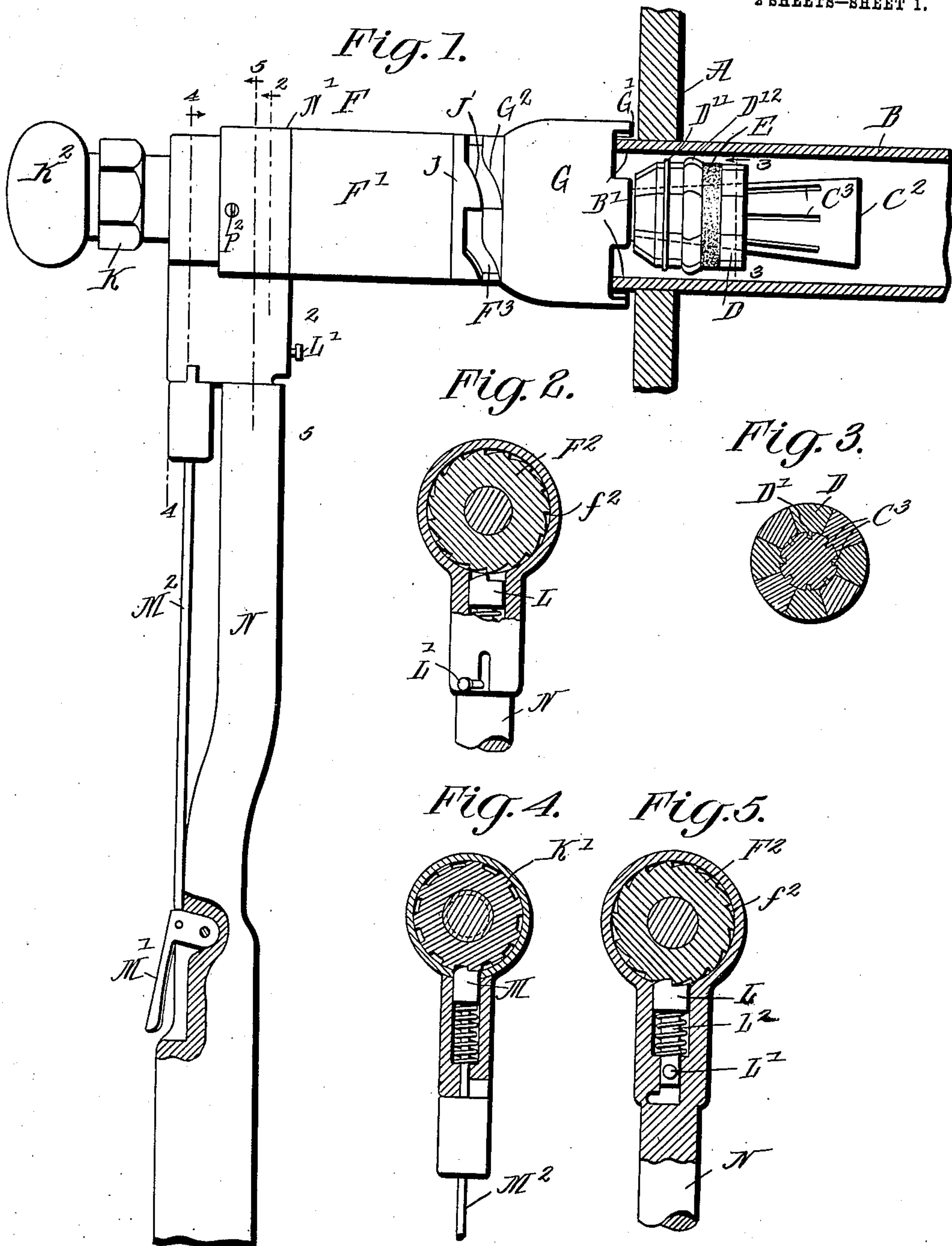


943,579.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 1.



