

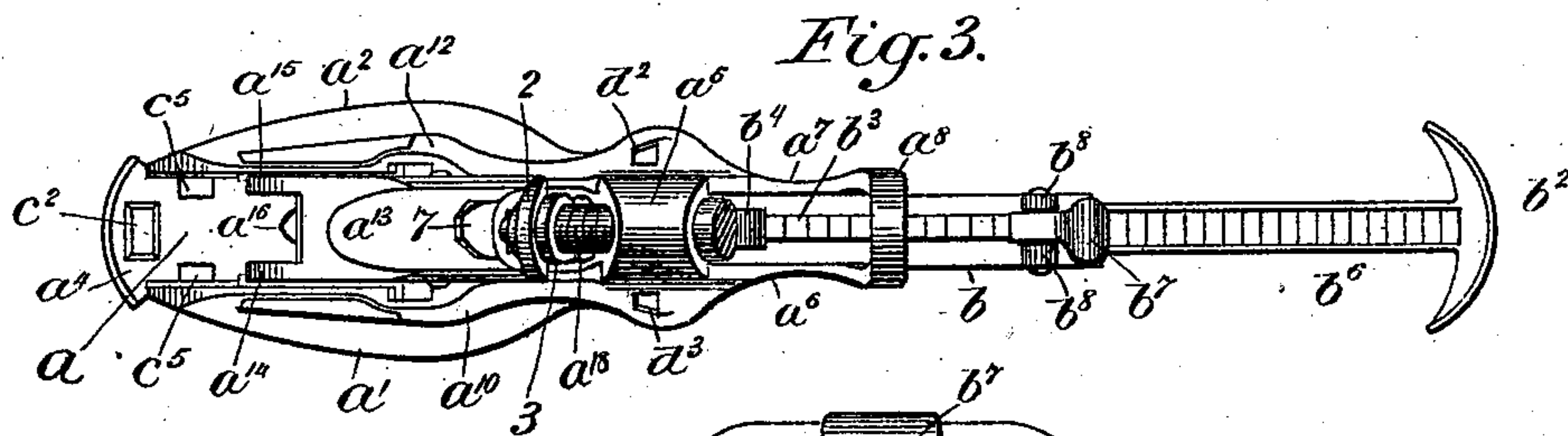
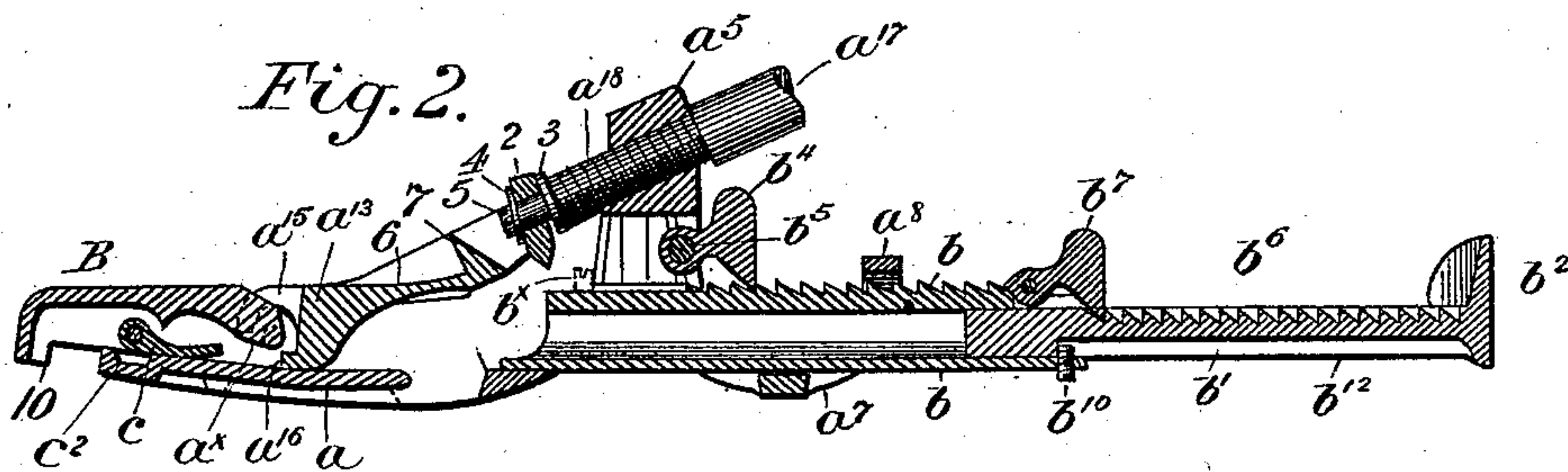
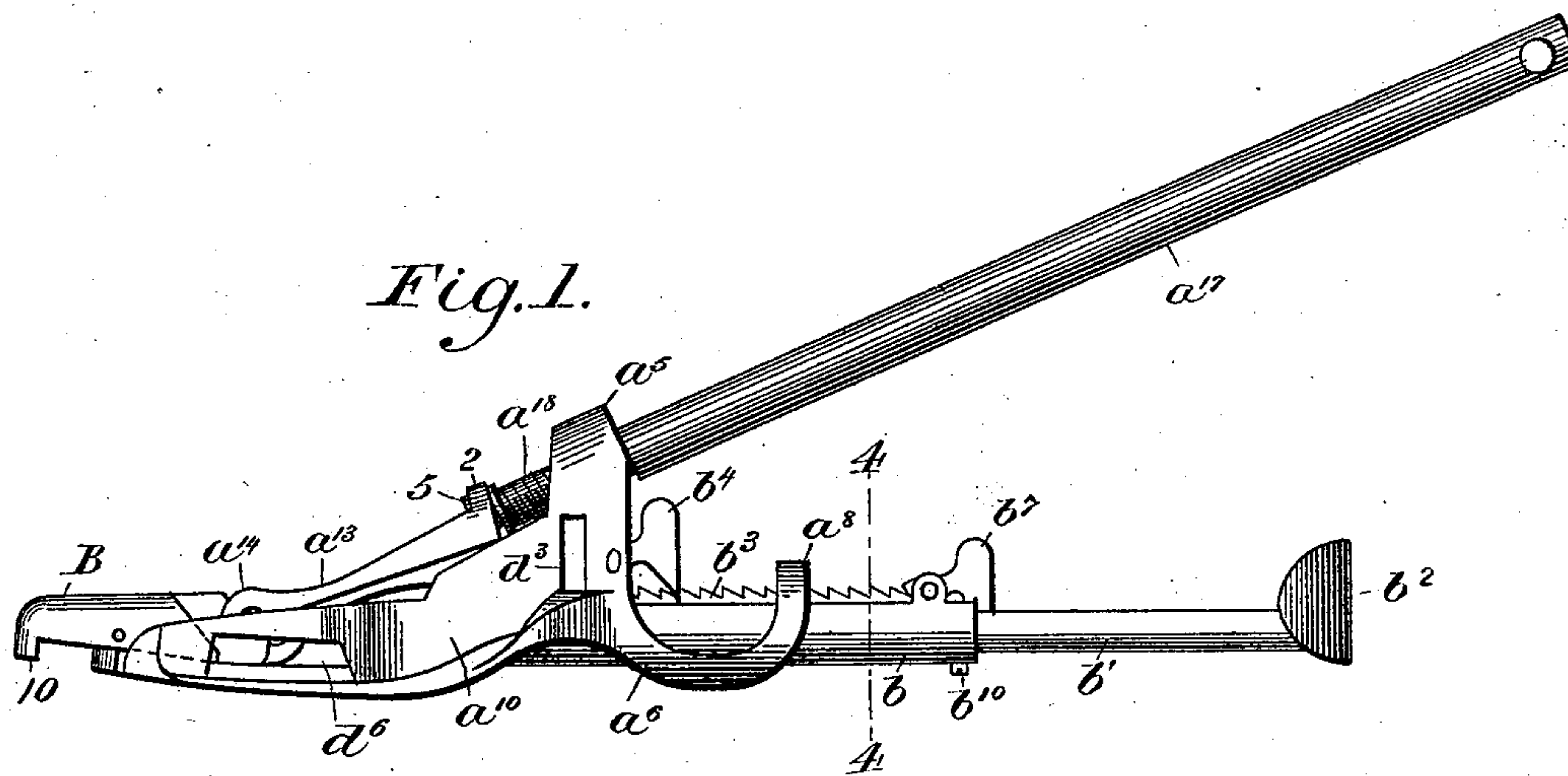
(No Model.)

