

No. 751,902.

PATENTED FEB. 9, 1904.

J. M. DODGE.
EXPANSION RIVET, BOLT, &c.
APPLICATION FILED APR. 10, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

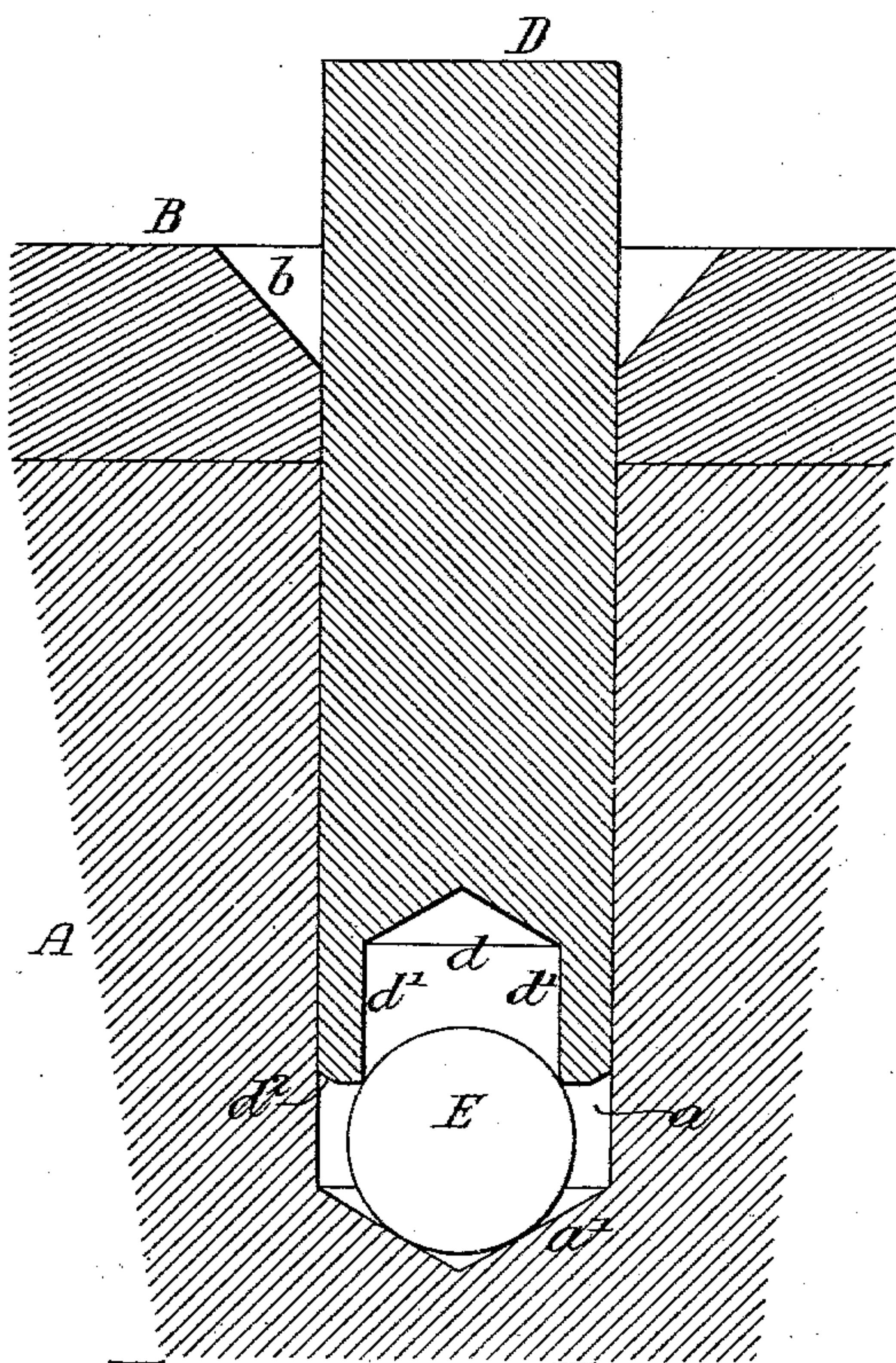


Fig. 2.

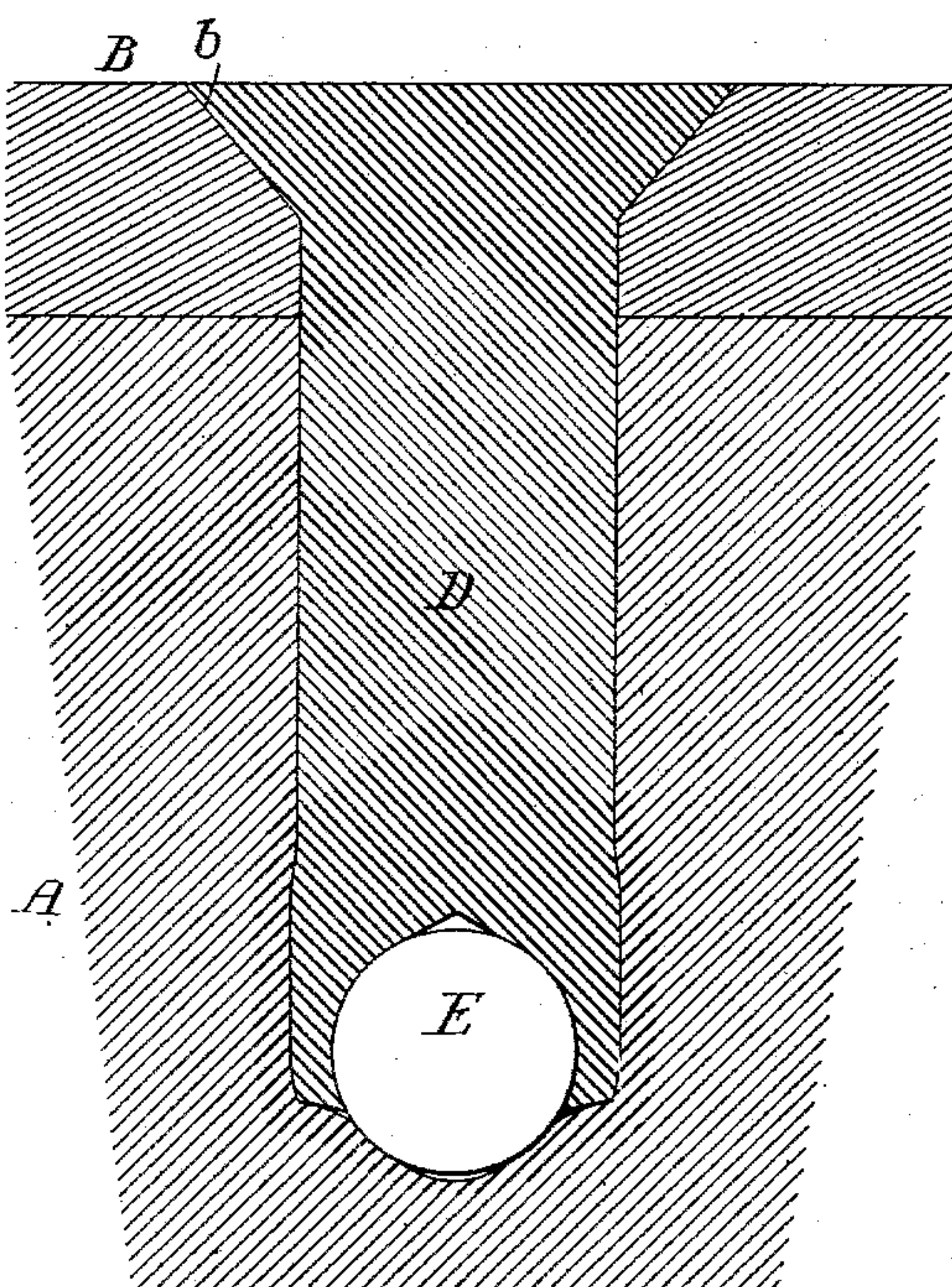


Fig. 9.

