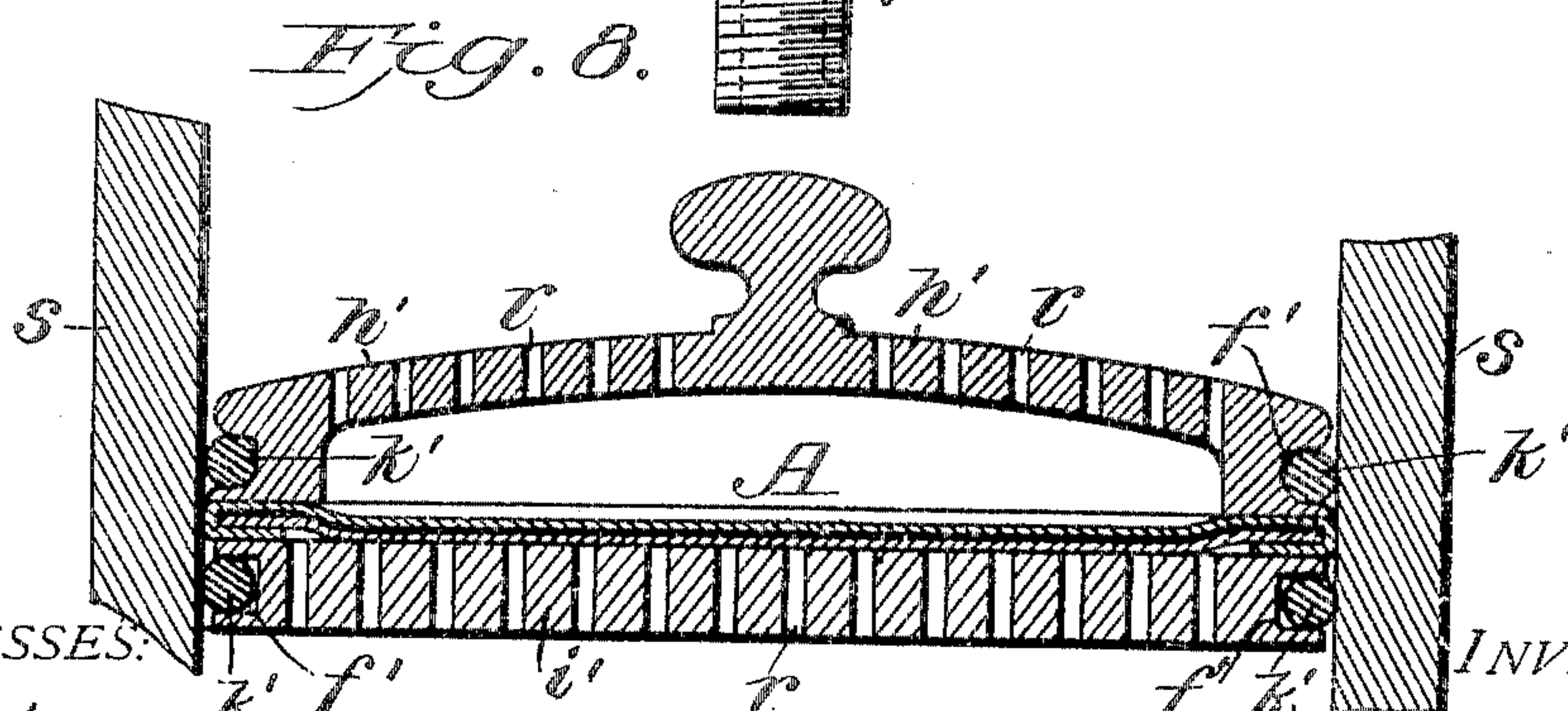