3 Sheets—Sheet 1.

E. J. HOWARD.
LAST.

No. 528,296.

Patented Oct. 30, 1894.



(No Model.)

3 Sheets—Sheet 2.

E. J. HOWARD.
LAST.

No. 528,296.

Patented Oct. 30, 1894.

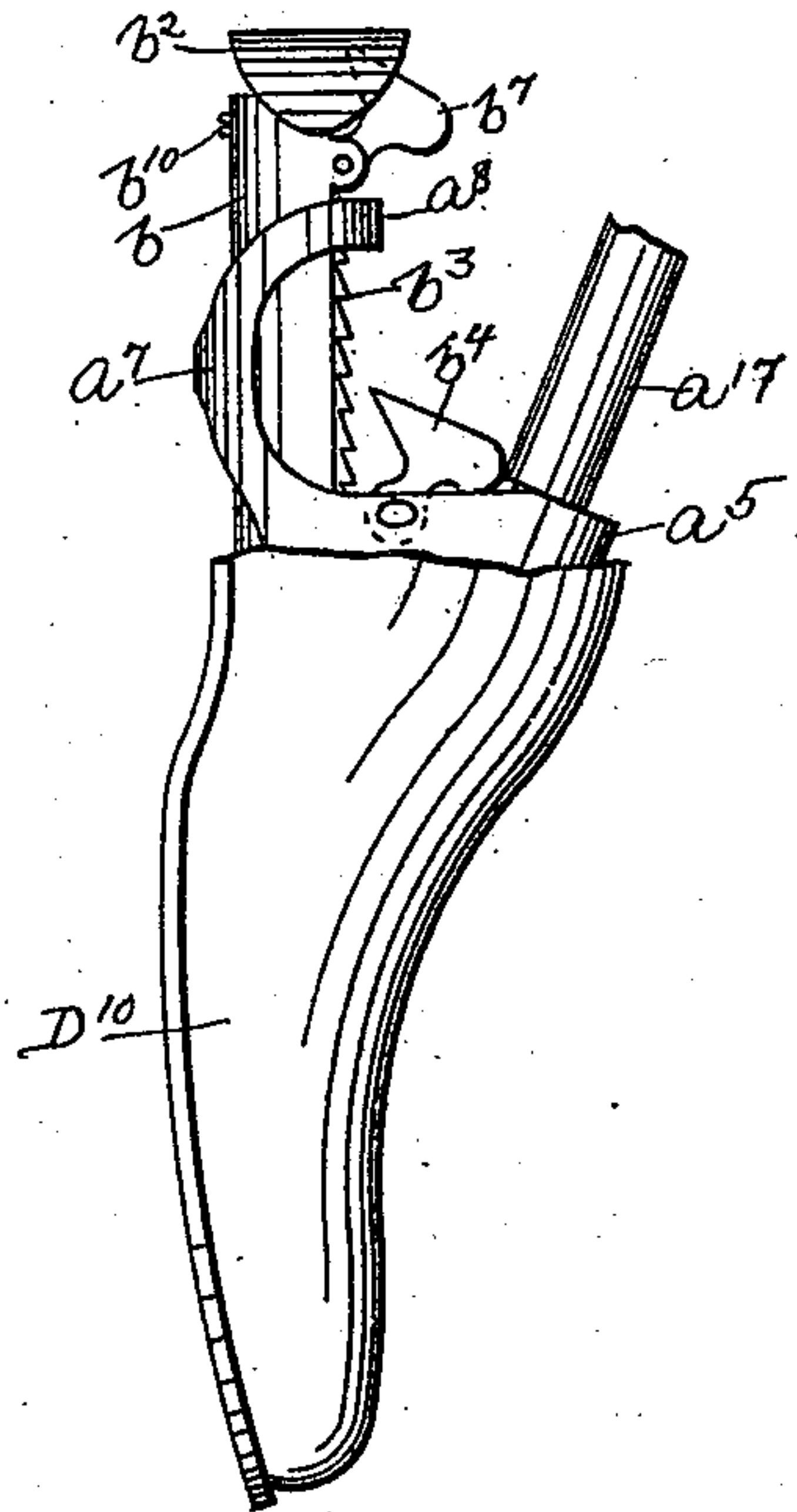


Fig. 6.

