

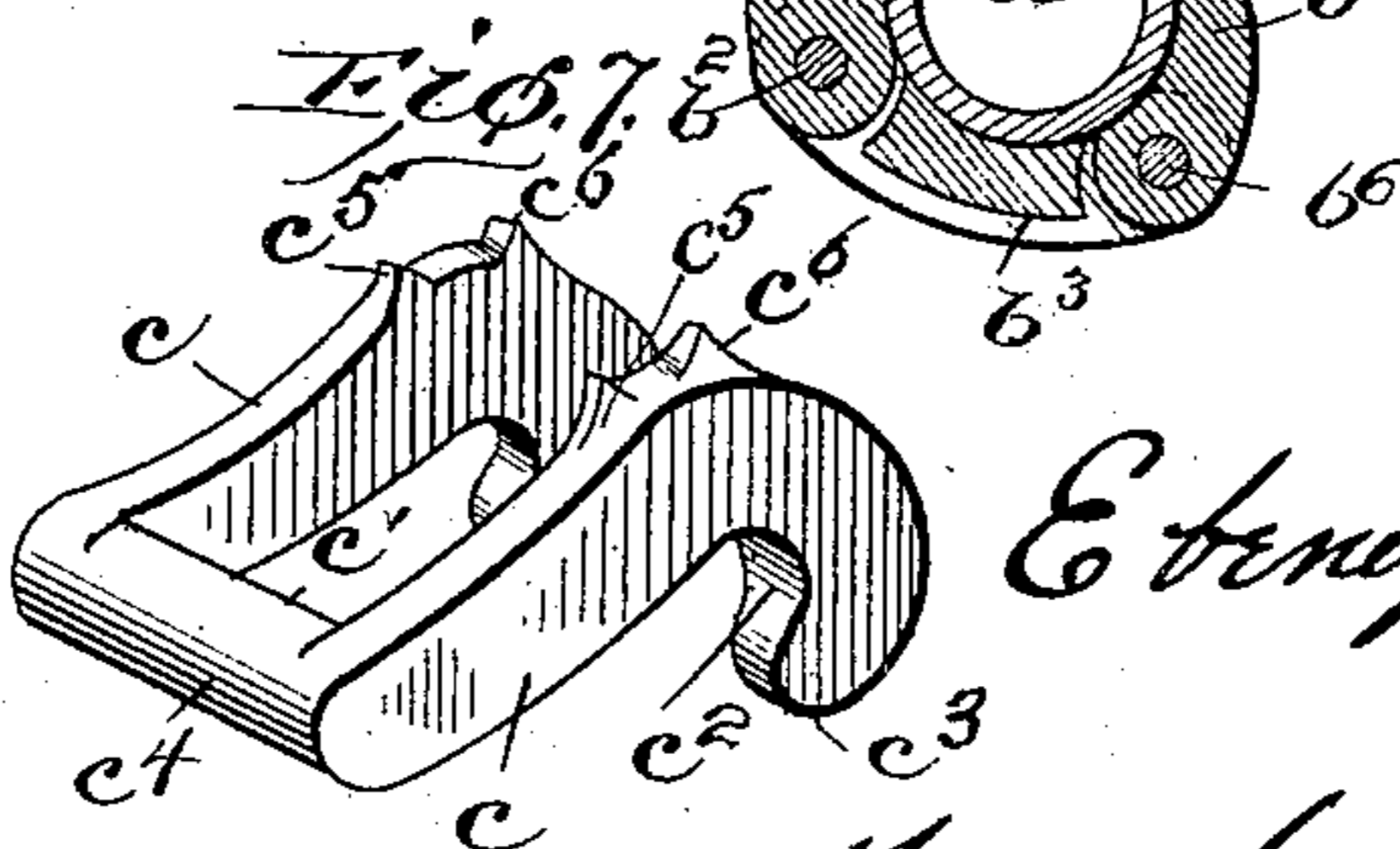
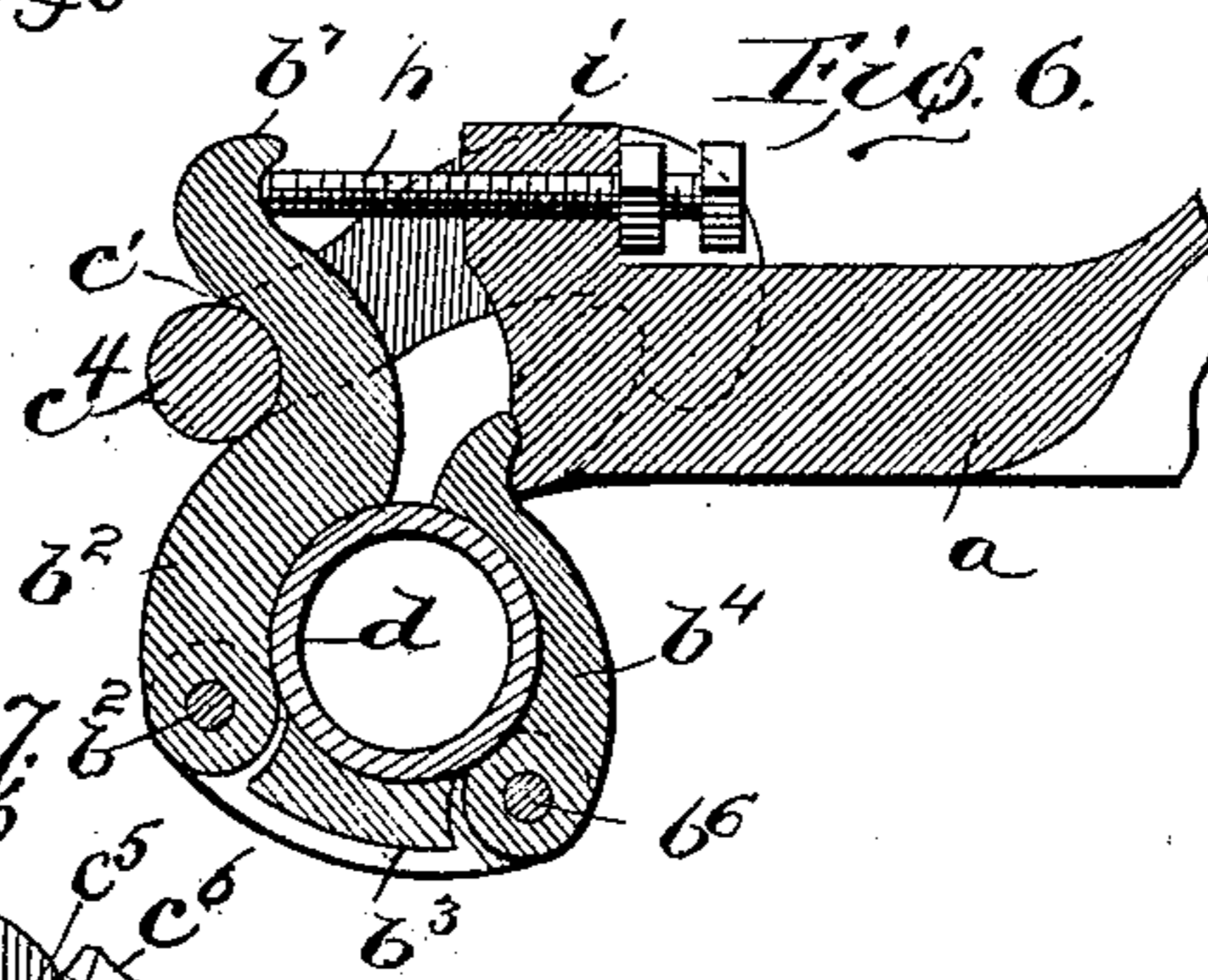