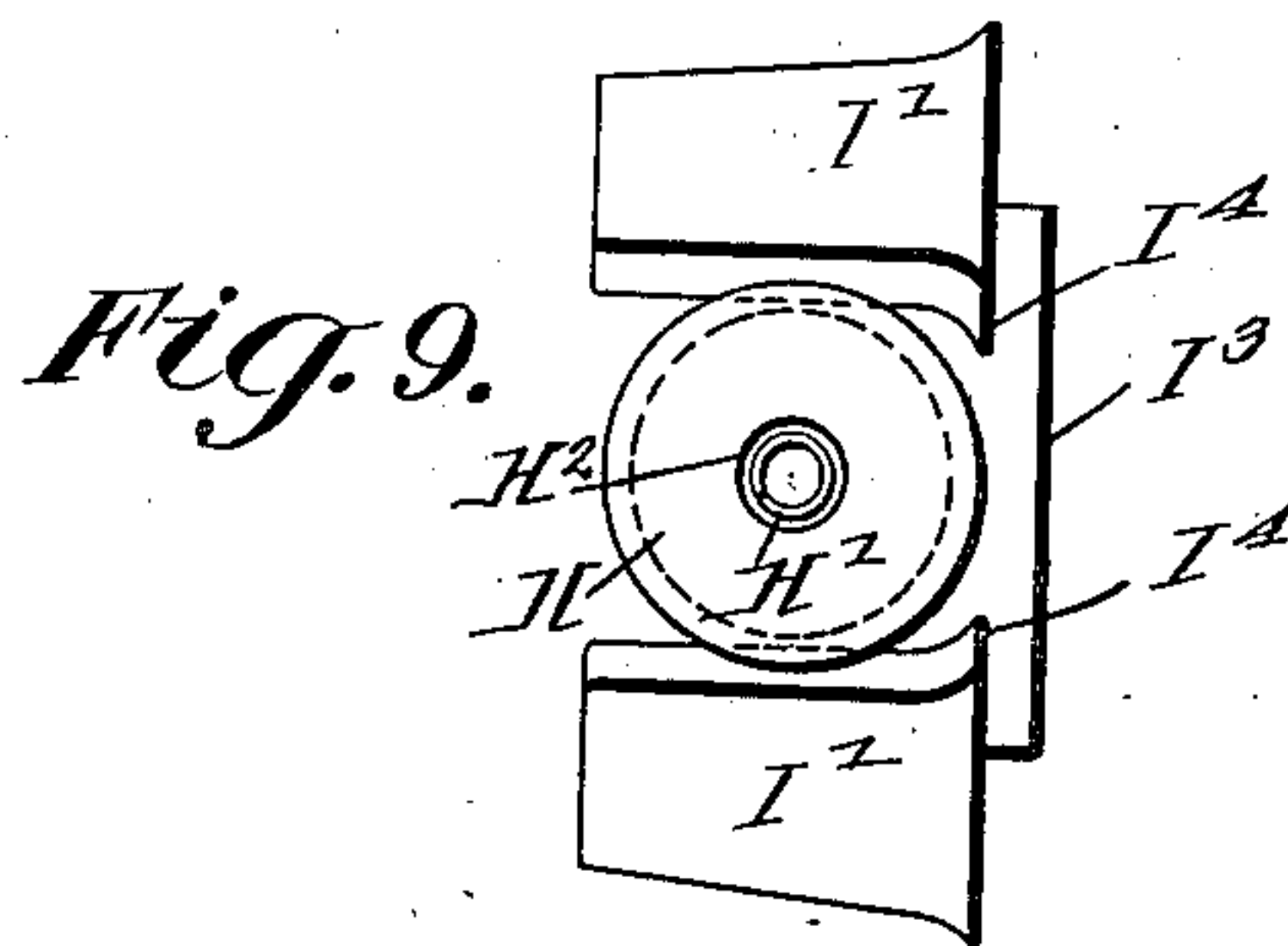
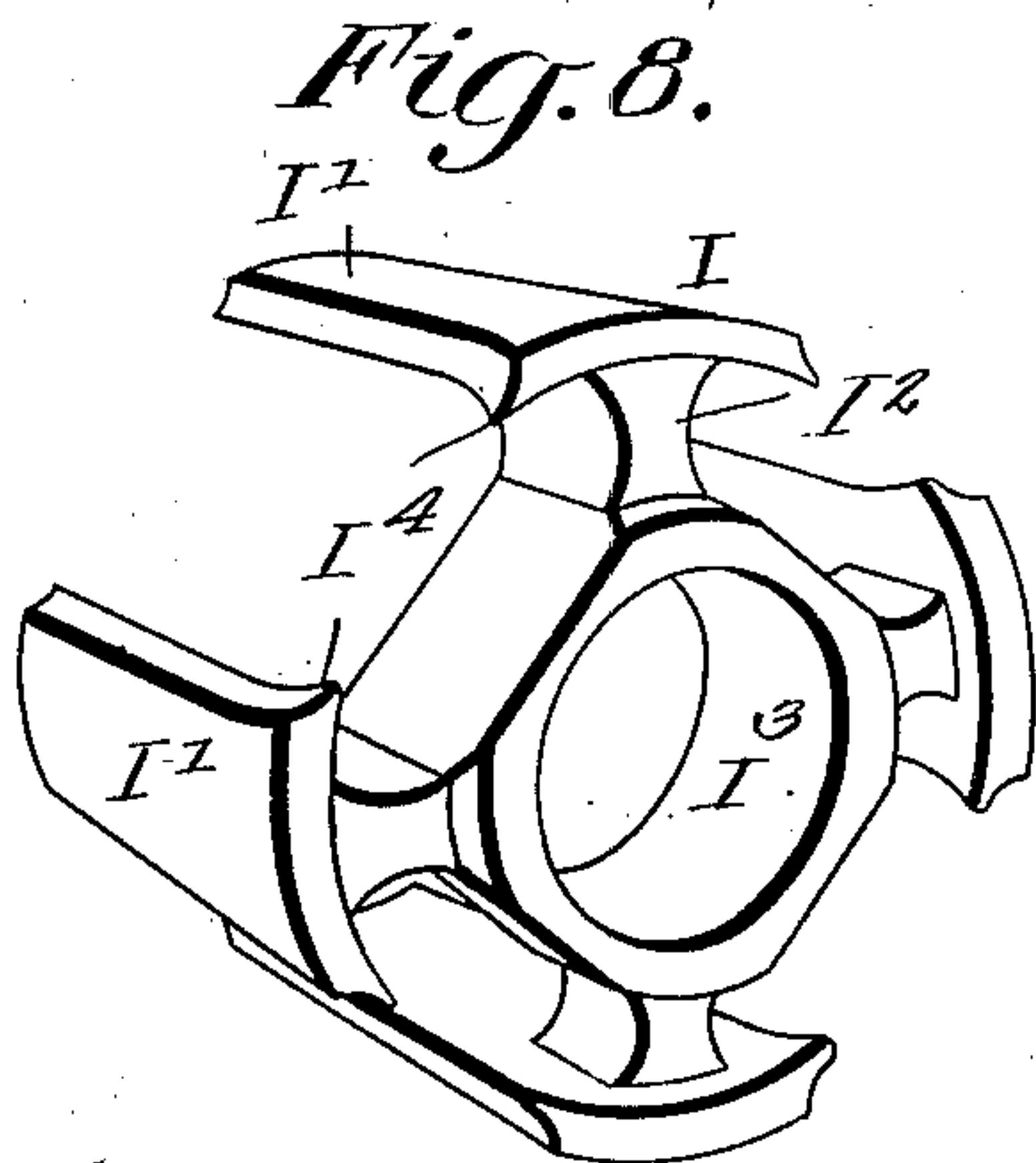
