R. D. TOMLINSON.

CONDENSER.

APPLICATION FILED JULY 25, 1907.

978,411.

Patented Dec. 13, 1910.

3 SHEETS—SHEET 1.

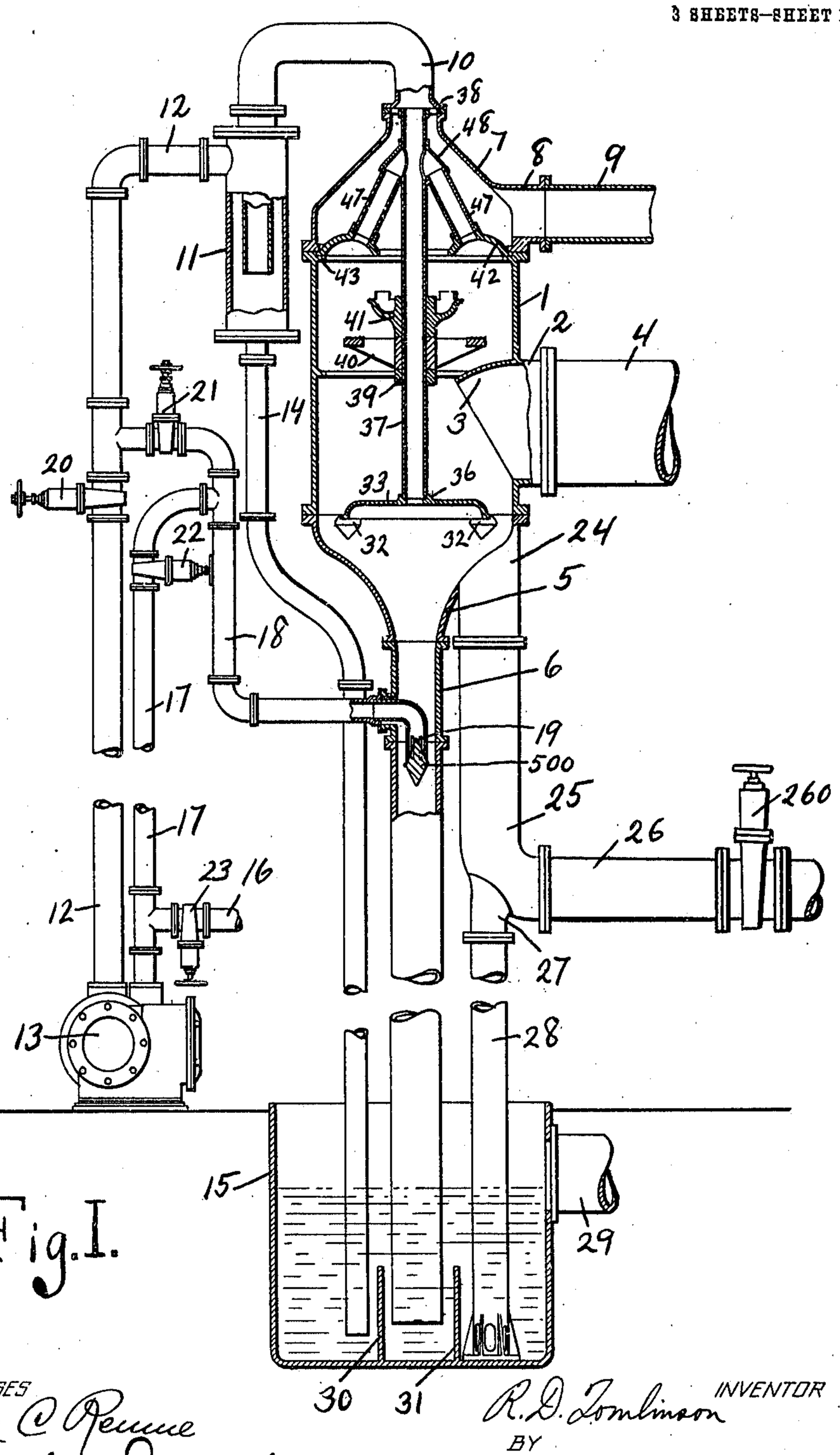

Fig. I.

