

(No Model.)

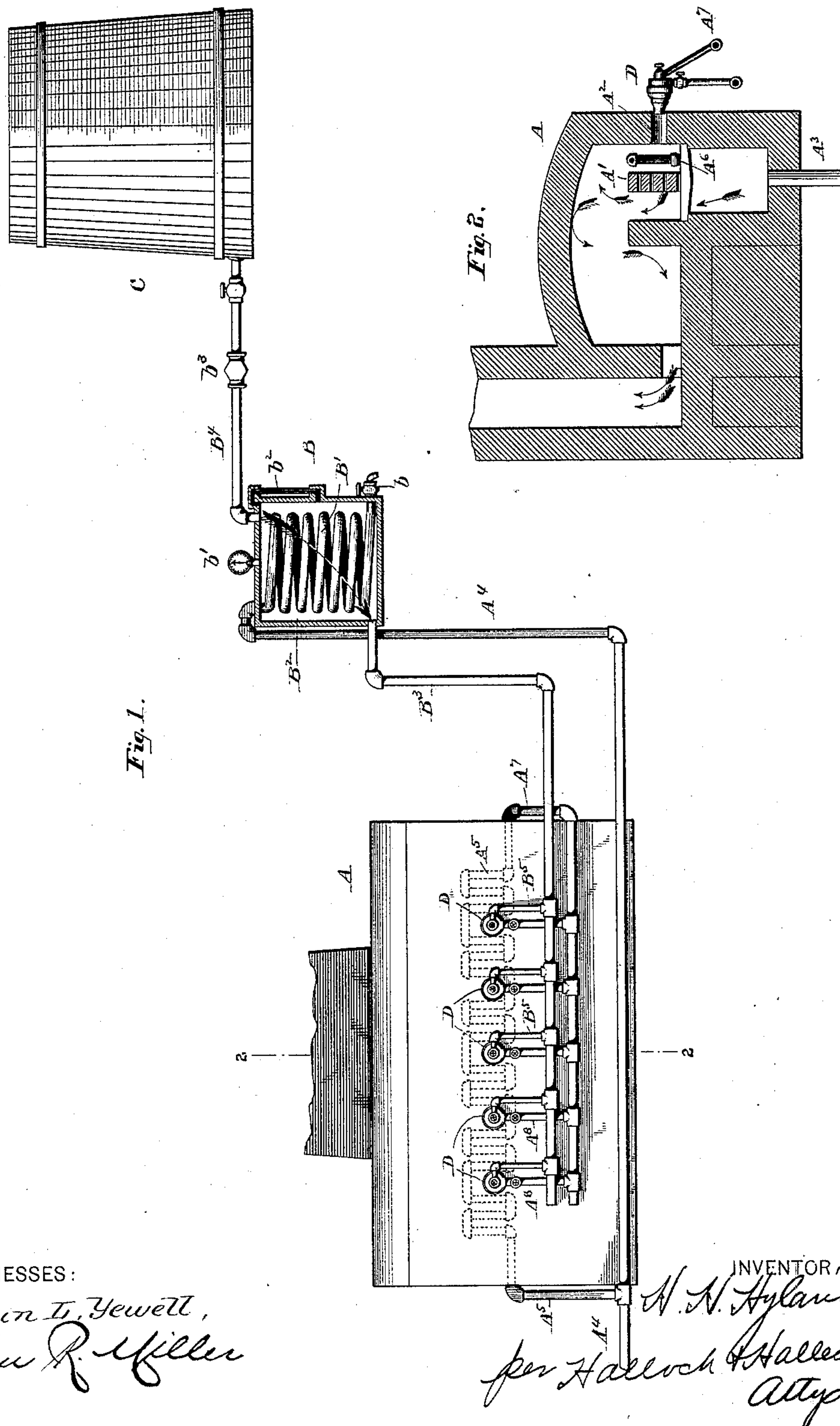
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H. H. HYLAND.

INJECTOR FOR BURNING PETROLEUM IN FURNACES.

No. 395,785.

Patented Jan. 8, 1889.



WITNESSES:

Edwin D. Yewell,
Leander R. Miller

INVENTOR,

H. H. Hyland
per Hallock & Halleck
Atty

(No Model.)

