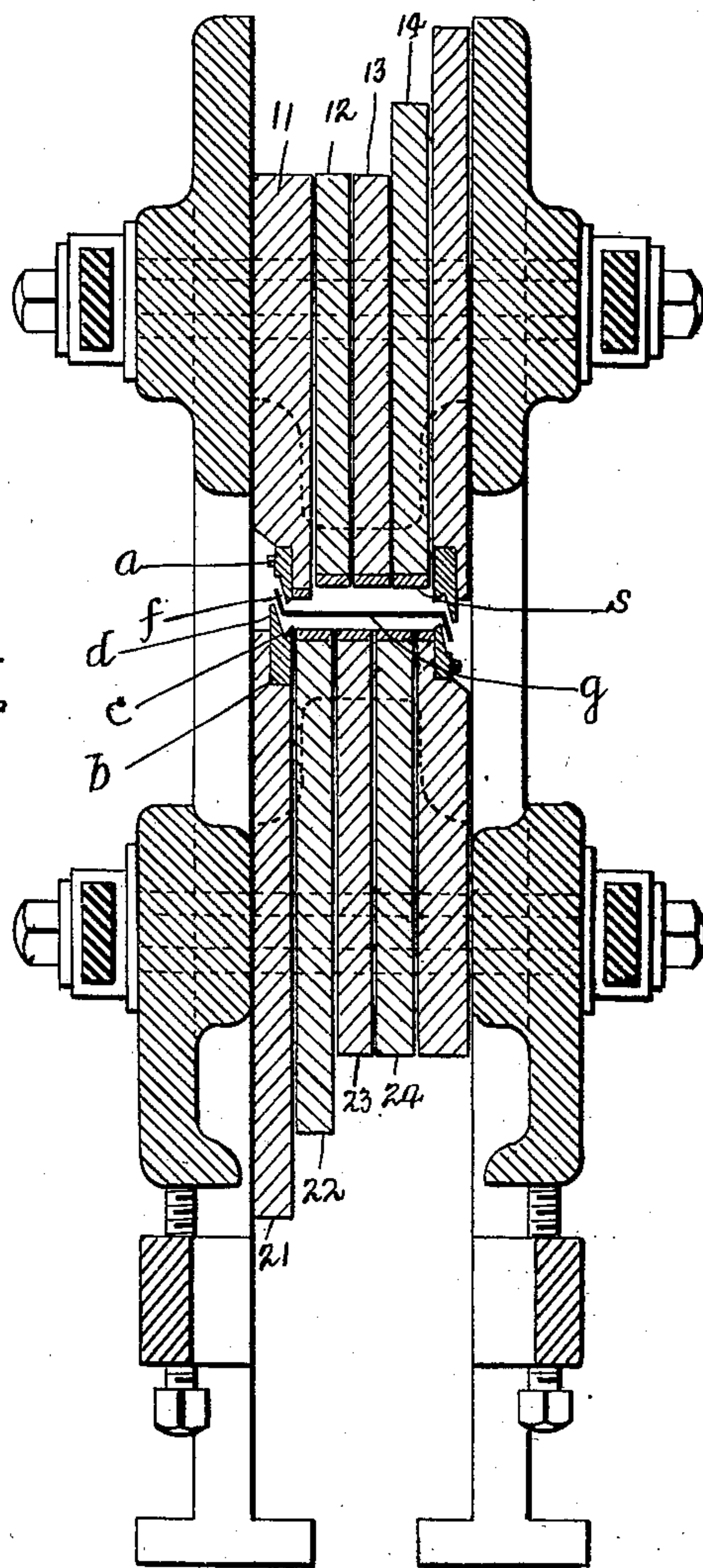


Fig. 2.

