

(No Model.)

W. PAINTER.
BOTTLE STOPPER.

No. 327,099.

Patented Sept. 29, 1885.

FIG. 1.

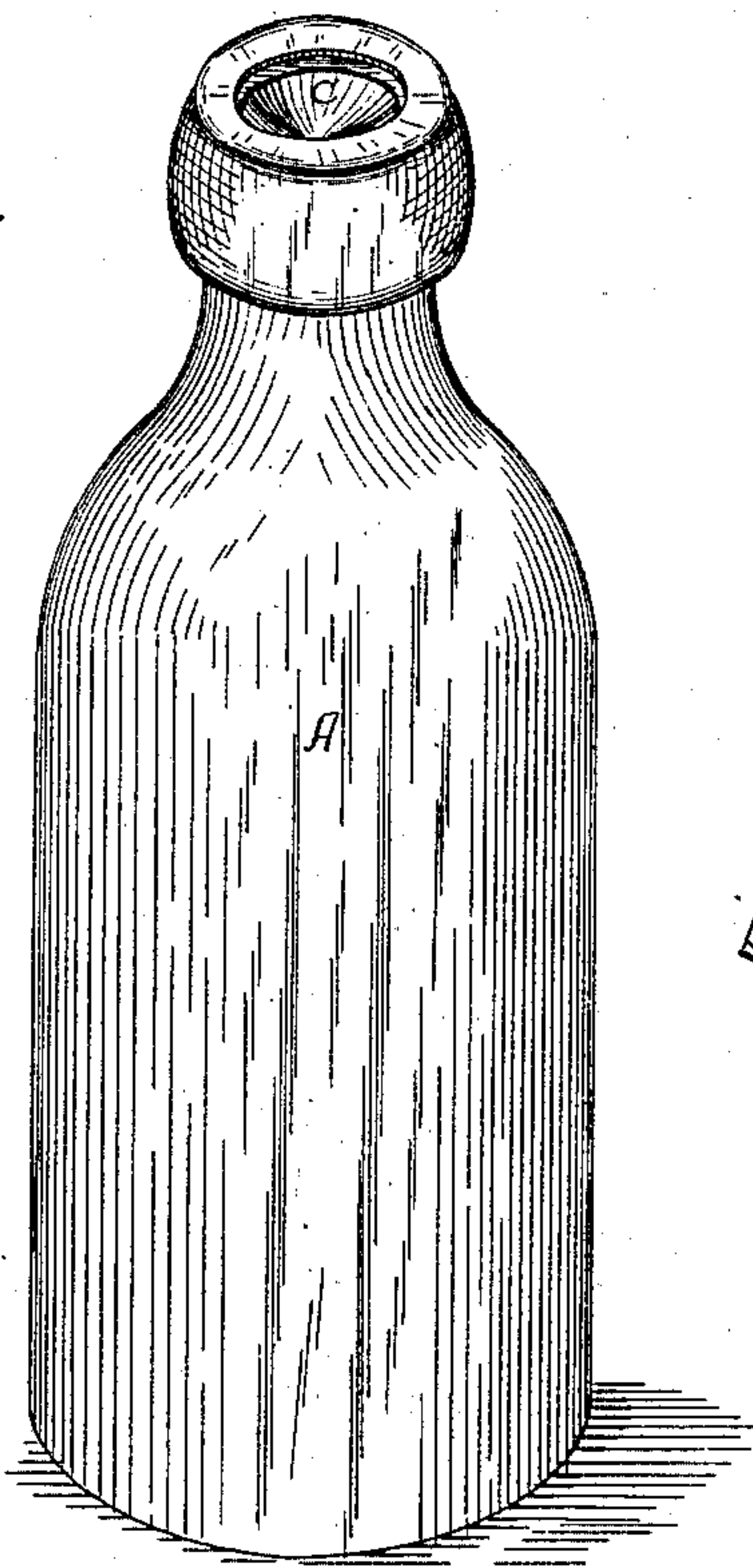


FIG. 2.

