

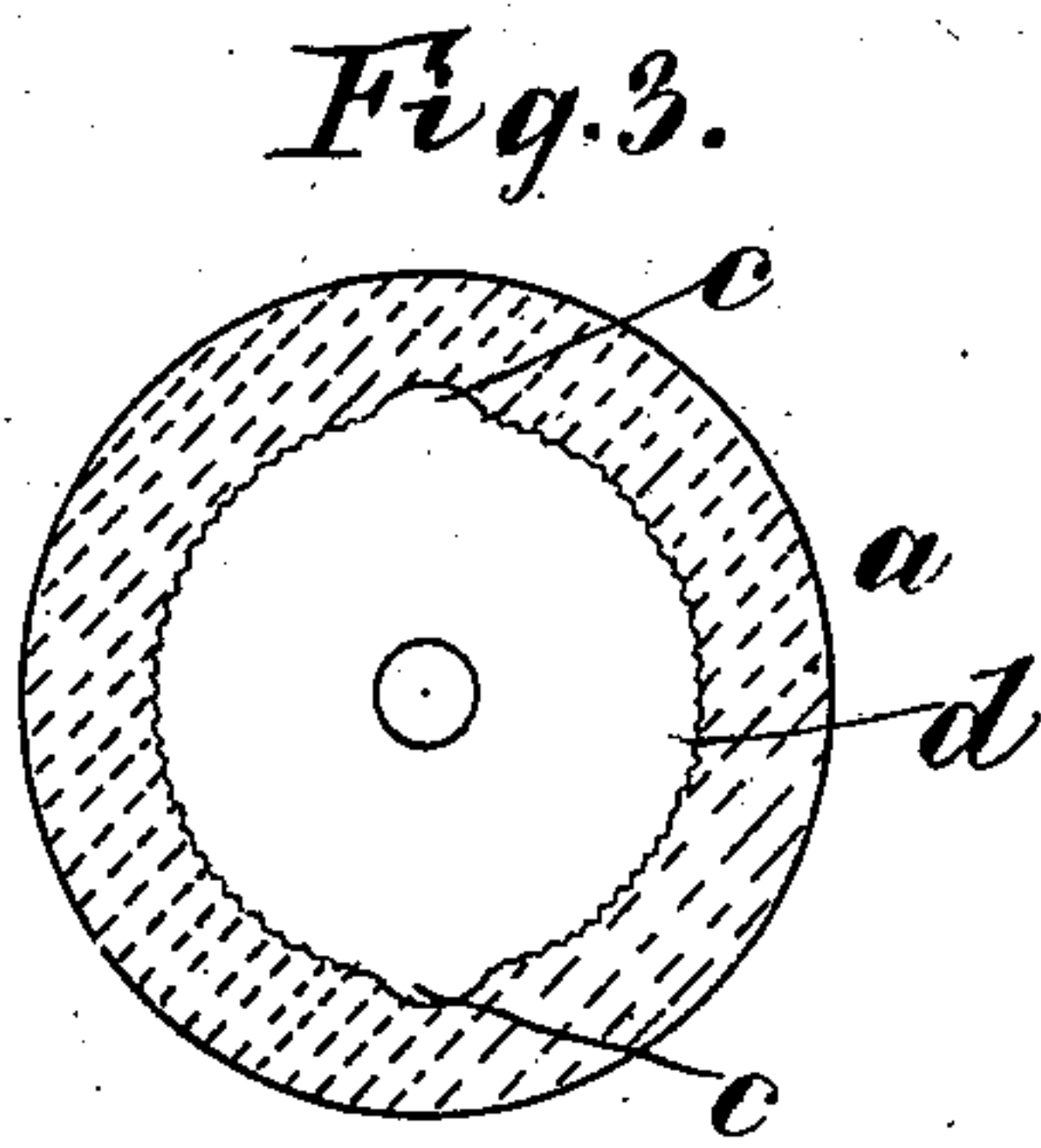
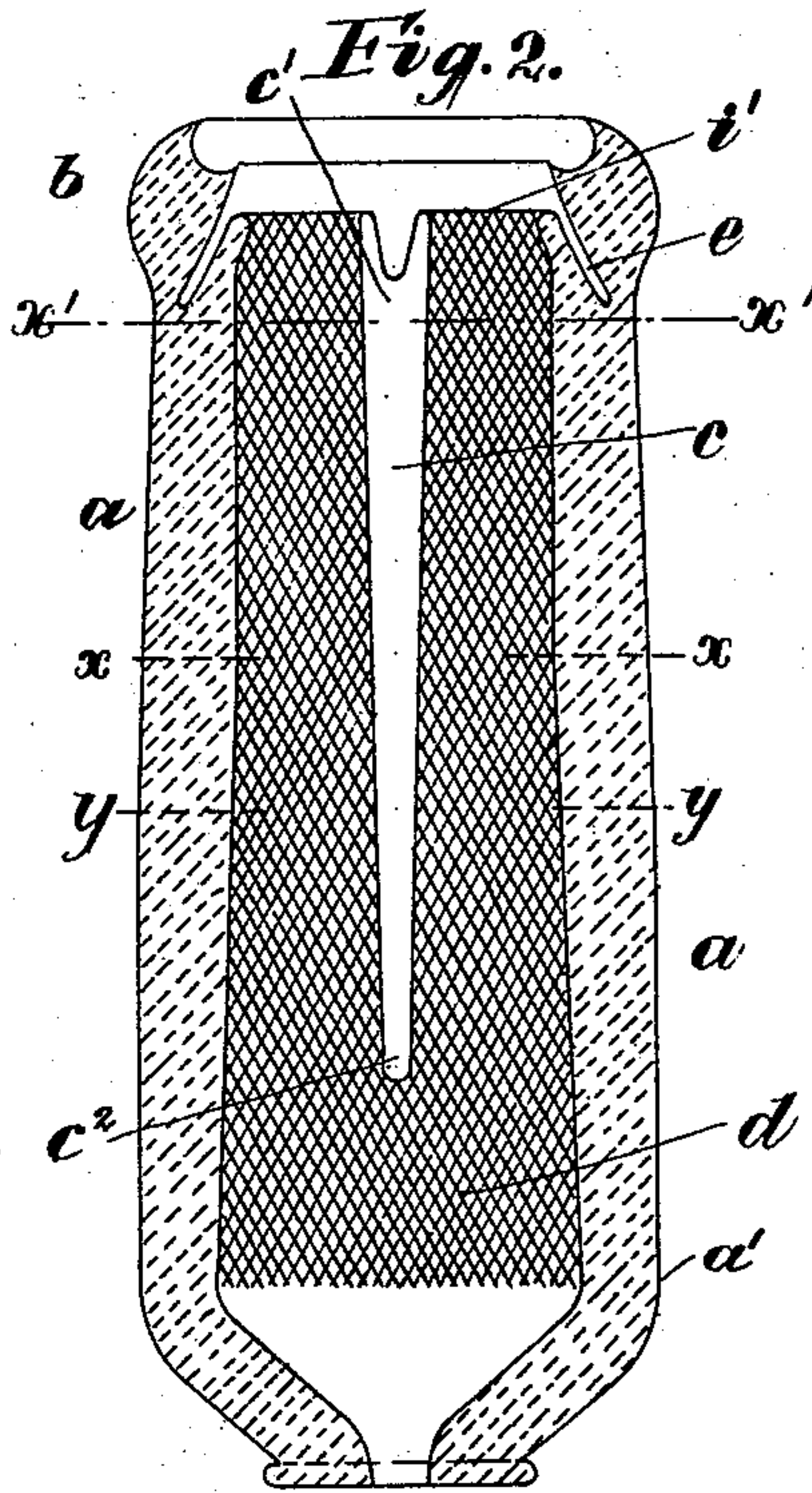
