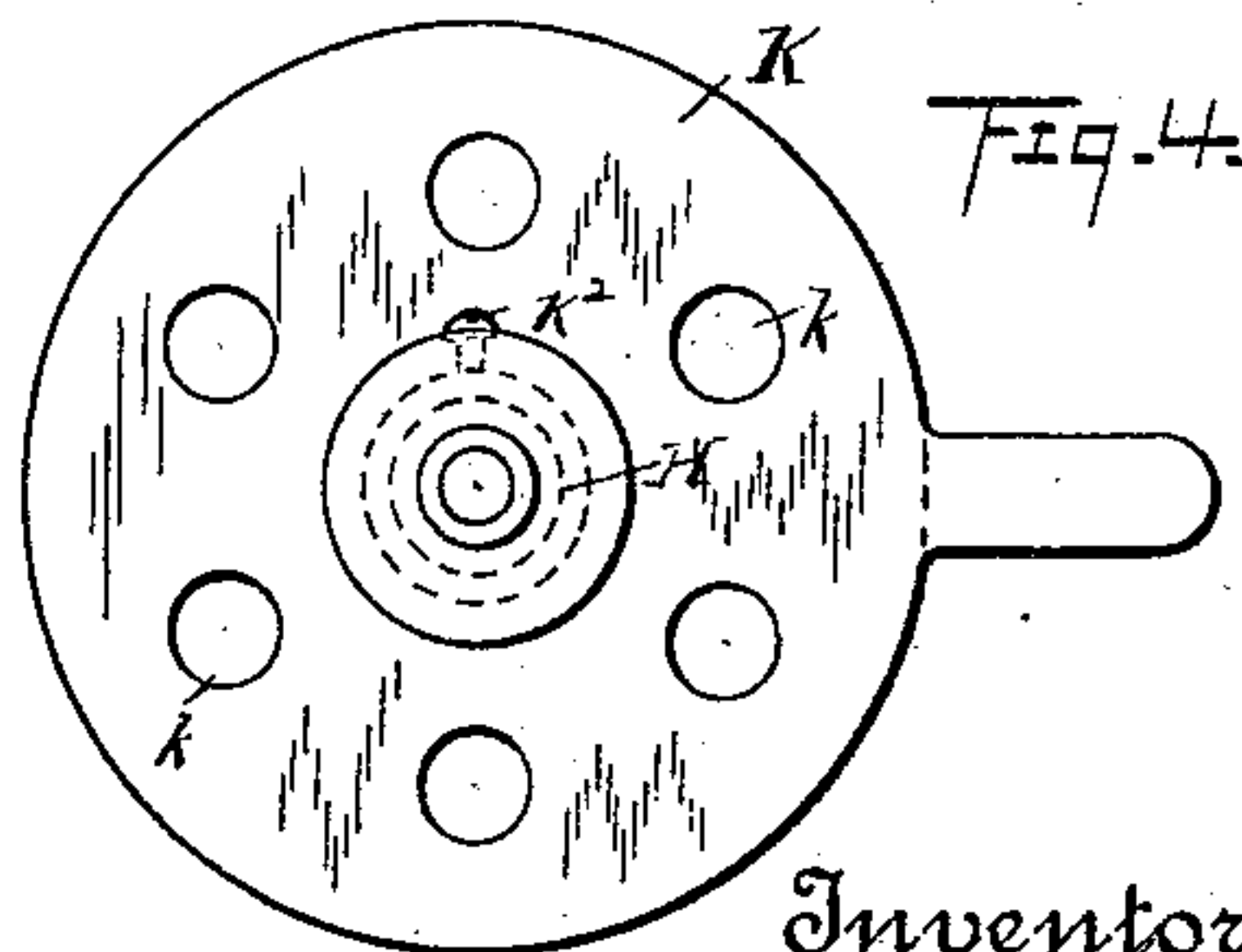
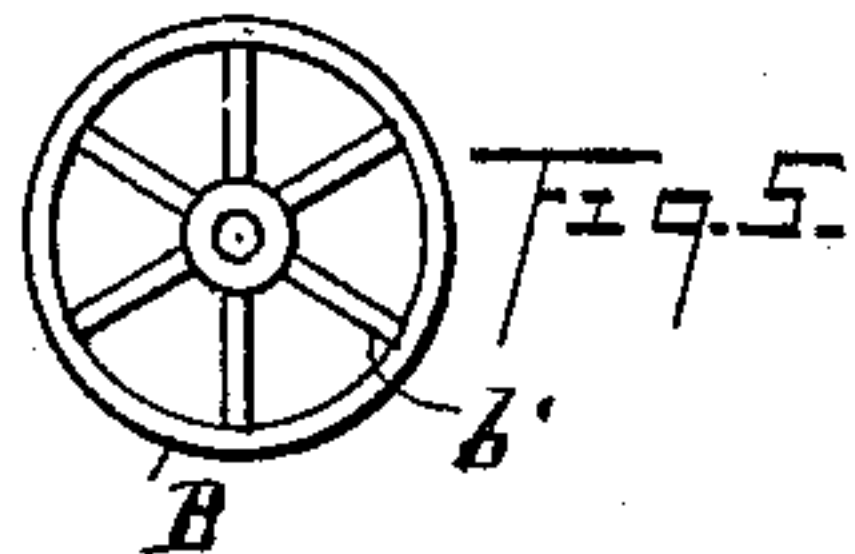
