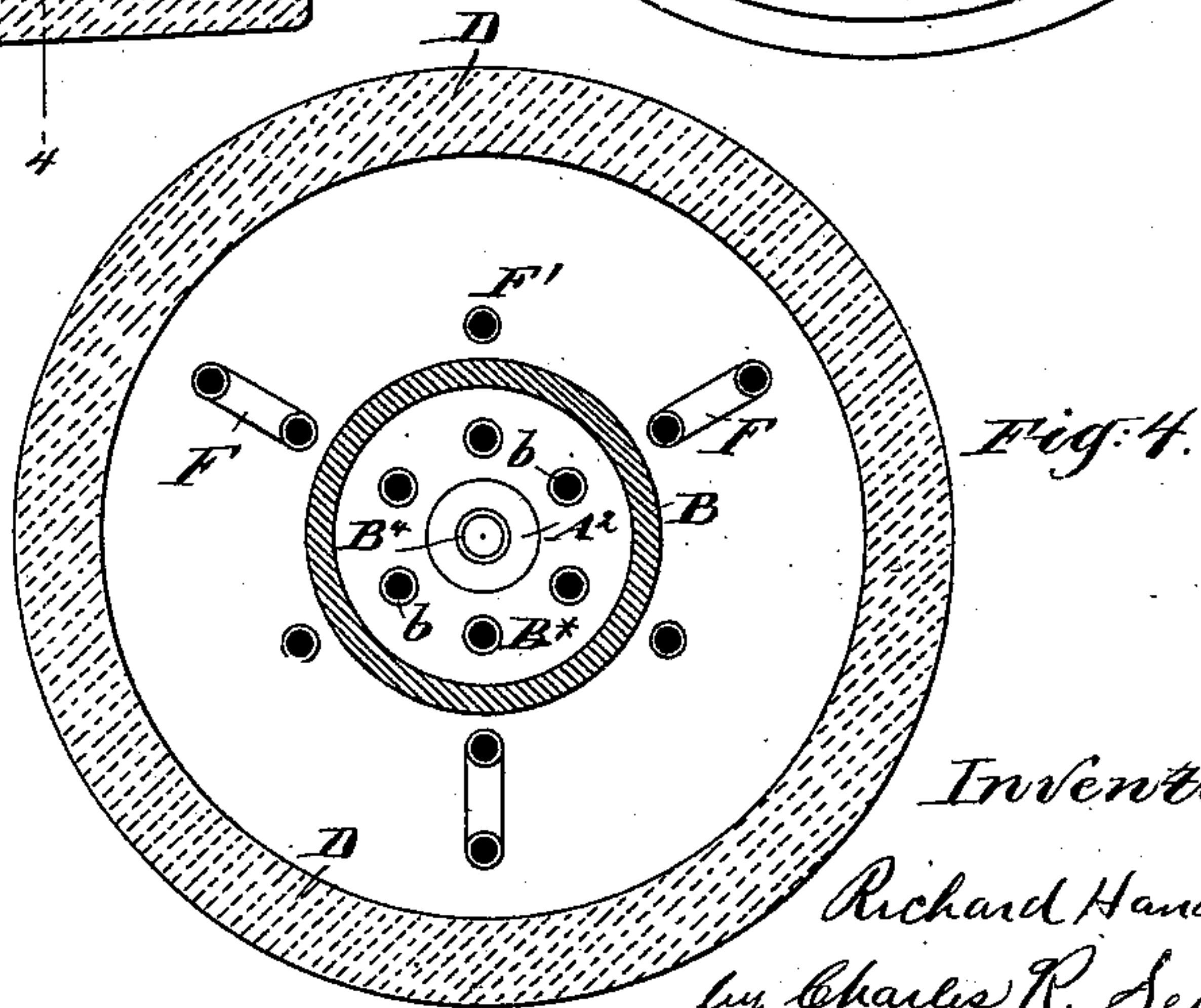