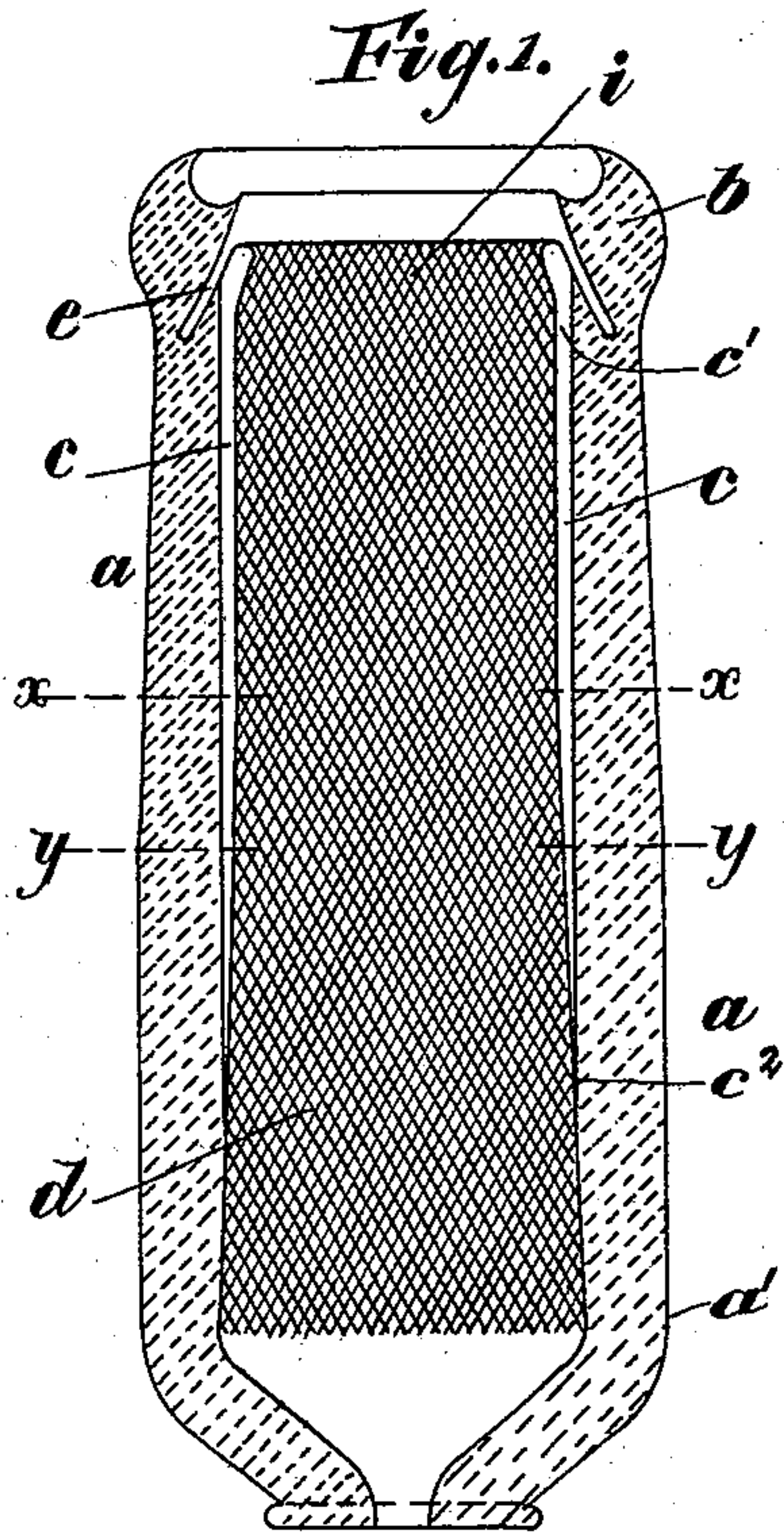
(Model.)

