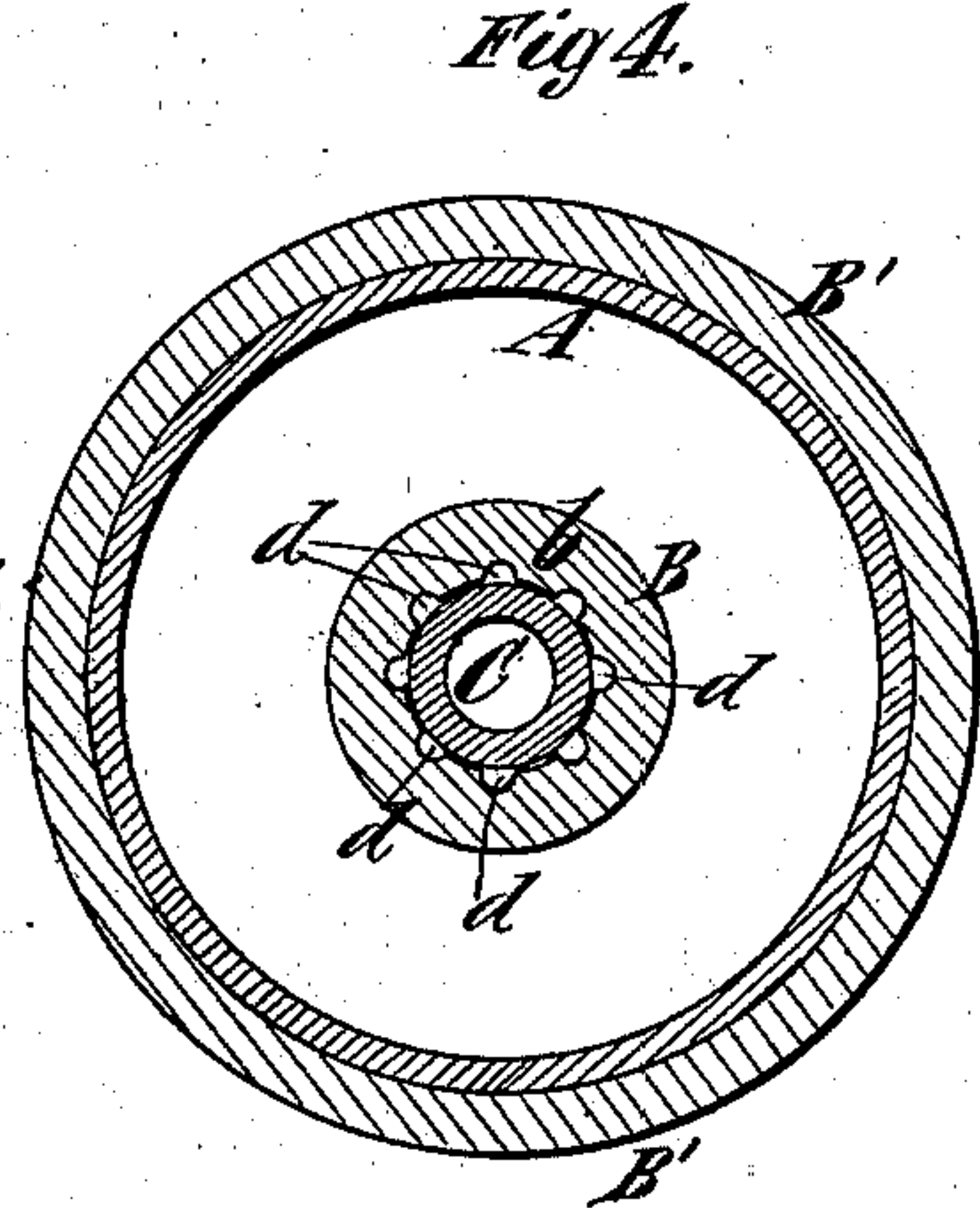