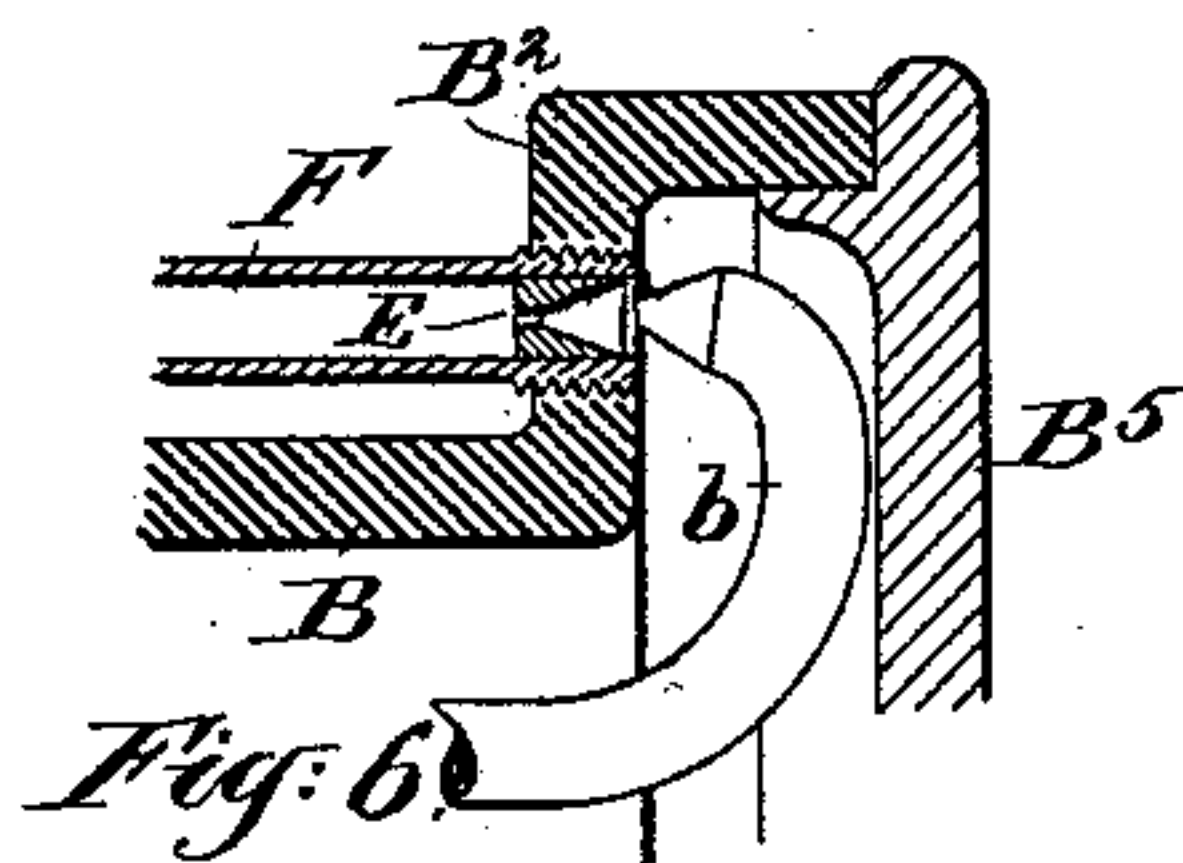