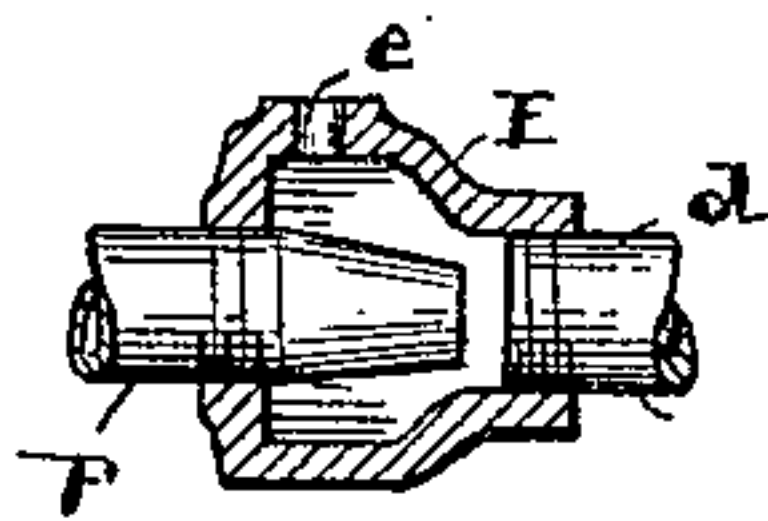
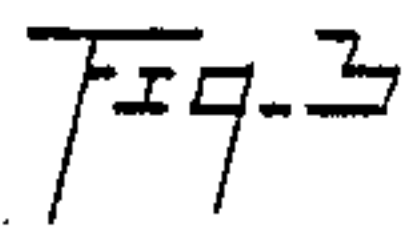
