

No. 624,047.

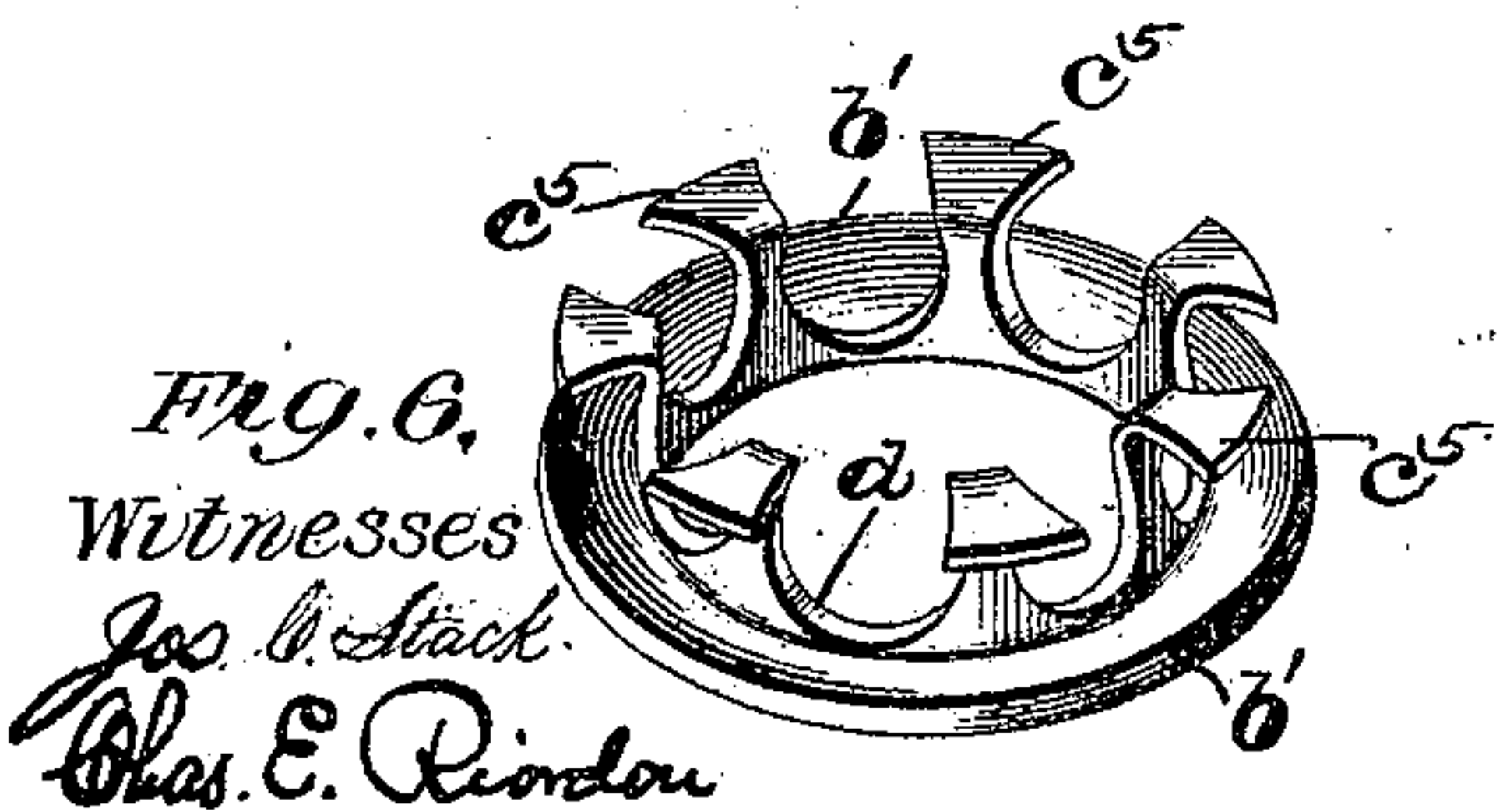