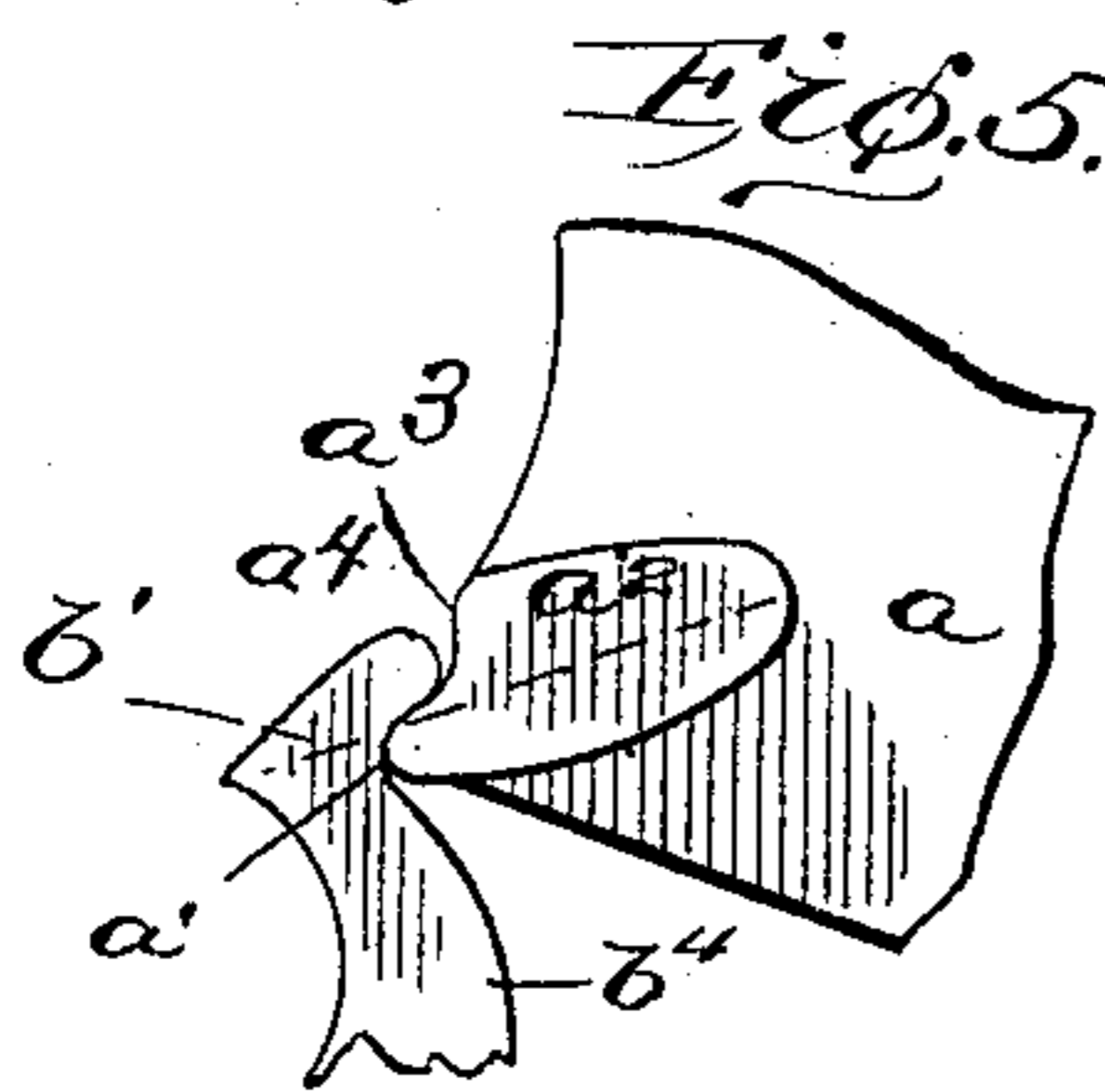
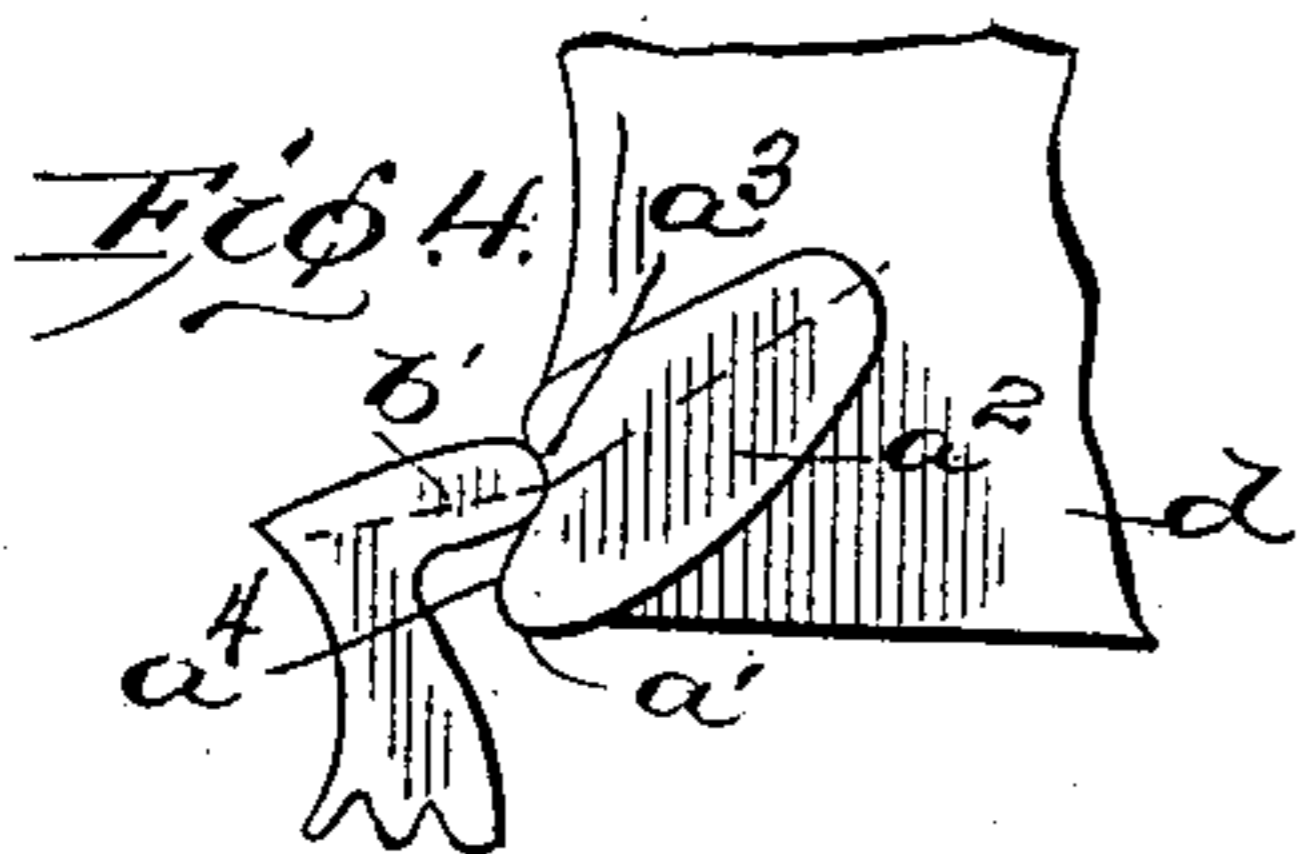