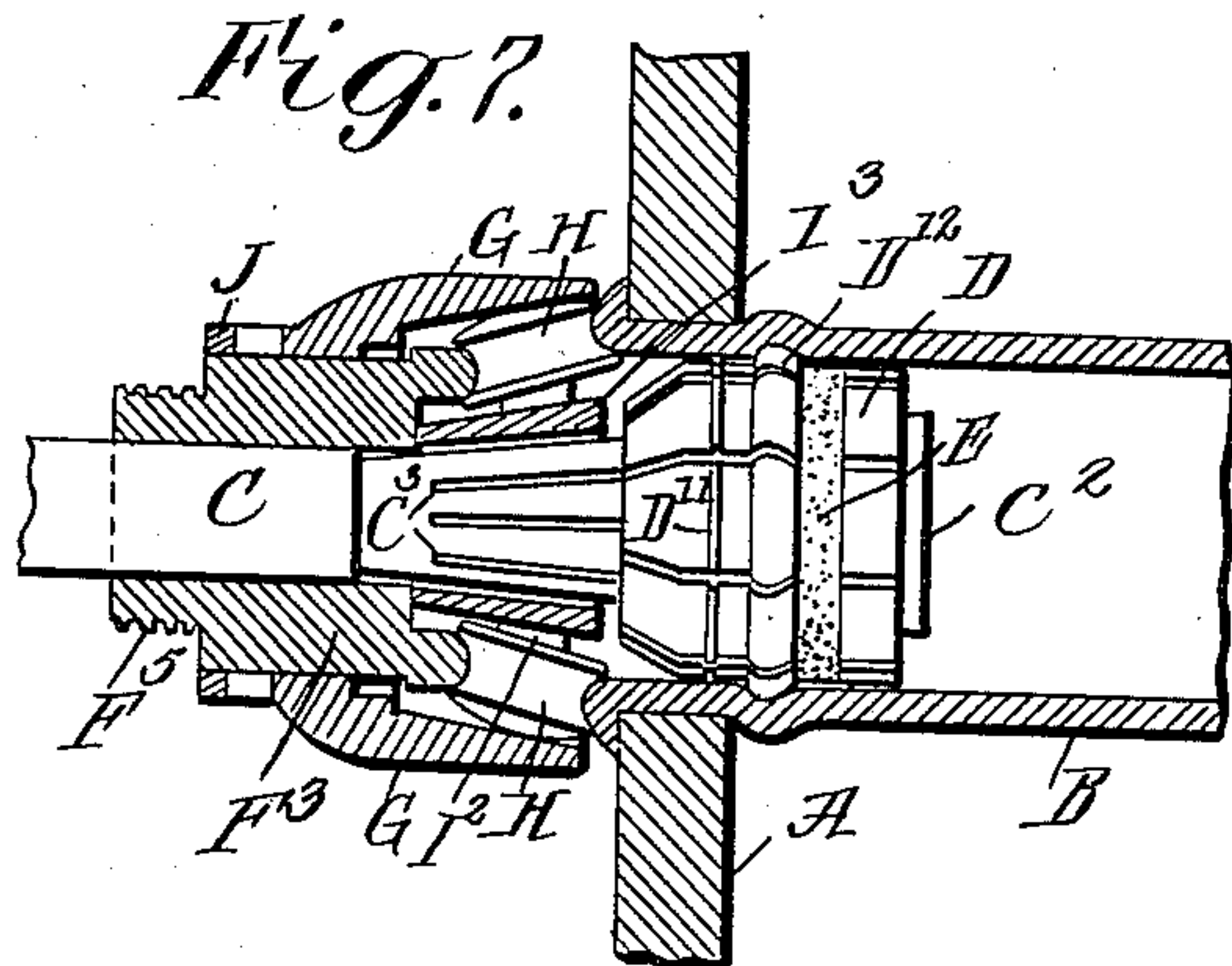
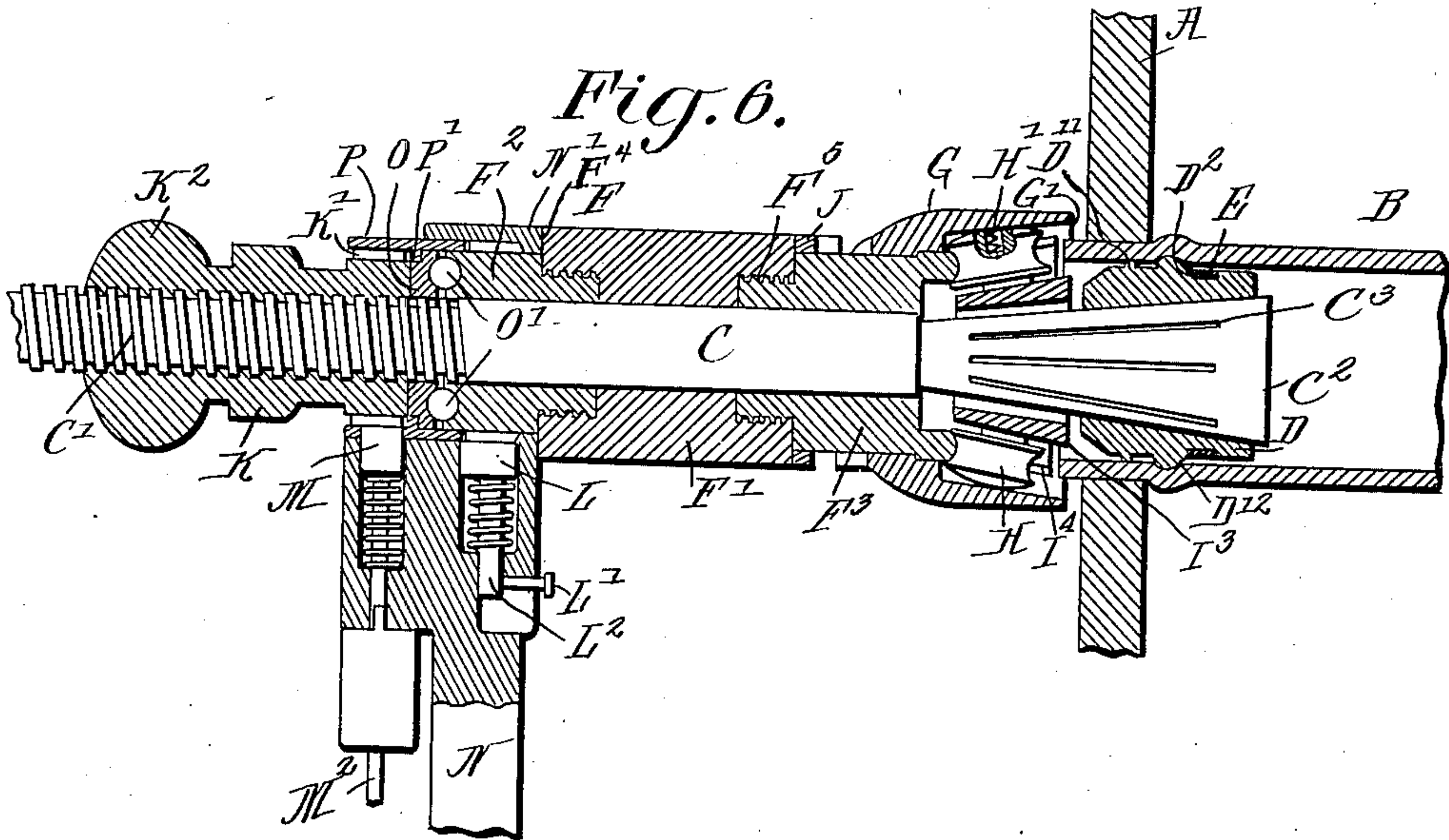
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BOILER TUBE EXPANDER.  
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2 SHEETS—SHEET 2.