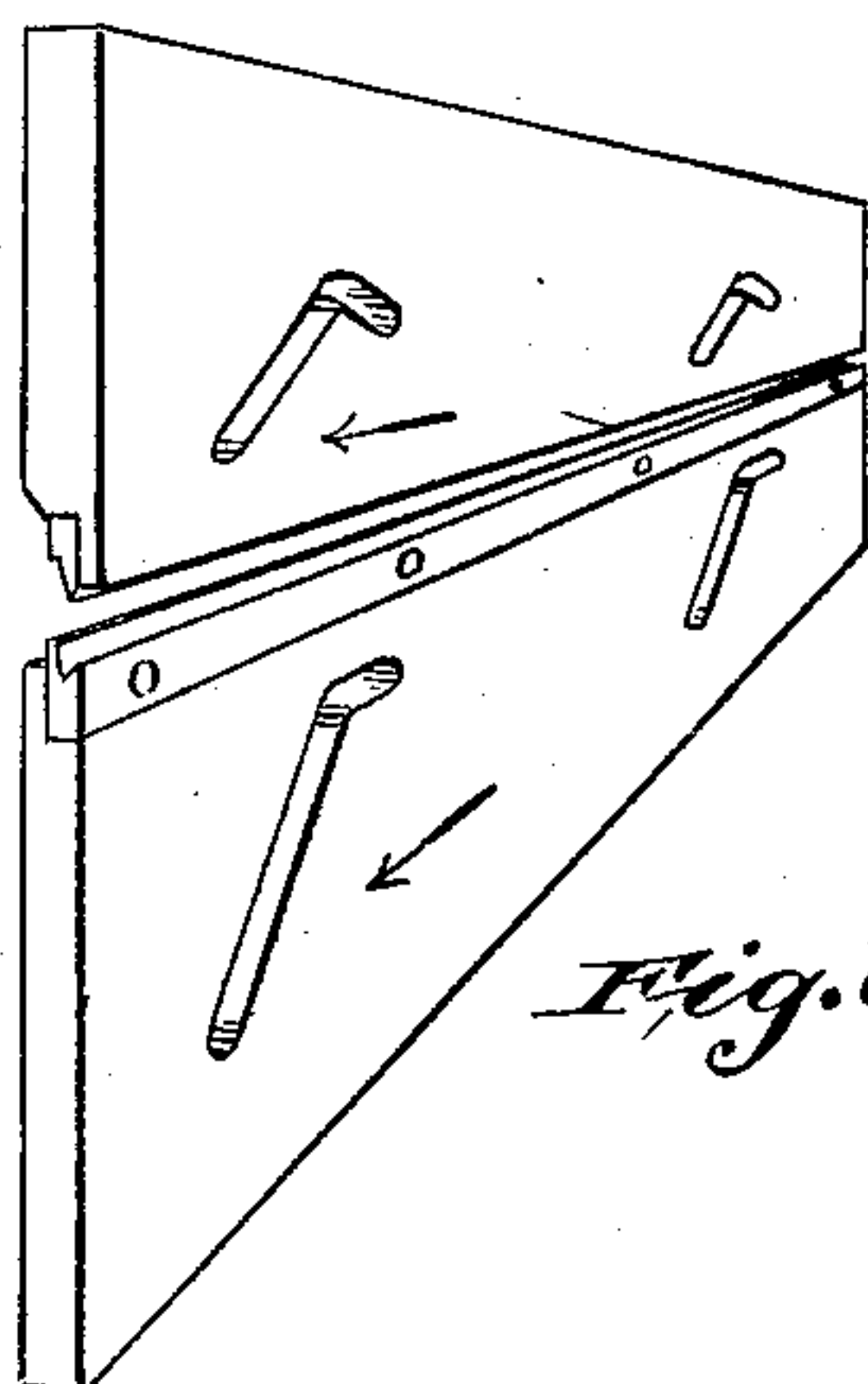


Fig. 7.