2 Sheets—Sheet 1.

A. SHIELDS.  
TEAT CUP FOR MILKING MACHINES.

No. 557,241.

Patented Mar. 31, 1896.



Witnesses  
H. van Oolenneg  
E. A. Scott

Inventor  
Alexander Shields

by *Richard R.*

Attorneys



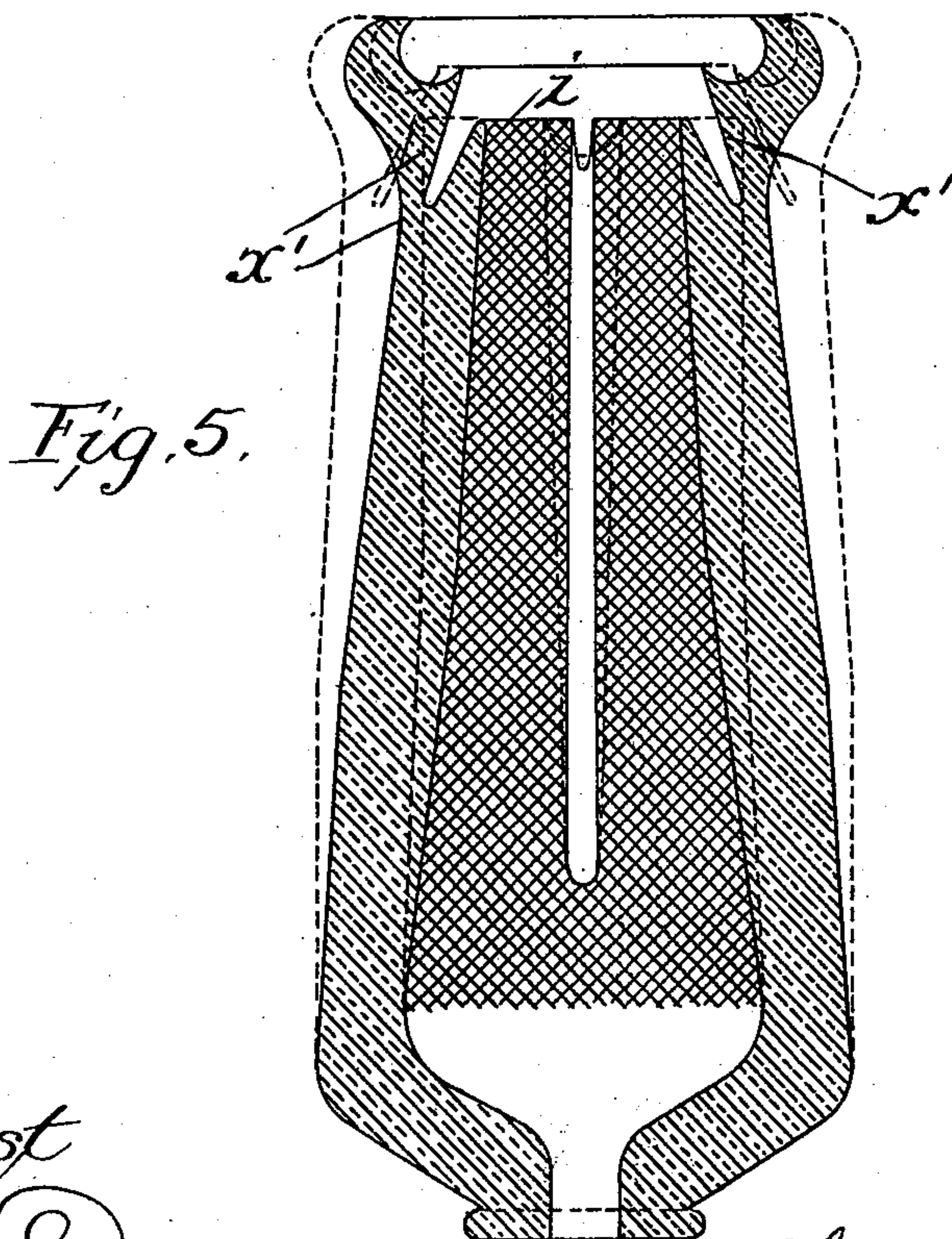
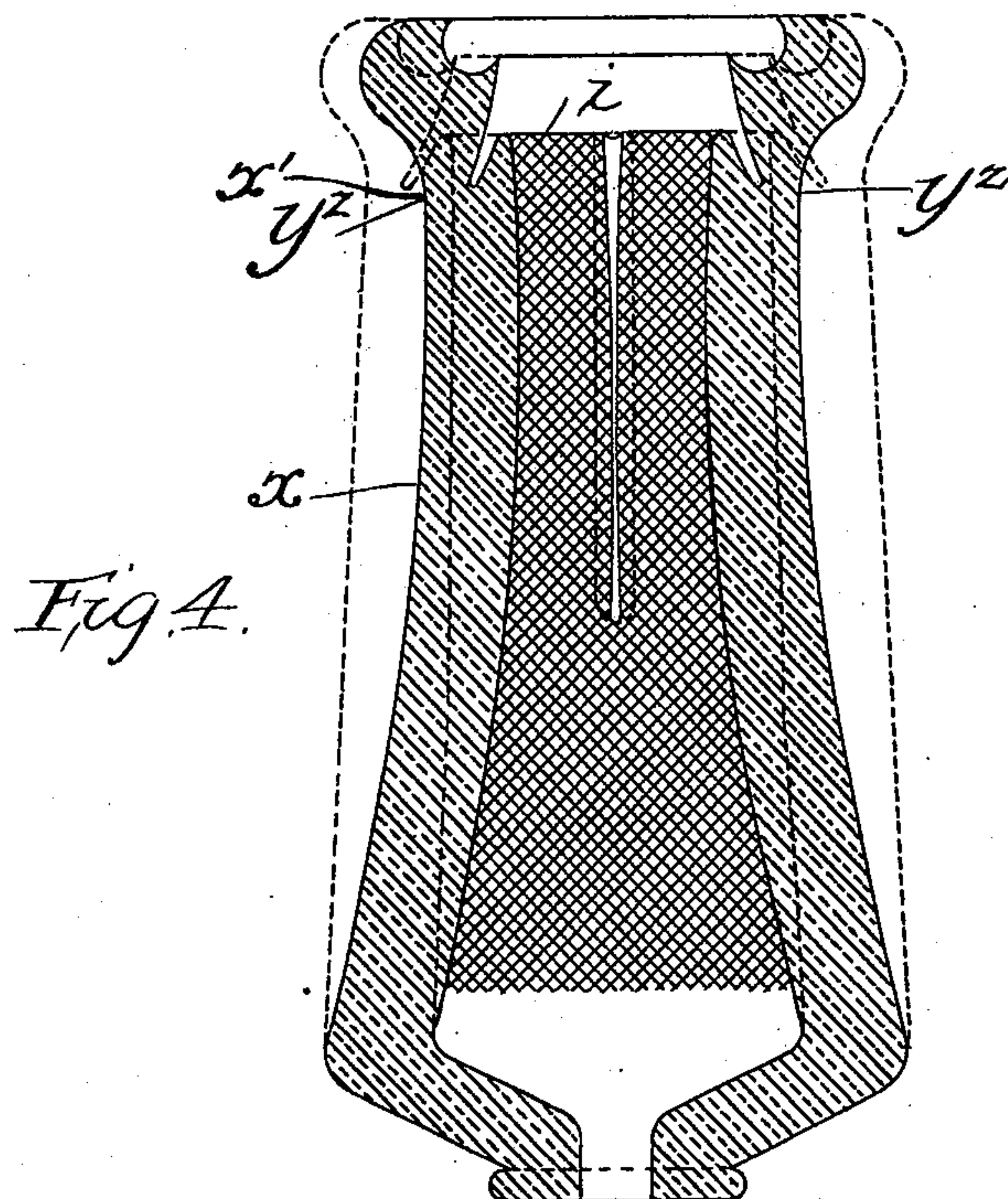
(Model.)

