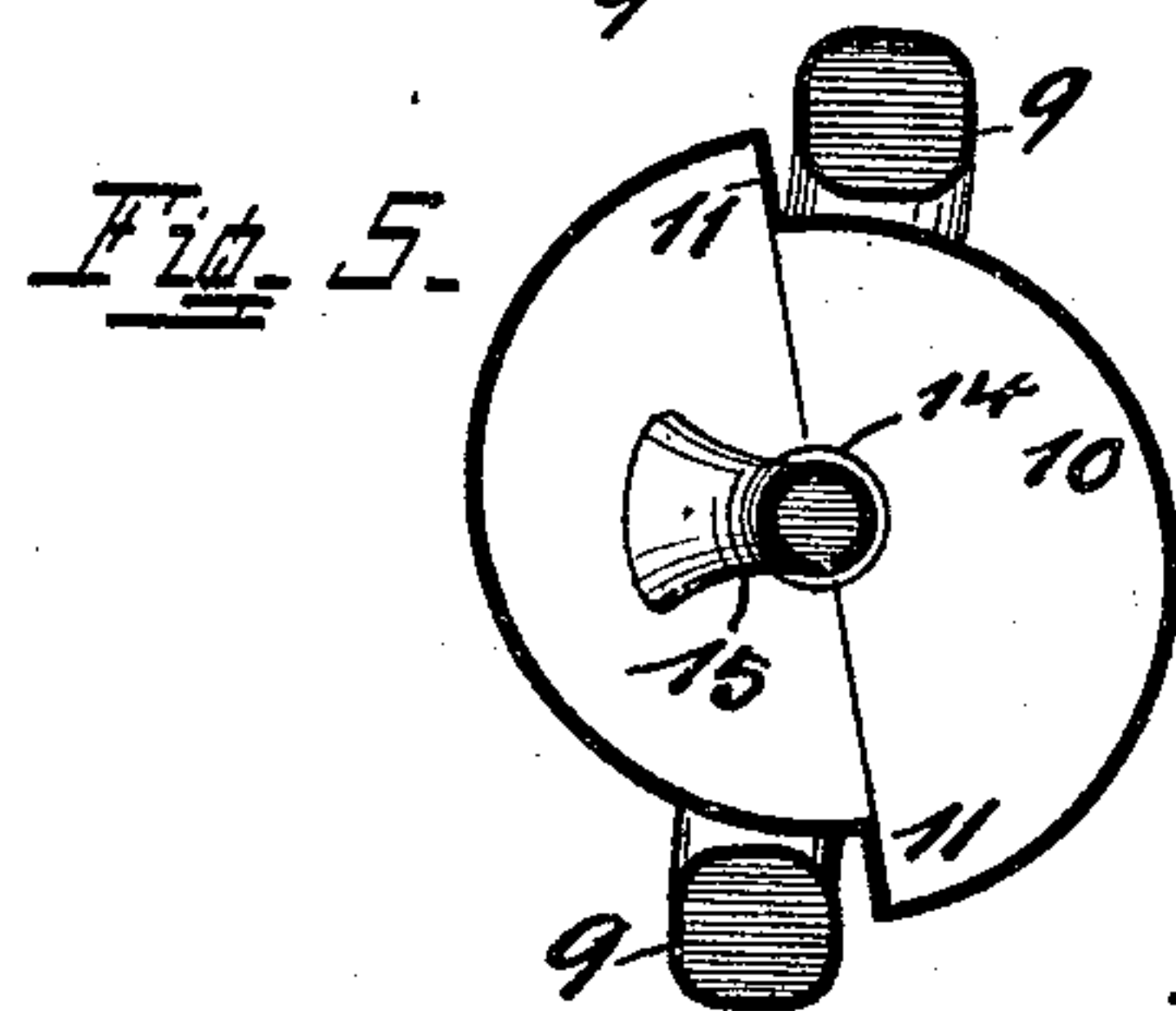
