

W. HORSLEY.
 NOZZLE FOR STEAM BOILERS.
 APPLICATION FILED AUG. 7, 1909.

948,053.

Patented Feb. 1, 1910.

2 SHEETS—SHEET 1.

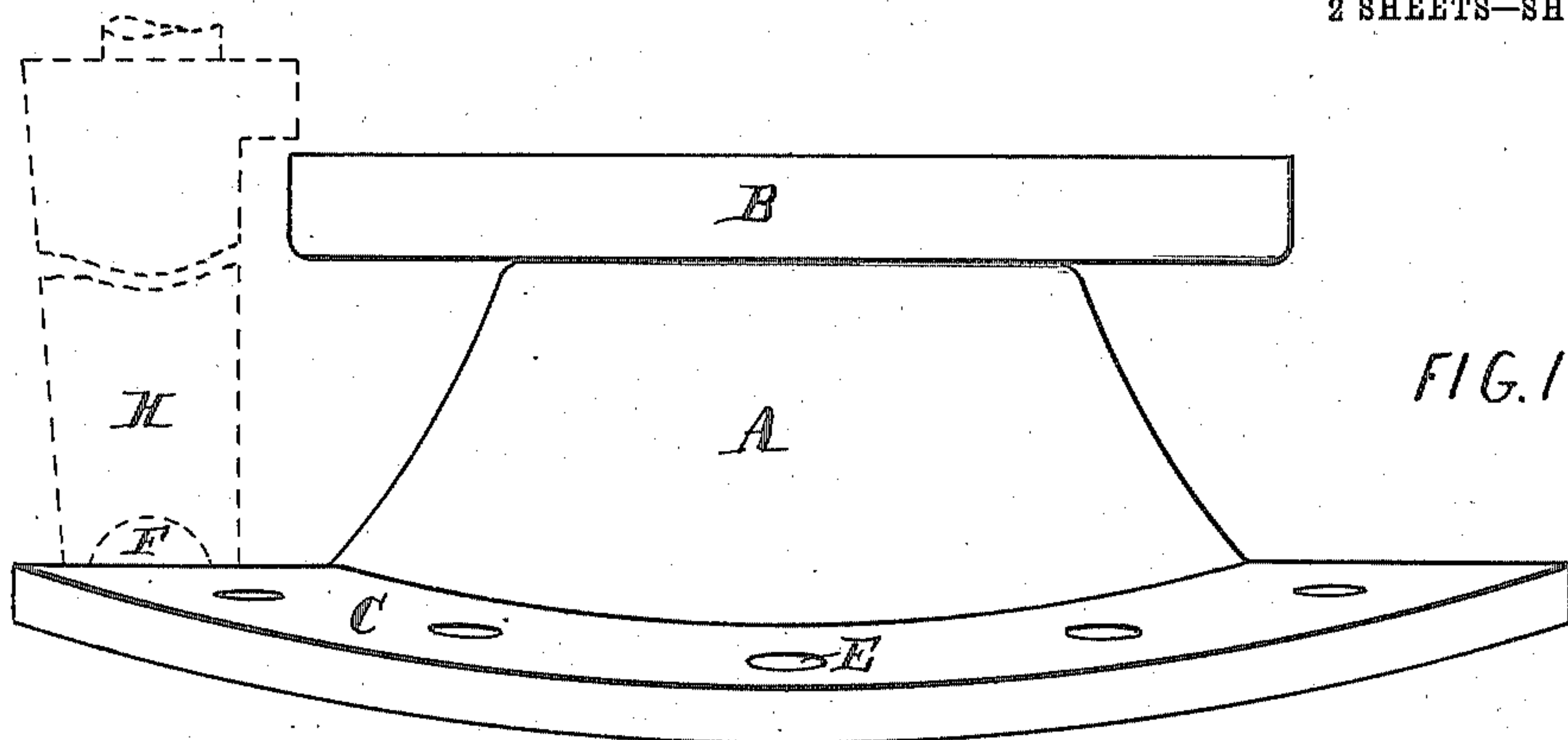


FIG. 1

