

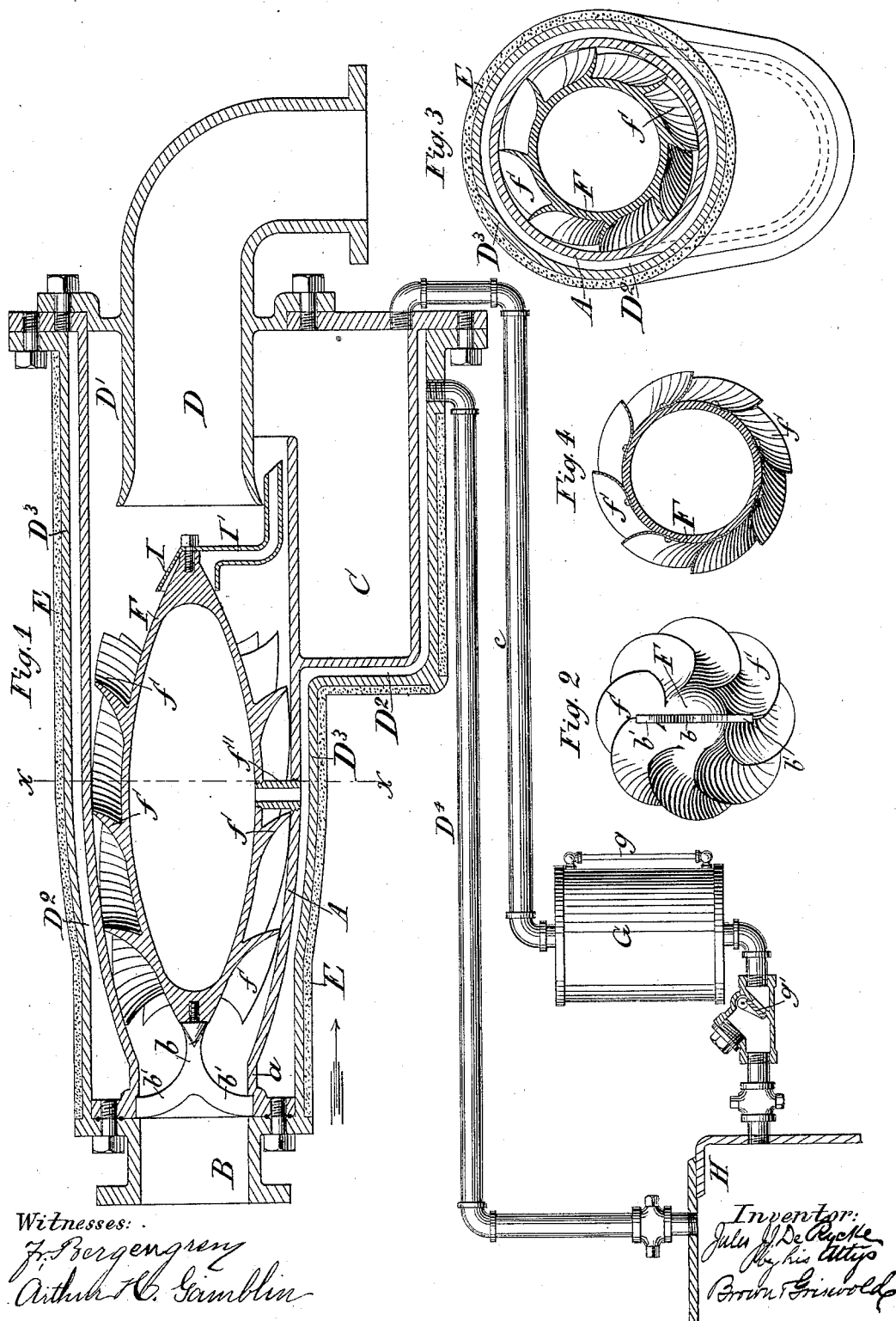
(No Model.)