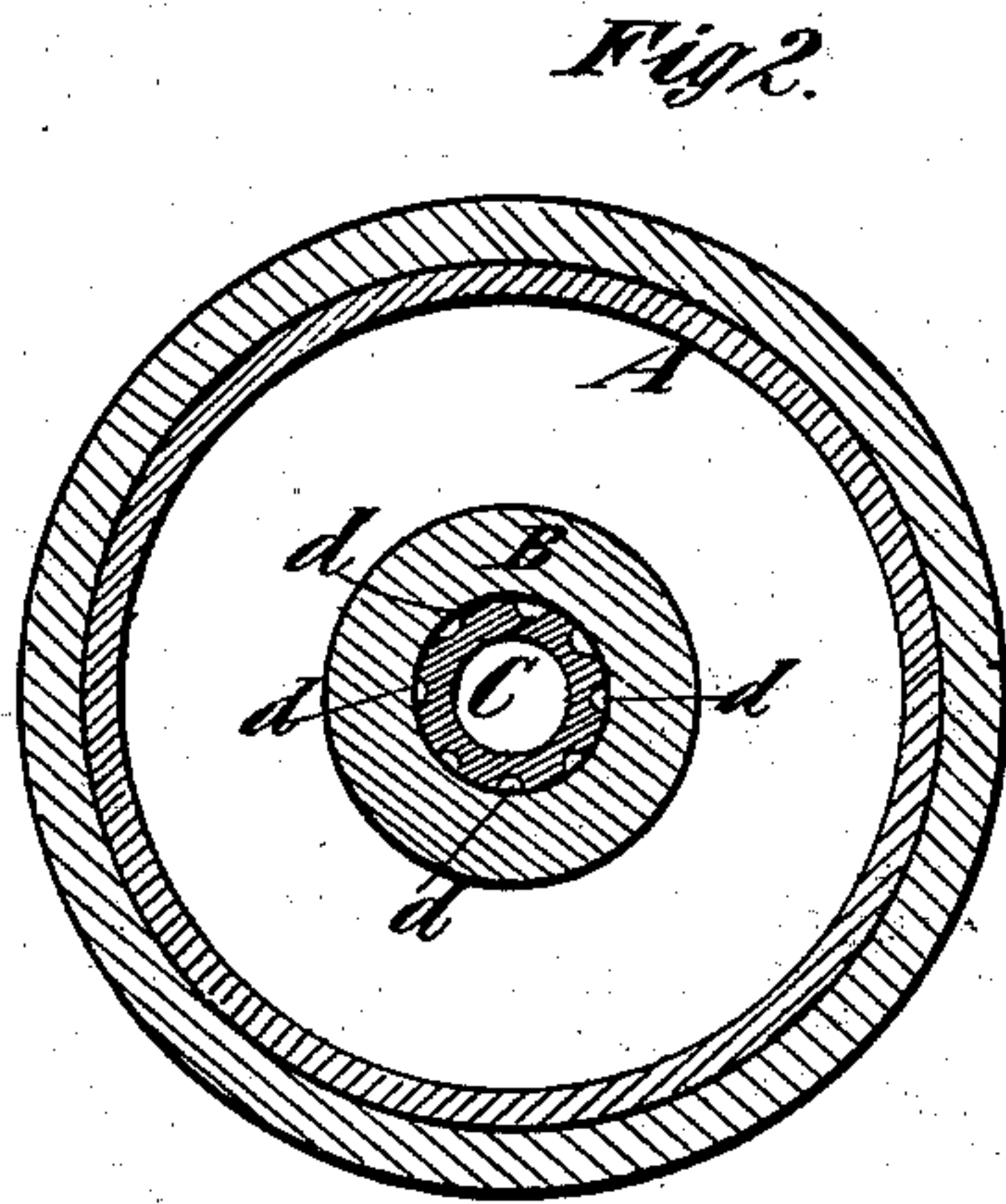
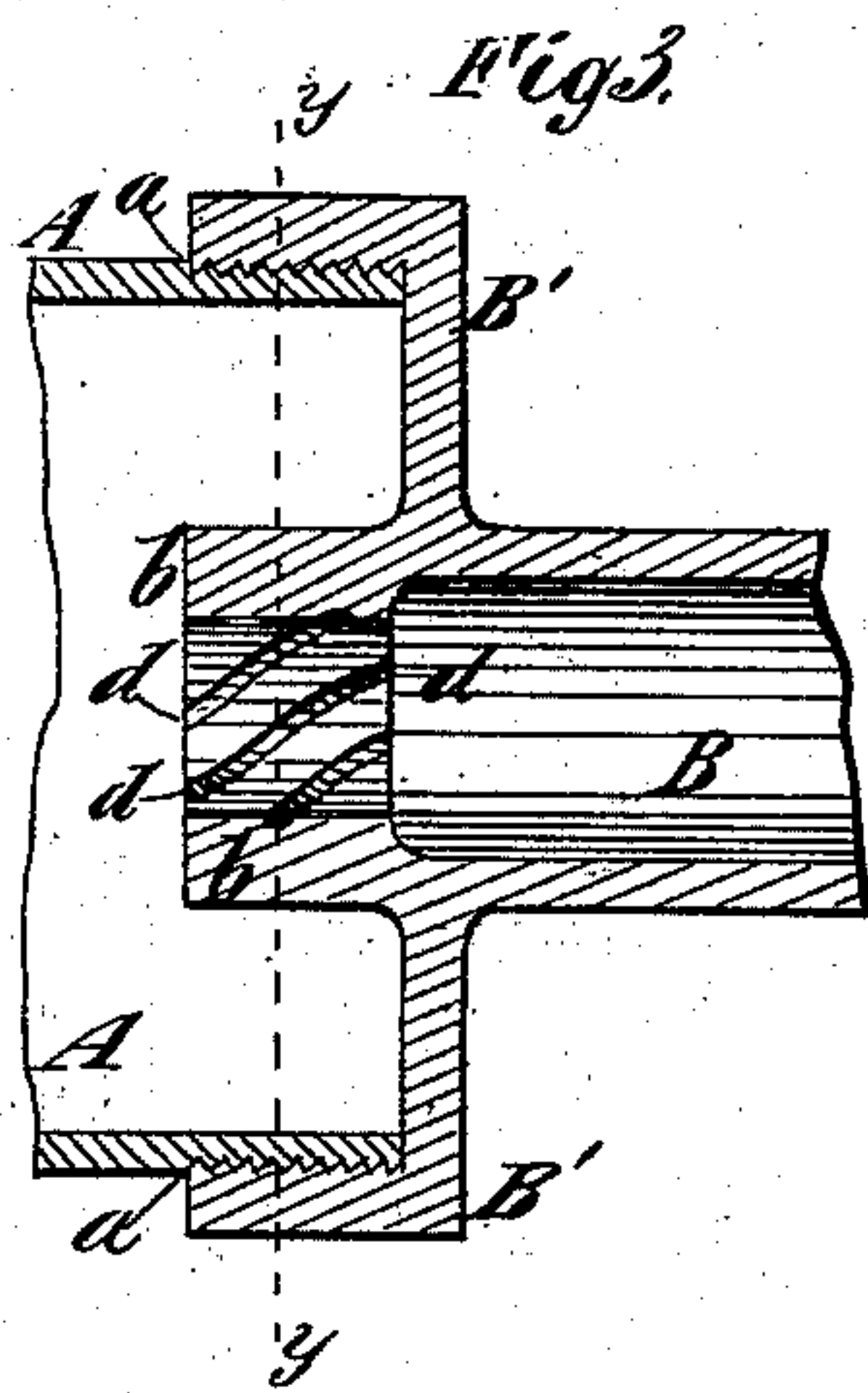