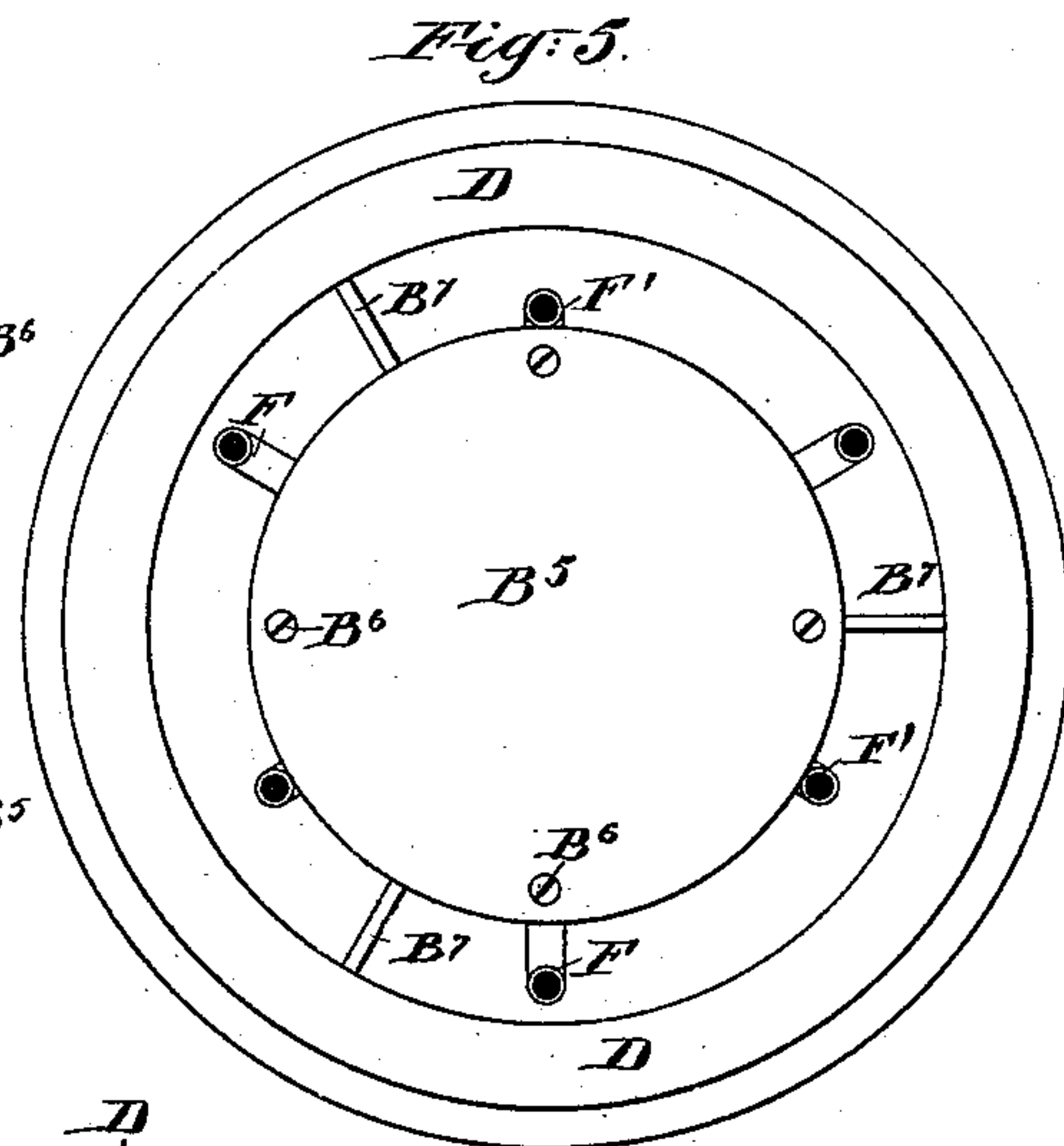
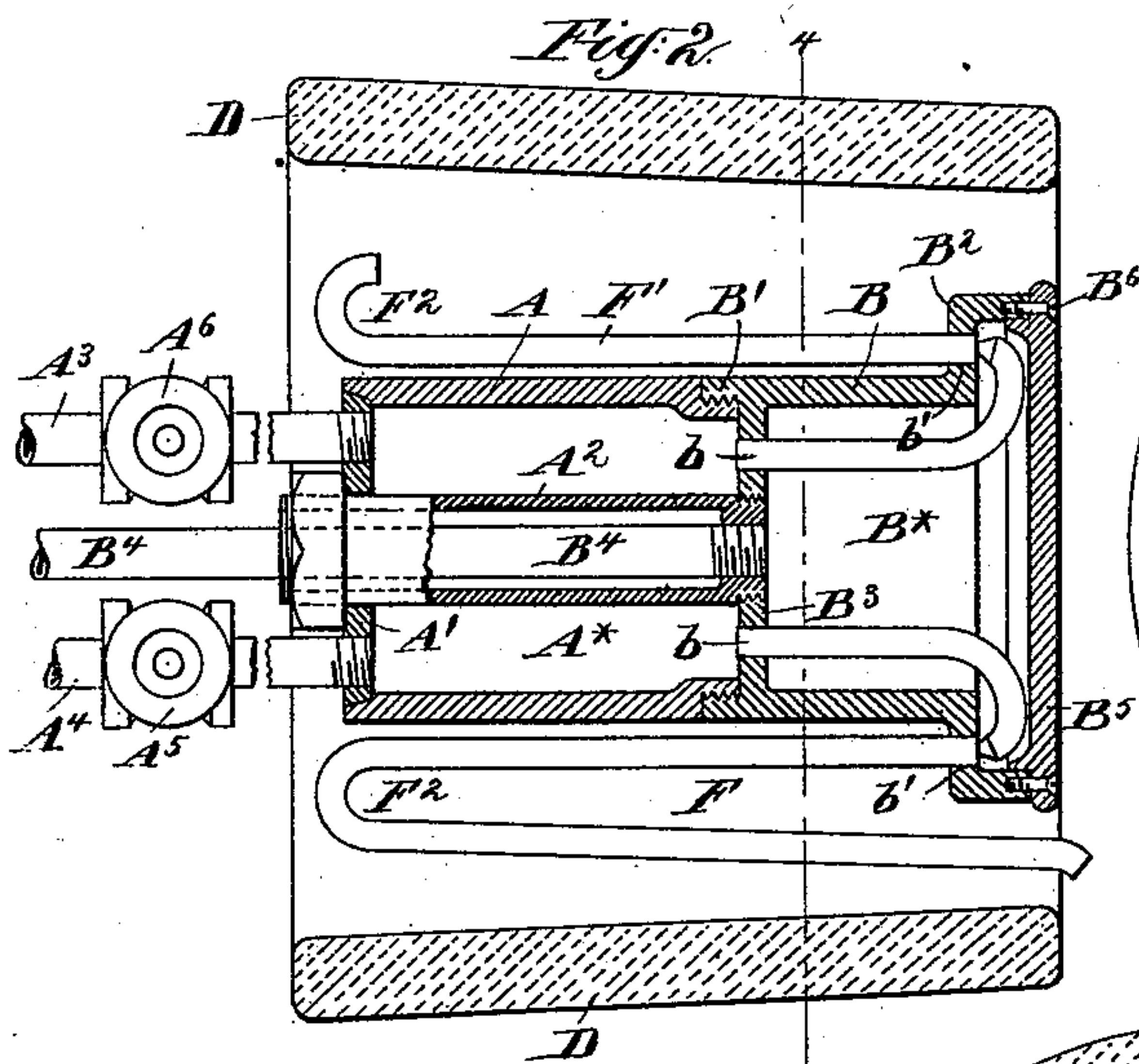