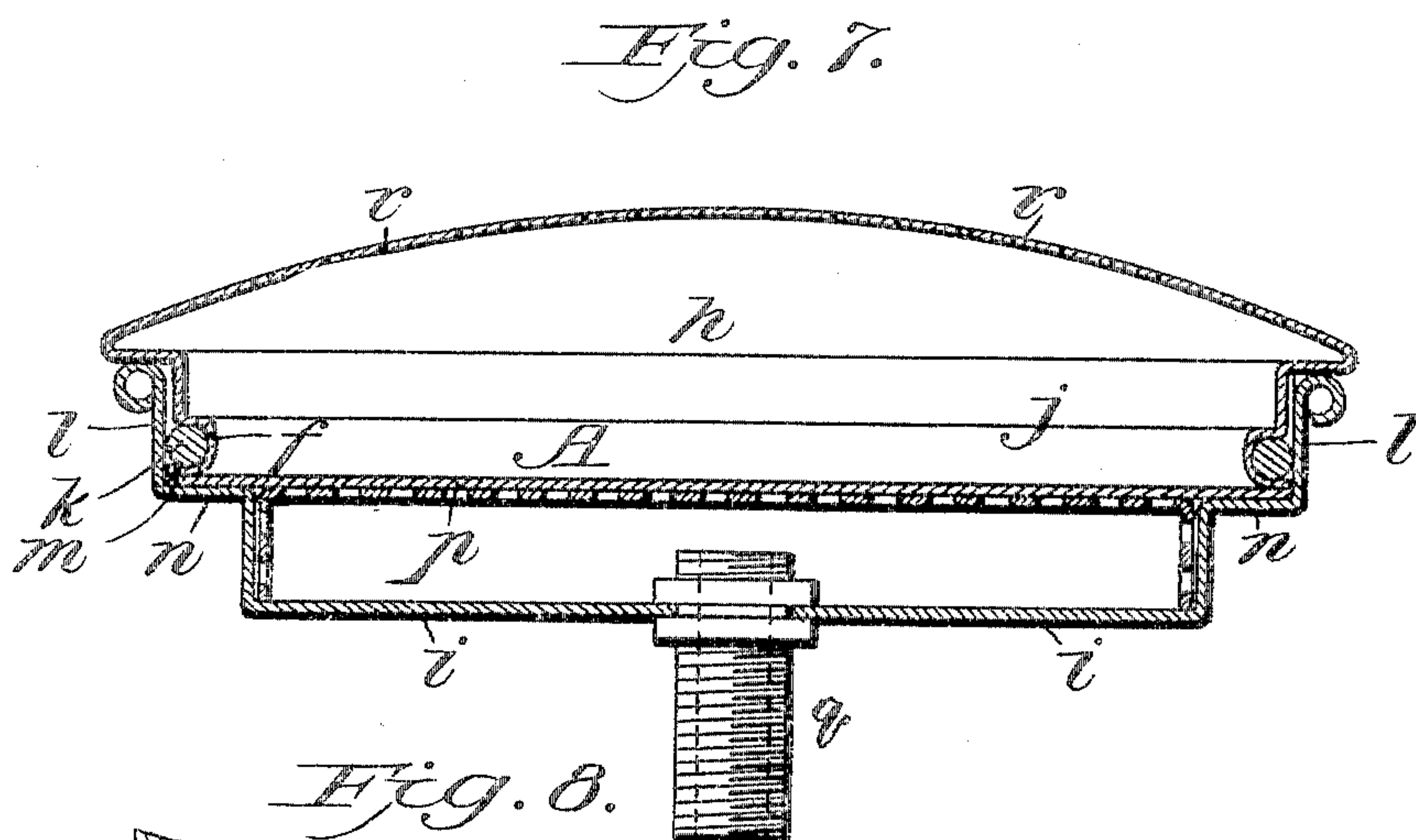
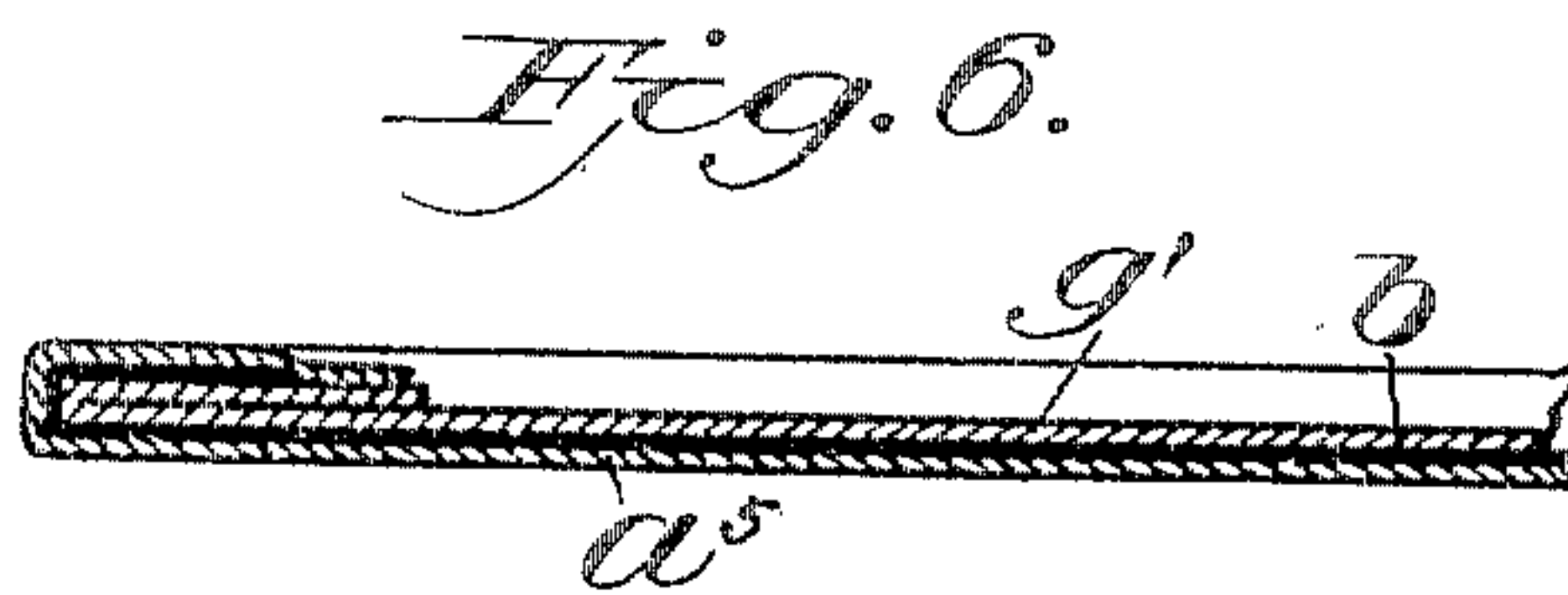