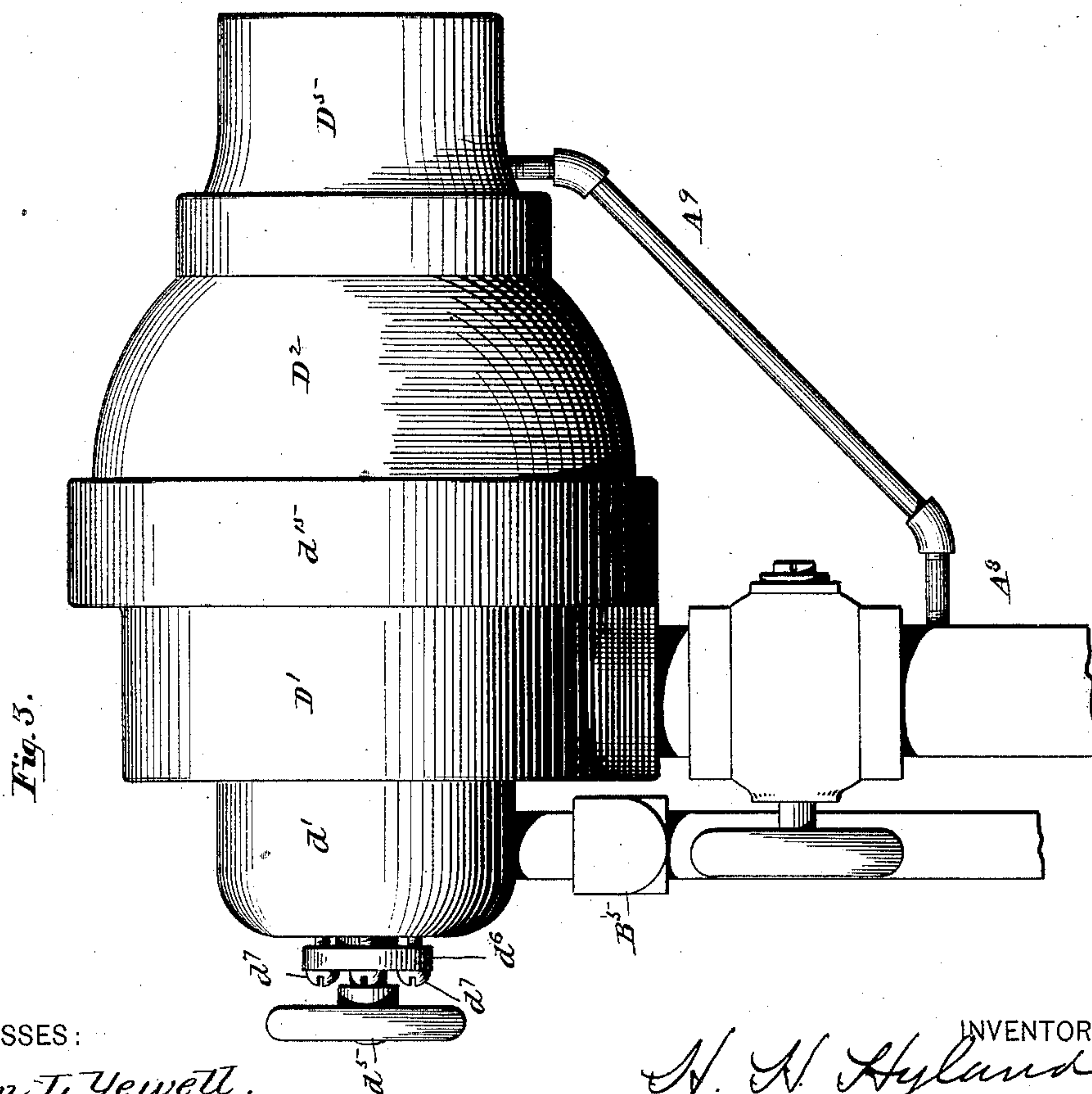
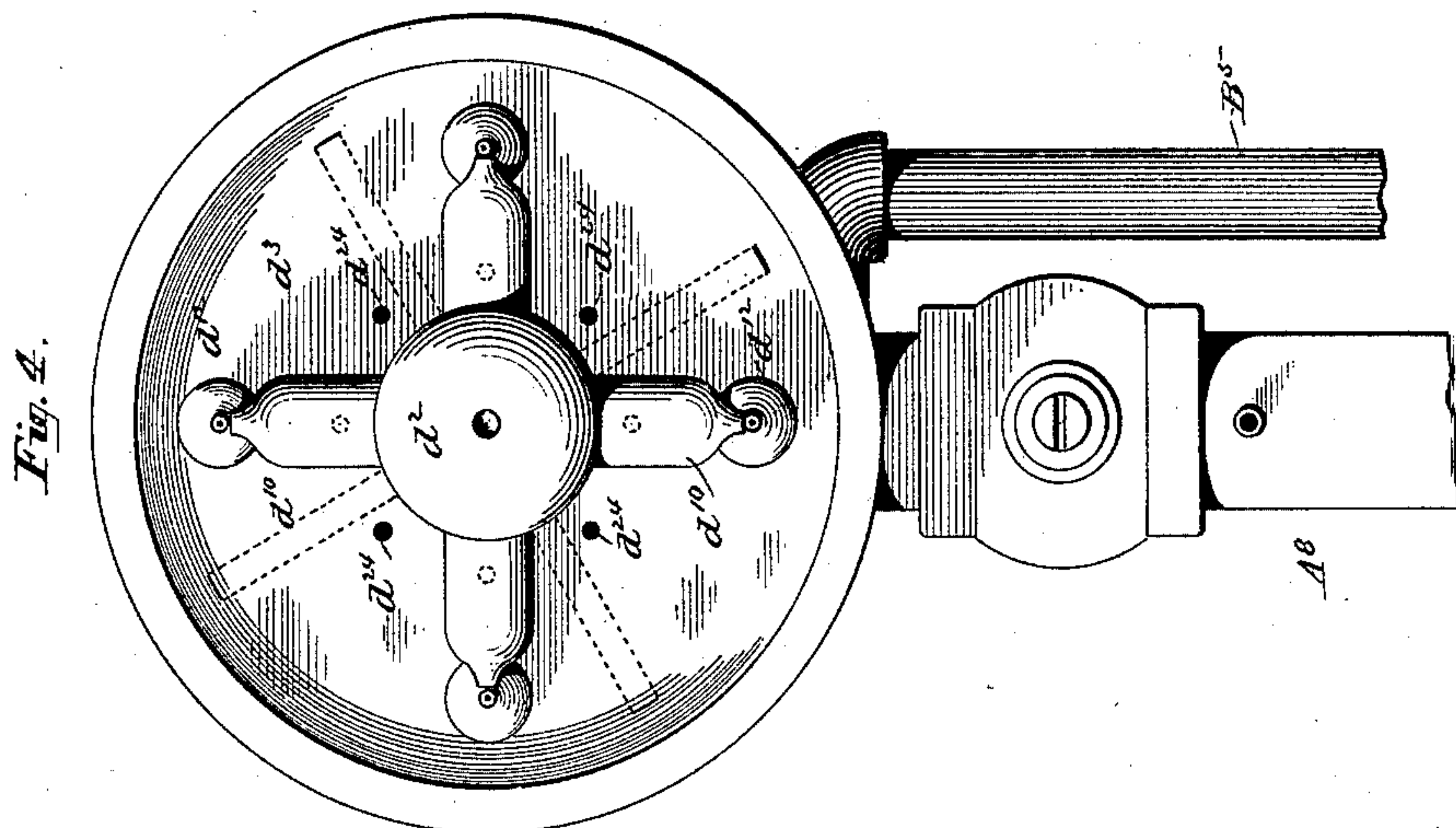