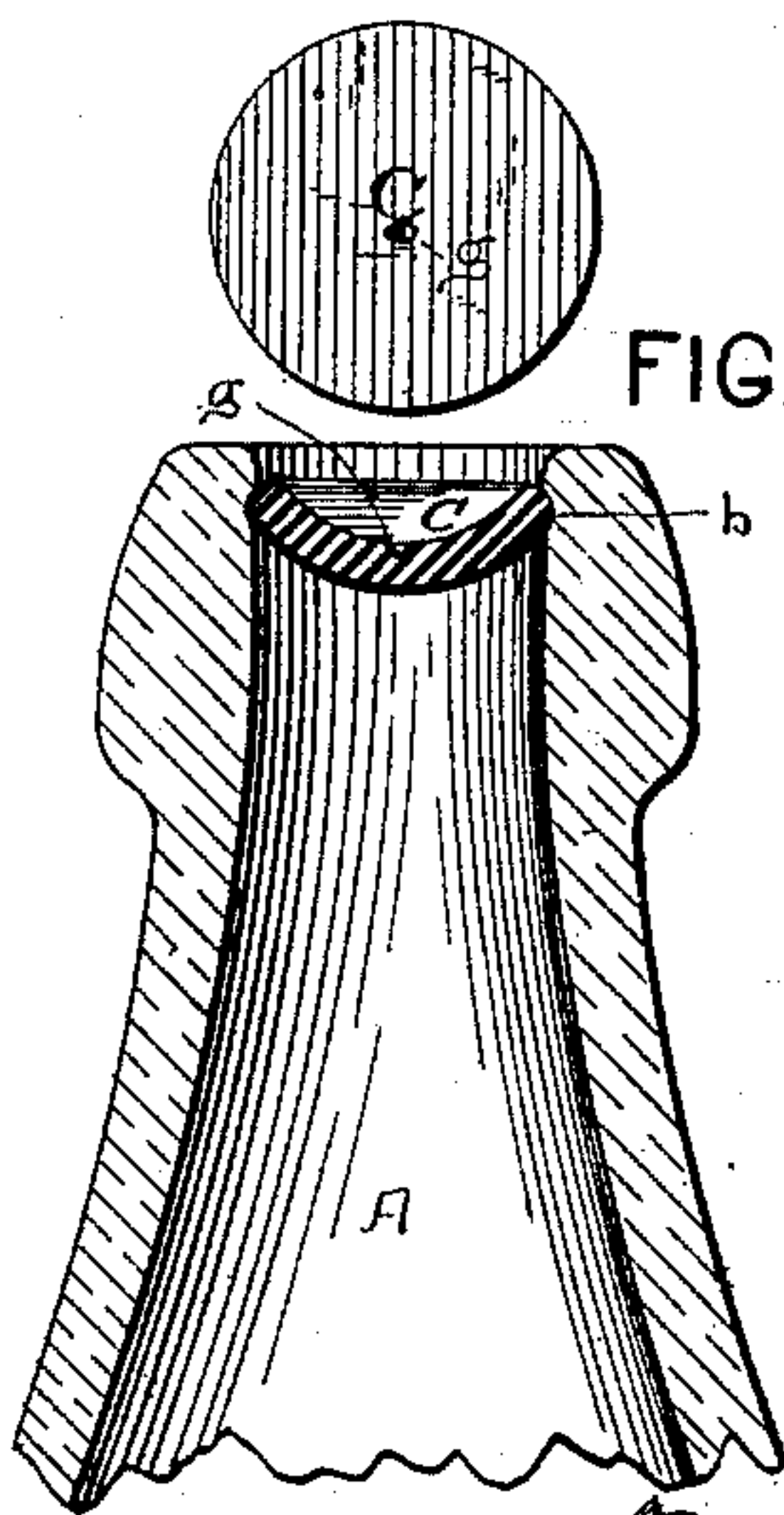


FIG. 7.

