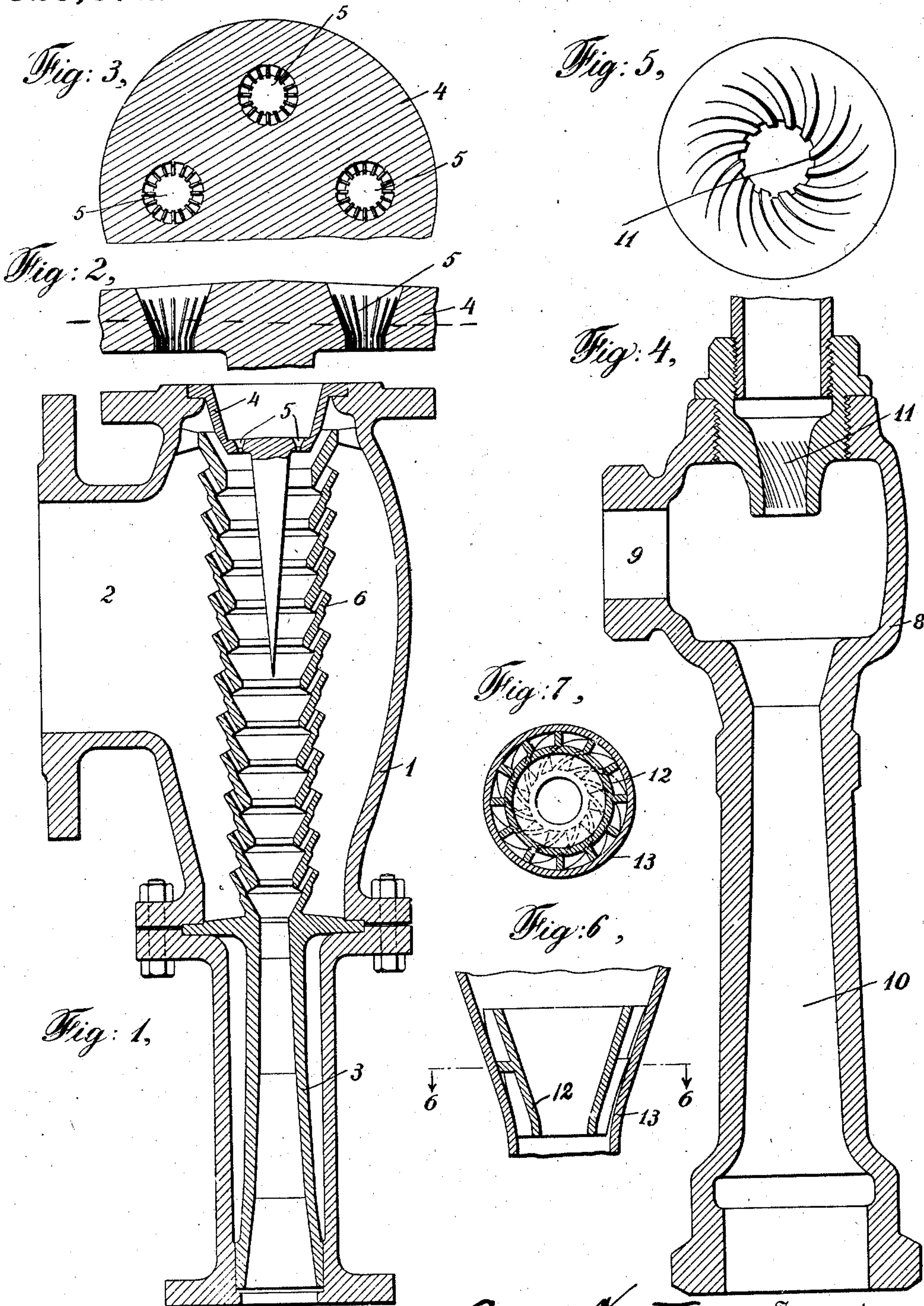


E. KOERTING.
WATER JET APPARATUS.
APPLICATION FILED OCT. 22, 1908.

929,674.

Patented Aug. 3, 1909.



Witnesses:
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UNITED STATES PATENT OFFICE.

ERNST KOERTING, OF PEGLI, ITALY, ASSIGNOR TO SCHUTTE & KOERTING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WATER-JET APPARATUS.

No. 929,674.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed October 22, 1908. Serial No. 458,976.