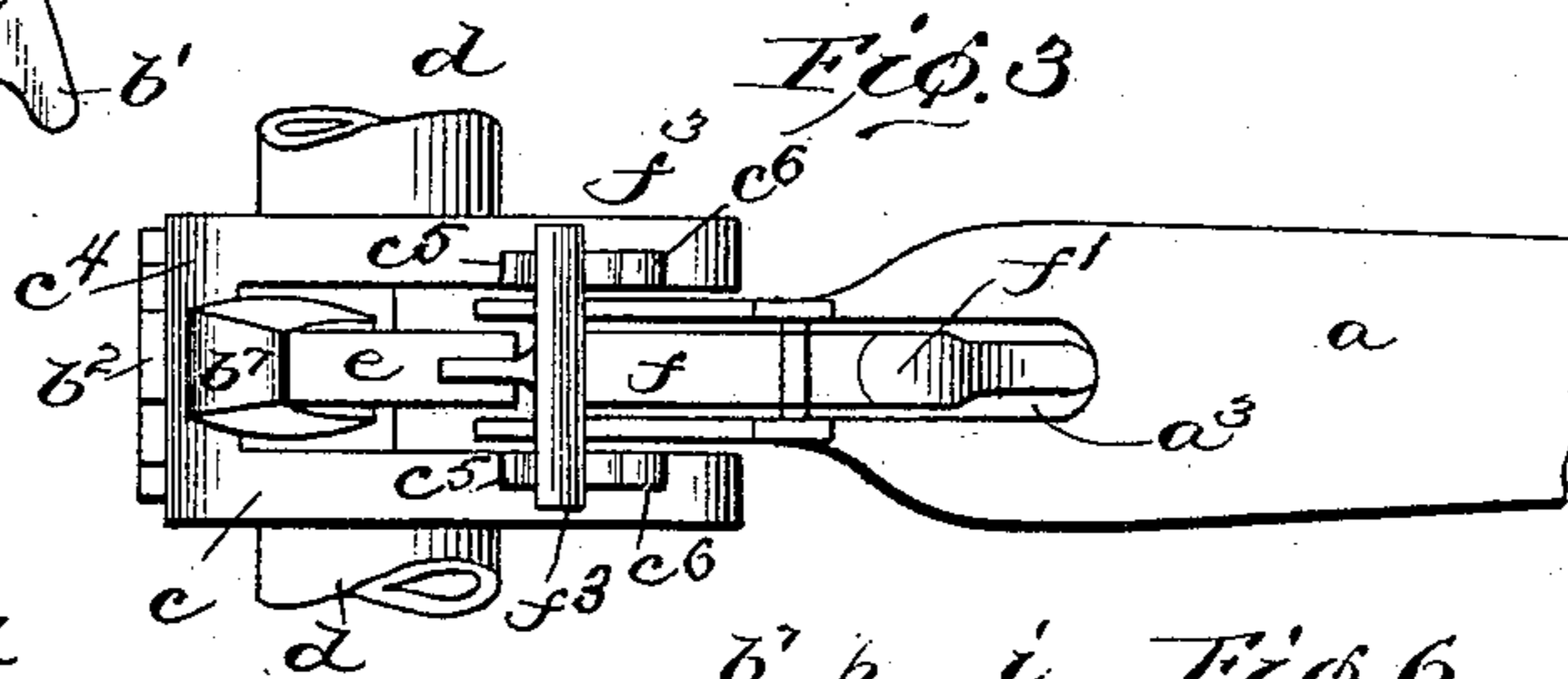