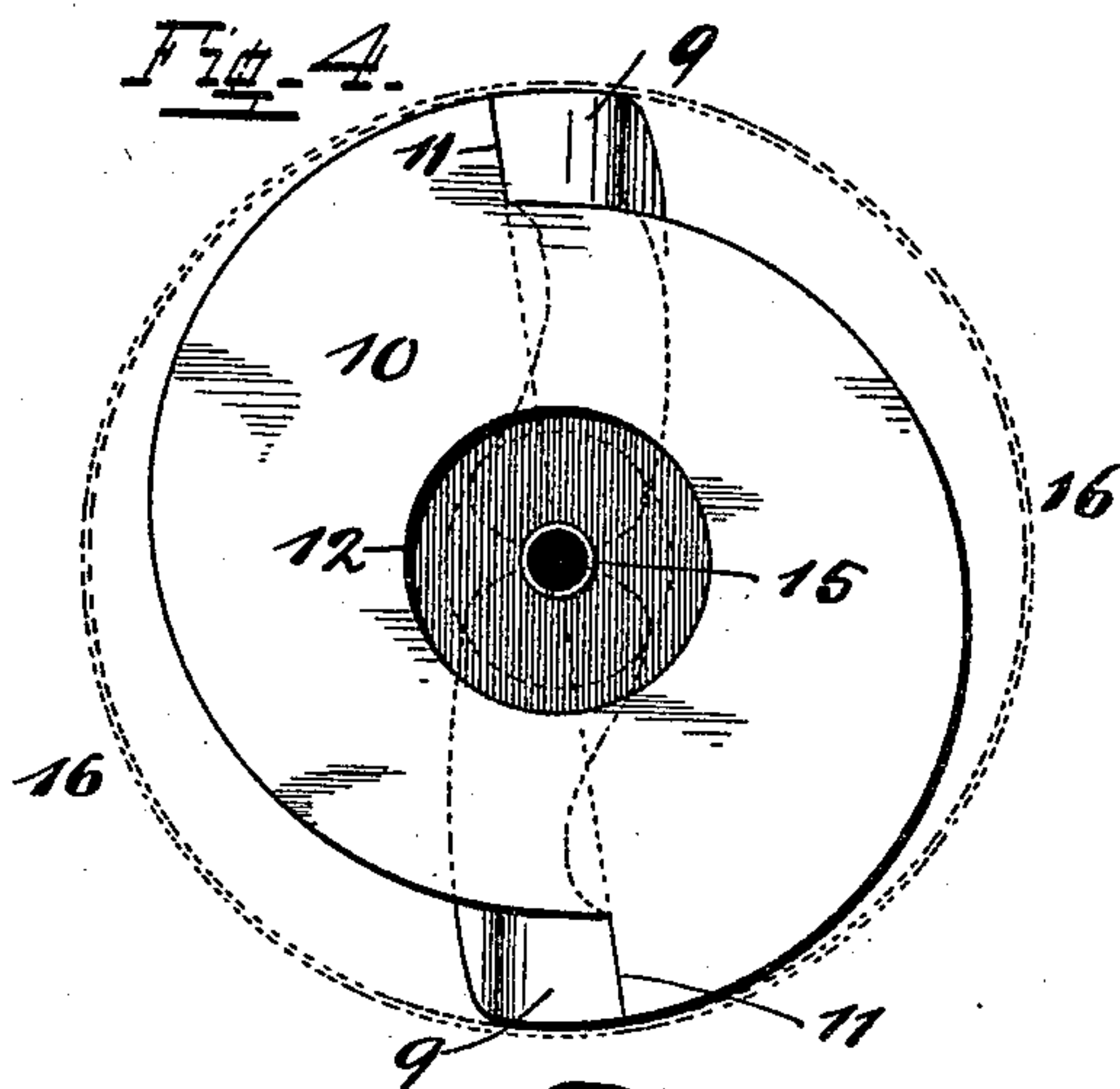
