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J. LÜHNE.

APPARATUS FOR OPERATING ON FINELY DIVIDED FLUIDS
OR SOLID MATERIALS.

APPLICATION FILED APR. 27, 1903.

NO MODEL.

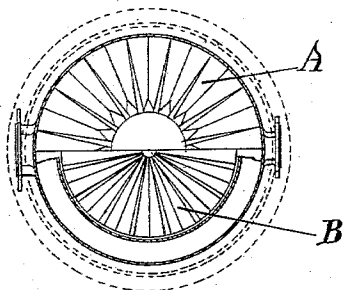


Fig. 2.

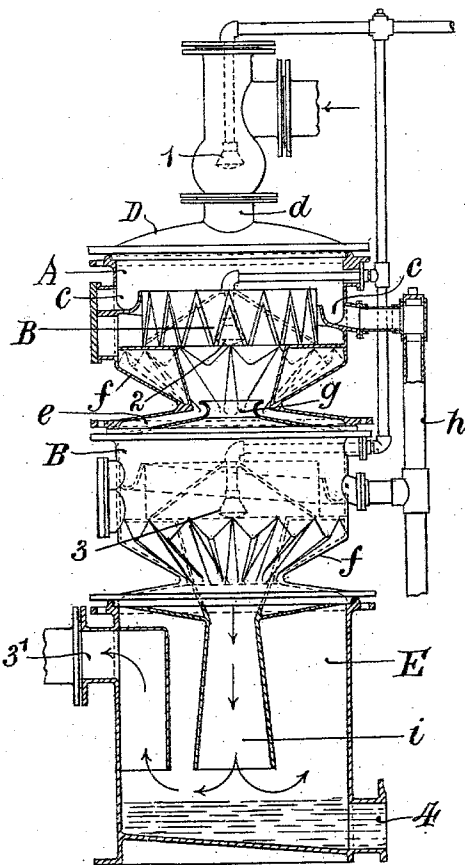


Fig. 1.

WITNESSES

H. M. Kuehne
Edw. C. Smith

INVENTOR

Johann Lüthne

BY *Richard J.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHANN LUHNE, OF AIX-LA-CHAPELLE, GERMANY.

APPARATUS FOR OPERATING ON FINELY-DIVIDED FLUIDS OR SOLID MATERIALS.

SPECIFICATION forming part of Letters Patent No. 757,757, dated April 19, 1904.

Application filed April 27, 1903. Serial No. 154,598. (No model.)

To all whom it may concern:

Be it known that I, JOHANN LUHNE, engineer, of Maxstrasse 10, Aix-la-Chapelle, in the Empire of Germany, have invented a certain new and useful Apparatus for Operating on Finely-Divided Fluids or Solid Materials; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In the carrying out of the present invention every possible treatment of and operation on all kinds of substances are centralized by elements placed one above the other and of the form of tubular bodies with prismatic surfaces of flow or treatment, these surfaces being inclined, flat, pointed, or otherwise, and starting either from the center of the apparatus or being directed toward the center. The said surfaces may be cooled or heated, as required. According to the industrial or chemical results which are desired these surfaces may be charged or gases or liquids may pass over these surfaces and the operations may, for example, be mixing, enrichment, saturation, purification, extraction, separation, absorption, condensation, evaporation, drying, distillation, dilution, washing, cooling, concentration, conservation, expulsion, suction, regeneration, &c. The residues and the by-products can be removed separately by stages or by elements to be otherwise disposed of.

In contradistinction to the methods now employed—as, for example, in the purification of gases by allowing them naturally and without compression to come in contact with moistened surfaces or with a spray of water or with vapor, which methods do not result, as required, in the perfect purification of the gas or the total conservation of the by-products—this new method and new apparatus realize by means of a forced circulation perfect purification as well as the total conservation of the by-products produced from the gas and gathered in stages. The output of the apparatus is thus far superior to that of the standard washer without requiring motive power. This rapid action is due to the use of

injectors, spray-distributors, &c., which direct the absorbing, cooling, or other substances, according to the nature of the treatment, under pressure onto surfaces of a special formation, which start from the center or are directed toward the center and drive the gas under pressure and with forced circulation from one to another in performing the operation either of suction or forcing.

By moistening the surfaces of precipitation with oil simple purification and cooling can be obtained by suction. Since the materials to be treated strike and rub in their passage through the apparatus against the pointed and inclined surfaces in the shape of knife-blades, they are continually cut and divided without any loss of pressure, and by reason of the extended length of the surfaces, as well as the admission and treatment in stages, all kinds of substances may be subjected to all possible kinds of centralized treatment, either chemical or industrial.

In the accompanying drawings, Figure 1 represents the apparatus in longitudinal section. Fig. 2 represents a transverse section of an element, the upper half being a section through xx , the right-hand lower quarter being a section along the broken line yy , and the left-hand lower quarter showing a section at zz of the external surface of A, the interior being omitted.

The apparatus consists of a tubular piece A, in which the surfaces of flow, preferably prismatic and sloping toward the center, are arranged in star form.

