

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 February 2007 (15.02.2007)

PCT

(10) International Publication Number
WO 2007/018441 A2

(51) International Patent Classification: **Not classified**

(21) International Application Number:
PCT/PL2006/000056

(22) International Filing Date: 7 August 2006 (07.08.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
P376594 11 August 2005 (11.08.2005) PL

(71) Applicant and

(72) Inventor: JANÓW, Gwidon [PL/PL]; ul. Folwark 28,
PL-34-300 Zywiec (PL).

(74) Agent: RYGIEL, Andrzej; Kancelaria Rzecznika Paten-
towego, ul. Bohaterów Warszawy 26 Lok. F, PL-43-300
Bielsko-Biala (PL).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,

CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP,
KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT,
LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA,
NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC,
SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ,
UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

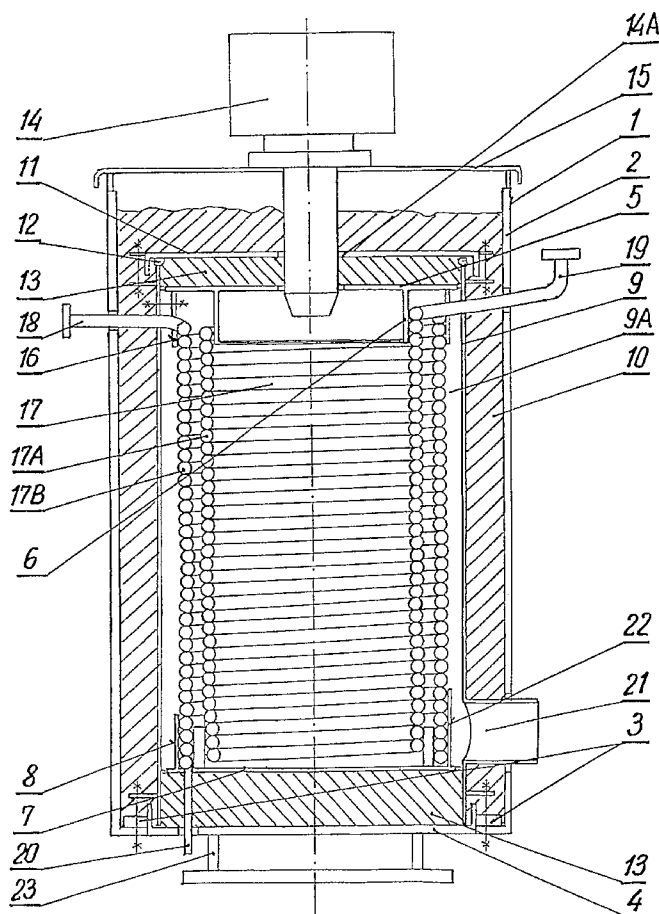
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished
upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: STEAM GENERATOR



(57) Abstract: The object of the invention is a steam generator intended for quick steam generation. The steam generator consists of an external jacket (1), fixed to a frame (2), attached to a lower cover (4) with connectors (3). Inside the external jacket (1) there is a cylindrical casing (9) of a combustion chamber (9A) limited by upper reversible cover (5) with a flange (6), lower reversible cover (7) with a flange (8) and by the cylindrical casing (9) of the combustion chamber (9A), which is wrapped into insulation (10) and closed with an upper cover (11) and the lower cover (4). The upper reversible cover (5) with the flange (6) is freely set in slings (16) of a coil pipe (17) that are screwed to the casing of the combustion chamber (9) in a separable way. The flange (6) is slid to the inside of the internal coil (17A) of the coil pipe (17). Sealing in the form of cord (12) is placed between the flange (6) and the internal coil (17A).

STEAM GENERATOR

The object of the invention is a steam generator intended for quick steam generation.

There are some popular steam generators that consist of an external jacket separated from combustion chamber casing by insulation, where the space of combustion chamber is closed from the top and bottom with covers, along with a double coil pipe placed inside, having a water inlet and steam outlet in its upper part and in the upper part of the steam generator there is a burner built-in with flame directed vertically downwards; moreover, there are also popular three-draught steam generators, where exhaust gas outlet is placed in the lower part of the generator.