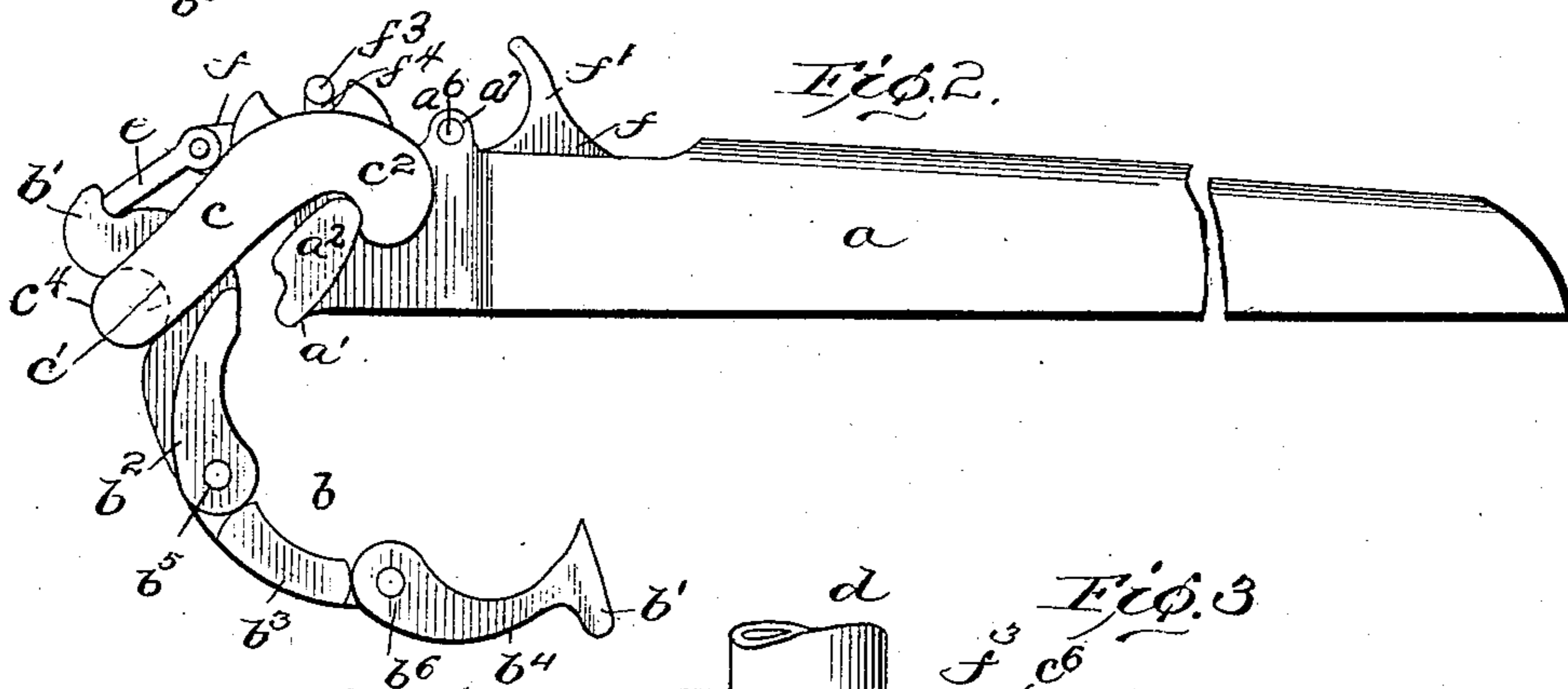
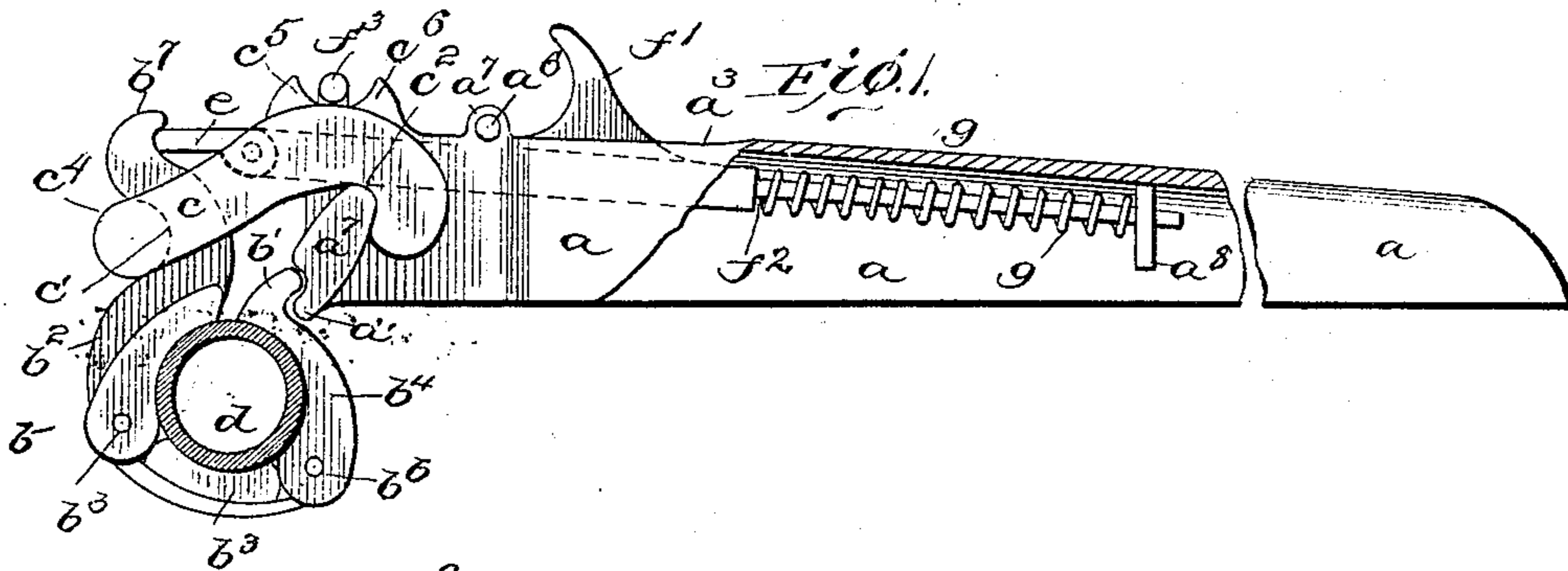
No. 773,933.