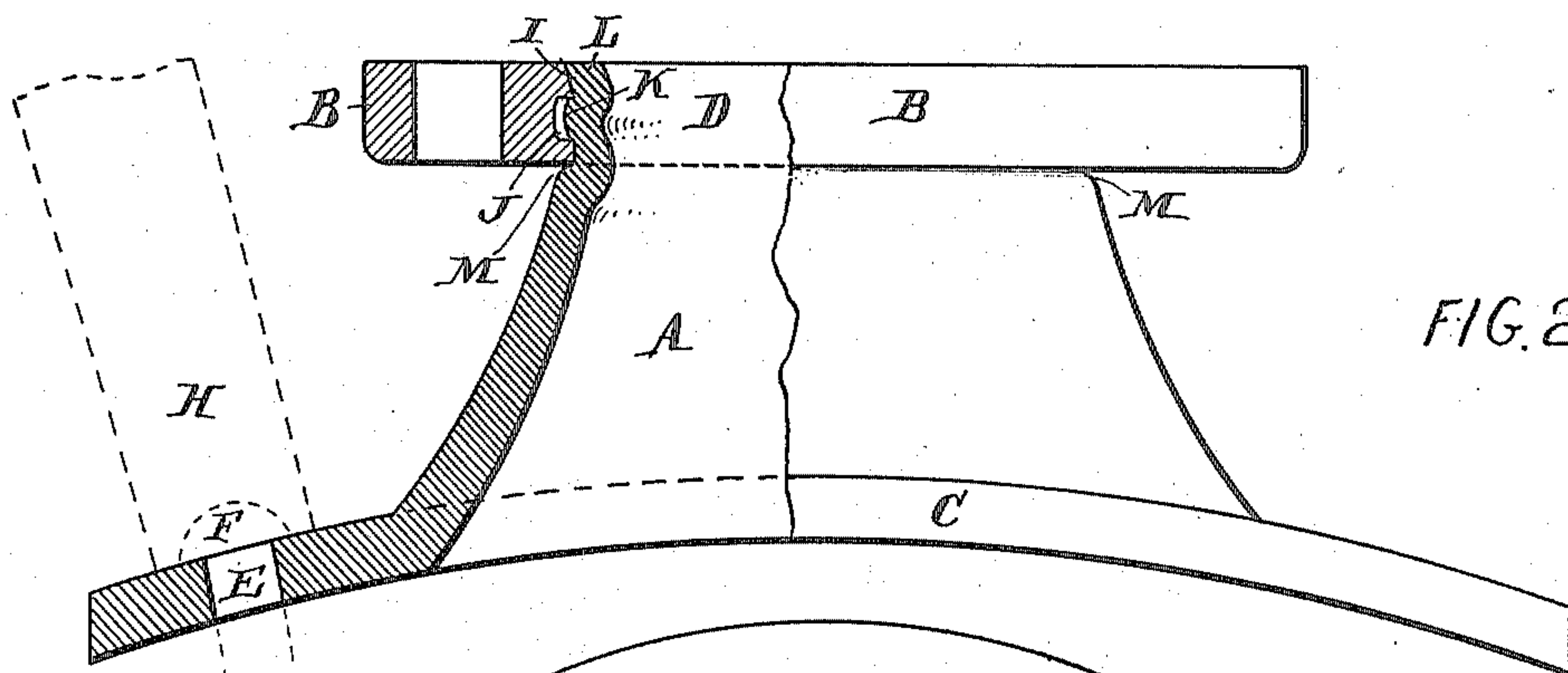


FIG. 2

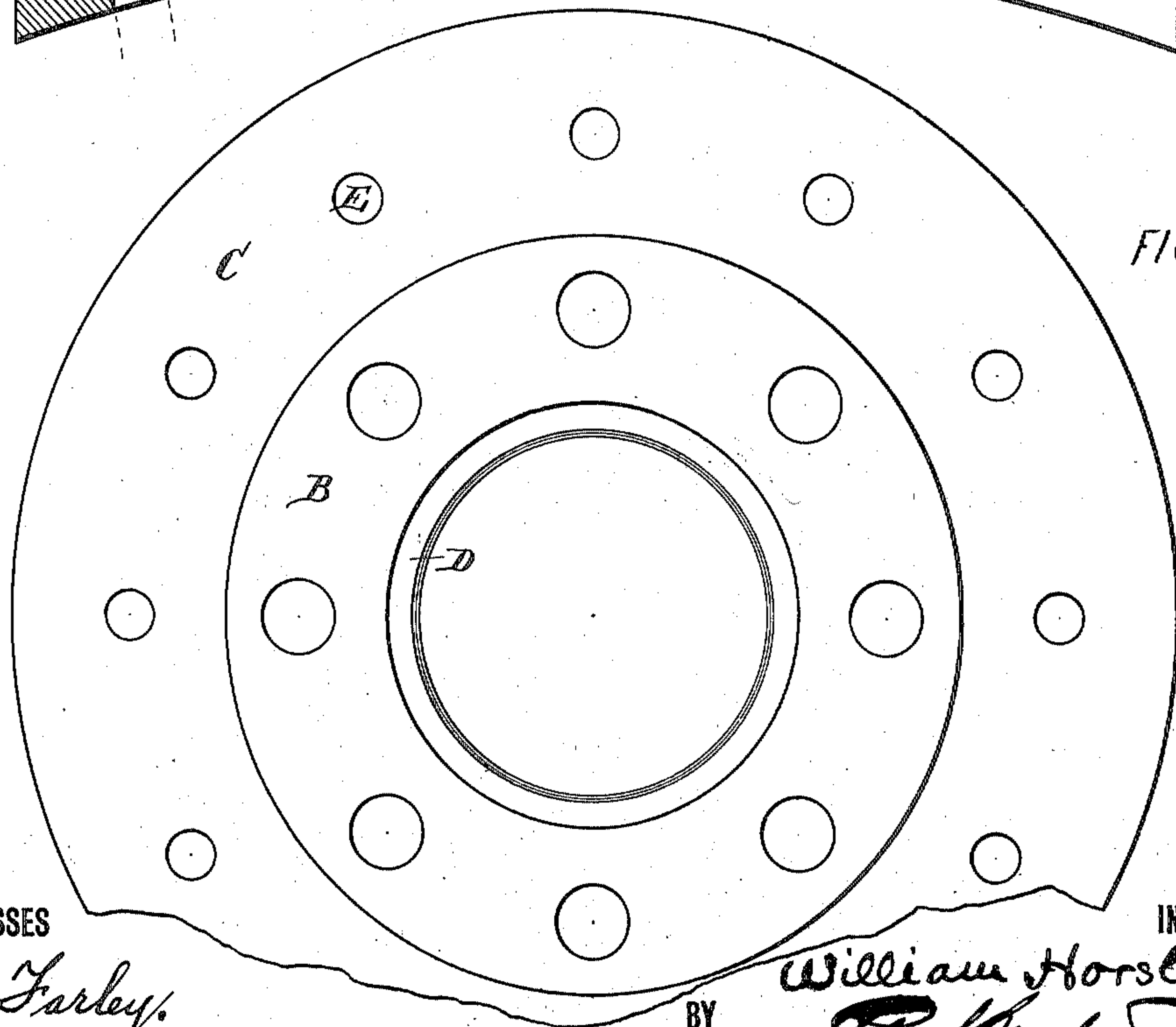


FIG. 3

WITNESSES

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 E. H. Barlow.

