

No. 751,543.

PATENTED FEB. 9, 1904.

L. C. McNEAL.  
PIPE ELBOW.

APPLICATION FILED JULY 8, 1902.

NO MODEL.

Fig. 1.

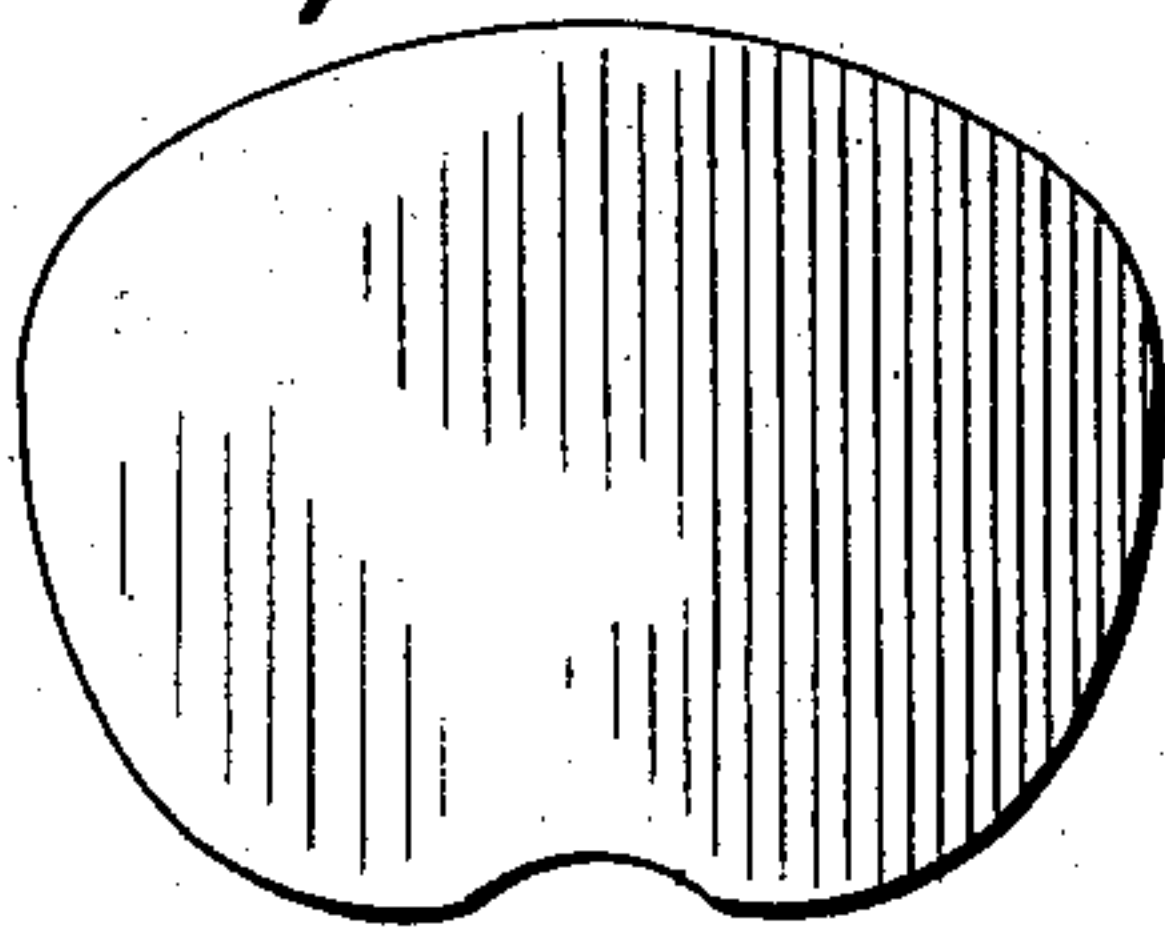


Fig. 2.

