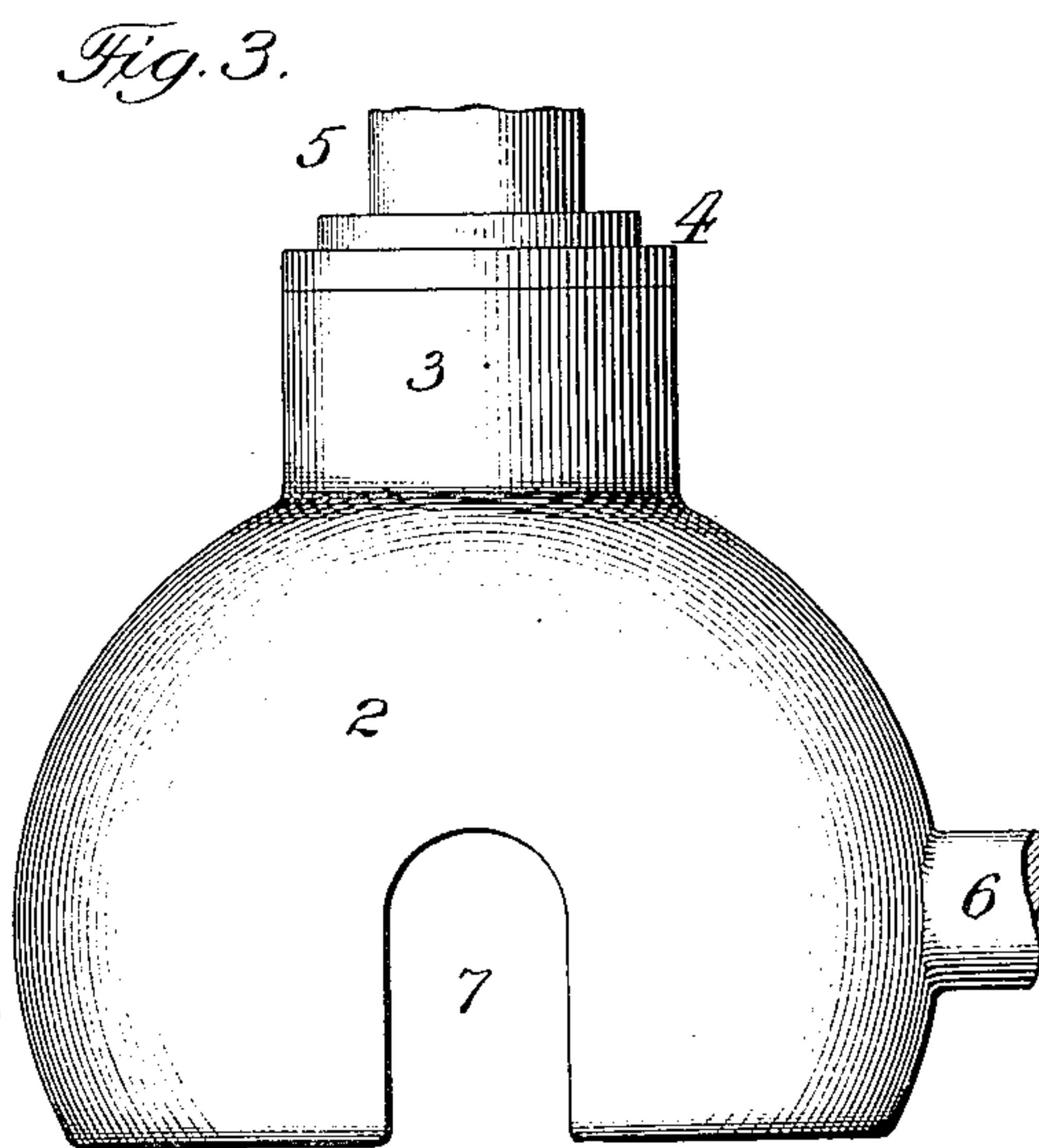
