

No. 728,782.

PATENTED MAY 19, 1903.

W. TATE & M. L. CABLE.
COMBINED WATER HEATER AND CONDENSER.

APPLICATION FILED SEPT. 24, 1902.

NO MODEL.

Fig. 1.

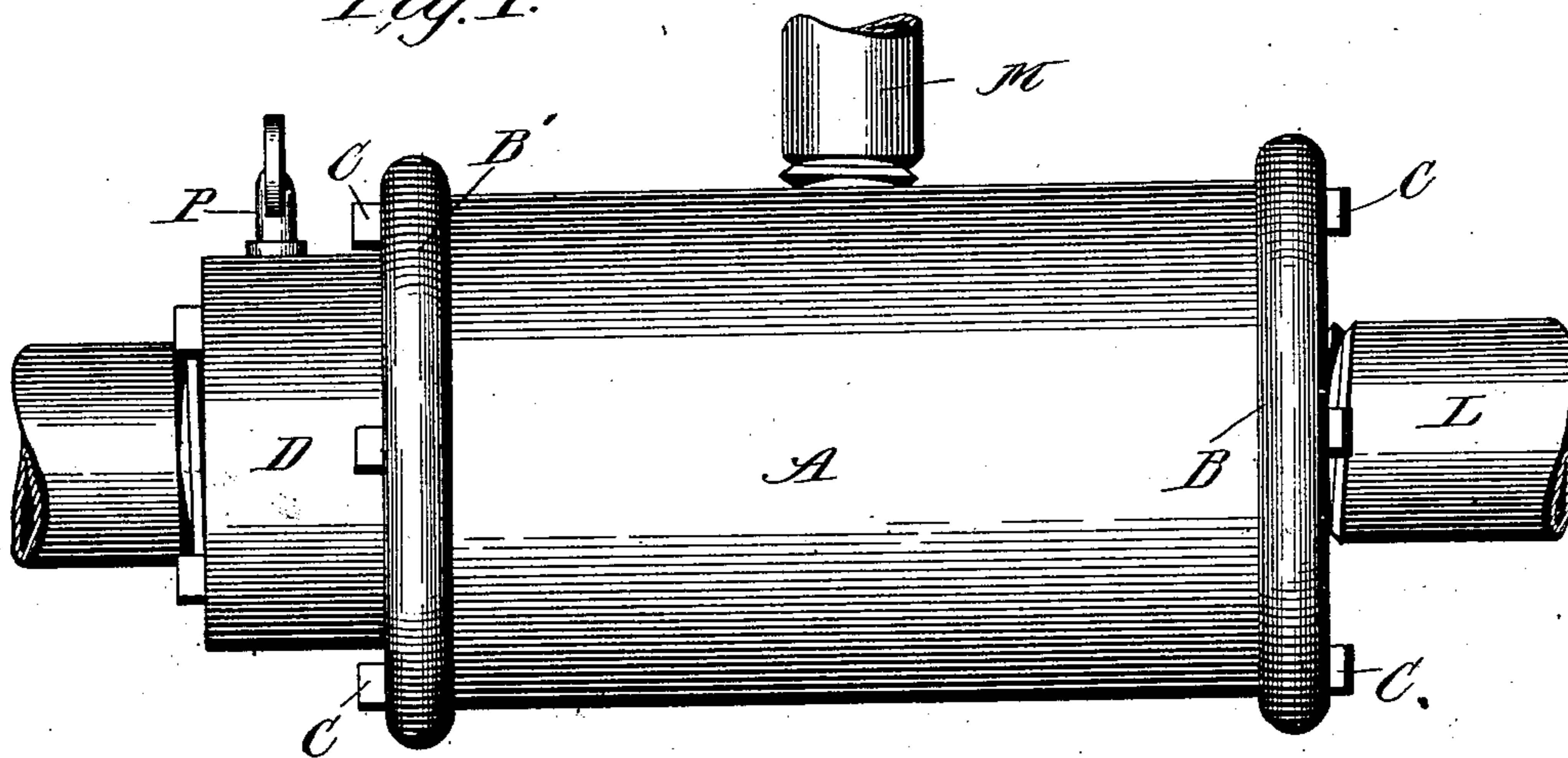


Fig. 2.