3 Sheets—Sheet 1.

J. J. J. DE RYCKE.
SEPARATOR.

No. 417,774.

Patented Dec. 24, 1889.



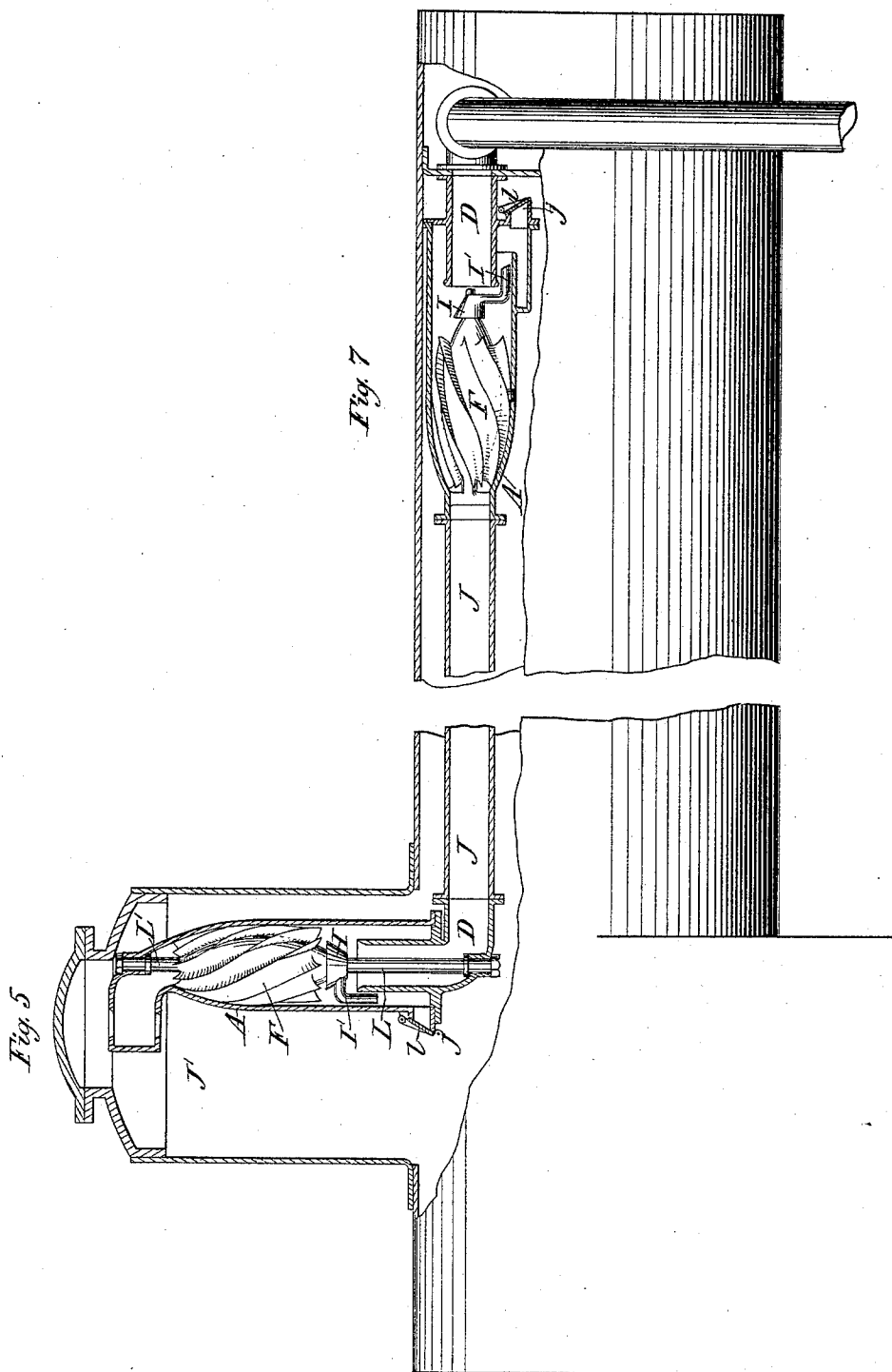
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J. J. J. DE RYCKE.
SEPARATOR.

