

(No Model.)

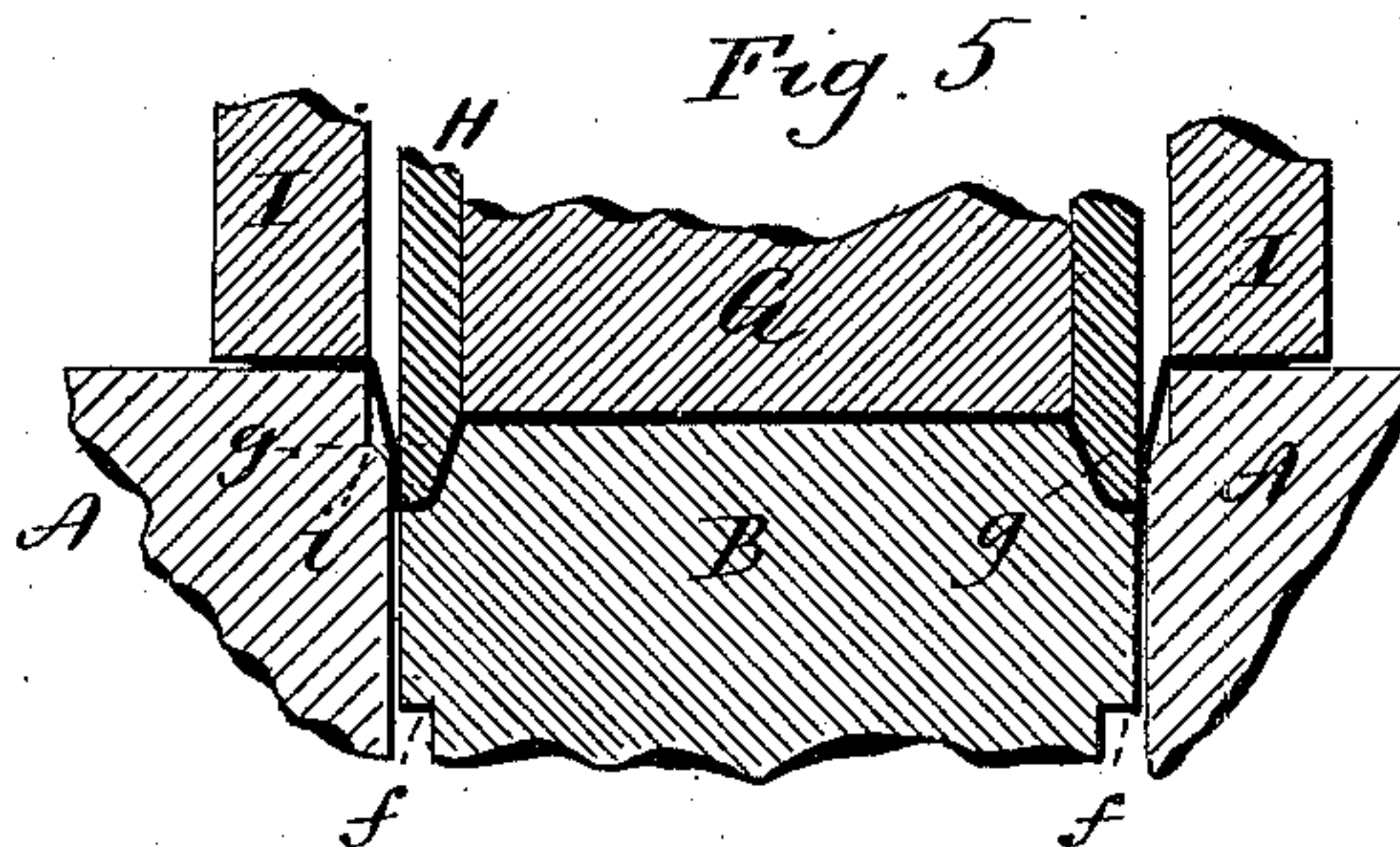