PATENTED NOV. 1, 1904.

E. FISHER.
WRENCH.

APPLICATION FILED OCT. 7, 1903.

NO MODEL.



Witnesses
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WRENCH.

REISSUED

SPECIFICATION forming part of Letters Patent No. 773,933, dated November 1, 1904.

Application filed October 7, 1903. Serial No. 176,144. (No model.)

To all whom it may concern:

Be it known that I, EBENEZER FISHER, a subject of the King of Great Britain, and a resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Pipe-Wrenches, of which the following is a full, clear, and exact description.

My invention relates to improvements in pipe-wrenches of the class employing as the gripping member of the wrench a series of linked sections or segments adapted to conform to the surface of the pipe and operating by adhesion. Heretofore the chief difficulty experienced in the use of wrenches of this character has been found to arise from the very limited movement of the gripping-loop in expanding and contracting about the pipe during the operation of the wrench thereon, by reason of which not only is facility of operation wanting, but in the event of pipes varying slightly in size, which is very common, or having irregular surfaces an utter failure of gripping ensues.

It has therefore been my object to so construct a wrench of this character that it shall not only firmly grip the pipe without slipping, but have sufficient self-adjusting expansibility and contractibility in its linked loop or gripping member as to permit it to accommodate itself within certain limits to pipes varying in size and be effective notwithstanding any lack of uniformity in the pipe-surfaces and as a result of this greater range of movement the more readily permit the application of the wrench to the pipe and its removal therefrom.