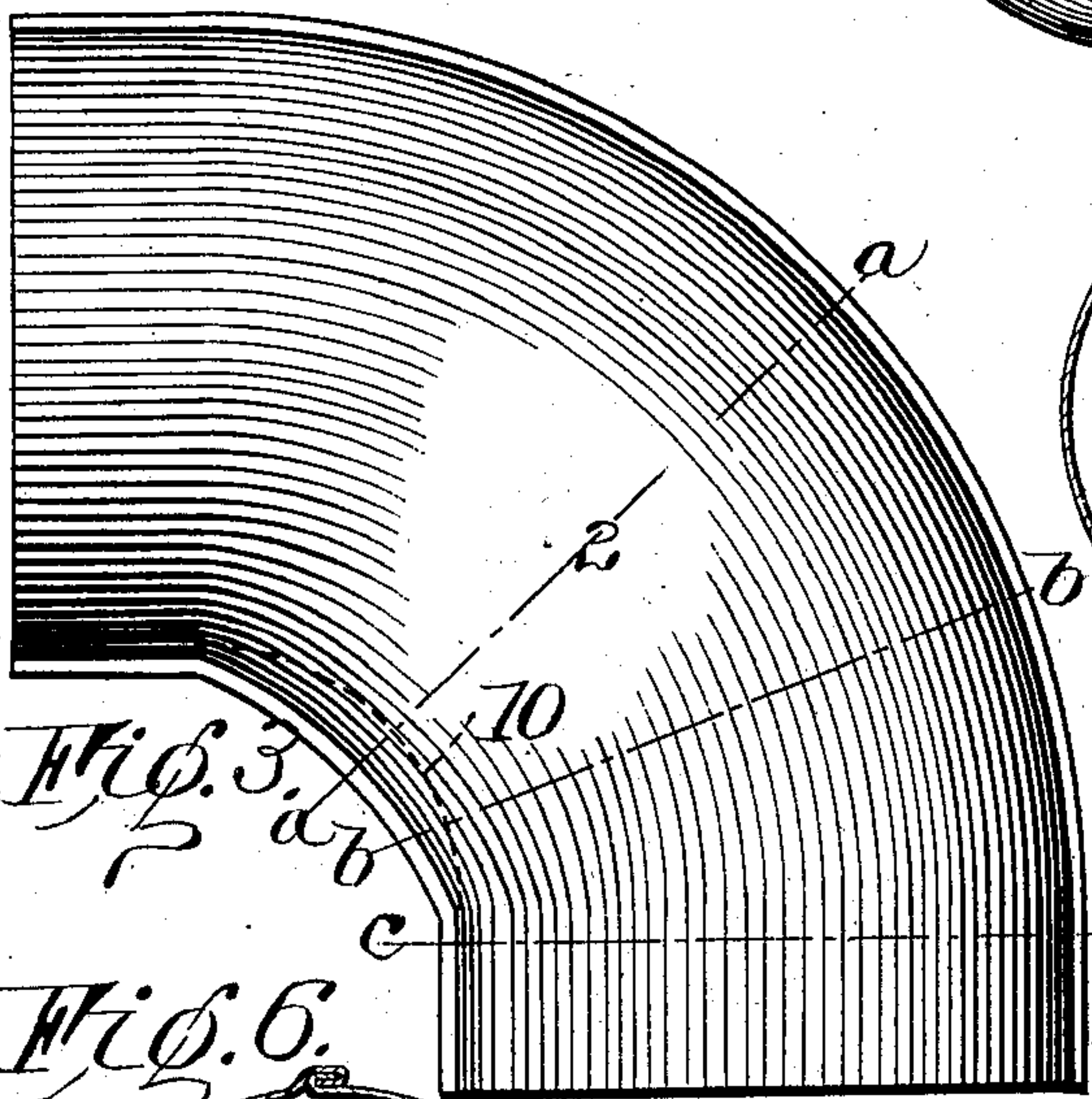
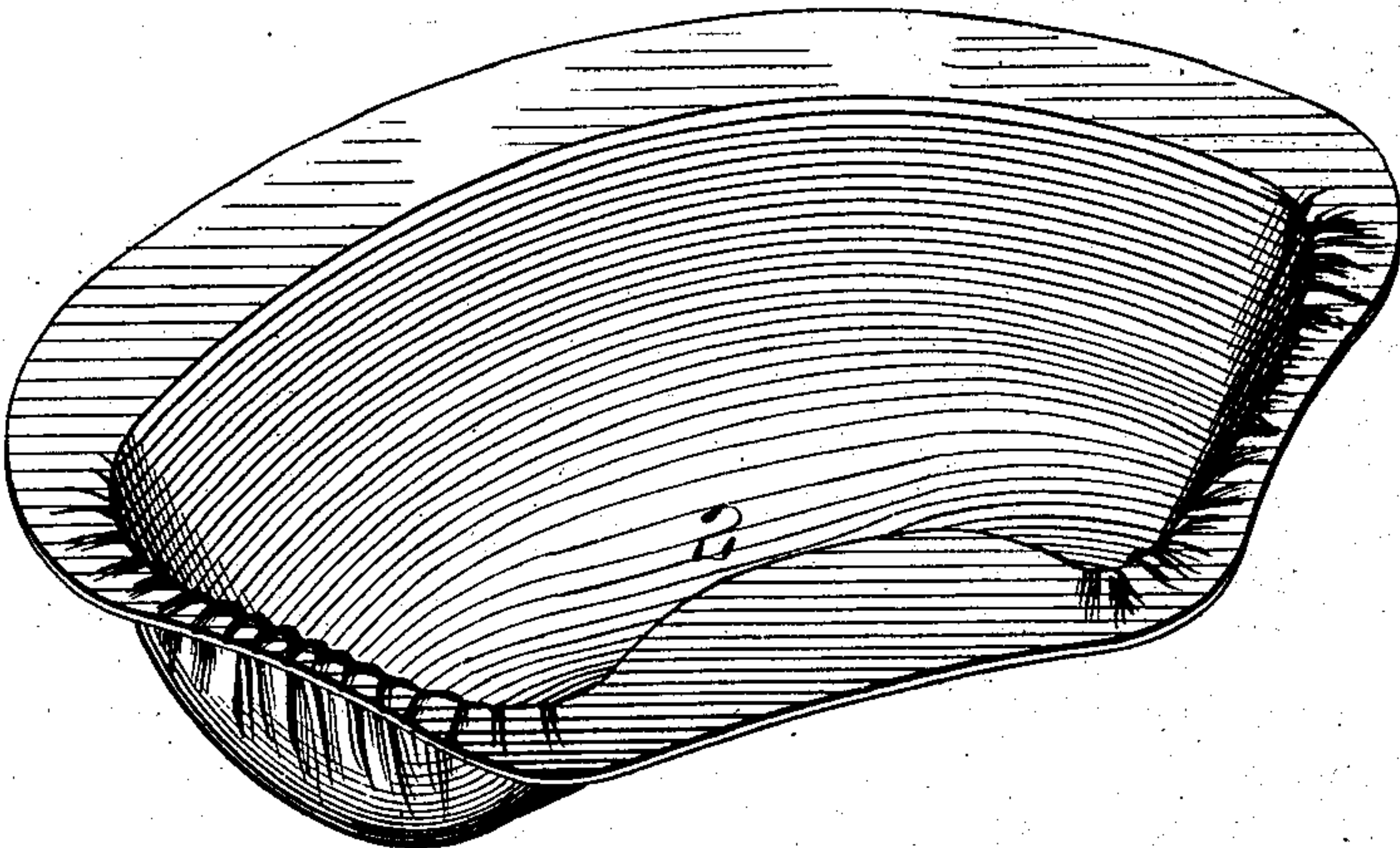