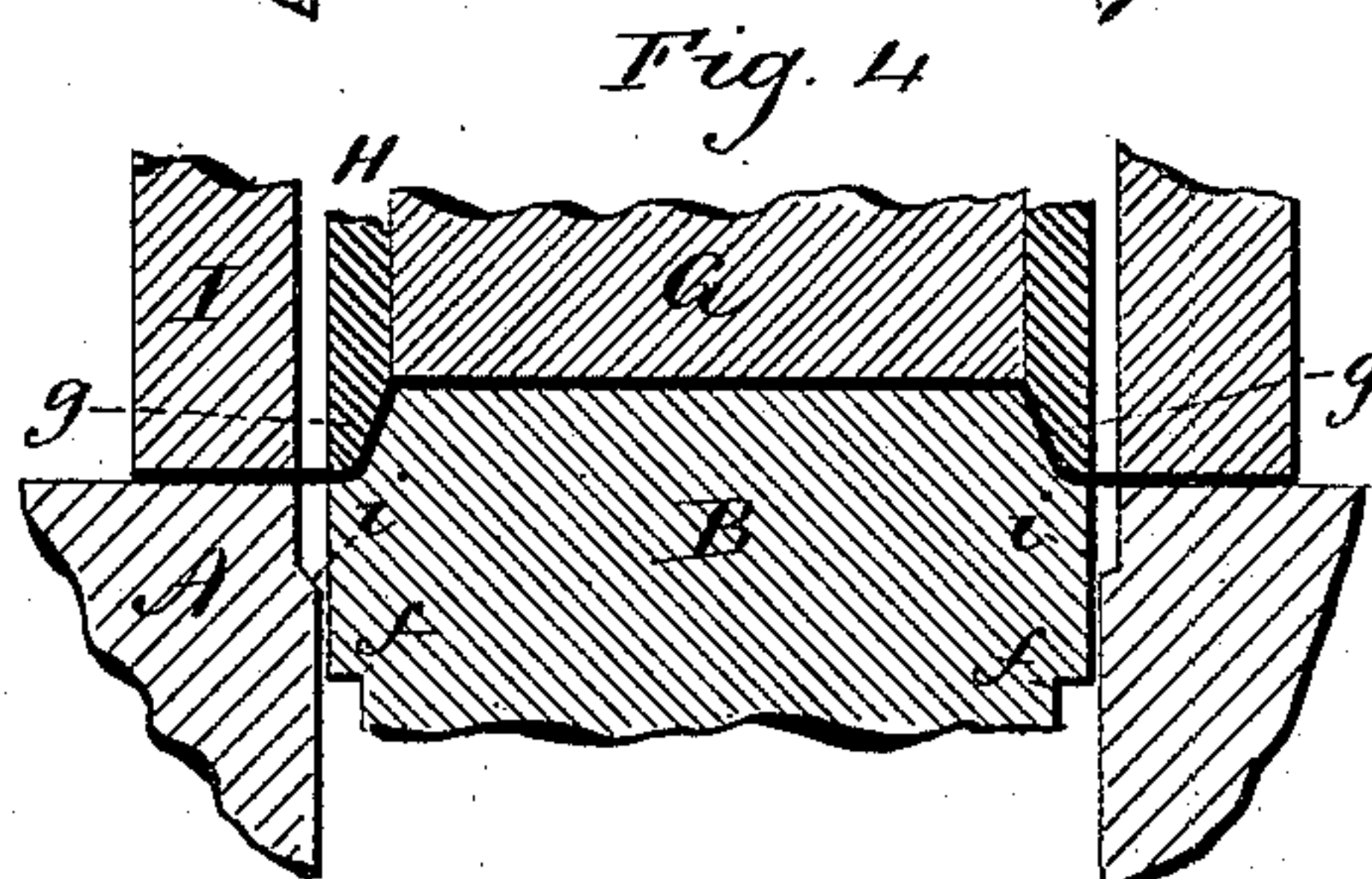
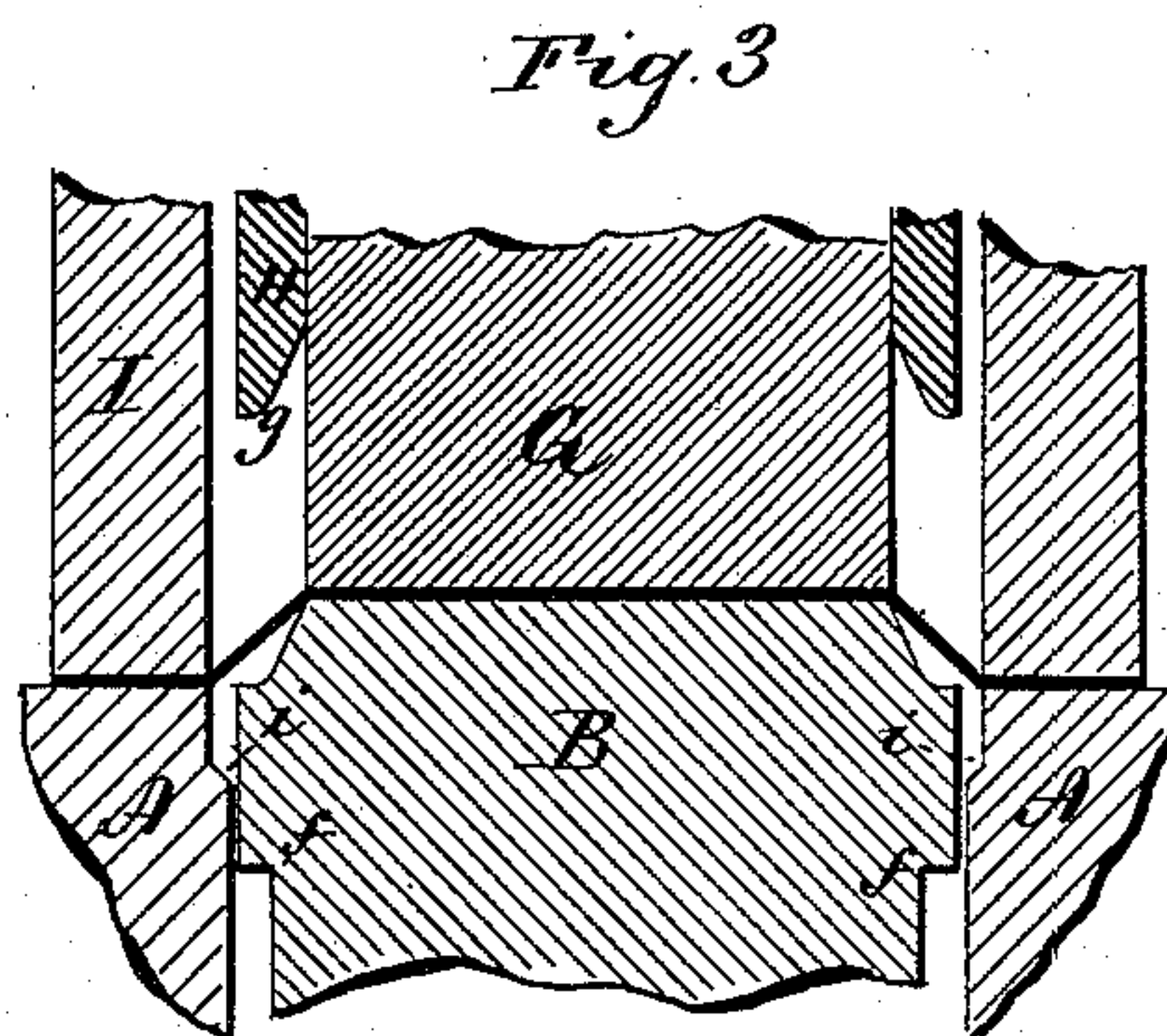