Another object of the invention is to provide for a change of leverage, so that after a clamping pressure of the requisite force has been applied to the loop the direction of the leverage will be such as to exert a pulling action on the loop, thus admitting of the application of any degree of force without injury to the pipe.

My invention consists, primarily, in a gripping loop or member adapted to encircle a pipe or other cylindrical body, a main sup-

porting member adapted to fulcrum on one end of the loop, and a link or oscillating member carried by the main supporting member and fulcruming on the outer end of the loop, these elements being so arranged that the action of the main supporting member in applying leverage will press forward one end of the loop and will cause the link connection to be pulled backward simultaneously, while the friction of the pipe or other body within the loop will operate to pull the swinging end of the link connection in a direction to shorten the distance between said end and the fulcrum of the loop on the main supporting member.

The invention further consists in so constructing the loop and main supporting member of a gripping device of the general character of that above set forth that a fulcrum will be furnished for one end of the loop which will change during the application of the leverage for the purpose of bringing about and maintaining a clamping pressure upon the gripping-loop which will not be unduly increased by the continued application of leverage in turning the pipe or other device upon which the gripping device is applied.

The invention further consists in certain other novel features in the construction and arrangement of parts, as hereinafter fully set forth and claimed.

In the accompanying drawings, Figure 1 is a view in side elevation, showing the wrench applied to a pipe, the parts being in the position for the application of the leverage. Fig. 2 is a view in side elevation, showing the position of the parts when the gripping-loop is released from its bearing on the main supporting member. Fig. 3 is a top plan view of the device. Fig. 4 is an enlarged detail view showing the initial position of the cooperating fulcrum-faces of the loop and supporting member. Fig. 5 is also an enlarged detail view showing the changed position of the cooperating fulcrum-faces after the application of the initial clamping leverage. Fig. 6 is a longitudinal vertical section view of a modified form of the device in which adjustment is made with a set-screw. Fig. 7 is a perspec-

tive view of the oscillating or link member for connecting the outer end of the gripping-loop with the lever or handle.

Referring to the drawings, a indicates the 5 main lever or handle of the device, which is of the usual hollow construction and is formed with an engaging toe a' , constituting a fulcrum at the point of the lever on which is supported one end of the gripping-loop b , 10 which terminates in the hook or projection b' . The other end of the gripping-loop is connected with the lever a by means of an oscillating or link member c , which projects forward at the end of the lever a and furnishes 15 a support on which the said loop fulcrums at c' , so that the said loop will be supported in advance of the end of the main lever. The inner end of the member c fulcrums on the lever a at c^2 .

20 The gripping-loop is formed of three members or segments b^2 , b^3 , and b^4 , pivoted or fulcrumed at b^5 and b^6 and presenting smooth inner curved faces to the pipe d , which permits the loop to conform within certain limits to pipes varying in size.

The principle of operation of the device in effecting an instantaneous and firm gripping of the pipe on the slightest movement of the wrench in the direction of its gripping lies in 30 the relative positions of the fulcrums a' , c' , and c^2 , which cause the initial friction of the pipe in the loop to pull down the oscillating or link member c at its outer end, thus holding it against the relative change of fulcrum 35 a' and c^2 , the former acting to press forward the member b^4 at its end, while the latter acts to pull the member c backward the more the three fulcrums a' , c' , c^2 approach alignment and causing the said members b^4 and c to have 40 simultaneous and equal movement toward each other.

To insure the initial clamping of the loop about the pipe, it will be observed that the arrangement of the loop with respect to the 45 lever a and link member c is such that any tendency of the loop to lift the said link member, as from the weight of the device when applied to a pipe, will bring about a clamping action which will allow the application of the 50 leverage. When leverage is applied, the force exerted upon the loop in the effort of the same to turn upon the pipe is toward the handle, and the loop being carried by the link member c it is forced slightly under the toe a' 55 and upward against it, so that whatever the tendency of the lifting action of the leverage may be to raise the loop and cause it to travel upward in the arc described by the link member it is resisted by the toe a' and for the 60 reason that the raising or lowering of the said link member at its swinging end must bring the loop against the toe of the lever and make its engagement therewith secure while producing the initial clamping action by any 65 movement of the loop up or down. Not only is

the member c so arranged that it will crowd the terminal segments of the loop together if swung to either side of its normal position, as above explained, but in order to increase this crowding tendency upon any swinging of the 70 loop away from the toe a' of the main lever, and, further, to create a natural tendency for the said member c to swing toward the toe a' to bring about and insure an initial friction of the loop on the pipe which will render 75 positive and certain the main gripping action the said member c is mounted so as to change its fulcrum-point c^2 , whereby, in effect, to lengthen the said link member as it approaches the toe a' , thus creating a natural tendency 80 for the said member to swing in that direction and not to swing in the opposite direction, in which a shortening effect is created and with the increased results stated. During the application of the main leverage the 85 direction of the force is such as to produce first the necessary clamping action of the loop about the pipe by causing the toe a' to be forced against the point of the engaging projection b' of the loop, (see Fig. 4,) and 90 thus as the position of the toe changes (see Fig. 5) to cause the further application of the leverage to exert a pulling action on said loop.