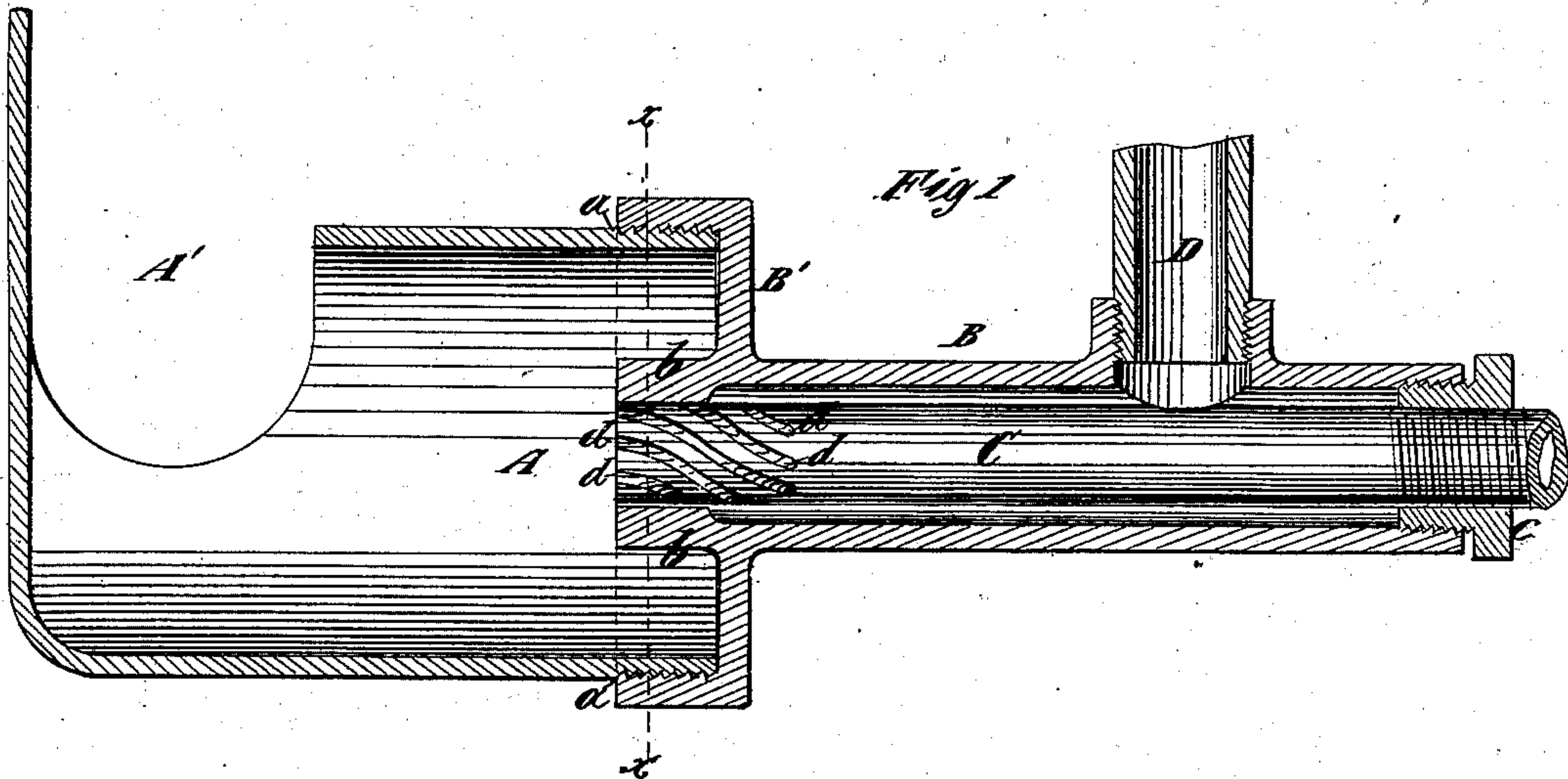