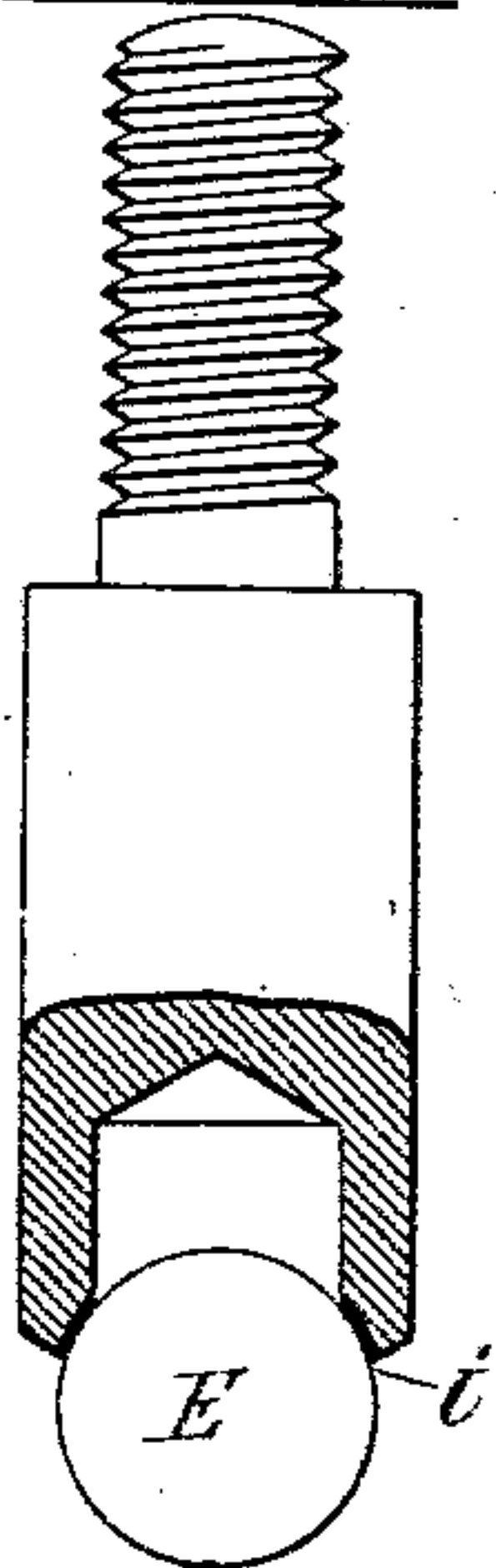


Fig. 8.

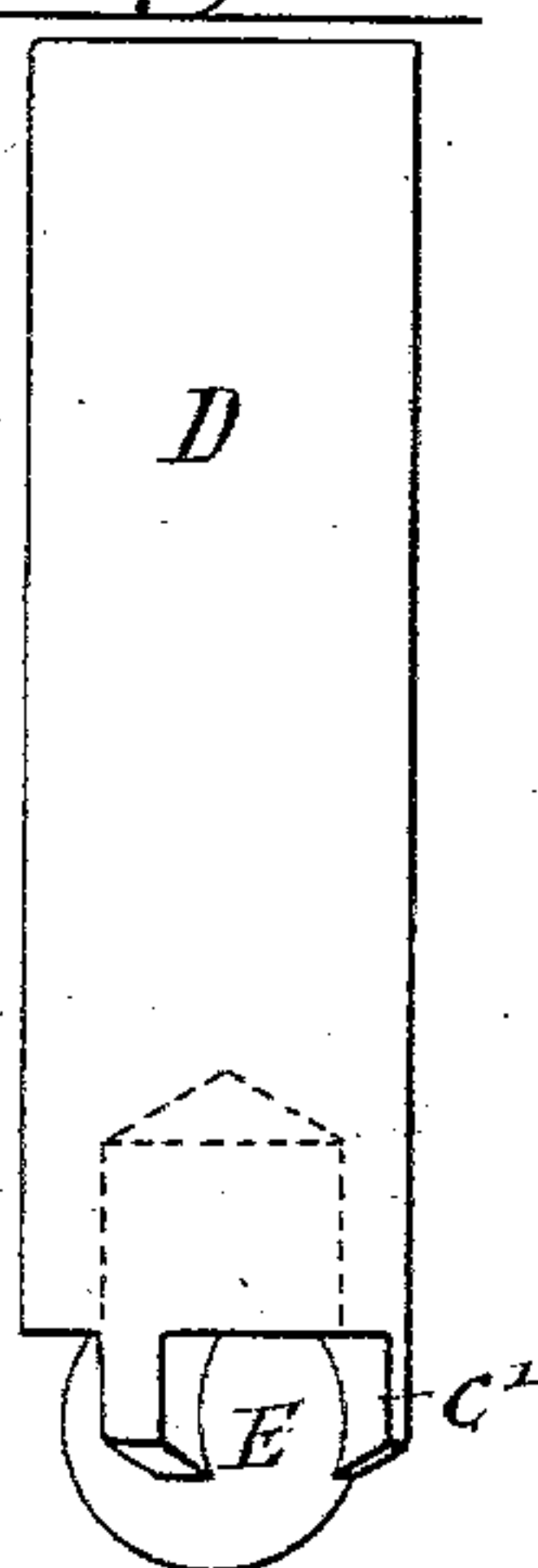


Fig. 13.