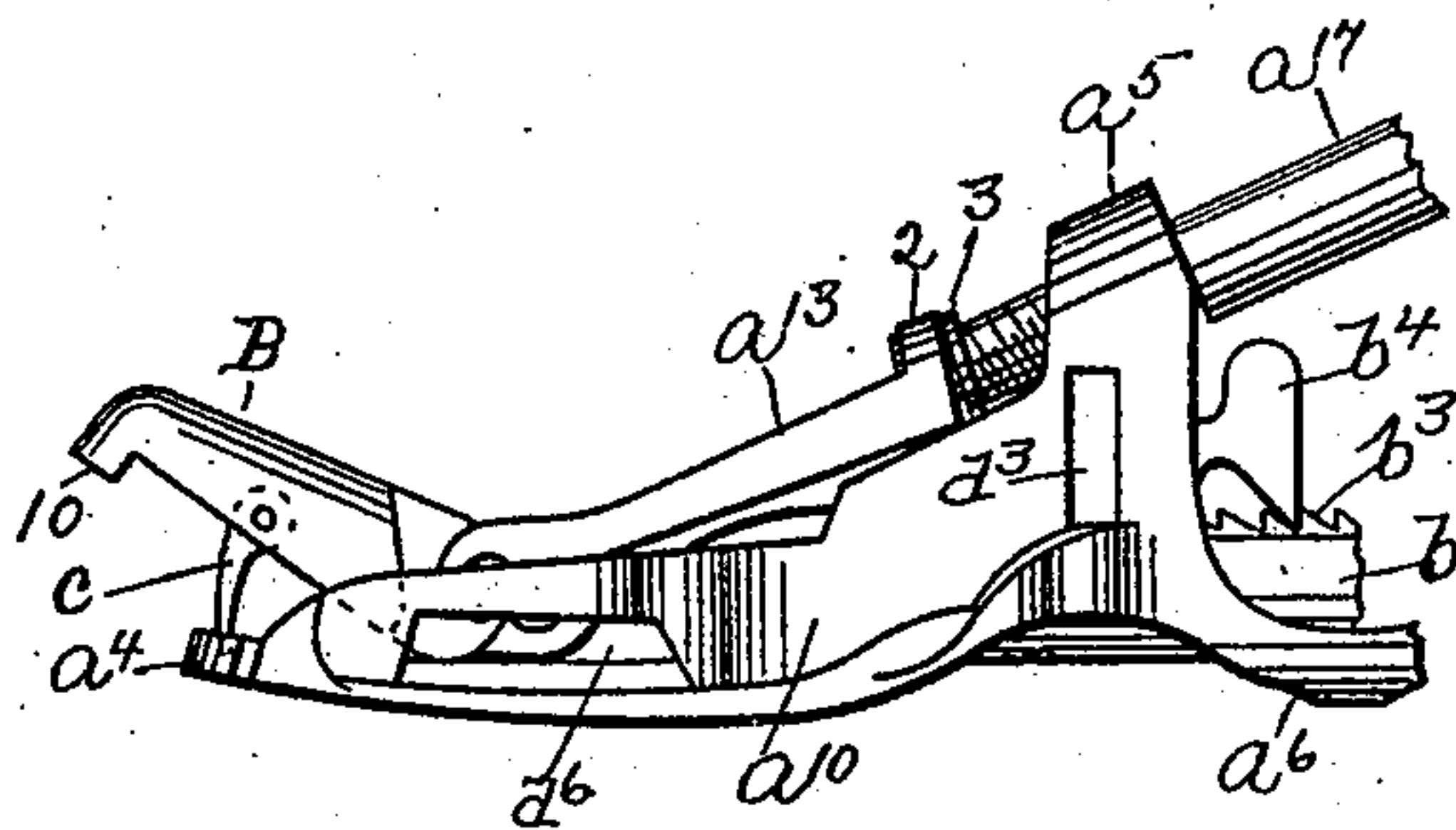


Fig. 7.

WITNESSES.

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INVENTOR.

Edward J. Howard
By Jas. H. Churchill
ATTY.