3 Sheets—Sheet 2.

No. 417,774.

Patented Dec. 24, 1889.



Witnesses:
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Arthur H. Gamblin.

Inventor:
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Brown & Greenwood

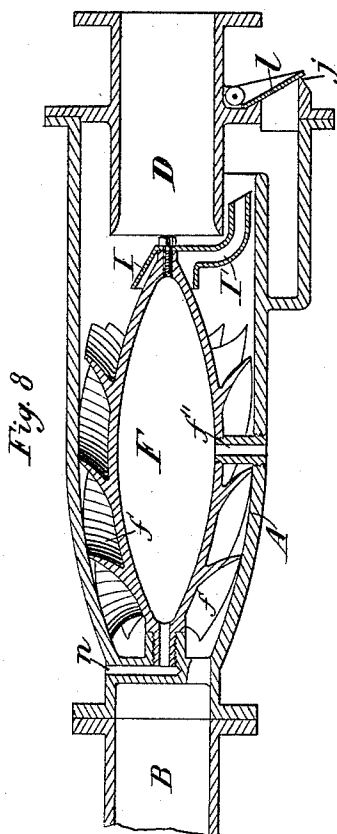
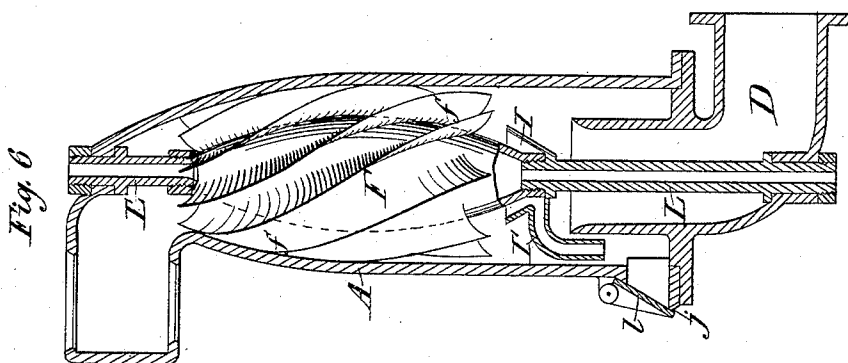
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3 Sheets—Sheet 3.

J. J. J. DE RYCKE.
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No. 417,774.

Patented Dec. 24, 1889.



Witnesses:

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UNITED STATES PATENT OFFICE.

JULES J. J. DE RYCKE, OF NEW YORK, N. Y.

SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 417,774, dated December 24, 1889.

Application filed February 11, 1889. Serial No. 299,364. (No model.)

To all whom it may concern:

Be it known that I, JULES J. J. DE RYCKE, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Separators, of which the following is a specification.

My improvement relates to separators employed for separating water, grease, or other impurities from steam.

I will describe in detail a separator embodying my improvement, and then point out its novelty in claims.