WITNESSES

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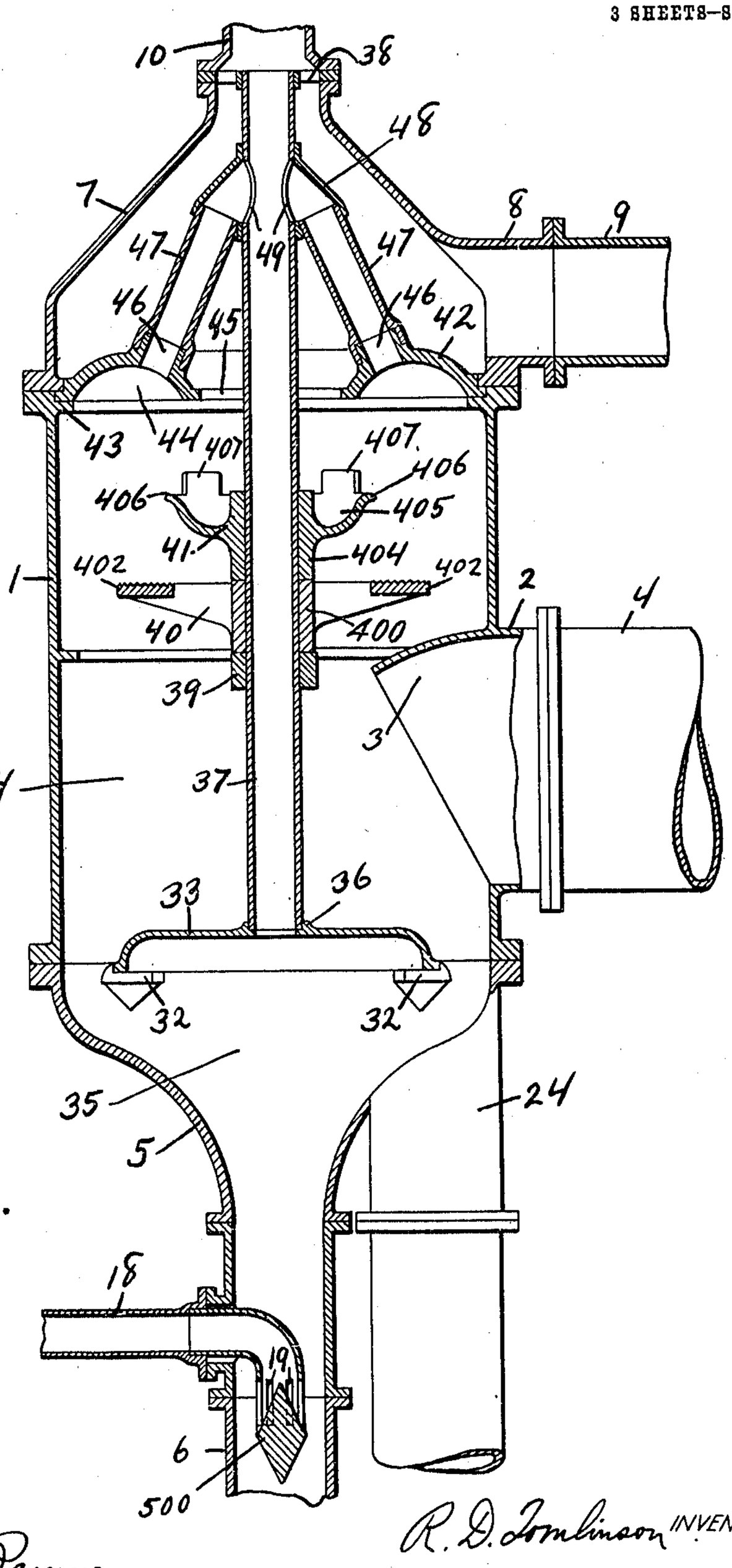

Fig. II.

