

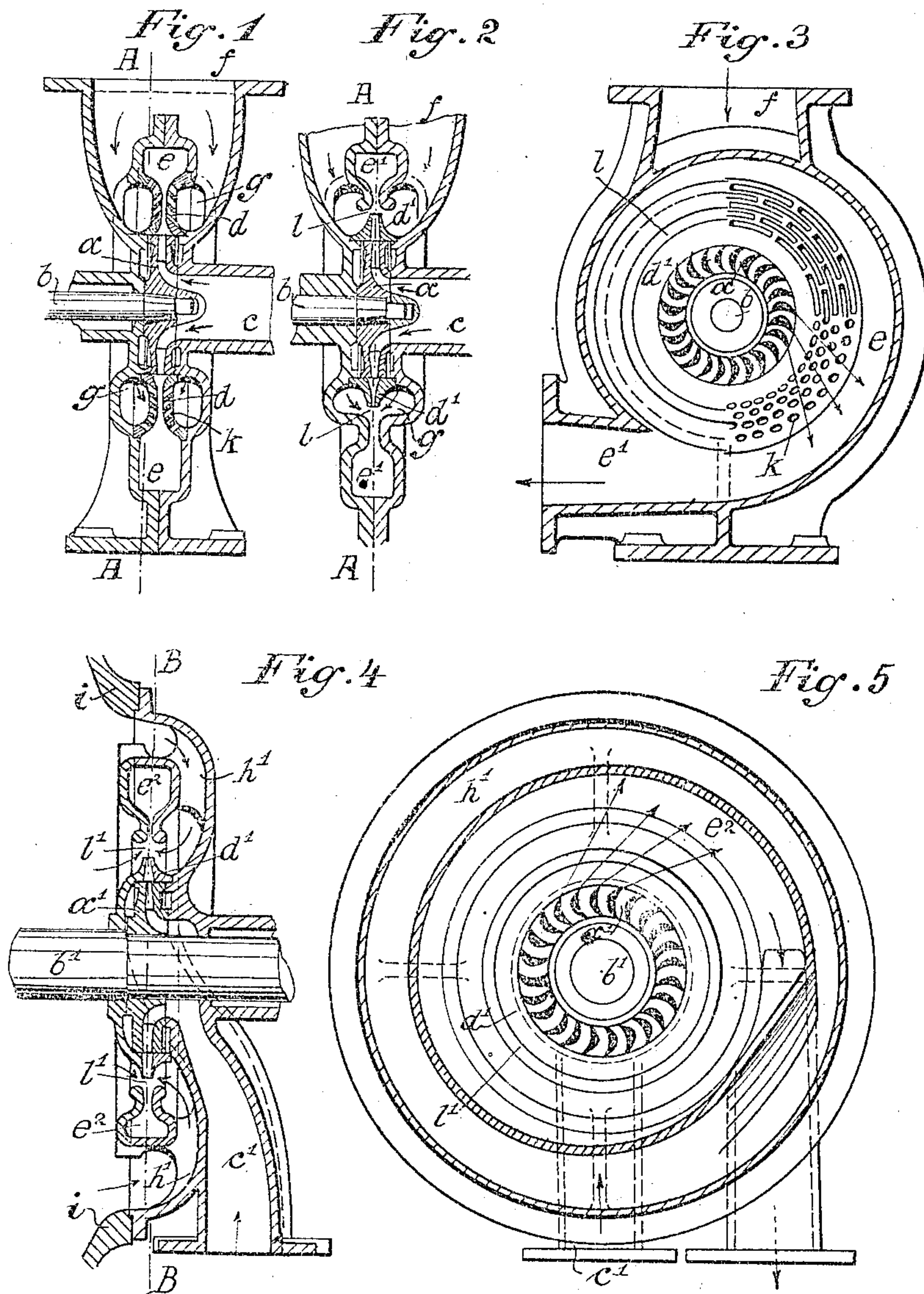
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O. KOLB.

APPARATUS FOR CONDENSING STEAM.

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APPARATUS FOR CONDENSING STEAM.

No. 837,308.

