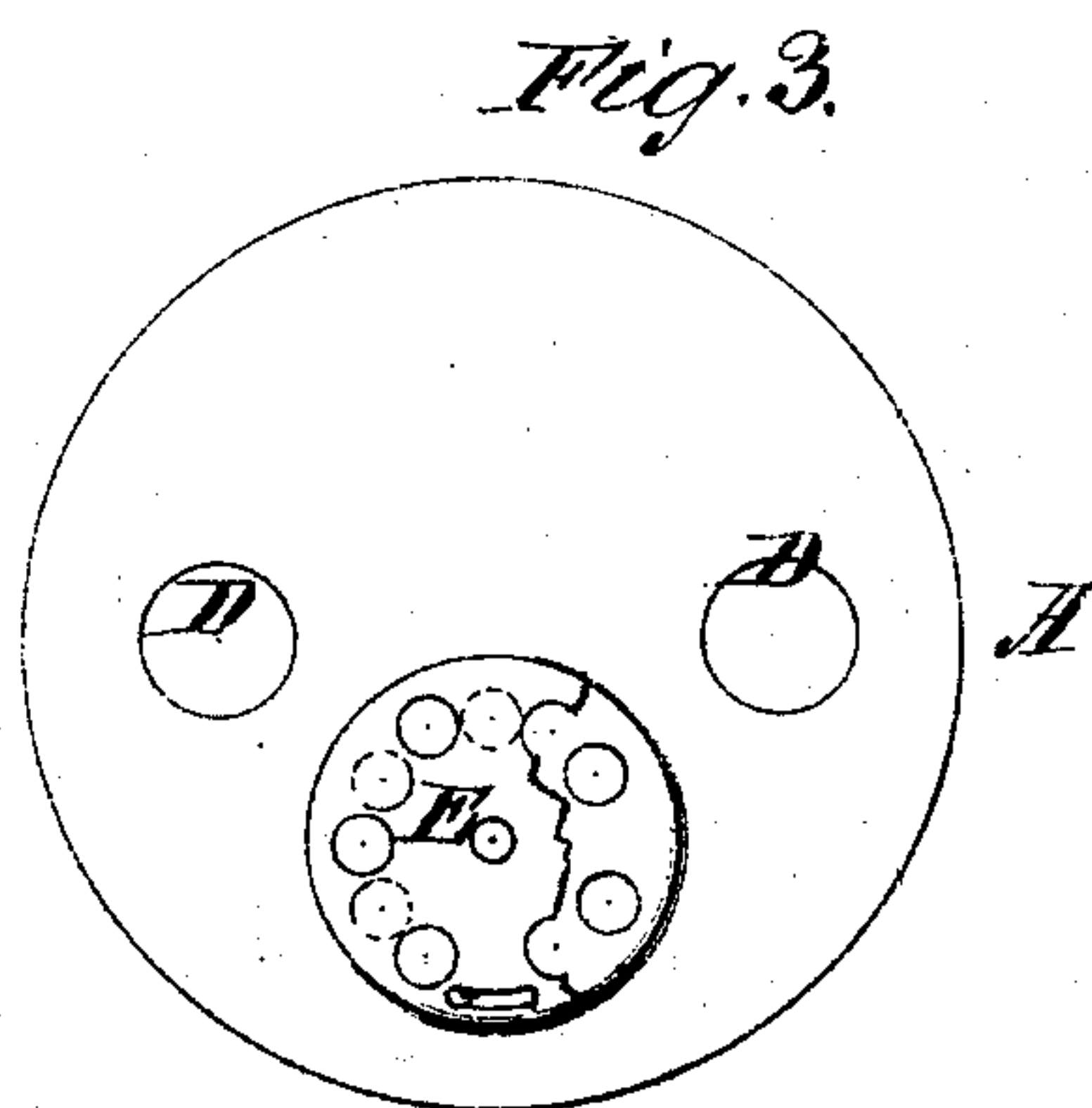
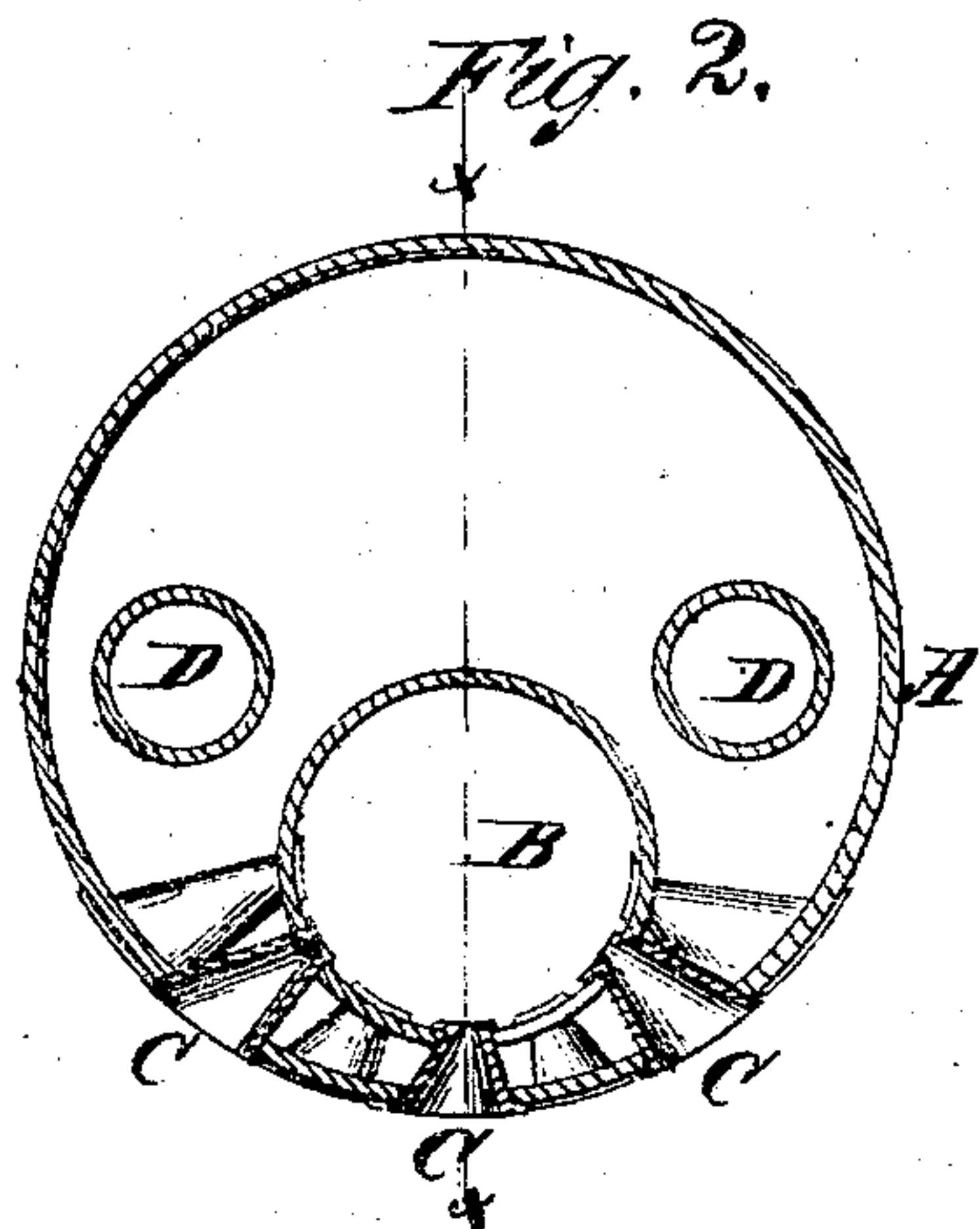