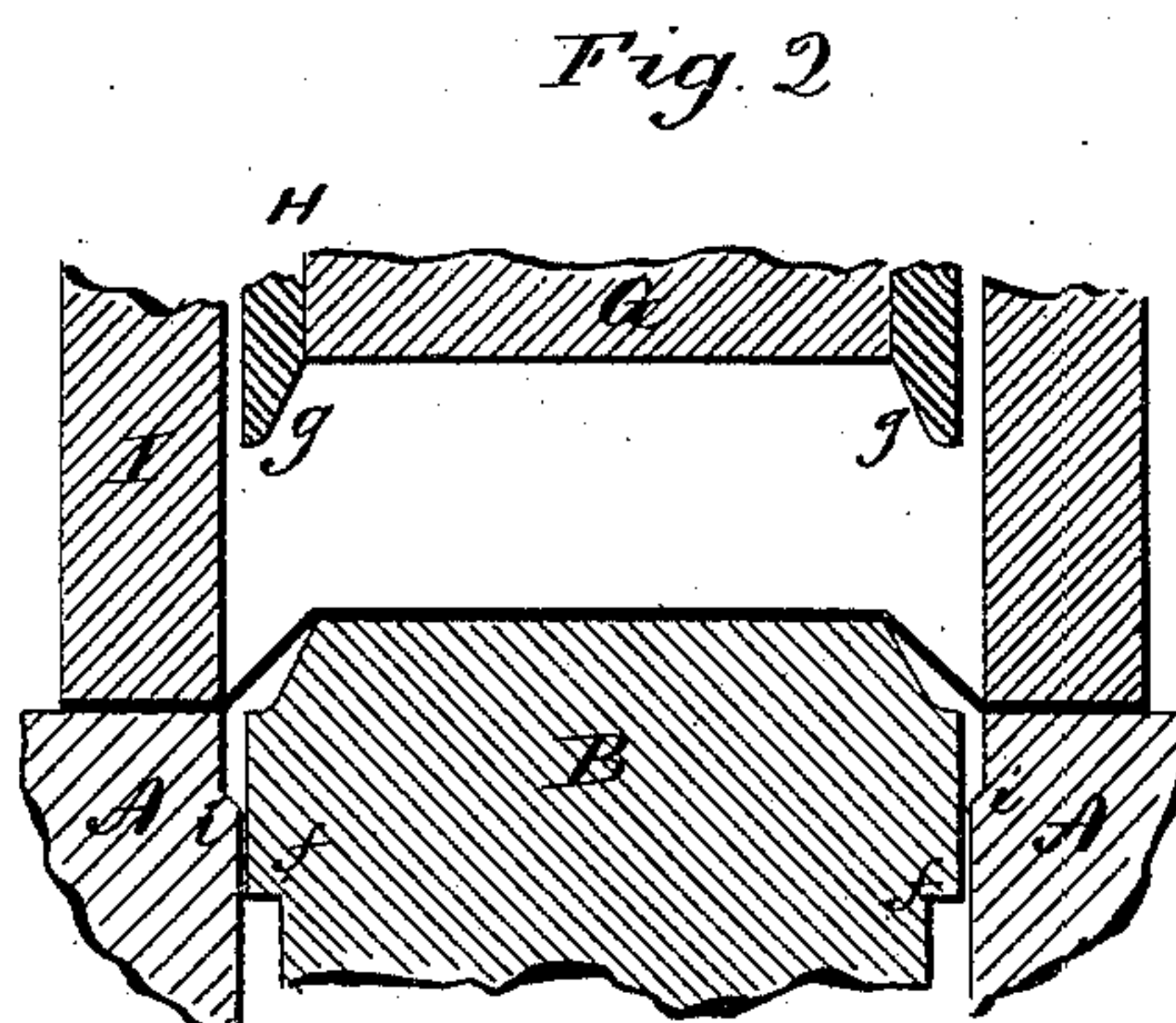
