

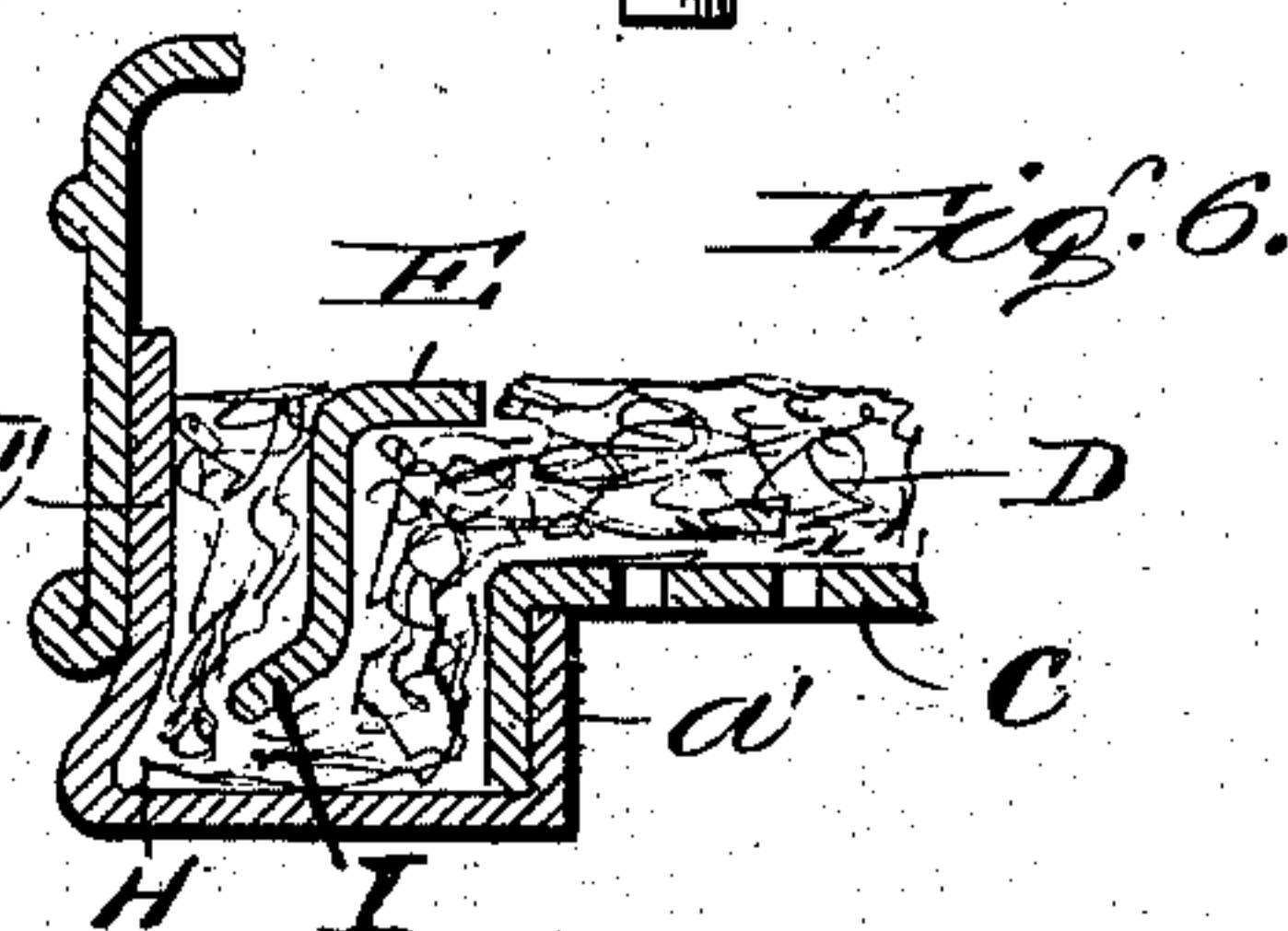