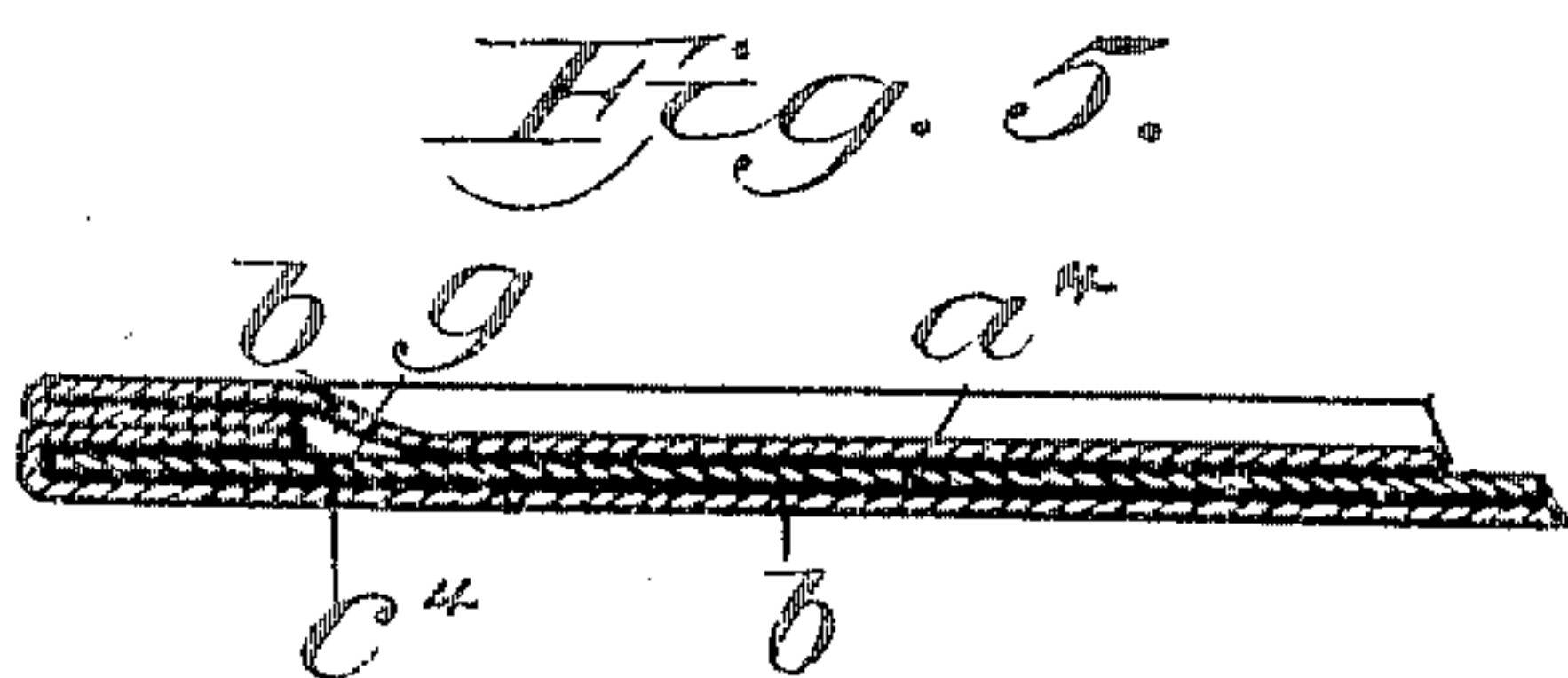
