

(No Model.)

4 Sheets—Sheet 1.

W. S. BEMIS.

DIE FOR THE MANUFACTURE OF WRENCHES.

No. 498,204.

Patented May 23, 1893.

Fig. 1.

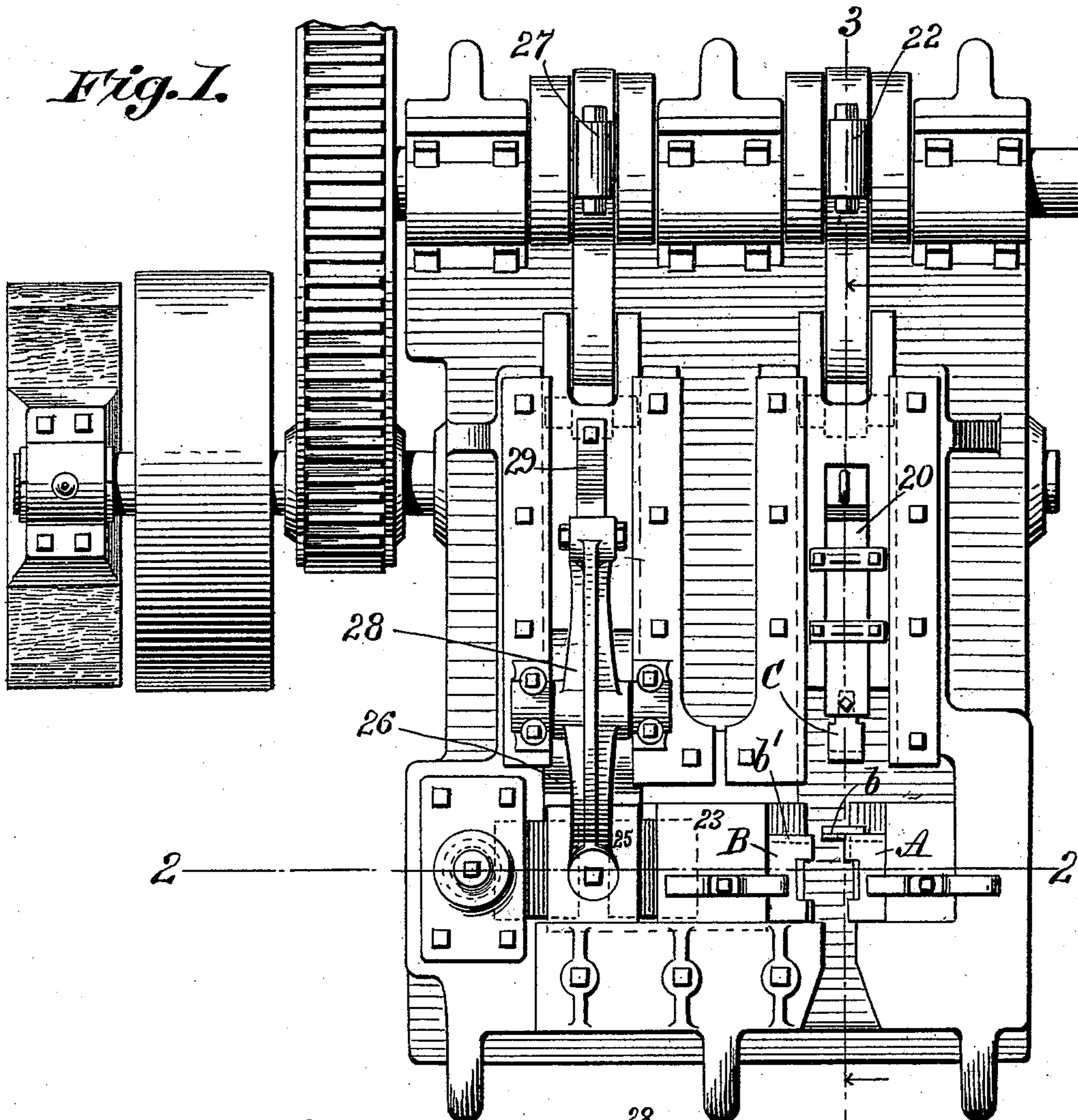
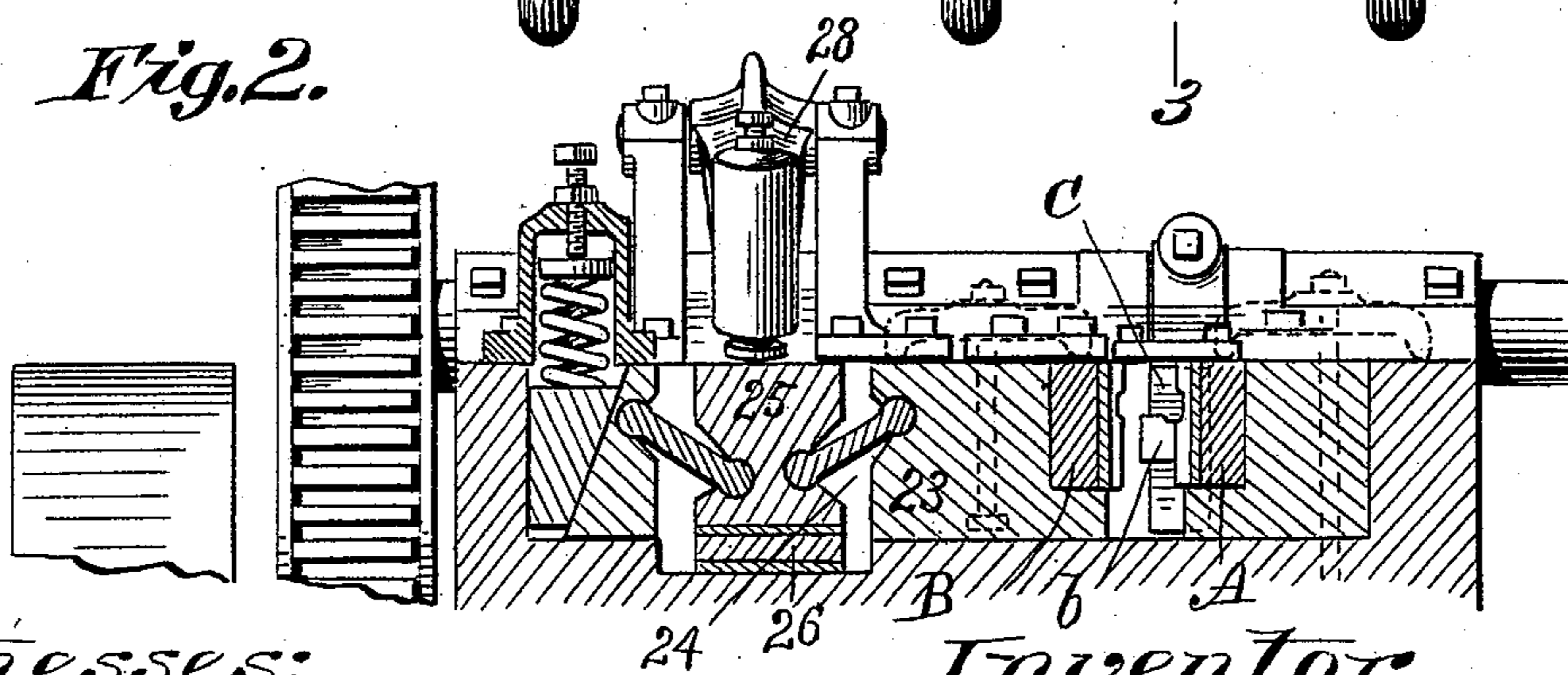


Fig. 2.