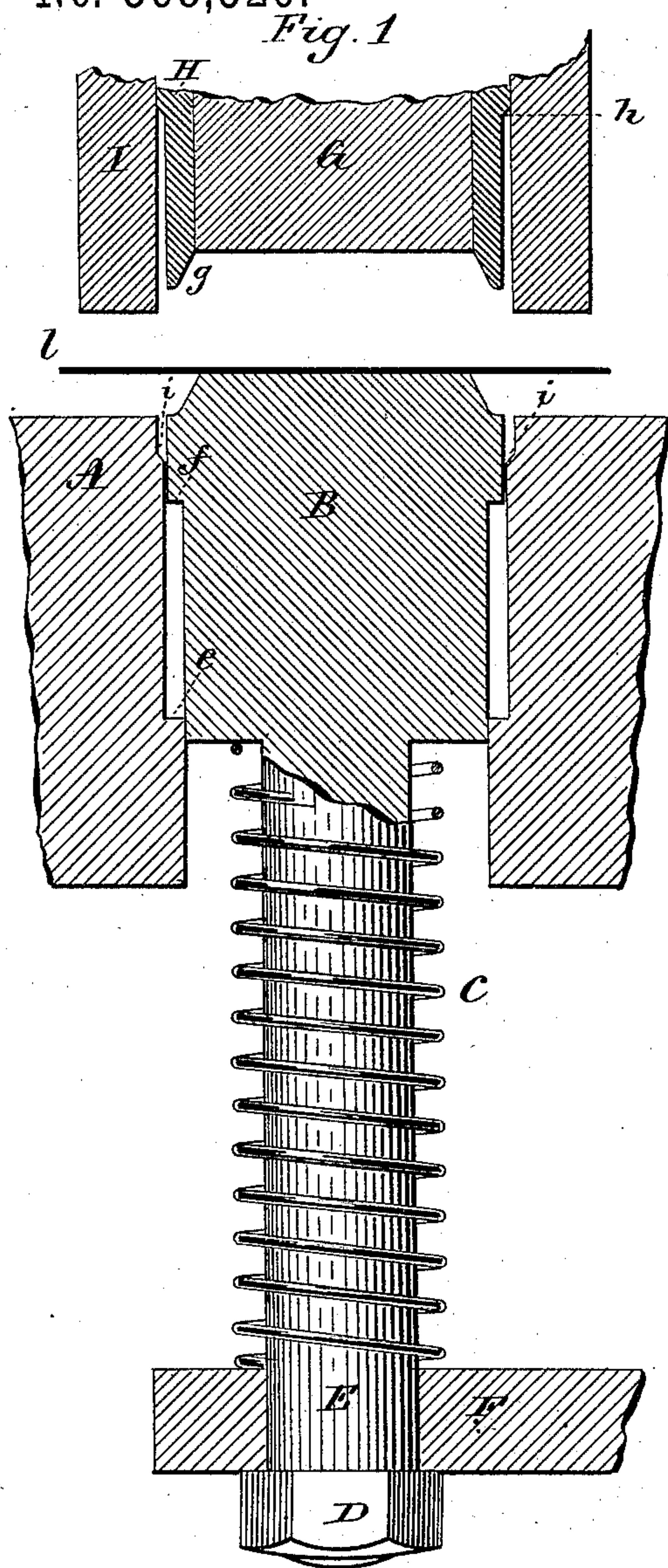
2 Sheets—Sheet 1.