Fig. 3.

Fig. 6.

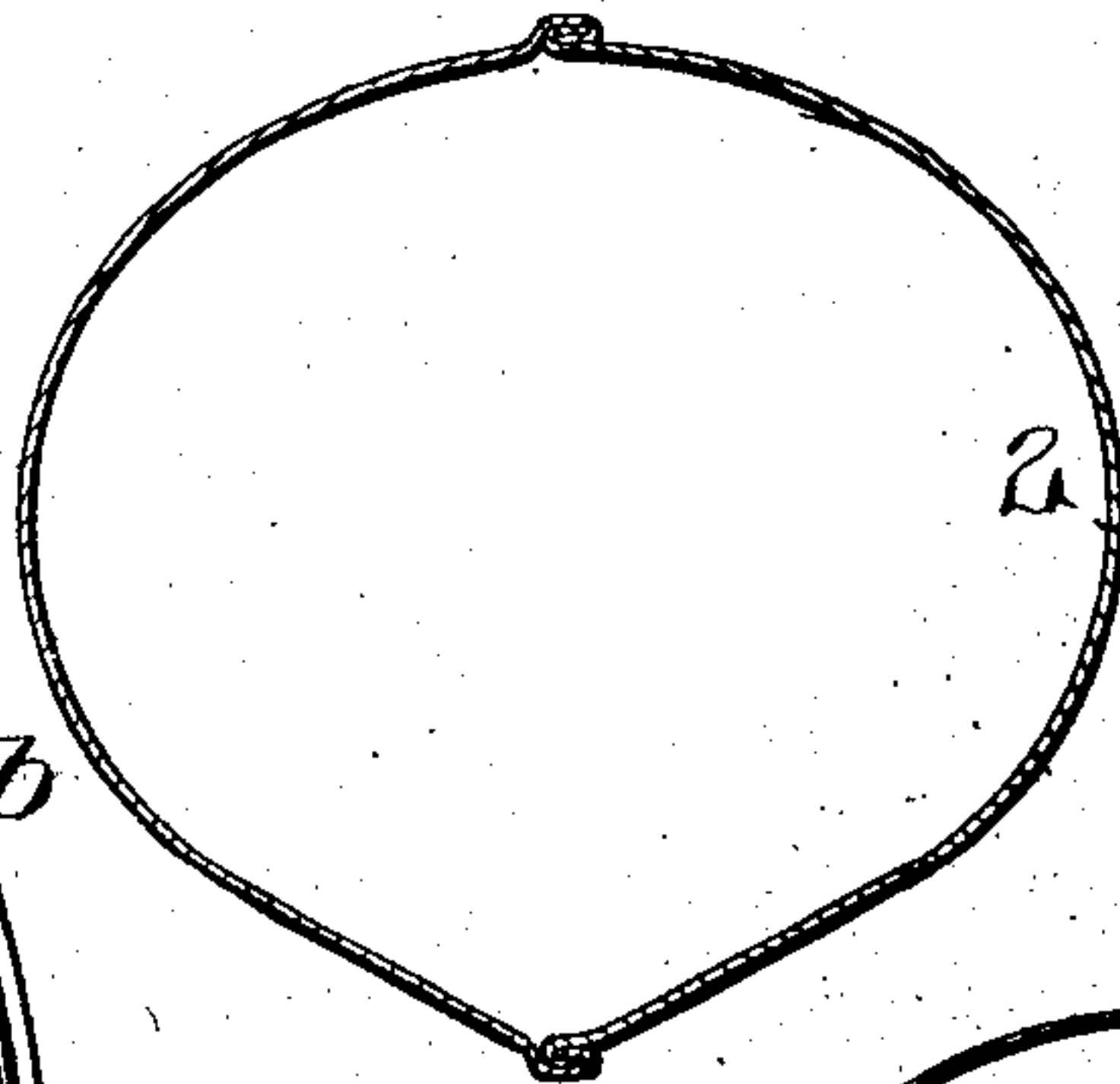


Fig. 4.