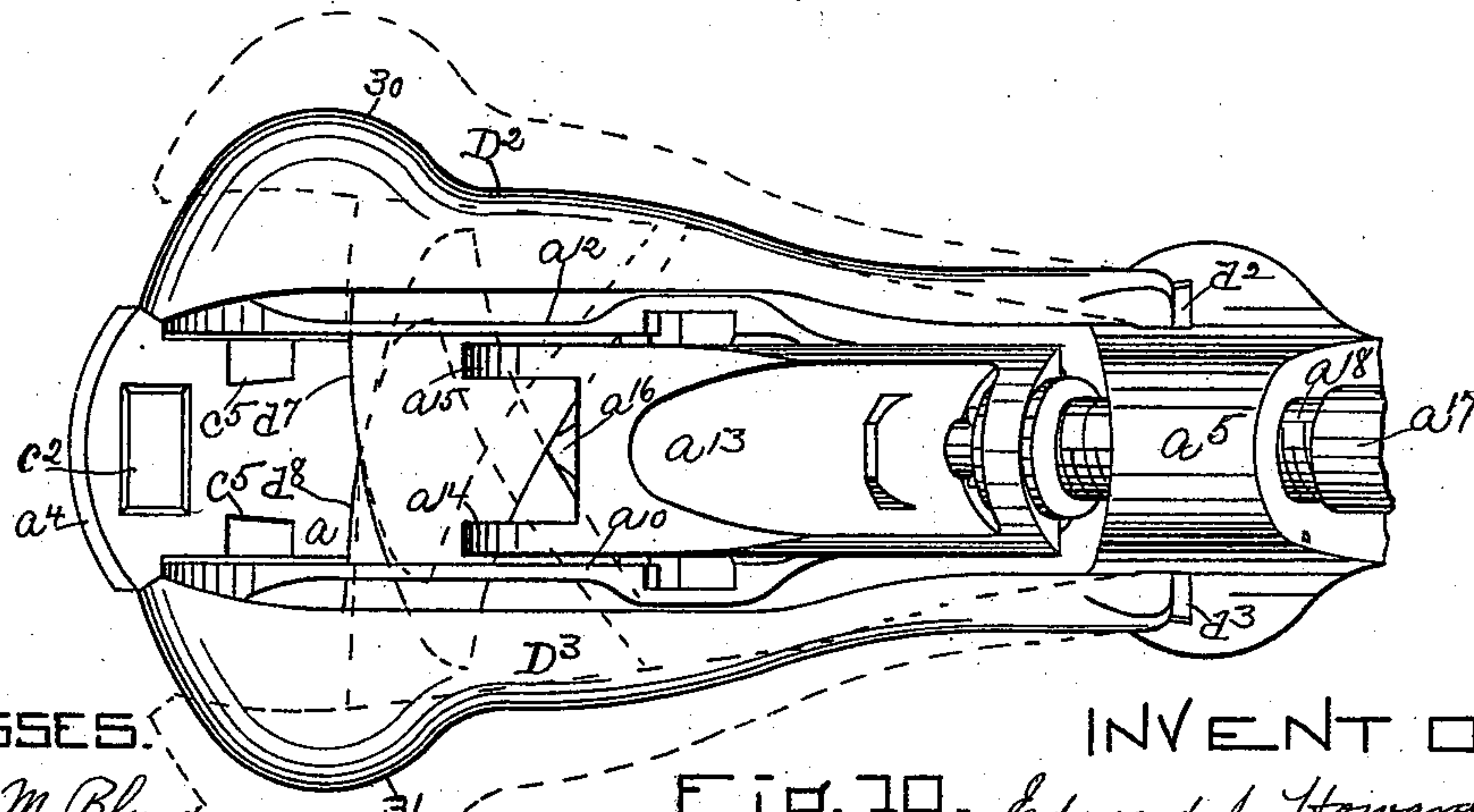
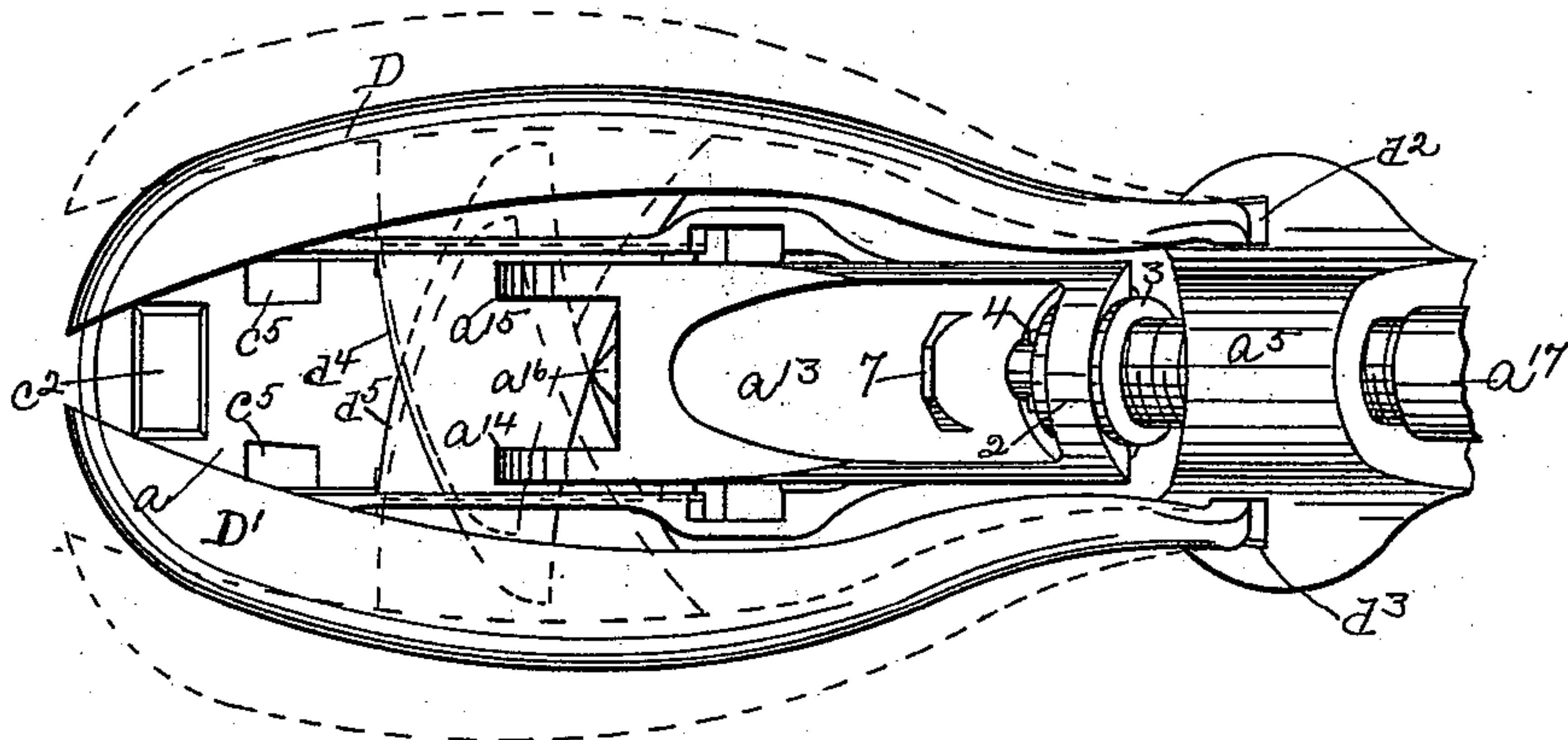
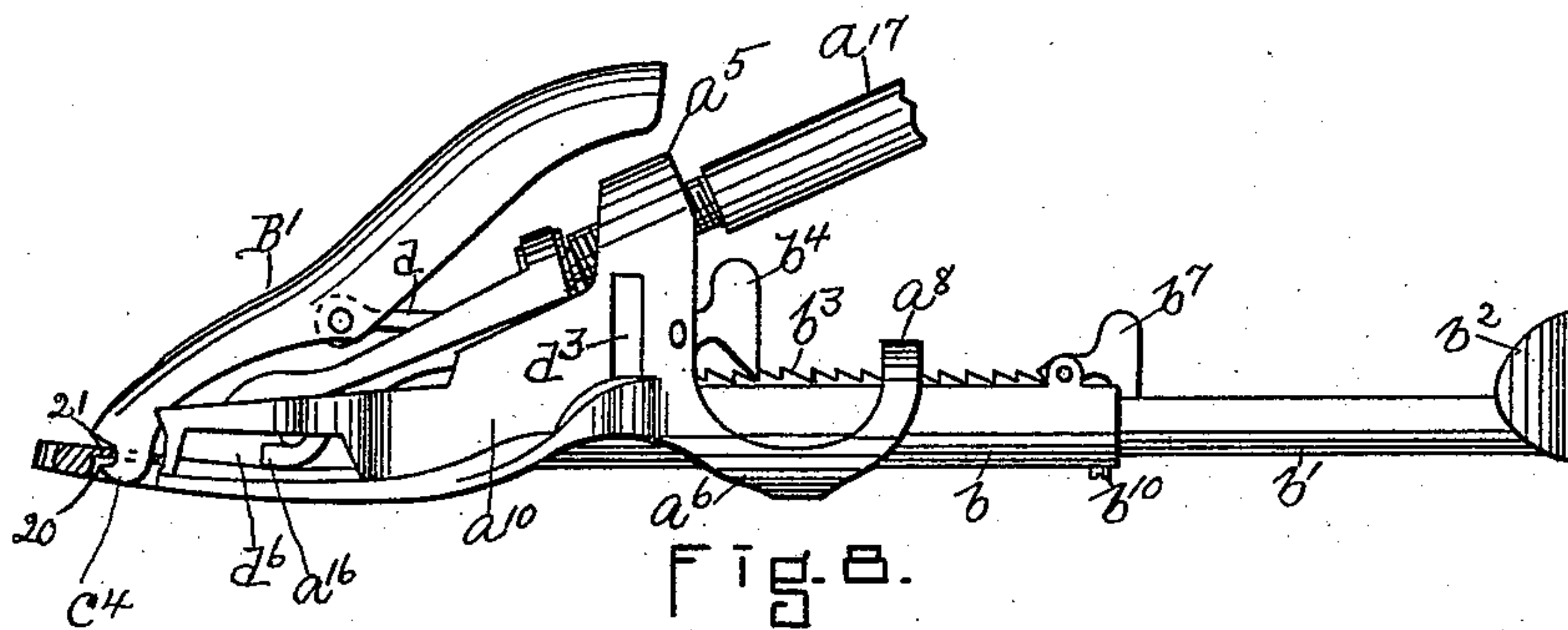
(No Model.)