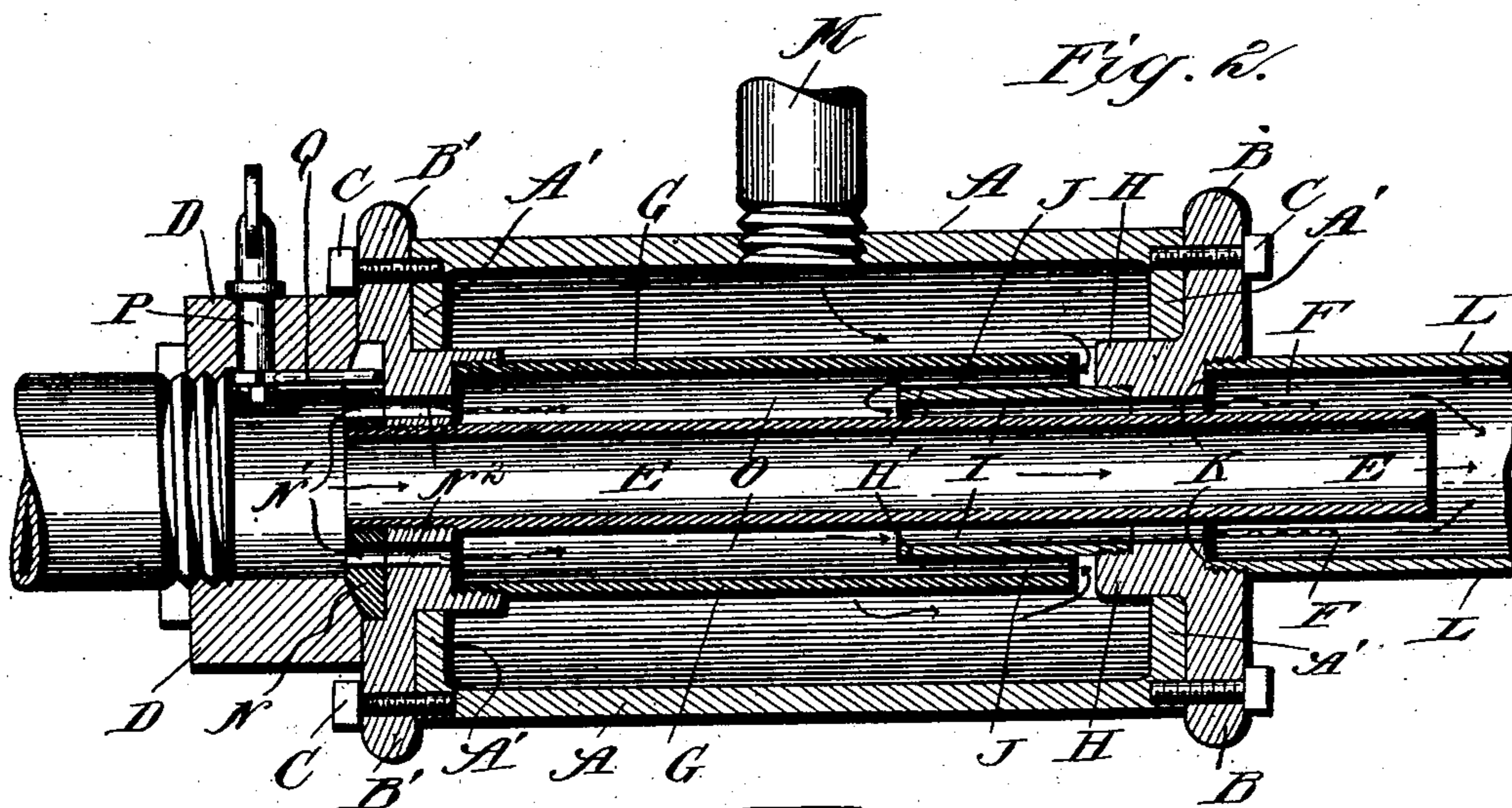
