

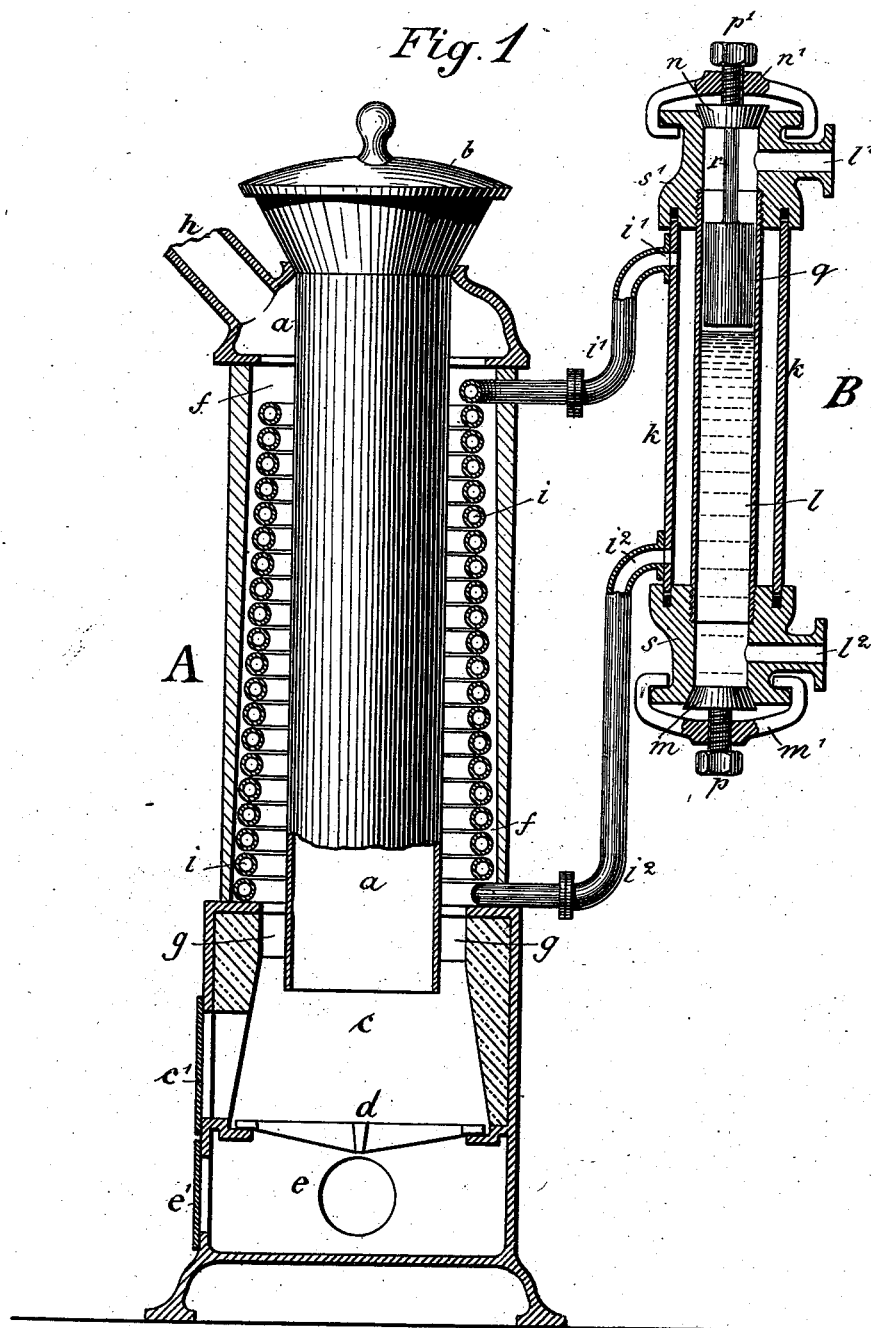
(No Model.)

3 Sheets—Sheet 1.

W. SCHMIDT.
STEAM GENERATOR.

No. 382,835.

Patented May 15, 1888.



Witnesses:
C. F. Scheler.
A. H. K. Scheler.

Inventor:
Wilhelm Schmidt.
by *A. K. H. R. D. D. D.*
his attorneys in fact.

(No Model.)