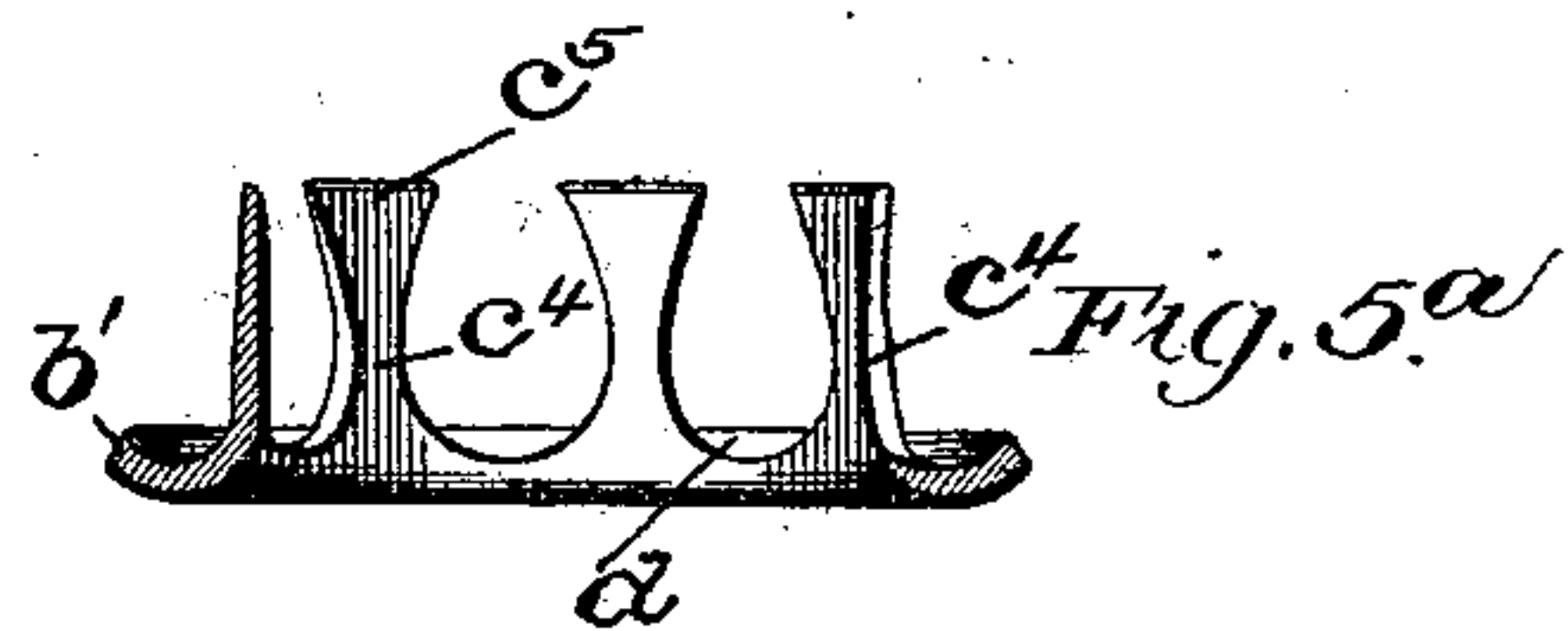
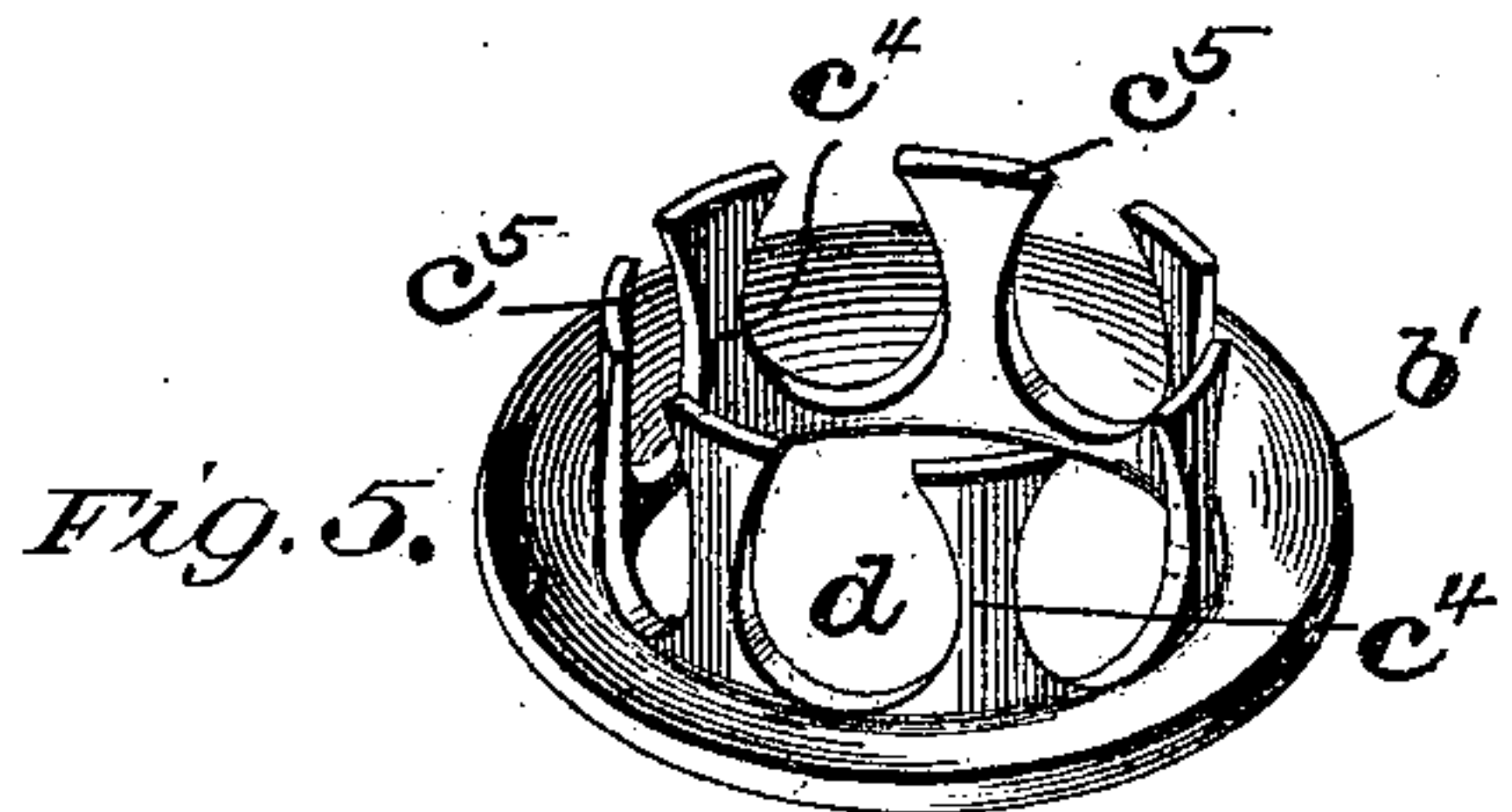