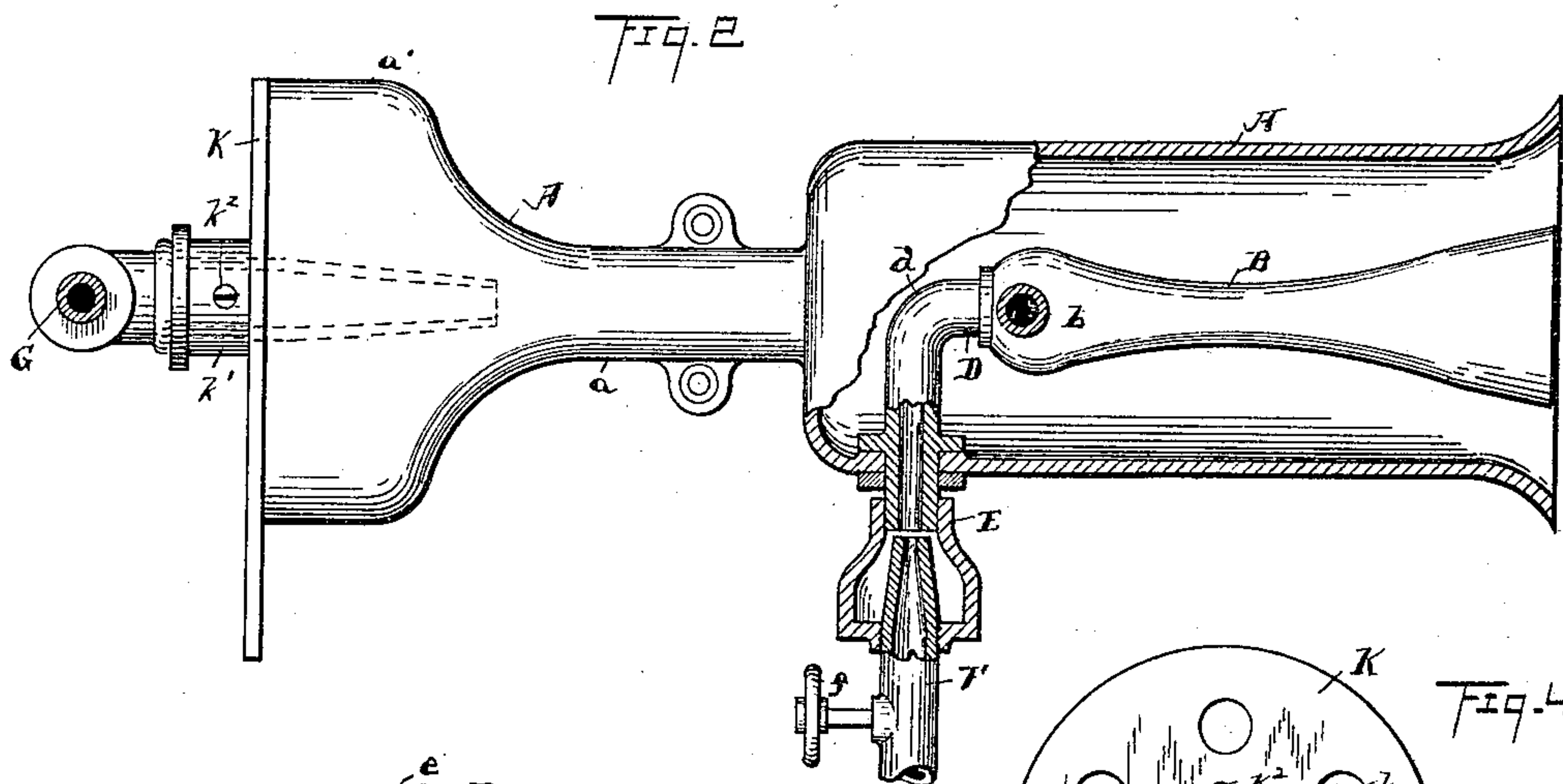
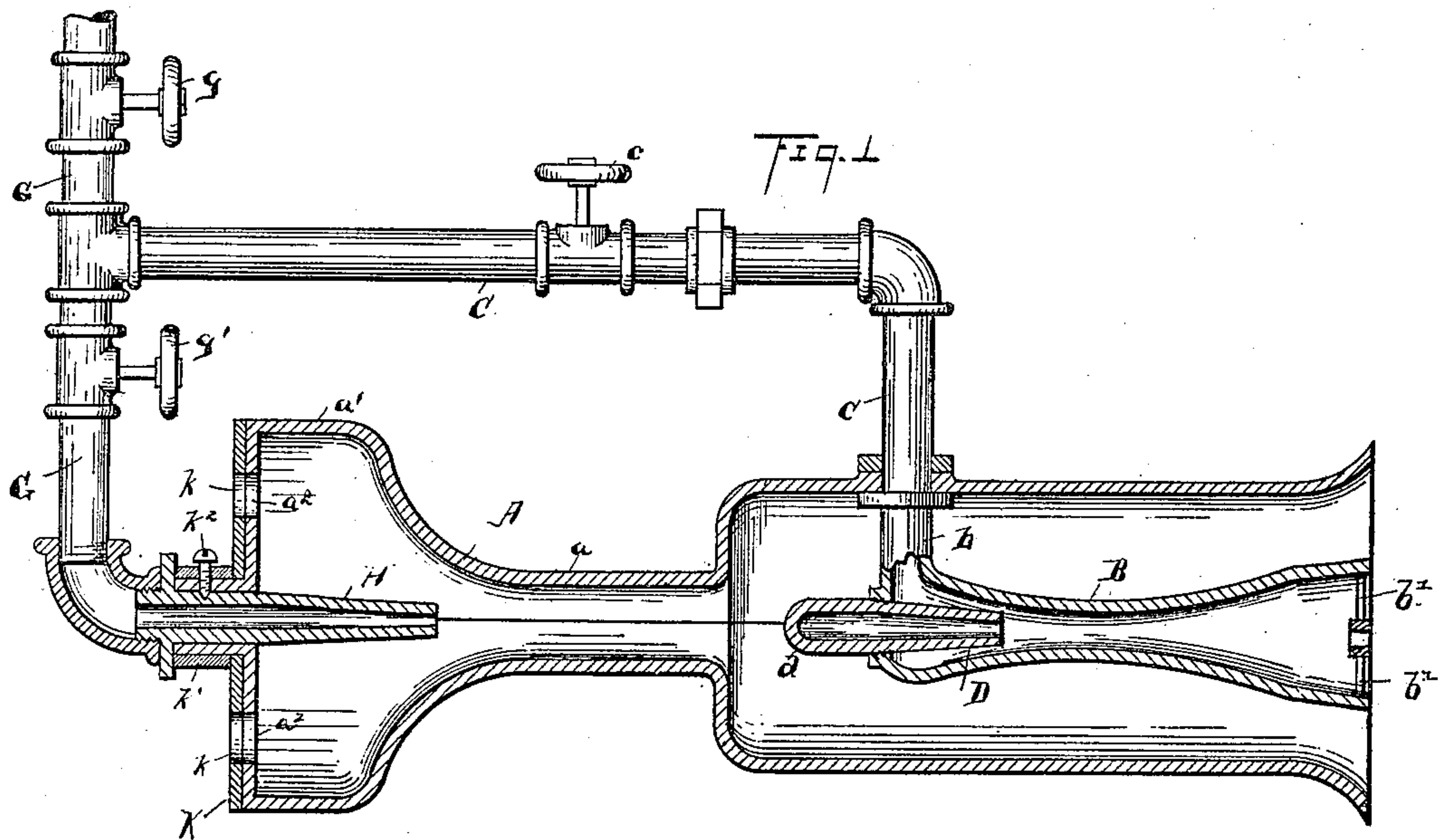