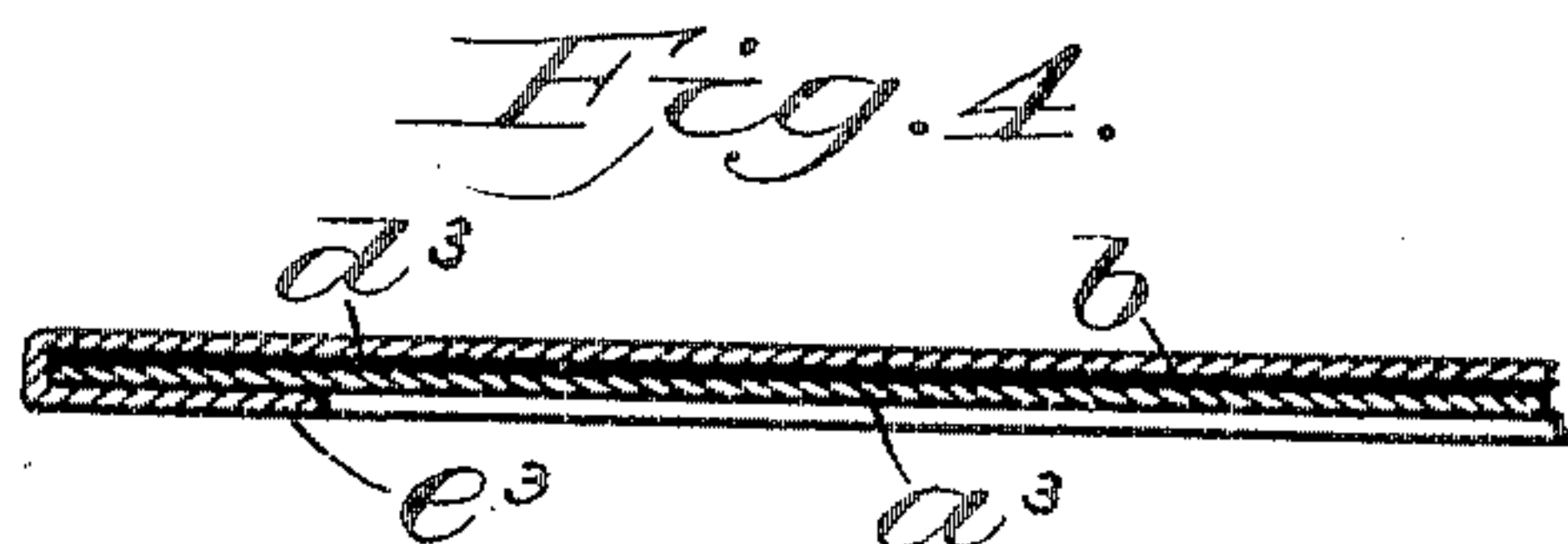