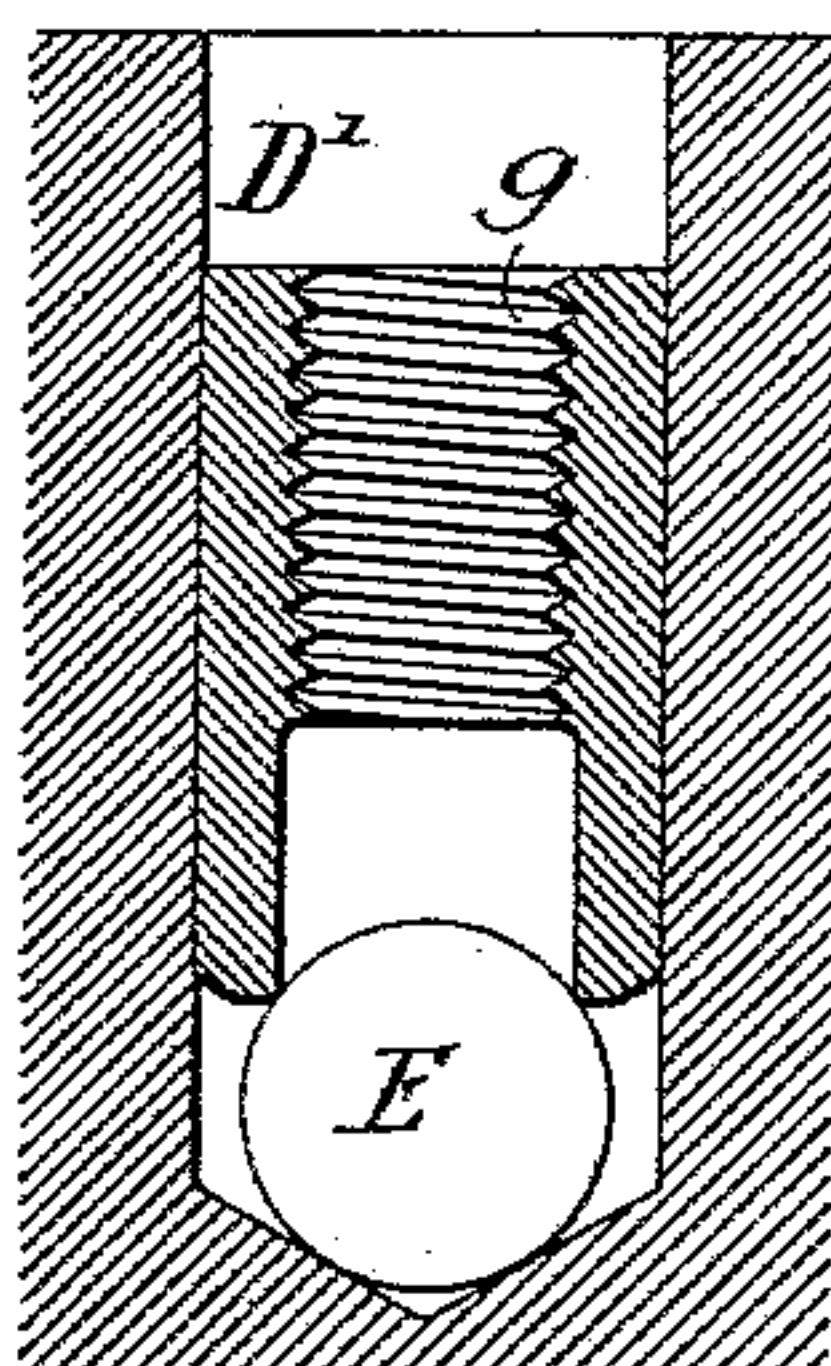
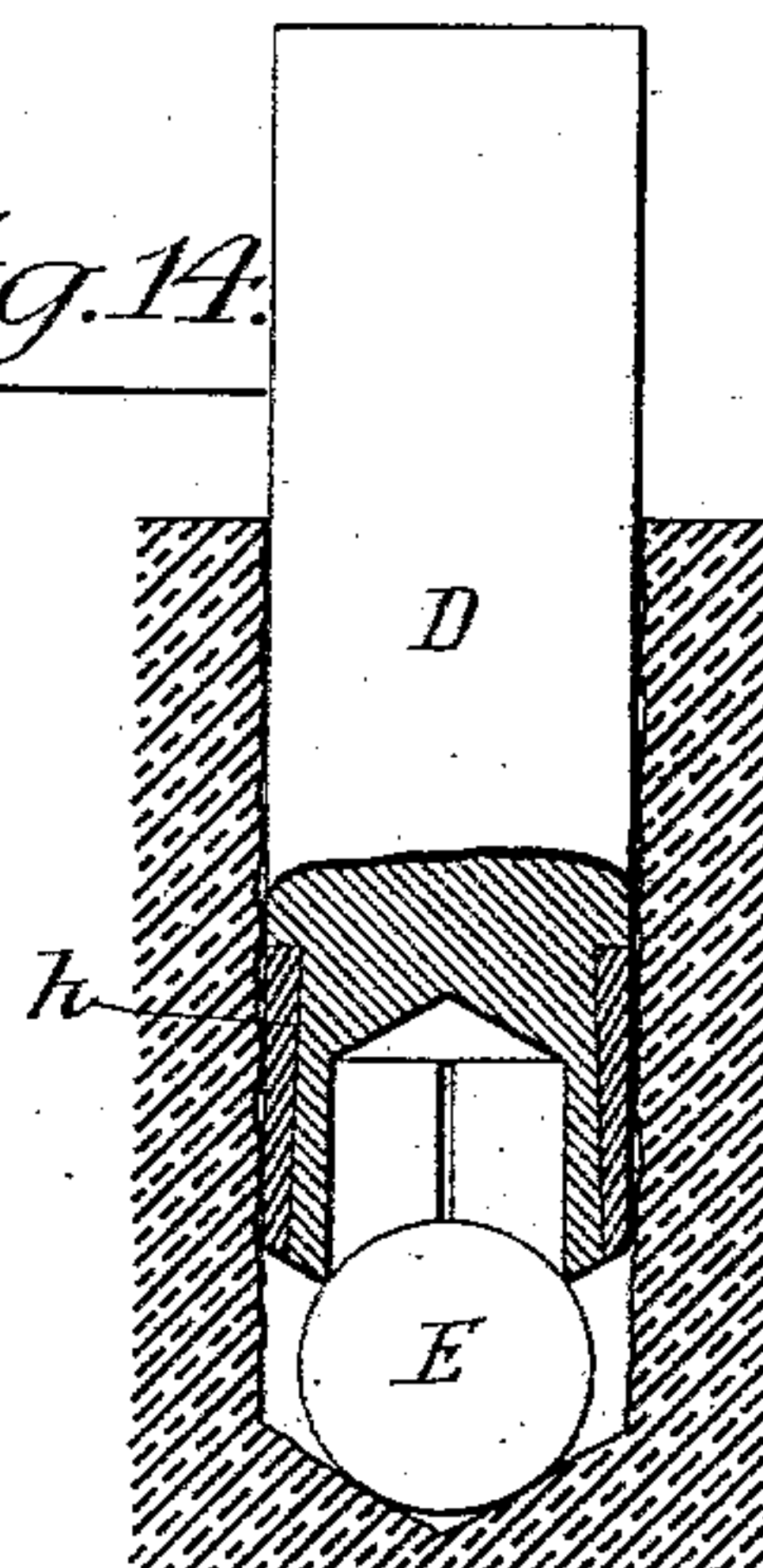


Fig. 14.



Witnesses:

Hamilton D. Turner
Wm. A. Barr.

Inventor:

James M. Dodge
by his Attorneys:
H. W. Jones & H. W. Jones

No. 751,902.

PATENTED FEB. 9, 1904.

J. M. DODGE.
EXPANSION RIVET, BOLT, &c.
APPLICATION FILED APR. 10, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 4.