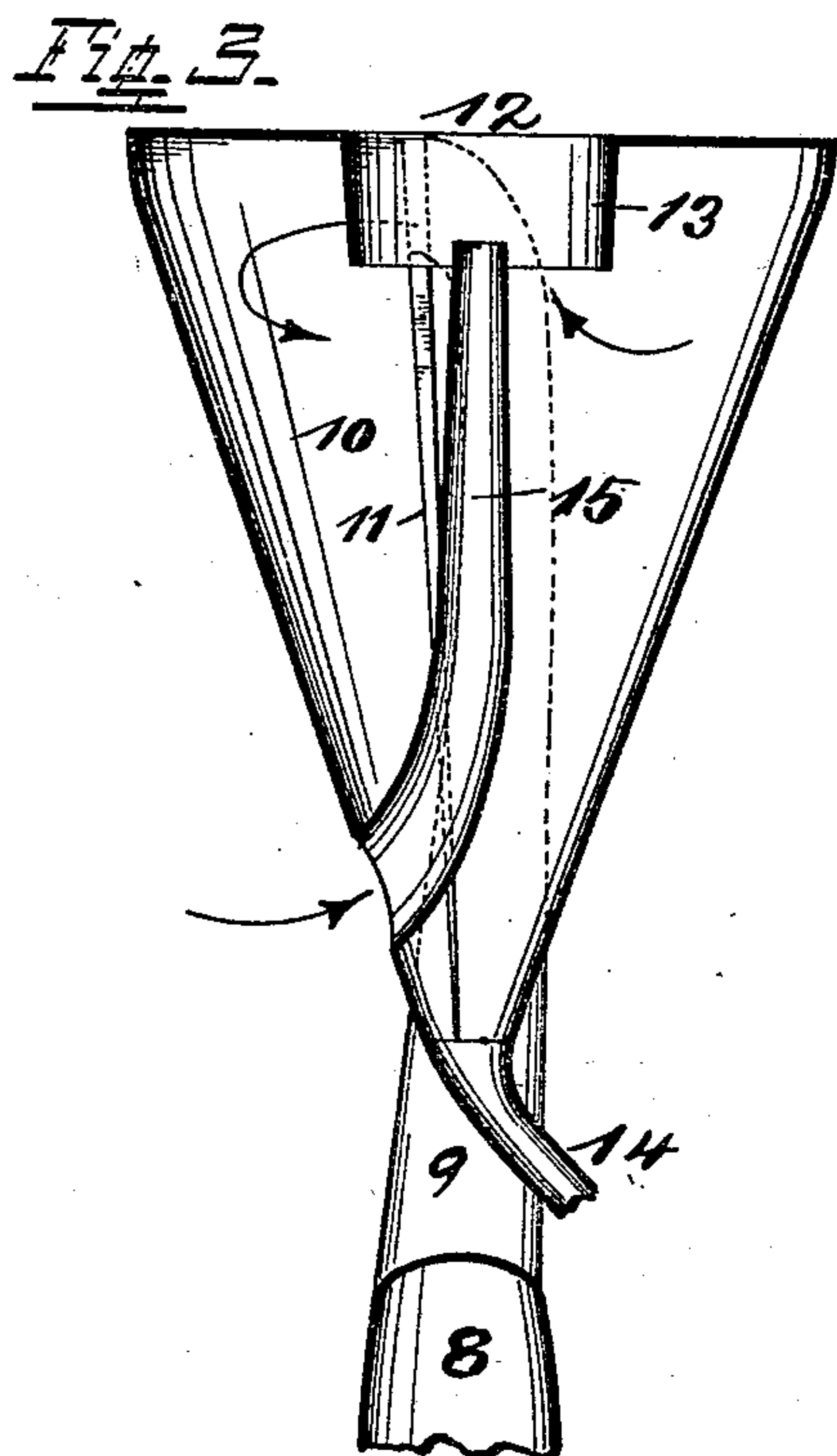
