

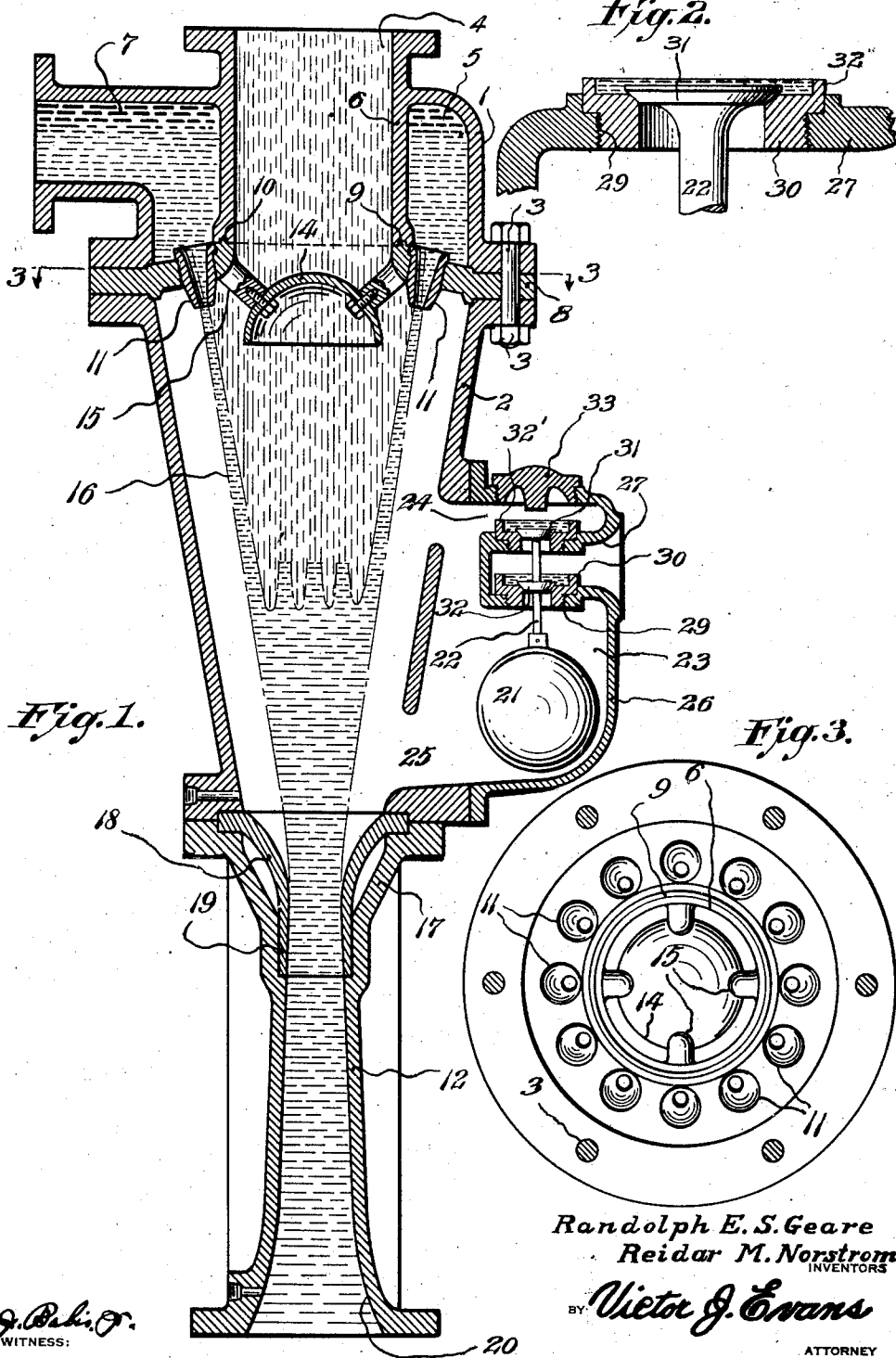
March 29, 1927.