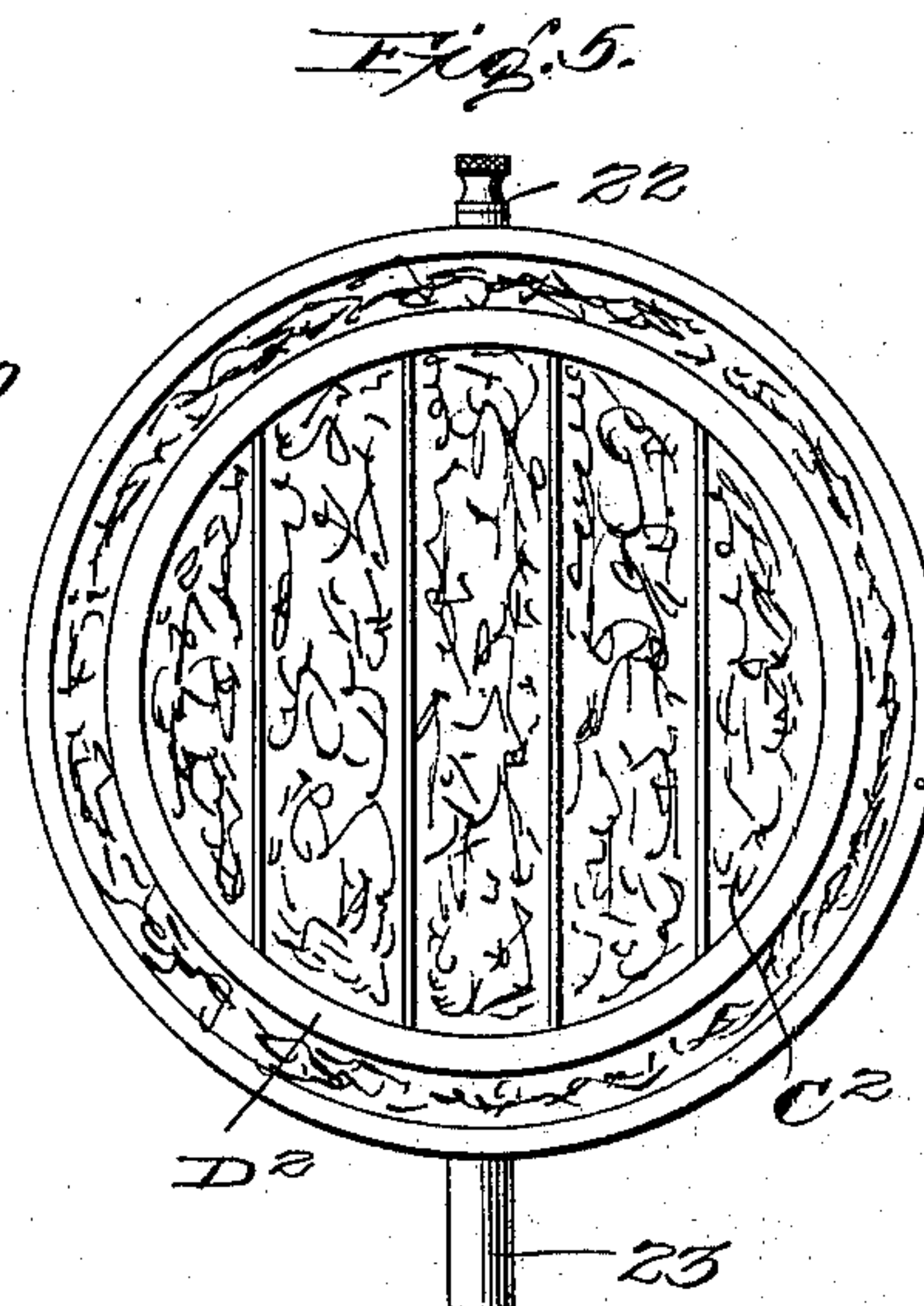
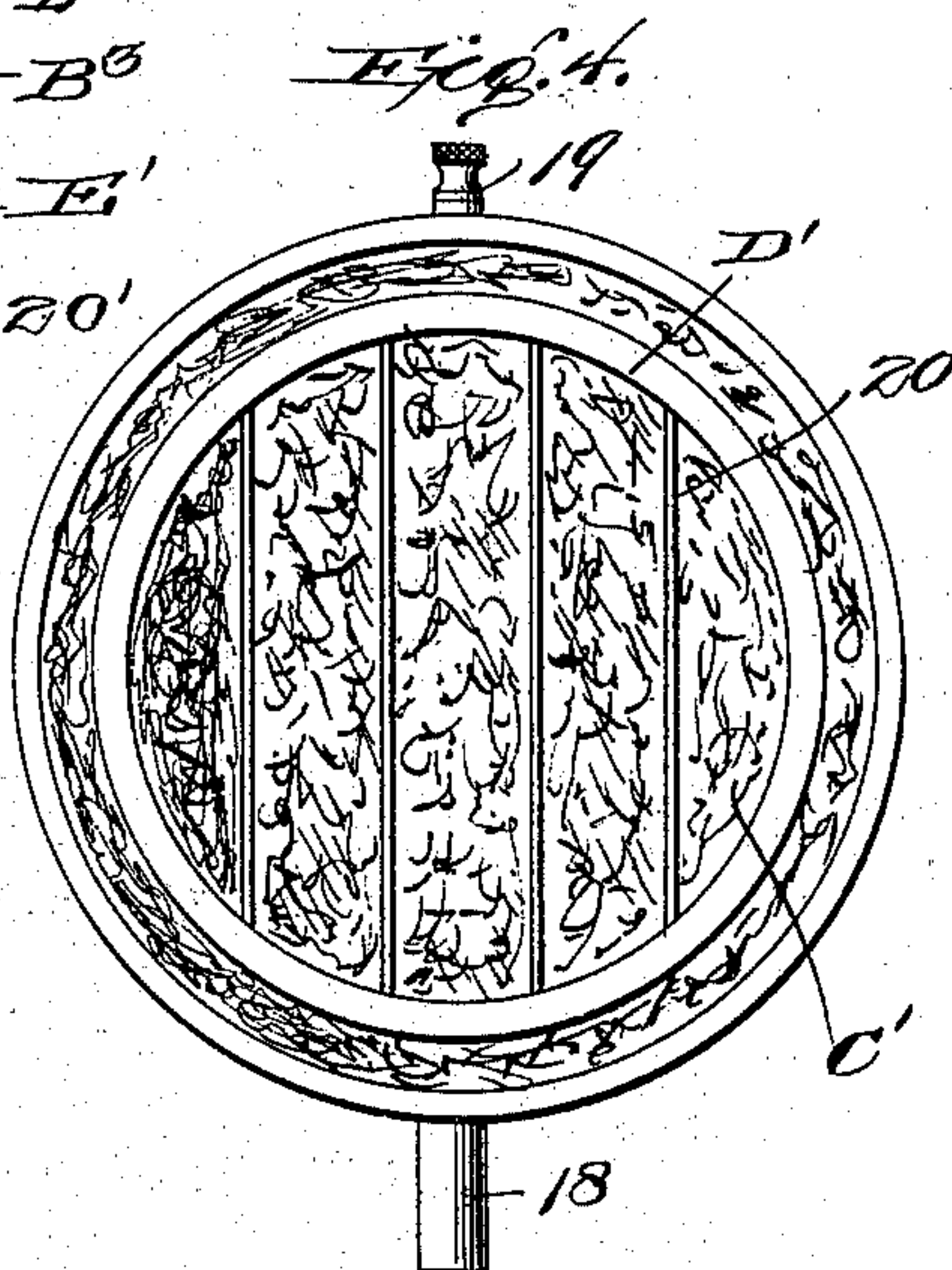