From the foregoing will be seen the principles upon which the more important elements of the wrench operate without confusing the same with the various auxiliary features of the invention and details of construction, which will now be referred to. 95 100

The oscillating member c is preferably in the form of a bifurcated hook adapted to admit the end of the lever a between the parts thereof and engage a lug or projection a^2 , which forms the fulcrum c^2 . These lugs are 105 preferably formed in approximately elliptical or elongated shape, extending to and including the toe a' in order that the pressure of the hook thereon may be resisted in a direct line to the point at which the pressure of the 110 toe is brought upon the loop, as well as forming a stop for limiting the downward movement of the said member c .

The fulcrums c^2 , provided by the lugs a^2 , admit of the bearing of the member c to be at 115 a point well within the curve of the hook thereof, at which point the said member describes its greatest arc; but as said member raises the action of the fulcrum-surfaces of the lugs is to transfer the bearing or fulcrum point 120 to the end c^4 of the hook, thus not only shortening the leverage, but bringing the fulcrum-point c^2 farther rearward and with the results stated—namely, providing an increased clamping effect upon the terminal segments of the 125 loop whereby to prevent upward movement of the member c and rendering such clamping action less upon the downward movement of said member within certain limits, so that it will normally seek the downward position. In 130

the main the natural tendency of the member *c* to swing in the direction of the loop is accomplished by virtue of the fulcrum *c*² being at the point of the hook when said member is in the normal gripping position, owing to the fact that said member *c* forms an angle-lever which when any outwardly-pressing force is applied to its swinging end tends to swing the said member downward. This tendency is increased with the application of the leverage; but it will be seen that the fulcrum-point shifts during this application so as to bring the strain well within the hook. By reason of the foregoing provision for resisting any tendency of the loop or member *c* to move upward, and thus evade the initial gripping, a wide range of movement is allowed in which the initial gripping will take place, and thus admitting one size of gripping-loop to be used on pipes of various sizes.

The positive gripping movement takes place immediately upon the adjustment of the loop *b* to its operative position, which gripping produces the necessary friction to allow the lever *a* to apply its leverage without any slipping of the parts. As will be seen by reference to Figs. 4 and 5, the toe *a'* of the lever *a* is provided with a fulcrum-surface, the concave portion *a*³ of which receives the point of the projection *b'* and causes the initial leverage to act upon such projection, as indicated by the dotted lines in Fig. 4, to clamp the terminal segment *b*⁴ against the pipe, thus increasing the initial friction between the pipe and loop, and the convex surface *a*⁴ subsequently engages the under surface of said projection *b'*, thus changing the direction of the force of the leverage to exert a pulling action on the loop, which will admit of the application of a degree of force for turning the pipe that if applied through the initial clamping action would depress it.

The oscillating member *c* furnishes the fulcrum *c'* by means of its bar *c*⁴ connecting the hook parts thereof at its outer end and readily permits the end of member *b*², which is curved, to receive the same near its end to be connected therewith and held against the pipe thereby. This manner of coupling the gripping-loop with the oscillating member admits of the ready application of loops of various sizes. It also becomes necessary that provision be made for holding the loop firmly coupled to the oscillating member, so that it cannot be shaken apart when not on a pipe or as shown in Fig. 2 and in a manner that will readily permit the removal of the loop at the will of the operator. To this end and for a purpose hereinafter referred to the member *b*² is made to extend beyond the hook or curve which holds it to the bar *c*³ and to terminate in a rearward hook *b*⁷, which engages a dog *e*, pivoted on the end of a spring-actuated bolt *f*. This bolt lies partly within the hollow of the handle and at its forward end

projects therefrom into a groove or channel *a*³, formed in the top of the lever *a* at its forward end. The bolt is retained within its channel by the pin *a*⁶, held within the perforated ears *a*⁷, and its forward movement is limited by the finger-hold *f'* coming in contact with said pin. The bolt is normally pressed forward by the coil-spring *g*, bearing at its forward end on the shoulder *f*² and at its other end on the lug *a*⁸, which lug forms a support for the rear end of the bolt. By means of the finger-hold *f'* the bolt is readily drawn back against the pressure of its spring when it is desired to disengage the dog *e* and release the gripping-loop.

The action of the spring *g* upon the end of member *b*² through the bolt *f* and its pivoted dog *e* is such as not only to project the dog into engagement with the hook *b*⁷, but normally press against said end, which pressure will not only force the gripping-loop toward the toe *a'* of the lever, but by reason of the downward movement of the member *c*, on which *b*² fulcrums, an initial downward pressure is brought on the pipe, thus increasing the friction between the pipe and the loop and assisting the initial resistance, which permits positive gripping action of the wrench to come into play.

When it is desired to remove the wrench from a pipe, the loop must be swung outward, overcoming the action of the spring *g* until the projection *b'* is free from the toe *a'* of the main lever, and a similar outward swinging of the loop and an upward swinging of the link member *c* is required to adjust the loop in operating position on a pipe.

In order to hold the oscillating member *c* in engagement with the lug *a*² and permit of freedom of oscillation thereof, the bolt *f* is formed with a bar *f*³, preferably formed on a slightly-raised portion *f*⁴ and integral therewith, which bar extends across the bolt and projects over and bears on the said member *c* at each side and engages stops or lugs *c*⁵ *c*⁶, cast thereon and sufficiently far apart to permit a certain amount of movement of the oscillating member, while by the engagement of said bar *f*³ with the stops or lugs *c*⁵ the spring *g* normally exerts a pressure to cause the said oscillating member to lower at its swinging end as well as holding the said member *f* in its hooked position on the lugs.