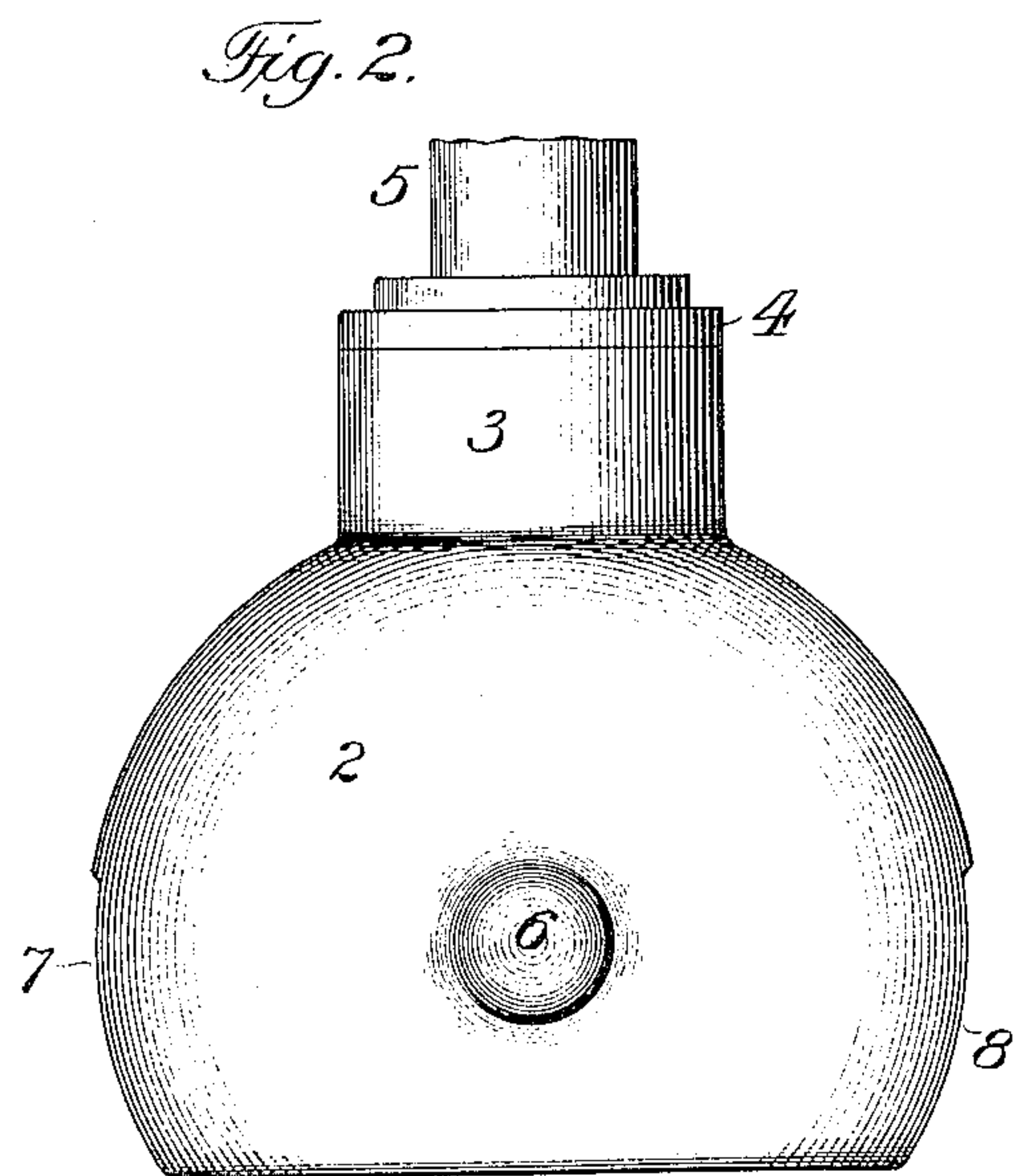