M. FOWLER.

DIE FOR FORMING METALLIC CLOCK CASES..

No. 368,526.

Patented Aug. 16, 1887.



Witnesses  
J. H. Shumway.  
Fred C. Earle

Merrin Fowler.  
Inventor  
By atty. *Fred C. Earle.*



(No Model.)

2 Sheets—Sheet 2.

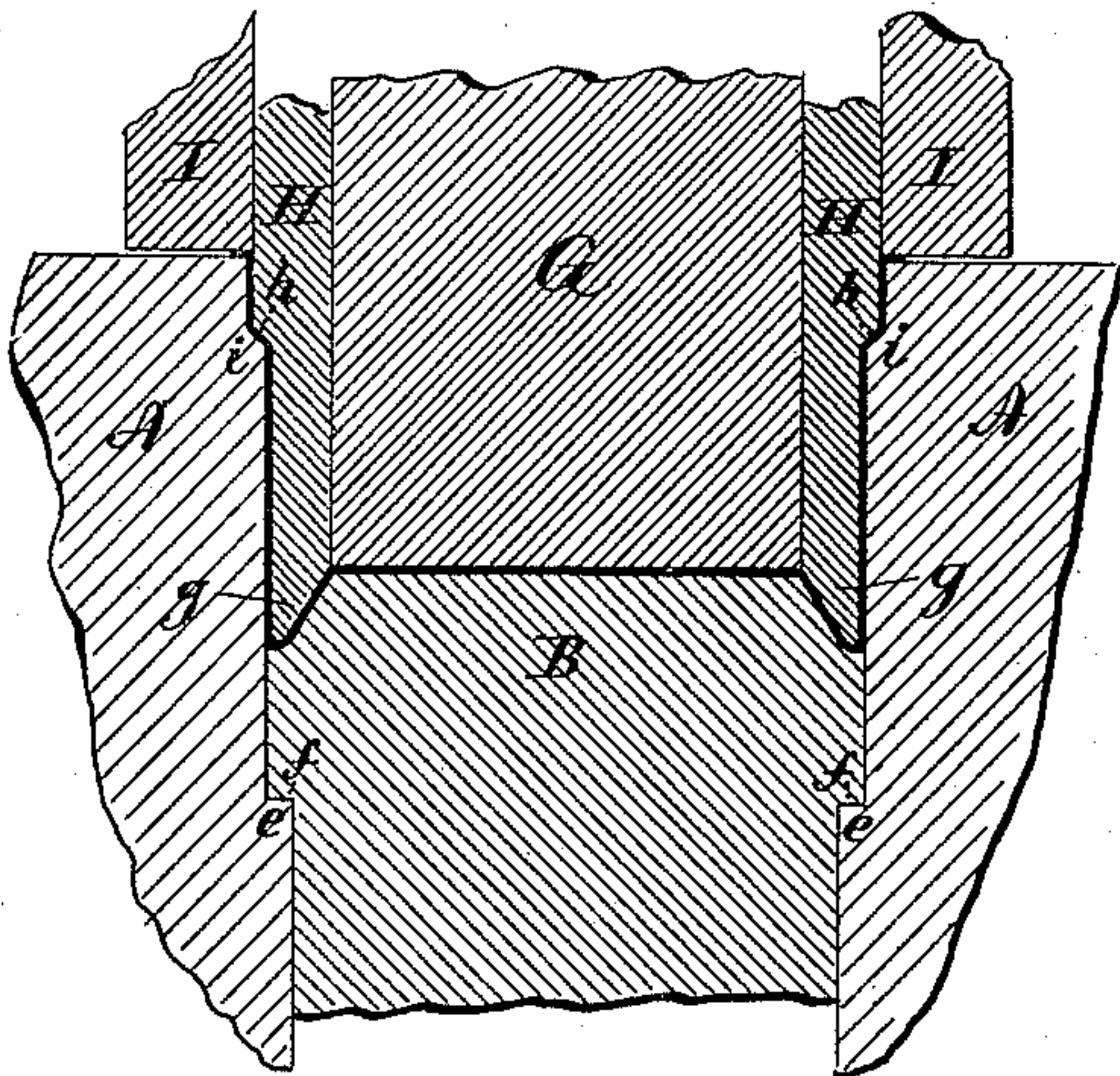
M. FOWLER.