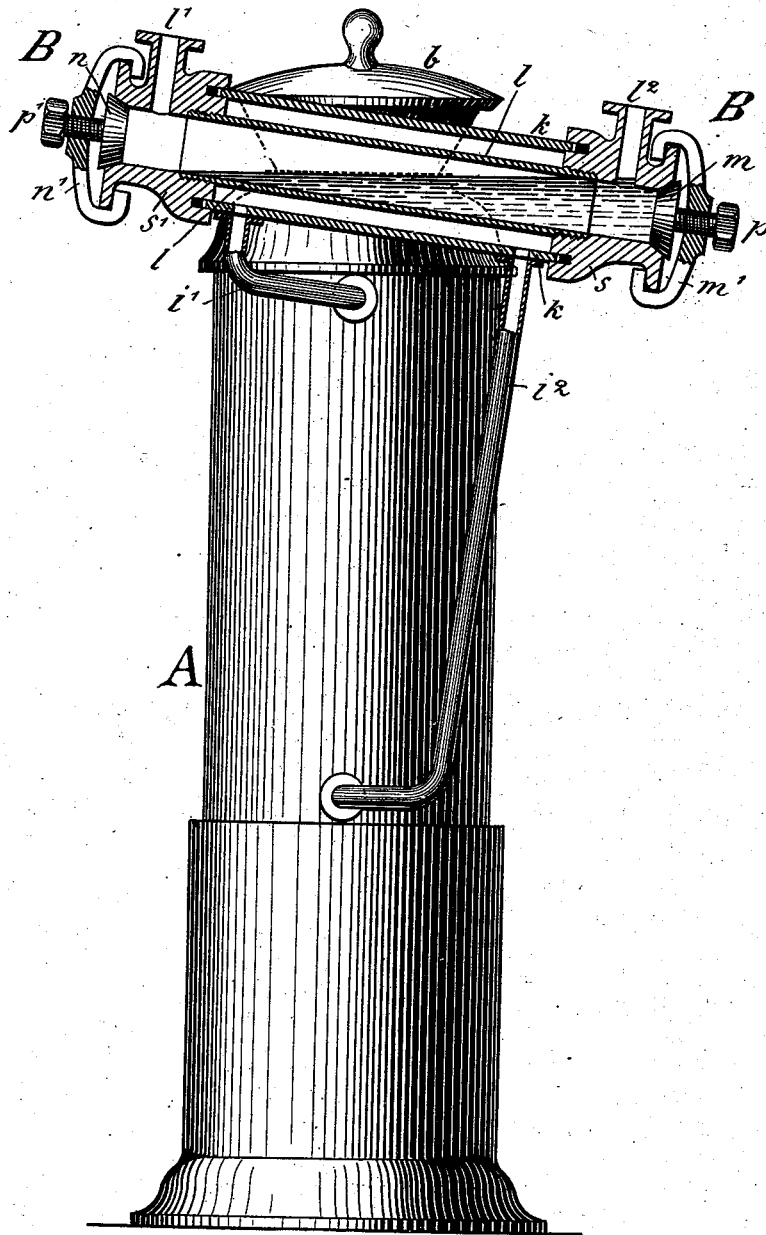
W. SCHMIDT.
STEAM GENERATOR.

3 Sheets—Sheet 2.

No. 382,835.

Patented May 15, 1888.

Fig 2



Witnesses:

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O. Lüthgen.

Inventor:

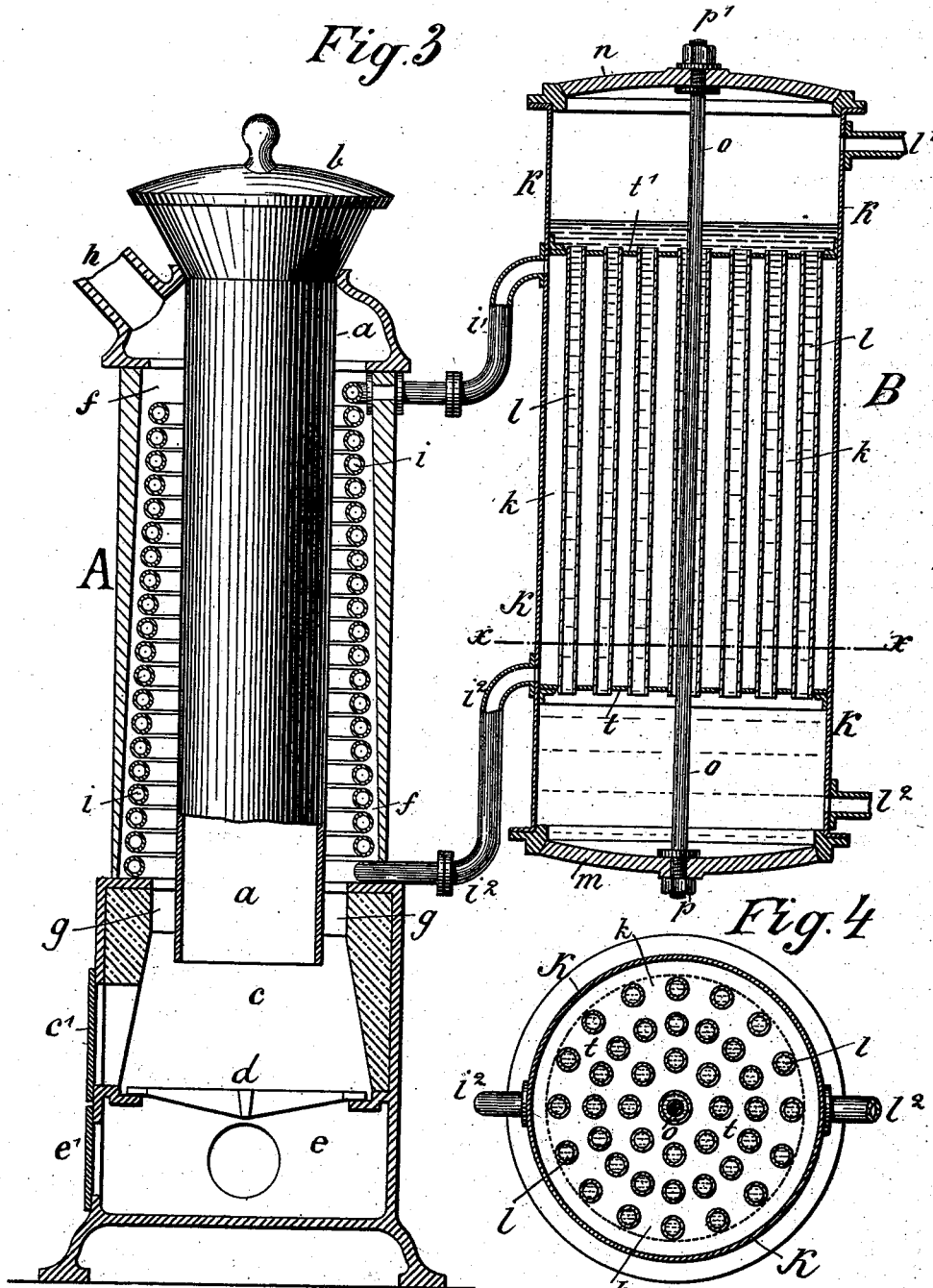
Wilhelm Schmidt
by *H. Kubat & R. Winter.*
his attorneys in fact.

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Fig. 3



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF HALBERSTADT, PRUSSIA, GERMANY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 382,835, dated May 15, 1888.

Application filed October 17, 1887. Serial No. 252,617. (No model.) Patented in Germany May 5, 1886, No. 27,287.

To all whom it may concern:

Be it known that I, WILHELM SCHMIDT, a subject of the King of Prussia, German Emperor, residing at No. 8 Plantagen Street, Halberstadt, in the Kingdom of Prussia, German Empire, civil engineer, have invented certain new and useful Improvements in Steam-Generators, (for which I have obtained a patent in Germany, No. 37,287, bearing date of May 5, 1886,) of which the following is a specification.

My invention relates to improvements in steam-generators in which superheated steam is used for heating the steam-generator proper; and the object of my improvements is to construct a steam-generator of the smallest size possible, being adapted especially for use in small manufactories—i. e., for driving or working small motors; and my generator consists of a tube or tubes surrounded by another tube of larger diameter, thus leaving a space between the tubes, into which superheated steam is continually conducted, and, when condensed, is guided off again. I attain this object by the construction of the steam-generator illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of my improved steam-generator; Fig. 2, an elevation, partly in section, of a modification of the same. Fig. 3 shows another modification in sectional elevation, and Fig. 4 is a transverse section on line *x x* of Fig. 3.

Similar letters refer to similar parts throughout the several views.

A is the furnace, and B the steam-generator, taken as a whole. The furnace A is fed from above through chute *a*, being provided with a cover, *b*.

c is the fire-box, *d* the grates, and *e* the ash-pit. Fire-box and ash-pit are provided with doors *c'* and *e'* for pricking the coal or cleaning the ash-pit, respectively. The smoke or products of combustion enter the flue *f* through channel *g*, being of tubular shape, and escape through chimney-pipe *h*. While passing through flue *f* the smoke surrounds spiral tube *i* and imparts its heat to the latter, being filled in its lower part with water, which is thereby evaporated. The steam thus produced is guided into my new steam-generator B, which I may construct in different ways.

In the construction shown in Fig. 1 the

steam generator consists in the main of two pipes, *k* and *l*, of different diameters, of which tubes *l* is the steam-boiler, being inclosed in pipe or tube *k*. Both pipes are closed at their top and bottom ends. Pipe *l* is closed by caps *s* and *s'*, having central channels, which make part of the inner tube or boiler, *l*, being closed by conical covers *n* and *m*, which are held in position by stays *n'* and *m'*, in combination with adjusting-screws *p p*, pressing on the covers. Boiler *l* is provided with similar ports or channels, *l'* and *l''*, and with a piston, *q*, being suspended from cover *n* by rod *r*, the purpose of which piston will be hereinafter described.