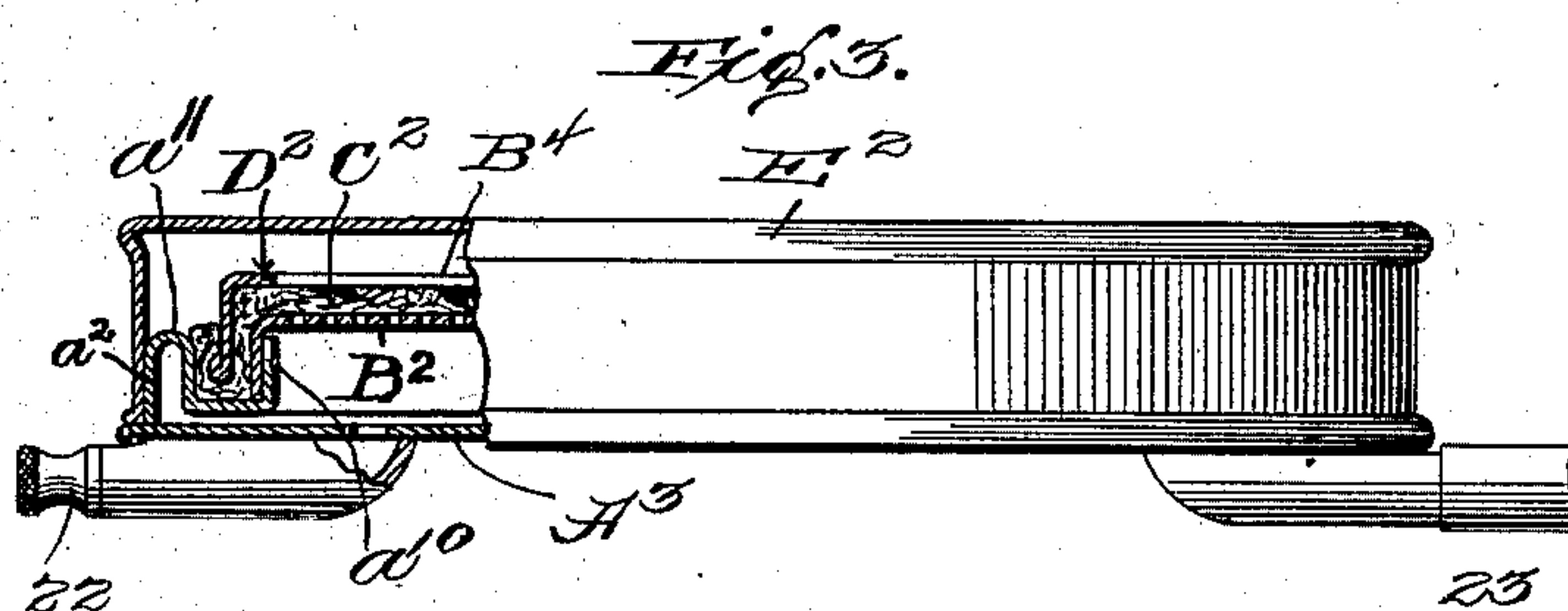