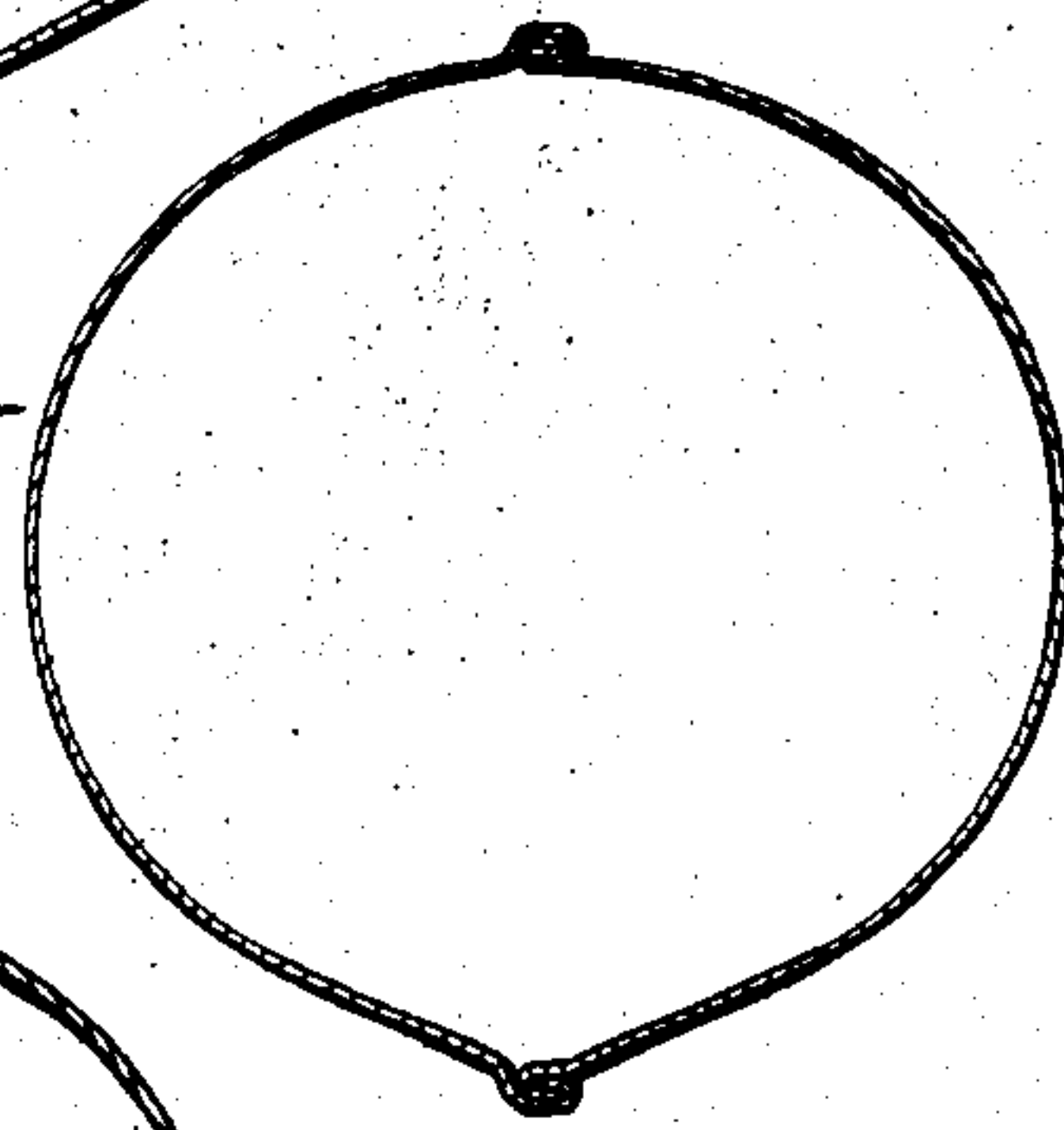