Specification of Letters Patent.

Patented Dec. 4, 1906.

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To all whom it may concern:

Be it known that I, OTTO KOLB, engineer, a subject of the German Emperor, and a resident of Karlsruhe, Germany, have invented certain new and useful Improvements in Apparatus for Condensing Steam by Injection, of which the following is a specification.

When injection-condensers with water and air piston-pumps are used to condense the exhaust-steam of steam-turbines, for example, they require to be separately driven and occupy a large amount of space. In the arrangement according to this invention these piston-pumps are replaced by a centrifugal condenser coupled to or mounted on the shaft of the turbine or the like, this centrifugal condenser acting both as an air-pump and a condenser proper.

The accompanying drawings illustrate arrangements according to this invention as applied to a turbine.

Figures 1 and 2 are transverse sections through the center line of a condenser and a cold-water pump combined. Fig. 3 is a section on the line A A of Figs. 1 and 2. Fig. 4 is a transverse section of a similar condenser attached to the exhaust side of a steam-turbine, and Fig. 5 is a section on the line B B of Fig. 4.

The condenser according to this invention consists, essentially, of a centrifugal pump for the supply of the required condensing water and of a water-guiding device encircling the external periphery of the vane-wheel and consisting of two guiding-rings, the said guiding device serving also for the admission of the exhaust-steam to be condensed.

The condenser comprises a spiral casing inclosing the water-guiding apparatus and serving for the reception and evacuation of the condensed steam and water and air.

The operation of this condenser is as follows: The vane-wheel a or a' , which may be mounted on a special shaft, as shown in Figs. 1, 2, and 3, or directly on the shaft of the turbine, as shown in Figs. 4 and 5, draws the cold water through a suction-pipe c or c' , attached to the condenser. This water as it passes through the vanes of the turbine acquires such an acceleration that it passes at a high speed in the form of jets between the rings d or d' , forming the guiding apparatus

that surrounds the vane-wheel, and is discharged into the spiral casing e , e' , or e^2 . The action of the jets causes the exhaust-steam in the arrangement shown in Figs. 1, 2, and 3 to be drawn by the branch f into and distributed over two annular chambers g . In another arrangement (shown in Figs. 4 and 5) the exhaust-steam is drawn into an annular chamber formed between the cover h' and the casing i of the turbine. Circular openings k or slits k' or nozzle-shaped chambers l or l' connect the annular chamber or chambers with the ring-jet, and the condensed steam, water, and air are delivered into the aforesaid spiral casing e or e' , Fig. 2 or Fig. 3, or e^2 , Figs. 4 and 5. The exhaust-steam is so intimately mixed with the condensation-water that the steam is quickly and entirely condensed. The condensed steam, water, and air are delivered into the spiral casing e , e' , or e^2 and led away from the condenser. In this arrangement it is not necessary to fill the suction-pipe of the centrifugal pump with water for the purpose of starting it, because the steam, which is at first not condensed, escapes through the spiral casing e , e' , or e^2 into the atmosphere and creates a vacuum in the suction-pipe of the centrifugal pump, which will in consequence be filled with water, so that the condensation will then proceed without difficulty.

I claim—

1. In a centrifugal condenser, a rotary vane-wheel provided with a water-inlet and with peripheral water-outlets, and water-guiding means comprising two concentric rings arranged to allow an uninterrupted passage of water between them from the peripheral outlets of said vane to the evacuation-chamber, said rings being provided with steam-openings.

2. In combination with a steam-turbine, a vane-wheel fixed on the shaft thereof, said vane-wheel having a water-inlet and peripheral discharge-openings communicating with said inlet, a water-supply pipe communicating with said inlet, a spiral casing surrounding said vane and adapted to receive and convey away the water issuing from said discharge-openings, water-guiding rings arranged between said vane and said casing in parallel planes and to permit the water to pass

uninterrupted between them, said rings and casing also arranged to provide annular openings between the peripheries of the rings and the contiguous parts of the casing, and a casing forming steam-chambers communicating with said annular openings and with the exhaust of the turbine.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OTTO KOLB.

Witnesses:

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