(No Model.)

T. M. PAINTER.  
VAPOR BURNER FOR STEAM BOILERS.

No. 459,791.

Patented Sept. 22, 1891.



Witnesses  
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Inventor  
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By his Attorney  
W. T. Fisher.



# UNITED STATES PATENT OFFICE.

THOMAS M. PAINTER, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO  
RICHARD E. OGLEBAY, OF SAME PLACE.

## VAPOR-BURNER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 459,791, dated September 22, 1891.

Application filed November 6, 1890. Serial No. 370,528. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS M. PAINTER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Vapor-Burners for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to vapor-burners especially adapted for steam-boilers; and it consists in the construction of the burner, substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of the burner with the pipes leading thereto in full lines. Fig. 2 is a plan view of the burners with portions thereof broken away and the oil-supply pipe and its connections shown in horizontal sections. Fig. 3 is a vertical sectional view of the coupling for the oil-supply or feed-pipe and showing air-inlet openings at its top, these, however, being at right angles to the section shown in Fig. 2. Fig. 4 is a side elevation of a rotary valve employed to control the air-supply at the rear of the burner. Fig. 5 is a front elevation of the inner flaring tube through which the oil and steam issue from the burner.

This burner, as above stated, is designed especially for steam-boilers, although its use is not thus limited, and employs steam in connection with the oil as well as a steam pressure and supply upon the outside of the oil and steam passage arranged centrally in the burner, all as hereinafter more fully described.

A represents the outer casing or shelf of the burner, and B is the inner supply-tubes. This tube is formed with a neck *b* at right angles to its inner end, with which the steam-supply pipe C is connected and through which steam issues into the said tube B.