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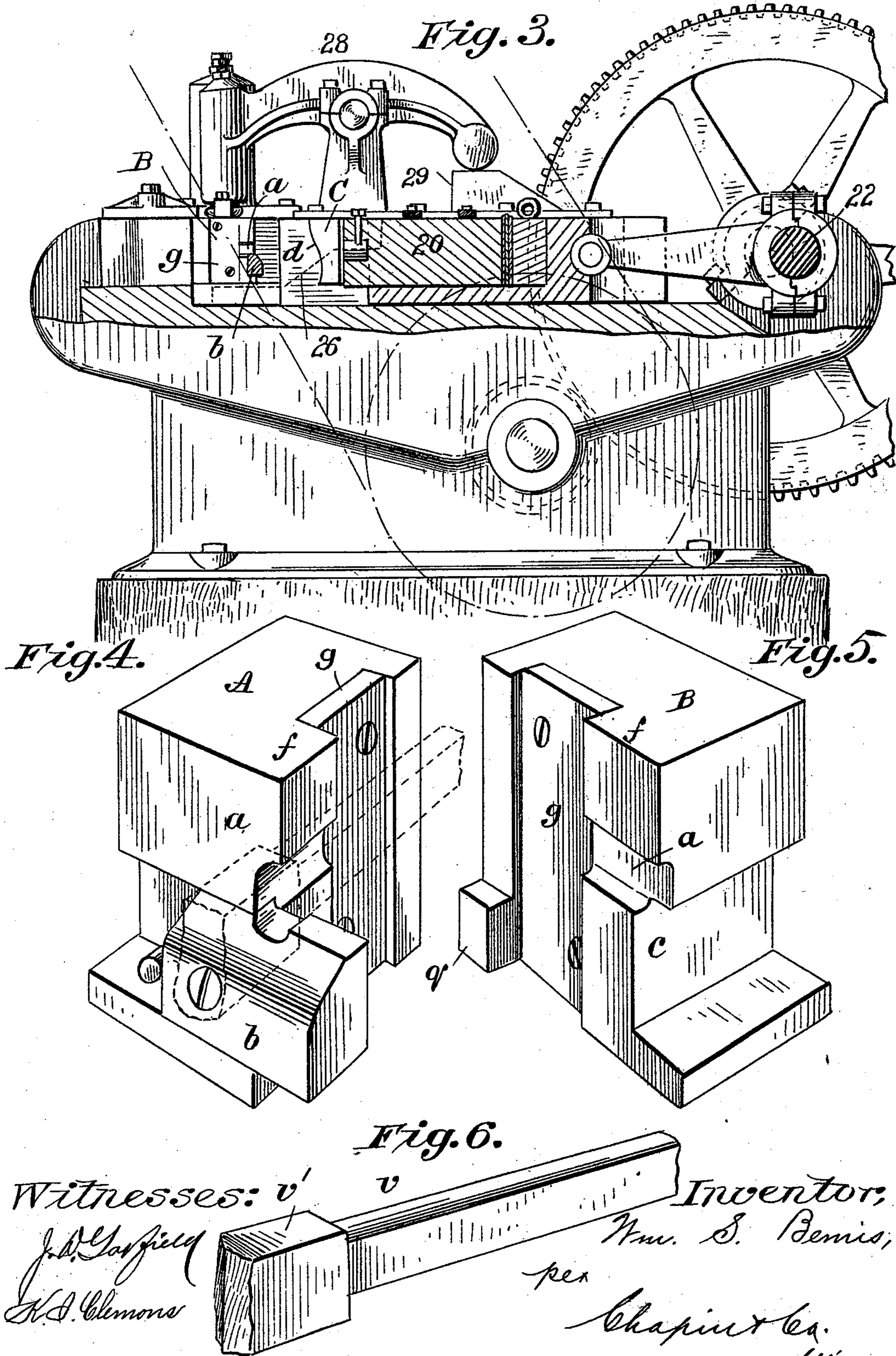
Chapman & Co. Attys.

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Fig. 7.