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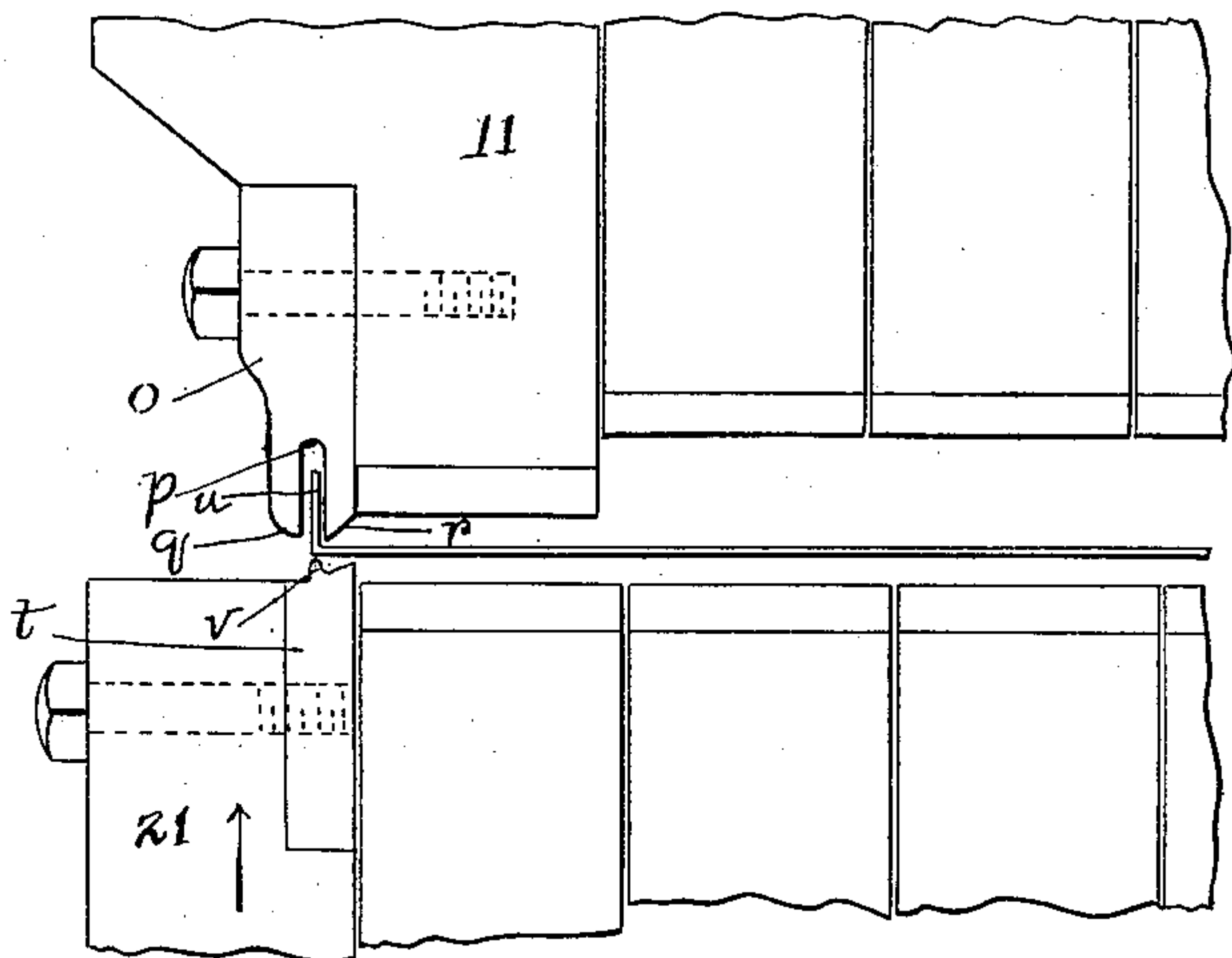
by *Harold E. White*  
*Att'y*