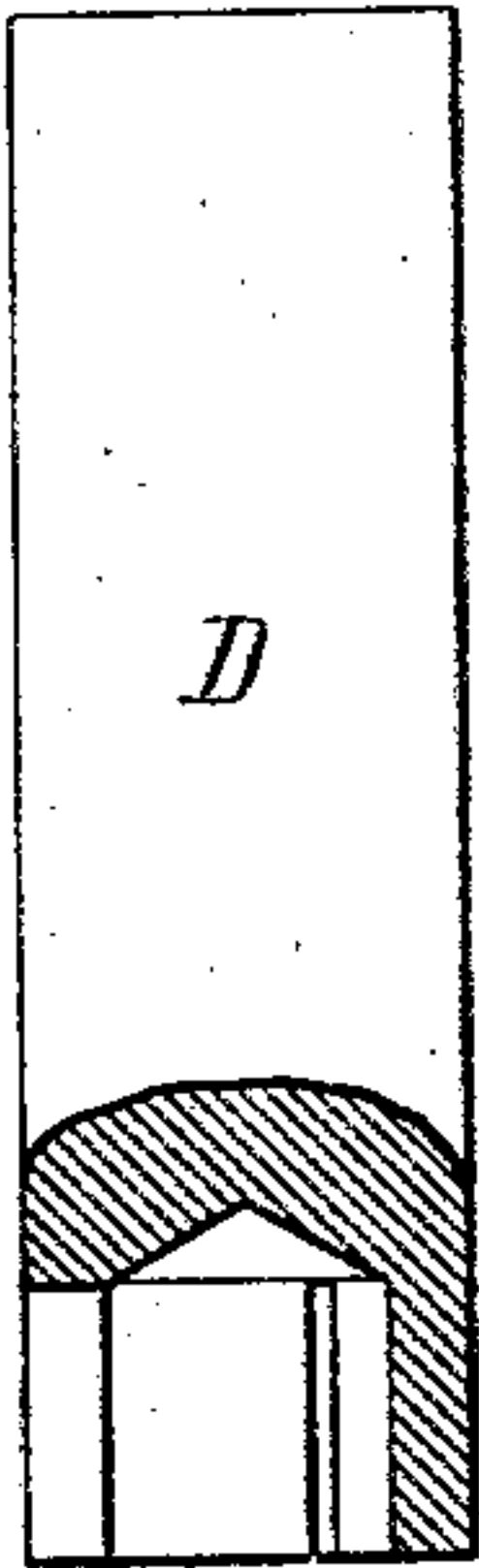


Fig. 3.

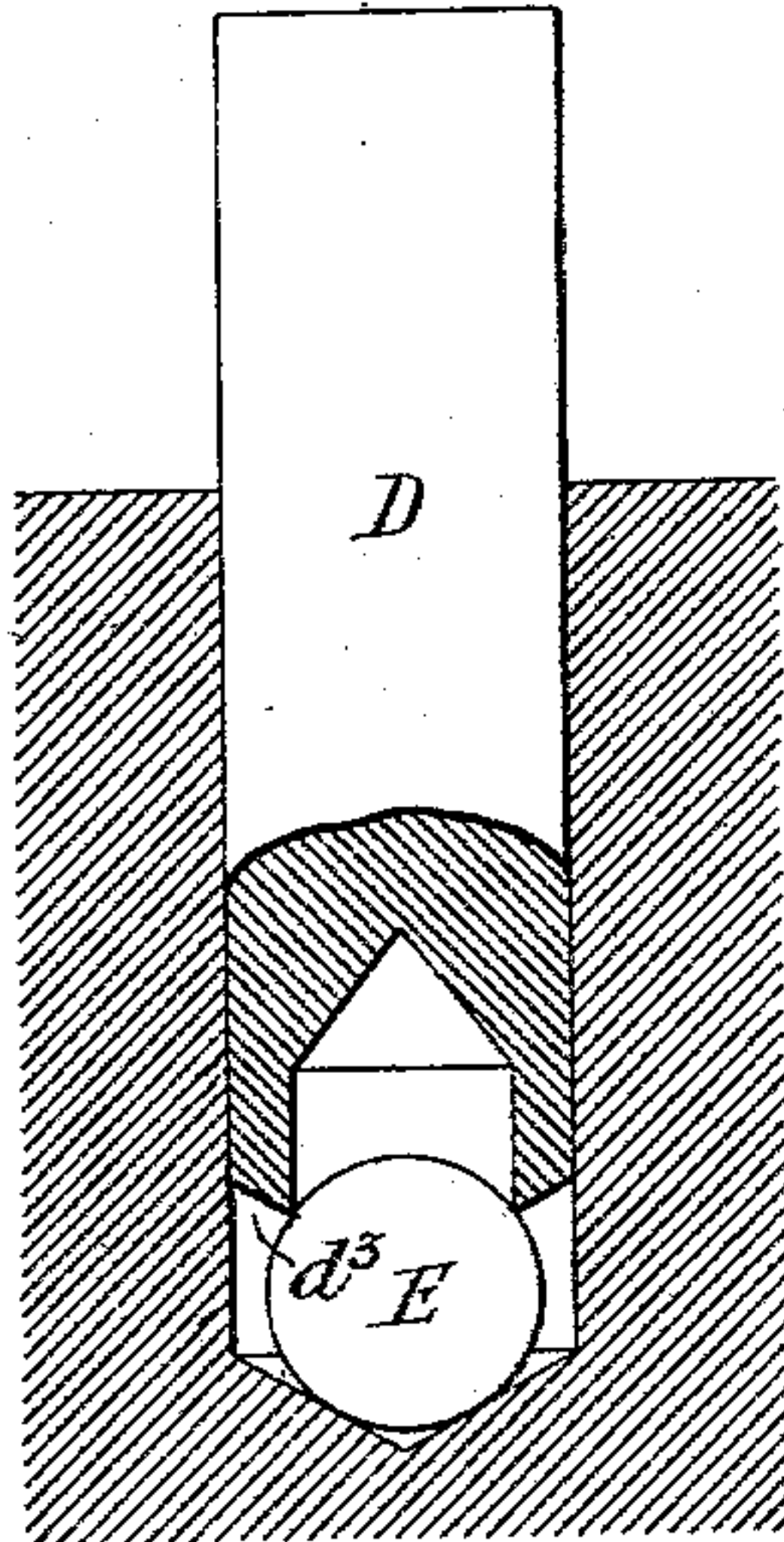


Fig. 6.