INVENTOR

William Horsley

BY

J. M. [Signature]

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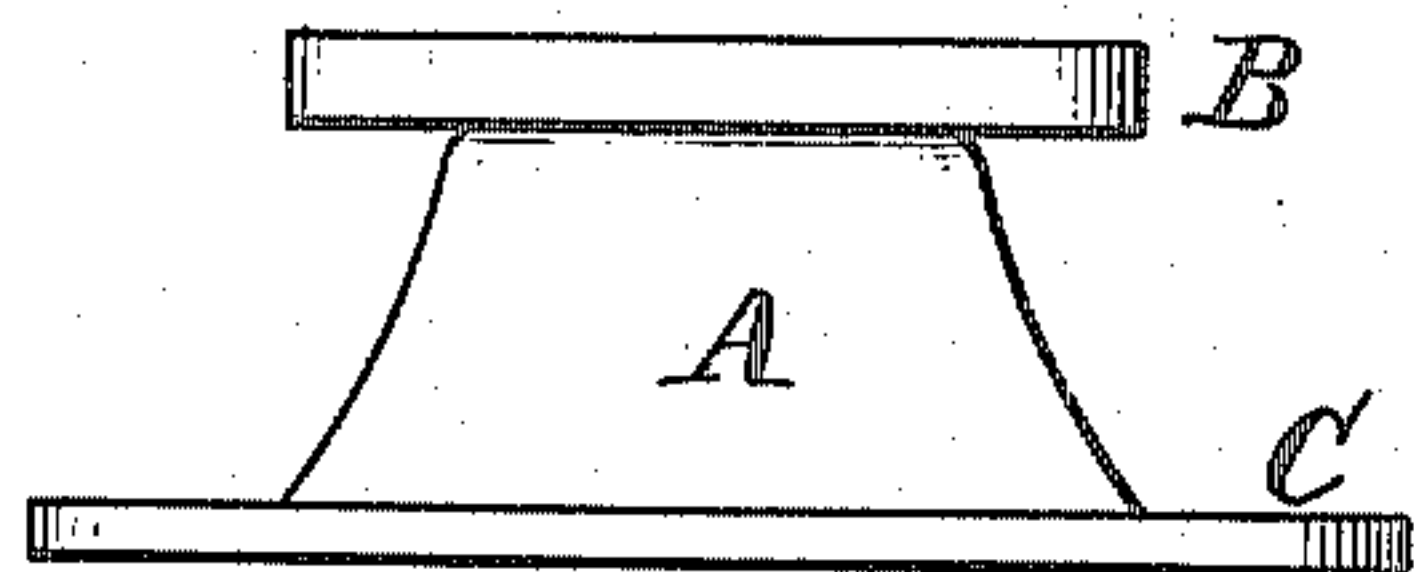