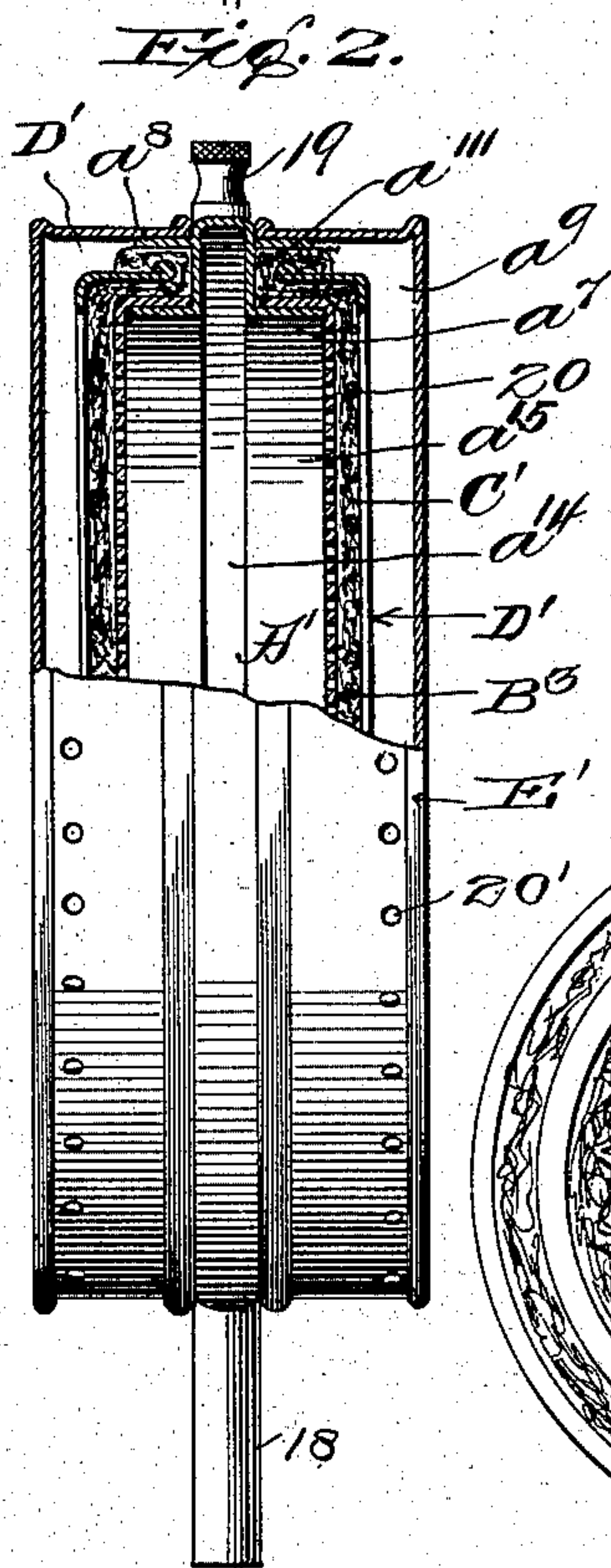