WITNESSES:

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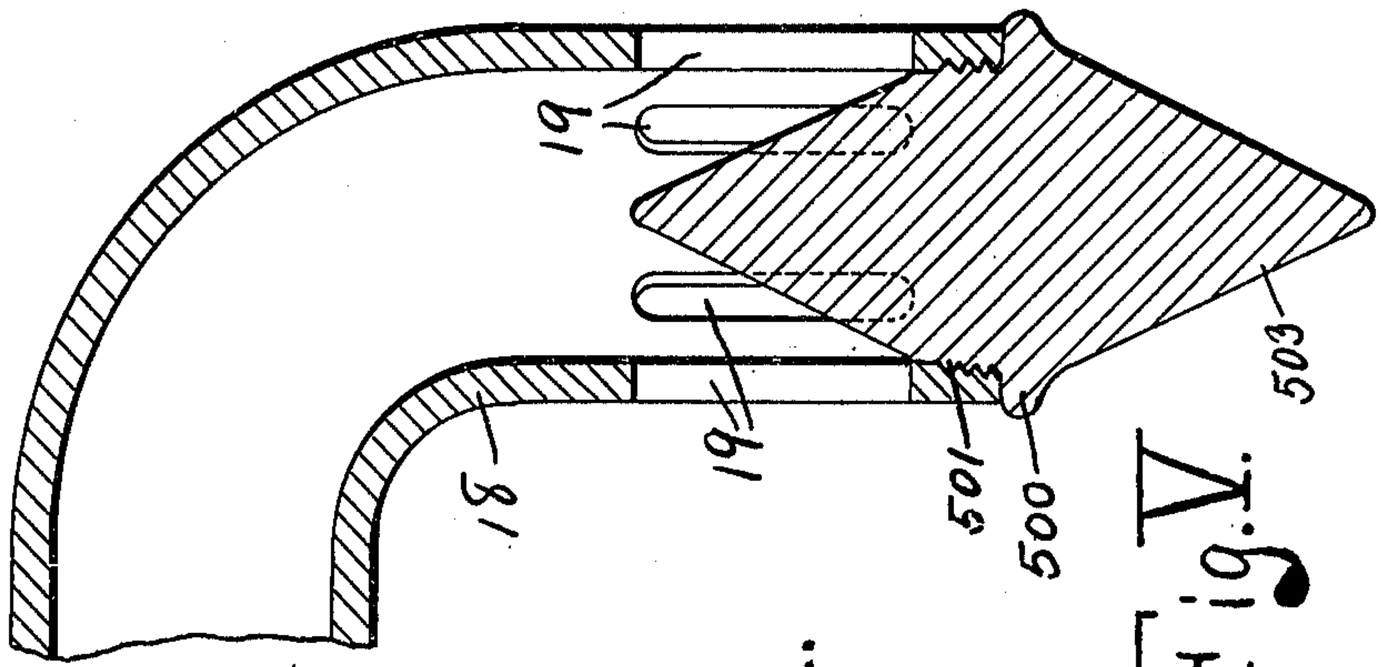

Fig. V.

