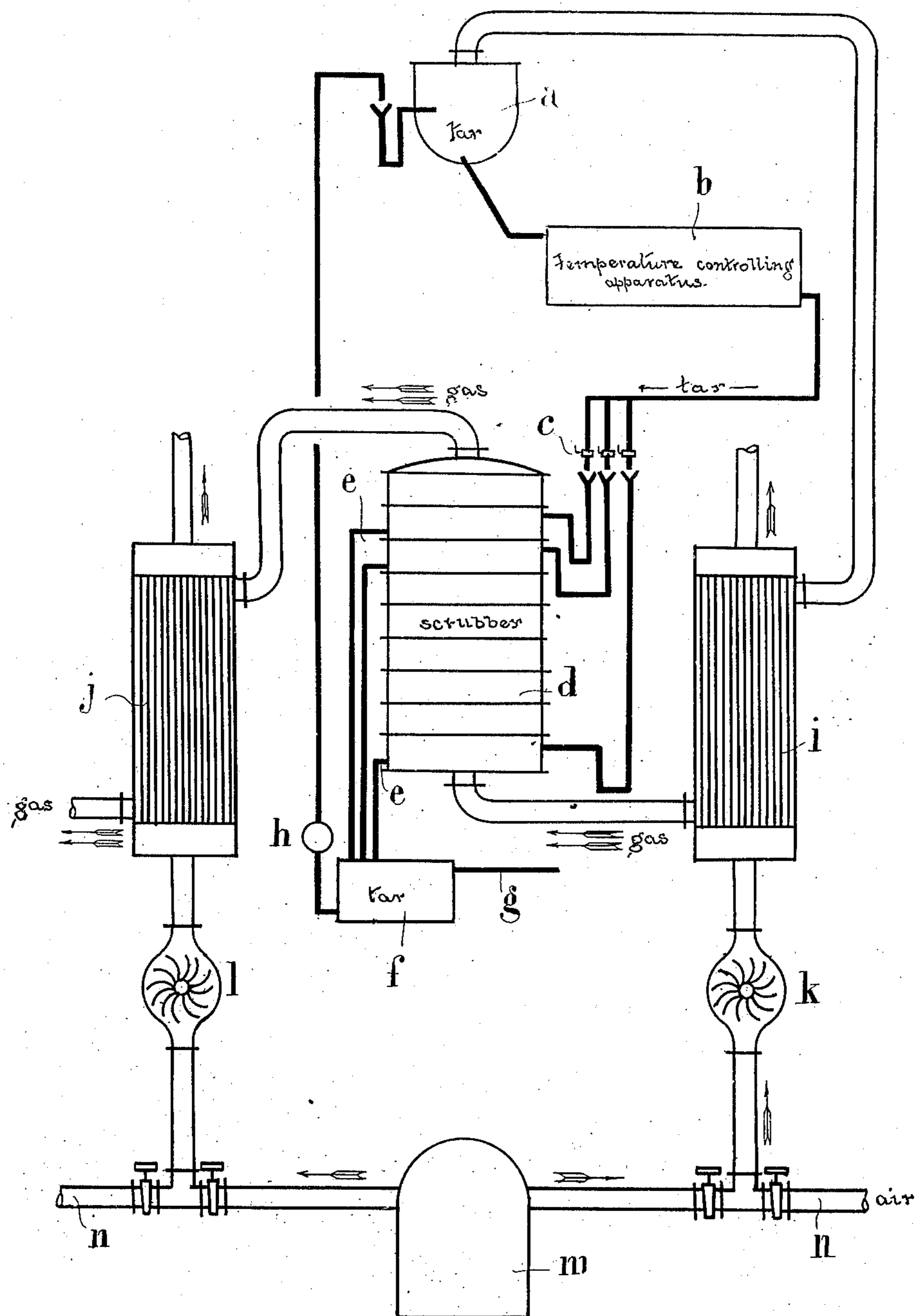


E. SOLVAY.
 APPARATUS FOR REMOVING TAR FROM COAL GASES.
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR REMOVING TAR FROM COAL-GASES.

963,401.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNEST SOLVAY, a subject of Belgium, residing at Brussels, Belgium, have invented new and useful Improvements in Apparatus for Removing Tar from Coal-Gases, of which the following is a specification.

For the purpose of avoiding distillation of the ammoniacal waters produced in coke ovens and gas works it has been proposed to deliver the gases direct to the acid solution provided for fixing the ammonia. The practical success of such an operation entails a preliminary separation of the tar contained in the gases. Now hitherto this separation of the tar has been effected while accompanied by a cooling process so that it was necessarily attended by condensation of water. It has been proposed to recover the tar at temperatures at which the water does not condense and it has also more particularly been proposed to use liquid tar itself as a liquid serving to recover the tar in suspension in the gas. These various proposals are published in prior publications and belong to the domain of common knowledge.

This invention consists of an apparatus suitable for carrying out the operation of removing the tar in the presence of heat.