In the accompanying drawings, Figure 1 is a longitudinal section of a separator embodying my improvement and showing certain means by which the same may be connected with a steam-boiler. Fig. 2 is an end view of a certain core or body employed in the separator, looking in the direction of the arrow, Fig. 1. Fig. 3 is a vertical section looking in the same direction and taken on the line $x x$, Fig. 1. Fig. 4 is a sectional view of a core or body, taken on the same line as Fig. 3 and showing a modification. Fig. 5 is a view partly in section, showing a portion of a locomotive-boiler having a separator embodying my improvement arranged in the steam-dome thereof, the separator being of somewhat modified form. Fig. 6 is a view, on an enlarged scale and partly in section, of the separator shown in Fig. 5. Fig. 7 is a view partly in section, showing a portion of a locomotive-boiler having a separator embodying my improvement arranged horizontally within the steam-space thereof, the separator being of still another modified form. Fig. 8 is a view, on an enlarged scale and in section, of the separator shown in Fig. 7.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to the example of my improvement illustrated in Figs. 1 and 3, A designates the case or shell of the separator. In the example represented this case or shell is provided with a neck-piece a , with which communicates one end of an outlet or supply pipe B for the same. From the neck portion a the case or shell gradually increases in diameter for a distance as it extends rearwardly until its internal diameter is considerably greater than that of the inlet or supply pipe B. Formed upon the case or shell near its

under side is a reservoir or chamber C. Extending for a distance into the case or shell from its rear end is a pipe D, through which the dry or anhydrous steam is conveyed away. The pipe D occupies approximately a central position in the case or shell and extends for such a distance that there is formed between it and the wall of the case or shell an annular space D' . I prefer to place the separator within a steam-chamber D^2 , containing live steam, for the purpose of keeping the separator heated. In this example of my improvement the steam-chamber is formed by a jacket D^3 , which surrounds the casing A at a distance therefrom. Steam is admitted to the steam-chamber through a pipe D^4 , communicating with the steam-space of a boiler H. I prefer when used outside of a boiler to surround the jacket D^3 with a packing of asbestos or other suitable material. I have indicated such a packing by the letter E. The packing may be secured upon the case or shell in any suitable manner.

F designates a core or body. This core or body is in the example shown of conical shape at both its ends. It is arranged approximately concentric within the case or shell. Its forward end is adjacent to the inlet or supply pipe B, and is secured by screw-threads or otherwise to a support b , which support is provided with arms b' , which arms extend into recesses in the case or shell and are there secured by being clamped between the end of the outlet or supply pipe B and the walls of said recesses.

Upon the exterior of the core or body F are arranged wings or projections f . These wings or projections extend spirally about the core or body F. They are of such extension widthwise and the curve of their outer edges is such that the outer edges will contact with the inner wall of the case or shell A for a considerable distance inwardly. The case or shell A therefore forms a support for the core or body F and prevents lateral movement of the said core or body. It will be perceived that one of the surfaces of the wings is tangential to the axis of the core or body. In this example such surfaces are curved from the outer edges of the wings inwardly toward the core or body, while the other surfaces of the wings are approximately radial to the

axis of the core or body. The result of this construction is that steam entering from the supply or inlet pipe is caused to not only pass through spiral channels extending about the core or body, but also through spiral channels which have upon one side tangential surfaces throughout their lengths, whereby a violent whirling motion will not only be imparted to the steam passing through the channels, but the heavier particles will more readily be precipitated from the core or body F. It is to be remarked that the steam in entering and passing through the spiral channels is spread out into a thin body by the core or body F and thus expanded and rendered in a better condition to be deprived of its entrained or suspended water than would be the case if the steam continued in a body of uniform diameter and density throughout the separator. The violent whirling motion imparted to the steam causes the suspended water to be thrown against the wall of the case or shell and thus separated from the steam. The water thus gathered upon the surface of the case or shell has itself acquired a whirling motion and runs down into the reservoir or chamber C, from whence it runs off by gravity through a pipe *c*. The core or body F is in this example hollow, and a nipple *f'* connects the steam-chamber with the interior of the core or body, so that steam from the steam-chamber may pass into the core or body to heat the same.

I have shown in the pipe *c* a reservoir G, and upon the reservoir G a water-gage *g*, whereby the amount of water passing from the separator can be accurately gaged. In the pipe *c*, also, is a reflow check-valve *g'*. By the use of the reservoir G and the water-gage the quantity of water being returned by the separator can be accurately measured.