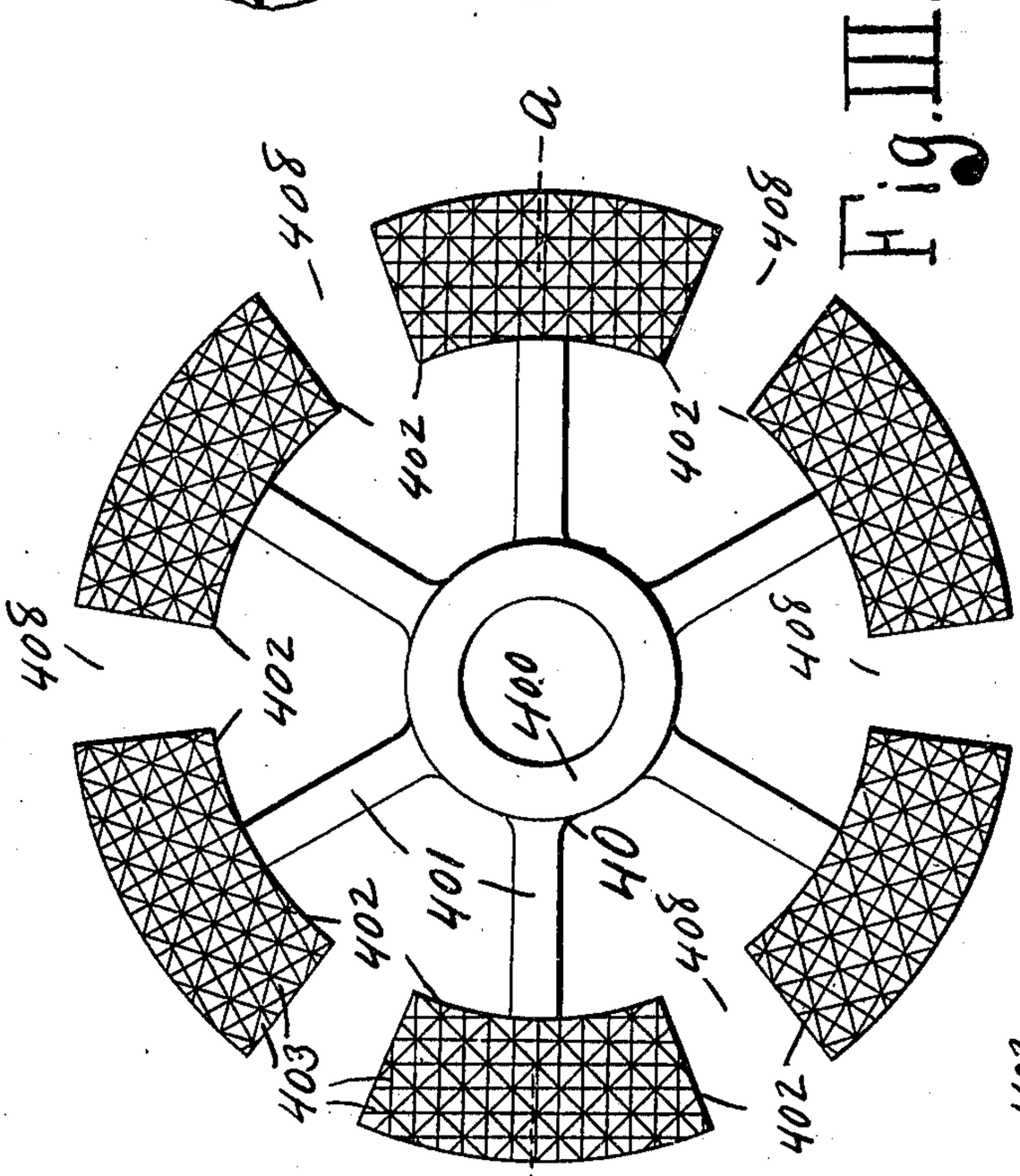

Fig. III.

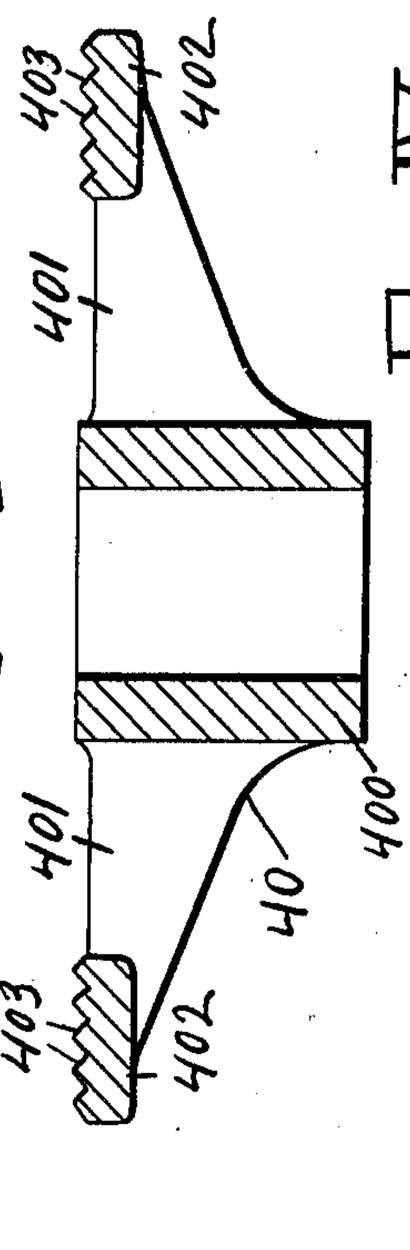

Fig. IV.

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UNITED STATES PATENT OFFICE.

ROYAL D. TOMLINSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

CONDENSER.

978,411. Specification of Letters Patent. Patented Dec. 13, 1910.