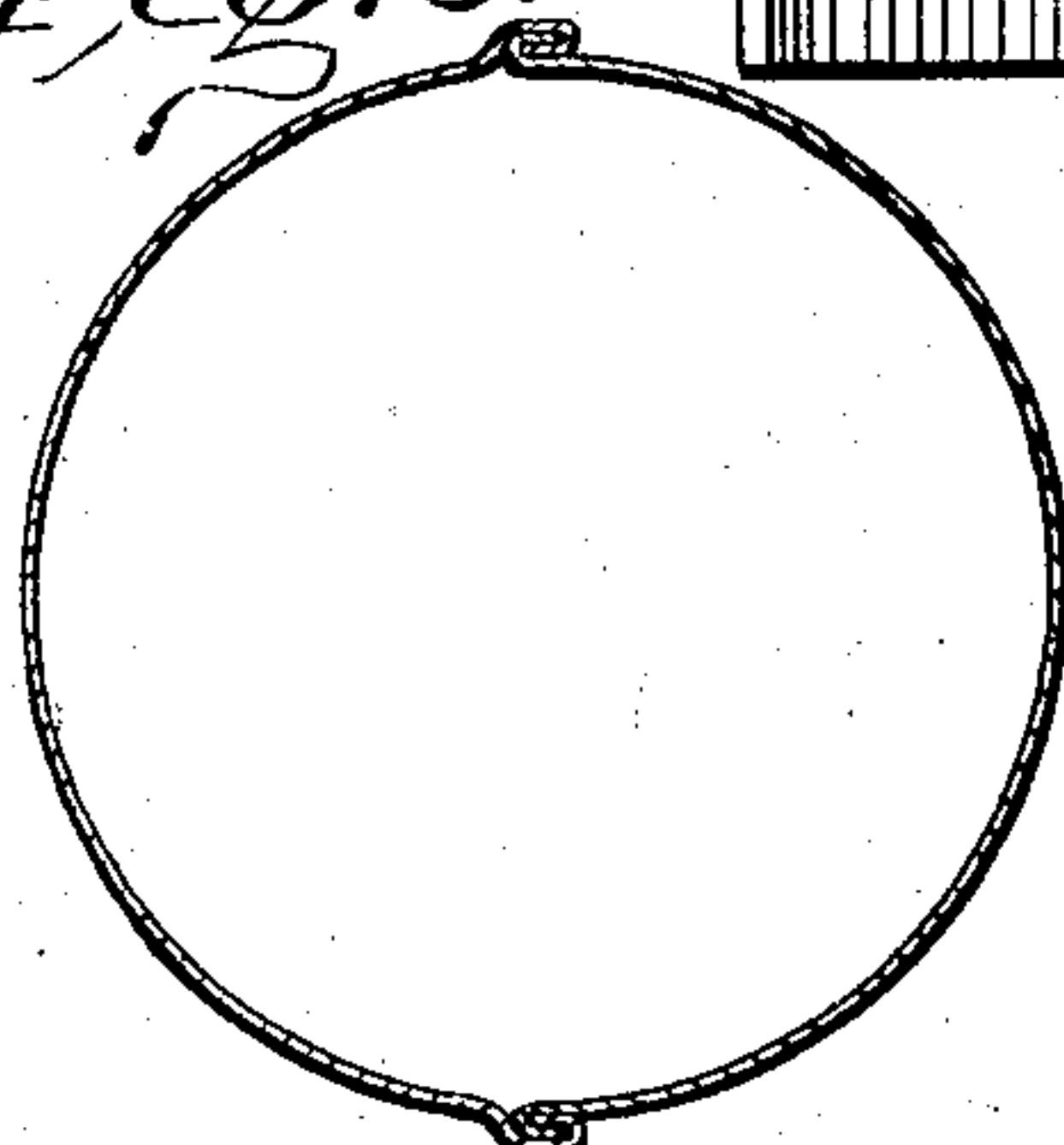


Fig. 5.