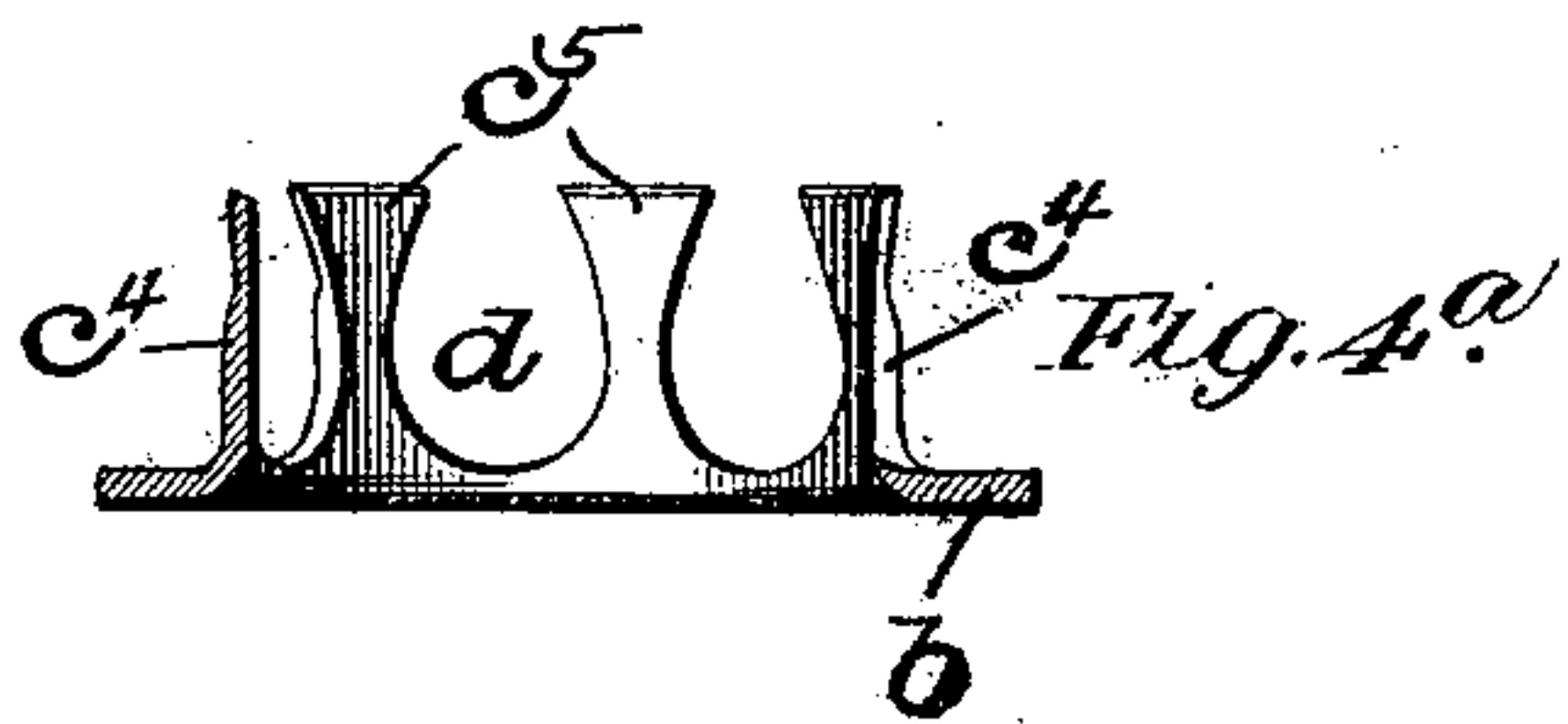
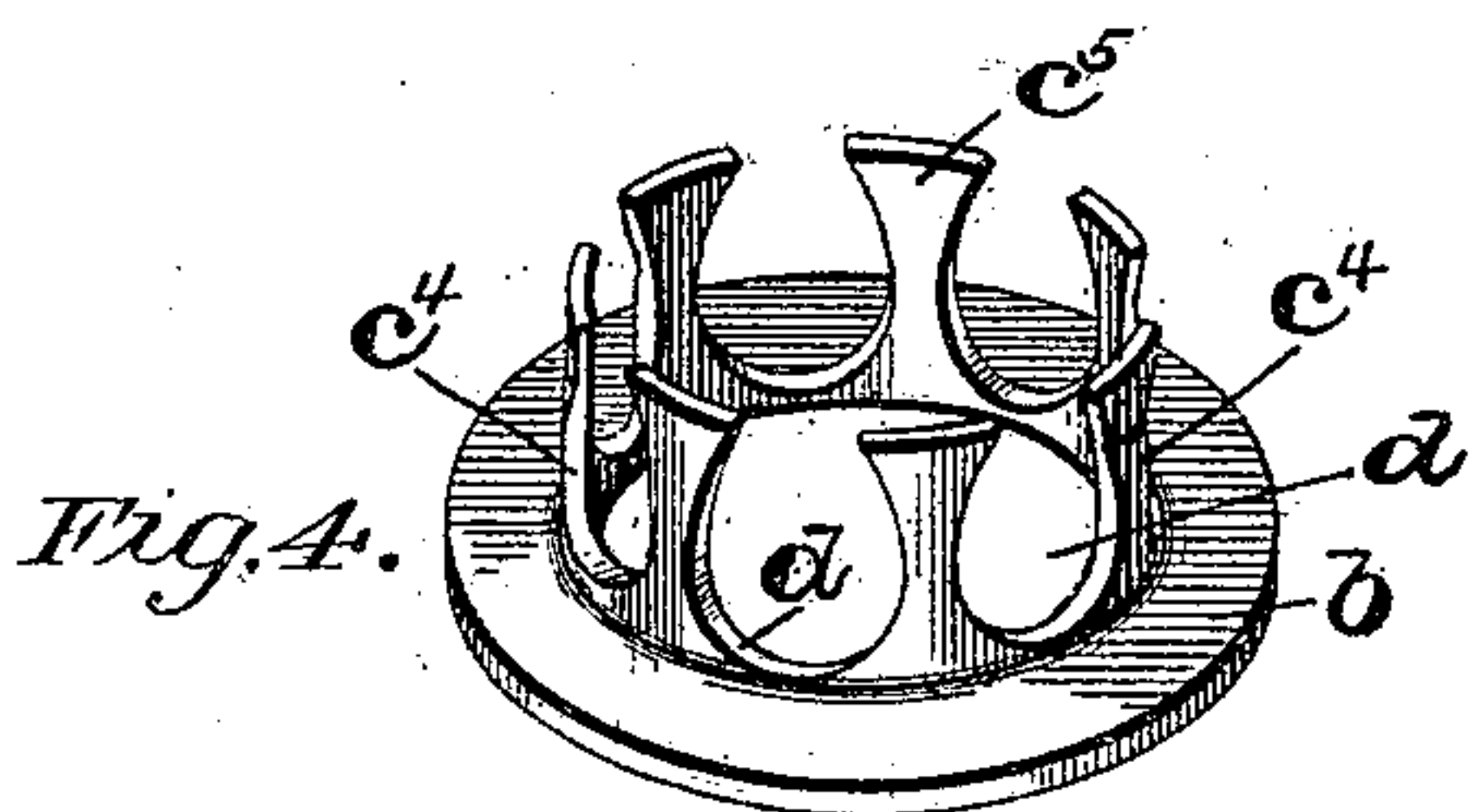