Projecting into the rear end of the tube B is the oil or vapor jet D, arranged in this instance horizontally and projecting into the tube B some distance past the point at which the steam enters, so that in operation the steam issuing through pipe C and into the

tube B will act on the principle of a siphon to draw the vapor through the jet D and carry it forward into the furnace. The rear end of the tube B is somewhat enlarged, so as to form a steam-chamber round about the inward-projecting end of the jet, while the central portion of the tube is contracted to form an interior passage for the combined air, steam, and vapor, and the outer end is flared so as to scatter or spread the commingled air, vapor, and steam and give a larger burning area than there would be if it issued in a small compact body. The outer end of the tube B, as seen in Fig. 5, has a number of ribs or strips *b'* radiating from a small central disk to the edge of the tube, said parts serving to further spread and break up the volume of air, vapor, and steam that issues through the said tube. The jet D has a tubular extension forming an elbow which passes out laterally through the casing A, and upon its outer extremity is secured a coupling-joint E, into which the oil-supply pipe F projects. The outer portion of this coupling is so much enlarged as to form a chamber around about the inwardly-projecting and contracted extremity of the oil-supply pipe, while the inner portion of the said coupling is contracted to connect with the elbow *d* and also to form a siphon for the air which is in said chamber, an air inlet or orifice *e* being provided at the side in said chamber. The supply-pipe F has a valve *f* to control the supply of the fluid.

Obviously the parts here described and referred to by letters D, E, and F need not be made exactly as shown and described, but may be made in one or more parts and differently connected, provided the same function of result be obtained. It will be seen that the pipe F terminates outside of the casing A, and that it is impossible on account of its location and the volume of steam that intervenes between the jet of said pipe and the frame for any carbon or other objectionable deposit to be formed in the vapor-channel. This is an important consideration in burners of this kind in which there is a constant tendency to clog up and be obstructed and rendered useless by carbonizing. The pipe C leads back to a general supply-pipe G, to which it is coupled. The said pipe G extends



down to the rear of the burner-casing A, where it has an independent inlet-extension H. The casing A, back of its main body and of the steam and vapor inlets, has a narrow and contracted neck  $a$ , and then back of this neck an enlarged head  $a'$ , into which the pipe connection H projects with its extremity partially in the neck  $a$ . This head  $a'$  is provided with air-passages  $a^2$ , and a rotating valve K is arranged upon said head and provided with openings  $k$ , adapted to register with the openings  $a^2$ , so that said openings may be open or closed, as may be required. The valve K is held in position by means of a collar  $k$  on the tubular projection on the end of the head  $a'$ , and a set-screw  $k^2$  extends from the said collar in said tubular projection to the pipe connection H and locks the same in position, thus forming a slip-joint for said pipe connection H. The pipe G has a main control-valve  $g$ , and the projection of said pipe below its connection with pipe C has another valve  $g'$  and the pipe C has a valve  $c$ , by which the flow of steam through said pipes is easily controlled. The advantage of a burner constructed after the principle here shown and described is found in the perfect combustion of the oil-vapors which is thereby insured. In the first place I have commingled vapor, air, and steam issuing through the tube B, and this is re-enforced and the flame is further fed by the commingled steam and air which passes from the rear of the burner through the neck  $a$  into the main chamber and onward between the casing A and the tube B. Thus the burner

is supplied with all the oxygen that can be demanded by the amount of oil or vapor required to obtain the requisite heat, and the decomposition of the steam in the furnace contributes materially to the intensity of the heat and the combustion of the vapor. The outer volume of steam and air issuing from about the side of the tube B mingles with the vapor, air, and steam which passes through said tube, and the result is a complete and perfect consumption of the vapor, which is necessary.

Having thus described my invention, what claim as new, and desire to secure by Letters Patent, is—

1. In a vapor-burner, the outer casing having a contracted neck near its center and provided with steam and oil or vapor inlets near the front of the casing and steam and air inlets at the rear end of the burner, substantially as described.

2. The outer casing having a contracted portion  $a$  and a head  $a'$ , an inside commingling-tube at the front of the casing, and steam and oil or vapor pipes discharging into said tube, said outer casing having air-inlets in the head  $a'$  and a steam-jet to force the air through the neck  $a$  and through the burner, substantially as described.

Witness my hand to the foregoing specification this 10th day of October, 1890.

THOMAS M. PAINTER.

Witnesses:

H. T. FISHER,

NELLIE L. McLANE.