2 Sheets—Sheet 2.

A. SHIELDS.  
TEAT CUP FOR MILKING MACHINES.

No. 557,241.

Patented Mar. 31, 1896.



*Attest*  
*Maclern Donaldson*  
*J. L. Middleton*

*Inventor*  
*Alexander Shields*  
*by Richards & Co*  
*Attys*



# UNITED STATES PATENT OFFICE.

ALEXANDER SHIELS, OF GLASGOW, SCOTLAND.

## TEAT-CUP FOR MILKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 557,241, dated March 31, 1896.

Application filed August 24, 1895. Serial No. 560,422. (Model.) Patented in England August 2, 1894, No. 14,789.

*To all whom it may concern:*

Be it known that I, ALEXANDER SHIELS, a subject of the Queen of Great Britain, and a resident of the city of Glasgow, Scotland, have  
5 invented certain new and useful Improvements in Teat-Cups for Milking-Machines, (for which I have obtained Letters Patent in Great Britain, dated August 2, 1894, No. 14,789,) of which the following is a specification.  
10 tion.

This invention relates to teat-cups for use in connection with milking-machines, and it is a development of my prior invention patented in the United States, No. 524,738, dated  
15 August 21, 1894.

The present invention has for its objects to improve the construction and action of the teat-cup and to render it capable of thoroughly "stripping" the cow's teats. To  
20 enable it to perform this latter function, it is necessary that the cup should gradually and progressively collapse from the neck downward toward the bottom, so as to produce an action like the hand when milking.

25 On the annexed drawings, which illustrate the invention, Figure 1 is a vertical section of the new teat-cup. Fig. 2 is another vertical section of the teat-cup, taken at right angles to Fig. 1; and Fig. 3 is a horizontal section on the line  $xx$ , Fig. 2. Fig. 4 is a sectional view of a teat-cup in collapsed condition, showing the imperfect action resulting from the absence of the features of my invention therefrom. Fig. 5 is a similar view of a  
30 teat-cup embodying my improvements, showing the perfect action thereof in stripping the teat.