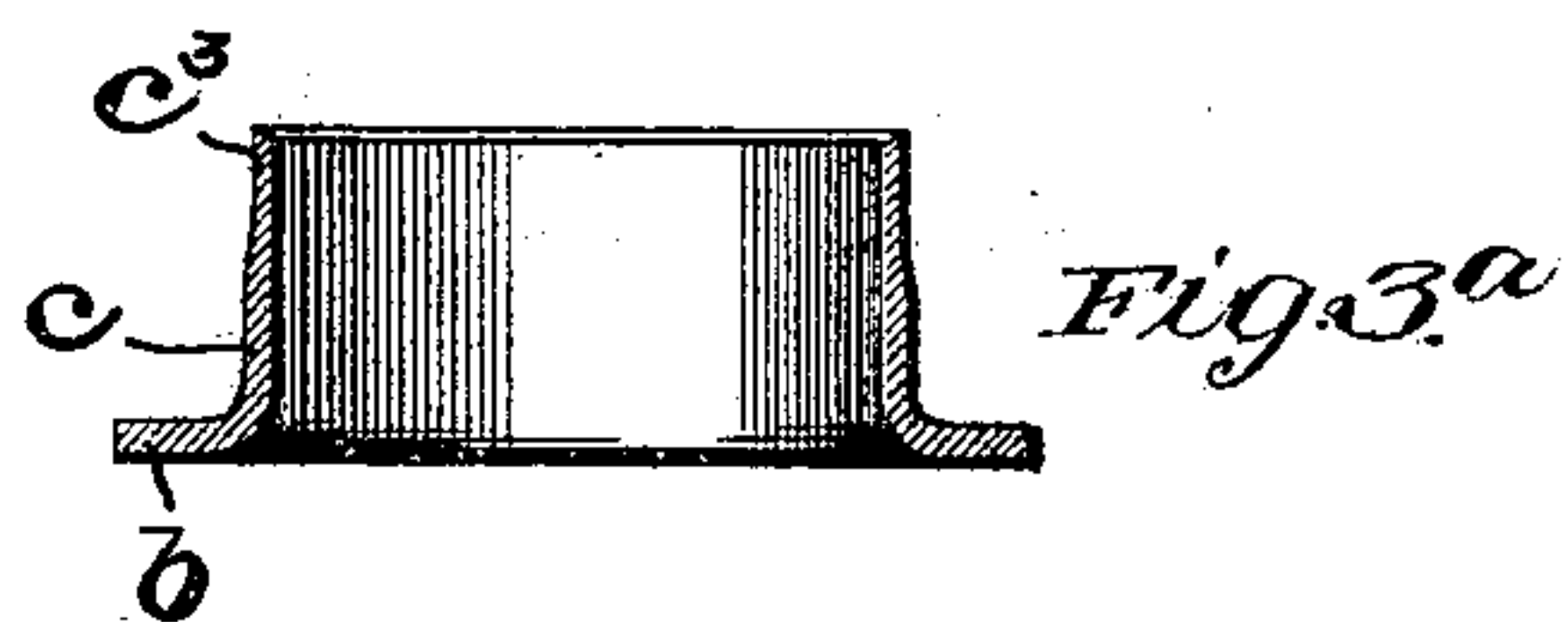
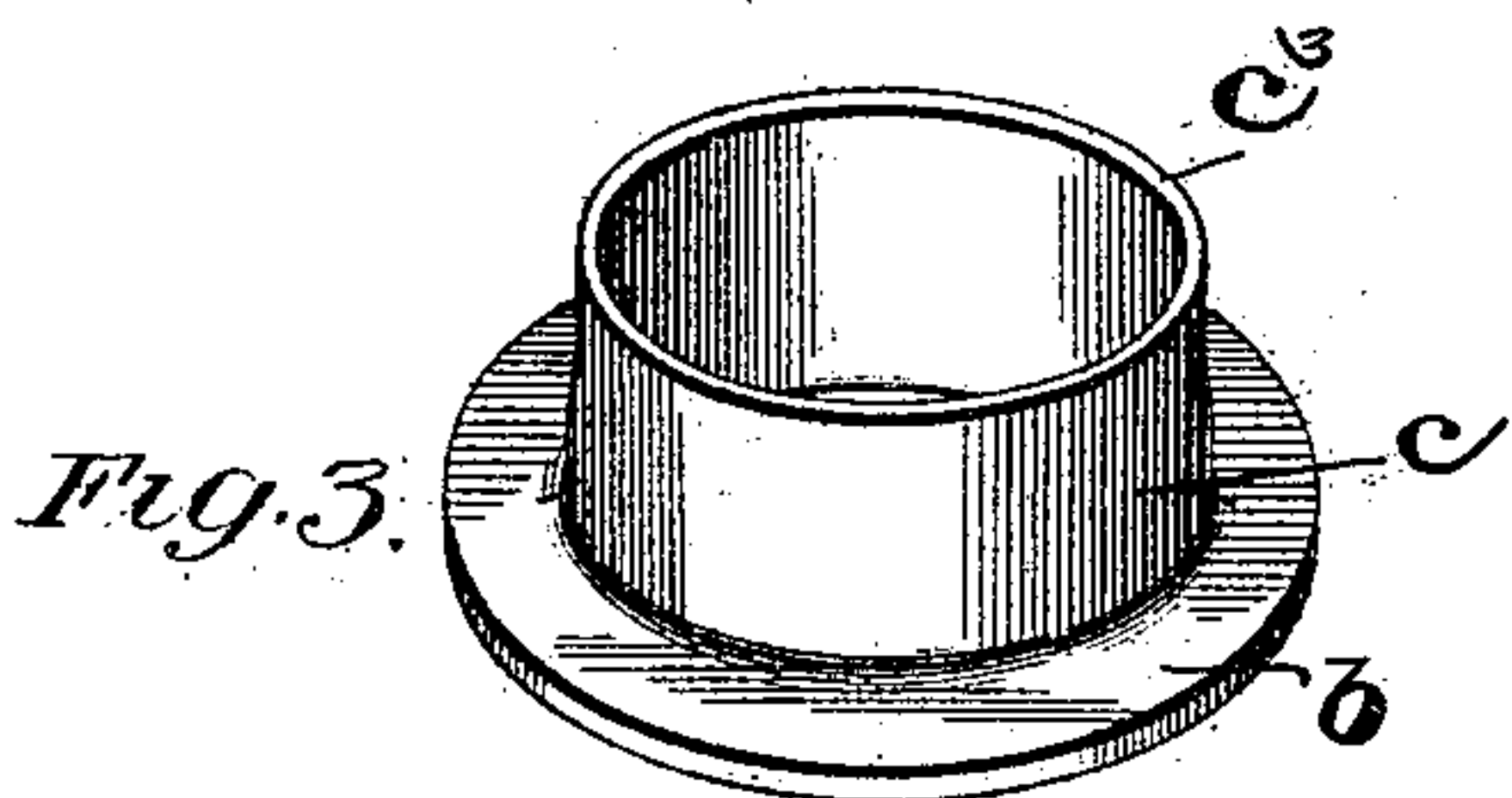