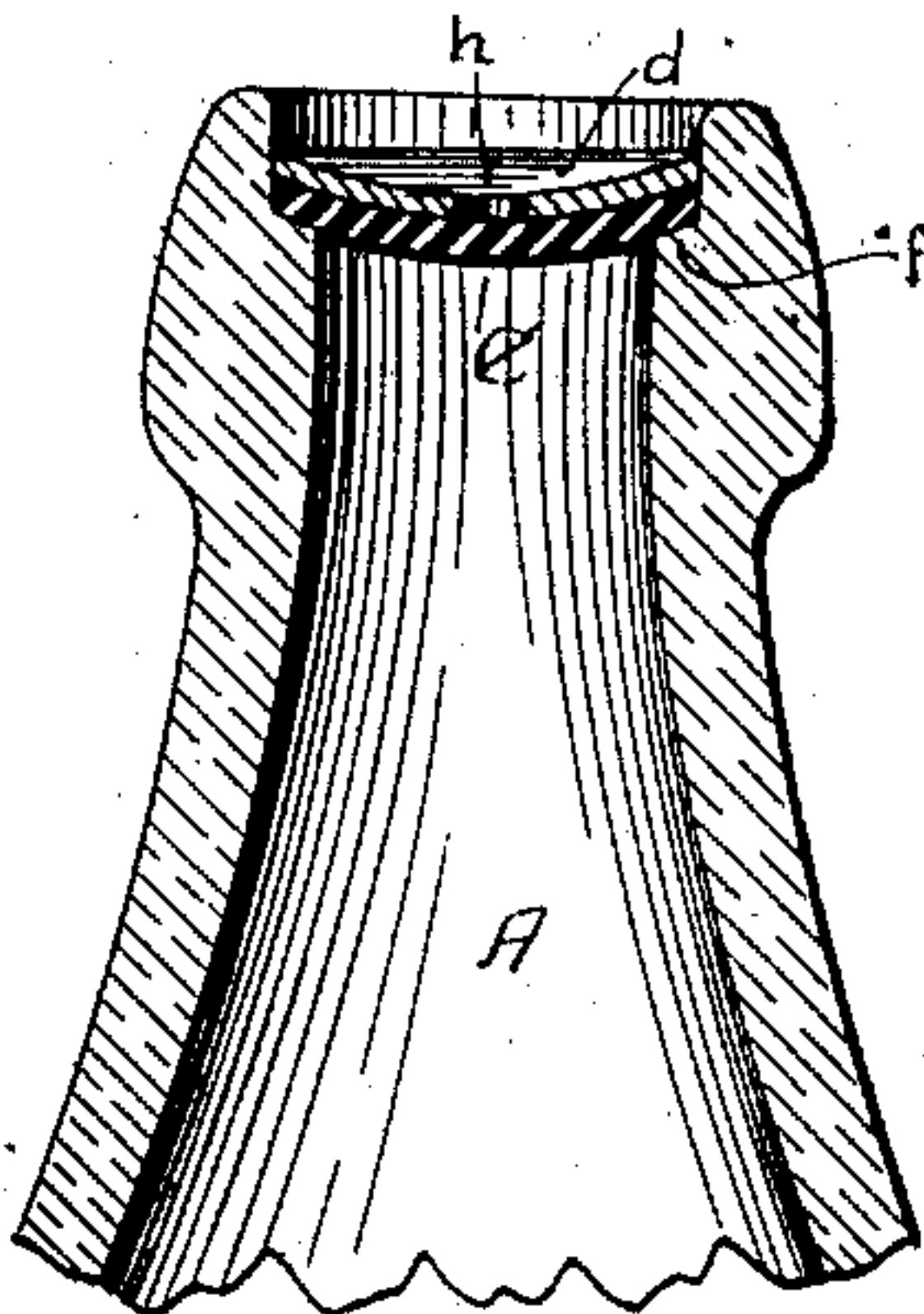


FIG. 3.

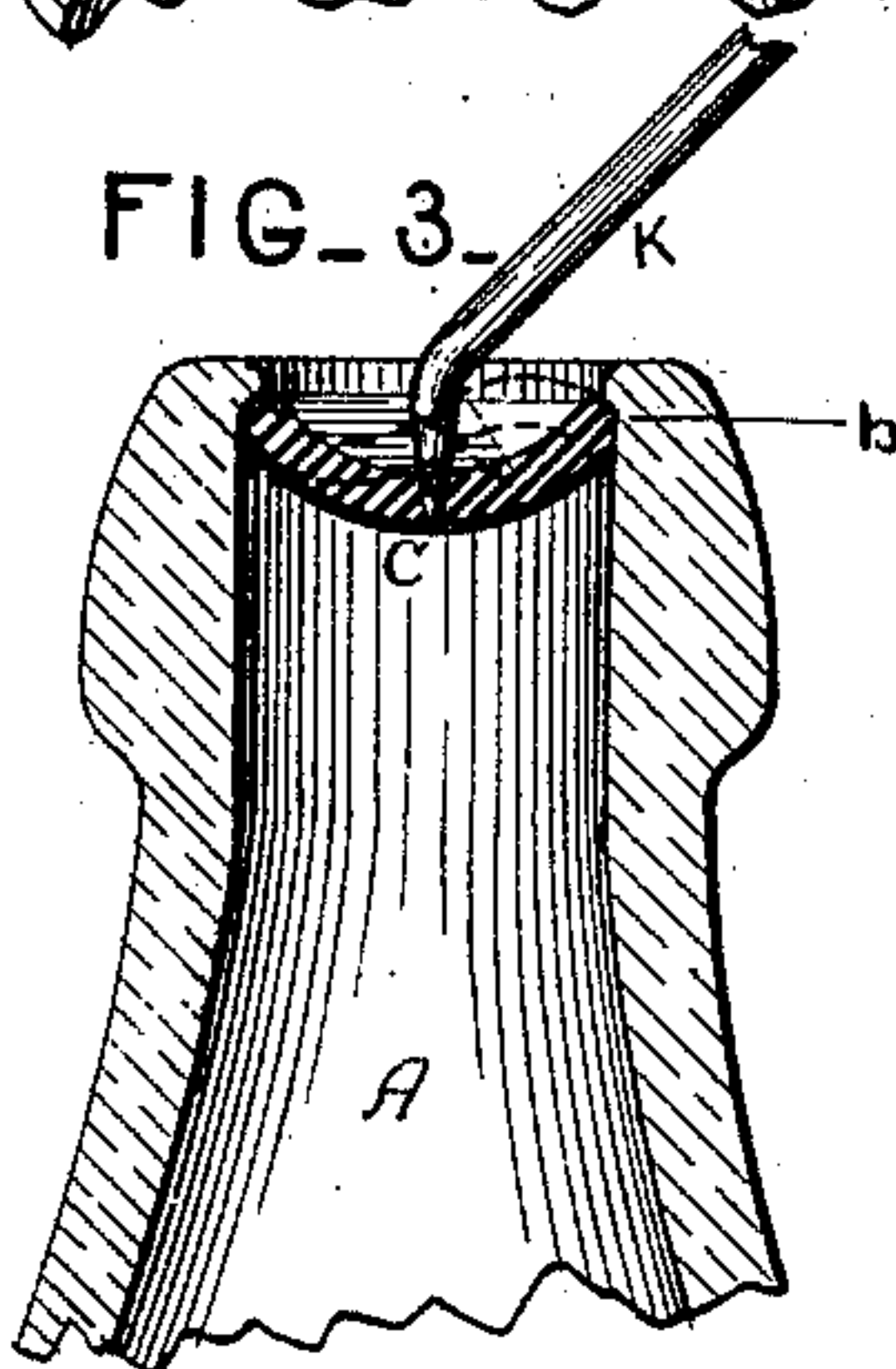


FIG. 8.