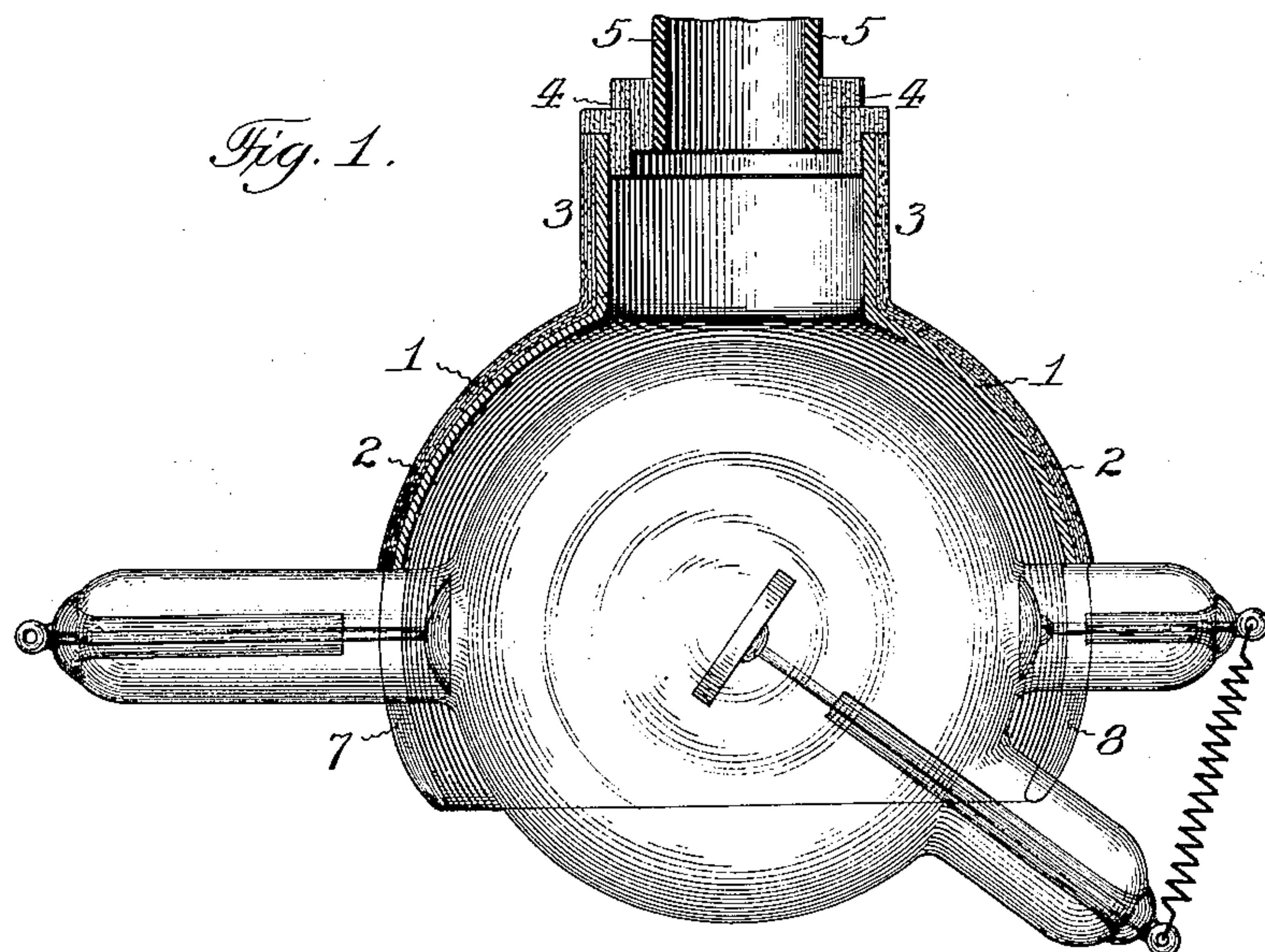