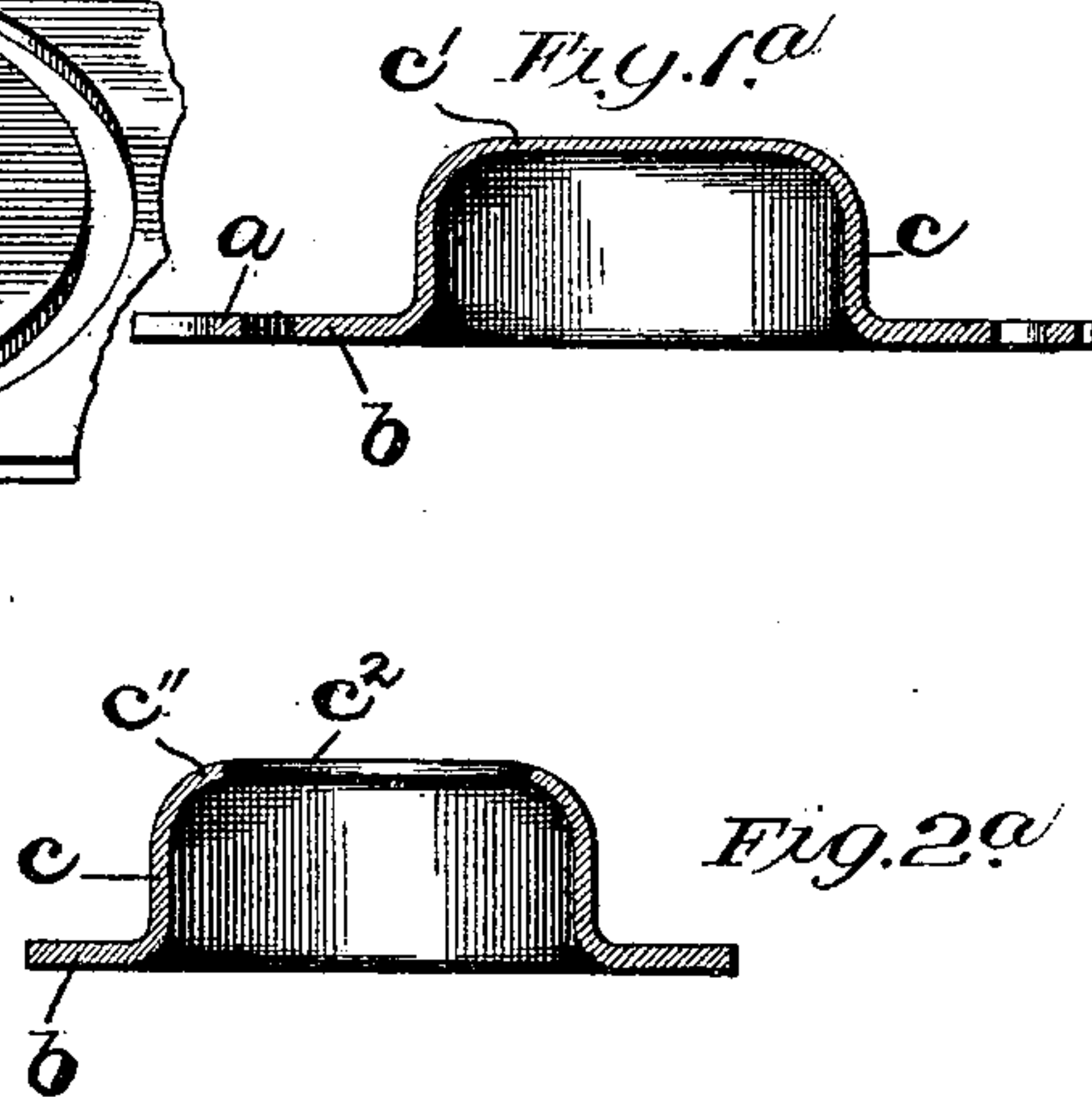
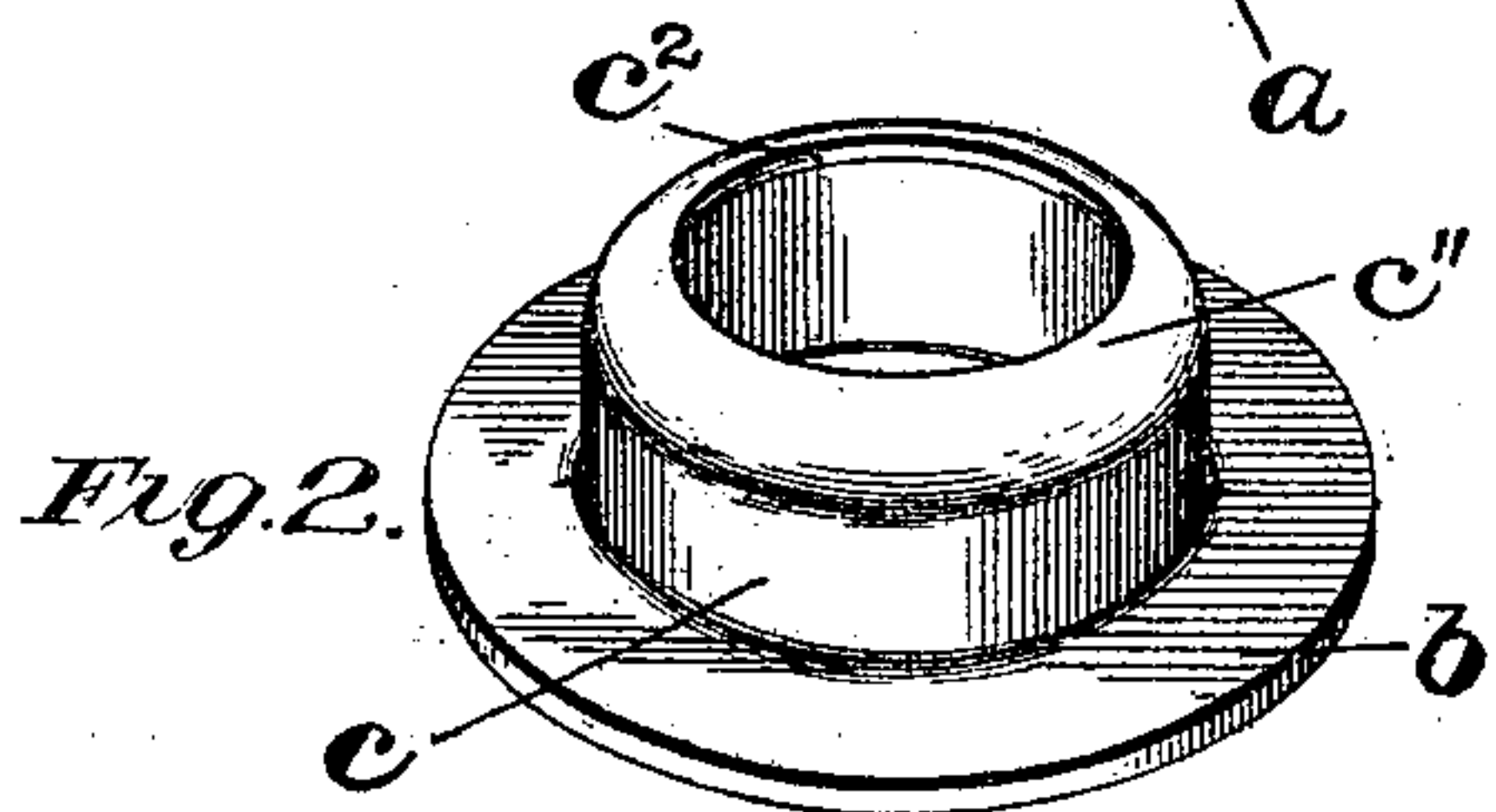