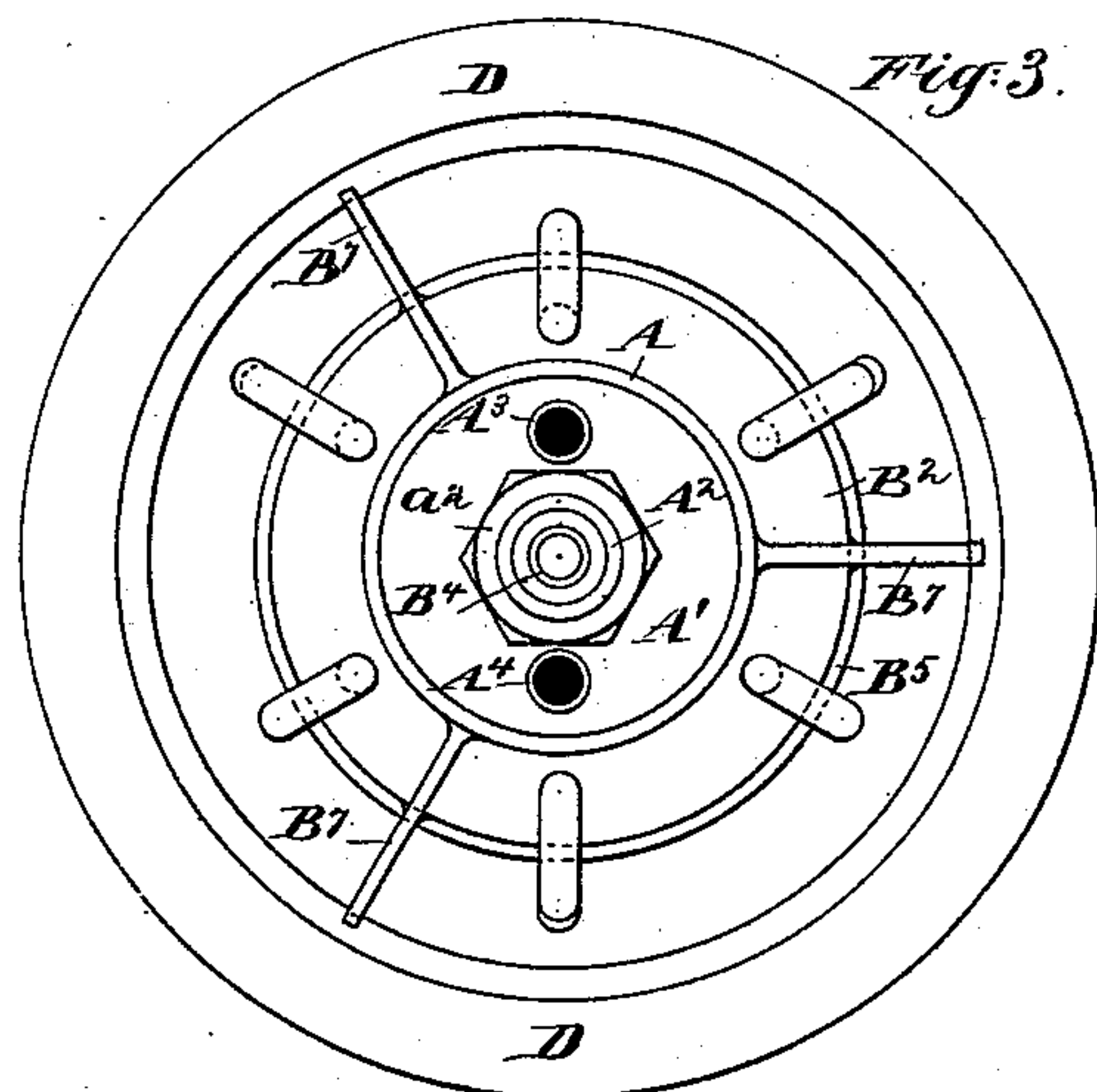