To all whom it may concern:

Be it known that I, ERNST KOERTING, a subject of the Emperor of Germany, and a resident of Pegli, Italy, have invented certain new and useful Improvements in Water-Jet Apparatus, of which the following is a full, true, and concise specification:

The invention aims to increase the efficiency of the water jets which serve as the propulsive or actuating means in aspirators, exhausters, jet-condensers and similar apparatus, and consists in the provision of means, associated with the jet nozzle, for dividing or breaking up the outer skin of the jet, so that it issues from the orifice in the form of an envelop of separated and partly scattered water particles surrounding an interior solid and compact core. The gas or other fluid to be moved, surrounding the jet, mixes readily with the separated water particles of the outer envelop and, becoming entrained therein, is discharged through the exhaust, while the energy of the jet as a whole and the force of the discharge is maintained by the momentum of the solid core of water passing through the chamber. Thus an effective entrainment and exhaustion of the gas is accomplished, while the energy of the jet is not materially influenced by the slight disturbance of its skin, which produces the entraining envelop.

In the accompanying drawings—Figure 1 represents in central longitudinal section a water jet steam-condenser of a known type and Figs. 2 and 3 represent, in enlarged longitudinal and transverse sections, the jet nozzles which embody this invention; Fig. 4 represents in section another form of aspirating apparatus having a single jet nozzle employing this invention and Fig. 5 is an enlarged detail plan of the interior of such nozzle showing the ribs or grooves therein; Figs. 6 and 7 are respectively longitudinal and transverse sections of a developed form of the invention.

Referring to Figs. 1 to 3, the reference numeral 1 represents the casing of a chamber for the steam or other fluid to be moved, which has the inlet for such fluid at 2 and the discharge outlet at 3. The water head 4 which forms the closure to the top of the chamber, is perforated with a number of water jet nozzles 5, which discharge into the chamber and within a perforated separating tube 6 therein. In the case illustrated,

the jets from the several nozzles converge toward the end of the separating tube where they meet and pass together out of the tail tube 3. As shown more clearly in the enlarged views of Figs. 2 and 3, each jet nozzle is somewhat tapered toward its orifice, and on its interior wall it is provided with a circumferential series of ribs or grooves which serve to divide or break up the surface or skin of the water column passing through it and thus produce the entraining envelop above referred to, while the central portion of the column of water in each water jet remains as a solid core, the momentum of which maintains the force of the discharge. The said ribs or grooves may extend to the extreme end of the nozzle as shown or they may terminate somewhat in advance of that point.

In the apparatus of Figs. 4 and 5, the chamber 8 with its inlet 9 and exhaust passage 10, has but a single jet nozzle, the internal ribs or grooves 11 of which are spirally disposed so as to produce more or less of a whirling motion in the entraining envelop, while the interior solid core passes straight to the discharge inlet. The ribs and grooves of this form of the invention terminate slightly above the end of the nozzle, but they may extend down to the end as in the preceding form, if desired.

In the nozzle shown in section in Figs. 6 and 7, an inner concentric nozzle or ring 12 is located within the main nozzle orifice 13, as a means for separating the envelop from the core and whereby also, a smooth or polished discharge opening may be provided for the latter. The water forming the envelop issues from the annular space between the two nozzles and is subdivided and broken up by means of a series of substantially longitudinal partitions or vanes disposed therein. These vanes may be parallel with the axis of the nozzle, like the ribs of Figs. 1 to 3, but they have preferably a slight pitch as shown, in order to produce whirling motion of the envelop.

Having described my invention, what I claim and desire to secure by United States Letters Patent is:

1. In water jet apparatus, the combination with a chamber containing fluid to be moved, of a nozzle adapted to discharge a solid-core actuating water jet into said chamber to move said fluid and provided with

means for issuing an entraining envelop of separated or scattered water particles surrounding the said core.

2. In water-jet apparatus, the combination with a chamber containing fluid to be moved, of an actuating water-jet nozzle discharging therein and containing means within itself for disturbing the surface of the jet and issuing or discharging same as an entraining envelop to the solid core of the jet.

3. In water-jet apparatus the combination with a chamber containing fluid to be moved, of an actuating water-jet nozzle having within its orifice a circumferential series of ribs or grooves adapted for producing an entraining envelop for the solid core of the jet.

4. In water-jet apparatus, a tapered water-jet nozzle provided with a series of circumferentially disposed ribs adapted for acting upon the jet and producing an entraining envelop around the central portion thereof.

5. In water-jet actuating apparatus, a

water-jet nozzle provided with an annular series of internal ribs, terminating in advance of the orifice of said nozzle and adapted to produce an entraining envelop for the solid core of the jet.

6. In water-jet apparatus, a water-jet nozzle provided with an interior circumferential series of internal, spirally arranged ribs, adapted for issuing an entraining envelop around the solid core of the jet.

7. In water-jet actuating apparatus, a water nozzle comprised of concentric orifices, the outer of said orifices being provided with substantially longitudinal ribs adapted for producing an entraining envelop of water for the jet issuing from the inner orifice.

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

ERNST KOERTING.

Witnesses:

A. HENNEXGIN DE LA FAYETTE,
W. W. BEHNE.