3 Sheets—Sheet 3.

E. J. HOWARD.
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No. 528,296.

Patented Oct. 30, 1894.



WITNESSES.

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Fig. 10. Edward J. Howard
By Jas. H. Lehmkuhl
ATT'Y

UNITED STATES PATENT OFFICE.

EDWARD J. HOWARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HOUSEHOLD BOOT AND SHOE STRETCHER COMPANY, OF PORTLAND, MAINE.

LAST.

SPECIFICATION forming part of Letters Patent No. 528,296, dated October 30, 1894.

Application filed September 9, 1893. Serial No. 485,190. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. HOWARD, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an
5 Improvement in Lasts, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention relates to a last for boots and shoes, capable of shaping the boot or shoe after it has been made, so as to conform to the foot of the wearer.

Prior to this invention, I am aware that
15 lasts have been made to shape specific parts of the boot or shoe, but such lasts, while more or less efficient for a specific purpose, are useless for other purposes, that is to say, a last which is provided with a toe lift is use-
20 less for shaping the boot or shoe to conform to a protuberance on the side or other part of the foot.

This invention has for its object to provide a last, which is practically universal in its
25 use, that is, a last, which can be used to shape the boot or shoe to remedy any defective construction of the boot or shoe and to conform to any irregularity in the shape of the foot.

Another feature of this invention consists
30 in making an automatically extensible last, which is capable of fitting any size boot or shoe and can be lengthened and shortened automatically to bring the operating part of the last at that portion of the boot or shoe to
35 be operated upon.

In accordance with this invention, a skeleton or last frame is provided, to which a number of attachments, having specific purposes as will be described, may be attached so as
40 to be readily and easily operated. The skeleton or last frame may and preferably will be made automatically extensible to enable the last to be quickly and easily applied to and removed from the boot or shoe. These and
45 other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation of one form of shaping last embodying this invention, the
50 skeleton or last frame being shown as pro-

vided with a toe attachment arranged to lengthen the boot or shoe; Fig. 2, a longitudinal section of the last shown in Fig. 1, the operating handle being broken out; Fig. 3, a top or plan view of the skeleton or last frame
55 shown in Fig. 1, with the toe attachment removed and the handle broken out; Fig. 4, a transverse section on the line 4-4, Fig. 1, looking toward the right; Fig. 5, a side elevation, partially broken out, of a shoe showing the shaping last inserted therein, the shoe
60 being inverted to show the manner of unlocking the extensible portion of the last preparatory to removing the last from the shoe. Fig. 6, represents the shoe shown in Fig. 5 as
65 turned into a vertical position; Fig. 7, a detail in side elevation showing the manner of operating the toe attachment to raise or lift the toe of the shoe; Fig. 8, a side elevation of the skeleton or last frame and the attachment for raising the instep, the latter being
70 shown in elevated or operative position; Fig. 9, a plan view on an enlarged scale of the skeleton or last frame, partially broken out, showing the symmetrical side attachments
75 in their normal position in full lines and in an expanded position by dotted lines, and Fig. 10, a top or plan view on an enlarged scale of the skeleton or last frame, showing
80 one form of unsymmetrical side attachments in closed position by full lines and in open or operative position by dotted lines.

The skeleton or frame of the last forming the support for the various attachments, to be hereinafter described, may and preferably
85 will be made of metal, and may consist, as herein shown, of a bottom piece *a* provided with laterally extended side flanges *a'* *a*² (see Fig. 3) the bottom piece *a*, as represented in Fig. 3, having at its front end a projection
90 *a*⁴. The bottom *a* and side flanges *a'* *a*² are curved or shaped to conform to the general form of the sole of a boot or shoe, the bottom and side flanges being provided at their rear ends with an upright extension *a*⁵ and with
95 rearwardly extended side pieces *a*⁶ *a*⁷ herein shown as united at their top by a cross piece or band *a*⁸. The side flanges *a'* *a*² have secured to or forming part of them, upright flanges *a*¹⁰ *a*¹², which extend rearwardly and
100

are secured to or form part of the upright extension a^5 .