FIG. 4

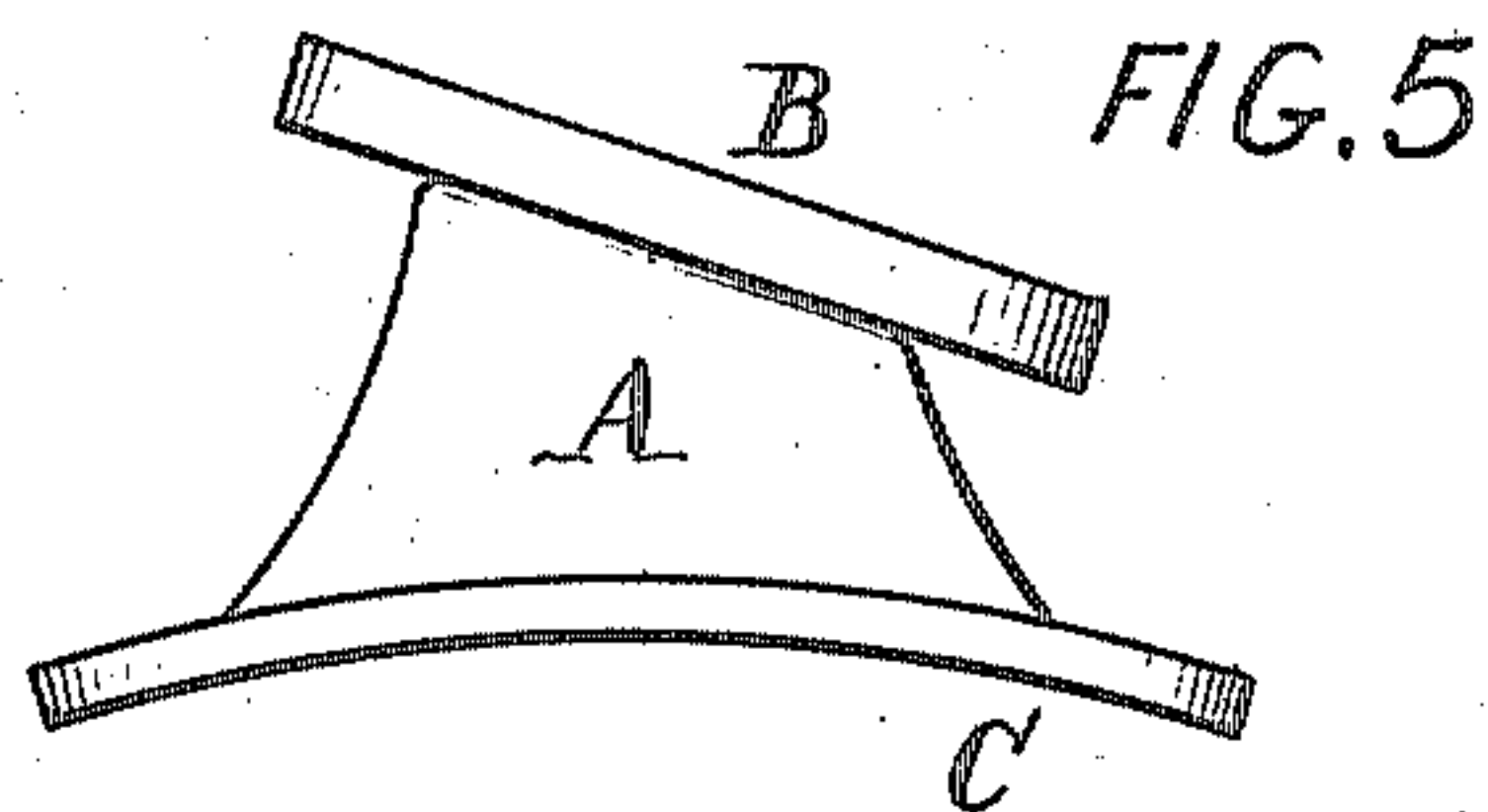


FIG. 5

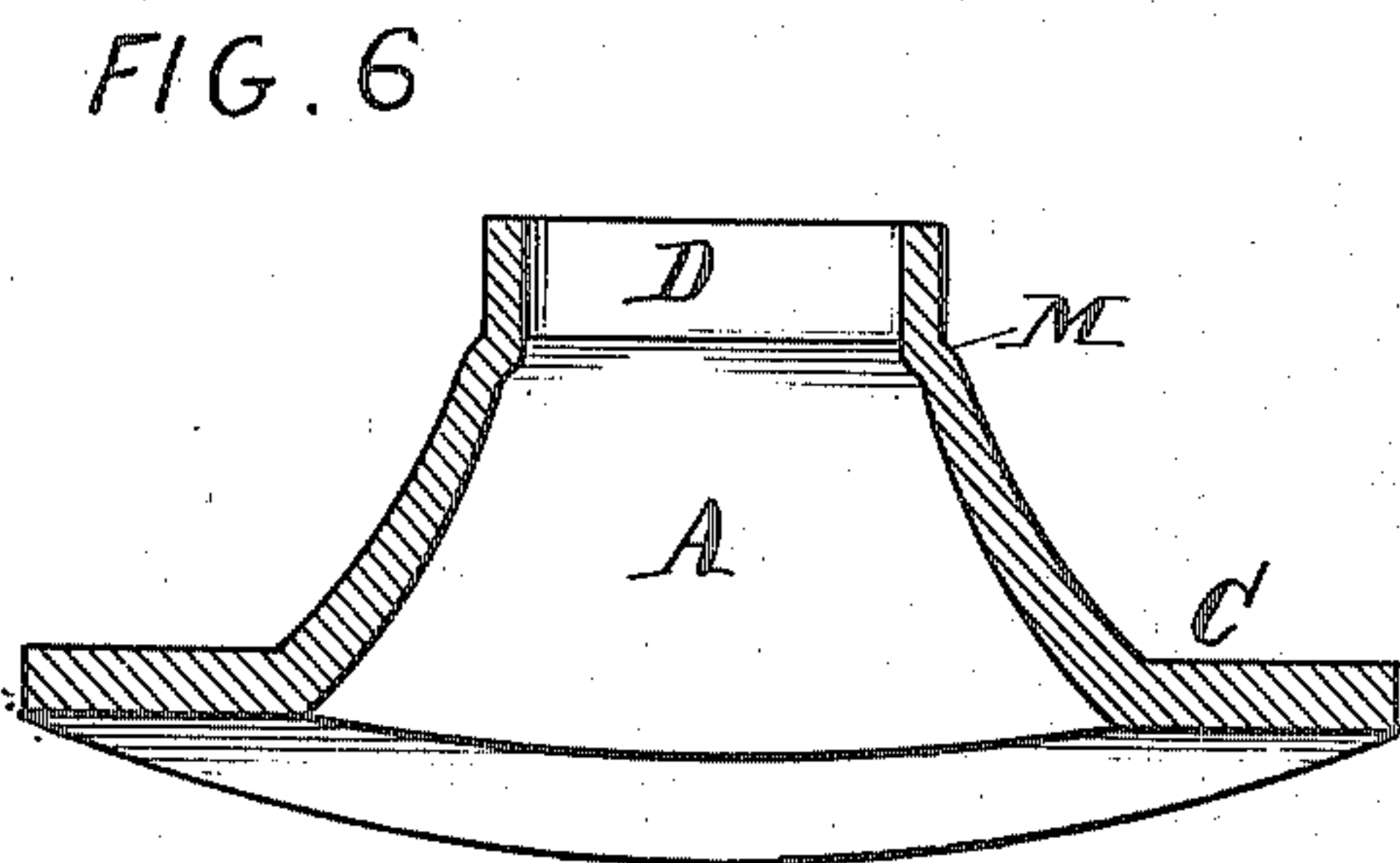


FIG. 6

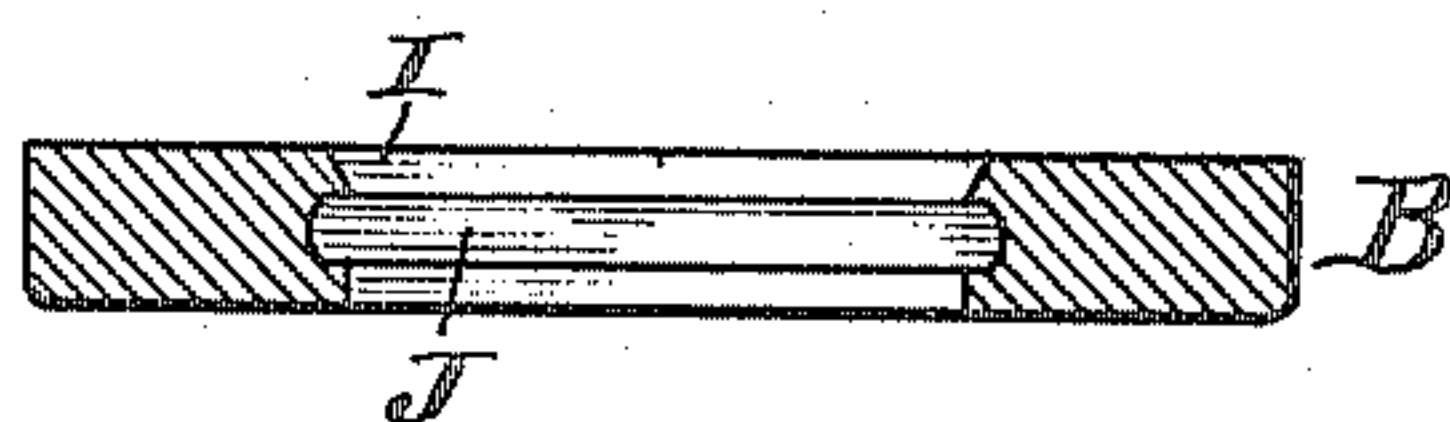