$a$  is the cup.

$b$  is the ring for gripping the cow's teat.

40  $c c$  are the vertical grooves made in the walls of the cup.

$d$  is the roughened inside surface of the cup.

$e$  is the annular groove.

In this invention the inner lip  $i$  of the cup  
45  $a$  is made of a gradually-decreasing diameter toward the edge or tip  $i'$  and its thickness is preferably tapered from the root toward the tip  $i'$ , while the vertical grooves  $c$  are made longer than heretofore. The depth of these  
50 grooves  $c$  is not the same throughout, but gradually diminishes from the neck part  $c'$  down to the bottom  $c^2$ . Lines drawn along

the bottoms of these grooves would be parallel with an axial line drawn through the center of the cup. 55

The thickness of the walls of the cup, which, as shown, is somewhat cylindrical in shape, gradually diminishes from the maximum thickness at the center to the minimum at the neck part and at the bottom. 60

The interior surface of the cup gradually tapers or diminishes in diameter from the bottom at  $a'$  to a point indicated by the dotted line  $x$  preferably a little above the center, and from this point to the neck the surface 65 is cylindrical, the interior side walls being parallel. The exterior surface of the cup, on the other hand, is perfectly cylindrical from the bottom  $a'$  to the center or to a point  $y$ , (indicated by the dotted lines,) preferably a 70 little below the center, and from this point it gradually diminishes in diameter up to the neck.

By making the body of the teat-cup with walls which taper in thickness from both ends 75 toward the middle in the manner shown in Fig. 1 a peculiar motion is produced under the action of the vacuum-pulsations. When the vacuum gradually increases from the minimum to the maximum, the upper part of 80 the cup at the neck part, which is in this case the line of least resistance, first compresses tightly on the cow's teat, and as the vacuum increases this compression gradually passes downward to the bottom of the cup, so 85 as to produce a gradual downward compressive action like the hand when milking. If the walls were tapered in thickness regularly from the top to the bottom or if the walls are of the same thickness throughout, the teat-cup 90 would not act in this manner, as the line of least resistance would be at the center and the strongest parts at each end  $Y^2$ , Fig. 4, which remain almost rigidly cylindrical, and the action would be similar to that shown in 95 Fig. 4, where it will be seen in full lines that the greatest compression takes place at the center  $x$  of the cup. The dotted lines indicate the normal shape of the cup. By making the walls with a properly-proportioned 100 thick part in the center that part is strengthened, so that the line of least resistance is thrown onto the neck part at  $x'$ , and the cup acts, as a consequence, in the manner shown



in full lines at Fig. 5, where it will be seen that the greatest compression is at the neck.

By making the two grooves C longer and of a decreasing depth from top to bottom the  
5 above stripping action is facilitated and the cup is allowed to assume when compressed a somewhat flattened shape between the ring ends, which practically retain their shape, so as to squeeze the teat.

10 As will be seen, the lip *i* is made to extend inwardly, flange-like, instead of being in a line with the interior walls of the cup, and it is also tapered so as to appear like a tongue in section. The object of this construction is  
15 to allow the said cup to perform a free articulating movement, so as to alternately, under the action of the vacuum-pulsations, tightly grasp the root of the cow's teat and then, to a certain extent, relax its grasp. In fact the  
20 action is very similar to that of the gums of the calf's mouth when sucking.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A rubber teat-cup made with walls, 25 which, at the inside, are cylindrical from the neck to a point above or about the center and then gradually taper outward or increase in diameter to the bottom, and, at the outside, are cylindrical from the bottom to a point be- 30 low or about the center and then gradually taper inward or diminish in diameter to the neck, substantially as hereinbefore set forth.

2. The teat-cup *a* having the rim to grip the root of the teat, the internal circular articulating-lip *i* which gradually diminishes in 35 internal diameter toward its edge or tip *i'* and is tapered in thickness, and the vertical grooves *c* whose depth gradually diminishes toward the bottom, substantially as herein- 40 before set forth.

Signed at Glasgow, Scotland, this 25th day of April, A. D. 1895.

ALEXANDER SHIELDS.

Witnesses:

H. D. FITZPATRICK,  
JOSEPH McLACHLAN.