(No Model.)

J. J. WALTER.  
Burner for Hydrocarbon Furnaces.

No. 239,630.

Patented April 5, 1881.



Witnesses:  
Fred H. Hynes  
Alb. Webb

Inventor:  
Jacob J. Walter  
by his Attorneys  
Brown & Brown



# UNITED STATES PATENT OFFICE.

JACOB J. WALTER, OF INDIAN CREEK, PENNSYLVANIA.

## BURNER FOR HYDROCARBON-FURNACES.

SPECIFICATION forming part of Letters Patent No. 239,630, dated April 5, 1881.

Application filed April 30, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, JACOB J. WALTER, of Indian Creek, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Burners for Hydrocarbon-Furnaces, of which the following is a specification.

Hydrocarbon liquids—such, for example, as petroleum—when employed for heating purposes, are commonly introduced or injected into a furnace by means of a jet of superheated steam, and the object to be attained in such burners or injecting devices is to effect the thorough commingling of the hydrocarbon liquid and the steam, so that they are injected together in the form of vapor or spray, and are readily and thoroughly consumed.

My invention consists in the combination, with a chamber or shell having a tubular socket contracted at its inner end, of a pipe for the introduction of hydrocarbon liquid passing through said socket, and having its outer surface fitting closely within the inner surface of the contracted portion thereof, one of the fitting-surfaces being constructed or provided with a series of spiral grooves, through which the steam enters in fine jets to commingle with the hydrocarbon liquid.

In the accompanying drawings, Figure 1 represents a longitudinal section through a burner or injecting device embodying my invention. Fig. 2 represents a cross-section upon the line *x x*, Fig. 1. Fig. 3 represents a longitudinal section of the tubular socket or nozzle of a similar burner, in which the spiral grooves are formed upon the inner surface of said socket or nozzle; and Fig. 4 represents a transverse section upon the dotted line *y y*, Fig. 3, with the pipe for the hydrocarbon liquid inserted therein.