FIG. 7

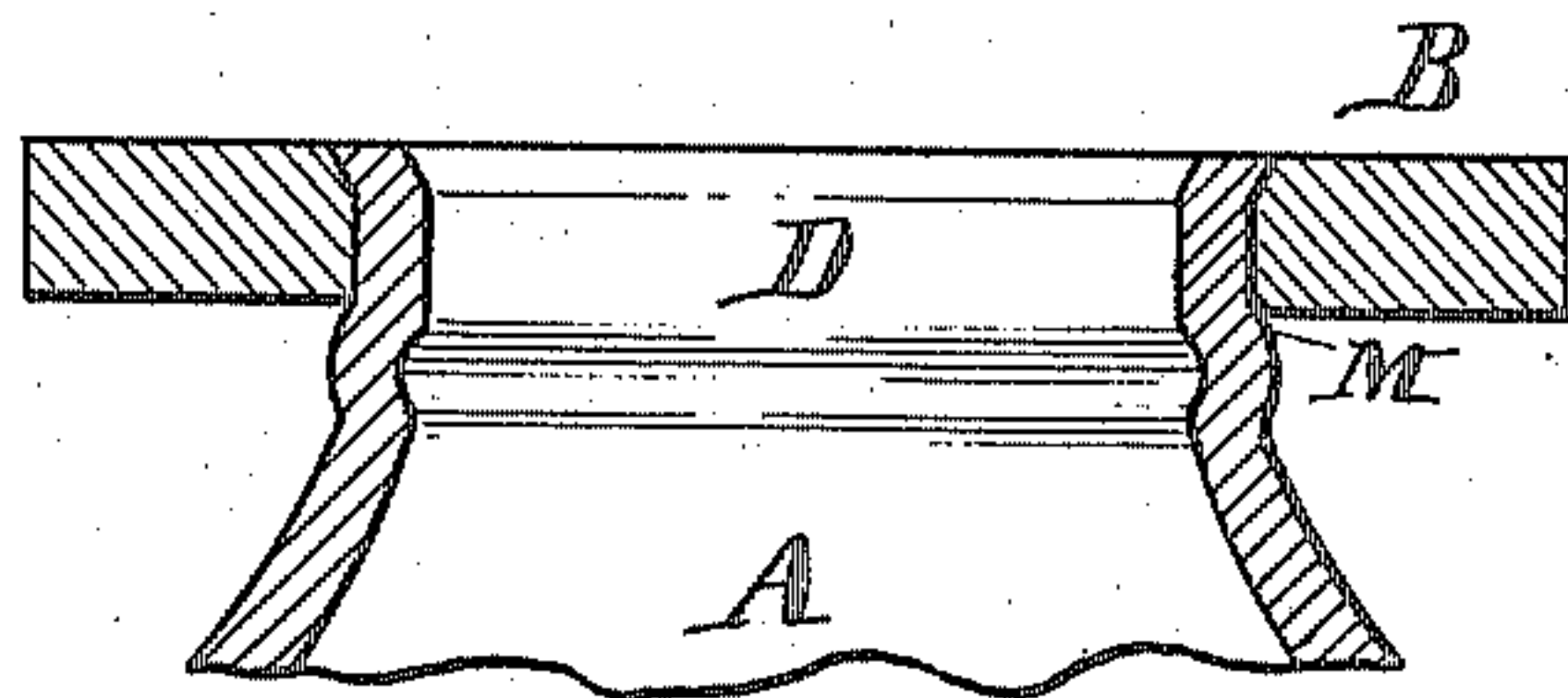


FIG. 8

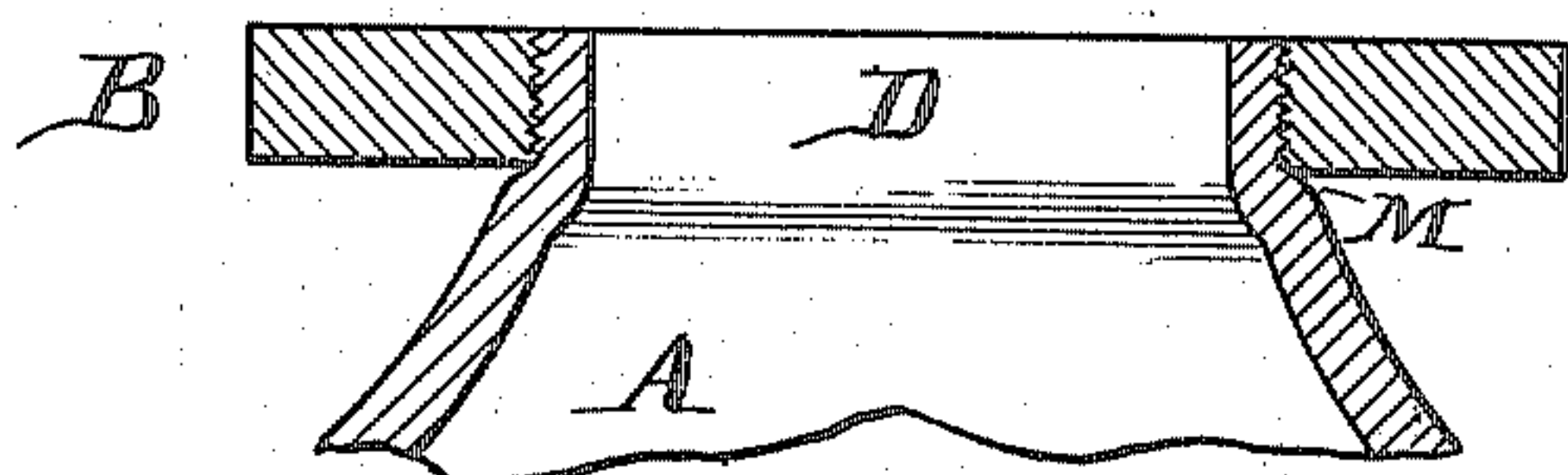


FIG. 9