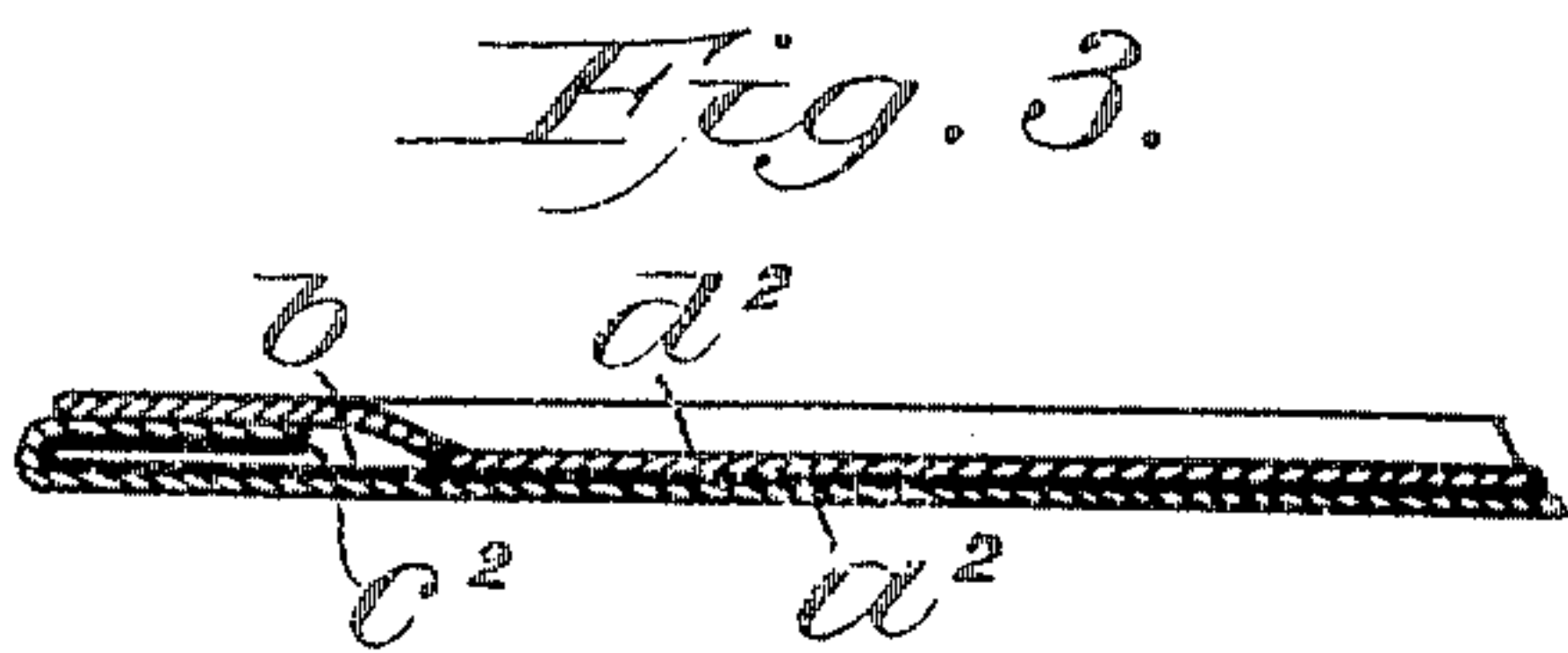
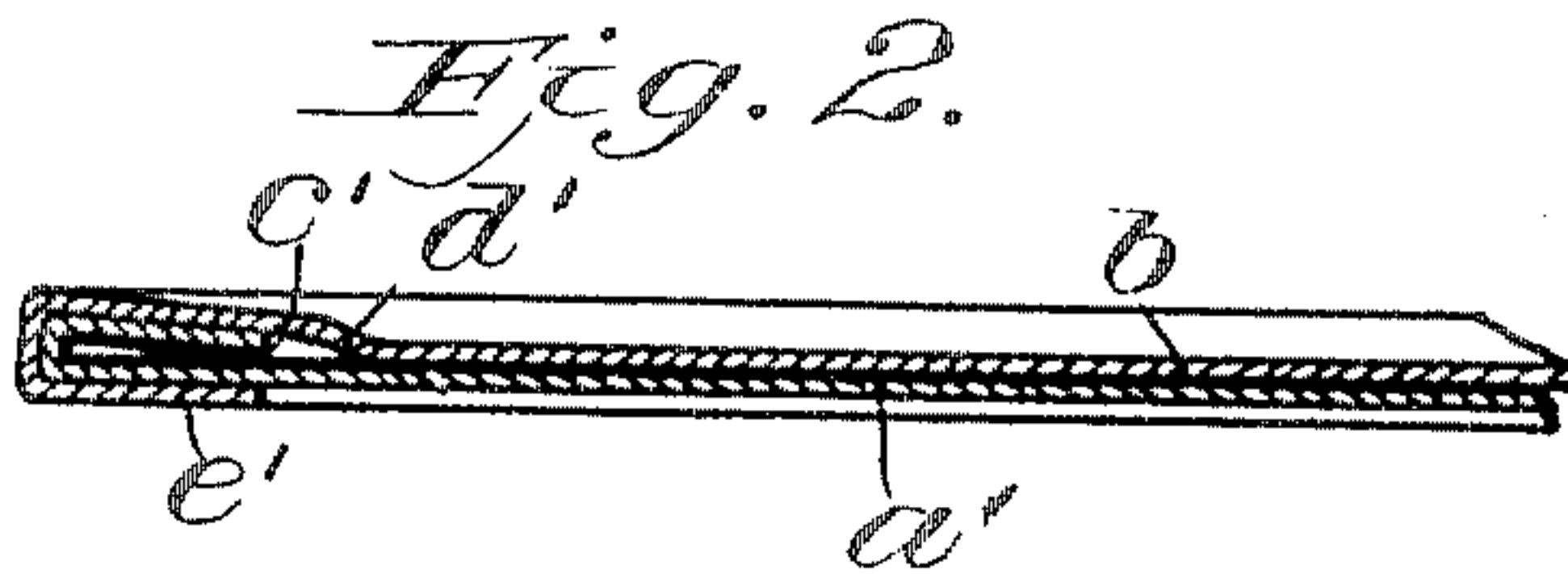