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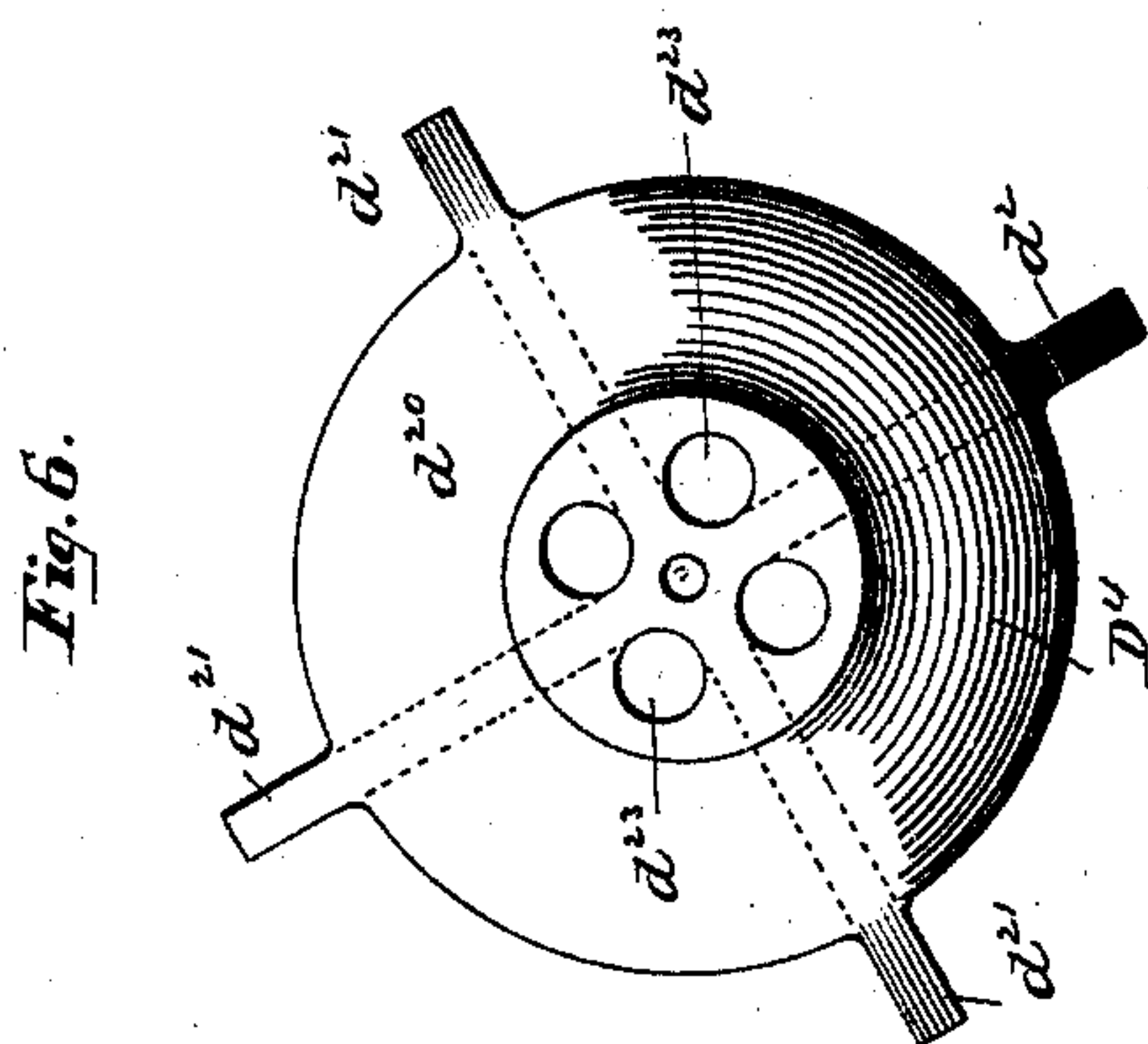