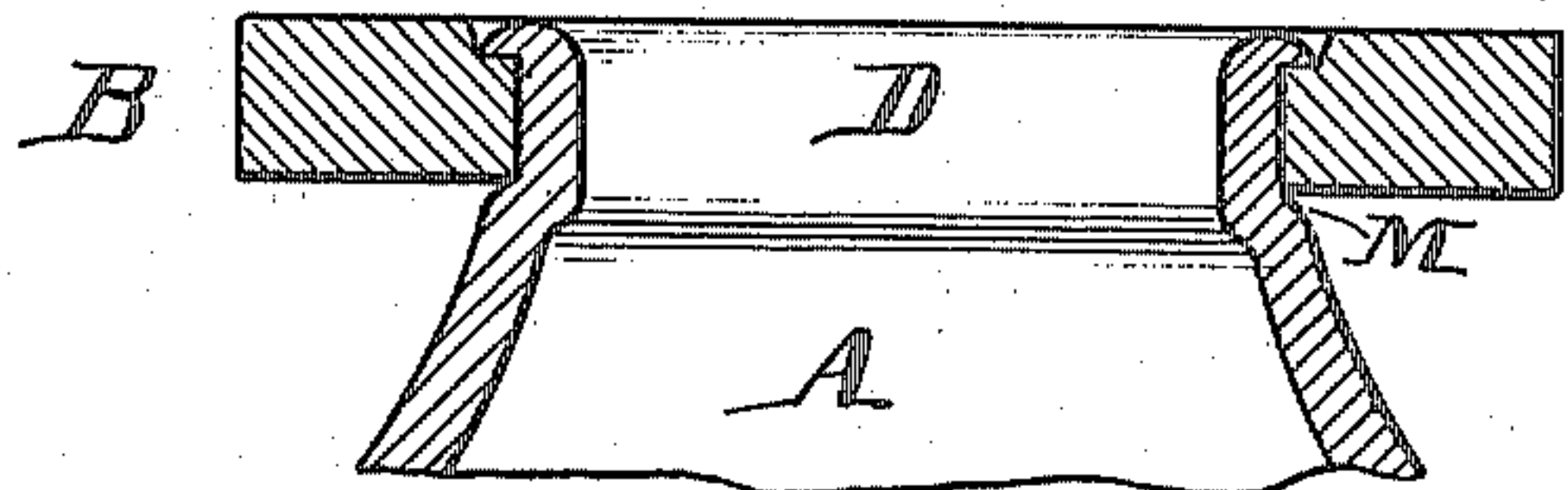


FIG. 10

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM HORSLEY, OF JERSEY CITY, NEW JERSEY.