R. E. S. GEARE ET AL

1,622,945

LOW LEVEL JET CONDENSER

Filed Dec. 1, 1924



Randolph E. S. Geare
Reidar M. Norstrom
INVENTORS

BY *Victor J. Evans*

ATTORNEY

UNITED STATES PATENT OFFICE.

RANDOLPH E. S. GEARE AND REIDAR M. NORSTROM, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO SCHUTTE & KOERTING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LOW-LEVEL JET CONDENSER.

Application filed December 1, 1924. Serial No. 753,272.

This invention relates to multiple-jet condensers and an object of the invention is to provide a condenser of this type which is comparatively simple in construction, and can consequently be manufactured and installed at a comparatively low cost with respect to the multiple-jet condensers of approved type now on the market.

Another object of this invention is to provide, in a multiple-jet condenser as specified, a simple, practical vacuum breaker construction which is utilized as a safeguard against any possible flooding of the condenser chamber and exhaust line in the event of failure of the injection of water supply.

More specifically, the invention comprehends the provision of an injector, which is supplied by water under pressure, the said water entering the condenser in a plurality of circumferentially spaced streams, all of which streams or jets combine or unite at high velocity in the throat of the condenser and create a suction and vacuum through the condenser, passing from the throat, and drawing the mixture of steam and water, as well as air and non-condensable gases into a suitable discharge or hot well.

Other objects of the invention will appear in the following detail description, and in the accompanying drawings wherein:

Figure 1 is a vertical longitudinal section through the improved multi-jet or low level condenser.

Figure 2 is an enlarged detail sectional view, showing a part of the vacuum breaker valve construction, and the fluid seal over one of the valve heads.

Figure 3 is a horizontal section on the line 3—3 of Figure 1.

Referring more particularly to the drawings, the improved low level jet condenser comprises an inlet head or body 1 which is attached to the main substantially frusto-conical body 2 of the condenser in any suitable manner, such as by means of bolts 3. The head 1 has a steam entrance 4 therein which aligns axially with the body 2. The steam inlet which is adapted to have connection with the steam exhaust of any suitable mechanism, is separated from the water chamber 5 within the head 1 by a wall 6, and the water under pressure enters the water chamber 5 through a side inlet 7. A jet carrying disc 8 is positioned between the

head 1 and body 2, and it has an annular rim 9 formed on its upper inner edge which fits into a groove 10 formed in the lower end of the wall 6 to provide a fluid tight connection between the disc 8 and wall 6. A plurality of jet nozzles 11 are carried by and extend through the disc 8 at circumferentially spaced points and these jet nozzles open out into the chamber 5 in relatively wide mouths, and the bores of the nozzles are constricted towards their outlet. By constricting the bores of the nozzles, the velocity of the fluid passing therethrough is increased. The water, which is delivered under pressure to the chamber 5, passes downwardly, through the nozzles 11 in a plurality of jets, at circumferentially spaced points, and as the jets 11 are positioned at acute angles to the axis of the body 1, and with their axes in parallelism with the sides of the body 2, the jets will converge at the lower or constricted end of the body 2 and pass in a single unitary stream through the throat 12.

A substantially semi-spherical baffle 14 is supported at the entrance of the steam into the body 2, by a plurality of suitable supporting lugs 15 which project inwardly from the ring 8 as clearly shown in Figure 1 of the drawings. The substantially semi-spherical baffle 14 has its convex surface facing the steam inlet 4 and the steam entering the condenser will be deflected out of its straight path by the baffle 14 and directed outwardly towards the jets of water as indicated at 16. The force of the jets acting on the steam and the deflecting of the steam by the baffle 14, together with the force of the water rushing through the body 2 and through the throat 12, will create a suction which will draw the condensate and water as well as air or any non-condensable gases outwardly through the throat causing a mixing of the various fluids in the lower mixing portion of the body 2.