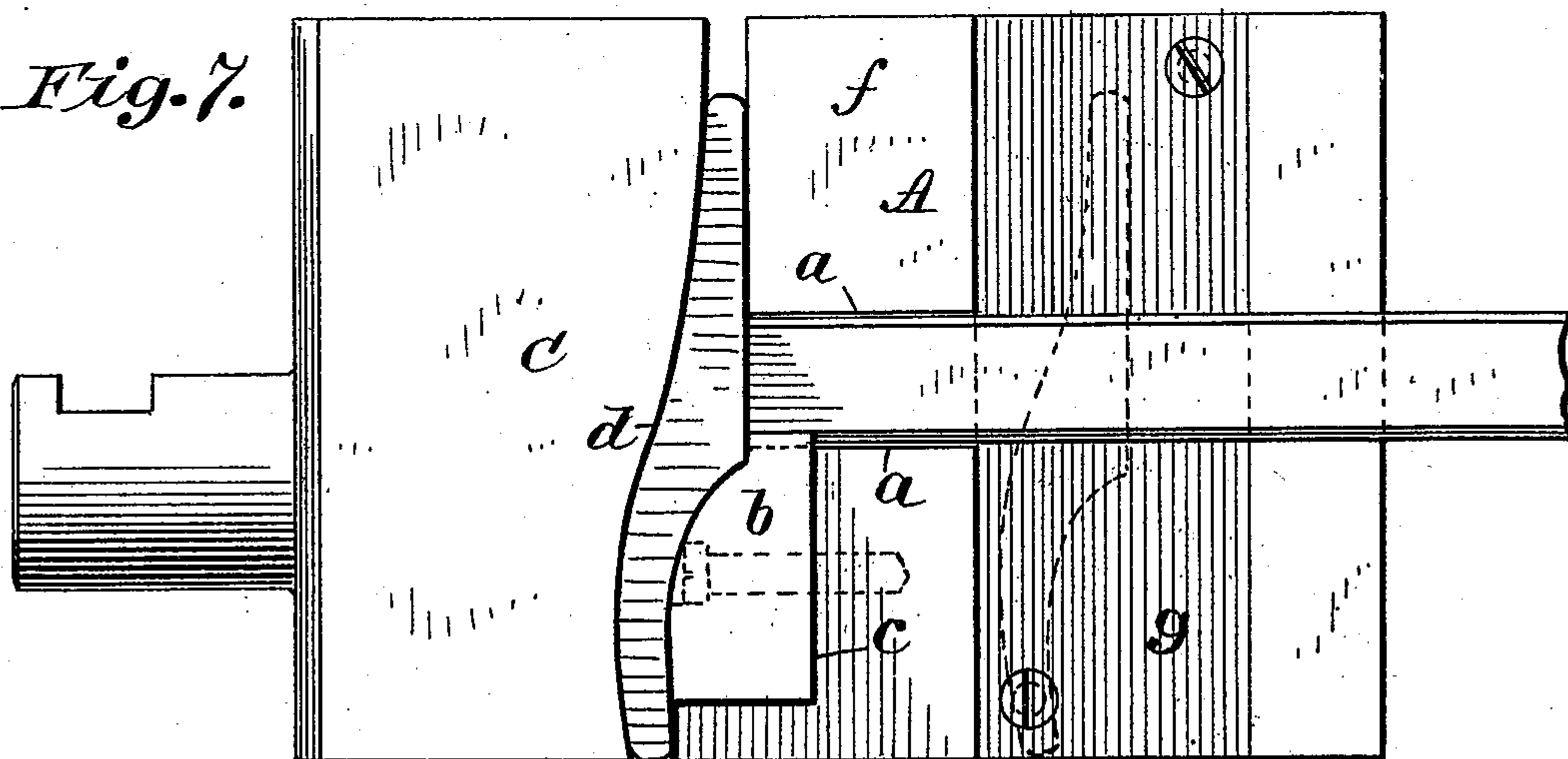


Fig. 8.

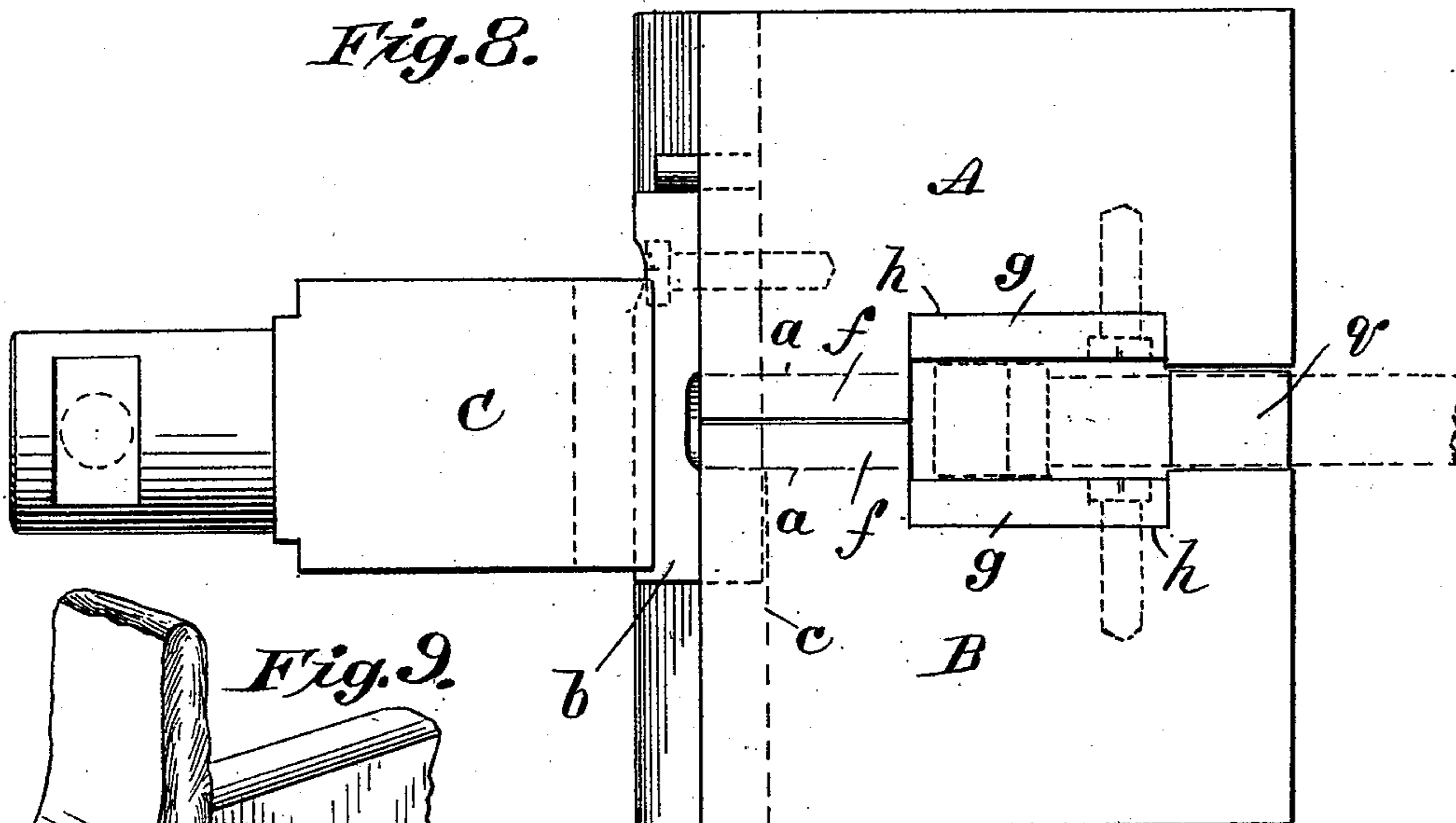


Fig. 9.