The new or improved apparatus comprises a splashing column or gas scrubber and two surface heat regulators adapted to suitably regulate the temperatures of the gas at the inlet and at the outlet of the scrubber, and a surface heat regulator for controlling the temperature of the tar supplied to such scrubber. This arrangement of apparatus is essential for correcting the variations of temperature resulting from the distillation and as the proper working of the entire apparatus necessitates the whole of the water remaining in the state of vapor but without being uselessly superheated, it is necessary that means should be provided for raising or lowering the temperature of the gases and tar at will.

The scrubber is of the ordinary type of washing apparatus employed in the gas industry, that is to say it comprises superposed sections the bottoms of which are provided with splashers and a passage for the descent of the tar from top to bottom, and an arrangement for the methodical passage of the gases in the opposite direction that is

to say from the bottom to the top. It embodies however one novel and characteristic feature. The known apparatus of this kind are only provided with an arrangement for the supply of liquid at the top. Experience has shown however that it is not possible to insure in this way the necessary homogeneity of the washing liquid and according to the present invention the usual system of working is modified by providing a special inlet for the tar supply at each section or series of sections and also a special outlet at each section or series of sections. On the accompanying diagrammatic illustration of a plant according to this invention only three inlets and three outlets are shown in order not to complicate the drawing.

The improved arrangement enables the methodical recovery of the tar in the gas to be effected by the tar supplied to the apparatus in that as the temperature of the tar in the apparatus decreases in an upward direction, such tar recovers successively the whole of the constituents of the tar in the gas from the heaviest, which are recovered at the bottom of the apparatus to the lightest, which are recovered at the top of the apparatus. This mode of proceeding implies a different temperature in each section or compartment, contrary to certain processes wherein a fixed temperature is maintained throughout.

The temperature regulators for the gases comprise casings in which a double system of pipes enables the gases that have to be heated or cooled by a hotter or cooler medium to be brought into contact without mingling with each other.

The source of heat may if desired be the heat of the tars leaving the apparatus or any other suitable source, this not being an essential point however. In the accompanying drawing the flue for the burned gases is shown as the source of heat.

The most convenient source of cold or refrigeration seems to be the atmospheric air as it lends itself better to being admitted at the point required by a simple arrangement of vanes, as shown in the drawing, the whole being combined with a ventilator for each regulator. Other refrigerating means may however be employed; for instance a current of water may be used.

The drawing is substantially self explanatory. The tar from the ordinary tar collecting vessel *a* of the retorts passes through the temperature-controlling apparatus *b* and is fed by means of cocks *c* to each of the compartments of the scrubber *d*. After passing through said scrubber the tar is delivered through the several outlets *e* into the tar collecting tank *f* which is provided with an outlet *g* for drawing off the surplus.

h is the tar pump, *i* and *j* the two gas temperature controllers, *k* and *l* the fans for each of the latter, *m* the gas flue.

The circulation of the gas is indicated by double arrows and that of the heating or cooling fluid by single arrows.

n is the cold air inlet which may be provided if desired.

In operation, the gas from the retorts passes through the collecting vessel *a*, said gas then passing to and through the temperature controller *i*, then to and through the scrubber *d*, then to and through the temperature controller *j* and to the place of storage or use. The tar collected in the vessel *a* runs through the temperature controller *b* and then, under the control of the cocks *c*, to and through compartments of the scrubber *d*, escaping through the outlets *e* and passing to the collecting tank *f* from which it may be pumped by means of a pump *h* back to the vessel *a*, surplus tar passing out through the outlet *g*.

The gas flue *m* is connected by means of suitable conduits with both of the temperature controllers *i* and *j*, fans *k* and *l* being located in said conduits. Connected with said conduits are other conduits *n* for a cooling medium, the conduits being provided with suitable valves as indicated in the drawings whereby either the gas from flue *m*, which may be employed as a heating medium, or cold air through the conduits *n*, may be sent through the temperature controllers *i* and *j*.

Having now described my invention, what

I claim as new and desire to secure by Letters Patent is:

1. In apparatus for recovering the tar from coal gases and maintaining such gases at the proper temperature for their saturation by acids, in combination a gas washing scrubber comprising superposed sections, inlets for the washing liquid to two or more of said sections, and outlets for the said liquid from the same, an inlet for the gases to the said scrubber, an outlet for the gases therefrom, temperature regulators in connection with the said gas inlet, and outlet and a temperature regulator in connection with the inlets for the washing liquid to the scrubber.

2. In apparatus for freeing coal gases from tar, of the character described, in combination a gas washing scrubber comprising superposed sections, an inlet for the washing liquid to each of said sections, an outlet for said liquid from each of said sections, an inlet for the gases at the bottom of said scrubber, an outlet for the gases at the top thereof and surface heat regulators in connection with the washing liquid inlets and the gas inlet and outlet respectively.

3. Apparatus for removing the tar from coal gases, of the character described, comprising a gas washing scrubber made in sections, inlets for the washing liquid to a number of said sections and outlets for the said liquid from the same, an inlet for the gases at the bottom of said scrubber, an outlet for the gases at the top thereof and heat controllers in connection with the washing liquid inlets and the gas inlet and outlet respectively.

In testimony whereof I have affixed my signature in presence of two subscribing witnesses.

ERNEST SOLVAY.

Witnesses:

J. L. FURSTENHOFF,
GREGORY PHELAN.