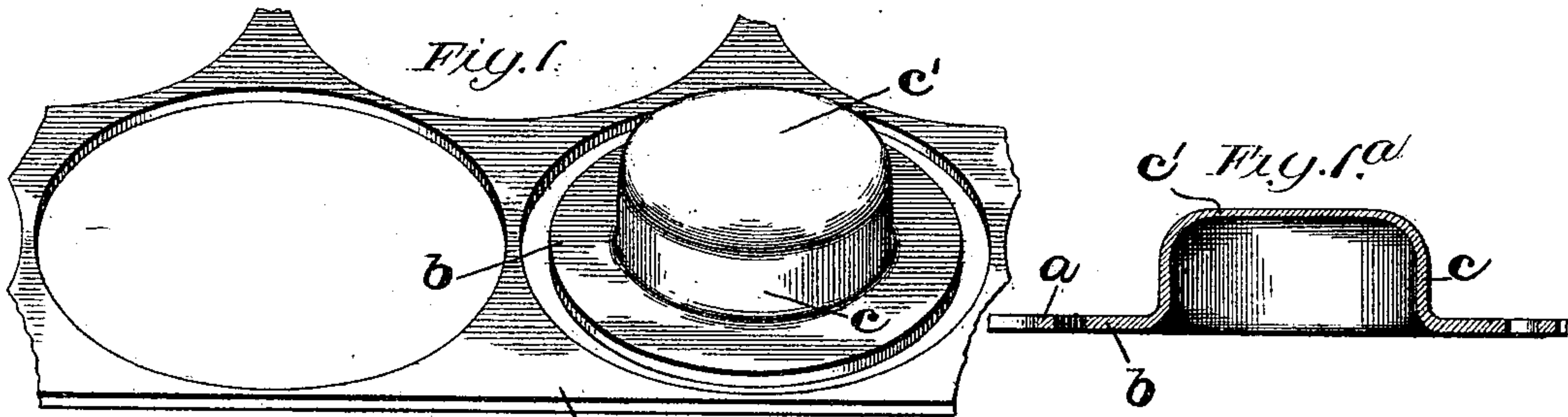
Patented May 2, 1899.