Application filed July 25, 1907. Serial No. 385,421.

To all whom it may concern:

Be it known that I, ROYAL D. TOMLINSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Condenser, of which the following is a specification.

This invention relates to condensers and comprises improvements in the structure and arrangement of the parts of jet or barometric condensers, and the objects of this invention are to provide a condenser body of simple construction, the parts of which may be readily arranged to suit the specific needs of any plant, to provide cheap and easily constructed means to be disposed within the body of the condenser for insuring thorough and complete spraying of the water, to provide a system of pipes so arranged in the condenser body that the air which is drawn off through them may be cooled by the inflowing condensing water, and to provide a hot well of special construction which is specially adapted for use in connection with the discharge pipes leading from jet or barometric condensers supplied with a tail pipe and an overflow pipe.

The drawings which accompany this specification and form a part of the same and on which the same reference characters are used to designate the same elements wherever they may appear in each of the several views, show a condenser embodying this invention.

Referring to the drawings,—Figure 1 is an elevation with parts in section; Fig. 2 is a sectional elevation of the head and a part of the tail pipe, drawn to an enlarged scale; Fig. 3 is a plan view of the spray plates; Fig. 4 is a vertical section of the spray plates taken on the line *a*—*a* of Fig. 3; and Fig. 5 is a section of a detail, drawn to an enlarged scale.

Referring to the drawings, the numeral 1 designates a cylindrical casing, which forms a part of the body proper of the condenser, provided with the steam inlet 2, this inlet being provided with the deflector 3 located within the condenser head, and to the inlet 2 is connected the exhaust steam pipe 4.

The numeral 5 designates the base of the condenser which is provided with flanges to which are adapted to be connected the flanges of the tail pipe 6 and the flanges of the casing 1.

The numeral 7 designates the top or cap of the condenser, provided with the water inlet 8, to which the pipe 9 for conveying the condensing water to the condenser is connected. The top 7 is shown as provided with a flange by which it may be connected with a flange at the upper end of the casing 1, though it is to be understood that any equivalent means for uniting the casing 1 and the top and base may be provided, as the special fastening means which may be employed form no part of this invention. The upper end of the top 7 is open and is provided with a flange to which the dry air pipe 10 is connected. This dry air pipe 10 is extended into a receptacle or separator 11 from which the pipe 12 leads to the dry air pump 13. The separator 11 is provided with a drip pipe 14, which for convenience leads down into and discharges into the hot well 15.

The numeral 16 designates the free discharge pipe of the air pump through which the air which accumulates in the condenser is discharged by the pump into the atmosphere and this pipe is illustrated by the drawings as being a branch of the pipe 17, which is in communication both with the discharge side of the dry air pump and the pipe 18, which pipe in turn is in communication with the pipe 12 and is extended within the tail pipe 6 where it projects downwardly a short distance and is provided with ejector orifices.

The valves 20, 21, 22 and 23 are provided by which the discharge of the air from the condenser may be caused in one of several ways. By closing the valves 21 and 22 and opening valves 20 and 23, the pump 13 will discharge the air from the condenser into the atmosphere. By closing valves 21 and 23 and opening valves 20 and 22, the pump will discharge the air from the condenser into the tail pipe 6, the back pressure on the pump being reduced by the vacuum creating power of the water flowing through the tail pipe. By closing valves 20 and 22 and opening valve 21, the suction effect of the water flowing through the tail pipe will withdraw the air from the condenser, and

this procedure may be adopted either to save the expense of operating the pump or to hold a vacuum if the pump be disabled.

It should be observed that the pipe 17 is led to a sufficient height so that the water in the condenser will overflow into the overflow pipe 24 before it rises to a height where it could pass into the pump 13 through said pipe 17.

The overflow pipe 24 is shown as provided with an elbow 25 to which a pipe 26 may be connected, the pipes 24, 26, and elbow 25 being of such a size that they can serve as a free exhaust for the engines when running non-condensing, and pipe 26 may be provided with any suitable or preferred valve arrangement as the stop valve 260 or preferably an ordinary form of atmospheric relief valve for permitting such free exhaust while maintaining the function of the pipe 24 as an overflow pipe when running condensing. Elbow 25 is provided with a reduced nipple 27 to which is connected the overflow pipe 28 which extends into the hot well.