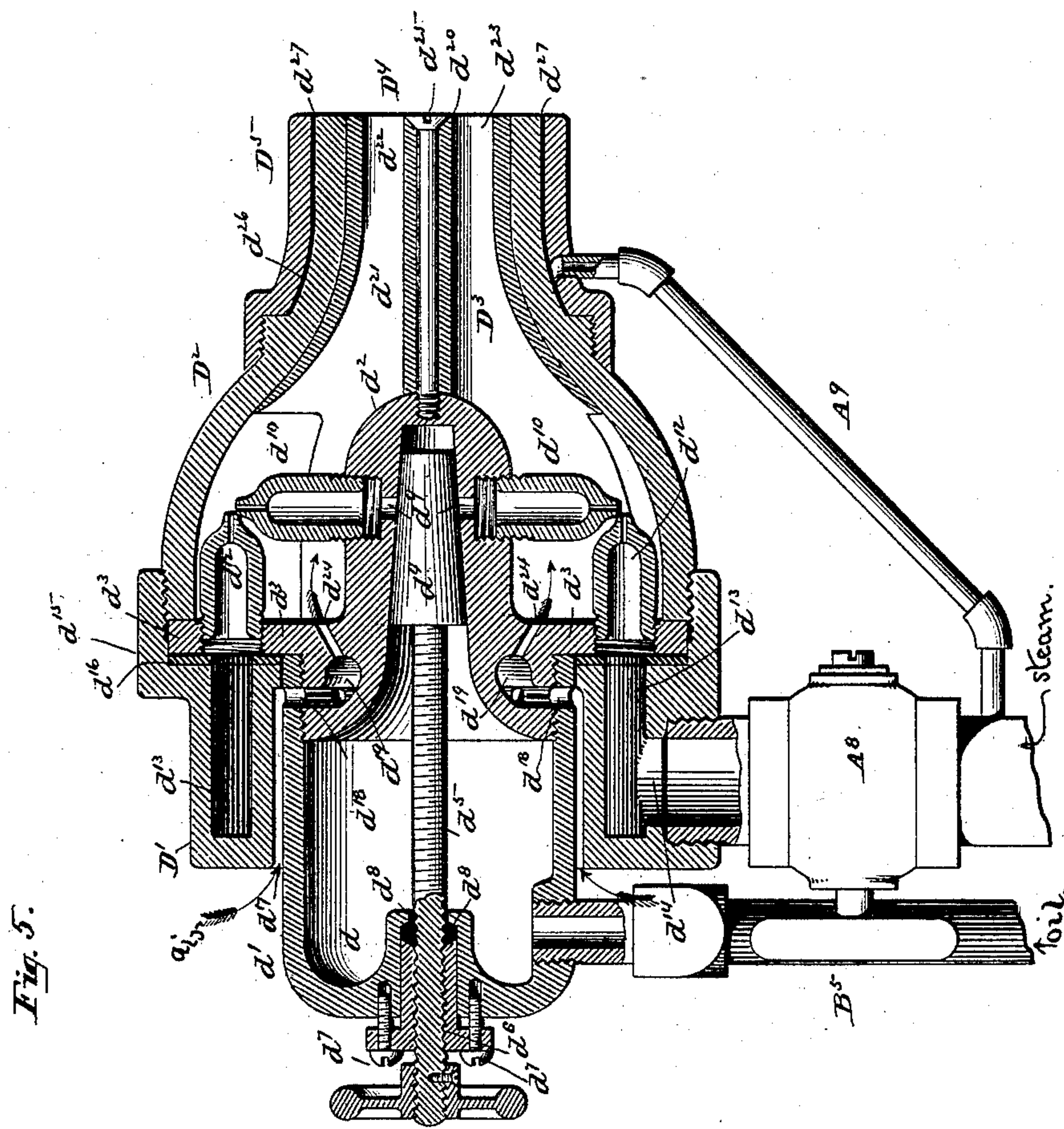
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