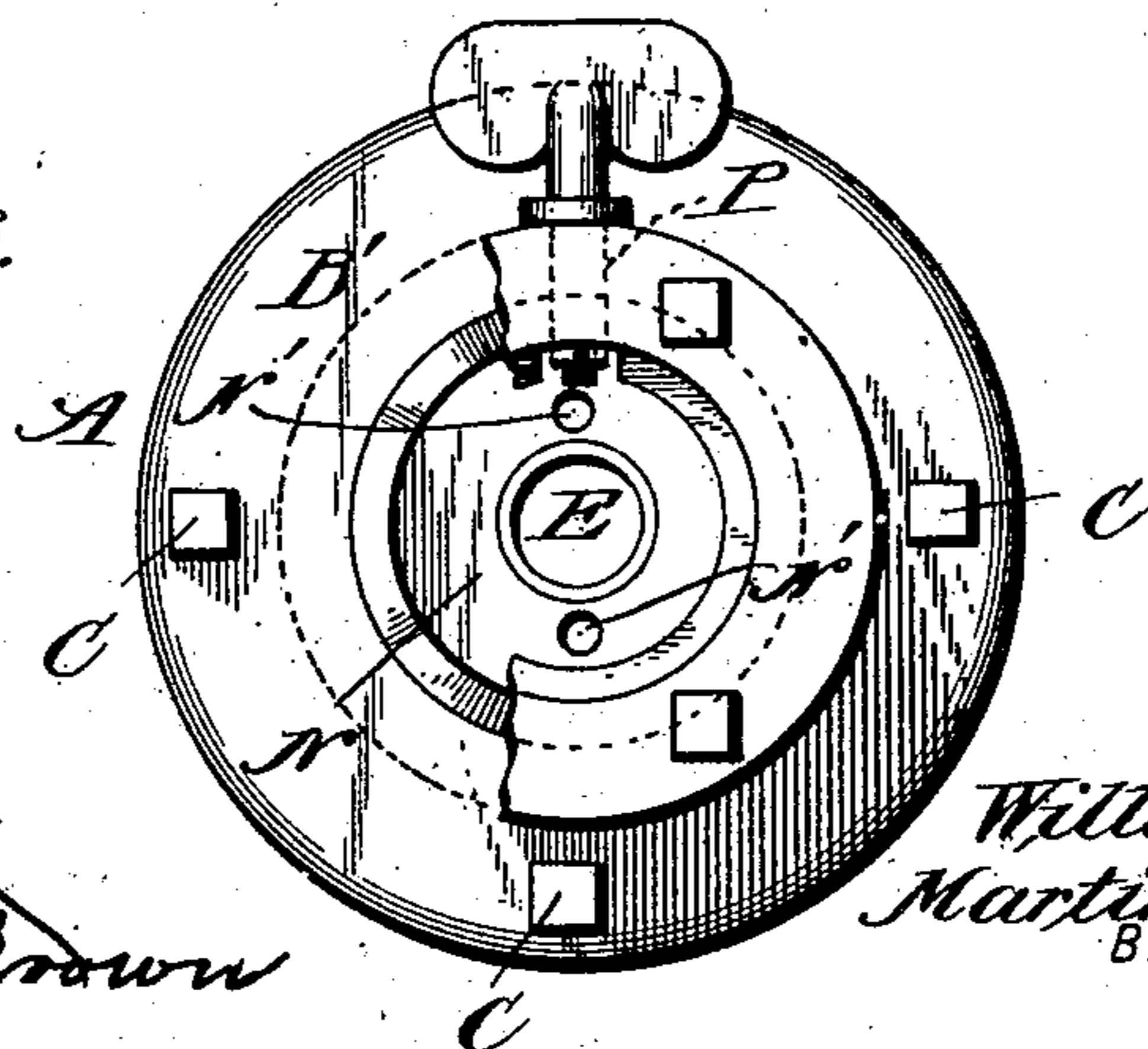