Witnesses.

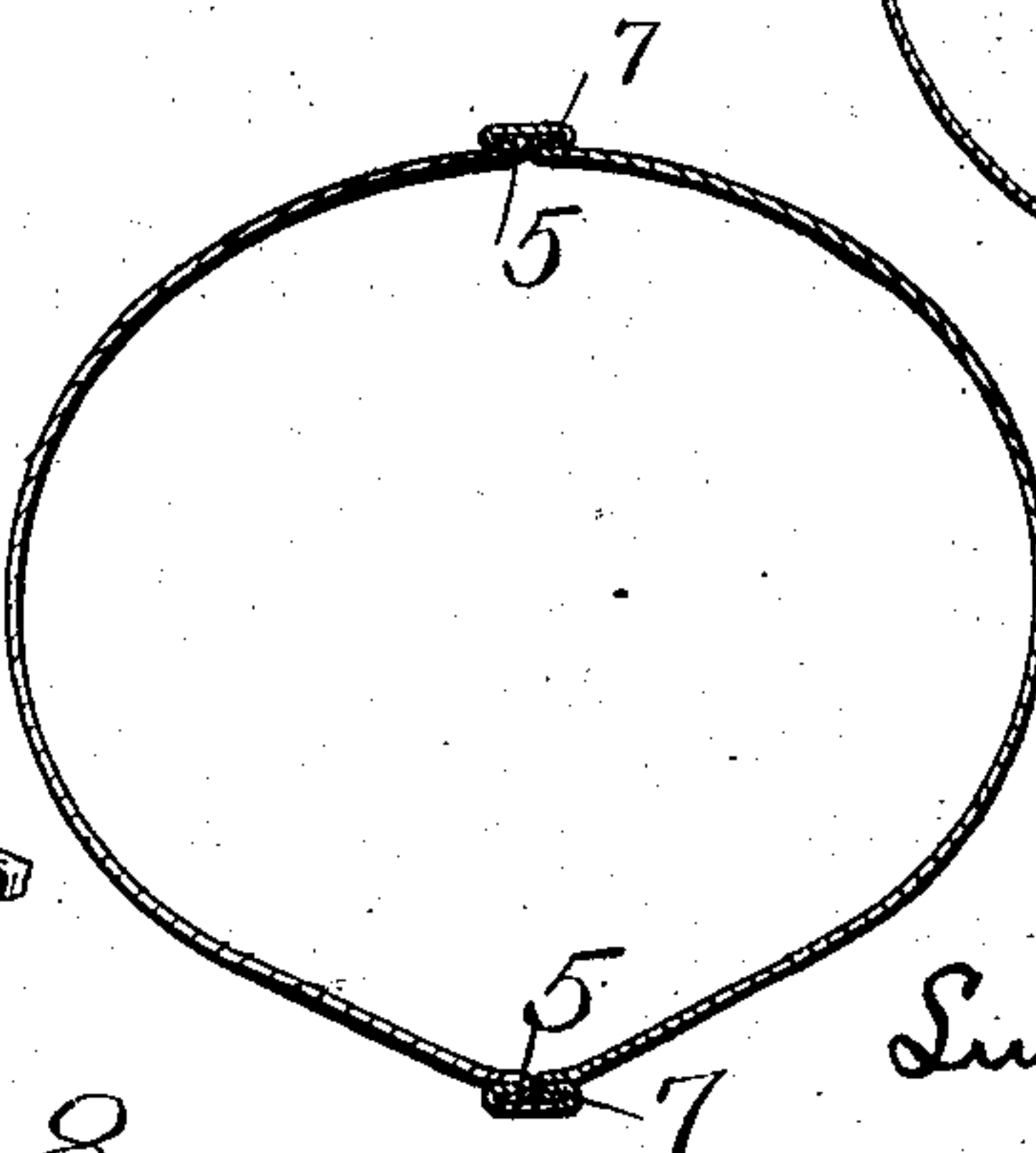


Fig. 7.

Inventor.

Walter B. Payne

Willard Rich.