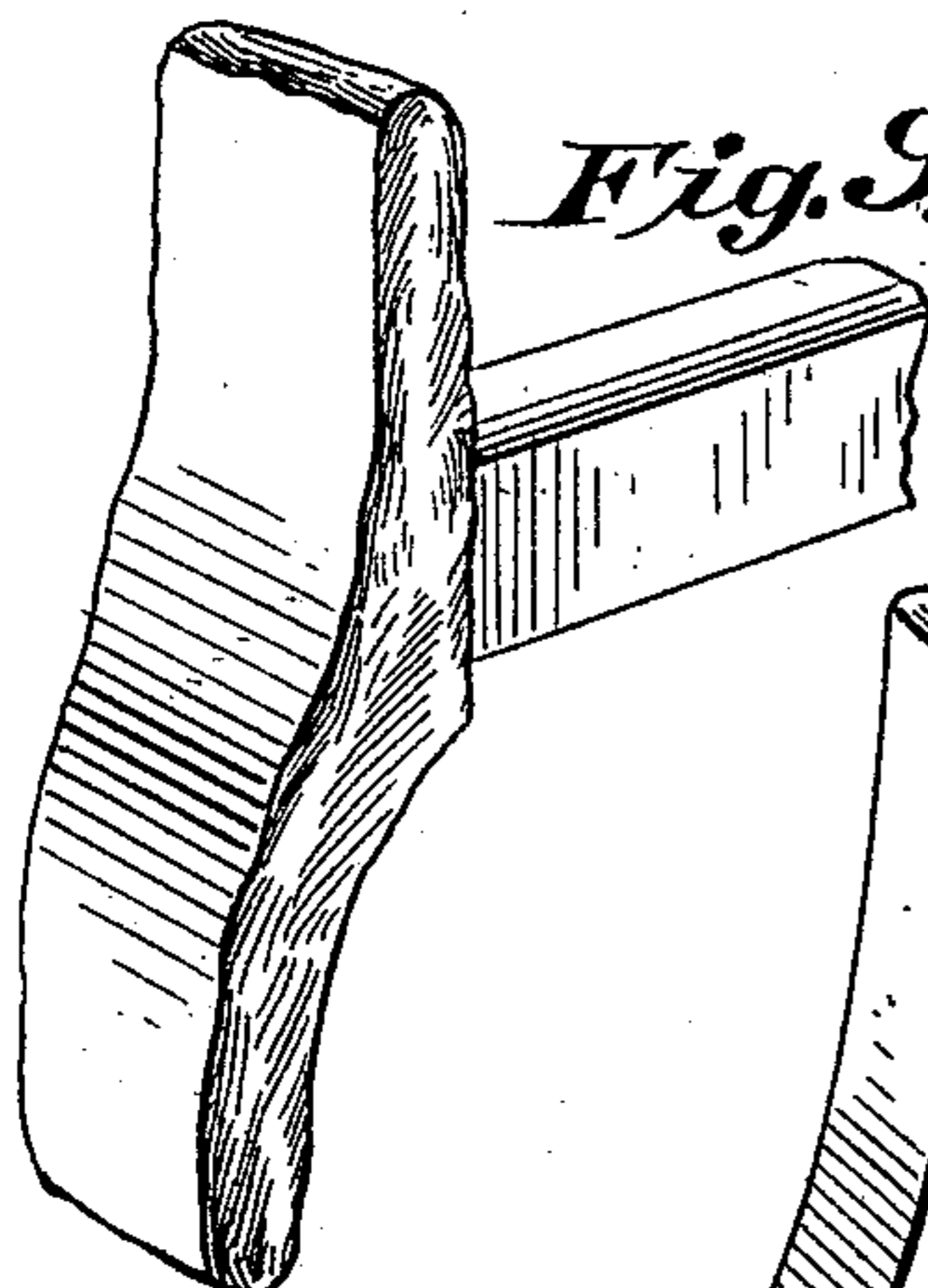
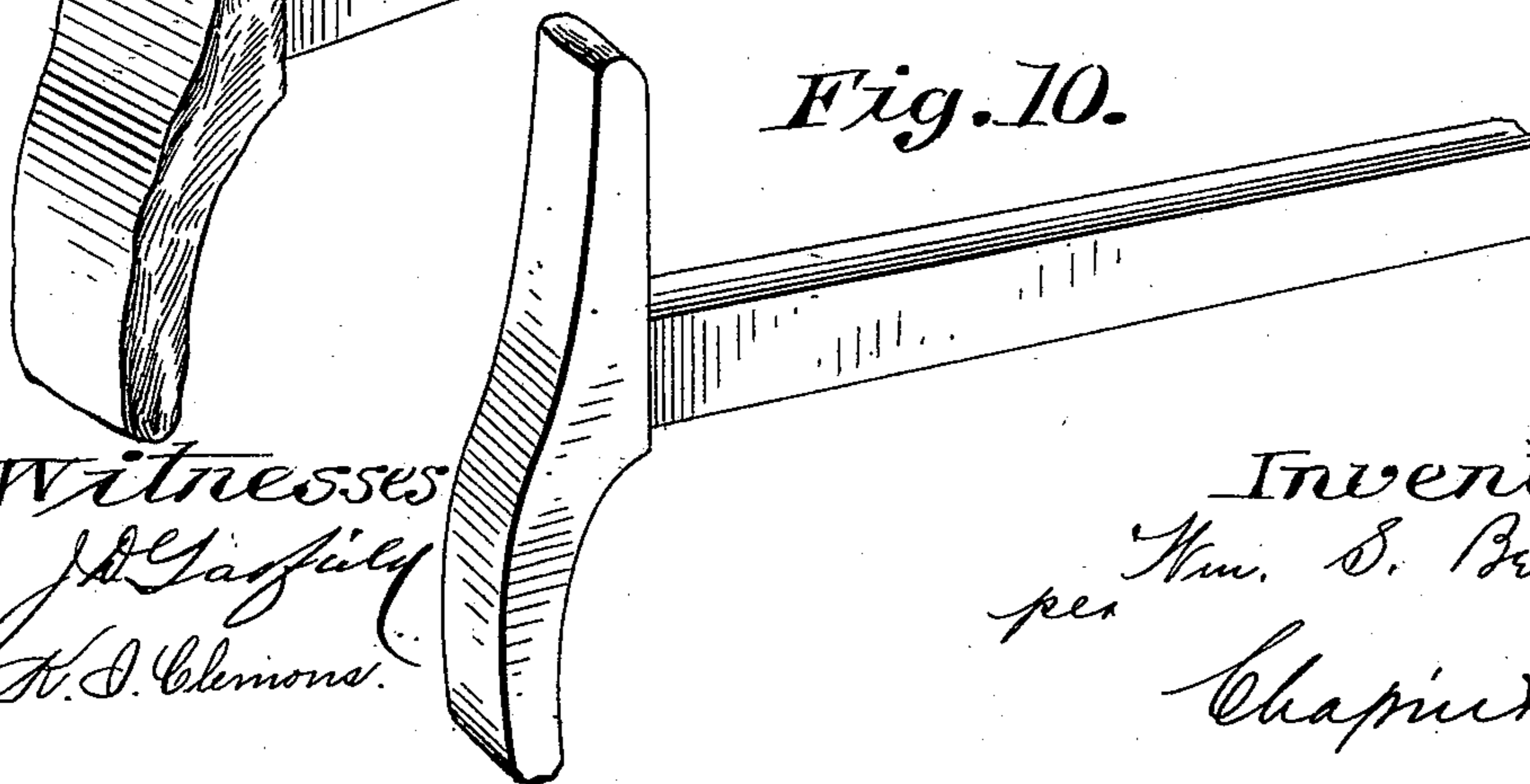


Fig. 10.



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Fig. 11.