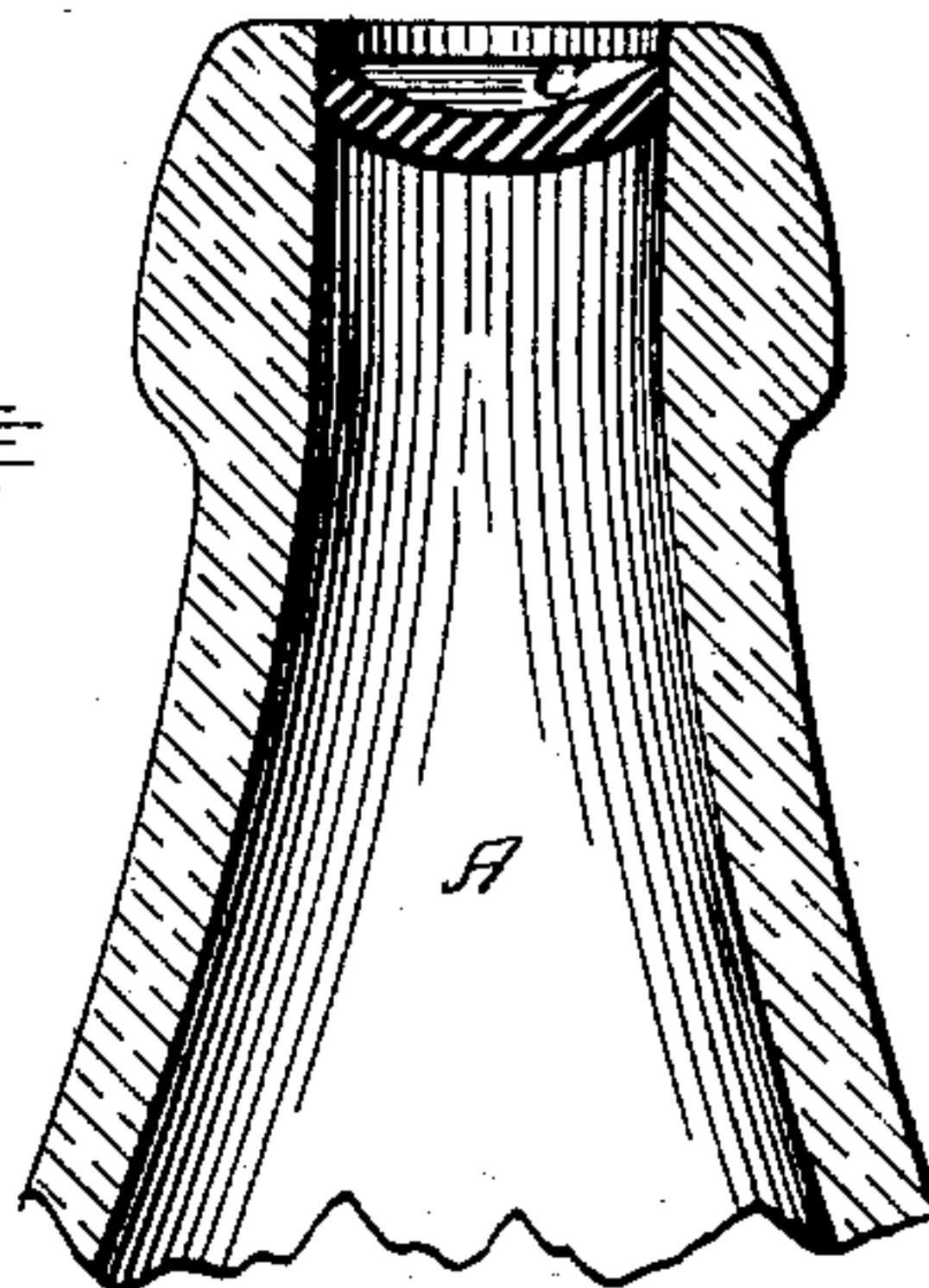


FIG. 4.