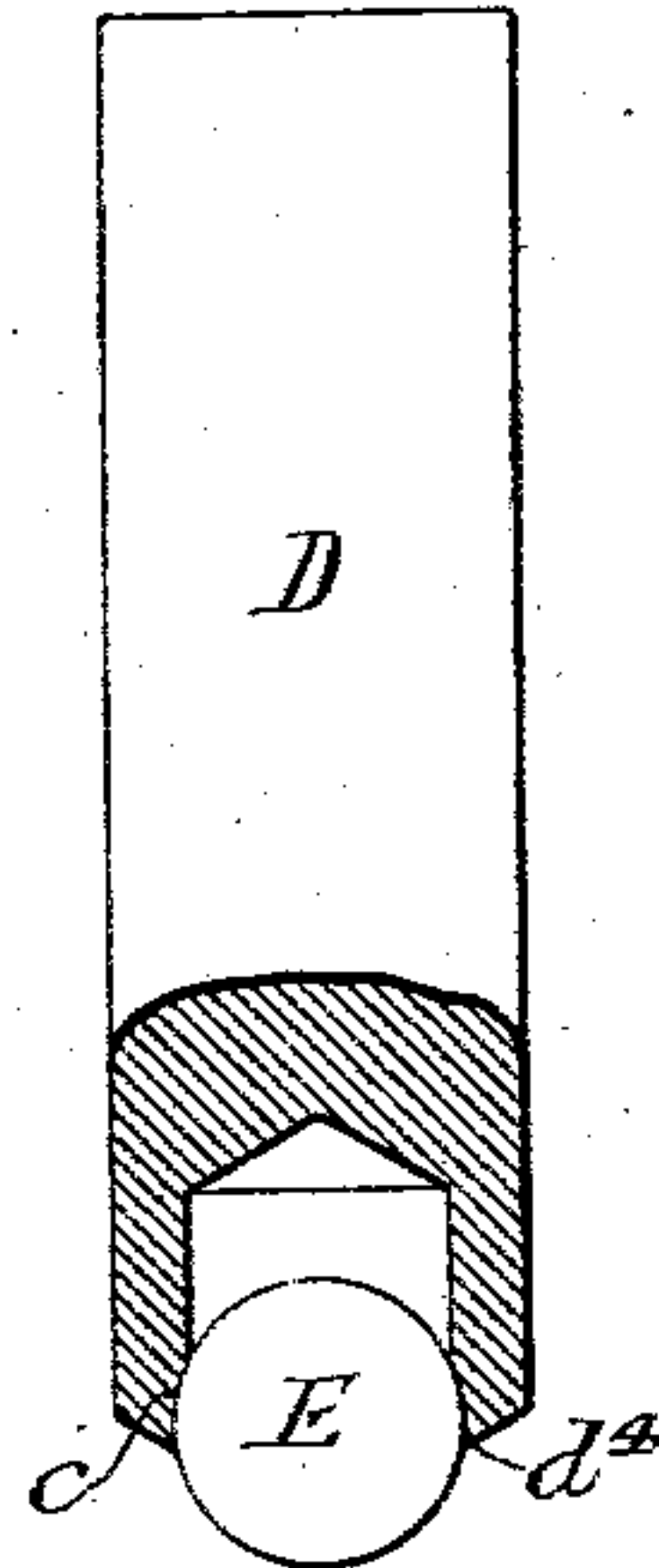


Fig. 5.

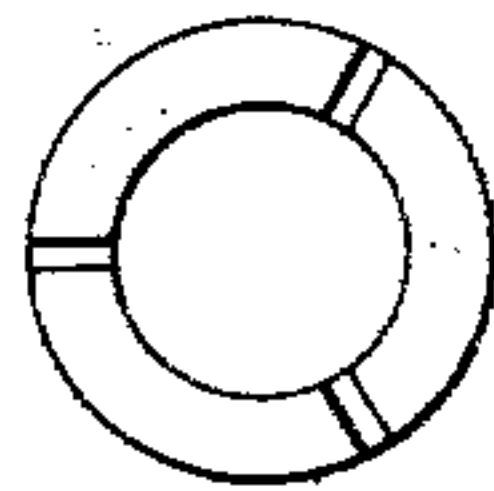


Fig. 7.

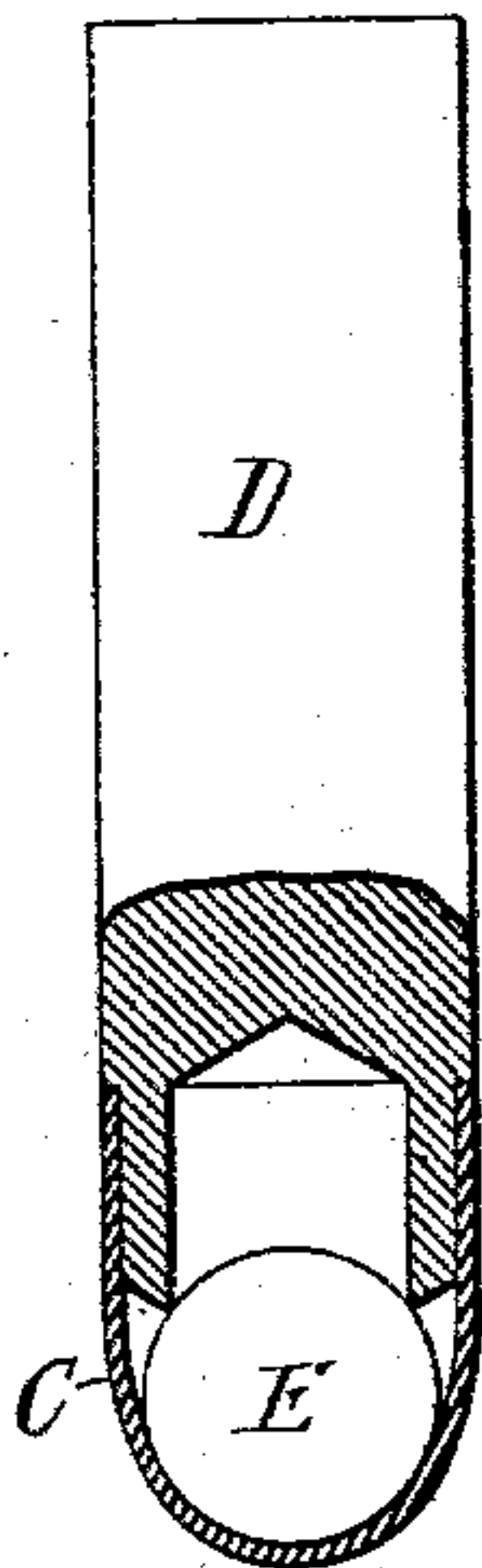


Fig. 10.