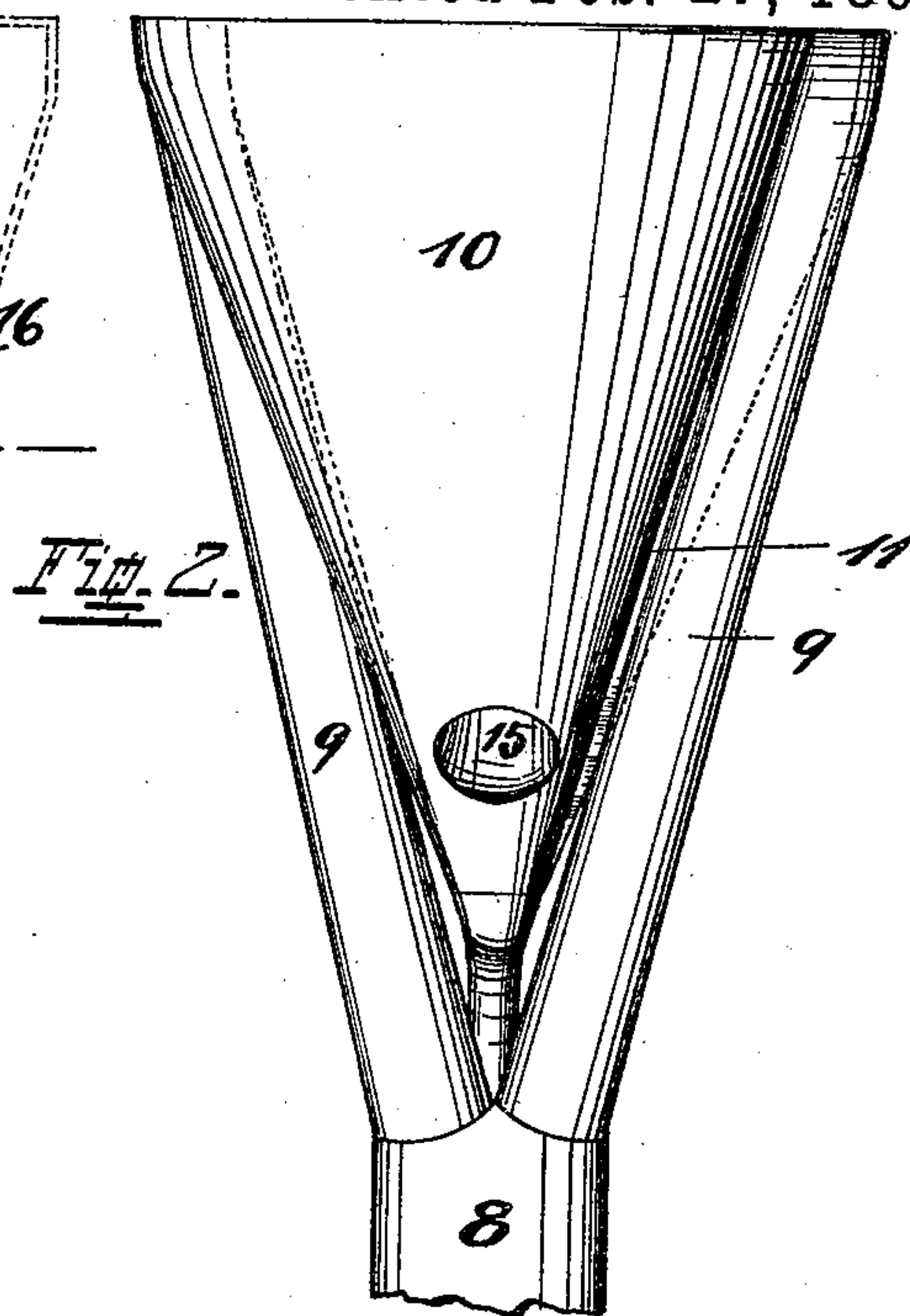