No. 765,469.

PATENTED JULY 19, 1904.

R. FRIEDLANDER.  
SHADE FOR X-RAY TUBES.  
APPLICATION FILED SEPT. 19, 1903.

NO MODEL.



*Attest:*

*John Enders,*

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# UNITED STATES PATENT OFFICE.

ROBERT FRIEDLANDER, OF CHICAGO, ILLINOIS.

## SHADE FOR X-RAY TUBES.

SPECIFICATION forming part of Letters Patent No. 765,469, dated July 19, 1904.

Application filed September 19, 1903. Serial No. 173,786. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT FRIEDLANDER, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Shades for X-Ray Tubes, of which the following is a specification.

The present invention relates to ray-intercepting shades or shields for ray-tubes, and more particularly to that type of such shades which constitute the subject-matter of my prior Letters Patent, No. 731,767, dated the 23d day of June, 1903; and the object of the present improvement is to provide a simple and efficient shade construction having high non-conducting properties which permits of the close application of the shade to the ray-tube without liability of said shade forming a short circuit between the terminals of the ray-tube, and which construction in addition is adapted to afford a shade of great lightness and opacity to the rays emanating from a ray-tube, all as will hereinafter more fully appear and be more particularly pointed out in the claims.

In the accompanying drawings, illustrative of the present invention, Figure 1 is a sectional elevation illustrating the preferred form of the present invention with an ordinary X-ray tube shown in position therein. Fig. 2 is a side elevation of the shield or shade. Fig. 3 is an end elevation of the same.

Similar numerals of reference indicate like parts in the different views.

The present invention involves the formation of the ray-tube shield or shade with a base or formation portion 1, of paper-pulp or other equivalent light and rigid material, and a series of coatings 2 of a paint-like composition of matter which is opaque to X and other like rays. Such coatings in the present improved method of manufacture are applied serially and between each application are exposed to a thorough drying operation in any usual and suitable manner in order to attain a complete drying of one coating before an application of the next succeeding coating. From extended practical experiment it has

been found that such coatings applied in the manner above described, and consisting of what is known to the paint trade as "white-lead drier," and consisting of white-lead pigment ground in drier-oil, assumes a dense and coherent condition, having a very superior non-conducting nature that permits of the close application of the shade or shield to a ray-tube without liability of the material of the shade forming a short circuit between the ray-tube terminals. Such experiments further show that a given degree of opacity can be attained by the present invention with a much less weight of material in the shield than can be attained with a shield in which the ray-intercepting portion is formed from sheet-lead and from lead-foil, as in my former patented construction.

The ray-tube shield made as above described may have any suitable form which a particular use of the same may indicate and for ordinary use with an X-ray tube is preferably of the semispherical shell form shown in the present drawings and as set forth in my former patented construction of June 23, 1903, and in the particular construction shown will comprise a structural formation as follows.

3 is an outlet passage or neck in and upon the shield and through which the desired rays from a ray-tube are permitted to pass for use by the operator. Such passage or neck is so arranged on the body of the shield as to receive the central and more direct rays emanating from a ray-tube.

4 and 5 are removable annular stops fitting the orifice or passage of the aforesaid neck 3 and adapted to regulate the size of such orifice to suit any particular requirement at the will of the operator.

6 is a projecting stem or handle on the exterior of the shield for convenience in handling as well as in an attachment of the shield to the clamp-arm of a supporting-tripod.

7 and 8 are opposed marginal recesses formed in the shield and adapted to receive the tubular necks of the ray-tube and form a support for the same in proper relation to the aforesaid outlet passage on neck 3 of the shield.

Having thus fully described my said inven-



tion, what I claim as new, and desire to secure by Letters Patent, is—

1. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like, and a series of coatings of a paint-like non-conducting composition opaque to X and like rays, substantially as set forth.

2. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like and having a semispherical form, and a series of coatings of a paint-like non-conducting composition opaque to X and like rays, substantially as set forth.

3. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like and having an outlet-neck, and a series of coatings of a paint-like non-conducting composition opaque to X and like rays, substantially as set forth.

4. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like semispherical in form and having an outlet-neck, and a series of coatings of a paint-like non-conducting composition opaque to X and like rays, substantially as set forth.

5. A shield for ray-tubes, comprising a sup-

porting body portion of paper-pulp or the like, and a series of coatings of a white-lead drier imposed upon such base, substantially as set forth.

6. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like and having a semispherical form, and a series of coatings of white-lead drier imposed upon such base, substantially as set forth.

7. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like and having an outlet-neck, and a series of coatings of white-lead drier imposed upon such base, substantially as set forth.

8. A shield for ray-tubes, comprising a supporting body portion of paper-pulp or the like semispherical in form and having an outlet-neck and a series of coatings of white-lead drier imposed upon such base, substantially as set forth.

Signed at Chicago, Illinois, this 16th day of September, 1903.

ROBERT FRIEDLANDER.

Witnesses:

ROBERT BURNS,

THEODOR FRIEDLANDER.