As before stated, it is not essential to the primary principle of operation that the wrench be provided with spring-actuated devices such as described, as the initial friction necessary to cause gripping may be from the natural tendency of the link to swing toward the loop, as explained, or by the force of gravity, or this initial friction may be imparted by a set-screw *h* working in the lug *i*, formed on the end of the lever, as shown in Fig. 6. In this form of the wrench the hook *b*⁷ engages the end of the screw, which forms therefor

an adjustable stop, while its pressure forward on the end of member b^2 acts to bring the gripping loop against the toe a' as well as bring the said member b^2 down on the pipe d in the manner and with the effect heretofore pointed out.

It will be obvious that the combination and arrangement of levers and gripping-loop herein described may be used as a clutch in connection with a pulley or other device, and such is within the scope and spirit of the invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A gripping device comprising a gripping-loop, a main supporting member adapted to fulcrum on one end of said loop, a link connection between the outer end of said loop and said supporting member wholly without the confines of said loop, and means whereby said link connection is normally pressed in the direction of said loop, substantially as and for the purpose set forth.

2. A gripping device comprising a gripping-loop, a main supporting member adapted to fulcrum on one end of said loop, and a link member carrying the other end of said loop and having a fulcrum-bearing on said supporting member adapted to change the center upon which said link member swings and during the gripping operation, substantially as and for the purpose set forth.

3. A gripping device comprising a gripping-loop, a main supporting member adapted to fulcrum on one end of said loop, and a link member carrying the other end of said loop, and having a fulcrum-hook whereby the fulcrum-point of said link is adapted to move from within said hook to the point thereof, during the application of the leverage, substantially as and for the purpose set forth.

4. In a gripping device, the combination of a main supporting member and a gripping-loop connected thereto and fulcrumed thereon, the engaging section of the fulcrum-support having diverging faces whereby the initial leverage applies pressure to compress the loop and the pressure of the continued leverage is diverted to apply a wrenching action to said loop, substantially as and for the purpose set forth.

5. In a gripping device, the combination of a main supporting member and a gripping-loop connected thereto and fulcrumed thereon, the engaging section of the fulcrum-support having diverging faces whereby the initial leverage applies pressure to compress the loop and the pressure of the continued leverage is diverted in part to apply a wrenching action without increasing the loop compression beyond a predetermined limit, substantially as and for the purpose set forth.

6. A gripping device comprising a gripping-loop, a main supporting member adapted to

fulcrum on one end thereof, a link carried by said supporting member and adapted to fulcrum on said loop, and pressure means in engagement with said loop, substantially as and for the purpose set forth.

7. A gripping device comprising a gripping-loop, a main supporting member adapted to fulcrum on one end thereof, a link carried by said supporting member and adapted to fulcrum on said loop adjacent its other end, and pressure means in engagement with the said latter end of the loop, substantially as and for the purpose set forth.

8. A gripping device comprising a gripping-loop, a main supporting member adapted to fulcrum on one end of said loop, a link carried by said supporting member adapted to fulcrum on the outer end of said loop, and yielding means for holding said outer end in engagement with said link, substantially as and for the purpose set forth.

9. A gripping device comprising a segmental gripping-loop, a main supporting member adapted to fulcrum on one end thereof, a link carried by said supporting member and adapted to fulcrum on the outer terminal segment of the loop intermediate the ends of said segment, and pressure means for engagement with the said outer end of said segment, substantially as and for the purpose set forth.

10. A gripping device comprising a segmental gripping-loop, a main supporting member adapted to fulcrum on one end thereof, a link carried by said supporting member and adapted to fulcrum on the outer terminal segment of the loop and locking means for the outer end of said segment adapted to have movement therewith, substantially as and for the purpose set forth.

11. A gripping device comprising a main supporting member, a link carried thereby, a gripping-loop adapted to fulcrum on said supporting member and having an outer terminal segment adapted to fulcrum on said loop intermediate the ends of said segment, and a spring-actuated sliding member on said supporting member, carrying a pivoted locking-dog for cooperation with the ends of said terminal segment, substantially as and for the purpose set forth.

12. A gripping device comprising a main supporting member, a link carried thereby, a gripping-loop having terminal segments adapted to hook upon the said supporting member and within said link, respectively, the outer segment having a hooked extension and a spring-actuated sliding member carried by said supporting member and adapted to be engaged by the hook of said extension, substantially as and for the purpose set forth.

13. A gripping device comprising a segmental gripping-loop, a main supporting member adapted to fulcrum on one end thereof, a link carried by said supporting member and adapted to fulcrum on the outer terminal seg-

ment of the loop intermediate the ends of said segment, and pressure means in engagement with said link and the outer end of said terminal segment adapted to maintain pressure
5 on said link independent of the pressure exerted on said segment, substantially as and for the purpose set forth.

14. A gripping device comprising a main supporting member, a gripping-loop adapted
10 to fulcrum at one end on said supporting member, a bifurcated link connection for the outer end of said loop adapted to hook over suitable

bearings on said supporting member, and means for holding said link connection in movable engagement with said bearings, substantially as and for the purpose set forth. 15

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

EBENEZER FISHER.

Witnesses:

H. M. STERLING,
H. G. DIETERICH.