H. B. KEIPER.

PROCESS OF MANUFACTURING BALL RETAINERS FOR ANTIFRICTION BEARINGS.

(Application filed June 9, 1898.)

(No Model.)



Witnesses  
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# UNITED STATES PATENT OFFICE.

HENRY B. KEIPER, OF LANCASTER, PENNSYLVANIA.

PROCESS OF MANUFACTURING BALL-RETAINERS FOR ANTIFRICTION-BEARINGS.

SPECIFICATION forming part of Letters Patent No. 624,047, dated May 2, 1899.

Application filed June 9, 1898. Serial No. 683,030. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY B. KEIPER, a citizen of the United States, residing at Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Processes of Manufacturing Ball-Retainers for Antifric-  
tion-Bearings; and I do hereby declare the following to be a full, clear, and exact de-  
scription of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the manufacture of retainers such as employed in antifric-  
tion bearings for the purpose of holding a set or cluster of balls in such a manner as to provide for their removal and insertion all together and for keeping the balls out of contact with each other.

The present invention consists in a method or process of making a particular form of ball-retainer comprising an annular base portion or ring of dished form, a circular series of arms or standards springing from the inner edge of said ring and extending axially of the latter, and flaring end portions bent at right angles to the said standards or arms and confronting the base portion, the balls being snapped past the corners of these flaring end portions. In order to effectively confine the balls in this form of retainer, it is necessary to provide a greater combined length of standard and flaring end portion than would result from simply stamping out a blank from a sheet, with a series of converging arms to be bent up from the inner edge of an encircling ring and their end portions bent outwardly to confront the ring. Therefore in the production of a ball-retainer of the above description I pursue a process including steps whereby I am enabled to sufficiently elongate the standards and end portions to provide for effectively confining the balls as desired, while at the same time the completed article has great strength and durability and permits the easy introduction and removal of the balls without distorting any part of the retaining structure.

The drawings which accompany and form part of this specification illustrate the various steps of the process by showing the article as it appears at different stages of its production.

Figures 1 and 1<sup>a</sup> illustrate the first step,

Fig. 1 showing in perspective a portion of a plate from which the blanks are cut and also showing the first form which the article takes and Fig. 1<sup>a</sup> showing the same thing in cross-section. Figs. 2 and 2<sup>a</sup> show perspective and cross-sectional views, respectively, of the article as it appears in the second stage of its production. Figs. 3 and 3<sup>a</sup>, 4 and 4<sup>a</sup>, and 5 and 5<sup>a</sup> are views similar to Figs. 2 and 2<sup>a</sup>, showing the article in the third, fourth, and fifth stages of its production; and Figs. 6 and 6<sup>a</sup> are perspective and cross-sectional views of the completed retainer.