The superheated steam being generated in spiral tube *i* passes off from out the same through pipe *i'* into tube *k*, where it imparts its heat to the boiler *l*, which is filled up till somewhat below the piston *q* with water entering into the same through pipe *l'* near the bottom end. Thus by means of the superheated steam surrounding the boiler *l* the water inside the latter will be evaporated and the generated steam is guided into the motor through steam-outlet port *l''*. Before leaving the boiler *l* the steam has to pass the narrow space left between piston *q* and tube *l*, where it is more fully subjected to the heat of the superheated steam being expended in the outside tube or steam-jacket, *k*, and thus leaves the boiler fully dried, though there is but little room left for the steam above the water-line of the boiler *l*. The water in the steam-boiler *l* is continually kept up to the same level, as sufficient fresh water is always conducted into the same through pipe *l'*. When the steam of the steam-jacket *k* has condensed, it passes out of the same through pipe *i'*, back into the spiral tube *i*, where it is again evaporated, and is again conducted into steam-jacket *k* through pipe *i'*. Thus the same quantity of water is continuously evaporated and the incrustation of the tubes and jacket is prevented.

The boiler may easily be scaled when taking off the two covers *m* and *n*. My improved steam-generator is therefore well adapted to be used in small factories with the greatest safety. It is not necessary to arrange the steam-generator B vertically. I may well construct it in the manner as is shown in Fig. 2 of the accompanying drawings, where it is arranged nearly horizontally, for the steam of

steam-jacket *k* surrounds the boiler just as well as in the above-described construction and imparts its heat to the boiler. In this second case I have done away with the piston *g*, for the steam will get dry enough when passing along the upper part of boiler *k*.

Another modification of my steam-generator is shown in Figs. 3 and 4. The boiler in this case consists of several tubes *l*, being inserted in and surrounded by steam-jacket *k*. The tubular vessel constituting the steam-jacket is extended above and below the water-pipes *l* and makes part of the steam-boiler, as the steam-jacket proper is shut off by partitions *t* and *t'*, in which the boiler-tubes *l* are inserted. The water enters the lower part of the boiler at *l'* and fills pipes *l*, and its surface is somewhat above the top end of pipes *l*. The steam, coming through pipe *l'*, enters steam-jacket *k*, being shut off from cylinder *K* by the partitions *t* and *t'*, and surrounds the boiler-tube *l*, just as in the constructions described above, and evaporates the water within the latter. The steam thus produced passes off through pipe *l'* into the motor to be worked, and the condensed steam of the steam-jacket *k* enters again spiral tubes *i* through pipe *i'*; also, in this case a piston is not necessary, as the exhausting-chamber of the boiler is large enough to deliver but dry steam into the motor.

The scaling of the boiler may well be done by removing covers *n* and *m*, being connected and locked to the boiler by a rod, *o*, passing through both covers, and being fastened to the latter by screw-nuts *p* and *p'*.

I am aware that prior to my invention steam-generators have been constructed which were provided with steam-jackets and were

heated by superheated steam. I therefore do not claim such a combination, broadly; but What I do claim as my invention, and desire to secure by Letters Patent, is—

1. A steam-generator consisting of two tubes, *l* and *k*, of different diameters, being shut off from one another, and of which the one *l* is inserted in the other, *k*, and is provided with a steam-outlet port, *l'*, and water-inlet port *l''*, and of which the other one, *k*, is connected to the boiler by means of the pipe *i'* at the top and by the pipe *i''* at the bottom, in combination with a directly-heated system of tubes, *i*, the steam of which is conducted into tube *k* by a pipe, *i'*, and the condensed steam is guided back into the system of tubes *i* through pipe *i''*, for the purpose substantially as described.

2. In steam-generators consisting of two tubes, *l* and *k*, of different diameters, being shut off from one another, and of which the one *l* is inserted in the other, *k*, and is provided with a steam-outlet port, *l'*, and water-inlet port *l''*, and of which the other one, *k*, is provided with similar ports, *i'* and *i''*, in combination with a directly-heated system of tubes, *i*, the steam of which is conducted into tube *k* by a pipe, *i'*, and the condensed steam is guided back into the system of tubes *i* through pipe *i''*, and with a piston, *g*, arranged inside the boiler *l* above the surface of the water, for the purpose substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILHELM SCHMIDT.

Witnesses:

B. ROY,

O. MÜHLNER.