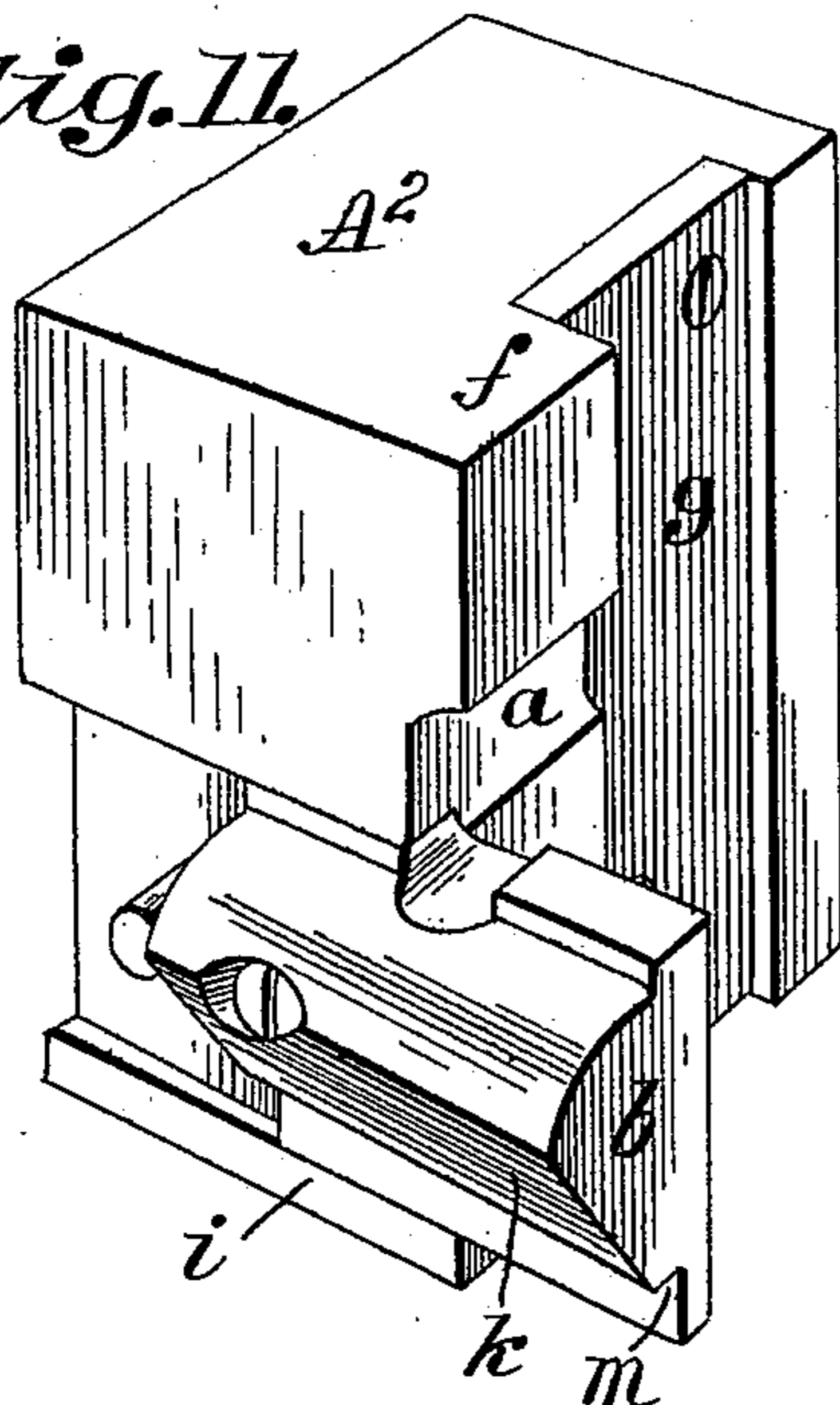


Fig. 12.

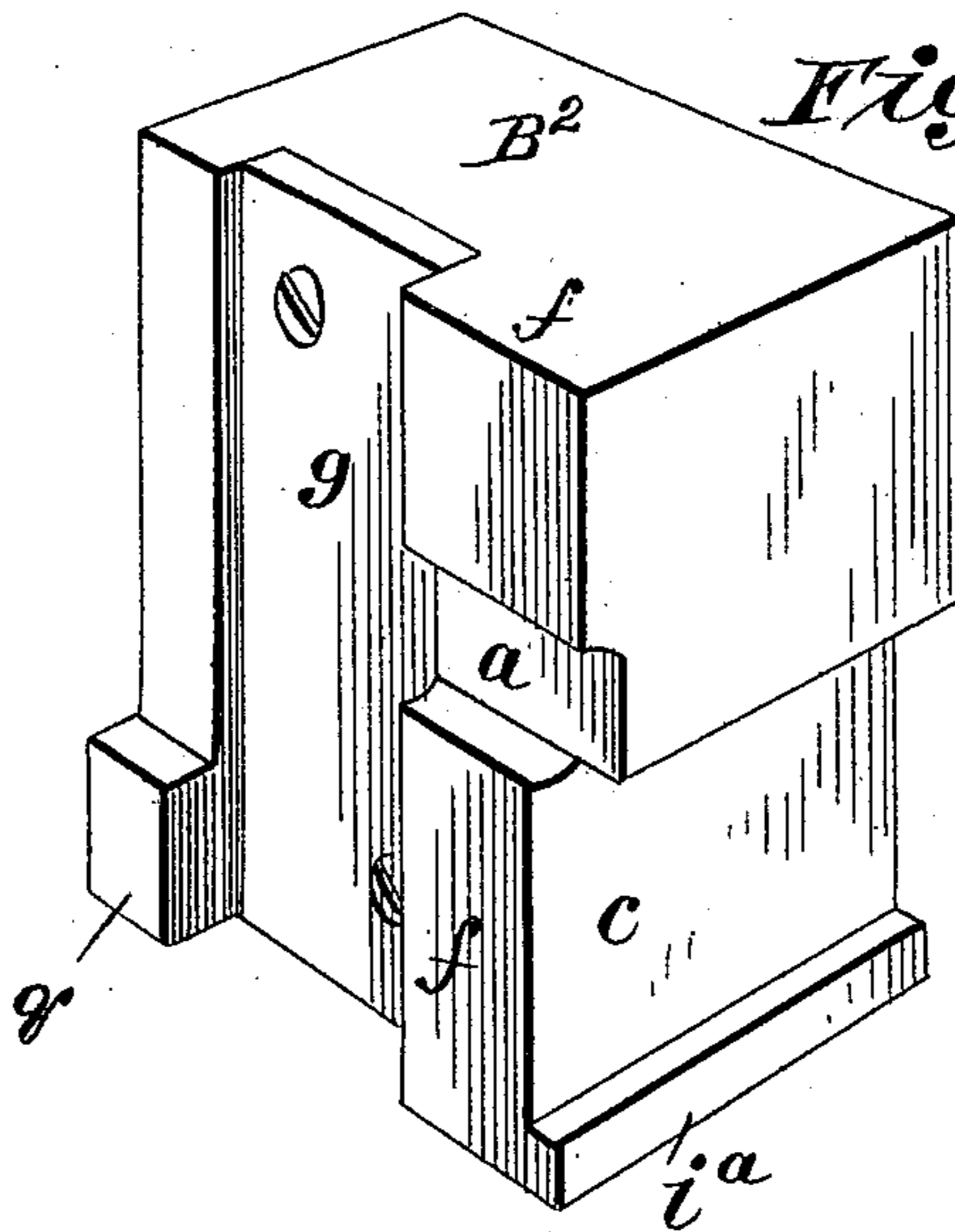


Fig. 13.