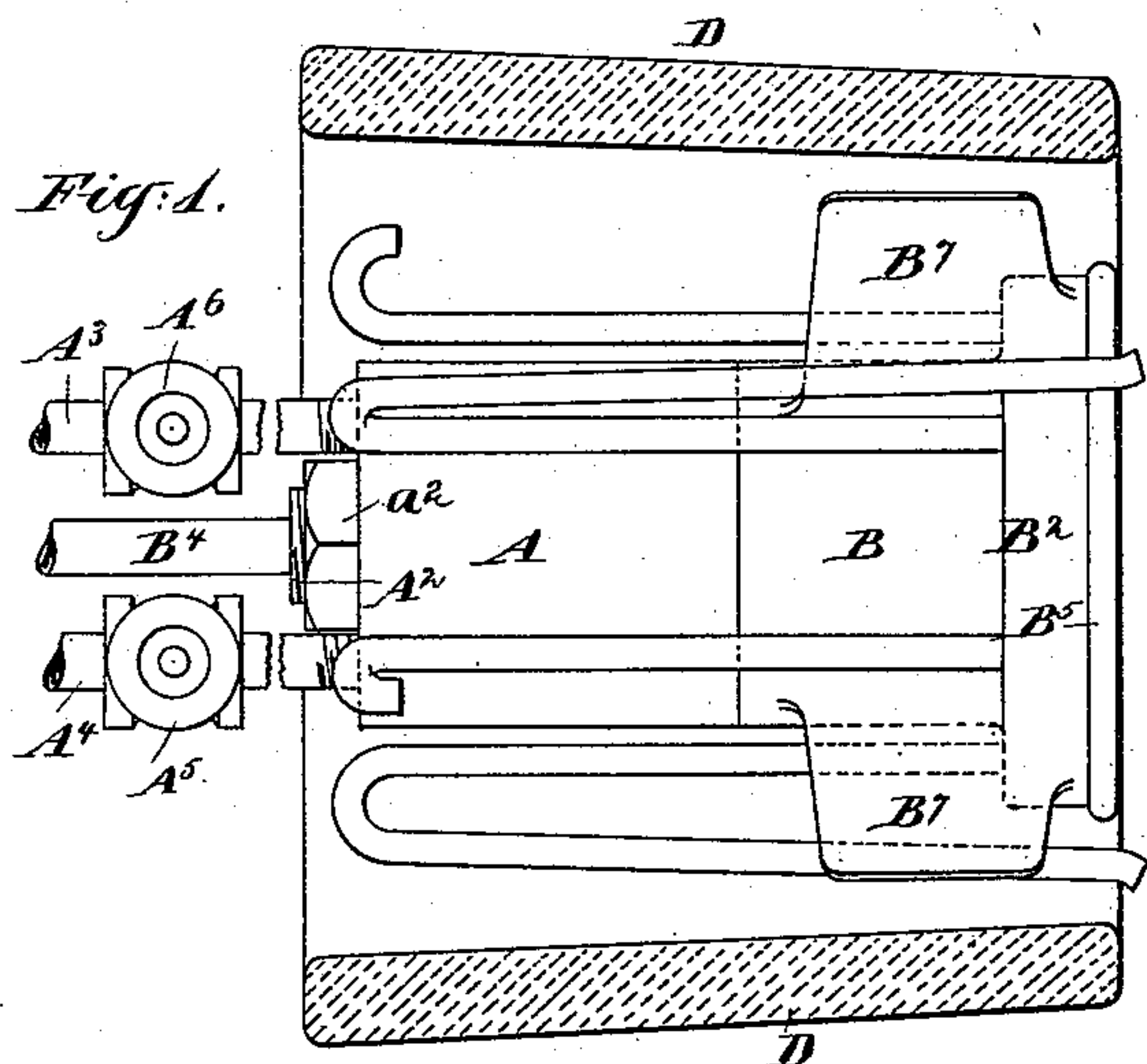