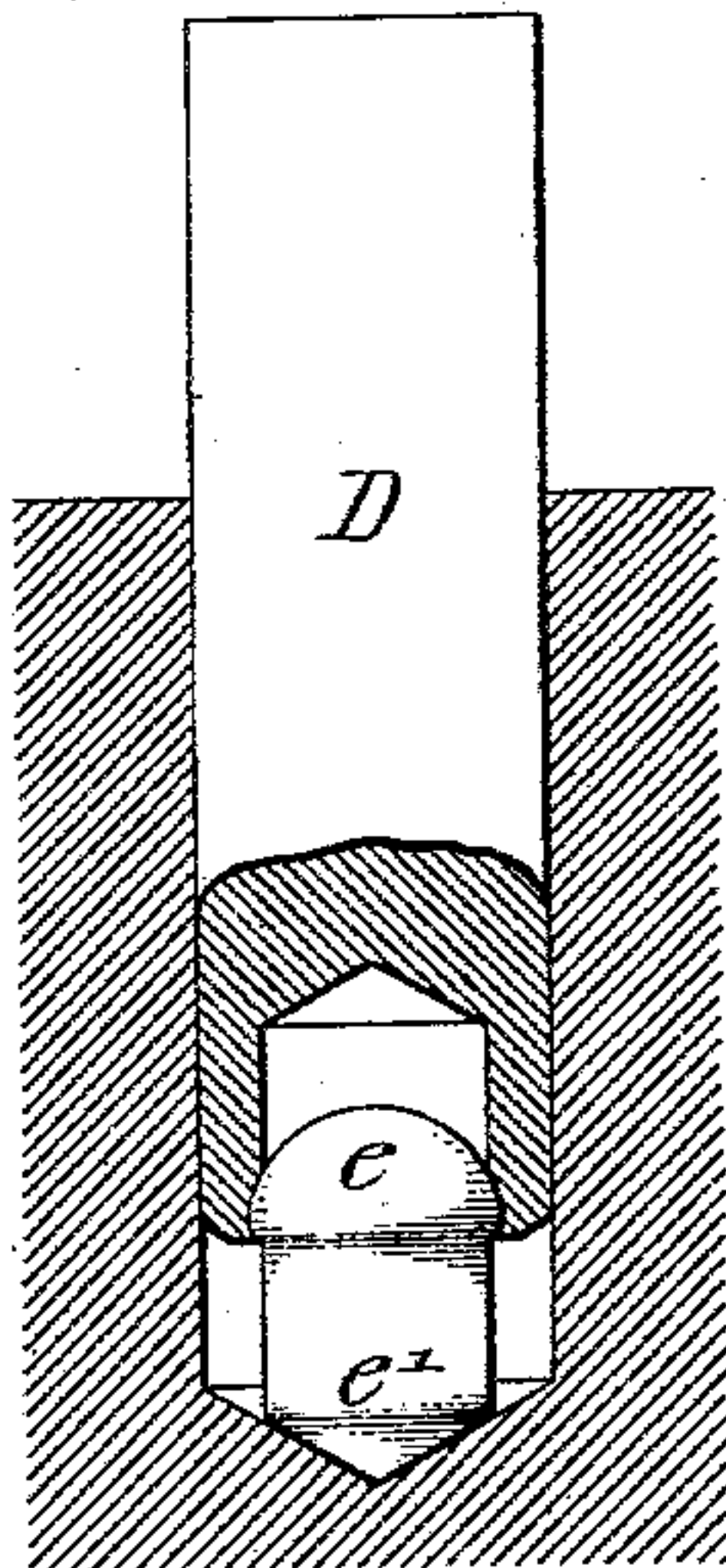


Fig. 11.

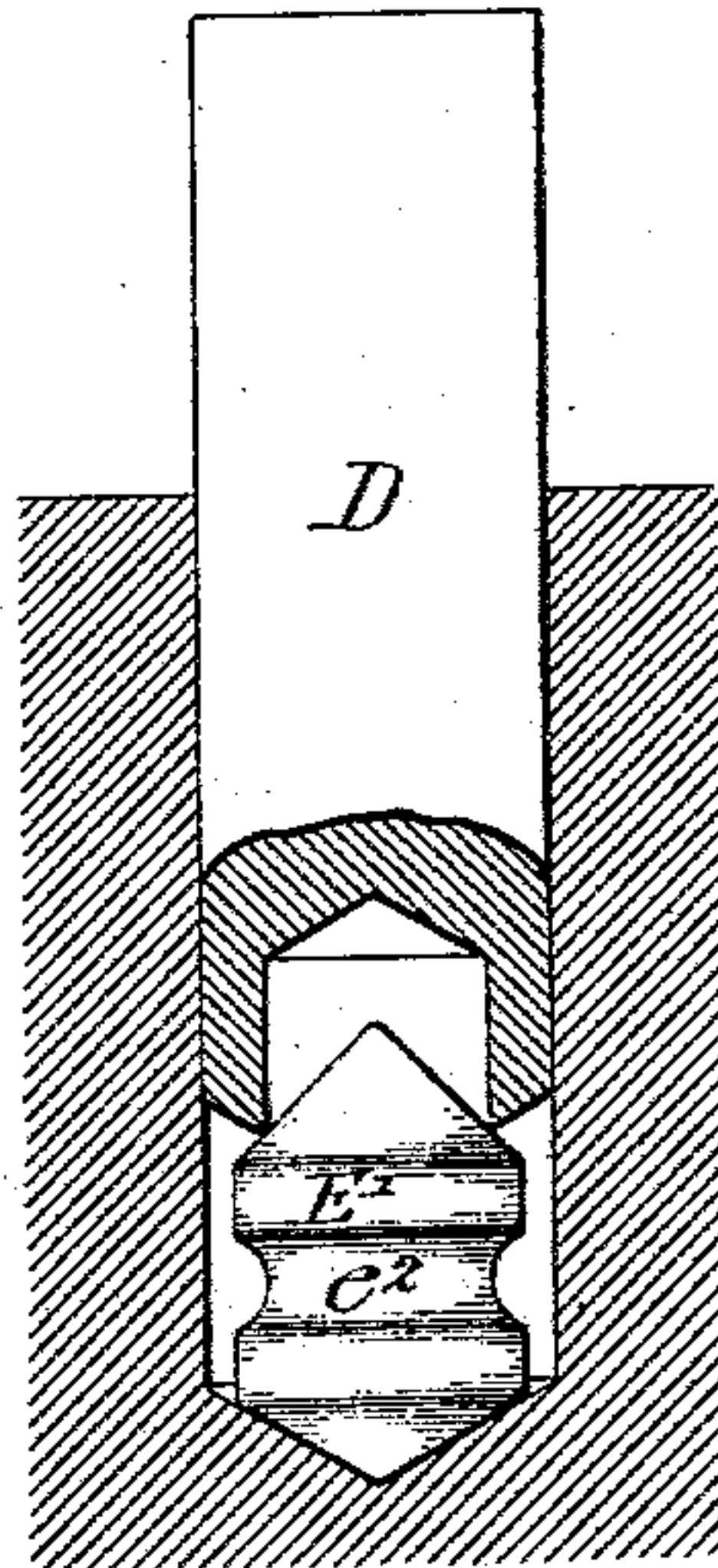


Fig. 12.

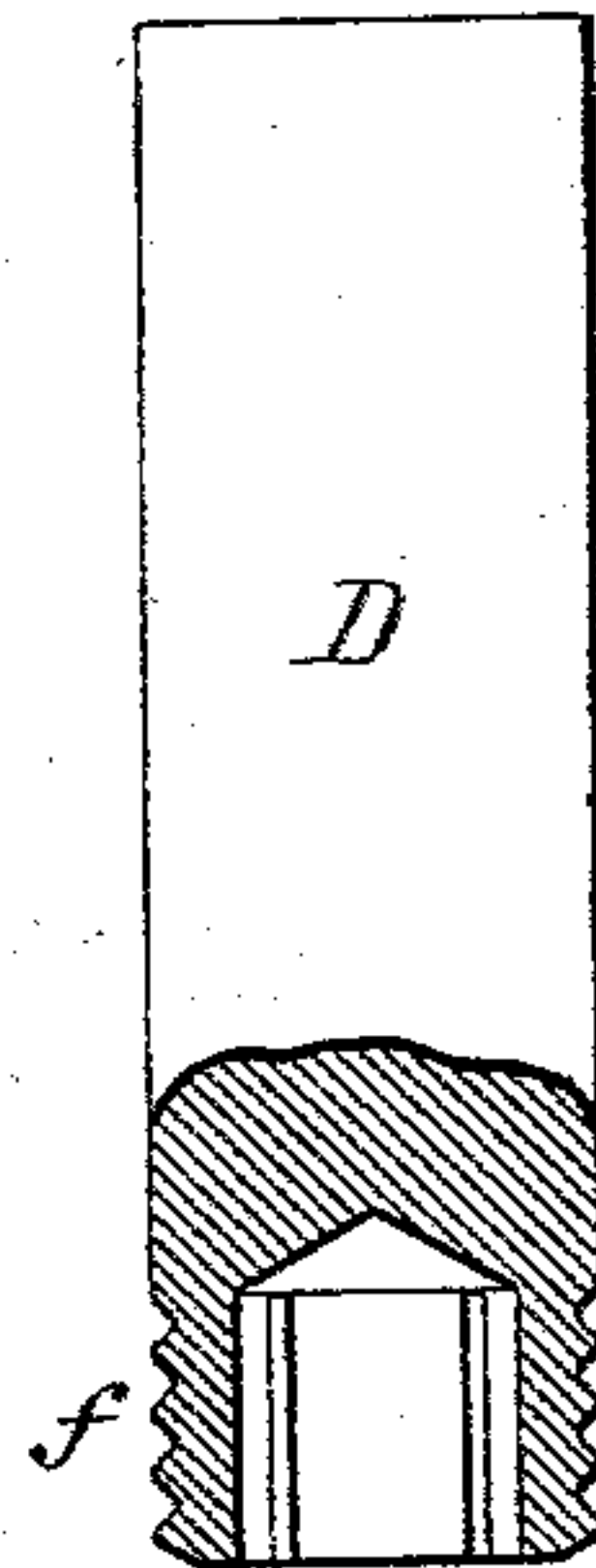


Fig. 15.