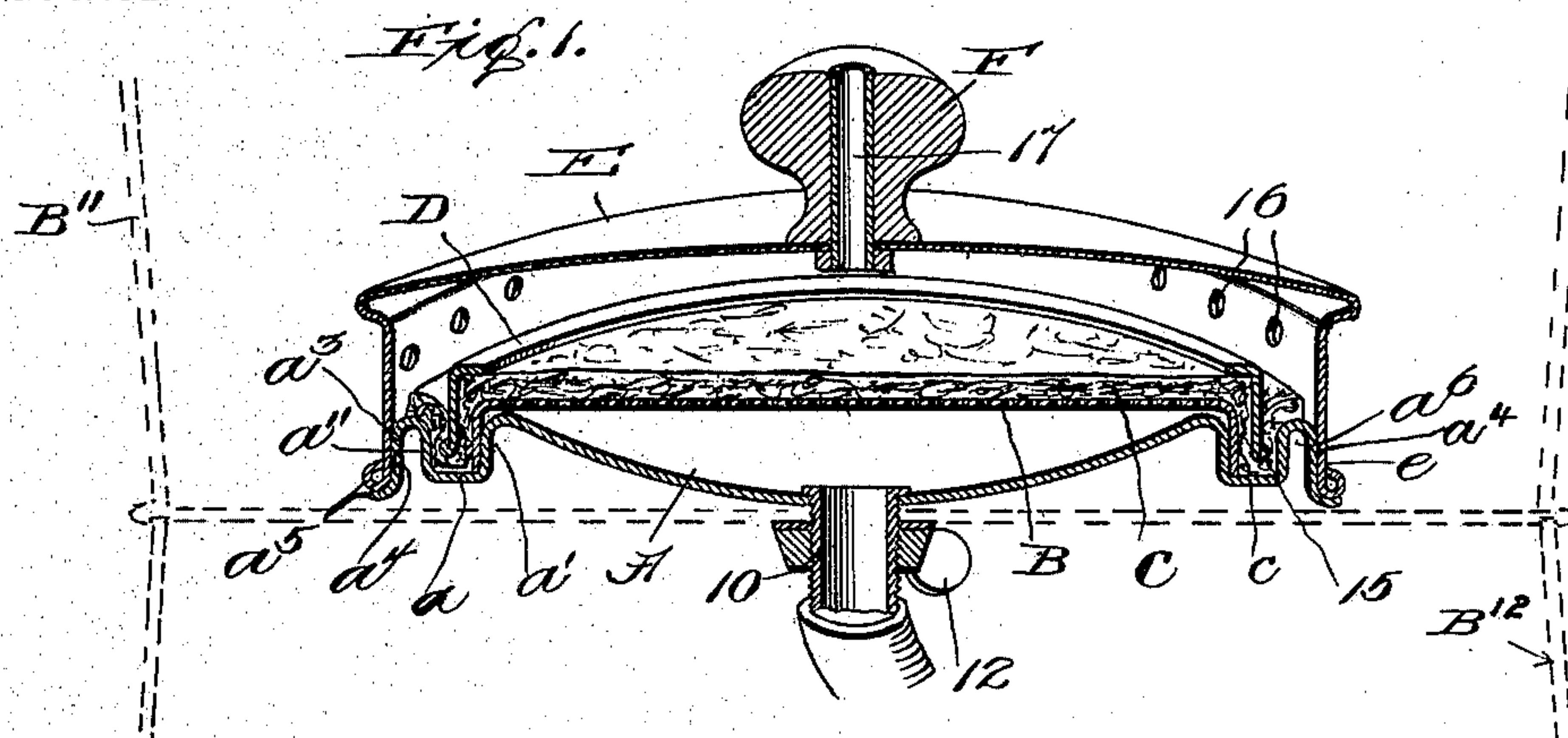
No. 734,890.