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## BOILER-TUBE EXPANDER.

943,579.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed April 2, 1909. Serial No. 487,420.

*To all whom it may concern:*

Be it known that I, JOE CEPHUS TASSEY, a citizen of the United States, and resident of Nashville, in the county of Davidson and State of Tennessee, have made new and useful Improvements in Boiler-Tube Expanders, of which the following is a specification.

This invention is an improvement in boiler tube expanders for pressing boiler tubes into boiler sheets and relates particularly to that class of such devices illustrated in the Patent No. 897,175 issued August 25, 1908, to J. C. Tassey and J. B. Harrington, and the present invention consists in certain novel constructions and combinations of parts as will be hereinafter described and claimed.

In the drawings, Figure 1 is a side view, partly in section, embodying my invention. Fig. 2 is a cross section on about line 2—2 of Fig. 1. Fig. 3 is a cross section on about line 3—3 of Fig. 1. Fig. 4 is a sectional view on about line 4—4 of Fig. 1. Fig. 5 is a sectional view on about line 5—5 of Fig. 1. Fig. 6 is a vertical longitudinal section of the expander as in use, showing the wedges expanded within the tube and the beading rolls in retracted position. Fig. 7 is a sectional view similar to Fig. 6, and showing the beading rolls in operative position. Fig. 8 is a detail perspective view of the frame holding the rolls, and Fig. 9 is a side view showing one of the rolls in place in the said frame.

An important feature of my invention is the means whereby a cover sleeve fitting over the beading rolls may be advanced over the said rolls to bear against the flue sheet and permit the projection of the flue beyond the flue sheet during the operation of expanding the wedges within the flue, after which the said cover sleeve may be released and permitted to adjust back over the rolls away from the flue sheet so the rolls may operate on the projecting portion of the flue to bead the same into engagement with the flue sheet.

In the construction shown, A is the tube sheet, and B one of the tubes, and the expander comprises a main bolt C which is threaded at one end at C' and is provided at its other end with a conical portion C<sup>2</sup> receiving the wedge sections or blocks D. The conical section C<sup>2</sup> is grooved longitudi-

nally at C<sup>3</sup>, and the wedge blocks D are provided on their inner faces with ribs D' which enter the grooves C<sup>3</sup> and thus hold the wedge blocks against turning upon the conical portion C<sup>2</sup> of the main bolt. These wedge blocks D are provided in their outer sides with grooves D<sup>2</sup> which receive a bridle E, which may be of rubber or other suitable material and operates to secure the blocks expansively upon the conical portion C<sup>2</sup> of the main bolt. The blocks D are ribbed on their outer sides at D<sup>11</sup> and D<sup>12</sup>, and operate to produce the bead in the tube B at the inner side of the flue sheet A as shown in Fig. 6 of the drawings.

Upon the main bolt A I mount, what for convenience of reference I term the body F, which is shown in the form of a barrel and preferably made with an intermediate section F', a ratchet section F<sup>2</sup>, and a pressure section F<sup>3</sup> on opposite sides of the intermediate section F' and threaded thereto as shown at F<sup>4</sup> and F<sup>5</sup>. A cover sleeve G is mounted upon the inner end of the body F and preferably upon the section F<sup>3</sup>, the latter being shouldered to prevent the accidental displacement of the cover sleeve, this cover sleeve extending forwardly over the beading rolls H and the frame I carrying the same, and is movable longitudinally on the body portion F<sup>3</sup> so its outer edge G' may be advanced beyond the rolls H as shown in Figs. 1 and 6, or may be retracted as shown in Fig. 7 to permit the operation of the rolls H as shown in the said Fig. 7.

Means are provided for facilitating the advance of this cover sleeve G to the position shown in Figs. 1 and 6, and also for securing the sleeve when so advanced, and this preferably comprises cam devices operating between the cover sleeve and the body portion and shown as comprising a series of cams G<sup>2</sup> in stepped form at the rear end of the cover sleeve G, and a corresponding series of cam surfaces J' on a band J encircling the section F<sup>3</sup> of the body as shown in Figs. 1, 6 and 7 of the drawings. By this construction I provide a series of cam surfaces carried by the body portion, and a series of cam surfaces on the cover sleeve which when adjusted to the position shown in Fig. 1 will advance the cover sleeve over the rolls H, so the said sleeve may bear against the flue sheet A in expanding the



wedge blocks D to bind within the tube B without any pressure of the rolls against the expanded end B' of the tube B. At the same time by turning the cover sleeve G slightly from the position shown in Fig. 1, its cam portions will escape those of the body portion and the cover sleeve may be adjusted back to the position shown in Fig. 7, to permit the rolls H to bead the projecting end B' of the tube and be further pressed down and firmly clamped in connection with the tube as shown in Fig. 7 of the drawings.