The skeleton or last frame referred to, carries an attachment operating device shown as a separate piece a^{13} , provided at its front end as herein shown with curved or hooked fingers a^{14} a^{15} and with a substantially wedge-shaped nose or projection a^{16} . The attachment operating piece a^{13} is movable fore and aft on the skeleton or last frame, and may be operated as herein shown by means of a rod a^{17} provided at its front end with a screw-threaded extension a^{18} , projected through a screw-threaded hole or opening in the upright a^5 and secured to the rear portion or cross piece 2 of the attachment operating piece a^{13} in any suitable manner, it being herein shown as loosely extended through the cross piece 2 and clamped between washers 3, 4, by a nut 5, but instead of the particular manner of securing the attachment moving piece a^{13} to the rod a^{17} , any other suitable or desired connection may be made. The attachment moving piece a^{13} is provided in the present instance with an inclined upper face 6 and with an upright stud or projection 7, for a purpose as will be described.

The skeleton or last frame has secured to it a rearward extension, preferably made as herein shown, it consisting of a hollow sleeve b into which telescopes a bar b' , provided as herein shown, with a heel seat b^2 . The sleeve b is extended through a suitable opening in the upright a^5 and is also preferably movable through the said opening, the said sleeve being limited in its forward movement as will be described. The sleeve b is made substantially flat on its upper side and is provided with rack teeth b^3 forming a rack bar with which engages a pawl b^4 , mounted upon a suitable pivot or pin b^5 supported in the under side of the upright a^5 . The extension rod or bar b' is also provided on its upper side with rack teeth b^6 , with which co-operates a pawl b^7 , pivoted in suitable ears b^8 at the rear of the sleeve b . The pawls b^5 b^7 are preferably made as gravity acting pawls, so as to be engaged with the rack teeth b^3 b^6 respectively, when the last is in its normal position represented in Fig. 1, and to be disengaged from the said rack teeth or bars when the last frame is inverted or turned into the position shown in Fig. 5. This result is accomplished by constructing the rack teeth b^3 b^6 and the pawls b^4 b^7 after the manner shown in the drawings, that is, each rack tooth is provided with an inclined face extended toward the front of the last and with a straight face extended substantially at right angles to the rack bar of which the tooth forms a part, and each pawl is provided with an inclined face, which normally rests upon the inclined face of the rack tooth, and with a straight face, which normally engages the straight face of the said rack tooth, so that when the last is inverted, the pawl is free to drop out of engagement with the rack tooth by reason of the straight

face of the pawl not being prevented from moving downward by the straight side of the rack tooth. The rack teeth b^3 b^6 are inclined as herein shown toward the front of the last, so that, when the latter is turned so as to move the front or toe of the last from a horizontal into a substantially vertical position, the extensions b b' will be automatically extended, the section b' being limited in its extreme outward movement by a stop on the sleeve b , which stop in the present instance is shown as a set screw b^{10} extended up through the bottom of the sleeve b and into a longitudinal guiding slot b^{12} in the under side of the bar b' , the said set screw engaging the end of the slot b^{12} when the section or bar b' is extended to its full length represented in Fig. 2.

The outward movement of the sleeve b is limited by a stop, which may be a screw b^x represented in dotted lines, Fig. 2; the said screw engaging the upright a^5 , and the forward movement of the said sleeve is limited in the present instance by the pawl b^7 striking against the cross bar or band a^8 .

By means of the automatically extensible portion of the last, it will readily be seen that the last when inserted into the boot or shoe and tipped in the proper direction, will automatically accommodate itself to the length of the particular shoe with which it is used. The skeleton or last frame may and preferably will be constructed so as to permit of the use of a number of attachments or pieces differing in shape and size, and used for different purposes, as will be hereinafter described.

The various faults, which a boot or shoe possesses after being made, and which are particularly objectionable on account of the discomfort afforded the wearer, may be classed under four general heads, namely: first, it is too short; second, the toe pinches; third, the instep binds; and fourth, it is too narrow. To overcome these faults, the skeleton or last frame herein shown may have applied to it as will be described, first, a toe piece or attachment, which may be constructed to simply lengthen the toe or which may be so constructed as to possess the additional function of lifting the toe; second, an instep piece or attachment by which the instep may be raised; third, symmetrical side pieces or attachments by which the shoe may be widened without distorting or disfiguring its symmetrical shape; fourth, unsymmetrical or irregular shaped side pieces or attachments by which one or both sides of the shoe may be widened or stretched to conform to irregularities of the foot.

In order that the operation of the last may be more clearly comprehended, I will specifically describe the operation of the various pieces or attachments in the order specified.

Referring to Figs. 1 and 2, B represents the toe piece or attachment, which, in the present instance, is made hollow on its under side and provided at its front end with a down-

wardly extended nose or projection 10, which rests against the inner sole of the shoe, the said attachment at its rear end being provided on its opposite sides with suitable lugs or projections a^x , only one of which is shown by dotted lines in Fig. 2, and which lock into and engage the fingers a^{14} a^{15} of the attachment moving piece a^{13} .

When the toe piece or attachment B is being used to lengthen the shoe and thereby overcome the first mentioned fault, it is pushed forward by the attachment moving piece a^{13} , which is itself forced forward by the threaded extension a^{18} of the actuating device or rod a^{17} and by reason of the bottom of the last frame being made smooth or flat on its upper surface in contradistinction to a bottom provided with a raised portion at its toe portion, the toe piece or attachment is enabled to move forward in a straight line and is thereby enabled to lengthen the toe of the shoe without raising the same.

If it is desired to enable the toe piece or attachment B to perform the double duty of lengthening, and lifting or raising the toe of the boot or shoe, the said attachment may be provided on its under side with a pawl c (see Figs. 2 and 7) the said pawl being pivotally supported in the sides of the toe attachment B, and adapted to have its end extend into a depression or pocket c^2 in the bottom a of the skeleton or last frame.