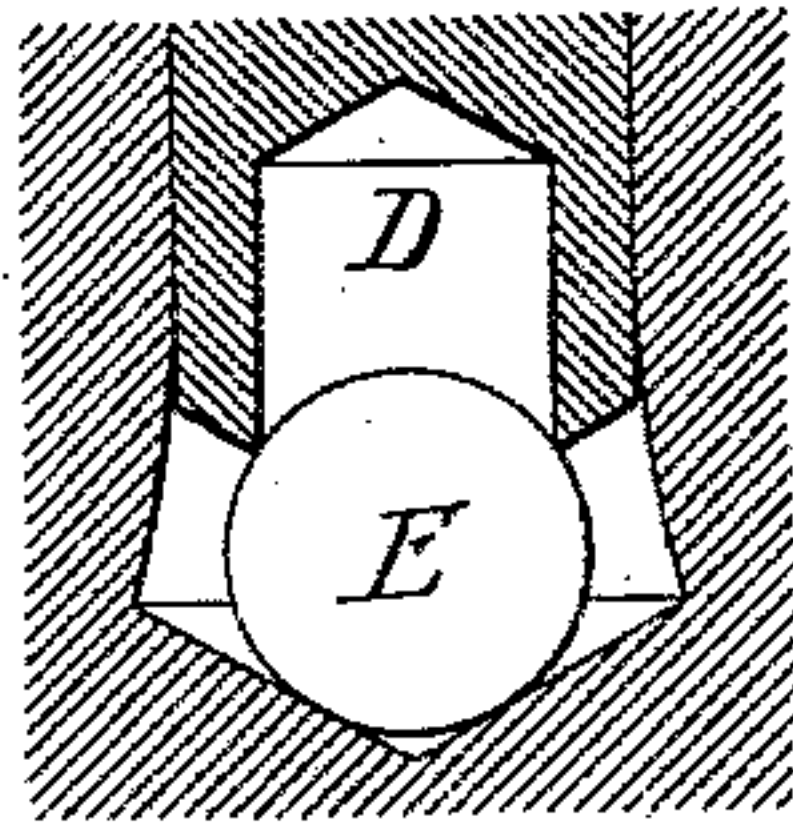
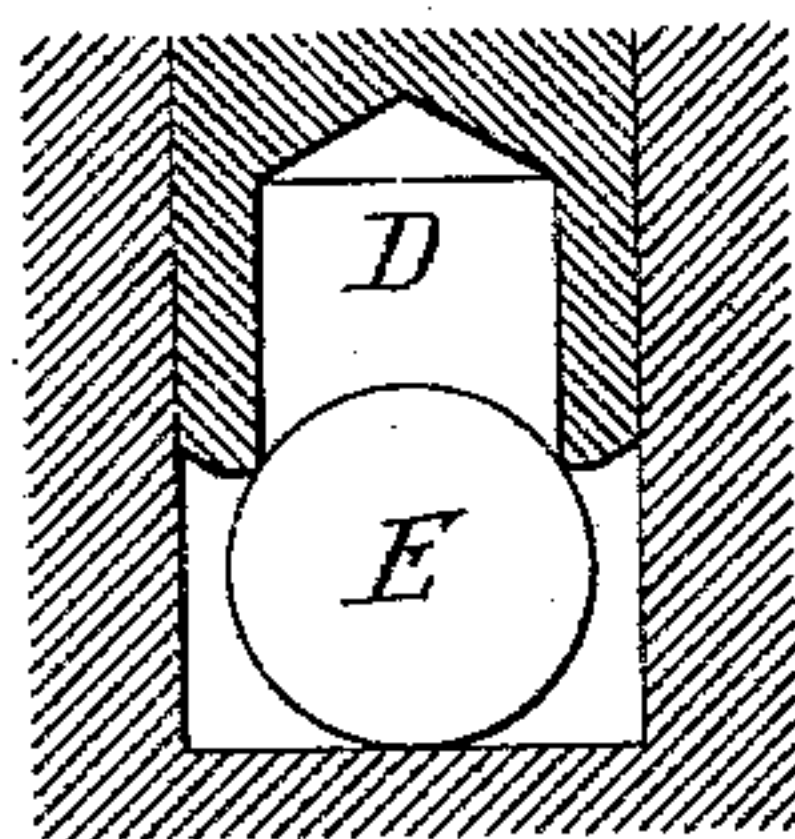


Fig. 16.

Witnesses:-
Hamilton S. Turner
Wm. A. Barr.

Inventor:-
James M. Dodge,
by his Attorneys,
Howson & Howson

UNITED STATES PATENT OFFICE.

JAMES M. DODGE, OF PHILADELPHIA, PENNSYLVANIA.

EXPANSION RIVET, BOLT, &c.

SPECIFICATION forming part of Letters Patent No. 751,902, dated February 9, 1904.

Application filed April 10, 1903. Serial No. 151,990. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. DODGE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Expansion Rivets, Bolts, &c., of which the following is a specification.

My invention relates to certain improvements in means for securing rivets, bolts, spikes, and like objects firmly in position.

My invention is especially applicable for use where the hole to receive the rivet or other article does not extend through the object to which the rivet or other pin is to be secured.

The object of my invention is to provide means for rapidly and permanently attaching the rivet, bolt, or other pin by the use of an expander so formed that it not only expands the end of the rivet or other bolt and enlarges the base of the hole, but is so formed that it will be fixed to the rivet or bolt, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a sectional view showing the expander and a rivet in position to be driven into place. Fig. 2 shows a rivet driven in place and engaging the expander. Fig. 3 is a view showing the end of a rivet tapered to correspond to the tapered bottom of the hole. Fig. 4 is a sectional view showing the end of a rivet split. Fig. 5 is an inverted end view of Fig. 4. Fig. 6 is a view showing the expander attached to the rivet. Fig. 7 shows a cap for securing the expander to the rivet. Fig. 8 shows another means of securing the expander to the rivet. Fig. 9 shows a rivet secured to the expander by solder or other means of fastening. Figs. 10 and 11 show different forms of expanders. Fig. 12 shows a rivet with a corrugated outer surface. Fig. 13 shows a sleeve or nut so shaped that it can be driven into an opening and secured to the expander. Fig. 14 is a sectional view showing a soft-metal ferrule surrounding the end of the rivet. Fig. 15 is a view showing the hole having a flat base, and Fig. 16 is a view showing the hole enlarged at the base.

I will describe my invention in connection with a rivet which is to be used for securing a plate onto a metallic body. The usual method of accomplishing this is to use a screw-thread-

ed bolt and then rivet the end of this bolt, so as to secure the plate to the body; but this riveting loosens the threaded bolt in the body, and consequently a very unsatisfactory fastening is the result.