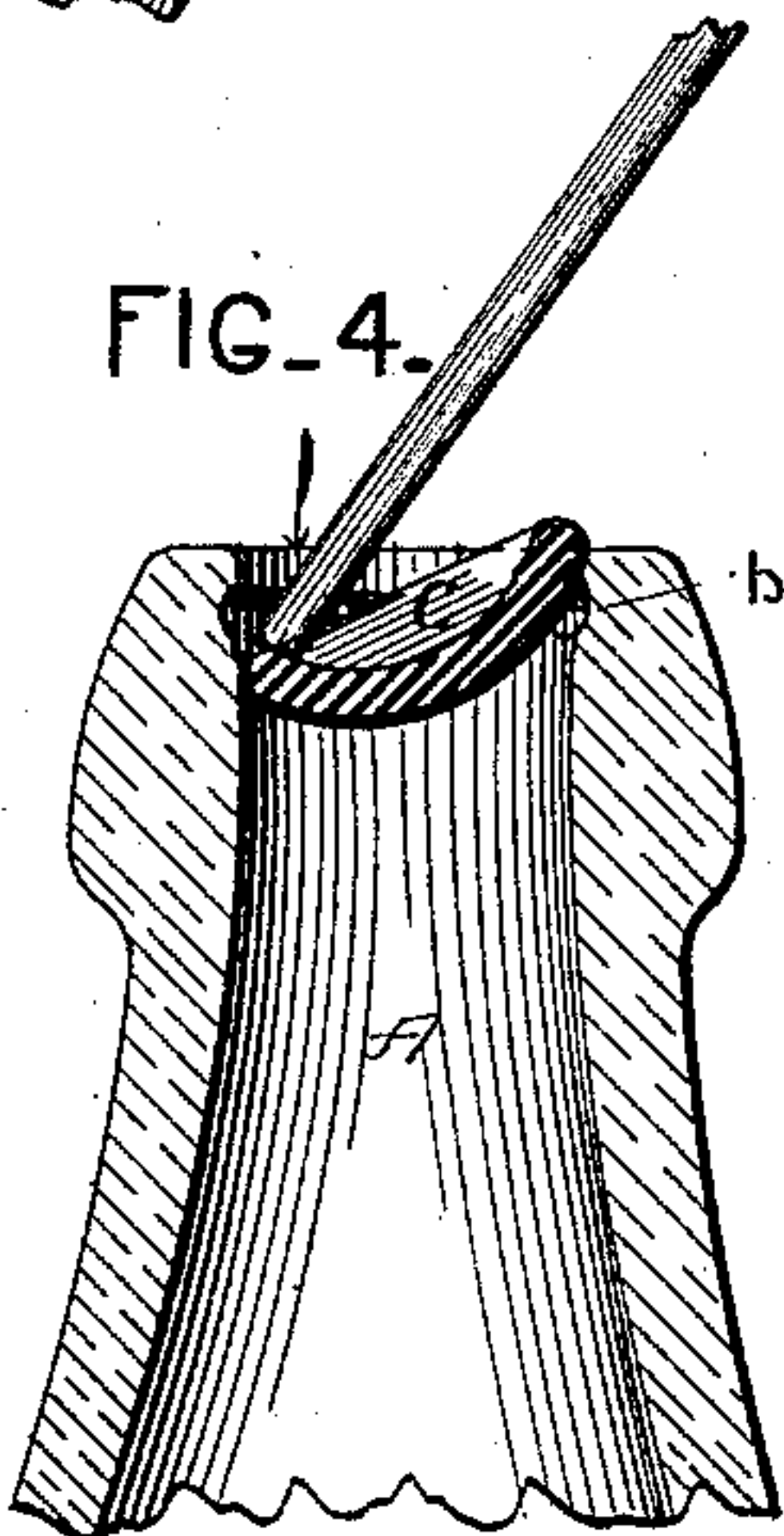


FIG. 5.