NOZZLE FOR STEAM-BOILERS.

948,053.

Specification of Letters Patent.

Patented Feb. 1, 1910.

Application filed August 7, 1909. Serial No. 511,675.

To all whom it may concern:

Be it known that I, WILLIAM HORSLEY, a citizen of the United States, and a resident of Jersey City, county of Hudson, State of New Jersey, have invented an Improvement in Nozzles for Steam-Boilers, of which the following is a specification.

My invention has reference to improvements in nozzles for steam boilers and tanks and consists of certain improvements fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

My invention relates to nozzles for general use, but more particularly to nozzles used in combination with steam boilers for permitting the escape of steam from the boiler through the nozzle, and has for its object the provision of a simple, efficient and economical nozzle in which there is the maximum of strength with the minimum of weight.

Heretofore, it has been the practice to make nozzles out of materials such as brass, cast iron and cast steel. Brass, while making a strong and efficient nozzle, is used only on very rare occasions on account of the price being prohibitive. Cast iron has been used extensively, but has great objection on account of brittleness and danger of cracking while being applied to the boiler or other vessel and the danger of explosion while the boiler is under pressure. Cast steel nozzles are open to several objections, among which may be stated the great cost, not only because it is cast steel but also because of the extra cost of making the steel of a hard structure, and further because of the very large percentage of defective castings from blow-holes which make the manufacture uncertain and costly and prohibitive as to cost excepting for special cases where cost is not material.

My improved nozzle overcomes all of the above objections to the existing type of nozzles since it may be made of the finest grades of sheet steel and pressed and drawn up into shape in a speedy and economical manner, so that the nozzle not only has strength and cheapness, but is accurate as to form and shape, has a good finish, may be readily calked, and has elasticity in its flanges which enables it to form a perfect joint with the boiler and the other part to be united to it. It has, moreover, greater metal thickness at its larger diameter than at the

smaller diameter so that with a given minimum weight of metal, the greatest uniform strength is secured.

My invention consists in forming a nozzle of two parts united so as to provide two flanges connected by a drawn and shaped ductile metal tubular body.

More specifically, my invention consists in stamping or pressing and drawing a flanged body part out of one piece of sheet metal and attaching, to the smaller tubular end of the body, a flange of smaller diameter than the integral flange of the body part, the said smaller flange being made of stamped sheet steel or otherwise, as desired, and permanently or fixedly connected to the body portion so as to form one integral structure.

My invention further comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:

Figure 1 is a side elevation of my improved nozzle, as it would appear when looking from the side of the boiler; Fig. 2 is an elevation of the same, partly in section, when looking in the direction of the length of the boiler; Fig. 3 is a plan view of my improved nozzle with the portion broken away; and Figs. 4 and 5 are elevations showing modified forms of my improved nozzles; Fig. 6 is a sectional elevation illustrating the stamped and drawn sheet metal body and integral flange; Fig. 7 is the sectional elevation of the stamped sheet metal upper flange; and Figs. 8, 9 and 10 are sectional views showing different manners of connecting the nozzle body with the upper flange.

A is the body of the nozzle and has a lower flange C integral therewith, and has attached to its other end an upper flange B, preferably of greater thickness than the thickness of the body A and its flange C. These flanges C and B may be provided with rivets or bolt holes, as indicated at E and as would be ordinarily employed when using the nozzle commercially in place on a boiler or other vessel. The body A is tapering and tubular having the larger orifice adjacent to the flange C, the latter being of large diameter and constitutes the lower flange or that which is riveted to the boiler or vessel. As shown, this lower flange is preferably curved to correspond to the curvature of the boiler shell to which it is riveted by rivets F. The

flange B is made flat and may be secured to the smaller tubular end D of the body A in any one of a variety of ways, some of which are referred to hereinafter. In Fig. 2 the union between the flange B and the upper part D of the body A is intended to indicate the preferred form.

In carrying out my invention I form the body A and the lower flange C of the nozzle from ductile metal, preferably steel plate, by pressing or drawing a suitably formed blank in dies so as to produce a tapered nozzle such as shown in the drawings at Fig. 6. The upper flange, shown separate in Fig. 7, is also preferably formed of ductile metal by being punched out of sheet steel by dies. The upper flange B is preferably flat or in one plane, whereas the lower flange C may be curved to suit the curvature of the boiler or tank shell to which it is to be attached by the rivets or otherwise. The sheet steel in being drawn or pressed into the tapered nozzle form has the metal drawn down to a gradually lessened thickness toward the smaller diameter of the body A and flange D to which the flange B is secured, as is clearly shown in Figs. 2 and 6. In this manner the flange C and body A adjacent to it, have the greatest thickness and this thickness gradually decreases toward the smaller end D and where, because of the smaller diameter, less thickness is required to maintain the same strength. This tapering in thickness of the metal in the body between the flanges C and B is an important feature of my invention as it maintains a uniform strength with a minimum weight of metal and also provides a more satisfactory thickness for the expanding of the small end in the flange B to make a steam tight joint therewith.