Expansion-bolts have been made in which a wedge is used for separating the end of the bolt when driven; but these expansion-bolts are readily removable, as when power is applied to draw the bolt the expanded portions simply contract as they draw from the wedge.

By my invention the expander after the bolt is driven is secured to the bolt, so that if the bolt is withdrawn the expander must come with it. Tests have shown that the resistance to withdrawal is higher than the allowable strain of engineering practice of the bolts to which my invention is applied.

Referring to Figs. 1 and 2 of the drawings, A is the body in which is drilled a hole a of any depth required, having in the present instance a conical base a' . B is a plate which is to be secured to the body A, and this plate has a hole of the same diameter as the hole in the body and is countersunk at b to receive the head of the rivet to be formed. D is the rivet-blank, made to snugly fit the hole a , and in one end of the rivet is a recess d of a given depth, depending upon the size of the rivet. This recess forms an annular flange d' on the inner end of the rivet. E is an undercut expander, in the present instance in the form of a ball, which is so proportioned in reference to the hole a and the recess d in the rivet D that it will spread the flange d' when the rivet is driven, so as to slightly enlarge the hole near the base, as clearly shown in Fig. 2, and condense the metal of the body portion at this point, as well as to condense the metal of the rivet. As the rivet is driven, the flange d' is forced over the ball between it and the walls of the opening, and the flange is so proportioned that the end of the rivet will pass beyond the center of the ball and will crowd slightly under it, as clearly shown in Fig. 2, permanently securing the ball to the rivet. In order to aid the rivet in accomplishing this, I prefer to slightly bevel the end of the rivet at d'' , so that when the end of the rivet strikes the base a' of the hole it will be forced under the ball. This is an im-

portant feature, as it prevents the rivet leaving the ball when the rivet is subjected to longitudinal strain. If the rivet is to be removed after it is driven in place, the ball must be removed with it, and therefore it will be seen that it is almost impossible to remove the rivet no matter how slight an enlargement of the hole is made by the rivet when it is driven. At the same time that the rivet is driven in place in the body portion the head of the rivet is formed, as clearly shown in Fig. 2, so that the action of the hammering upon the rivet-head is to more firmly secure the rivet to the body portion.

In Fig. 3 I have shown a rivet provided with an extended tapered end d^3 .

In Figs. 4 and 5 I have shown the flange of a rivet split, so as to allow it to freely expand.

In Fig. 6 I have shown a socket c formed in the end of a rivet for the reception of the ball, the extreme end d^4 of the rivet extending slightly past the center of the ball and turned onto the ball to secure it permanently to the rivet. This is especially desirable where a number of different-sized rivets are used, each size having a different-sized ball, as the balls must be in proportion to the diameter of the rivet and the diameter of the recess therein, and by having the balls attached to the rivets no mistake can be made by the riveter.

In Fig. 7 I have shown a casing C , preferably of soft metal, paper, or composition, which incloses the ball and is secured to the end of the rivet for the purpose of holding the ball to the rivet.

In Fig. 8 I have shown the lugs c' for the purpose of fastening the ball to the rivet.

In Fig. 9 I have shown a stud-bolt having a socket in which the ball rests, and the ball is secured to the end of the bolt by solder i or other material which will fasten the ball to the end of the bolt.

In Fig. 10 I have shown a different form of undercut expander in place of the ball shown in the other figures. This expander has a shouldered head e and a tapered portion e' , fitting the conical base of the hole. In the present instance the end of the rivet is turned under the shouldered head, so as to confine the expander to the rivet before it is driven. When the rivet is driven, the flange extends past the head and firmly secures the expander to the rivet, as well as enlarging the hole near the base.

In Fig. 11 I have shown an expander E' having a conical portion at each end, one cone fitting in the base of the hole and the other extending into the recess in the end of the rivet. The expander has an annular groove e^2 , into which the flange of the rivet extends when the rivet is driven, so as to attach the expander to the rivet.

In Fig. 12 I have shown the rivet with a series of corrugations f on the outer surface of the flanged portion, so that when the rivet

is driven the corrugated portion will be forced into the walls of the opening. This is particularly useful where the rivet is to be secured in soft metal or material, such as stone or wood.

In Fig. 13 I have shown a sleeve D' or plug secured in an opening by means of the expander, the sleeve having a threaded central opening, into which a threaded bolt can be screwed.

In Fig. 14 I have shown a bolt having a soft-metal ferrule h surrounding the end of the bolt, and the bolt in this instance is shown preferably split. The ferrule is also preferably tapered, as shown, and by means of this construction the bolt can be driven into stone or other material, the soft metal filling up the uneven crevices of the stone.

In some instances the hole may have a flat base, as shown in Fig. 15, and the hole may be enlarged at the base, as shown in Fig. 16, without departing from my invention.

Other modifications of the fastening may readily suggest themselves, the essential feature being to expand the end of the rivet or bolt in the opening, so as to enlarge the base of the opening, at the same time confine the expander to the bolt, so that if there is any tendency to remove the bolt the expander must come with it.

The recess in the rivet can be of different depths, as desired. As shown in Fig. 1, the recess is of a sufficient depth that when the rivet is driven to the fullest extent and seats itself in the bottom of the hole the ball is seated against the bottom of the recess in the rivet and has displaced the metal to such an extent as to make the metal of the rivet snugly fit the ball. This gives greater strength to the rivet, as the shoulder formed by the expansion of the end of the rivet is considerably above the end of the recess in the rivet. In some instances, however, there may be a space left between the ball and the end of the recess in the rivet without departing from the main feature of my invention.

While I have shown my invention mainly in connection with a rivet, it will be understood that it can be used to secure any pin, bolt, spike, or like object permanently in position.

I claim as my invention—

1. The combination of a rivet or bolt having a recess in one end thereof forming an annular flange, an undercut expander larger at its greatest diameter than the recess in the rivet, so that when the rivet is driven its flange will be expanded and will pass over the expander and become attached thereto, substantially as described.

2. The combination of a rivet or bolt having a recess in one end thereof forming an annular flange, a ball larger than the recess in the end of the rivet, so that when the rivet is driven its flange will be expanded and will

pass over the ball and become attached thereto, substantially as described.

3. The combination of a rivet or bolt having a recess in one end thereof forming an annular flange, the edge of said flange being beveled, an undercut expander having a greater diameter than the recess, so that when the rivet is driven its flange will be expanded and the beveled edge of the flange will strike the bottom of the hole into which the rivet is driven and will be forced under the expander, substantially as described.

4. The combination of a rivet or bolt having a recess in one end forming an annular flange, an undercut expander circular in section, larger at its greatest diameter than the recess, the recess being of such depth that when the rivet is driven the expander will entirely fill it, causing the rivet to expand above the line of the recess and to become attached to the expander, substantially as described.

5. The combination of a rivet or bolt, having a recess in the end thereof forming an annular flange, a ball slightly larger than the

recess, and means for securing the ball in the recess, substantially as described.

6. The combination of a bolt or rivet having in the end of the same a recess surrounded by a substantially continuous split annular flange, and an undercut expander, substantially circular in section, engaged by said flange when the bolt or rivet is driven, substantially as described.

7. The combination of a rivet or bolt having a recess in the end thereof forming a flange, an expansible ferrule surrounding the flanged portion of the rivet or bolt, and an undercut expander which will be firmly attached to the recessed end of the rivet or bolt when the latter is driven over the same, substantially as described.

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

JAMES M. DODGE.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.