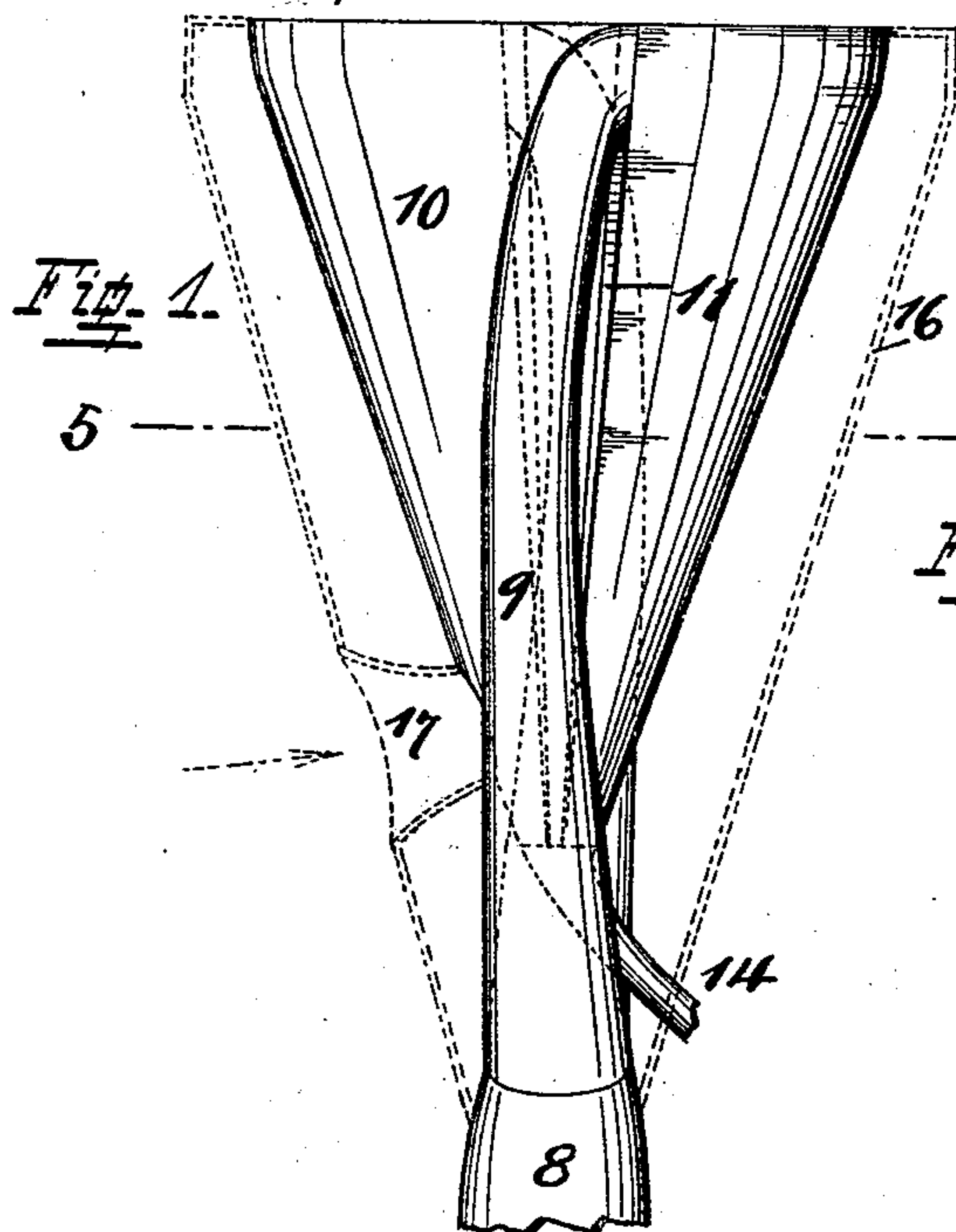