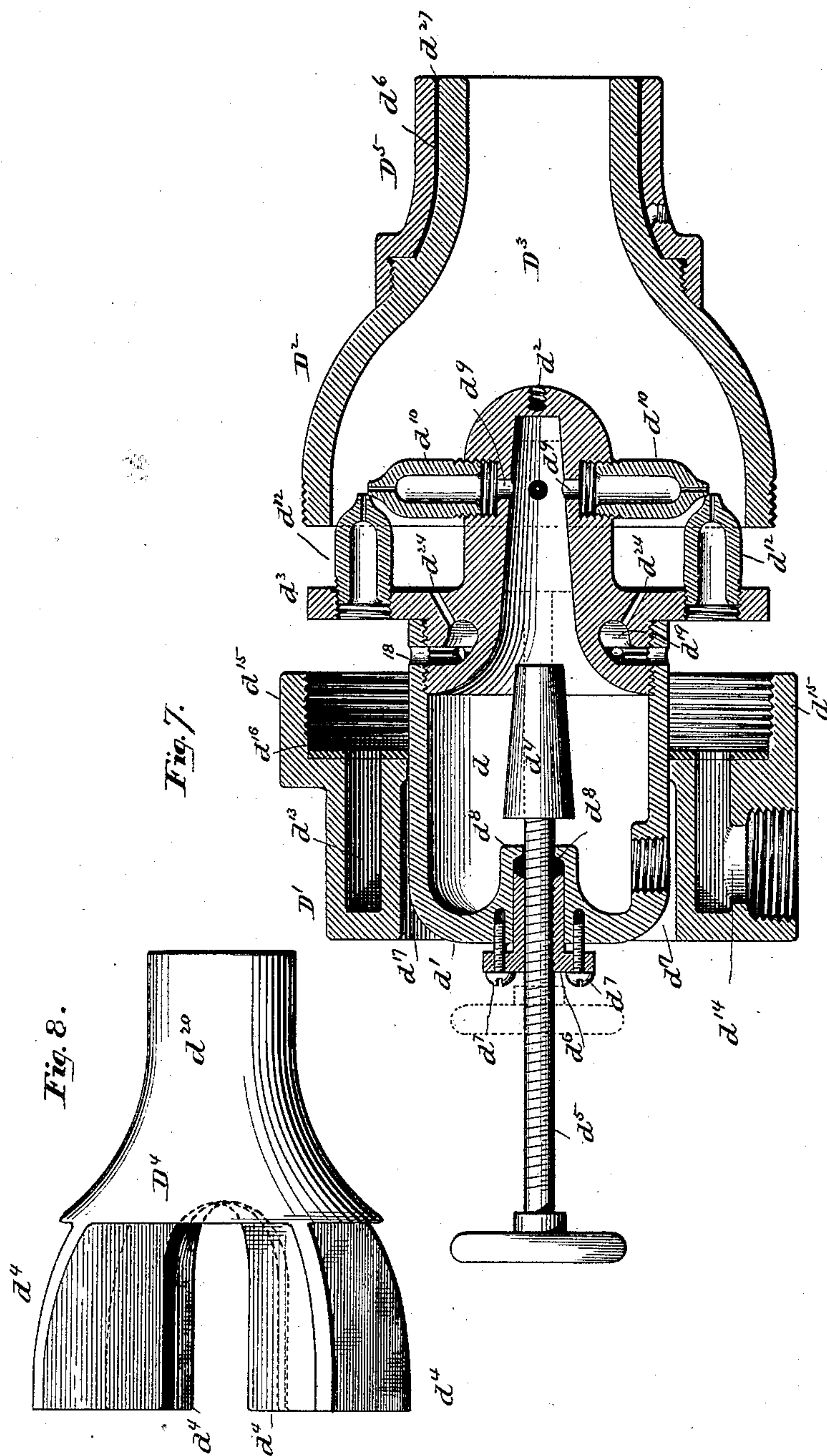
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(No Model.)