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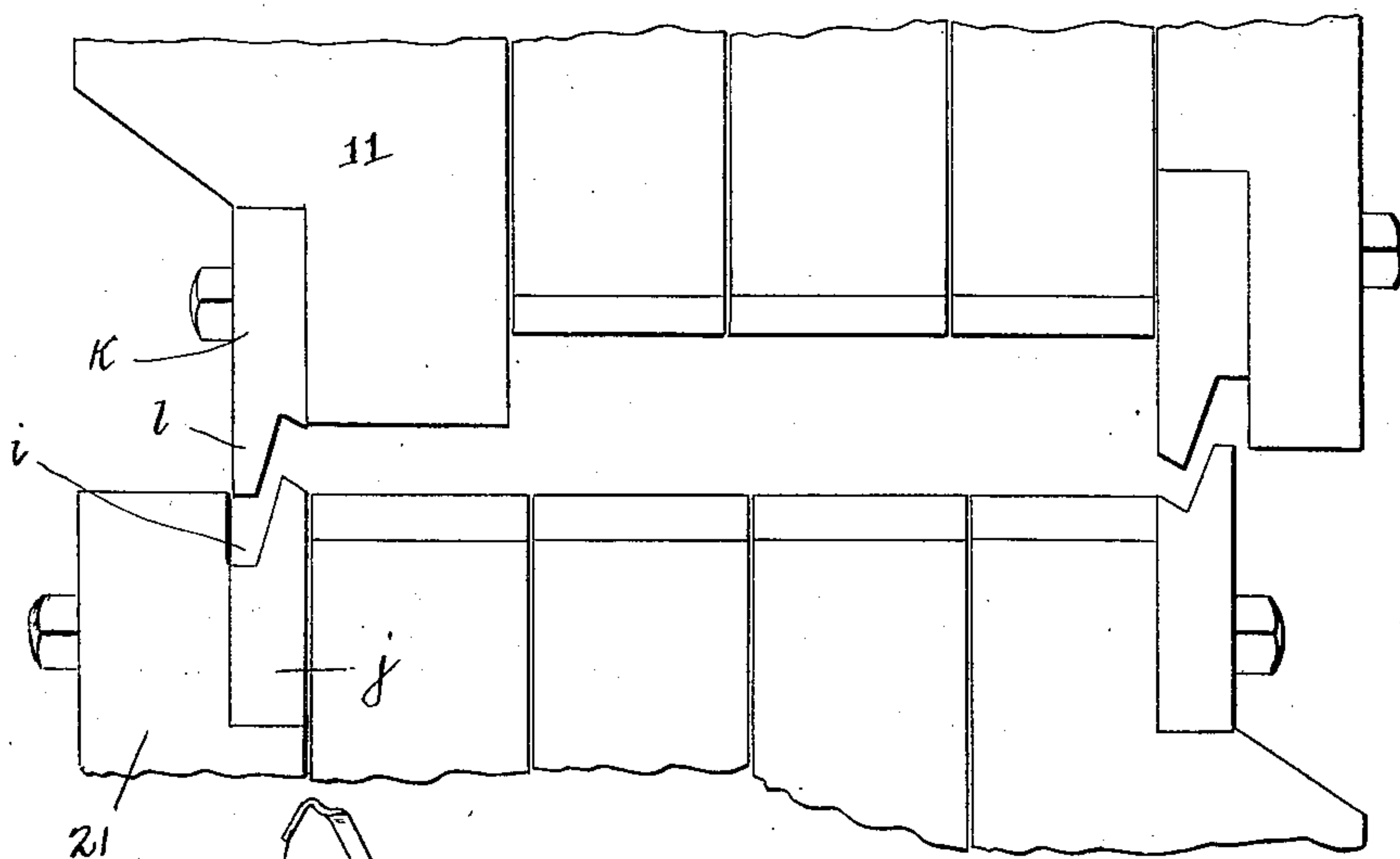