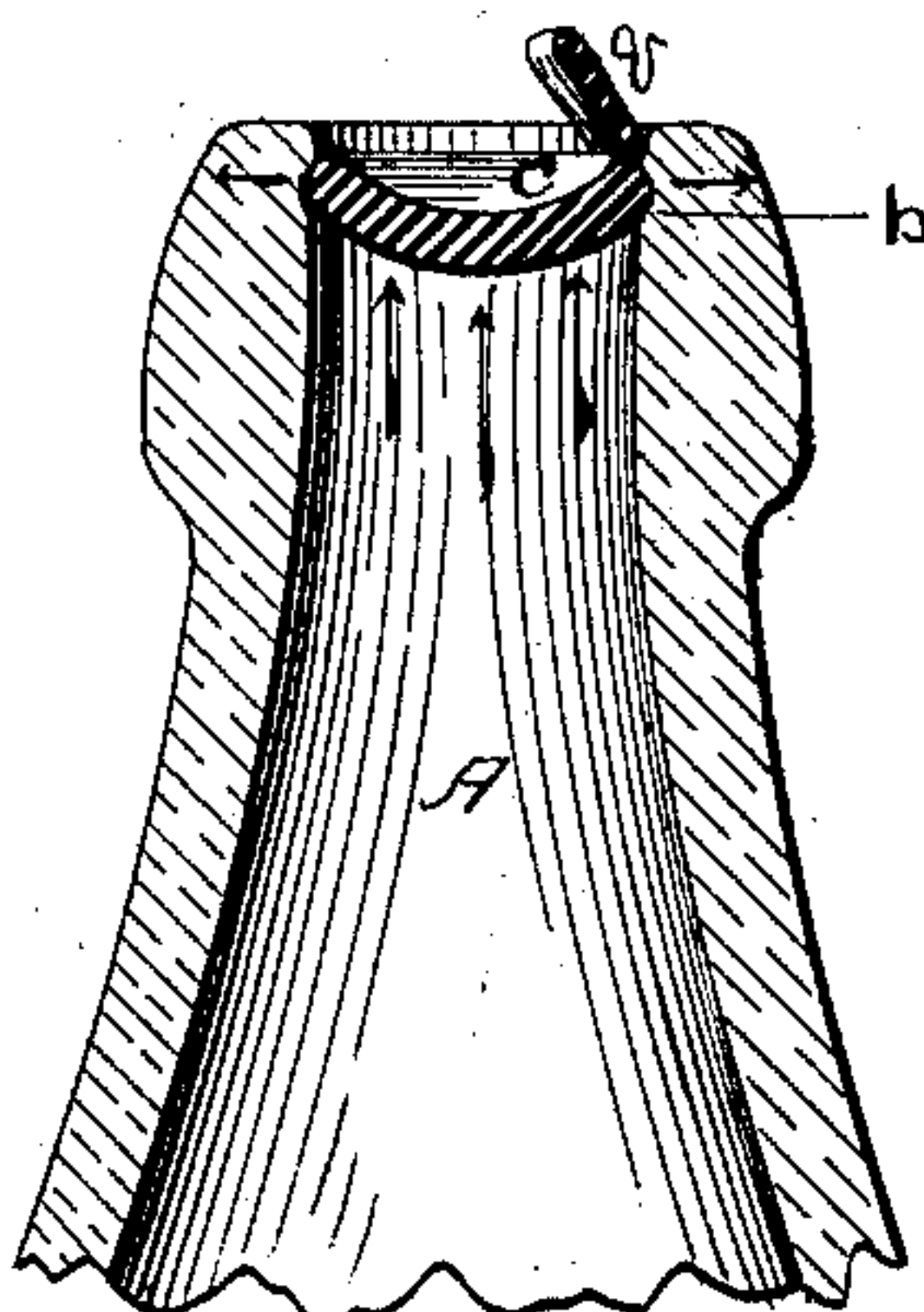
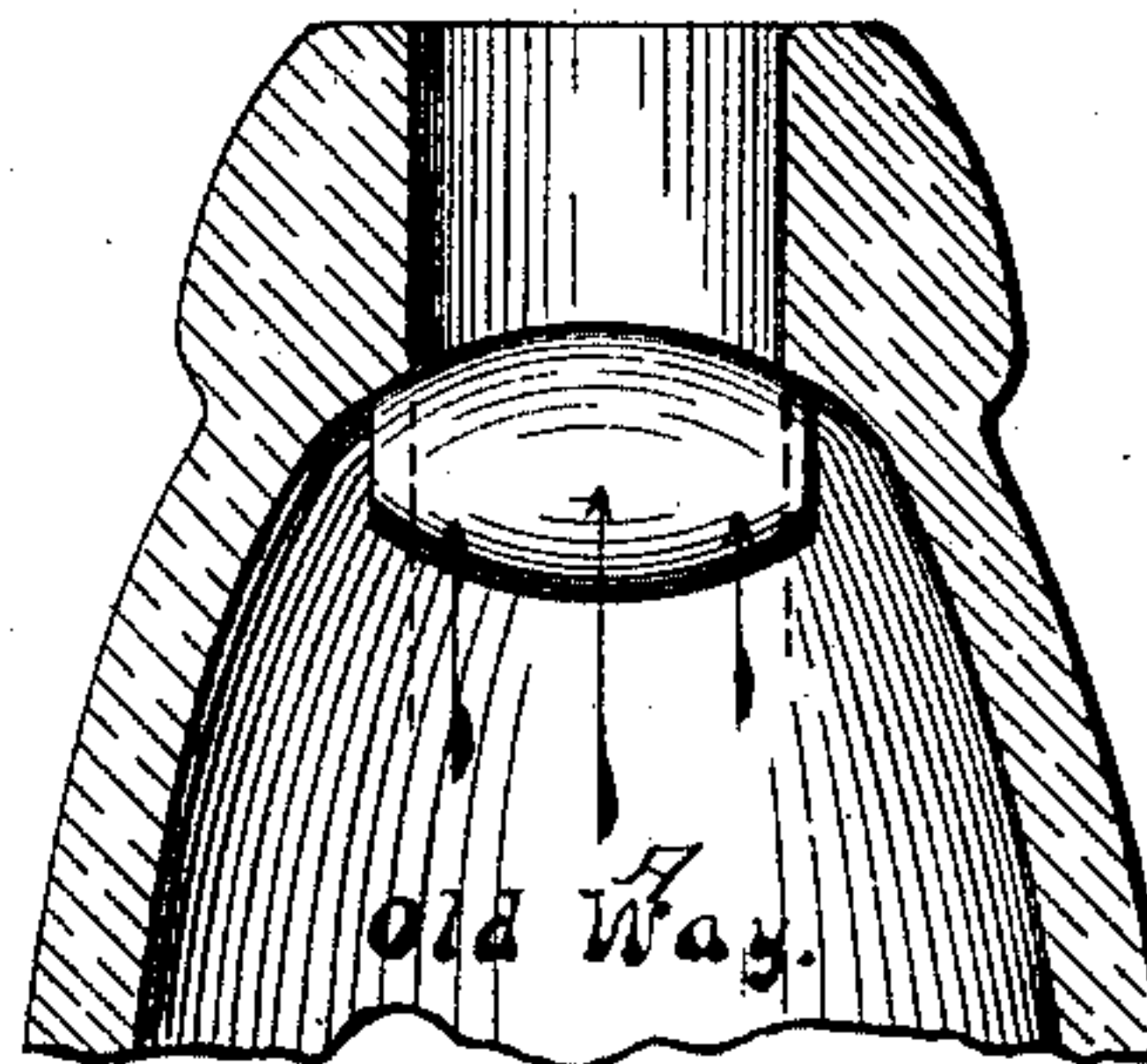