DIE FOR FORMING METALLIC CLOCK CASES.

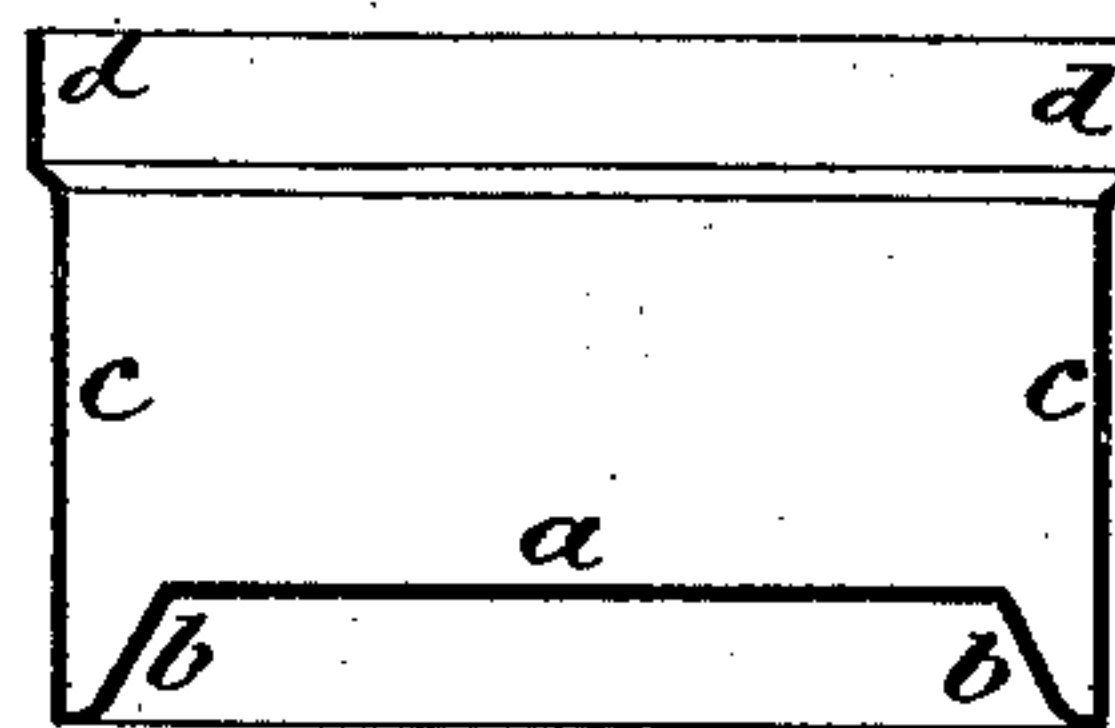
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*Fig. 6*



*Fig. 7*



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# UNITED STATES PATENT OFFICE.

MERWIN FOWLER, OF NEW HAVEN, CONNECTICUT.