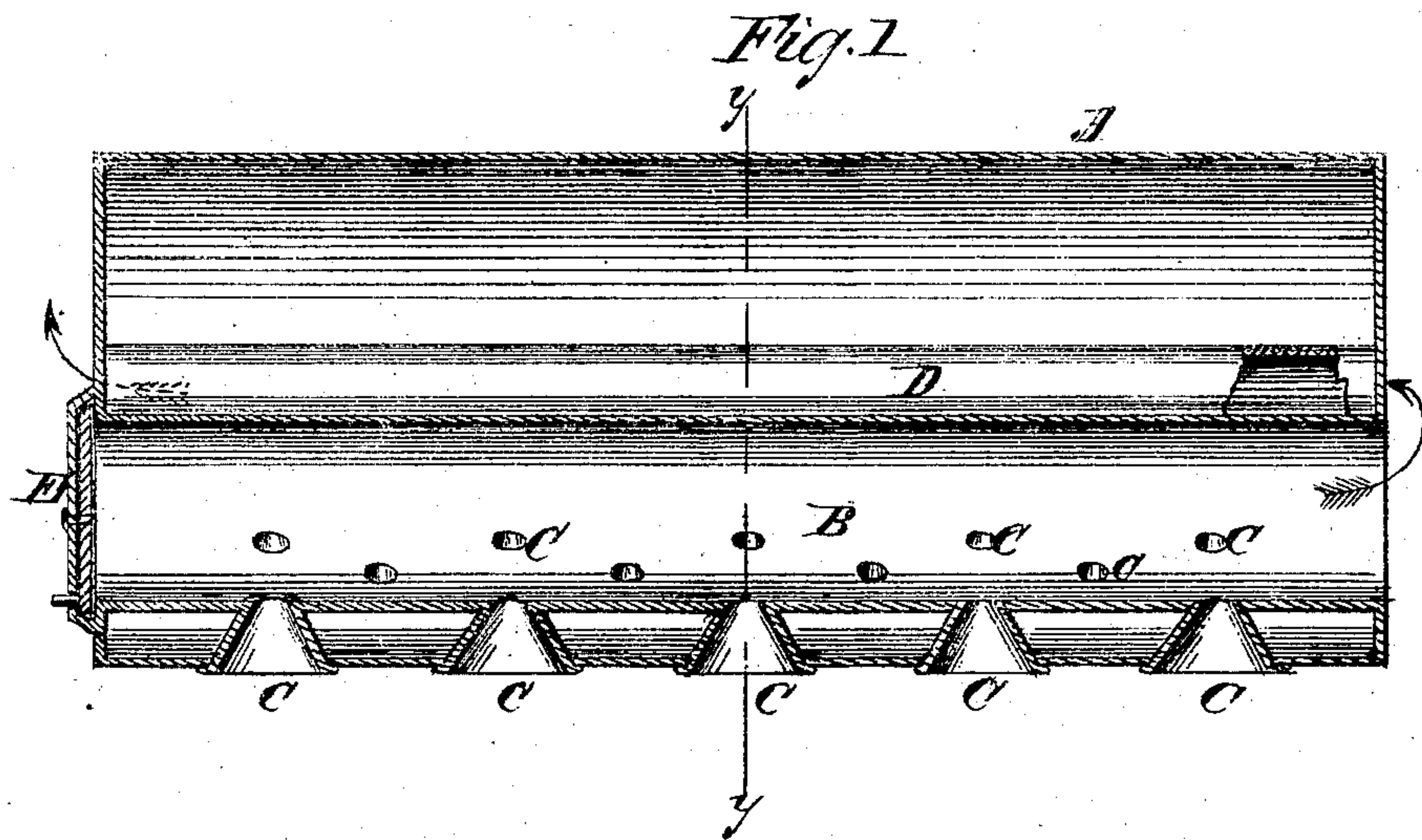