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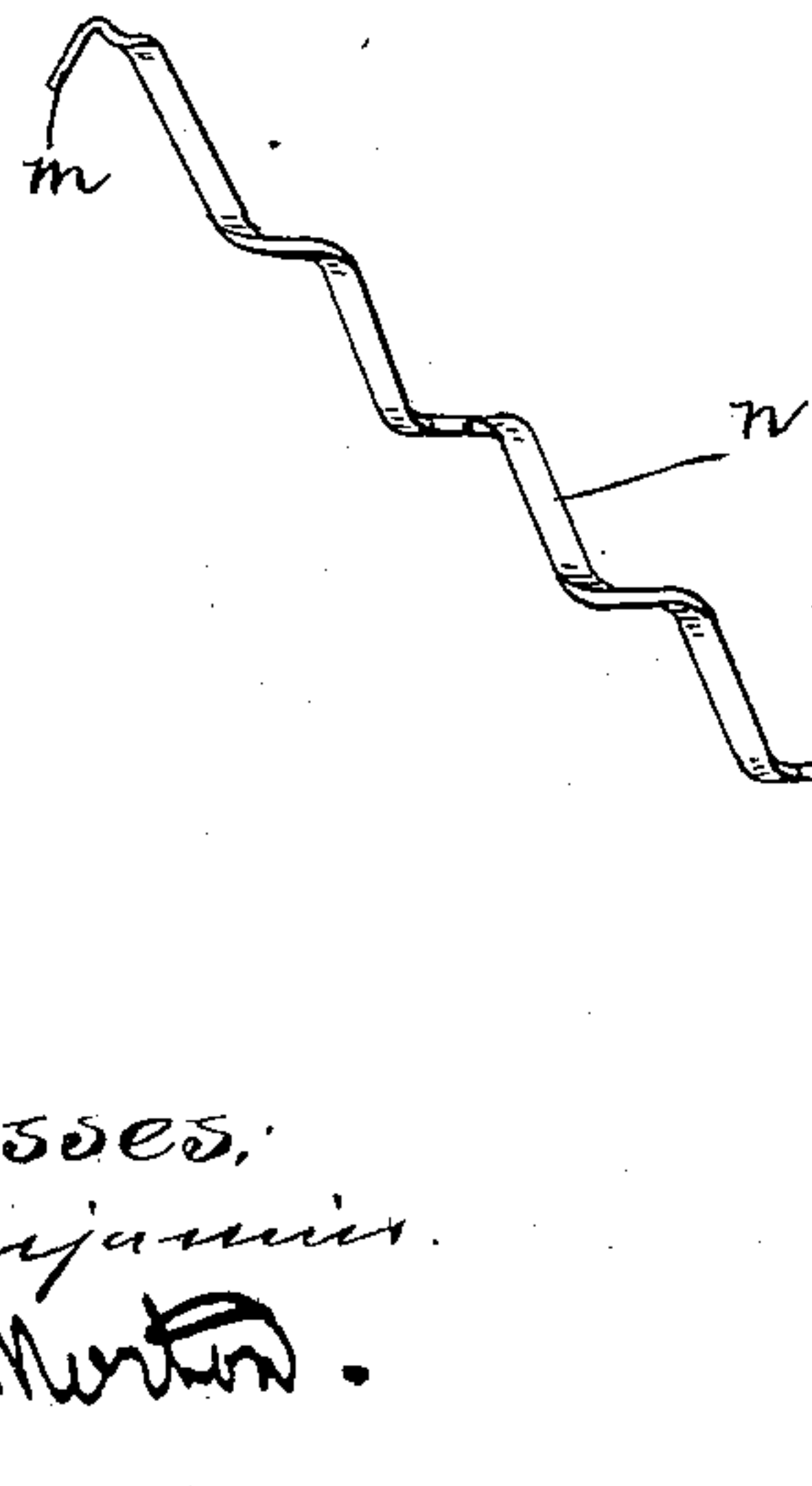
2 SHEETS—SHEET 2.