## DIE FOR FORMING METALLIC CLOCK-CASES.

SPECIFICATION forming part of Letters Patent No. 368,526, dated August 16, 1887.

Application filed June 6, 1887. Serial No. 240,393. (No model.)

*To all whom it may concern:*

Be it known that I, MERWIN FOWLER, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Making Hollow Articles from Sheet Metal; and I do hereby declare the following, when taken in connection with accompanying drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a vertical central section of the stationary die, yielding follower, central punch, tubular punch, and holder in their normal or stopped condition as preparatory to receiving the blank; Figs. 2, 3, 4, and 5, the same parts in different positions in their movement to the complete position of the same parts shown in Fig. 6; Fig. 7, a central section of a case complete.

This invention relates to an improvement in dies for forming hollow articles from sheet metal, with special reference to the formation of sheet-metal clock-cases, such, for illustration, as seen in section, Fig. 7. These cases are of cylindrical shape, the back being completely closed, the case open at the front to receive the movement, dial, &c. In this illustration *a* represents the back and *b* the bevel around the back to form a recessed back; *c*, the sides of the case, and *d* the rabbet at the front of the case. The case is drawn up complete from a disk of sheet metal; but in the more general methods of drawing several operations are required, each operation requiring separate and distinct dies, and, because the work performed in one operation necessarily hardens the metal to a considerable extent, annealing is required at stages during the formation of the complete case. What I have said regarding the method of forming the case of the shape and character described and shown is true of many other shapes of clock-cases, as also of other hollow articles. In thus drawing up the articles from sheet metal, owing to the great strain which is necessarily brought across the lower end of the drawing-die, the metal is distressed to such an extent that it frequently breaks either at the angle or on the sides as the punch forces the metal into the die.

The object of my invention is to produce such cases or hollow articles at a single operation, avoid annealing, and also avoid the great distress and breakage of the metal under the usual methods of shaping.

I will describe the process and dies for the manufacture of a case such as seen in Fig. 7.

The press for performing the drawing operation is common and well known, and does not require particular description further than to say that it carries three vertical slides, each timed with relation to the others, according to the work to be performed, with a bed below as usually arranged for carrying the stationary die.

In Fig. 1 I illustrate the die mechanism as in the normal position awaiting the introduction of a disk of metal. *A* represents the lower die, which is made fast in the bed of the machine. Centrally within it is a cavity opening upward, and of a diameter and shape corresponding to the exterior of the case. In the cavity of this die is a follower, *B*, which is arranged to move up and down in the die, guided in the cavity of the die so as to always maintain the same relation thereto. The upper end of this follower corresponds to the outside shape of the central or back plate, *a*, and the bevel *b*. The follower is supported upon a yielding device, preferably a spring, *C*, which will forcibly hold the follower up, with its face above the top plane of the fixed die *A* equal to the depth of the cavity to be formed in the back of the case, and as seen in Fig. 1. The amount of resistance required for this spring will be indicated hereinafter.

The upward position of the follower may be limited by a nut, *D*, screwed onto a shank, *E*, extending from the lower end of the follower downward through a stationary bracket, *F*, and the spring *C* may rest upon this bracket *F* and bear against the lower end of the follower. In the cavity of the die *A* in which the follower moves, or at some other suitable point, a stop is formed to limit the distance to which the follower may be forced downward. This is best done by making the shoulder *e* in the cavity with a corresponding shoulder, *f*, on the follower, so that at the proper time the follower may come to a bearing on the said shoulder, as seen in Fig. 6. In the slides



above there is fixed, first, a central punch, G, having its lower face corresponding to the flat portion of the top of the follower—that is, to the back plate of the case. Surrounding the punch G is a tubular punch, H, the external diameter of which corresponds to the internal diameter of the body of the case, and its lower end corresponds to the inside of the bevel which surrounds the back plate. This latter portion is indicated at *g*, Fig. 1, and normally stands below the face of the punch G. Surrounding the tubular punch H is a tubular holder, I. These three parts, G, H, and I, are moved in the proper time by the respective slides of the press. The internal diameter of the holder I should be little larger than the extreme diameter of the finished article, and the plane of the face should be parallel with the plane of the stationary die A. To form the rabbet *d* in the case the tubular punch H is constructed with a shoulder, *h*, enlarging the diameter of the punch H to the extent of the rabbet to be formed, and the stationary die has at its upper end a corresponding enlargement, *i*, of its cavity.