5 Sheets—Sheet 5.

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Fig. 9.

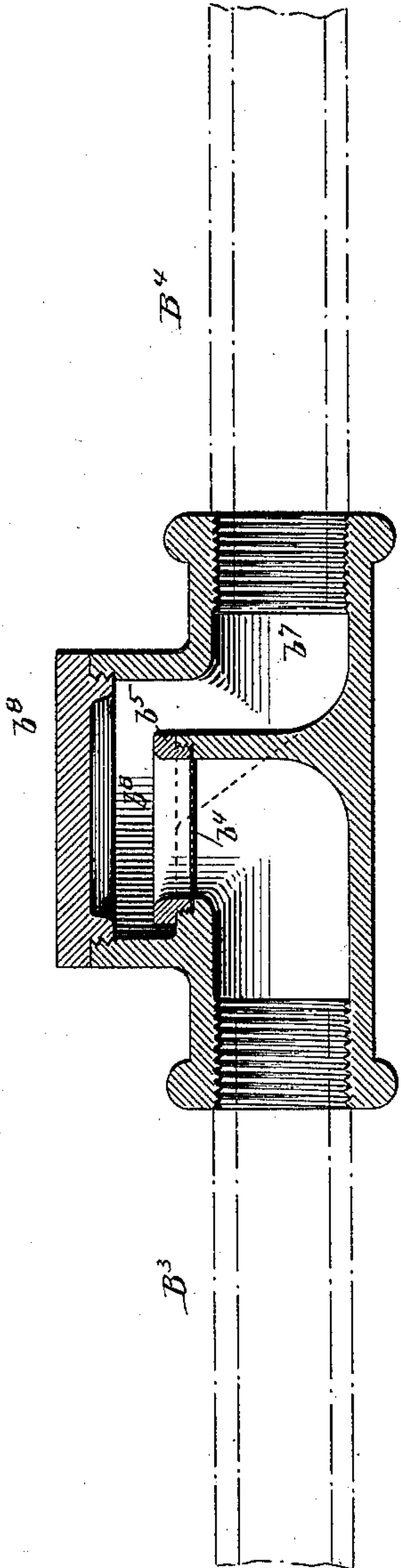
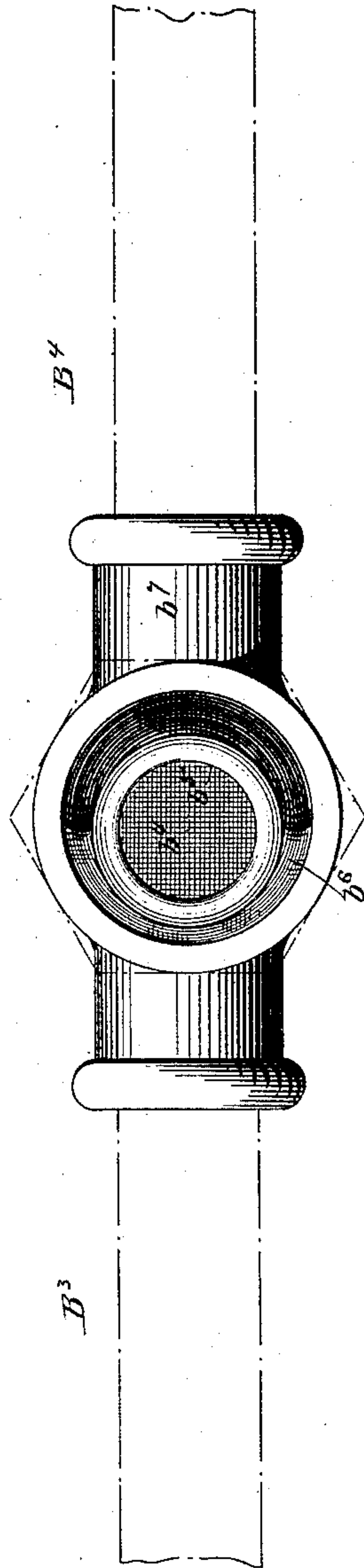


Fig. 10.