*Fig. 4.*



*Fig. 5.*



*Fig. 6.*

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by

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# UNITED STATES PATENT OFFICE.

HERBERT E. WHITE, OF NILES, OHIO, ASSIGNOR TO GENERAL FIREPROOF-  
ING COMPANY, A CORPORATION OF OHIO.

## MACHINE FOR EXPANDING METAL.

SPECIFICATION forming part of Letters Patent No. 735,635, dated August 4, 1903.

Application filed February 15, 1902. Serial No. 94,167. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT E. WHITE, a resident of Niles, Trumbull county, Ohio, have invented certain new and useful Improvements in Machines for Expanding Metal, of which the following is a specification, accompanied by drawings.

My invention relates to that class of apparatus for expanding slit sheets of metal described and illustrated, for example, in Letters Patent issued to me February 26, 1901, No. 668,669, in which the proper slitted sheet is gripped or clamped along separated parallel lines between the terminations of the series of slits and is then expanded by moving the different pairs of gripping-jaws progressively to greater distances; and my invention consists of means for preventing the skewing or bending or warping of the metal blank or sheet prior to the operations required to expand it or for preventing the slipping of the same during the expanding operations, or for both these objects, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 illustrates in plan and section part of a properly-slitted sheet prior to expanding the same. Fig. 2 is an enlarged sectional view illustrating a sheet in position in the jaws before they are set in motion to expand the sheet. Fig. 3 shows a sheet expanded in the jaws after the completion of the operation. Fig. 4 is a view similar to Fig. 2 of jaws, showing a modified construction. Fig. 5 is a sectional view of another modification. Fig. 6 is an edge view of a finished sheet which has been expanded in jaws constructed as shown in Fig. 5, and Fig. 7 is a perspective view of the jaws.

Referring to the drawings, the sheet to be operated upon is formed and slitted as illustrated in Fig. 1, from which it will be seen that there are alternating slitted and non-slitted portions and there are successive pairs of jaws 11 21, 12 22, 13 23, and 14 24 so disposed that when the opposite jaws are brought together the sheet will be clamped in parallel lines along alternate non-slitted portions  $x\ x\ x$ , Fig. 1, which subsequently form the ribs. By a proper movement of the jaws the sheet is then so acted upon as to

separate the ribs formed between the successive rows of slits in the manner fully set forth in my aforesaid Letters Patent, producing a structure of the general character illustrated, for example, in Letters Patent No. 668,670, also dated February 26, 1901, for the process of manufacturing.

In carrying into effect the above operations in the machine described in Patent No. 668,669 it was found that there was a tendency of the metal blank to skew or warp or bend when thrust into the machine and not to occupy the proper position at the moment of being gripped between the jaws and that sometimes the sheet would slip after being gripped and during the operation of expanding. In order to overcome this defect, I so construct a pair of opposite jaws (which preferably are the outer jaws 11 21) that as they are brought together upon the blank the latter will be clamped or gripped in such manner as will hold it in its proper position for expanding as the other jaws are brought to clamp it and will grip it effectually, so as to prevent slipping during expanding operations. One way of mounting and one way of actuating the jaws both severally and together is fully set forth in my Patent No. 668,669, and not being of the essence of the present improvement it will not be herein described. To effect this preliminary securing and subsequent gripping, according to one form of my invention I provide the outer jaws with registering projections and grooves or recesses extending, preferably, the entire length of the face of the jaw. The outer jaws on both sides may be provided with grooves and projections. The intermediate jaws are preferably provided with faces or edges of suitable material, as steel, to withstand the wear, and the grooves and projections for gripping the sheet are formed in suitably-shaped blocks or strips of steel secured to the outer jaws. This has been found to be a convenient construction. The grooves and projections, if desired, might be formed upon any other of the pairs of jaws, I having preferred to illustrate them only in connection with the outer jaws.

In Fig. 2 a block *b*, suitably rabbeted or grooved along its face at *c* and preferably



provided with a lip *d*, is shown secured to the lower jaw 21 in a recess in the jaw, as by bolts *e*. To the upper jaw 11 is shown secured a block *a*, provided with a projection *f*, adapted to cooperate with the recess or groove *c*.