The disk from which the case is to be formed is cut from sheet metal of the required thickness and size, and is laid flat across the top of the follower B, as seen in Fig. 1, *l* indicating the disk. The press now commences its work, the holder I comes down upon the disk around the follower B and crimps the disk over the top of the follower, the resistance of the spring being sufficient to support the follower against the pressure of the holder I, and the holder I clamps the portion of the disk around the follower upon the stationary die A with sufficient force to flatten the metal and hold it, yet so that under the subsequent action of the press the metal may be gradually drawn from between the holder I and the die A. The punch G next comes upon the disk and firmly clamps the central part of the metal between it and the follower B, as seen in Fig. 3. The hold upon the metal, produced by the punch G and the follower B, is so strong that in the subsequent operations the metal will not to any appreciable extent be drawn outward from between the punch G and the follower B, the power of the spring or yielding support of the follower B being sufficient to resist such tendency. The disk now stands with its central portion raised from the plane of the surrounding portion, the portion between the punch G and the holder being inclined upward to substantially the extent at which the plane of the follower is above the plane of the stationary die A. Next the tubular punch H comes upon the metal between the punch G and the holder I. The lower edge of the tubular punch forces the metal down over the edge of the follower, as seen in Fig. 4. This gives to the disk the depression for the back and forms the bevel surrounding the back. Under this condition the metal is firmly clamped between the follower B, the central punch, G, and the tubular

punch H. Then the punch G and the tubular punch H continue their downward movement, the follower B yielding for such movement, as seen in Fig. 5. Under this action the metal is drawn inward from between the holder I and the stationary die A and into the cavity in the die A, as seen in Fig. 5. The descent of the punches G and H continues until finally the descent of the follower B is arrested by the shoulders *ef*, (see Fig. 6,) and the descent of the punch G and the tubular punch H cease at the same time, as seen in Fig. 6. The enlargement of the tubular punch enters a corresponding recess at the mouth of the cavity in the stationary die and forms the rabbet. Under this action, and as the punches descend, the metal is gradually drawn from beneath the holder and stationary die into the die to form the sides of the case.

The drawing of the metal for the sides commences as the tubular punch enters the stationary die, and as the metal between the punches and the follower B is so firmly held as not to yield under the drawing strain, the metal drawn from beneath the holder and stationary die follows the punch and forms the sides as the punch descends; and, because of the support given by the follower B to the metal, preventing the stress of metal over the lower edge of the drawing punches, the liability of the metal to break is avoided, and because the reverse bend or striking necessary to form the depression in the back is produced before the drawing of the sides commences, the portion of the metal from which the sides are to be formed is not distressed or affected by the central shaping operation; hence no annealing is required in the complete production of the article, and it is produced so complete from a disk of metal at a single operation or drawing.

The yielding device for the follower B should be made adjustable, so that a greater or less clamping-pressure may be produced between the central holding and shaping punches and the follower, according to the nature of the metal or the central shaping required to be produced.

The illustration of the invention as applied to the formation of the cylindrical cases, as I have described, will be sufficient to enable those skilled in the art to apply the invention to the production of hollow articles of other shapes.

I have represented the parts as arranged in a press in which the movable slides are above and the fixed die below; but it will be understood that these parts may be inverted, as is done in presses for many classes of work.

After the work is complete the slides above return, withdrawing the punches and holder. The follower, rising with the central punch, forces the article upward from the stationary die, and the punch, passing above the face of the holder, the rim, which is necessarily left around the open edge of the article, bears



against the under face of the holder, so that the punch is withdrawn, leaving the article free to be removed.

I claim—

5 The herein-described dies for forming hollow articles, consisting of a stationary die having a cavity therein corresponding to the exterior of the sides or wall of the article, a follower within said cavity and adapted to yield under pressure, the face of said follower, in its  
10 normal position, being in a plane above the plane of said stationary die and corresponding to the shape of the closed end of the article to be produced, a central punch the face

of which corresponds to the central portion of  
the face of said yielding follower, a tubular  
punch surrounding said central punch, its face  
and sides, with the face of the central punch  
corresponding to the shape of the interior of  
the article to be produced, a holder surround-  
ing said tubular punch, its face parallel with  
the face of the stationary die and adapted to  
clamp the disk upon said stationary die, sub-  
stantially as described. 15 20

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Witnesses:

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