Similar letters of reference designate corresponding parts in all the figures.

A designates the shell or chamber of the burner, which is represented as provided with an open mouth, *A'*, which serves to spread the flame. From the end of the shell or chamber extends a tubular socket, B, which might be made in the same piece with the shell or chamber, but which is here represented as constructed in a cap-piece or cover, B', secured to the shell or chamber by means of a screw-

thread, *a*. The inner end, *b*, of the tubular socket B is contracted for a short distance from its mouth, so as to form a nozzle, and its outer end is closed by a plug, *c*.

D designates a nozzle, to which the inlet-pipe for steam may be attached.

C designates a pipe for the introduction of the hydrocarbon liquid, arranged within the tubular socket B, and secured in place, in this instance, by being screwed into the plug *c*, and adjusted so that its inner end is in proximity to the inner end of the said tubular socket. Between the exterior of said pipe and the side of the tubular socket is an annular duct for the circulation of steam, except at the contracted end portion *b* of the tubular socket, which is of a size to fit closely around the pipe C. Between the fitting-surfaces of the pipe C and the nozzle *b*—in the present instance upon the exterior of the end portion of the pipe C—are a number of grooves, *d*, which form channels or passages for dividing the steam and causing it to enter the shell or chamber A in small jets, which enable it to more thoroughly commingle with the hydrocarbon liquid entering through the pipe C; and to enable this result to be more effectually accomplished the said grooves extend spirally upon the pipe C, so that the atoms of steam have imparted to them a spiral motion, or rather a forward motion in a spiral direction.

The grooves *d* may be more or less in number, and may be of considerable size or very minute, as is found most desirable in practice.

Instead of the spiral grooves *d* being in the exterior of the pipe C, they might be formed in the interior of the socket or nozzle *b*, as shown in Figs. 3 and 4, and in that case the end portion of the pipe C will be perfectly plain and smooth, as seen in Fig. 4.

Various hydrocarbon liquids—such as petroleum or the products of gas manufacture, such as tar—may be employed, and the steam employed should be superheated to a greater or less degree.

When the valves which control the admission of steam and hydrocarbon fluid are opened the steam passing around the pipe C and out through the grooves *d* into the shell or chamber serves, in a measure, the purpose of an injector in drawing in the hydrocarbon liquid, and



as both issue into the shell or chamber they become thoroughly mingled together and form a spray or vapor which is very combustible.

In the operation of my burner the numerous  
5 currents or jets of steam issuing from the grooves *d* in a spiral direction form, in point of fact, a hollow tube the walls of which are moving spirally, and hence the hydrocarbon liquid issuing through the pipe C cannot drop down  
10 or escape from this tube of steam without becoming mingled with the steam. Where the steam issues in separate straight jets much of the hydrocarbon liquid or spray escapes between the streams or jets of steam, and hence  
15 the advantage of giving said streams or jets a spiral direction.

I am aware that it is not new to employ two concentric nozzles, one inside the other, to inject liquid by means of steam. I am also aware  
20 that it is not new to introduce oil into a retort by means of a small chamber through which the steam enters, which is placed just below the induction-passage for the oil, and is provided with spiral ribs for giving the entering  
25 steam a whirling motion. I am also aware that it is not new to inject oil into a furnace by means of a nozzle or pipe which is concentric with and passes through a cap, in the end of which are numerous holes or openings converging

toward the mouth or end of the oil pipe or nozzle, and therefore I do not claim any of these as of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a burner for hydrocarbons, the combination of a shell or chamber having a tubular socket extending from it and contracted at its inner end, a pipe for the introduction of hydrocarbon liquid passing through said socket, and having its outer surface fitting within  
35 the inner surface of the contracted portion thereof, one of the so fitting surfaces being constructed or provided with a series of spiral grooves for the escape of steam, whereby the currents or jets of steam are impelled in a  
40 spiral direction around the pipe through which the liquid enters, substantially as and for the purpose specified.

2. The combination of the shell or chamber A, the tubular socket B, comprising a contracted portion, *b*, the pipe C, fitting the said  
45 contracted portion *b*, one of said fitting-surfaces being provided with spiral grooves *d*, substantially as and for the purpose specified.

JACOB J. WALTER.

Witnesses:

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