# G. Keen. Steam Boiler.

118246

PATENTED AUG 22 1871



Witnesses:  
John Becker.  
Wm H. C. Smith.

Inventor:  
G. Keen.  
PER *Wm H. C. Smith*  
Attorneys.

# UNITED STATES PATENT OFFICE.

GEORGE KEEN, OF NORTH MCGREGOR, IOWA.

## IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. 118,246, dated August 22, 1871.

*To all whom it may concern:*

Be it known that I, GEORGE KEEN, of North McGregor, in the county of Clayton and State of Iowa, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

The object of this invention is to increase the steam-generating surface of the ordinary flue-boiler and to consume the smoke and gaseous products of combustion, thereby economizing fuel; and it consists in a series of short funnel-shaped conducting-tubes, which connect the furnace or fire-box with a main flue or combustion-chamber of the boiler, and in an adjustable damper at the front end of the said main flue, by means of which any required amount of atmospheric air may be admitted to mingle with gaseous products of combustion in the flue, thereby supplying an additional amount of oxygen to such gases and consuming them. It also consists in the general arrangement and combination of parts, as will be hereinafter more fully described.

In the accompanying drawing, Figure 1 represents a vertical longitudinal section of my improved boiler taken on the line *xx* of Fig. 2. Fig. 2 is a vertical cross-section taken on the line *yy* of Fig. 1. Fig. 3 is a front end view of the boiler, showing the adjustable damper.

Similar letters of reference indicate corresponding parts.

A represents the shell of the boiler. B is a flue, or more properly a combustion-chamber, in this arrangement, as it receives all the smoke and gaseous products of combustion from the fire-box below, and such smoke and gases are mingled with atmospheric air therein and consumed. C repre-

sents short funnel-shaped flues, more or less in number, which pass through the bottom of the boiler and connect the combustion-chamber B with the furnace. D D are return-flues through the boiler, which connect with the chimney. E is an adjustable damper over the front end of the chamber B. The boiler is placed directly over the fire-box or furnace. The smoke and gaseous products of combustion pass into the combustion-chamber B through the flues C. The damper E is so adjusted that jets of air are admitted, which mingle with the heated gases and consume the smoke and carbon in the chamber. The incombustible gases pass into a cinder-box in the rear of the boiler and from thence into the return-flues D, and are discharged into the chimney, as indicated by the arrows.

In ordinary furnaces carbonic oxide is formed and carries off a large amount of carbon or fuel. If atmospheric air is allowed to mingle with this oxide while the latter is in its heated state it is given an additional supply of oxygen, which consumes the extra carbon in the combustion-chamber and converts the carbonic oxide into carbonic acid. The smoke is also consumed, and the result is the temperature of the combustion-chamber is greatly increased, fuel is saved, and the smoke nuisance is abated.

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

The smoke-consuming chamber B having damper E to admit air from the outside, and conical flues C to bring up the products of combustion thereinto from a fire-box beneath, when arranged in a boiler, as and for the purpose specified.

GEORGE KEEN.

Witnesses:

C. L. MELLER,  
LOUIS RICE.