In attaching the upper flange of the nozzle to the body thereof we may adopt either one of several methods, namely, by expanding the body of the nozzle within the flange by use of a sectional expander either by hand or power, by expanding the body within the flange with an ordinary roller tube expander and using straight or convex or taper rolls as desired, by cutting a thread upon the outside of the body and upon the inside of the flange and screwing the same together to make a steam tight joint, by screwing the parts together as last mentioned and then expanding the body within the flange, by screwing or expanding the flange upon the body and beading the flange, or by welding the flange to the body by the methods used in blacksmithing, oxy-acetylene process, by electric welding, or otherwise.

In Figs. 2 and 8 the body is shown as attached to the upper flange by being expanded therein; Fig. 9 shows the attachment between the body and the upper flange by

the parts being screwed together, and Fig. 10 indicates the union of the body part and upper flange by expanding and beading of the body within the flange.

In the preferred form of uniting the body and flange B, the flange is made with an internal groove J and a beveled annular edge 1 adjacent to the groove, and into which groove the metal of the neck D of the body A is expanded and the free edge L thereof pressed outward against the annular beveled edge 1 as fully shown in Fig. 2.

The particular manner of uniting the upper flange to the tapered end of the body of the nozzle is immaterial to my invention so long as the joint is a steam tight joint, but I have referred to the above methods of making the joint so that those skilled in the art may employ either of the methods as preferred or any others found desirable. I also prefer to form an annular shoulder M adjacent to the small end or neck D of the body and upon which the flange B rests in the finished nozzle and this shoulder may be made in any of the forms shown or otherwise.

While I have described my invention as being particularly adapted to steam boilers, I do not wish to be restricted thereto, or to any particular use of my invention, as it may be employed equally well on all kinds of work where it is necessary to have an outlet from a vessel, which outlet shall be light in weight, strong and efficient for the purpose, and easily applied to the vessel.

By so proportioning the lower flange of the nozzle with respect to the upper flange, that that portion of the lower flange which is parallel to the upper flange, may project beyond the upper flange as shown in Fig. 1, the lower flange may be readily riveted to the boiler shell by means of a power riveting tool H acting upon the rivet F. In the case of that portion of the lower flange C at an angle to the upper flange, as shown in Fig. 2, the rivets F may be equally well riveted by means of the same riveting tool H. The flange C may be riveted to the boiler shell, or the vessel to which it is to be applied, by use of any number of rivets desired, and in cases where the surface of the vessel to which the nozzle is to be applied is flat, the lower flange C would be made flat, but would be of larger diameter than the upper flange B to enable the riveting tool H to be employed as indicated in Fig. 1. Such modified construction is shown in Fig. 4. In some cases the flanges C and B would not be in the same plane nor the flange B at right angles to the axis of the nozzle, but may be at an incline thereto, as shown in Fig. 5.

The shape of my improved nozzle not only permits the ready riveting of the nozzle to the boiler shell or vessel, but it enables such

riveting to be done by means of a hydraulic or other power riveter, and because of the capacity to employ power driven rivets the cost of attachment becomes very much lower than it would be if the rivets were required to be driven by hand, as has heretofore been customary in attaching nozzles in position.

My invention comprehends broadly the making a nozzle of two distinct pieces of ductile metal, each of which provides one of the flanges of the nozzle and uniting the said parts to form a tight joint, whereby the parts may be struck up or drawn in dies and subsequently united by expanding, or otherwise, so that the nozzle as a whole, becomes one integral mass of ductile material embodying lightness, strength and efficiency and with a varying thickness in the body between the flanges.

A great advantage of my improved nozzle lies in the fact that when the nozzle is attached by rivets to the boiler shell, it may be made steam tight by calking the outside of the flange of the nozzle where it joins the boiler shell and further, does not necessitate the cutting away of the shell to the full diameter of the nozzle adjacent to the flange C in order to calk it inside of the nozzle. In this way the boiler shell has a hole made in it only of the diameter equal to the small diameter D of the aperture through the nozzle body A, thereby leaving a maximum strength in the boiler shell.

While I prefer the construction shown, the details may be modified to adapt my nozzle for different purposes without departing from the spirit of the invention.

In this application I do not make claim to the method involved in the manufacture of my improved nozzle, as the said method is reserved for a separate application.

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

1. A nozzle for steam boilers and other

uses, which consists of a tapered tubular body part of ductile metal of gradually lessened thickness from the large end toward the smaller end and having an integral flange of maximum thickness at its larger end and also having a shouldered neck at its unflanged or smaller end, said neck being of less diameter than the body below the neck, combined with a separate flange rigidly secured to the unflanged end or neck of the tubular body and resting against the shouldered portion thereof.

2. In a nozzle for steam boilers and other uses, a tubular flanged body therefor drawn and pressed from ductile sheet metal having a base flange of maximum thickness and a tapered tubular body having walls of gradually less thickness to the smaller end and provided at said smaller end with a tubular flange of substantially uniform thickness, combined with a second flange of smaller diameter than the base flange and secured to the tubular flange by the latter being expanded therein.

3. A nozzle for steam boilers and other uses, which consists of a body part formed of sheet metal drawn into tapered tubular form and in which the tapered body is of gradually lessening thickness between the flange end and the free end thereof and in which the body at a distance from its free end is provided with an annular shoulder, combined with a ring shaped flange secured to the free end of the tapered body portion by means of a steam tight joint comprising an annular groove upon the inner wall of the aperture in the ring shaped flange and into which an annular portion of the free end of the tapered tubular body is expanded.

In testimony of which invention, I hereunto set my hand.

WILLIAM HORSLEY.

Witnesses:

WILLIAM C. WITTMAN,
H. J. FENNELL.