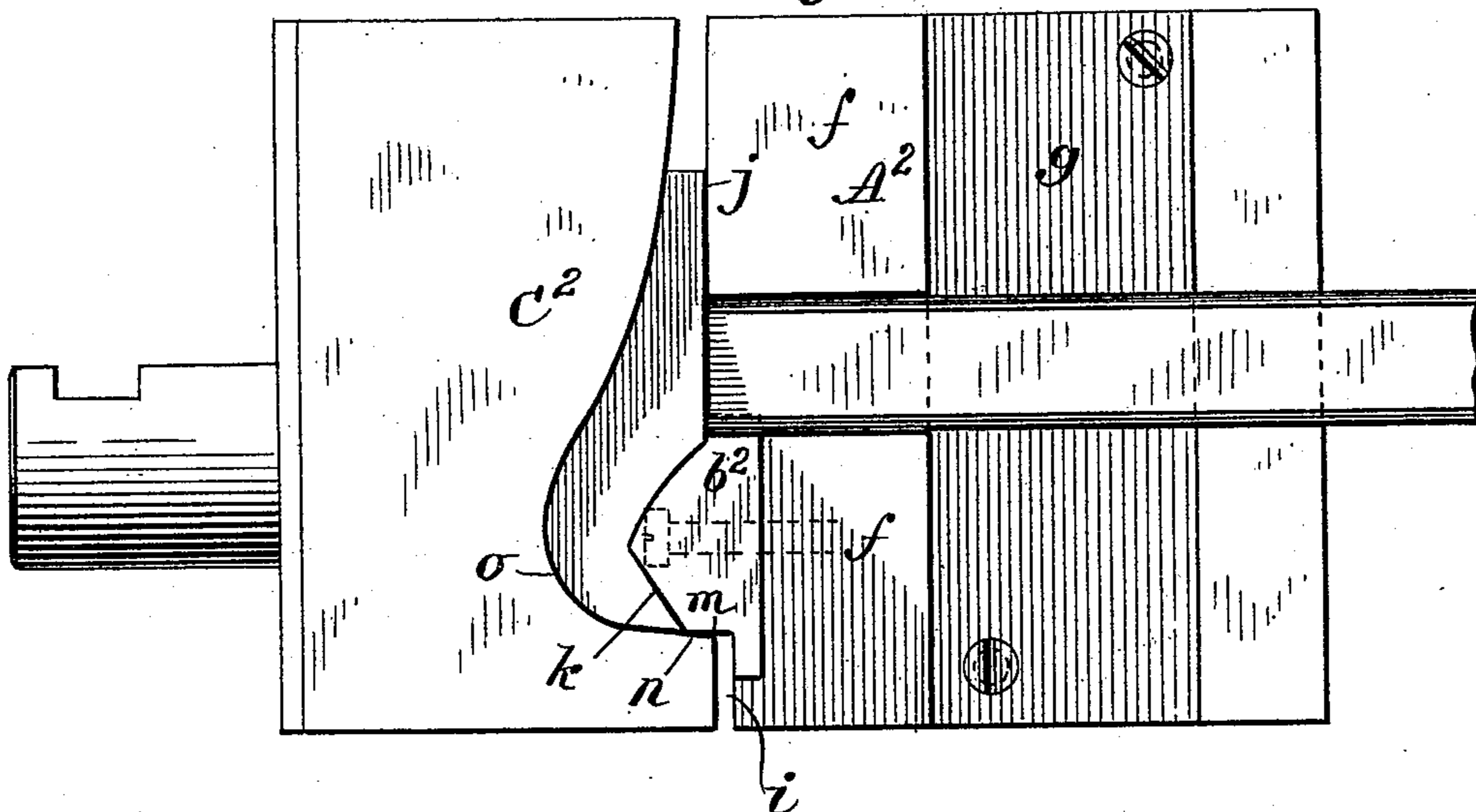
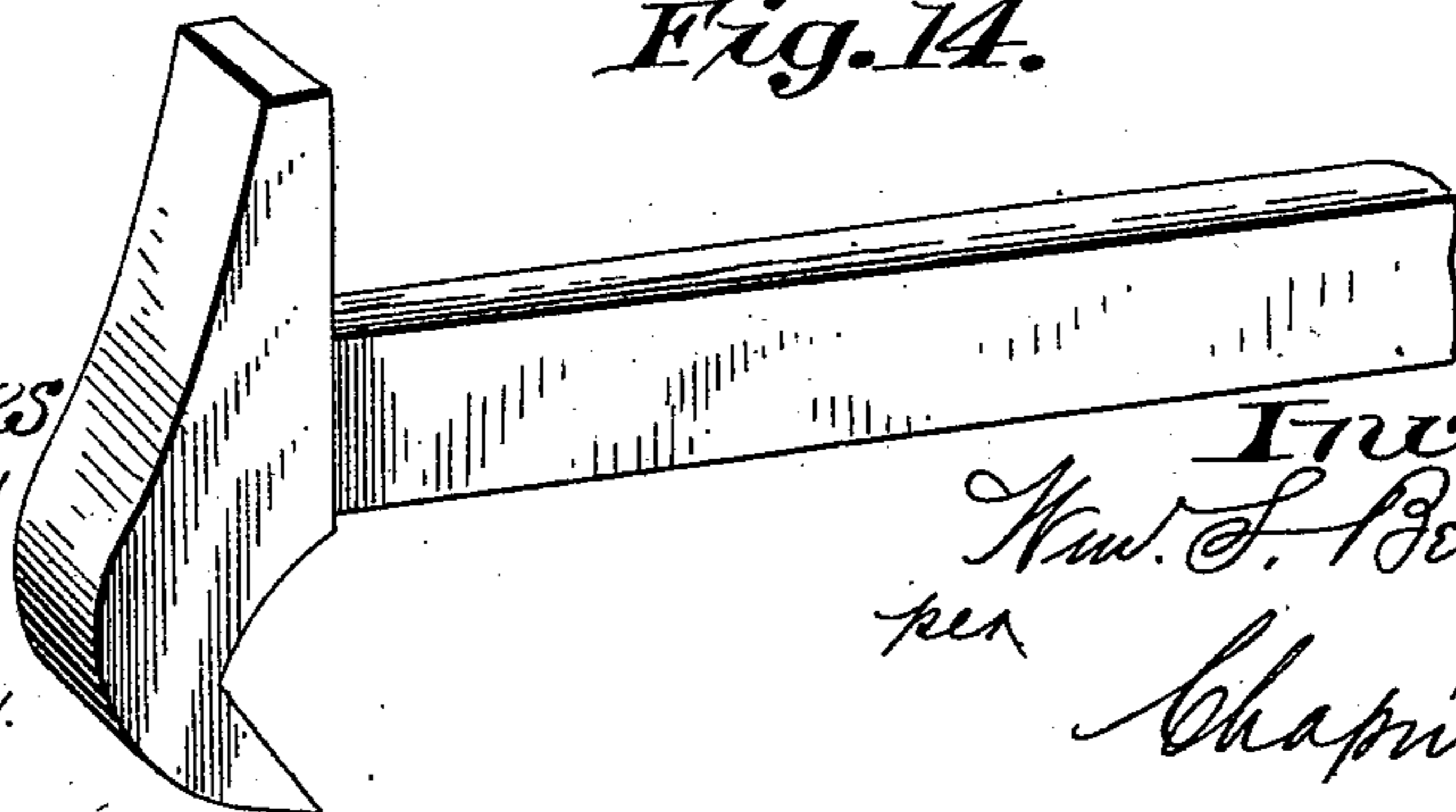