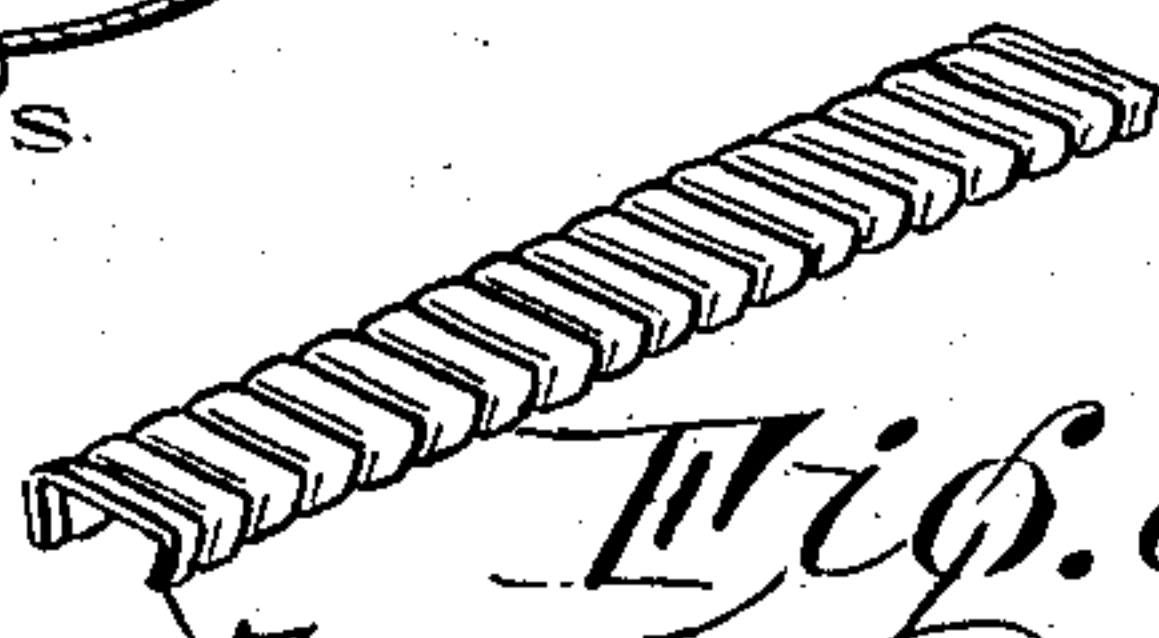


Fig. 8.

L. C. McNeal  
by Frederick H. Church  
his Attorney



# UNITED STATES PATENT OFFICE.

LUTHER C. McNEAL, OF ROCHESTER, NEW YORK.

## PIPE-ELBOW.

SPECIFICATION forming part of Letters Patent No. 751,543, dated February 9, 1904.

Application filed July 8, 1902. Serial No. 114,730. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER C. McNEAL, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pipe-Elbows; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to sheet-metal elbows such as are used for stovepipes, and has for its object to produce an elbow having a smooth exterior and interior, and preferably composed of two similar parts or sections joined by seams extending longitudinally thereof, the parts being duplicates of each other excepting, perhaps, as to the securing-flanges and being preferably formed by the same dies, so that they may be nested when shipping in knockdown form, if desired, and readily assembled by the user.

Heretofore great difficulty has been encountered in endeavoring to form curved stovepipe-elbows of two similar parts of sheet metal, such as iron or steel, which would present a neat appearance and at the same time would not retard the passage of the smoke and products of combustion by obstructing, more or less, the passage through it or by having corrugations or projections on the exterior which catch soot, &c., and quickly rust. It has been proposed to form the curved sheet-metal elbows of large diameter to fit the standard-size stovepipes by forming them of two similar sections joined by seams extending longitudinally, but, so far as I am advised, without success from a practical standpoint, owing to the difficulty in forming by punches and dies the half-section of the curved pipe-elbow having a short radius of even diameter throughout its length and circular in cross-section, because the relative thickness of the metal is so small and the area of metal so great that the portion of the metal at the sides of the sections and toward the center of the arc and between that and the inner curve will be wrinkled, while all other portions of the section are apt to be stretched or drawn to nearly its limit of tensile strength. The

portions of the plate or section which are thus liable to wrinkle are at such a distance from the margin of the blank which is gripped by the pressure-plate and die in forming that the metal is liable to be torn before the draw effects the wrinkles sufficiently to smooth them out.

I have found after considerable experimenting that pipe-elbows may be formed of two similar half-sections joined at their longitudinal edges, having a greater and lesser curved radius and substantially smooth exteriorly and interiorly, by enlarging the diameter of the elbow near its central portion or on a radius from the center on which the outer curve of the elbow is struck, so that while the ends of the elbow extending at right angles to each other are circular, so as to fit upon the standard sizes of stovepipe, the central portion is of greater diameter in at least one direction and that preferably in a plane at an angle to the plane of the seam or connection between the two sections. This arrangement not only permits of the formation of the elbow-sections by punches and dies, but decreases the friction or resistance to the passage of the fluid, and, moreover, the meeting edges of the sections will squarely meet and have no tendency to spring out of shape.