In carrying out the process I take a flat plate *a*, of a suitable quality of steel, and with a circular cutter or die remove a disk-like portion *b* therefrom, and at the same operation I stamp or draw out the central portion of the disk in such a way as to produce a dome comprising a substantially cylindrical portion *c*, the thickness of whose walls is somewhat less than the thickness of the base portion *b*, and a rounded crown *c'*, which is somewhat thinner than the said cylindrical portion. The result of this operation is an article having a hat-like appearance, and the next step in the process is to remove the central portion of the crown *c'* by making a circular opening *c''* therein, thus leaving of what before formed a crown only an inwardly-curved flange *c''*, as best shown in Fig. 2<sup>a</sup>. Next this inwardly-curved flange is expanded and brought to a cylindrical form, as shown at *c*<sup>3</sup> in Figs. 3 and 3<sup>a</sup>, where it is practically a continuation of what formed the sides of the dome; but the metal of the flange has been drawn out so that the cylindrical extension *c*<sup>3</sup> is thinner than the first-formed cylindrical portion *c*. This stamping or drawing out of the center of the disk, followed by the removal of the central portion of the crown of the dome thus produced and thereafter the expanding and straightening of what is left of the crown, effects the desired elongation of the cylindrical portion of the article from which standards or arms of the requisite length are to be formed.

The article in the form shown in Figs. 3 and 3<sup>a</sup> is ready for the formation of the arms or standards, and these are produced by making partially oval or contracted U-shaped cuts in the cylindrical portion, as shown at *d* in the remaining figures, the inner portions of these cuts being substantially semicircular,



but the outer portions being taken on elliptical lines. The result of this operation is to produce a circular series of arms or standards  $c^4$ , springing from the inner edge of a flat ring, which is the disk of the original formation, and having flaring outer end portions  $c^5$ . The flat ring is next dished, as best shown in Fig. 5<sup>a</sup>, its outer edge  $b'$  being thus upturned, and at the same time the standards or arms and the openings between the same are trued. The final step consists in bending over the flaring end portion  $c^5$  of the standards or arms, so that they extend at right angles to the latter, as shown in Figs. 6 and 6<sup>a</sup>, and confront the dished ring.

It will be seen that by pursuing the process above specified a ball-retainer of the type first above described is produced and that the objects primarily stated are attained. It will be noted that the first three steps of the process not only provide for the requisite lengthening of the portion from which the standards are formed, but also provide for a reduction in thickness of the flaring end portions, which permits greater resiliency in these portions, and this is important in connection with the removal and insertion of the balls, as the said end portions, or at least the corners thereof, must yield slightly to permit the snapping in and out of the balls. Of course some variation may be made from the precise manner of procedure above explained, and hence the claims which follow are so worded as to embrace such modifications as lie within the scope of the invention.

The article which is here shown as resulting from the described process is claimed in a separate application filed December 23, 1897, Serial No. 663,184. As the dishing or flanging of the base ring is not essential to the utility of the article, the step of the process by which this is effected may be omitted without departing from the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The improved process of making a ball-retainer which consists in producing an annular disk with an open-ended cylindrical protuberance on one side thereof, removing portions of such cylindrical protuberance by making openings at intervals throughout its circumference in from the edge thereof with opposite walls at reverse angle to such edge thereby forming a circular series of arms or standards with widening end portions, and bending said end portions until they confront the annular disk with their widest parts outermost or opposite the outer edge of the latter.

2. The improved process of making a ball-retainer which consists in producing an annular disk with a cylindrical protuberance on one side thereof springing from its inside edge, removing portions of such cylindrical protuberance by making openings at intervals throughout the circumference thereof and contracted at the edge of the same whereby

a circular series of arms or standards with flaring end portions is produced, and bending said end portions outwardly until they confront the annular disk with their widest parts opposite the outer edge of the latter.

3. The improved method of making retainers for the balls of roller-bearings, the same consisting in cutting a circular disk from a metal plate and drawing the central portion of such disk into a dome, removing the central portion of the crown of said dome, straightening the remaining portion of the crown into the sides of the dome, removing portions of such sides by openings entering from the edge of the latter, and bending over the extremities of the series of arms formed by so removing portions of the sides.

4. The improved process of making a ball-retainer which consists in forcing out the central portion of a circular disk and giving such portion a cylindrical form, removing portions of the cylinder thus produced and thereby forming a circular series of arms or standards with widening end portions, and bending the latter outwardly until they confront the annular remaining portion of the original disk.

5. The improved method of making retainers for the balls of roller-bearings, the same consisting in cutting a circular disk from a metal plate and drawing the central portion of such disk into a dome with walls thinner than the marginal portion of the disk, removing the central portion of the crown of said dome, straightening the remaining portion of the crown into the sides of the dome, thereby reducing the thickness of the said remaining crown portion and forming it into a continuation of the sides, removing portions of such sides by partially oblong or contracted U-shaped openings entering from the edge of the latter, and bending over the flaring extremities of the series of arms formed by so removing portions of the sides.

6. The improved method of making retainers for the balls of roller-bearings, the same consisting in cutting a circular disk from a metal plate and drawing the central portion of such disk into a dome with walls thinner than the marginal portion of the disk, removing the central portion of the crown of said dome, straightening the remaining portion of the crown into the sides of the dome, thereby reducing the thickness of the said remaining crown portion and forming it into a continuation of the sides, removing portions of such sides by partially oblong or contracted U-shaped openings entering from the edge of the latter, dishing the disk, and bending over the flaring extremities of the series of arms formed by so removing portions of the sides.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY B. KEIPER.

Witnesses:

CHAS. E. LONG,  
H. P. TAYLOR.