As before stated, the numeral 15 designates the hot well into which extend the overflow pipe 28, the tail pipe 6, and the drip pipe 14, their open ends being water sealed therein, the hot well being provided with the overflow 29 which may lead to waste or be connected with a second hot well from which the boilers are fed. The hot well 15 is provided with partitions 30 and 31 which extend from the bottom thereof higher than the outlets of the pipes entering said hot well, the purpose of these partitions being to prevent any air which may be discharged through any one of said pipes from ascending into another of said pipes. These partitions, while preferably being formed as partitions for cheapness of manufacture, may be replaced by pipes surrounding the lower ends of the pipes which discharge into the hot well, and of greater diameter than the same, as barriers will thus be formed which serve the same purpose as the partitions permitting the free discharge of air and water from a pipe but preventing any air discharged by one pipe from ascending the open end of an adjacent pipe.

Lugs 32 are provided preferably adjacent the top of the base 5, upon which lugs the umbrella 33 is seated, this umbrella serving to spread the water so that it forms a perfect seal between the steam space 34 of the condenser and the chamber 35 which is formed by the umbrella and the base 5. The umbrella is provided with an aperture at the center thereof and with a flange 36.

Seated upon the umbrella 33 and retained in position concentric with the aperture therein by the flange 36, is the pipe 37 through which the air which collects under the umbrella is withdrawn, the upper end of the pipe 37 being centered by the spider 38 which is shown as clamped between the flanges of the head and the dry air pipe 10. This pipe 37 is provided with a collar or step 39 upon which rests the spray plate 40, the spray plate 40 in turn supporting the urn 41, these members being formed separately and slipped into position over the pipe and simply rest against the collar 39.

The numeral 42 designates an annular dam which is supported upon the flange 43, preferably formed integral with the casing 1, this dam being in cross section substantially semicircular and affording on its under side a pocket 44 in which air can collect while its semicircular shape in cross section causes the water which enters through inlet 8 to be distributed entirely around the circumference of the condenser head and to flow over said dam from all sides down through its central aperture 45. The top of the dam is provided with flanged apertures 46, and upon the flanges of these apertures are seated the pipes 47, upon the tops of which is seated the spider-collector-coupling 48, the pipe 37 being provided with apertures 49 in the chamber of this coupling through which the air which collects underneath the dam may be drawn out through pipe 37 and pipe 10.

The spider 38 located at the upper part of the head 7, permits any air which might accumulate in the upper part of said head to be withdrawn through pipe 10.

The extreme simplicity of the construction illustrated and described is apparent at a glance. The casing 1, head 7 and base 5 are inter-dependent so that one can be turned with respect to its adjacent element whereby any specific condition as to the direction of lead of the condensing water pipe with respect to the steam exhaust pipe may be readily established. Moreover the different parts located within the condenser proper are simply held in position by being slipped one over the other and there are no bolts, screws or other fastening devices located within the condenser, consequently the parts may be readily and conveniently removed with the least trouble and expense.

In assembling the condenser, the base 5 is first set up, then the casing 1 is placed upon the base, the proper direction of the exhaust steam inlet 2 being fixed, the umbrella 33 is then seated on the lugs 32, the pipe 37 seated upon the umbrella, the spray plate 40 slipped over the upper end of the pipe, the urn 41 slipped over the pipe on top of the spray plate, the dam 42 is placed in position, the pipes 47 are slipped over the flanges of the apertures 46, the spider 48 is slipped over the pipe 37 embracing the upper ends of the pipes 47, the top 7 is then placed upon the casing 1 giving the proper lead to the inlet 8, the spider 38 is then slipped over the top of pipe 37 and the dry

air pipe 10 is then connected up. The reverse of these operations is the procedure for disassembling the condenser.

The spray plate 40 is composed of a hub 400, radially extended arms 401, each of said arms carrying at the extremity thereof a section 402 of an annular ring, the upper surfaces of these sectors being provided with pyramidal projections 403.

The urn 41 is provided with a hub 404, the cup or receptacle 405 with the rolling flanges 406, over which the water flows to fall upon the sections 402 between the upstanding guards 407, which guards are placed in the condenser so that they are directly above and radially in line with the spaces 408 between the sections of the splash plate, these guards serving to prevent water flowing out of the urn at those places where it would not impinge upon the sections 402.