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Attys.

UNITED STATES PATENT OFFICE.

HENRY H. HYLAND, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO THOMAS H. PHELPS, OF SAME PLACE.

INJECTOR FOR BURNING PETROLEUM IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 395,785, dated January 8, 1889.

Application filed August 26, 1887. Serial No. 247,972. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. HYLAND, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Injectors for Burning Petroleum in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to mechanism and apparatus for vaporizing and spraying hydrocarbon oils to be used as fuel in metallurgical operations, and particularly for use in a furnace for welding pipe.

The nature of the invention consists of constructions and combinations, all as hereinafter described in the specification and pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a furnace, a section of the oil-heater, and an elevation of the oil-tank; Fig. 2, a transverse section of the furnace on line 2 2, Fig. 1, showing one manner of applying my device; Fig. 3, a side elevation of the injector; Fig. 4, a front view of the injector with the casting that forms the mixing-chamber removed; Fig. 5, a longitudinal section of the injector; Fig. 6, an end view of the casting having partitions to divide the mixing-chamber into several parts or passages; Fig. 7, a longitudinal section of the injector, showing parts separated from each other and the casting having partitions removed; Fig. 8, a side elevation of the casting having partitions; Fig. 9, a longitudinal section of the strainer; and Fig. 10, a top plan of the strainer, the cap being removed to show the oil-chamber.

A represents a furnace, which may be of any desired form; B, an oil-heater; C, a tank, and D an injector.

The furnace represented is the kind ordinarily used for welding pipe. It is, however, provided with additional features, which will now be described.

A' is a perforated bridge or arch of any desired form and located in the fire-box. It is shown supported by the grate-bars; but the

latter may be removed and the arch supported in any other manner.

In the front wall of the furnace are openings A² for the injector D, and in the ash-pit between the fire-box is a blast-pipe, A³, for supplying air.

A⁴ is a steam-pipe leading from a suitable generator and having a branch, A⁵, leading into the furnace. This branch is connected with a series of pipes, A⁶, located between the bridge and the front wall of the furnace, and which are preferably arranged as shown in dotted lines, Fig. 1. From these pipes a superheated-steam pipe, A⁷, leads to the injector D, and connected to the latter in a manner that will hereinafter be described. The pipe A⁴ is extended to an oil-heater, B, arranged at any suitable point and connected at one end of a steam-coil, B', inclosed by the drum B². The other end of the coil extends outside of the drum B² and is provided with a petcock, b, which, when open, allows the water of condensation to escape from the coil, and also allows the steam to have a free circulation through the coil if it be desired to raise the temperature in the heater B.

The drum B² is provided with a thermostat, b', a sight-glass, b², an oil-exit pipe, B³, which leads to the injector D, and an oil-supply pipe, B⁴, leading to the tank C and having a strainer, b³, placed at any suitable point. This strainer consists of a coupling somewhat similar in form to a globe-valve. Instead, however, of a valve-seat, that part of the device is rabbeted to receive a filter, b⁴, of any suitable material, wire-gauze being the material shown. It is secured in place by the ring b⁵, which is screwed onto the vertical face of the rabbet. Above this ring a chamber, b⁶, is formed and connects with the inlet-pipe b⁷. The upper part of the chamber is closed by a screw-cap, b⁸, which can be removed when access to the chamber be desired to clean the face of or remove the filter from the coupling.

All the injectors are connected to the oil-pipe B³ by vertical pipes B⁵ and to the steam-superheater pipe A⁷ by vertical pipes A⁸. In each injector the pipe B⁵ leads to an oil-chamber, d, formed of a cup-shaped casting, d', and