Fig. 14.



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UNITED STATES PATENT OFFICE.

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DIE FOR THE MANUFACTURE OF WRENCHES.

SPECIFICATION forming part of Letters Patent No. 498,204, dated May 23, 1893.

Application filed June 18, 1892. Serial No. 437,141. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. BEMIS, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in the Manufacture of Wrenches, of which the following is a specification.

The purpose of this invention is to produce, by the employment of improved means, the head of a wrench, termed in the trade a "combination" wrench, wherein the widened head is projected from the wrench-bar for a suitable distance in a member above the bar, and in another member at the other side of the bar, which on its inner or rear side has an angular recess or depression, whereby it partakes of the nature of a hook. An example of this form of wrench-head is seen in Figure 14 of the accompanying drawings.

An object of the invention is to secure the production of the wrench-head of the required form, on the wrench-bar very rapidly and by few steps or manipulations.

Another object is to insure, in the production of the wrench-head of the required form, the avoidance of a seam-mark, or web or fin, on the inner angular face of the head and otherwise secure the more nearly perfect conformation of the head, whereby lessened and easier labor becomes necessary in the finishing up of the wrench member.

Another result, derived under this invention, is the remarkable increase in the capacity and durability of the dies for remaining unimpaired after long continued use.

The invention consists in sets of dies shaped and constructed substantially as will be hereinafter fully described and set forth in the claims.

For uniformity and brevity of reference herein, two of the dies of each set will be termed the "former" dies, and the third die, which has a reciprocatory movement toward and from the closed position of the former dies, will be termed the "working" die.

In the accompanying drawings, which form part of this specification:—Fig. 1 is a plan view of the complete machine showing the

mechanism for reciprocating the working or follower die and one of the forming dies. Fig. 2 is a vertical section on line 2—2, Fig. 1. Fig. 3 is a side elevation and partial vertical section of the machine taken on the line 3—3, Fig. 1. Figs. 4 and 5 are perspective views, on a larger scale, of the pair of dies in conjunction with which the working die is employed for one portion of the wrench-head-forming operation, Fig. 6 being a perspective view of the primary form of the forging blank or bar. Fig. 7 is a side view, also on a large scale, of one of the former dies and the working die as seen toward the right of the line 7—7, Fig. 1. Fig. 8 is a plan view of the working die and of the two former dies, all of said dies being shown as in working proximity. Figs. 9 and 10 are perspective views of the wrench-head as partially and completely formed by the operations of the dies referred to in the foregoing views. Figs. 11 and 12 are perspective views of a second set of forming dies, to the action of which the wrench-head is subjected, after it has been brought partially to form by the aforementioned dies. Fig. 13 is a view similar to Fig. 7, but showing the one former die, and the working die of the secondary set. Fig. 14 is a perspective view of the wrench-head as brought to the ultimate form.

The machine shown in plan in Fig. 1 and in vertical section in Figs. 2 and 3, is adapted to have fitted therein, in proper bearings, or seats, the one fixed and the other movable, former dies, A and B, and the follower or working die, C, or in place thereof, the dies, A², B², C², according as the first or second portion of the head-producing operation is to be performed.

No particular or extended description of the machine will be herein entered into, but brief mention will be duly made of the mechanism for imparting the reciprocatory movements to the movable dies.

The former dies, A, B, are fully illustrated in Figs. 4 and 5, and in conjunction with the working die, C, in Figs. 7 and 8. The fixed and movable former dies, A, B, comprise blocks of cast iron, or other suitable kind of

iron or metal, and have their sides, one of which is approached by the other toward the rear of each block, the wider as at f, f , so that both die-blocks may have the surfaces of said widened portions brought to contact; while forwardly of the contacting portions the less wide portions of the said blocks leave a space as most clearly seen in Fig. 8, the utility of which will be hereinafter referred to. The said meeting portions of the die-blocks, A, B, are provided intermediate of their heights, with the horizontal grooves or channels, a, a , for the accommodation of the portion of the forging bar, v , which is next to the enlargement, v' , from which the wrench-head is to be produced, and so that said enlargement may protrude beyond the rearward faces of the said blocks which are toward the reciprocating working die, C. There is, between the rear faces of said dies, A, B, and the forward face of the working die, C, when said dies are in their proximate relations, a space, as seen in Fig. 7, which conforms to the contour from front to the rear of the drawn forging bar enlargement, which is indicated in Figs. 9 and 10;—that is to say, a space, the wall of which next to and above the bar is perpendicular and which wall, below the bar, is convex, while the opposite wall is of a gradual ogee contour. In their contribution to the formation of this forging space, one of the former dies, say the fixed one, has a rearwardly prominent or extended lug, b , the rear surface of which,—having its top next below the groove, a ,—is rearwardly and downwardly curved, and is extended across and beyond the face of the portion, a' , which contacts with the corresponding face of the other block, B; and for the accommodation of this lug extension, said block, B, has the open socket or recess, C. When the die blocks, A and B are together, said extension, b , appears to be, and for the instant is the same as a rearward horizontal protuberance from the continuous rear surface of both of said blocks having a portion thereof extended at each side beyond the seam.

The working die, C, has its forward face, d , of the aforementioned ogee or compound curved form, its prominent section being upward, and is mounted at the forward end of the slide 20 to which the reciprocatory movement is imparted by the connection with the eccentric or wrist, 22, on the main shaft. The die, B, is fixed on a sliding support, 23, which is movable toward the die, A, at right angles to the slide for the working die. Its motion is imparted in the one direction by the straightening of the toggle, seen at 24, in Fig. 2, which is occasioned by the elevation of the member, 25, by an inclined slide, 26, (indicated on Figs. 2 and 3) which slide receives its reciprocatory motion by the wrist or eccentric connection indicated at 27, Fig. 1. The slide 23 and its die block, B, are withdrawn by the positive lowering of the member, 25,

which is occasioned by the downswinging of the forward arm of the intermediately hung lever, 28, as the inclined portion, 29, of the slide, 26, upwardly forces the rear arm of said lever. These last described devices for imparting the movements to the die-carrying slides constitute no part of this invention, and, of course, may be substituted by other means for giving said motions.