Fig. 3.



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WILLIAM TATE AND MARTIN L. CABLE, OF GREENSBORO, NORTH CAROLINA.

COMBINED WATER HEATER AND CONDENSER.

SPECIFICATION forming part of Letters Patent No. 728,782, dated May 19, 1903.

Application filed September 24, 1902. Serial No. 124,704. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM TATE and MARTIN L. CABLE, citizens of the United States, and residents of Greensboro, in the county of Guilford and State of North Carolina, have invented certain new and useful Improvements in a Combined Feed-Water Heater and Condenser, of which the following is a specification.

Our invention has for its object improved means whereby feed-water for steam-boilers and heating plants generally may be more effectually heated by exhaust-steam or return water from radiator heating systems.

The invention also comprehends improved means adapted to condense exhaust-steam and the water thereof be mingled with the feed-water as it passes along through to a hot-water pump operating to force the heated feed-water into the boiler.

More specifically stated, the invention consists in a special apparatus of novel and improved construction, which we will now proceed to describe in detail with reference to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a view showing our invention in side elevation. Fig. 2 is a central vertical longitudinal sectional view through the whole apparatus; and Fig. 3 is an end view, partly broken away, showing the valve at the feed end of the apparatus.

In carrying out our invention we employ a cylindrical casing or drum A, having annular flanges A' at both ends, which may project inwardly, as shown, or outwardly, if so desired. One end of the drum A is closed by a head B and the other by a similar head B', both of which are secured by screw-bolts C, tapped into the flanges A'. The head B is provided with a socket B, perforated and adapted to form support for a centrally-located or inner steam-passage E, extending through an enlarged opening F in the head B'. Within the drum A and around the steam pipe or passage E we arrange a cylinder G, having support at one flange A' and extended through the drum A to a point just short of the far end, as shown in Fig. 2. The inner side of the head B' is provided with an annular shoulder H and a reduced similar

shoulder H', through which the exit end of the steam passage or pipe E projects, leaving a space or passage-way I between them. The annular shoulder H' is arranged to project into the free end of the cylinder G, leaving a space or passage J. The outside of head B has an enlarged screw-threaded socket K, into which is screwed one end of a pipe L, in size adapted to leave an intermediate space forming a continuation of the passage-way I. (See Fig. 2.)

M indicates the feed-water inlet into the drum A.

Within the socket D on the outer side of the head B we arrange an annular rotatable flat valve N, having port-holes N', adapted to register with similar port-holes N² in the head B and opening into the space O between the steam passage or pipe E and the cylinder G. Any suitable means may be utilized adapted to rotate the valve N to position providing open passage-way through the ports N' N²; but in our drawings we show a headed stem P, passing through the side wall of the socket D and having a right-angle pin Q extending into a suitable recess in the valve N, adapted when the stem is turned to rotate the valve, and thereby open or close the ports N' N².

It is our idea to use the apparatus above described in connection with a hot-water pump for the purpose of heating feed-water to steam-boilers, radiator heating systems, or other similar purposes. The heating medium may be return water from radiator systems or live or exhaust steam. When steam is utilized for heating the feed-water, it is condensed within the pipe E by water flowing through the passage I.

In operation the heating medium is passed through a suitable pipe screwed into the socket D, and the feed-water is fed through the pipe M into the drum A. If the feed-water is under pressure, the valve N should be adjusted, opening the ports N' N², when pressure of steam will pass into the space O, with effect to retard passage of the cold water entering through the reduced passages J I and at the same time partially heat it. When the feed-water is under practically no pressure, the ports N' N² should be closed. With

a valve at the inlet end of the heater adapted to be operated as just described flow of the feed-water through the heater can be regulated according to the force of the feed-pump
5 operating to force the heated water into the boiler.

It will be understood that with our improved apparatus water enters the drum A through the pipe M, and thence through the
10 reduced passage J to the end of the annular shoulder H', and thence in a reverse direction through the passage I to the exit end of the pipe E, where it comes in direct contact with and is heated to maximum degree by
15 the main volume of steam, according to the pressure in the central passage and the force of the feed-pump.

Among the special advantages residing in our improved apparatus may be mentioned
20 its adaptability, since it requires but little room to be used on locomotives or with steam-ship-boilers. It is equally adapted to be used with hot-water-heating systems in connection with the boiler feed-pump operating to keep
25 a continual flow of hot water through the radiator system.

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

30 1. The combination with a feed-water pipe for a boiler and a feed-pump, of a combined heater and condenser consisting of a drum, a central passage or steam-pipe through the drum, a cylinder inclosing the said central
35 passage and spaced therefrom, an opening at one end of the said cylinder communicating with reduced passages providing a reverse water circulation ending with an outlet at the discharge end of the central passage, and a

valve at the inlet end of the central passage 40 adapted to be adjusted for opening or closing ports leading into the space between the said central passage or steam-pipe and its inclosing cylinder substantially as described.

2. The combination with a feed-water pipe 45 for a boiler and a feed-pump, of a combined heater and condenser employing a main receiver or drum having internal reduced water-passages providing a back-and-forth circulation of the water, steam-passages through the
50 drum ending at the discharge end thereof, and a valve at the inlet end of the drum adapted to be adjusted for opening and closing ports providing communication with the water-passage next to the central steam-pipe 55 substantially as described.

3. A combined feed-water heater and condenser consisting of a drum, an internal cylinder open at one end, a central passage through the drum, reverse reduced passages 60 between the said central passage and the said cylinder located at the exit end of the latter, an enlarged pipe connecting the exit end of the drum and inclosing the projecting end or exit of the central passage leaving a space 65 between them, a socket at the feed end of the drum and also an annular valve, ports closed by the said valve providing communication from the said central passage or steam-pipe into its surrounding space, and a stem pass- 70 ing through the side wall of the valve-inclosing socket adapted for adjusting the said valve, substantially as described.

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Witnesses:

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