having a nozzle, d^2 , screwed into the front end and having a flange, d^3 , overlapping the casting d' . The interior of the nozzle d^2 is bell-shaped to receive a valve, d^4 , which is moved
 5 in and out of the same by a screw-threaded stem, d^5 , extending through a screw-threaded gland, d^6 , secured in place in casting d by screw d^7 , and provided with a packing between its end and the lips d^8 on the casting
 10 d' . A series of openings, d^9 , radiate through the walls of the nozzle d^2 and are covered by nipples d^{10} , screwed into an enlargement of the holes d^9 and projecting at right angles to the length of said nozzles and on a line with
 15 nipples d^{12} , screwed into the flange d^3 , which forms the front end of the annular steam-chamber d^{13} . This chamber is formed in an annulus, D' , in which the casting d' is seated, and is provided with a steam-supply port, d^{14} ,
 20 and a screw-threaded flange, d^{15} , encircling the flange d^3 , the nipples in which register with the steam-chamber d^{13} and are held in place by the conoidal casting D^2 , screwed into the flange d^{15} of the casting D' , which has pack-
 25 ing, d^{16} , between it and the flange d^3 . Between the annulus D' and the casting d' is an annular air-passage, d^{17} , leading to a series of ports, d^{18} , formed in casting d' . These ports d^{18} open into an annular chamber, d^{19} , formed
 30 in the nozzle d^2 and having exit-ports d^{21} , leading into the mixing-chamber D^3 , formed by the casting D^2 at a point between the nipples d^{10} d^{12} , so that the blast of steam passing through nipples d^{12} will draw a current of air into the
 35 mixing-chamber D^3 . This mixing-chamber is divided into the same number of compartments as there are nipples d^{12} in the device by a casting, D^4 , which consists of a nozzle, d^{20} , having partitions d^{21} , which extend rear-
 40 wardly beyond the nozzle to any desired distance. The passages d^{22} , formed by these partitions d^{21} , are provided with an exit-opening, d^{23} , at the forward end.

The casting D^4 is secured in place by a bolt, d^{25} , that is screwed into the head of nozzle d^2 . To the front end of casting D^2 is secured a casting, D^5 , of the same shape, but slightly larger than that part of the casting D^2 to which it is attached to form a steam-cham-
 50 ber, d^{26} , having an exit-opening, d^{27} , at its front end and at a point where it commingles with the vapor passing through the openings d^{23} . This chamber is supplied with steam by a pipe, A^9 , leading from the vertical pipe A^8 .

55 The operation of this device is as follows: Oil and steam are respectively admitted to chambers d and d^{13} and the valve d^4 set to allow the desired amount of oil to escape through the nipples d^{10} , at the tips of which
 60 it is impacted upon by the blasts of steam passing through the nipples d^{12} , which also draws in sufficient air through the air-ports d^{24} to make the proper mixture in the mixing chamber or passages formed by the cast-

ing D^4 . As it escapes through the openings 65 d^{23} , it is impacted upon by a current of steam passing through the exit-openings in the chamber d^{26} . This mixture of oil, steam, and air is passed into the furnace and projected against the perforated arch or bridge A' and
 70 burned. To assist in the proper combustion of the mixture, a blast of air is supplied through pipe A^3 , which air commingles with the mixture as it breaks up at the arch or
 75 bridge and forces it up to the crown of the furnace and then down upon the hearth in the pipe-chamber. The heat in the furnace also superheats the steam passing through the pipes A^6 , which lead to the injector.

The oil is heated to the proper temperature 80 by the steam-pipe in the drum before it is fed to the injector, and by taking the oil from the lower part of the drum there is no danger of residual oil remaining in the drum to clog up
 85 the machine.

I do not herein claim the particular construction of furnace shown in this application, as that matter forms the subject of a separate application, No. 266,902, filed March
 90 10, 1888.

What I claim as new is—

1. The combination of a casting having an annular steam-chamber, a casting having an oil-chamber partly inclosed by and having an air-space between it and said steam-chamber, 95 a nozzle having nipples, and a flange provided with nipples arranged at right angles to the nipples on the nozzle, and said nipples having communication with said oil and steam chambers, and a nozzle or casting, D^2 ,
 100 covering said nozzle and flange and having a contracted exit-opening.

2. The combination of a casting having an annular steam-chamber, a casting having an oil-chamber partly inclosed by said steam- 105 chamber, a nozzle having nipples, and a flange provided with nipples arranged at right angles to the nipples on the nozzle, and said nipples communicating with said oil and steam chambers, and a nozzle or casting, D^2 ,
 110 covering said nozzle and flange and having a contracted exit-opening.

3. The combination of a casting having an annular steam-chamber provided with nip- 115 ples, a casting having an oil-chamber, a nozzle having nipples arranged at right angles to the nipples on the steam-chamber and communicating with the oil-chamber, a casting covering said nipples, and a casting secured to the nozzle and having two or more parti- 120 tions, which form mixing-chambers for each set of steam and oil nipples.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY H. HYLAND.

Witnesses:

S. C. MILLS,

M. F. HALLECK.