PATENTED JULY 28, 1903.

E. M. KNIGHT.  
FILTER.

APPLICATION FILED APR. 16, 1903.

NO MODEL.



Witnesses  
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# UNITED STATES PATENT OFFICE.

EDWARD MARTIN KNIGHT, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO R. H. MARTIN, OF NEW YORK, N. Y.

## FILTER.

SPECIFICATION forming part of Letters Patent No. 734,890, dated July 28, 1903.

Application filed April 16, 1903. Serial No. 152,954. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD MARTIN KNIGHT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Filters, of which the following is a specification.

This invention relates to filters generally, and particularly to that class designed for filtering water for domestic purposes and employing a filter-bed composed of fibers of asbestos, compressed to form a pad or diaphragm, which is the medium for removing the sedimentary or suspended matter from the water; and the invention consists of the parts and the constructions and combinations of parts which I will hereinafter describe and claim.

Referring to the accompanying drawings, which form a part of this specification, in which similar characters of reference indicate like parts throughout the several views, Figure 1 represents a sectional perspective view of a filter embodying my invention. Figs. 2 and 3 are sectional views of other type of filters, showing the salient features of my invention. Figs. 4 and 5 are plan views of the filter of Figs. 2 and 3 with the exterior caps removed. Fig. 6 is an enlarged detail to be referred to.

In carrying out my invention I prefer to form the filter so that it shall have the general shape of a relatively shallow disk, although I do not limit it to this specific shape. The filter consists of, say, five essential parts—namely, a flanged base portion A; a foraminous cap B, fitting said base; a fibrous pad or diaphragm C, fixed to or over the cap; a ring D of larger diameter than the cap and fitting around the same and serving as a “setter” for the filtering-pad or diaphragm, and an exterior cap E, having a surrounding rim or flange which incloses the cap, ring, and pad and fits over the outside of the flanged body portion.

Referring to Fig. 1, it will be seen that the base portion A is of a circular form and is spun, stamped, or otherwise shaped to provide a circumferential groove  $a$ , bounded on one side by a circumscribing flange  $a'$  and on the other side by a wall  $a''$ . This wall is

formed by upturning the edge of the base-plate to form a flange  $a^3$ , and said edge is thence folded over or returned upon itself to form an exterior wall  $a^4$ , at the base of which is formed a bead  $a^5$ . This form results from spinning or forming a relatively deep groove  $a^6$  in the bottom of the plate. The bottom of the plate, which may be slightly concaved, is pierced to receive an outlet-pipe 10, to which may be attached a flexible tube for drawing off filtered water into a vessel or tank. By way of illustration I show by dotted lines in Fig. 1 two superposed buckets  $B^{11}$   $B^{12}$ , one of which (the upper) receives the water to be filtered, while the other (the lower) serves as a receiver for filtered water. In the bottom of the upper bucket is made a hole to receive the outlet-pipe 10 of the base-plate of the filter, which pipe in this instance is threaded and is engaged by a suitable nut 12 and washer, whereby the filter is held in position. The buckets may of course be of any well-known and appropriate character and are made of any suitable and desired material, and they may represent any form of vessels for containing unfiltered and filtered water, respectively. Over the inner flange  $a'$ , which rises from the base-plate and forms the inner wall of the groove or channel  $a$ , is closely fitted the annular flange  $c$  of the inner or foraminous cap B, and over the cap is placed a pad or diaphragm C, of asbestos or other material, which is preferably formed between dies and has a soft flexible edge and a compressed central portion, as described more in detail in a former application filed by me March 4, 1903, Serial No. 146,123. This pad or diaphragm has a diameter in excess of that of the foraminous cap C, so that its surrounding edge projects sufficiently to allow it to be pressed into and substantially fill the groove or channel  $a$ , formed in the inner face of the base-plate A. In the present instance when the pad C or diaphragm is placed upon the inner foraminous cap B it is “set” and secured in position by means of a substantially wide ring D, which has a diameter slightly greater than that of the cap B, whereby upon being placed in position upon the cap and the superposed pad C the lower edge of the ring, which is preferably beaded, as at 15, forces the soft