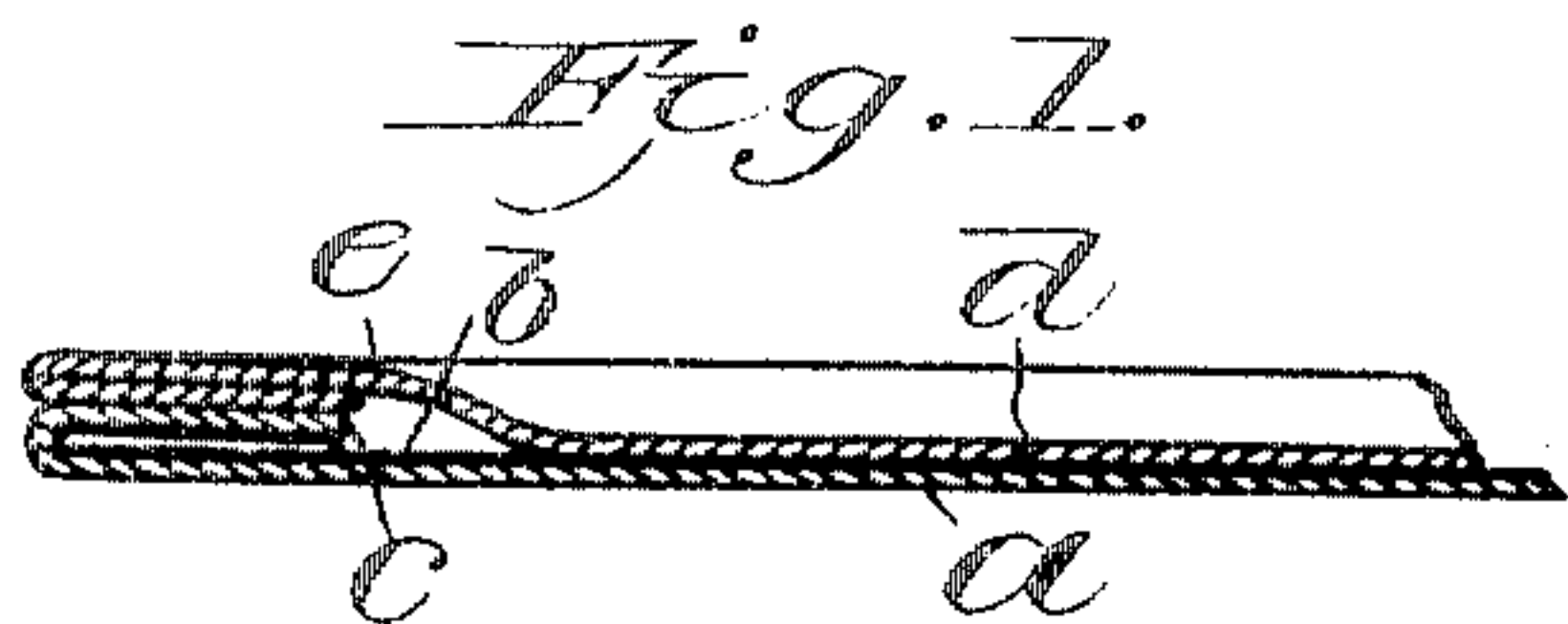