The walls of the surfaces are indented, thin, and uniformly distributed throughout and can be cooled by air, &c., or be slightly heated.

The star-shape surface is surmounted by a crown or cap B in the shape of a bell, in which the surfaces slope toward the periphery and which is surrounded by the channel C. The tubular piece A is closed on the top by a cover D, which serves for the introduction of the materials, while at the lower end it is closed by a collector E, from whence the treated substances are lifted out or otherwise conducted away.

In the superposition of several elements A

B the lower portion of each adjusts itself as a cover onto the upper portion of the other, which enables any number of these elements to be combined, according to the employment for which the apparatus is required.

The working of the apparatus varies according to the treatment to which the various materials placed in the apparatus are to be submitted. Gases are, for example, introduced into the apparatus through *d* by the aid of injectors or distributors fed with materials for purifying, mixing, absorption, &c., under pressure. The distributing-spray 1 draws in the gases and forces them into the element A B, where they are enriched, amalgamated, and divided by the substance which feeds the distributor. They pass under pressure and by a forced circulation on the surfaces of the crown B, which slope toward the periphery, then onto the surfaces of the piece A, which slope toward the center, and then they pass to a second element of similar construction and operation.

Substances of greater density deposit themselves on the lower portion *f* of the surfaces and are collected on the plate *e*, from whence they pass into the channel *c*, leading to the outside. The gases pass through the opening *g* of the plate *e*, while the deposited substances are led away to the outside and can be recovered separately from each element. The sprinkling arrangements in the shape of distributors 2 and 3 are arranged below the crown B of each element for the purpose of purifying, absorbing, enriching, &c. These distributors can be either fed separately or by a common pipe. The flowing away of the deposited substances can be done by means of a common pipe *h* or separately from each element A B. It is easy to understand that in this way the gases, &c., passing through the apparatus can be treated and manipulated differently in each element—for instance, naphthalene can be separated by means of oil, cyanogen and ammonia can be absorbed, and sulphydric acid eliminated by heating the surfaces. Also with one operation other eliminations besides those of ammonia and sulphydric acid can be made. The apparatus does not need the use of a gas-exhauster, and in many cases it can be utilized as an exhaust pump or ventilator, for, fed by the steam-injectors, the apparatus can develop a great suction or forcing power. The finished product passes through the tube *i* into the collector E, from whence this product, which can be gas, steam, air, liquid, or solid substances, or anything else, flows away through the tubes 3' or 4 or can be taken out from the collector. In the manufacture of gas for lighting purposes the apparatus may replace the first condenser or it may be utilized for the autocarburization of the mixed gas. When used as a chamber of contact in the

treatment or use of strong acids, &c., the apparatus may be made of glass, earthenware, or any other suitable material. The apparatus also can be advantageously used for the extraction of gold by washing sand containing gold or for any other mineral preparations requiring a minute separation. The operations and phenomena resulting from this arrangement of surfaces sloping from the center to the periphery and of other surfaces sloping from the periphery to the center, from the circulation of substances either from the top, to the bottom or from the bottom to the top and from the employment of different materials of treatment are of infinite variety. They cannot be enumerated in detail to explain all the modifications and combinations to be obtained by the use of this apparatus.

I claim—

1. An apparatus for effecting a succession of operations on matter adapted to be supplied in a fine state of division and the separation of the products which result in stages, consisting of a series of drum-shaped chambers of two kinds A and B which are alternately superposed on one another, the bottom of chamber A sloping downward toward a central aperture and the bottom of chamber B sloping from the center downward to its outer periphery, and a shelving partition-plate *e* dividing by its upper edge the central aperture of A into an annular area and an interior circular area, the lower edge of *e* carrying a channel leading to an external collecting-pipe.
2. An apparatus for effecting a succession of operations on matter adapted to be supplied in a fine state of division and the separation of the products which result in stages, consisting of a series of drum-shaped chambers of two kinds A and B which are alternately superposed on one another, the bottom of chamber A sloping downward toward a central aperture and the bottom of chamber B sloping from the center downward to its outer periphery, the surfaces of A and B being indented to increase their area and efficiency and a shelving partition-plate *e* dividing by its upper edge the central aperture of A into an annular area and an interior circular area, the lower edge of *e* carrying a channel leading to an external collecting-pipe.
3. An apparatus for effecting a succession of operations on matter adapted to be supplied in a fine state of division and the separation of the products which result in stages, consisting of a series of drum-shaped chambers of two kinds A and B which are alternately superposed on one another, the bottom of chamber A sloping downward toward a central aperture and the bottom of chamber B sloping from the center downward to its outer periphery, a shelving partition-plate *e* divid-

ing by its outer periphery, a shelving aperture of A into an annular area and an interior circular area, the lower edge of *e* carrying a channel leading to an external collecting-pipe
5 and a series of pipes with distributing-nozzles for the admission of mixing fluids.

In testimony that I claim the foregoing as

my invention I have signed my name in presence of two subscribing witnesses.

JOHANN LUHNE.

Witnesses:

HENRY KNORDFLUG,

E. M. BRUNDAGE.