(No Model.)

T. LEE.  
SPARK ARRESTER.

No. 515,345.

Patented Feb. 27, 1894.



Attest  
Wm. Kramer.  
W.H. Cooney.

Inventor  
Thomas Lee  
by C. Spengel Atty.



# UNITED STATES PATENT OFFICE.

THOMAS LEE, OF HOME CITY, OHIO.

## SPARK-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 515,345, dated February 27, 1894.

Application filed September 22, 1893. Serial No. 486,195. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS LEE, a citizen of the United States, and a resident of Home City, Hamilton county, State of Ohio, have invented a certain new and useful Spark-Arrester and Steam-Condenser; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form part of this specification.

The subject of this invention is a spark-arrester and steam-condenser. It may be used to serve in its double capacity at one and the same time, or it may be used to serve only for either purpose. When used as a spark-arrester it is particularly well adapted for locomotives, while as a steam-condenser it may be used anywhere at the end of steam-exhaust pipes.

The principle involved and carried out here by means of a novel construction consists substantially of introducing the smoke or exhaust-steam, without creating any back-pressure, into the upper part of a peculiarly-shaped chamber in a manner to change its direction and impede its progress, whereby the speed of its motion is slackened to enable the sparks and cinders to separate and drop, or in the case of steam giving the latter time to condense.

In the following specification and particularly pointed out in the claims is found a full description of my invention, its operation, parts and construction, the latter being also illustrated in the accompanying drawings, in which—

Figures 1. and 2, are vertical elevations taken at right angles to each other. Fig. 3. is a vertical section of the device as it appears in Fig. 1, and Fig. 4. is a top view of the same. Fig. 5. is a horizontal section on line 5—5 of Fig. 1.

8 indicates the end of a steam-exhaust-pipe through which, in case it is used on a locomotive, the smoke passes. For the purpose of reducing the volume of smoke or steam, to make it more susceptible for further action on it, pipe 8, spreads preferably in two or more branches 9, which discharge at their up-

per ends into the broad part of a chamber 10. The wall of this latter consists substantially of two inverted half cones, best of sheet metal, placed so that one projects laterally beyond the other and connected in such position by a piece of the same material which fills this opening between them and reaches from the edge of the one half cone to the edge of the other. By this construction offsets or breaks 11, are formed in what would otherwise be a perfect inverted cone and which offsets enable the exhaust-pipes to discharge into the chamber direct without any sharp turns which would create back-pressure and in a manner which causes the smoke or steam to follow along the inside of the circular wall, thereby assuming a rotary motion. This motion in addition to changing the direction of the smoke or steam accompanied by their sudden expansion when entering chamber 10, which reduces their pressure also lessens the speed of their progress, diminishing also in the case of smoke the force of the latter as a motive power to carry the cinders, which separate and drop down. In the case of steam it is this same lessening of speed which produces the desired effect by lengthening the time which the steam remains in the chamber in an expanded state which hastens its condensation.

The peculiar construction by which pipes 9, discharge into chamber 10, prevents any shelves or horizontal surfaces upon which cinders or water might accumulate and either of these latter, as soon as passed out of pipe 9, lose all direct support and become free to drop at once down into chamber 10. The number of these offsets 11 corresponds obviously with the number of branches 9. If pipe 8, were to be carried up straight, only one such offset would be required, otherwise their number corresponds with the number of the branches into which pipe 8, separates.

The smoke escapes through an opening 12, in the top of chamber 10. To prevent the immediate and direct escapement of either smoke or steam from this chamber, a flange 13, is provided which surrounds opening, 12, and extends downwardly therefrom. By these means smoke or steam are retarded and retained a sufficient length of time within chamber 10 to accomplish the desired object.



The cinders or the condensed water pass off through an outlet 14.

15, is a draft flue permanently open and opening outwardly through the lower part of chamber 10, and extending upwardly into opening 12, within flange 13. When used as a spark-arrester, the device is so set that the lower opening of this flue points toward the front of the locomotive so that, while the latter is running, air is caused to enter with great force and in great quantities, producing by its escape at the upper end, a draft through opening 12, which aids the escape of smoke therethrough. In the case of a steam-condenser the heat produced within chamber 10, by the hot steam, escapes through opening 12, and has a tendency to produce a vacuum in flue 15, which however is immediately filled by inflowing cold air from below. This produces a constant passage of cold air through flue 15, which, being sheet metal, remains considerably cooler than the steam surrounding it and therefore forms an important medium to cause rapid condensation. The use of this draft-flue is not dependent on the specific construction of the other parts and therefore I do not limit myself to its use in a specific combination but to its use for the same purpose in similar appliances.