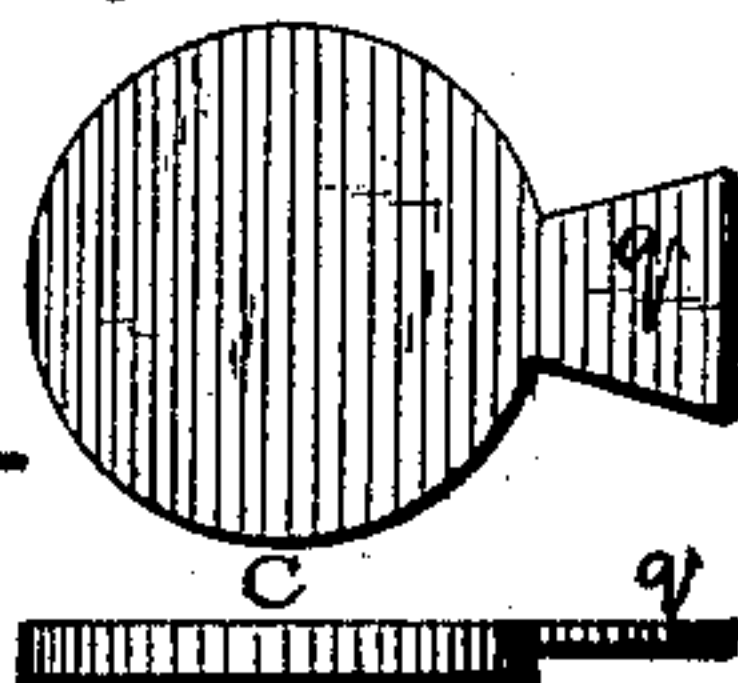
FIG. 6.



WITNESSES:

Wm. D. Gill.
W. E. Stearns

FIG. 9.



INVENTOR

William Painter

BY

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UNITED STATES PATENT OFFICE.

WILLIAM PAINTER, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF
TO LEWIS R. KEIZER, OF SAME PLACE.

BOTTLE-STOPPER.

SPECIFICATION forming part of Letters Patent No. 327,099, dated September 29, 1885.

Application filed June 5, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PAINTER, of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Bottle-Stoppers, of which the following is a full and exact description.

My invention is particularly designed for use with bottles or similar vessels containing fluids under pressure from effervescence or otherwise; but it is adapted as well for use where such pressure does not exist.

Stoppers have heretofore been made secure against internal pressure in one of two ways—by mechanical means exterior to the bottle, as by using a tie-wire, also by special stopper-fasteners, which have been made in large variety; or by placing the stopper inside the bottle and so arranging it that the stopper is forced against a seat or packing by the pressure within. The first of these methods is objectionable because of the expense, and in some cases the inconvenience of its use and liability of accidental opening. The second is so for the same reasons, and for the additional one that the presence of the stopper inside of the bottle is an obstruction to ready and effectual cleansing both of the bottle and stopper. Stoppers secured by external fastenings are retained solely by the power of the device to overcome the internal pressure. Those within the bottle are retained because they present a solid mass too large to pass through the bottle-neck. In neither case referred to does the lateral expansion of the stopper itself against the interior of the bottle-mouth enter as an element of its action in resisting internal pressure, as it does with stoppers made according to my method.

My invention differs from all others in the respects named. It is made of thin material, and placed within the bottle neck or mouth in cup-shaped form, with its convex side inward, so that it presents the resistance of an inverted arch or dome having its haunches supported by contact with the walls of the bottle-mouth, which are preferably indented or grooved to afford a more secure hold. Pressure upon an arch is always transferred in part as lateral pressure against its abutment, while a similar pressure upon a solid body having the same convexity does not tend to displace the abutment laterally, but to shear

off the edges of such solid body. This physical principle illustrates the actual difference between my cup-shaped disk-stoppers and all others with which I am acquainted.

In the accompanying drawings, Figure 1 is a perspective of an ordinary bottle with my stopper inserted. Fig. 2 is a vertical section of the bottle neck and stopper. Figs. 3 and 4 show methods of removing the stopper. Figs. 5 and 6 illustrate the difference in action between my inverted-arch stopper and an ordinary internal stopper. Figs. 7, 8, and 9 are modifications of the invention.

A is an ordinary bottle with a slight internal groove, *b*, within the neck near the top, and C is the disk-stopper in place. I prefer to provide the bottle-neck with a groove, because it makes the action of the stopper sure, notwithstanding the usual internal variation in sizes of necks incident to the manufacture of bottles, and also of any variations there may be in the material from which the disk-stoppers may be made, but the groove need not be more than one-sixty-fourth of an inch in depth. Were it practicable to secure uniformity in the respects named, the groove would not be required, and it may be dispensed with, as shown in Figs. 7 and 8. With comparatively low internal pressure the groove is not necessary in any case.

The stopper C is a circular disk of some suitable flexible material. It may be normally somewhat concave, but the flat form answers the purpose best. The disk is made considerably larger than the neck of the bottle, so that when it is forced therein its edges are contracted and it assumes the form of an inverted arch or dome supported by pressure against the internal walls of the bottle-neck, as shown. As in all structures of that form, pressure upon the arch will be in part transmitted to the abutment, as before described, therefore, the stopper being capable of expanding, pressure upon the arch will be transferred laterally to the bottle-neck, and will cause the resistance of the stopper to increase measurably in proportion to the pressure upon it up to that point at which the arch will be crushed.