The body portion is provided, preferably on its ratchet section F<sup>2</sup>, with ratchet teeth f<sup>2</sup>, and a nut K secured on the threads C' of the main bolt C is provided with teeth K', and these teeth f<sup>2</sup> and K' are engaged respectively by pawls L and M carried by the handle lever N and spring actuated into engagement with their respective teeth, means being provided for holding said pawls L and M out of engagement with their teeth when desired.

The nut K has a head or knob K<sup>2</sup> by which it may be operated directly by hand when so desired, and this nut operates upon the body F, preferably through intermediate devices, in such manner as to draw the main bolt C from the position shown in Fig. 1 to that shown in Fig. 6 in order to clamp the device within the tube B by expanding its wedge blocks D within the said tube preliminary to beading the projecting end B' of the tube. As shown, the nut K operates against a bearing plate O, between which and the outer end of the body F are provided ball bearings O' as shown in Fig. 6.

The bearing plate O is held in position by a sleeve P fitting over the said plate and having an inwardly projecting flange P' rabbeted in the outer face of the plate O, the inner edge of the band P extending within the sleeve N' of the handle N, and being suitably secured thereto, it may be by screws P<sup>2</sup> as shown in Fig. 1 of the drawings, thus holding the bearing plate and the anti-friction devices in place without regard to the nut K which can be removed if desired.

The nut K may be turned by hand until the wedge blocks are sufficiently expanded to secure them within the tube B when the pawl M may operate upon the teeth K' to provide for turning the nut K by the handle N. To release the pawl M from the teeth K' I provide a lever M' on the lever N and connected by a rod M<sup>2</sup> with the pawl M so the said pawl M may be held clear of the teeth K' whenever desired.

After the wedge blocks have been expanded within the tube B the pawl L may be adjusted into engagement with the teeth f<sup>2</sup>, and the lever N be operated to turn the body portion to bead the tube by the means more fully described hereafter. When it

is desired to release the pawl from engagement with its teeth f<sup>2</sup>, it is only necessary to pull the said pawl out from the position shown in Fig. 6 to that shown in Fig. 2 and turn the arm L' of its stem L to the position shown in Fig. 2, when the pawl will be held out of engagement with its ratchet teeth f<sup>2</sup>.

The rolls H fit between the segmental plates I' of the frame I, the said plates being carried by spokes I<sup>2</sup> from a central tube I<sup>3</sup> which loosely encircles the main bolt, and the outer ends of the plates I' extend inwardly at I<sup>4</sup> toward each other and operate as overlapping keepers to prevent the rolls H from dropping out of the frame I when the parts are as shown in Figs. 6, 7 and 9 of the drawings. The rolls H it will be noticed fit loosely between the frame plates I', being grooved to receive said plates and to perform their beading operation when actuated as shown in Fig. 7. Springs H' operating in sockets H<sup>2</sup> in the outer faces of the rolls H, and between the rolls and the cover sleeve G steady the rolls in position as will be understood from Fig. 6 of the drawings.

In the operation of my invention it will be noticed that when the parts are in the position shown in Figs. 1 and 6, the rolls will not interfere with the spreading of the wedge blocks to bind the expander within the tube B and after the blocks have been expanded as shown in Fig. 6 to bind the wedge blocks in place, the cover sleeve G may be retracted and the body F be turned by the handle N or otherwise as desired to press its section F<sup>3</sup> at F<sup>13</sup> against the rolls and to cause the said rolls to roll or bead the projecting end B' of the tube B to the desired form as shown in Fig. 7.

I claim—

1. A tube expander substantially as described comprising a bolt, expanding devices operating on the bolt, a body portion turning upon the bolt, a cover sleeve turning upon the end of said body portion and movable longitudinally along the said body portion whereby it may be advanced or retracted, beading rolls within the cover sleeve and in position to be operated upon by the end of the body portion, and a frame carrying the said beading rolls and having segmental plates operating on opposite sides of the said rolls, and provided at their ends with inwardly projecting portions overlapping and operating as keepers for said rolls substantially as and for the purposes set forth.