When used as a spark-arrester for locomotives, I prefer for the sake of appearances to pass pipes 9, up through the inside of chamber 10, or to surround the whole apparatus with a jacket 16, as shown in dotted lines in Figs. 1 and 4. In this case it is necessary to provide the lower opening of flue 15, with a funnel-shaped extension 17, which reaches from this opening to a larger one in the jacket. (See Fig. 1.) For a steam-condenser the absence of such jacket is preferable, because it permits free access of air to the outside of all parts which keeps them cool and thereby furthers the condensation.

I am aware of the existence of devices where smoke or steam is introduced centrally and from below and is changed in its direction or retarded for the purpose of dropping the cinders by internal appliances, shelves, deflectors, &c. These internal appliances I have found however very objectionable inasmuch as they form obstructions which interfere with the free escape of steam and smoke preventing also their expansion and reduction of pressure, which creates back pressure, as well as affording places for accumulations of cinders and water which latter induces corrosion.

Having described my invention, I claim as new—

1. In a spark-arrester and steam-condenser, the combination of an expansion chamber consisting substantially of two inverted half cones, placed so against each other that one half cone projects beyond the other one, upright partitions passing substantially radially from the edge of the one half cone to the

edge of the other one, whereby they are connected and the inclosure of the chamber completed, inlet-pipes discharging into the chamber through these upright, radial partitions and exit-openings in the top and lower end of the expansion chamber.

2. In a spark-arrester and steam-condenser the combination of a pipe 8, spreading in two or more branches 9, and a chamber 10, formed substantially of an inverted hollow cone with an opening in its top and an outlet in its contracted end, placed between these branches, which enter this chamber from the outside and discharge into it sidewise at its top in a manner to cause the exhaust from said branches to assume a rotary motion.

3. In a spark-arrester and steam-condenser the combination of a pipe 8, spreading in two or more branches and a chamber 10, formed substantially of an inverted hollow cone with an opening in its top, having a downwardly projecting flange 13, around it and an outlet in its lower contracted end, placed between these branches which enter this chamber from the outside and discharge into it sidewise at its top in a manner to cause the exhaust from said branches to assume a rotary motion.

4. In a spark-arrester and steam-condenser the combination of a chamber 10, formed substantially of an inverted hollow cone with an opening in its top and an outlet in its lower contracted end, one or more pipes discharging into chamber 10, sidewise at its top in a manner to cause the exhaust from them to assume a rotary motion, and a permanently open draft flue 15, entering chamber 10, at its lower part and projecting upwardly to within the opening in the latter's top.

5. In a spark-arrester and steam-condenser the combination of one or more pipes 9, a chamber 10, with an opening in its top and an outlet in its lower contracted end, receiving these pipes sidewise and at its top in a manner to cause the exhaust from them to assume a rotary motion, a draft flue 15, entering chamber 10, at its lower part and projecting upwardly to within the opening in the latter's top, a jacket 16, surrounding the whole structure and an extension 17, connecting the lower opening of draft flue 15, with a similar but enlarged opening in the jacket.

6. In a spark-arrester and steam-condenser the combination of a chamber 10, with an opening in its top, having a downwardly projecting flange 13, around it and an outlet in its lower contracted end, one or more upright pipes discharging into this chamber sidewise at its top in a manner to cause the exhaust from them to assume a rotary motion, and a permanently open draft-flue 15, entering chamber 10, at its lower part and projecting upwardly to within flange 13, surrounding the opening in the top.

7. In a spark-arrester and steam-condenser, the combination of an expansion chamber 10,



substantially of the shape of an inverted  
cone provided with outlets at top and bot-  
tom, and an exhaust-pipe rising to the top of  
this chamber and discharging with its upper  
5 end sidewise through the wall of said cham-  
ber whereby the discharge is expanded as  
well as caused to assume a rotary motion.

In testimony whereof I affix my signature in  
presence of two witnesses.

THOMAS LEE.

Witnesses:

W. J. MCCARTNEY,  
H. F. BROCKMANN.