(No Model.)

R. HANDY.
HYDROCARBON BURNER OR GAS GENERATOR.

No. 532,458.

Patented Jan. 15, 1895.



Witnesses:
H. A. Johnson
M. F. Boyle

Inventor:
Richard Handy
by Charles R. Searle,
Attorney

UNITED STATES PATENT OFFICE.

RICHARD HANDY, OF BLOOMFIELD, NEW JERSEY.

HYDROCARBON-BURNER OR GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 532,458, dated January 15, 1895.

Application filed May 15, 1894. Serial No. 511,322. (No model.)

To all whom it may concern:

Be it known that I, RICHARD HANDY, a citizen of the United States, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Hydrocarbon-Burners or Gas-Generators, of which the following is a specification.

My invention relates to that class of hydrocarbon burners in which a fluid hydro-carbon, as kerosene, is vaporized by heat mixed with steam and burned to produce a heating flame for use in the furnaces of steam boilers and the like, where intense heat and economy of fuel are important.

My burner or generator consists of two cylindrical chambers, separated by a diaphragm. Oil is admitted to the forward chamber, which I will call the fixing chamber while steam under pressure is admitted to the rear chamber, the steam chamber, and is forced into the fixing chamber through a number of small pipes set in the diaphragm, breaking up the oil mechanically by the force of the steam jets and issuing thoroughly mixed with the vaporized oil through small pipes leading toward the rear, and then returning to project the flame forward and completely bathe the apparatus in the hot products of combustion.

I surround the burner with a jacket of fire brick or other suitable material, leaving an annular space between, for the induction of air required to supply combustion and prevent the radiation of heat until the flame shall have passed beyond the burner.

My apparatus is believed to be peculiarly efficient in rapidly and completely vaporizing the fluid hydro-carbon, and highly economical, yielding a greater heat with a less consumption of fuel than has been attained in any similar apparatus hitherto known to me.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1, is a side elevation with a sectional view of the jacket. Fig. 2, is a central longitudinal section. Fig. 3, is an elevation seen from the rear. Fig. 4, is a vertical section on the line 4, 4, in Fig. 2. Fig. 5, is a front elevation, and Fig. 6, is a longitudinal section of a portion on a larger scale.

Similar letters of reference indicate the same parts in all the figures where they appear.

A, is a cylindrical shell of cast iron, provided with a rear cover A', having a central aperture through which passes a tube A², to be described further on; the whole forming an annular chamber, which I will designate the steam chamber A*. The rear wall A', is drilled and tapped at two opposite points to receive the screw-threaded ends of two pipes, A³, and A⁴; one of the pipes, A³, bringing steam from a boiler not represented, and the other controlled by the cock A⁵, allowing the steam to blow through freely and carry away the water of condensation, if any.

The forward end of the shell A, is offset inwardly and is provided with screw-threads which engage in corresponding threads in a rearwardly projecting flange B', on a cylindrical shell B, of the same diameter as the shell A, at the junction, but enlarged by an exterior offset B², at the front. The shell B, is cast with a partition or diaphragm B³, provided with a screw-threaded central opening at the rear which receives the end of the tube A², above referred to. This tube extends through the cover A', and secures the latter in place by means of a nut a². At the forward end of the tube the opening is contracted and is screw-threaded on the interior, to receive the oil supply pipe B⁴, which traverses the steam chamber in the inclosing tube A², and empties directly into the fixing chamber, as shown. Six or other number of small pipes b, set in the partition B³, extend forward axially, ending in conical nozzles b², bent backward and loosely entered in certain conically formed plugs, to be described.