Secured upon the rear end of the core or body F, I have shown a cup-shaped receiver I, provided with an outlet-pipe I'. Any water which may be carried along upon the surface of the core or body F will be gathered by the receiver I and carried off through the pipe I', from whence it may pass into the reservoir C.

In the example of my improvement shown in Figs. 1, 2, and 3 the core or body F and the wings *f* are cast in one integral piece; but in Fig. 4 I have shown the wings made separately—for instance, of sheet metal—and secured upon the core or body F by rivets. In this case, also, the wings *f* will be tangential upon both surfaces, as I do not deem it essential in any case that one of the surfaces of the wings should be radial to the axis of the core or body, but only that their outer surfaces should be tangential.

I have shown the separator as arranged horizontally and as forming in effect a portion of the pipe through which the live or exhaust steam may pass; but it might obviously be arranged vertically, as will be readily apparent.

In the examples of my improvement illustrated in Figs. 5, 6, 7, and 8 I have shown the separator as arranged in a steam-boiler—in this instance a locomotive-boiler. In both instances the separator is arranged in the dry-pipe J of the boiler, the casing A forming merely a continuation of the dry-pipe. In both instances, also, the steam-space constitutes the steam-chamber in which the separator is arranged. In Figs. 5 and 6 the separator is arranged vertically and extends into the steam-dome J'; but in Figs. 7 and 8 the separator is arranged horizontally in the steam-space. In both cases the pipe *c* is dispensed with, and the water from the separator is returned to the boiler through an outlet *j*, controlled by a check-valve *l*, arranged in the base of the separator. In both examples, also, I have shown the core or body F as hollow and as in open communication with the steam-chamber. In Figs. 5 and 6 such communication is afforded by vertical pipes L L', opening at one of their ends into the interior of the core or body, and the pipe L opening at its other end below the separator, while the pipe L' opens at its other end above the separator. In this instance the core or body F is supported by the pipes L L'. In Figs. 7 and 8 communication is afforded through a passage *n* and the nipple *f''*.

Of course the separator might be arranged in an exhaust-steam pipe and employed for extracting grease from the exhaust-steam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A steam and water separator consisting of a core or body and a surrounding conduit for the steam from which water is to be separated, and pipes conveying steam to heat said core or body independently of the steam passing around said core or body, substantially as specified.

2. The combination, with a steam and water separator consisting of a core or body having a hollow internal space, of a surrounding conduit for the steam from which the water is to be separated, and an external steam-chamber surrounding said conduit, through which steam will pass, and connections by which steam will pass to the interior of said core or body, substantially as specified.

3. The combination, in a separator for separating water from steam, of a core or body and an external conduit divided into spiral channels for the steam from which the water is to be separated, the said core or body being hollow and having an inlet and an outlet for the circulation of steam therethrough for the purpose of heating or preserving the heat of the steam passing through said conduit, substantially as described.

4. In a separator, the combination, with a case or shell, of outlet and inlet passages or pipes therefor and a core or body arranged therein, said core or body being provided with wings extending spirally about the same and having surfaces upon one of their sides tan-

gential to lines drawn radial to the axis of the core or body, substantially as herein described.

5 5. In a separator, the combination, with a case or shell provided with inlet and outlet passages or pipes, of a core or body arranged within said case or shell and provided with spirally-extending wings, and a receiver secured to the rear end of said core or body for gathering water or grease which may flow
10 along the surface of the core or body, substantially as described.

6. In a separator, the combination, with a case or shell comprising a reservoir, of a pipe for conveying water from the reservoir to a
15 boiler, another reservoir located in said pipe and provided with a water-gage, and a check-

valve in said pipe between the second-named reservoir and the boiler, substantially as described.

7. The combination, with a steam-boiler, of 20 a separator located in the steam-space of the boiler and comprising a casing having an inlet and outlet, and a core or body within said casing provided externally with spirally-extending wings having surfaces tangential to 25 the axis of the core or body and forming passages for steam, substantially as specified.

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