The pawl c when engaged in the pocket c^2 with the toe attachment in the position it would normally occupy when inserted into a boot or shoe, which is, with the nose 10 abutting against the projection or front edge a^4 on the bottom a , (the rod a^{17} having been turned to withdraw the threaded extension a^{18} toward the rear of the last, to move the actuating piece a^{13} back from the position shown in Figs. 1 and 2 to near the upright portion a^5 of the skeleton frame,) is prevented from moving forward bodily with the toe attachment B, and consequently, as the attachment actuating piece a^{13} is moved forward, the toe piece or attachment B is moved forward and at the same time upward, the pawl c acting as a jack to lift the toe attachment and turn its outer end upward substantially in a circle (see Fig. 7) with the lugs in engagement with the fingers a^{14} a^{15} as a center. As the outer end of the toe attachment is lifted, the toe portion of the boot or shoe is raised and the second mentioned fault is remedied.

The third fault above specified, namely, binding of the shoe at the instep, may be overcome by means of an instep piece or attachment B' preferably constructed as shown in Fig. 8, it consisting of a preferably metallic piece, curved to conform to the general outline or shape of the instep of the foot, and constructed to be attached to the skeleton or last frame so as to pivot or turn at one end. In the present instance, the instep attachment B' is provided at its front end with pref-

erably two fingers c^4 , (see Fig. 8) one at each side of the attachment.

The fingers c^4 are preferably made as herein shown, they being provided with a forward extension 20, and are adapted to enter slots, openings or pockets c^5 in the bottom of the skeleton or last frame, and have their extensions 20 project beneath a portion 21 of the skeleton or last frame, so as to lock the attachment B' to the skeleton or last frame while it is being operated.

The attachment B' has pivoted to its under side a pawl d , which is adapted to engage the stud 7 on the attachment actuating piece. The stud 7 is located near the rear portion of the attachment actuating piece a^{13} , and the pawl d is made sufficiently short to enable the instep attachment b' to fit close down to the actuating piece a^{13} , when the latter is in its normal or retracted position near the upright a^5 , which enables the last with the instep attachment B' coupled thereto, to be readily and easily inserted into the shoe D¹⁰, shown in Figs. 5 and 6, to be operated upon. When inserted into the boot or shoe D¹⁰, the handle a^{17} may be turned so as to move forward the attachment actuating piece a^{13} , and when the said actuating piece has been moved sufficiently far to bring its stud 7 into engagement with the pawl d , a further movement of the actuating piece a^{13} will tend to push the instep attachment B' forward, but by reason of its being pivotally secured at its lower front end to the last frame, the said instep attachment will be raised upward, it turning on the fingers c^4 as a pivot. The upward movement of the instep attachment B' lifts or raises the instep of the boot or shoe, thereby correcting the third fault above mentioned.

I have thus far described the pieces or attachments by which three distinct faults in the boot or shoe may be corrected, and there remain to be described pieces or attachments for correcting the fourth fault, which is, that the boot or shoe is too narrow and consequently requires widening or stretching. A narrow boot or shoe binds at the side of the shoe, which fault may be due to the fact, that the shoe itself has been made too narrow, or which may be due to the fact, that the foot of the wearer has irregularities on its sides, such for instance, as joints, corns, &c. The widening of the shoe may, therefore, be classified into two heads: first, the widening of shoes by symmetrical side pieces or attachments, which, while widening the shoe, still preserve the original symmetry or outline, and second, unsymmetrical side pieces or attachments, which may be of any irregularity in shape to conform to the particular irregularity or defect on the foot of the wearer.

Referring to Fig. 9, I have shown the last frame as provided with two symmetrical side pieces or attachments D D', which may be designated as right and left symmetrical side pieces or attachments. These pieces or at-

attachments are made to conform to the general shape of the boot or shoe and to uniformly widen on both sides when actuated to stretch the shoe, as will be described. The pieces or attachments $D D'$ are provided at their rear portions with inwardly turned fingers, not shown, which engage slots $d^2 d^3$ in the opposite sides of the upright portion a^5 , which fingers bear against the sides of the slots $d^2 d^3$ in the operation of the said pieces or attachments, and cause the latter to move out at their front end when moved by the actuating piece a^{13} . The side pieces or attachments $D D'$ are provided with inwardly extended curved arms $d^4 d^5$ preferably made substantially wide, as herein shown, the said arms being extended through slots or openings d^6 (see Figs. 1 and 8) in the upright side pieces $a^{10} a^{12}$ of the last frame, only one of the slots d^6 being plainly shown in Figs. 1, 7 and 8. The arms $d^4 d^5$ are cast or otherwise fixed to their attachments $D D'$ in such manner that one overlaps the other when inserted through the slots d^6 , the arm d^4 as shown in Fig. 9 lying upon the arm d^5 . The symmetrical side pieces or attachments $D D'$ normally occupy the position shown by full lines, Fig. 9, the substantially wedge-shaped nose a^{16} on the attachment actuating piece a^{13} being in engagement with the inner edge of both of the arms $d^4 d^5$, and when the attachment actuating piece a^{13} is moved forward, the wedge-shaped nose a^{16} pushes against the arms $d^4 d^5$ and forces the said arms from their full line position into their dotted line position, thereby moving the attachments $D D'$ from their full line into their dotted line position, Fig. 9, the attachments during such movement swinging on the fingers in engagement with the slots $d^2 d^3$ as pivots or centers.

By an inspection of Fig. 9, it will be seen, that as the symmetrical side pieces or attachments $D D'$ are moved outwardly into their dotted line position, the boot or shoe is uniformly stretched on both sides and widened without disturbing the symmetry or original outline of the boot or shoe. In many instances, the boot or shoe, while ordinarily of sufficient width, pinches or binds on the sides, owing to an irregularity in the foot of the wearer, which irregularity may be a corn, enlarged joint, &c.

To relieve the foot from the binding effect of the shoe, the symmetrical side pieces or attachments $D D'$ may be replaced with side pieces or attachments $D^2 D^3$ provided with arms $d^7 d^8$ similar to the arms $d^4 d^5$ of the attachments $D D'$. The attachments $D^2 D^3$ may be distinguished from the attachments $D D'$ by referring to them as unsymmetrical side attachments, they being provided with enlarged portions of suitable shape to stretch the boot at particular points.