B⁵ is a cover plate matching tightly on the enlarged forward end of the shell B, and secured thereto by screws B⁶. The inclosed chamber thus formed I term the "fixing chamber" B*.

The offset B², is provided with small holes b' receiving each a small tube F, F', extending rearwardly to a point behind the rear wall of a steam chamber, returning by a short bend, F², and extending forward in a line parallel with the axis of the cylindrical shells. Each alternate pipe F, is carried forward a little beyond the forward edge of the cover B⁵, while

the others, marked F', stop at a point only a little beyond the bend F². The free ends of these pipes are open and unobstructed, and form the orifices at which the vapor mixes
5 with the air, and is ignited and burns. The engaged ends of these pipes, F, F', are partially closed by the above-mentioned conically bored plugs E (see Fig. 6) through which the steam from the pipes b is forced, producing a
10 violent jet action, preventing the separation of the mixed vapor and steam, and insuring a free flow of oil by causing a partial vacuum to be formed in the chamber B*, by the well-known injector action induced by the violent
15 flow of steam through the nozzles b² and plugs E. The free ends of the pipes F, are preferably turned outward at a slight angle to throw the flame in a circle of larger diameter than would otherwise be produced.

20 The pipes F', throw their flames into immediate contact with the exterior of the shells A, B, heating the inclosed chambers to a temperature at which all the oil will be vaporized and the steam super-heated.

25 I provide a jacket D, of fire-brick or analogous refractory material, in the form of a truncated cone supported on lugs B⁷, cast on the shell B, with the large end toward the rear, as shown. This jacket prevents radiation of the heat and confines the flame to the
30 outer surfaces of the shells and also serves usefully to heat a portion of the air supplied to the pipes F, at the points of ignition, and thus add considerably to the intensity of the
35 flame.

The operation is as follows: Assuming that the burner is properly placed in the fire-box of a steam boiler, and that a supply of steam under pressure is available, the attendant
40 heats the burner by surrounding it with a small portion of hot coals, or by the use of a wood fire. As soon as the burner has become well heated by this means, he opens the exhaust-cock A⁵, and then the steam supply
45 valve A⁶, allowing steam to blow through the apparatus until the interior is well heated and the water of condensation removed or evaporated. The cock A⁵, is then closed and the steam forced through the pipes b, into the
50 fixing chamber B*, and thence out through the pipes F, F'. Oil is then allowed to flow through the pipe B⁴, either by gravity or by the injector-like action of the steam in the apparatus, and enter the fixing chamber, and
55 being drawn into the pipes F, F', by meeting the steam rushing through the pipes B, is

mechanically disintegrated thereby, and instantly vaporized if not already so conditioned by the heat of the apparatus. The gas thus generated unites with the super-heated
60 steam and is ejected with great force through the pipes F, F', mingling with the air as it issues, and being ignited, produces an intensely hot flame, which insures that the apparatus shall be maintained at the high tem-
65 perature necessary for the proper vaporization of the oil, and supplies an intense heat in the boiler tubes, so long as the oil supply and other conditions are properly continued.

Modifications may be made in the forms
70 and proportions without departing from the principle or sacrificing the advantages of the invention.

I can use a greater or less number of the pipes F, and F'. I may make them all of
75 similar length.

The jacket D may be of larger or smaller diameter, as may be found preferable in any case, to insure the proper heating and vaporizing conditions.

Although I have described the invention as applied in the furnace of a steam boiler, it will be understood that the gas generators may be used in melting iron and other metals, and in many other situations.

I claim—

1. In an apparatus for vaporizing and burning liquid hydro-carbons, the steam chamber A*, fixing chamber B*, pipes b, b, communicating from the steam chamber to the fixing
90 chamber, the oil supply pipe B⁴, emptying directly into said fixing chamber, in combination with each other and with the pipes F, F', having return bends F², all substantially as herein specified.

2. In an apparatus for vaporizing and burning liquid hydro-carbons, the steam chamber A*, fixing chamber B*, pipes b, b, communicating from the steam chamber to the fixing
100 chamber, the oil supply pipe B⁴ emptying directly into said fixing chamber, the pipes F, F', having return bends F², in combination with each other and with the jacket D, surrounding the pipes and chambers, all substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

RICHARD HANDY.

Witnesses:

GEORGE H. WISSCHUSEN,
WM. H. B. SMITH.