In the accompanying drawings, Figure 1 is a view of a blank for forming my elbow-sections. Fig. 2 is a perspective view of stamping from which my improved elbow is formed after being operated upon by the punch and die. Fig. 3 is a side elevation of the complete elbow. Fig. 4 is a sectional view on the line *a a* of Fig. 2. Fig. 5 is a sectional view on the line *b b* of Fig. 2. Fig. 6 is a sectional view on the line *c c* of Fig. 2. Fig. 7 is a sectional view showing a modified form of seam. Fig. 8 is a perspective view of a securing or seam strip.

Similar reference-numerals in the several figures indicate similar parts.

In carrying out my invention I take a piece or blank of sheet iron or steel of approximately the shape shown in Fig. 1 and by means of a suitable punch and die (preferably in a double-action press having a pressure-plate) draw or form the blank into the shape



shown in Fig. 2. The pressure-plate engages the blank at the edges in the usual manner and holds it flat, while the punch and die draw it into the form shown, pulling the metal in all directions beneath the pressure-plate; but the punch and die are so formed that instead of forming the blank truly semicircular throughout its length it is of irregular shape—that is to say, the deepest point is at about the point indicated by 2, Figs. 2 and 3, and from this it gradually tapers toward the side and ends to present the different diameters in a complete elbow, as shown in Figs. 4, 5, and 6 in the sections taken on the lines *a a*, *b b*, and *c c*. While thus forming the sections or halves of the elbow in the manner described, I am enabled to press them out of sheet metal of the requisite thickness without the formation of wrinkles on the shorter curved side and without stretching the metal on the outer curved side unduly. After the blanks are formed, as in Fig. 2, the rounded and wrinkled ends are cut off at right angles to each other and the inner and outer flanges are trimmed down to the requisite size to form seaming-flanges for the engagement of two similar half-sections. The particular seam employed for joining the sections is not material, although in some instances it is desirable to form an ordinary lapped seam, as shown in Figs. 4, 5, and 6, the cooperating edges being bent by any of the ordinary seaming-tools. The inner curved edge of the elbow is preferably arranged on a curve struck from a different center from that of the outer edge, the difference being that portion shown between the dotted lines 10 and the inner curve of the elbow, and the under sides of the sections are preferably rounded but slightly from the outer bulged portion 2 to this seam, as shown in Fig. 4, this construction preventing the metal from being wrinkled or broken on the shorter arc during the formation by the punch and die. If desired, instead of causing the edges of the sections to lap, as shown in Figs. 4, 5, and 6, they may be formed with outwardly and laterally extending flanges, as shown in Fig. 7, which may be connected by suitable covering-strips, these being formed of sheet metal and with the inwardly-turned flanges 7, said strip being corrugated laterally throughout its length, as shown in Fig. 8, so that it may be slipped over the laterally-extending flanges 5 of the sections and accommodate itself to the inner and outer curves of the elbow without stretching the metal unduly and smoothed by a suitable roller or tool. The principal feature of the invention is the

enlargement of the smooth curved two-part elbow at a point or points intermediate the ends, which permits both the sections to be formed by similar dies without unduly stretching the metal and without causing the formation of wrinkles at the shorter or inner curved side whether this enlargement be at right angles to the plane of the meeting edges of the sections, as shown, or otherwise, although I prefer the former construction, as the punches in the first instance may be formed on a true circle and afterward built up to produce the greater diameter at the point and in the manner indicated.

I claim as my invention—

1. A pipe-elbow having smooth interior and exterior surfaces composed of two similar stamped sheet-metal sections connected at their edges by seams extending longitudinally, the ends of said elbow being substantially circular in cross-section, the portion between the ends being enlarged at the sides and gradually tapering toward the ends and seams and the inner side of the elbow at the seam being formed on a curve having a different center from the center on which the outer side is struck.

2. A pipe-elbow having smooth interior and exterior surfaces composed of two similar stamped sheet-metal sections connected at their edges by seams extending longitudinally, the ends of said elbow being substantially circular in cross-section and the portion between the ends being enlarged transversely of the plane in which the elbow is bent and gradually tapering toward the ends and also toward the seams.

3. A pipe-elbow having smooth interior and exterior surfaces composed of two similar stamped sheet-metal sections connected at their edges by seams extending longitudinally, the portion between the ends being of larger interior diameter than the ends, said increase of diameter being uniform and transversely of the plane in which the elbow is bent and tapering gradually into cylindrical form toward the ends.

4. A device for connecting the flanged edges of curved pipe-elbow sections consisting of a strip of sheet metal having flanges at the sides extending toward each other, the body and flanges of the strip being corrugated transversely.

LUTHER C. McNEAL.

Witnesses:

ELIZABETH J. PERRY,  
ELIZABETH C. SQUIER.