E. M. KNIGHT.  
FILTER

APPLICATION FILED FEB. 25, 1905.



WITNESSES:

*C. M. Walker,*  
*E. M. Fowler*

INVENTOR

*Edward M. Knight*  
By

*J. Walter Fowler*  
his Attorney



# UNITED STATES PATENT OFFICE.

EDWARD M. KNIGHT, OF NEWARK, NEW JERSEY, ASSIGNOR TO R. H. MARTIN, OF NEW YORK, N. Y.

## FILTER.

SPECIFICATION forming part of Letters Patent No. 793,838, dated July 4, 1905.

Application filed February 25, 1905. Serial No. 247,386.

*To all whom it may concern:*

Be it known that I, EDWARD MARTIN KNIGHT, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Filters, (for which I have obtained British Patent No. 5,370, dated March 4, 1904,) of which the following is a specification.

This invention relates to filters of the kind in which the filtering medium is constituted by a carbonated asbestos pad or sheet; and it has for its object to simplify the construction and manufacture of such filters and to increase their efficiency.

Heretofore partially-carbonated asbestos pads or sheets have been employed in filters, but not asbestos sheets carbonated throughout, the reason being that it has not been found practicable to manufacture such a pad that will hold together when carbonated throughout, as the carbon causes the sheet to disintegrate. Moreover, such partially-carbonated asbestos sheets having an uncarbonated margin are liable to permit of leakage through the uncarbonated portion of the sheet.

According to my present invention I provide an asbestos pad or sheet which is carbonated throughout its entire area, whereby the whole of the sheet is available for filtering and a saving of asbestos is effected while leakage is avoided. In the manufacture of the pad or sheet an edge or edges thereof is or are turned, forming a binding which insures that the whole shall remain intact.

The holders previously used in connection with partially-carbonated films have been so constructed that the uncarbonated portion of the filtering-pad is tucked tightly into a recess to form a joint. In my present invention I dispense with this form of joint, and the holder for receiving the filtering-pad is provided with a rubber or other elastic joint between its constituent parts, by means of which the same are held tightly together and the filtering-pad is secured in position. In this way without tucking the asbestos pad a watertight joint is obtainable in holders made of stoneware, china, glass, and such like mate-

rials which heretofore has not been practicable.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate like parts, Figure 1 represents a sectional view of a portion of a filtering-pad embodying my invention. Figs. 2 to 6, inclusive, show modified forms of filtering-pads embodying my invention. Fig. 7 is an axial section of one form of holder for a filtering-pad. Fig. 8 illustrates a sectional view of a portion of a stoneware filter vessel fitted with my improvement.