The throat 12 has a flared inlet connection 17 which is connected in any suitable manner to the lower end of the body 2 and a frusto-conical mouth 18 is positioned in the flared portion 17 and forms an entrance or inlet to the throat 12 from the interior of the body 2. The bore 19 of the mouth 18 gradually flares, in uniform curvature, to its inlet, and the maximum diameter of the

mouth is greater than the diameter of the stream of the combined jets 16, so as to provide a gradually decreasing space in the mouth for receiving the steam and permitting the mixing of the steam with the stream of water as it passes into the throat 12 at which time the condensation of the steam is practically complete.

It is understood that the throat 12 may discharge through a flared outlet 20 into a hot well (not shown) of approved type used in connection with condensers.

A vacuum breaker structure is provided as a safeguard against any possible flooding of the condenser chambers within the body 2, and the exhaust line, in event of the failure of the means for removing the water. The vacuum breaker structure includes a float valve structure embodying a float 21 which is attached to the lower end of a valve stem 22 and rests in the auxiliary chamber 23 formed at one side of the body 2. The chamber 23 has inlet and outlet communication with the interior of the body 2 or with the condenser chamber through suitable openings 24 and 25.

The housing 26 which forms the chamber 23 is provided with an inwardly extending portion 27 having atmospherical communication and which inwardly extending portion is provided with a pair of vertically aligning openings 29 having communication with the interior of the chamber 23. The openings 29 have valve seat forming collars 30 threaded therein against which the valve discs 31 and 32 seat. Water seals about the valves 31 and 32 are provided by upstanding ribs 32' formed on the collars 29. The ribs 32' are spaced from the perimeter of the valve disc 31 and form pockets or wells for receiving condensation to provide a water seal about the valves. An inlet or test plug 33 is threaded into the housing 26 to permit access to the interior of the chamber 23, and to the valve 31 when desired. In case of failure of the means for removing the water, the accumulation of fluid in the chamber 23 will cause the float 21 to rise, and moving upwardly, it will unseat the valves 31 and 32, causing these valves to open and admit air into the chamber 23 and from chamber 23 into the condenser chamber or interior of the body 2, thereby breaking the vacuum and preventing flooding of the condenser chamber.

From the foregoing description taken in connection with the accompanying draw-

ings, it will be apparent that the jets 16 practically form a wall about a central pocket of steam and while in the drawings the jet nozzles 11 are shown as spaced so as to provide individual jets, it is to be understood that they may be placed close enough to form practically a complete wall of water about the central steam pocket.

It is to be understood that the cross sectional area of the condensation chamber within the body 2 is directly proportionate to the volume of vapor at any given point and this feature in conjunction with the placing of the jets 16, provides a low level jet condenser in which the fluid to be drawn and condensed, is placed within the drawing or condensing fluid or material, resulting in a maximum drawing and condensing action.

While we have described what we deem to be the most desirable embodiment of our invention, it is obvious that many of the parts may be varied without in any way departing from the spirit of our invention, and we therefore do not limit ourselves to the exact details of construction herein shown nor to anything less than the whole of our invention limited only by the appended claims.

What we claim is:—

1. In a jet condenser a casing, a water box at the upper end of the casing, a plurality of jet nozzles carried at the bottom of the water box and inclined to direct a multiplicity of jets in converging lines toward the outlet of the casing, a steam inlet centrally of said nozzles and arranged to direct steam within the space interiorly of the plurality of jets of water from said nozzles.

2. In a jet condenser a casing, a water box at the upper end of the casing, a plurality of jet nozzles carried at the bottom of the water box and inclined to direct a multiplicity of jets in converging lines toward the outlet of the casing, a steam inlet centrally of said nozzles and arranged to direct steam within the space interiorly of the plurality of jets of water from said nozzles, and a baffle disposed within the steam inlet and presenting a convex surface to the incoming steam for directing it against the inner walls of the water jets.

In testimony whereof we affix our signatures.

RANDOLPH E. S. GEARE.
REIDAR M. NORSTROM.