The unsymmetrical side pieces or attachments $D^2 D^3$ are shown in Fig. 10 in their normal position by full lines, and in their operative position by dotted lines, the said at-

tachments being secured in the slots $d^2 d^3$ of the upright a^5 in a similar manner to the symmetrical side attachments $D D'$. As represented in Fig. 10, the side pieces or attachments $D^2 D^3$ are provided near their front ends with enlarged or bulged out portions 30, 31, but it is evident that the said side pieces or attachments may be of any desired or suitable configuration or shape, according to the particular deformity or irregularity in the foot of the wearer.

As represented in Fig. 9, both symmetrical side attachments $D D'$ are secured to the last frame, and in Fig. 10, both of the unsymmetrical side attachments are secured to the last frame, but it is evident that either of the unsymmetrical side attachments may be used with either of the symmetrical side attachments, as for instance, if a person has an irregularity, such for instance as a corn, on the outside of the foot, the attachment D may be replaced by the attachment D^2 , if it were desired that the symmetry of the shoe should be preserved on its inner side; and if the outside of the foot is symmetrical in shape and free from irregularities, while the inside has an irregularity, such for instance as an enlarged joint, the symmetrical side attachment D' in this case, may be replaced by the unsymmetrical side attachment D^3 .

The instep piece or attachment B' is shown in Fig. 8 as symmetrical in shape to conform to the shape of the instep of the foot, but the said instep attachment may be made of any desired configuration or shape to correspond to any irregularity in the shape of the instep of the wearer.

The operation of fitting the boot with the last provided with any one of the attachments referred to, may be readily understood by a detail description of the operation of the last frame provided with the toe lengthening attachment B . In the normal position of the last before being inserted into the boot or shoe, the attachment actuating piece a^{13} is drawn back substantially near the upright a^5 , and the toe piece or attachment B has its front end or projection 10 abutting against the end a^4 of the last, the extensible portion of the last being closed and in the position shown in Fig. 6. The operator inserts the last with the particular attachment to be used, which may be supposed to be the toe attachment as above specified, into the boot or shoe, holding the latter in a substantially horizontal position, and after the last has been inserted into the boot or shoe, the operator inverts or turns the boot or shoe into a substantially vertical position with its toe upward, which permits the extensible portion of the last to automatically extend itself until the heel seat b^2 brings up against a firm bearing, namely, the counter or heel stiffening portion of the shoe, thereby rigidly fixing the last against longitudinal movement in the shoe; and when the said heel seat b^2 has found a firm bearing, the extensible portion herein

shown, is locked in this position by the pawl b^7 engaging the rack bar b^6 , while the sleeve b is also locked by the pawl b^4 engaging the rack teeth b^3 . In this position, the last is operated to perform the particular work of which the particular attachment used is capable. This may be effected by turning the handle or rod a^{17} so as to cause the attachment actuating piece a^{18} to move forward, and in case the toe attachment B is used for merely lengthening the shoe, the said toe attachment is forced forward in a substantially straight line into substantially the position shown in Fig. 1, thereby lengthening the boot or shoe.

After the work performed by the attachment has been accomplished, and it is desired to withdraw the last from the shoe, the operator turns the said last upside down or into substantially the position shown in Fig. 5, whereby the pawls b^4 b^7 are operated upon by gravity and are removed from engagement with their co-operating rack teeth b^3 b^6 , thereby leaving the rack bar b' and the sleeve b free to automatically close up when the shoe is turned into substantially a vertical position with the toe downward, as represented in Fig. 6, and when in this position, the last may be readily removed from the boot or shoe.

The extensible portion of the last is herein shown as composed of two parts, viz:—the sleeve b and the rack bar b' , but I do not desire to limit my invention to the particular number of parts comprising the extensible portion, as the number of parts may be increased or diminished, and furthermore, I do not desire to limit the automatically extensible feature of the last to the particular construction of last frame herein shown.

I claim—

1. In a last for shaping boots and shoes, the combination with a last frame, of a shaping piece or attachment carried by said frame, an actuating device to operate said shaping piece or attachment, and an extensible portion attached to the last frame and automatically operated independent of the said actuating device, substantially as described.

2. In a last for shaping boots and shoes, the combination with a last frame constructed to receive a plurality of pieces or attachments for shaping different parts of the boot or shoe, of a single attachment actuating device or piece carried by said frame and co-operating with each of said attachments, and an extensible heel portion attached to the last frame and automatically operated independent of the said actuating device, substantially as described.

3. In a last for shaping boots and shoes, the combination with a last frame, of a toe attachment or piece and an actuating device to operate said toe attachment, and an extensible heel portion attached to the last frame and automatically operated independent of

the said toe actuating device, substantially as described.

4. In a last for shaping boots and shoes, the combination with a last frame, of a combined toe extending and lifting piece consisting of a toe piece and a pawl pivoted to the under side of the said toe piece and normally inactive when the toe piece is moved to lengthen without raising the toe of the shoe, and adapted to engage the last frame to cause the toe piece to move in the arc of a circle to both lengthen and raise the toe of the shoe, and an actuating device operative upon the toe piece in both conditions, substantially as described.

5. In a last for shaping boots and shoes, the combination with a last frame provided with a plurality of attachments, of an actuating device to operate all the said attachments, and a detachable instep raising piece forming one of said attachments, and normally inactive when the said device is operating one of the other attachments and provided with a pawl adapted to co-operate with the actuating device to render the instep piece active, substantially as described.

6. In a last frame for shaping boots and shoes, the combination with a last frame provided with side slots d^2 d^3 , of side attachments having fingers at one end to engage said slots, and provided with arms adapted to extend across the last frame, and an actuating device to operate on said arms to turn the said attachments on their fingers as pivots, substantially as described.

7. In a last for shaping boots and shoes, the combination with a last frame, of an automatically extensible portion consisting of a sleeve b , and a bar b' movable in said sleeve, rack teeth on said sleeve and bar, and pawls co-operating with said rack teeth, substantially as described.

8. In a last for shaping boots and shoes, the combination with a last frame provided with side openings d^6 , of side pieces provided with arms normally extended through said openings, and means to act on said arms to operate said side pieces, substantially as described.

9. In a last for shaping boots and shoes, the combination with a last frame, of a plurality of shaping pieces or attachments carried by said frame, a single actuating device operating each of said attachments, and an extensible heel portion attached to said last frame and automatically operated independent of the said actuating device, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD J. HOWARD.

Witnesses:

H. W. FRENCH,
JAS. H. CHURCHILL.