In making my improved pad a compressed sheet *a* of asbestos fiber is coated over the whole of one side with a film or layer *b* of granulated or pulverized carbon, which may be applied wet by means of a brush or in any other suitable manner, and the edge or border of this sheet is turned over, as indicated at *c*, so as to provide an asbestos surface or border around the carbonated surface. By this means the sheet *a* can be efficiently united by pressure to another sheet *d* of compressed asbestos fiber, and at the same time the layer or film *b* of carbon extends to the periphery of the filtering-pad, so that there is no risk of the liquid to be filtered escaping unfiltered around the said layer of carbon.

In the arrangement shown in Fig. 1 the uncoated sheet *d* is made with an inwardly-turned border *e*, which is united by pressure to the inwardly-turned border *c* of the sheet *a*.

In the arrangement shown in Fig. 2 the border *e'* of the sheet *d'* is turned over the inwardly-turned border *c'* of the sheet *a'*, so as to provide double the area for forming the joint between the sheets *a'* and *d'*.

In Fig. 3 the edge of the sheet *d''* is not turned, but lies flat on the turned edge *c''* of the sheet *a''*.

Fig. 4 shows a modification in which the border of the coated sheet *a'''* is unturned, while the border *e'''* of the uncoated sheet *d'''* is turned, as in Fig. 2, so as to form the joint with the under or uncoated surface of the sheet *a'''*.

Fig. 5 shows a modification of Fig. 1 in which the sheet *g* of uncoated asbestos is ar-



ranged within the turned-over border  $c^4$  and an additional coated sheet  $a^4$  is arranged in place of the sheet  $d$ .

Fig. 6 shows a further modification in which the sheet  $g'$  of uncoated asbestos is placed on a coated sheet  $a^5$  and the whole turned over at the edge, as shown, and compressed. The turning of the edges of the sheet may be done by hand or by means of molds.

Fig. 7 shows an improved form of holder made of two parts  $h$   $i$ , of which the part  $h$  has a flange  $j$  provided with a peripheral groove or channel  $f$  for receiving an india-rubber packing-ring  $k$  for pressing against the interior surface of a cylindrical flange  $l$  on the part  $i$  of the holder, so as to form a fluid-tight joint. The flange  $j$  also bears an annular surface  $m$ , which coacts with an annular surface  $n$  on the part  $i$  to grip the edge of the filtering-pad A. The part  $i$  is provided with a perforated plate  $p$  for supporting the filtering-pad and with an outlet-pipe  $q$  for the filtered liquid. The unfiltered liquid enters the holder through holes  $r$  in the part  $h$ . This form of elastic joint is specially adapted for holders made of stoneware, china, glass, and the like. For example, in the arrangement shown in Fig. 8 the parts  $h'$   $i'$  are made of stoneware and are provided with grooves  $f'$  to receive elastic packing-rings  $k'$   $k'$ , by which said parts are fitted fluid-tight in the filter vessel  $s$ , holding the pad A between them in a similar manner to that described with reference to Fig. 7. Both parts  $h'$   $i'$  are perforated, as shown.

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

1. A filtering-pad comprising two or more sheets of compressed asbestos fiber having one or more films or layers of granular or pulver-

ized carbon extending between them over the whole area of the pad, said sheets being united by turning over the border of one or more of said sheets so as to enable the joint to be made between uncoated asbestos surfaces, substantially as described.

2. A filter-pad comprising a plurality of layers of fibrous material and a film of carbonaceous material interposed between the fibrous surfaces, the edges of said layers being turned inwardly to bring a portion of the uncoated surface of one layer in contact with the uncoated portion of the other layer whereby the fibers of the layers interlock to unite the layers.

3. A filter-pad comprising a sheet or layer of fibrous material having on one side a coating of carbonaceous material, and a second fibrous sheet in contact with the coated surface of the first sheet, said carbon-coated sheet having its edge folded to present an uncoated surface of contact for an uncoated portion of the second sheet whereby the fibers of the sheet interlock to unite the sheets.

4. A filter-pad composed of a plurality of layers or sheets of asbestos with an interposed layer of comminuted carbon covering substantially the entire area of one sheet, one of said sheets having its edge turned relative to the other sheet to present an uncoated surface of contact to an uncoated portion of the companion sheet whereby the fibers of the sheets interlock to unite the sheets.

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

EDWARD M. KNIGHT.

Witnesses:

A. R. MARTIN,

C. H. VAN NOSTRAND.