edge of the pad or diaphragm inward into the groove or channel  $a$ , and the surrounding flange of the ring circumferentially and tightly compresses the edge of the pad against the surrounding flange of the foraminous cap B, thereby making a joint that is proof against the leakage of unfiltered water, and to assist in obtaining this important result the free edge of the pad, which is turned up and exposed between the outer wall of the ring and the inner wall of the outer flange of the base-plate, may be tamped or otherwise compacted into the space therebetween. It will be observed that the ring is but substantially a band encircling and tightly compressing that portion of the pad between said band and the inner flange  $a'$  of the base-plate and between the lower edge of the band and the bottom of the groove or channel. It serves also, and primarily, to set the fibrous pad, and the ring being open all of the central and active portion of the pad is exposed, and the person applying the pad can see what he is doing, and if the pad should be upturned by setting it in position this defect would be noticeable and proper attention given to it before the filter is put into operation.

To complete the filter, I employ the exterior cover E, whose surrounding flange  $e$  fits closely over the exterior of the flange  $a^2$ , which surrounds the outer edge of the base-plate, and thus covers and protects and conceals the otherwise exposed edge of the fibrous pad. The exterior cover has sufficient height above the pad to form a chamber, and the unfiltered water enters this chamber through perforations 16, formed in the cover at a suitable point, say, in the surrounding flange, as shown in Fig. 1.

The exterior cap or cover E has a handle F to facilitate its removal and replacement, and through this handle is made a vent 17 for admission of air.

In operation the filter is placed in position in a vessel, and the water to be filtered is placed in the vessel and will pass into the chamber of the filter and thence percolate through the pad or filter-bed, giving up its impurities, and finally passing out of the discharge-tube and into a vessel placed to receive the filtered water.

In Fig. 2 I illustrate the present improvement in connection with a suction-filter of slightly-modified form designed to be fixed in an upright position in a vessel for lateral filtration through opposite sides. This filter includes a central member  $A'$ , of suitable material, having a centrally-located inwardly-opening circumferential groove  $a^{14}$  and an inner chamber  $a^{15}$ , said groove having leading from it a tube 18, through which filtered water may be drawn, while an air-valve at 19 is provided to admit air, and thus prevent the filter becoming air-bound.

On opposite sides of the central member of the filter is formed an annular groove or channel  $a'''$ , corresponding to the one shown

in Fig. 1 and bounded by inner and outer flanges  $a^7 a^8$ . Over the inner end of these flanges is placed a close-fitting foraminous cap  $B^3$ , upon which the pad of fibrous material  $C'$  is placed, as described for Fig. 1, and over this pad is placed a setter ring or band  $D'$ , having the same function as that described for a similar ring in Fig. 1, namely, to set the pad and also to make a water-tight joint. The ring of Fig. 2 may, however, have wires or light stiff rods 20 extending across it and in contact with the pad below to protect the surface of said pad exposed to the inflowing water. These rods are wide apart and offer no obstruction to a full view of the pad. Thus the latter is fully exposed during the application of the setting-ring.

The suction-filter of Fig. 2 is designed to have an exterior cap or cover  $E'$ , which fits over the outer flange  $a^8$  of the central member  $A'$ , as described for the exterior cover of Fig. 1, and said cover  $E'$  may be provided with an interior chamber  $a^9$ , with openings 20' for the admission of unfiltered water, or the cover may be an imperforate one to be removed from the filter when the filter is in use, and thus expose the pad to the direct action of the water, as shown in Fig. 4.

In Fig. 3 I show a suction-filter of thin disk-like form designed to be carried in the pocket and useful for tourists, sportsmen, the naval and military establishments, &c. In all its essentials it is like Figs. 1 and 2 in that it has a circular disk forming a base-plate  $A^3$ , with the inner and outer flanges  $a^{10} a^{11}$ . Over the inner flange  $a^{10}$  is closely fitted the foraminous cap  $B^2$ , and over this is placed the pad or diaphragm  $C^2$ . A ring  $D^2$  is placed over and upon the pad and tightly and circumferentially compresses the edge of the pad between its surrounding flange and the inner flange  $a^{10}$  of the base-plate, as described for the other forms, and an exterior cover  $E^2$  is used and made either perforate or imperforate, as described for the same cover of Figs. 1 and 2, said cover fitting over the outer flange  $a^{11}$  of the base-plate. If the cover used is of the imperforate type, it is removed from the filter when the filter is in actual use to give free and direct access of the water to the fibrous pad, whose exposed surface is protected by rods extending across the upper part of the setter-ring, as shown and as before described.