Referring to Fig. 5 of the drawings, the pipe 18 is shown as provided at its lower end with the apertures 19 which are vertically elongated, and the end of said pipe is closed by the double cone 500 which is provided with screw threads 501 adapted to engage with screw threads on the pipe to retain one end of the cone within the end of the pipe 18. This double cone structure is employed to divert the air outwardly from the pipe 18 through the apertures 19 into the water flowing out through the tail pipe 6, and the lower end 503 of the cone is shaped to conform substantially to the lines of flow of the water by the end of the pipe 18 so that no pocket will exist at this point in which air may collect by escaping from the water in the tail pipe. It is obvious that if it were not for this provision of the end 503 of the cone there would be a tendency to create a vacuum in a conical space below the end of pipe 18, and air instead of passing down the tail pipe and out with the water, would separate from the water and fill this space with air.

What I claim is—

1. The combination with a condenser casing provided with steam and water inlets and a tail pipe, of an overflow water pipe to act in conjunction with the tail pipe to prevent flooding of the casing when steam is being condensed therein, said overflow pipe having direct communication with the atmosphere, and a valve controlling said communication.

2. The combination with a casing provided with steam and water inlets, of a tail pipe for discharging the condensing water and the water of condensation from said casing, a dry air pipe leading from said casing, a pump with which said dry air pipe is connected, a second pipe communicating with said dry air pipe between said pump and the casing, said second pipe being extended into said tail pipe and adapted to discharge air therein, said dry air pump being provided with a discharge pipe communicating with said last mentioned pipe and being provided also with a free exhaust, and valves in said pipes so disposed that air from the casing may be discharged by said dry air pump either through the free exhaust or into said tail pipe, or that air from the casing may be discharged directly into the tail pipe without passing through the dry air pump.

3. The combination with a casing provided with steam and water inlets, a tail pipe and an overflow pipe, of a dry air pipe, a dry air pump with which said pipe communicates, and an upwardly extended discharge pipe from said dry air pump adapted to discharge air into said tail pipe, said discharge pipe from the dry air pump being extended upward to a point higher than the connection of the overflow pipe with said casing, whereby water from said tail pipe will be prevented from entering the dry air pump.

4. The combination in a condenser, of a casing provided with a steam inlet, a base adapted to be connected with a tail pipe, a top, an umbrella provided with an aperture seated in said condenser, a pipe seated on said umbrella, a spray plate and an urn seated on said pipe, a dam provided with apertures seated in said condenser, and pipes affording communication between the apertures in said dam and said first mentioned pipe.

5. The combination in a condenser of a casing, a base and a top, provided with steam and water inlets, the base of said condenser being adapted to be connected with a tail pipe, the top of said condenser being provided with an outlet adapted to be connected with a dry air pipe, an umbrella provided with an aperture seated in said condenser, an annular dam of substantially semicircular cross section seated in said condenser and provided with apertures, a pipe provided with a collar seated upon said umbrella in alinement with the aperture therethrough, a spray plate resting upon said collar, an urn resting upon said spray plate, pipes seated upon said dam in alinement with the apertures therein, a spider-collector-coupling inclosing said first mentioned pipe and seated upon said last mentioned pipes, said first mentioned pipe being provided with an aperture within the interior of said coupling, and a spider for positioning the top of said first mentioned pipe with respect to the dry air outlet in the top of the condenser.

6. A spray plate for condensers, comprising a hub, arms radially extended from said hub, each of said arms being provided at its end with an individual plate horizontally surrounded by free space.

7. A spray plate for condensers, comprising a hub, arms radially extended from said hub, each of said arms being provided at its end with an individual plate horizontally surrounded by free space, and the top of each of said ring sections being provided with pyramidal projections.

8. In a condenser, the combination of an urn comprising a hub for central mounting, an annular cup portion provided with a flange having spaced upstanding guards, and a spray plate below said urn having individual plates horizontally surrounded by free space and radially opposite the spaces between said guards.

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

ROYAL D. TOMLINSON.

Witnesses:
G. F. De Wein,
Frank E. Dennett.