If the stopper is made from material having considerable resilience or inherent expansive force, or if the interior of the bottle-mouth be roughened, sufficient adhesion will result with-

out the use of the groove to secure the initial hold, when any additional pressure will increase its holding power, as explained, and any usual internal pressure will be resisted.

5 For general purposes two-ply rubber packing of common quality answers well for making the disks. The material known as "linoleum" (made principally of ground cork) also serves an excellent purpose, and is still
10 cheaper than rubber packing. Many other materials, metallic as well as non-metallic, are available. Metal disks require a packing material to be used in connection with them, and such disks are preferably employed with bottle-necks having a packing-shoulder, as in Fig.
15 7, wherein *d* is the metal disk, *e* the packing of rubber or other suitable material, and *f* the shoulder against which the packing rests. In this case the metal disk is provided with a
20 hole, *h*, by which it may be extracted. Metal disks require great strength of bottle-neck to avoid breaking, and are therefore not considered as desirable for general purposes as disks made entirely of comparatively soft material,
25 in which case the edges should remain soft and elastic to give a proper bearing.

To remove my disk-stoppers, a simple wire hook, *k*, as shown in Fig. 3, may be employed. The point pierces the disk and either forcibly
30 reverses the arch or lifts up one edge, thereby releasing the disk. To facilitate the piercing of the disk, a pit or cavity, *g*, extending part way through the disk may be employed. By simply applying pressure against one edge of
35 the disk, so as to force it inward and tilt or partially rotate it, its hold is released, when the internal pressure causes it to fly out. This action is shown in Fig. 4. No special tool is required in opening the bottle in the way last
40 described. Any object capable of applying the requisite pressure to the edge of the disk will answer.

When a groove in the bottle-neck is employed, the concave form shown in Fig. 2
45 is preferred, the groove forming approximately a section of a hollow sphere in which the disk may be caused to partly rotate or tilt in the act of extracting it by forcing one edge inward, as described. An angular or abrupt
50 groove would in a measure retard such action.

It is sometimes desirable to remove the disk-stopper from the bottle without the use of a tool. In such cases I form the disks with a
55 lug or ear, *q*. (Shown in Figs. 5 and 9.) A slight pull on the ear starts the disk from its position, and it is thus easily extracted. I may also attach to the disk an eye of wire, like the shank of a button, or a string, cord, or other device to facilitate its removal; but for general
60 use the simple circular disk is preferred.

The groove in the bottle-neck may be of any desired form, concave, as in Fig. 2, V-shaped, or otherwise. A slight stricture at its top may be employed, as in Fig. 3, or a series of fine
65 grooves or corrugations may also be employed instead of a single groove.

The thickness of disks, their stiffness, &c.,

are dependent on the uses to which they are applied and the pressure they are subjected to, and may be varied with such conditions. 70 By my method of sealing bottles against internal pressure, as described, I am enabled to produce stoppers with the least possible quantity of material, and that of a very cheap kind. The stoppers require simply to be cut from a 75 sheet by a hollow punch or a punch and die. They can therefore be produced at a small portion of the cost of any other stopper I have knowledge of, and require no fastenings of any kind, as they are self-retaining. They are easily and quickly extracted, are neat in appearance, and leave the bottle and its mouth entirely clear of all obstructions.

A great saving of bottles results from the use of my disk-stoppers. They are extremely 85 cheap, and when bottles are lost or broken the cost of the bottles alone is sacrificed, which is not the case when any of the usual forms of fastening are employed. Moreover, by reason of the uniformity of the material employed a 90 perfectly tight seal is always secured, and the contents of the bottle cannot become flat.

While I have described several forms in which my arched disk-stopper may be used, many variations in details of construction and 95 application will suggest themselves; and I do not therefore confine myself to these herein described.

Having described my invention, I claim—

1. A bottle-stopper consisting of a disk of 100 flexible material, cup-shaped, placed in the bottle-neck with its convex side inward and its concave side outward, and with its edge abutted against the bottle-neck, whereby internal pressure upon said stopper will be transmitted as lateral pressure against the bottle-neck, and resistance to displacement will increase with an increase of internal pressure, as set forth.

2. A bottle provided with a groove, recess, 110 or cavity within its neck, combined with a stopper consisting of a flexible disk, cup-shaped, having its convex side inward, and its concave side outward, and its edge seated in said groove, substantially as and for the purpose set forth. 115

3. The combination of a bottle provided with a neck-opening, and a cup-shaped stopper of flexible material seated therein with its convex side inward and concave side outward, 120 substantially as set forth.

4. A bottle-stopper consisting of a disk of flexible material capable when compressed circumferentially in arched form of resiliency toward a less arch, and adapted to be forced into the bottle-mouth with its convex side inward 125 and its concave side outward, with its edge abutting against the bottle-neck, said disk being provided with a lug, whereby it may be extracted, substantially as set forth.

WILLIAM PAINTER.

Witnesses:

R. D. O. SMITH,
WM. T. GILL.