2. The combination in an expander substantially as described of beading rolls, and a frame therefor, having plates on opposite sides of the rolls, and provided with inwardly projecting portions spaced apart distances less than the diameters of the rolls and overlapping the rolls, and operating as keepers therefor, substantially as set forth.



3. In an expander substantially as described the combination with the grooved beading rolls, of a frame receiving the same and having plates operating at their edges in the grooves of the rolls, and provided at their ends with laterally extending portions overlapping the rolls, and a cover sleeve fitting over the rolls substantially as set forth.

10 4. The combination in a tube expander of a main plate and expanding devices operating in connection therewith, a body portion on the main plate, beading rolls at the end of the body portion, and a cover sleeve movable longitudinally along the body portion at the end thereof, and over the beading rolls and adapted to be advanced and retracted with respect to the beading rolls substantially as set forth.

20 5. The combination in a tube expander with the beading rolls and a body portion, of a cover sleeve movable longitudinally upon the body portion and over the beading rolls, and cam devices for advancing the cover sleeve over the beading rolls substantially as set forth.

30 6. In a tube expander the combination with a main bolt and expanding devices, of a body portion on the main bolt, beading rolls at the end of the body portion, devices carrying the beading rolls, a cover sleeve movable longitudinally on the body portion and over the beading rolls and provided with a series of cams in step form, and a corresponding series of cams carried by the body portion, and cooperating with those of the cover sleeve whereby to effect the longitudinal movement of the cover sleeve substantially as set forth.

40 7. The combination in a tube expander of a main bolt, expanding devices operating in connection therewith, a body portion upon the main bolt, beading rolls, a frame carrying the same, a cover sleeve movable longitudinally upon the body portion and over the beading rolls, and cam devices between the cover sleeve and the body portion, substantially as set forth.

50 8. The combination in a tube expander of a main bolt, expanding devices operating in connection therewith, a nut screwed on said main bolt, beading devices, a body portion having means operating upon the beading devices, and a handle having a pawl operating upon the body portion and a pawl operating upon the nut substantially as set forth.

60 9. The combination in a tube expander with beading rolls and a frame loosely carrying the same, of a cover sleeve over the beading rolls and springs bearing between the rolls and the cover sleeve substantially as set forth.

10. In a tube expander the combination of beading rolls, a frame loosely carrying said rolls, a cover sleeve over the beading rolls and approximately at a right angle to the axis of said rolls, and means independent of the roll carrying frame for supporting said cover sleeve.

11. The combination in a tube expander with beading rolls, and means loosely supporting the said rolls, of a body portion pressing at its end against the rolls, and a cover sleeve carried by the body portion and fitting over the rolls, substantially as set forth.

12. A tube expander having expanding means, and beading devices, and a cover sleeve over the beading devices and movable beyond the beading devices when the parts are adjusted for the operation of the expanding devices substantially as set forth.

13. The combination in a tube expander of a main bolt, expanding devices operating in connection therewith, and including the nut threaded on the bolt, beading devices, a body portion operating upon the beading devices, and a lever having means for operating upon the nut and upon the body portion, substantially as set forth.

14. The combination of a main bolt, expanding devices operating in connection therewith and including a nut threaded on the main bolt, beading rolls, a frame in which the said beading rolls are loosely supported, a body portion on the main bolt and operating at its end against the beading rolls, a cover sleeve on the body portion and movable longitudinally over the beading rolls, and a lever having means operating upon the body portion and upon the nut substantially as set forth.

15. In a tube expander the combination of a main bolt, expanding devices operating in connection therewith, beading rolls, means supporting the same, a body portion on the main bolt, a cover sleeve movable longitudinally on the body portion and over the beading rolls, and having a series of cams, and a ring supported on the body portion, and having a series of cams cooperating with those of the cover sleeve substantially as set forth.

16. The combination in a tube expander with a main bolt, beading devices, and expanding devices, and a nut screwing on the main bolt of the body portion on the bolt between the nut and the beading devices, and a handle lever having means for turning the body portion of the nut at will substantially as set forth.

JOE CEPHUS TASSEY.

Witnesses:

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JNO. T. MENESEE, Jr.