The space between the die blocks, A, B, forward of the widened portions, f, f , and leading to the front of the block are preferably constituted by removable pieces, g, g , which are set in the recesses, h, h , therefor. The facing surfaces of these pieces g, g , have, when the dies are together, a separation corresponding to the desired width, or transverse dimension, of the wrench-head.

The set of dies, A^2, B^2, C^2 , for performing the final part of the head producing operation are precisely the same in all respects as the above described set of dies, A, B, C, with the exception of the features which will be now pointed out. The former die, A^2 , has the lower portion of its rear face much less prominent than the lower rear portion of the die, A; in fact, as here shown, the lower face portion, i , is less prominent than the upper face portion, j ; and the lug, b^2 ,—which has the same relative position as the one, b , on the other die, A,—is of angular form the dividing line between the angularly arranged faces being in a horizontal line coincident with the direction of movement of the movable former die. The lower forwardly receding face, k , terminates abruptly in the face, m , which is extended forwardly at right angles to the aforementioned face, i . The face, i^2 , of the fellow former die, B^2 , is likewise rabbeted and in the same plane as the face, i , and has the channel, c , for the accommodation of the extension lug. The working die, C^2 , has its lower portion directly forwardly extended, the face, n , with the face, m , constituting a shear; and the curved portion, o , at the one side, and the angular faced lug at the other side, of the lower part of the die-space impart the angular-convex form to the lower jaw of the wrench-bar. It will be perceived that while the former dies of each of the sets A, B, or A^2, B^2 , have the forwardly opening space between them, in advance of said contacting portions, f, f , they, nevertheless, are prevented by the abutment lug, q , from having any swinging movements toward each other whereby the separated faces might be otherwise than parallel.

In the production of the two oppositely extended jaws on the wrench-bar, the heated forging blank, which is usually of wrought iron, is, while the three dies, A, B, and C are separated, held by tongs with its shank in the recess, a , of the fixed die, A, and the enlargement, v' , lying upon and extended rearwardly beyond the inclined face of the lug, b , as indicated in Fig. 4, and then the mov-

able former die, B, comes to its proximity with the die, A, and forging bar; the working die, C, next moves forwardly and swages, draws, or elongates the stock comprised in the enlargement, v' , upwardly and downwardly, at the same time also incidentally forcing it in some extent laterally. After one or more of such reciprocations and forging impacts, as the working die again recedes and the movable die, B, again separates from its fellow, the partially forged head is moved along the length of the lug, b , and, disengaged therefrom, is then forwardly moved endwise and brought to sidewise bearing against the face of the section, g , of the fixed die and receives one or several blows from the corresponding face of the movable die, B. This hammering action, sidewise on the head, may be alternated with the forging action by the working die, which secures the drawing of the head, until the proper degree of extension above and below has been insured, the sidewise hammering maintaining the head, under process of production, at approximately the desired width. In practice four or five swaging impacts of the working die, suitably alternated with about as many blows of the hammer faces, are sufficient for the production of the head to substantially the form shown in Fig. 10. After having thus formed a quantity of the upset bars, the dies, A^2 , B^2 , and C^2 , replace those first employed, and the forger manipulates the partially headed and formed bars substantially as before; and after the closing of the die, B^2 , upon the one, A^2 , as the working die, C^2 , then moves forwardly to impart the hook or angular-convex form to the lower jaw, the shear action of its surface, n , relative to the surface, m under the lug, b^2 , cuts off the surplus stock at the lower end of said jaw.

Particular attention is directed to the feature of one of the former dies of each set which has the lug, b or b^2 , at its rear face and extended beyond the edge to overlap, when the said dies are brought together a portion of the rear face of the fellow die, and which constitutes the entire die surface which corresponds to the width, as well as the height of the inner angular face of the hook-like member of the wrench-bar. Hence there is no seam mark or fin on said angular face, the absence of which renders the final labor or finishing up of the jaw much easier and quicker, and consequently materially cheaper, and this capability contributes largely to the present invention. The hammering faces, g , g , of the former dies are constituted by blocks or plates set and screwed into the vertical channels therefor which are planed in their facing sides. As these blocks may have their faces scarred out after protracted use, they are easily substituted by perfect ones. The lugs b , b^2 , are preferably constructed separately from the bodies of the dies, of which they constitute parts, being connected there-

to by bolts, screws, or otherwise. This permits greater facility of production of the dies of the sets which have such lugs, and also the replacement of the latter when the forging face thereof has become imperfect.

What I claim as my invention is—

1. A set of forging dies for the purpose substantially as set forth, consisting of two former dies, one of which is movable toward and from the other, and having between them an aperture for the accommodation of the wrench-bar, and one having at its side which is right angular to the said facing sides, the rib or lug, which is extended beyond the edge and adapted to overlies the face of the other former die, and the working die having a motion toward and from the faces of the former dies from which said lug protrudes, substantially as and for the purpose set forth.

2. A set of forging dies for the purpose substantially as set forth, consisting of paired die-blocks, one movable toward and from the other, and having at their proximate sides, next to their rear sides, the extended contracting portions, f, f , with the apertures, a, a , and having in the non-contacting portions of said proximate sides the removable plates or blocks, g, g , and the lug or rib provided to protrude beyond the rear faces of said dies, and a reciprocatory working die, substantially as described.

3. A set of forging dies for the purpose substantially as set forth, consisting of paired die-blocks one movable toward and from the other, and having, at their proximate sides, next to their rear sides, the extended contracting portions, f, f , with the grooves, a, a , one of said dies having the distance lug, q , and the lug provided to protrude beyond the rear faces of said dies, and a working die having a reciprocatory movement toward and from the rear faces of the said paired dies, substantially as described.

4. A set of forging dies for the purpose substantially as set forth, consisting of paired dies, one having a movement toward and from the other, and having the aperture between them for the accommodation of the bar, and the lug provided to protrude from the rear faces of both, which is located just below said aperture, and which has a downward and rearward inclination, and the working die having its forward face of a compound curved contour, and adapted for a reciprocatory movement at right angles to the movement of the aforesaid movable die, substantially as described.

5. A set of forging dies for completing the jaw forming operation, herein described, consisting of a pair of former dies movable toward and from the other, and provided with the aperture for the accommodation of the bar, and having protruding from their sides which are right angular to said proximate sides, the rib or lug which has the downward and rearward and then the downward and

forward courses and terminates in the shear
face, *m*, and the working die, adapted for a
reciprocatory movement toward and from the
rear face of the former dies, having its face
5 downwardly and rearwardly curved and then
forwardly continued and terminating in the
shear face, *m*, adapted to coact with said face,

m, and all substantially as and for the pur-
poses set forth.

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Witnesses:

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