The pocket-filter has a valved air-vent 22 leading to its interior chamber, and a suction-tube 23 leads from the discharge end of this chamber.

Each or any of the preceding forms of base plates or members may have and preferably has the lower portion or base formed of its outer circumscribing flange undercut, as at H, and connecting with the bottom of the annular groove which receives the setter-ring, as shown in Fig. 6, and the bottom edge of the setter-ring may be and preferably is formed with a projecting lip I, which coacts



with said undercut portion to form a secure lock for the edge portion of the fibrous disk, for when the ring is forced into place its flange turns the edge of the pad into the groove and the projecting lip I crowds a part of the edge of the pad into the said undercut portion of the outer flange of the base and forms a secure lock for the pad and prevents its slipping out of proper position.

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

1. In a filter, the combination of an annularly-channeled base member having a filtered-water outlet; a foraminous cap supported upon the base member; a pad supported upon the cap; and having such diameter that it normally extends over the annular channel of the base member; a ring fitted over the cap and pad and engaging the portion of the pad overlying the annular channel of the base member and compressing the edge portion into the annular channel and against the bottom thereof, and exposing the pad; and an exterior cap fitting the outside of the base member.

2. In a filter, the combination of an annularly-channeled base member having a filtered-water outlet, and having inner and outer concentric flanges forming the walls of the channel; a foraminous cap closely fitting the inner flange; a filtering medium placed upon said cap and having a greater diameter than the cap whereby its edge normally projects beyond the same and over the annular channel of the base member; a ring of slightly-greater diameter than the cap and fitting over the filtering medium and depressing the projecting edge portion thereof into the channel of the base member and against the bottom thereof, and circumferentially compressing the material against the standing wall of the inner flange to form a tight joint, said ring open at the center to expose the central portion of the filtering material.

3. In a filter, the combination of an annularly-channeled base member having a filtered-water outlet, and having inner and outer concentric flanges forming the walls of said channel; a foraminous cap closely fitting the inner flange; a pad of fibrous filtering material placed over the cap said pad of greater diameter than the cap whereby its edge projects beyond the same and over the annular channel of the base member when the pad is placed in position; a ring of greater diameter than the cap and having its lower edge to engage the projecting edge of the pad and force the same into contact with the bottom of the channel of the base member, thereby "setting" the pad, said pad having its central portion exposed through said "setter-

ring" and said ring circumferentially compressing the turned portion of the pad against the wall of the channel formed by the said inner flange; and a cover or exterior cap having a circumferential flange to pass over the outside of the outer flange of the base member.

4. In a filter, the combination of an annularly-channeled base member having a filtered-water outlet and inner and outer concentric flanges forming the walls of said channel; a foraminous cap fitting closely the inner flange; a pad of fibrous material over said cap and an open center ring for setting the pad in place said ring having its surrounding flange circumferentially compressing the pad against said inner flange and having its lower edge pressing an extended edge portion of the pad into said channel; and an exterior cap inclosing the pad and ring and having its surrounding flange extending over the outside of the exterior flange of the base member, said exterior cap having holes forming inlets for unfiltered water.

5. In a filter, the combination of a base member having concentric flanges forming a groove or channel between them; a foraminous cap seated against one of said flanges; a pad of fibrous material over said cap; and a ring for "setting" the pad; said ring having a surrounding flange to compress the pad circumferentially against the inner wall of the channel and said channel undercut in the opposite wall to permit the ring to force the fibrous material therein and form a lock for the pad.

6. In a filter the combination of a base member having concentric flanges forming a groove or channel between them; a foraminous cap fitting said inner flange; a pad of fibrous material over said cap; a ring for "setting" the pad and having its surrounding flange to compress the pad circumferentially against the inner flange and having its bottom edge to force the edge of the pad into the channel between the flanges said ring having a projecting toe-piece surrounding its lower edge.

7. In a filter, the combination of an annularly-channeled base member; a foraminous inner cap; a pad of fibrous material thereover and lying within said channel; said channel undercut at one side; and a ring for "setting" the pad said ring circumferentially compressing the pad and having a projecting toe surrounding its lower edge and adapted to force the pad materially into the undercut portion of the channel to make a lock-joint.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDWARD MARTIN KNIGHT.

Witnesses:

H. D. JAMESON,  
F. L. RAND.