The jaws 11 and 21, as shown, may be arranged to stand somewhat closer together than the adjoining pairs of jaws when the machine is not in operation, but in readiness for the insertion of the slitted sheets or blanks, so that after the insertion of the blank *g* between the sets of jaws, as illustrated in Figs. 2 and 4, upon starting the machine to bring the sets of jaws together jaws 11 and 21 will meet and grip first, thereby clamping and holding the edge of the sheet in the groove *c* and preventing its skewing out of shape or springing out of place while the remaining pairs of jaws come down upon the sheet. The edge of the blank *g* which is to be clamped, is preferably bent up, as at *h*, to fit between the projection *f* and lip *d*.

In Fig. 3 the sheet *g* is shown expanded after the completion of the operation and the edge *h* has been firmly clamped between the outer jaws 11 and 21, the metal being forced into the groove *c*, as shown. Any suitable form of grooves and projections may be provided; but the construction shown has been found particularly advantageous, since the forcing of the metal into the groove *c* so bends it as to present a shoulder *w*, which effectually prevents slipping during the expanding operations.

In Fig. 5 a modification of the construction is shown devised not only to prevent the sheets from slipping during the expanding operation, but also to produce hook-like or "lock" edges on the sheets. The construction of Fig. 5 is substantially a reversal of the arrangement of the clamping parts shown in Fig. 2, the groove *i* in one of the outer jaws, as in the lower jaw 21, being preferably formed by a recessed block *j*, suitably secured to the jaw, while a block *k*, secured to the jaw 11, is provided with a projection *l*, adapted to the recess or groove *i*. The operation of expanding with this construction forms the lock edges *m* upon the sheet *n*, as shown in Fig. 6.

Another modification of the construction is that shown in Fig. 4, wherein the block *o*, secured to one of the jaws, as the upper jaw 11, is provided with a groove *p* in its face, formed between fingers *q* and *r*, of substantially the shape shown, while the face of the block *t*, secured to the lower jaw 21, is of a shape adapted to the contour of the fingers *q* and *r*, as shown, a projection *v* being arranged substantially opposite the groove *p*. The end of

the sheet *g* is bent, as at *u*, before the sheet is expanded to enter the recess *p* in block *o*, and it will be seen that a secure grip is obtained upon the sheet when the sets of jaws are brought together.

In making expanded metal the slitted blanks become more or less badly distorted and warped during the cutting operation, so that it is difficult to make their edges straight, and it is also difficult to make the surface of a blank lie in one plane. If the surface is forced into one plane, the edges are forced into a curved line. According to my invention the edge or edges are turned at nearly right angles to the plane of the sheet, and the edge so turned is fed into the slot formed by the proximity of the two jaws 11 and 21, as illustrated in the figures. Then after this edge is firmly gripped there is no further danger of throwing the sheet out of position, and the other sets of jaws can be made to grip the sheet without distorting it.

Without limiting myself to the details of construction herein shown and described I claim as my invention the following:

1. In a machine for expanding slitted metal sheets, a plurality of pairs of cooperating jaws for gripping and expanding the sheet, one jaw of one pair having a recess and its cooperating jaw having a projection adapted to enter said recess and grip the metal sheet and the jaws of said pair being movable to grip the sheet prior to the action of the other pairs of jaws, substantially as set forth.
2. In a machine for expanding slitted metal sheets having a bent edge, a plurality of pairs of cooperating jaws for gripping and expanding the sheet, one pair of said jaws having devices for gripping said bent edge, and the jaws of said pair being normally closer to each other than the jaws of the other pairs, substantially as set forth.
3. In a machine for expanding slitted metal sheets having a bent edge, a plurality of pairs of cooperating jaws for gripping and expanding the sheet, one jaw of one pair having a recess and a projecting lip and the other jaw of said pair having a projection to cooperate with said lip to grip the bent edges, and also to cooperate with said recess to force a part of said sheet into it, and the jaws of said pair being normally closer to each other than the jaws of the other pairs, substantially as set forth.

Signed this 11th day of February at Niles, Ohio.

HERBERT E. WHITE.

Witnesses:

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VIRGINIA CARLTON.