The aim of the invention is to design a highly effective steam generator capable of quick steam generation.

The steam generator according to the invention consists of the external jacket, separated from combustion chamber casing by insulation, where the space of combustion chamber is closed from the top and bottom with covers, along with a coil pipe placed inside, forming three-draught circulation of exhaust gases and where in the upper part of the generator there is a burner built-in with flame directed vertically downwards and it is characterised by the fact that the combustion chamber space is limited with an upper reversible cover, a lower reversible cover and cylindrical casing. The casing of the combustion chamber is closed with upper and lower covers, which are attached to the casing in a

- 2 -

separable way and the joint is sealed with cord. Under the upper cover of the combustion chamber there is insulation placed on the upper reversible cover, loosely set against the combustion chamber casing and supported by slings of the coil pipe. The slings are connected with the combustion chamber casing in a separable way. The reversible cover is provided with a flange advanced towards the coil inside of internal coil pipe, sealed with a cord. The coil pipe has two counter-twisted internal and external coils in the form of cylinders formed by adjacent coils placed coaxially one inside the other, where cylinder length L in relation to the internal diameter of internal coil $\varnothing_{wzw}$ is within the range of $L = (3.3 \div 5.0) \times \varnothing_{wzw}$, and the ratio of the internal diameter of external coil $\varnothing_{wzz}$ to the internal diameter of internal coil $\varnothing_{wzw}$ equals $\varnothing_{wzz} / \varnothing_{wzw} = 1.30 \div 1.5$, and at the bottom, the external coils of the coil pipe are encircled with a ring sealed with cord, which is attached to the lower reversible cover loosely set in the cylindrical casing of the combustion chamber and placed on insulation that is on the lower cover tightly joint with cylindrical casing of the combustion chamber, where that casing is provided with an opening of exhaust gas outlet above the edge of lower reversible cover, and in the diameter of that opening, near the external coil of the coil pipe, there is a shield of an area at least equal to or larger than the area of the outlet opening.

The object of the invention is presented as the example product in the drawing, where Fig. 1 shows axial section of the steam generator's body; Fig. 2 shows a side view of the coil pipe; Fig. 3 presents a bottom view of the coil pipe; and Fig. 4 presents a top view of the coil pipe.

As it is presented in the drawing, the steam generator consists of an external jacket 1, fixed to a frame 2, attached to a lower cover 4 with connectors 3. Inside the external jacket 1 there is a cylindrical casing 9 of a combustion chamber 9A limited by upper reversible cover 5 with a flange 6, lower reversible cover 7 with a flange 8 and by the cylindrical casing 9 of the combustion chamber 9A, which is wrapped into insulation 10, and closed with an upper cover 11 and the lower cover 4. The lower cover 4, the upper cover 11 and the casing of the combustion

- 3 -

chamber 9A are connected, and the joint is sealed with cord 12. The upper cover 11 of the casing of combustion chamber 9A, which is provided with insulation 10 on the top and insulation 13 in its lower part has an opening 14A for a burner 14, which is attached to the cover 15. The cover 15 is screwed to the frame 2. The upper reversible cover 5 with the flange 6 is loosely set in slings 16 of a coil pipe 17, where the slings 16 are screwed to the casing of the combustion chamber 9 in a separable way. The flange 6 is slid to the inside of the internal coil 17A of the coil pipe 17. Sealing in the form of cord 12 is placed between the flange 6 and the internal coil 17A. The coil pipe 17, placed in the cylindrical casing 9, consists of two counter-twisted coils: the internal coil 17A and the external coil 17B having the form of cylinders placed coaxially one inside the other and connected in the lower part. The external coils 17B of the coil pipe 17 are provided with water inlet stub pipe 18 in the highest place and the internal coils 17A are provided with steam outlet 19 and blowdown stub pipe 20 in the lowest place. In the lower part the coil pipe 17 is supported on the lower reversible cover 7 with the flange 8 and insulation 13 is placed under it. There is an exhaust gas outlet opening 21 in the cylindrical casing 9 over the edge of the lower reversible cover 7 and a shield 22 is in the diameter of that opening 21, near the coil pipe external coil 17B. The steam generator is supported on the carrying frame 23.

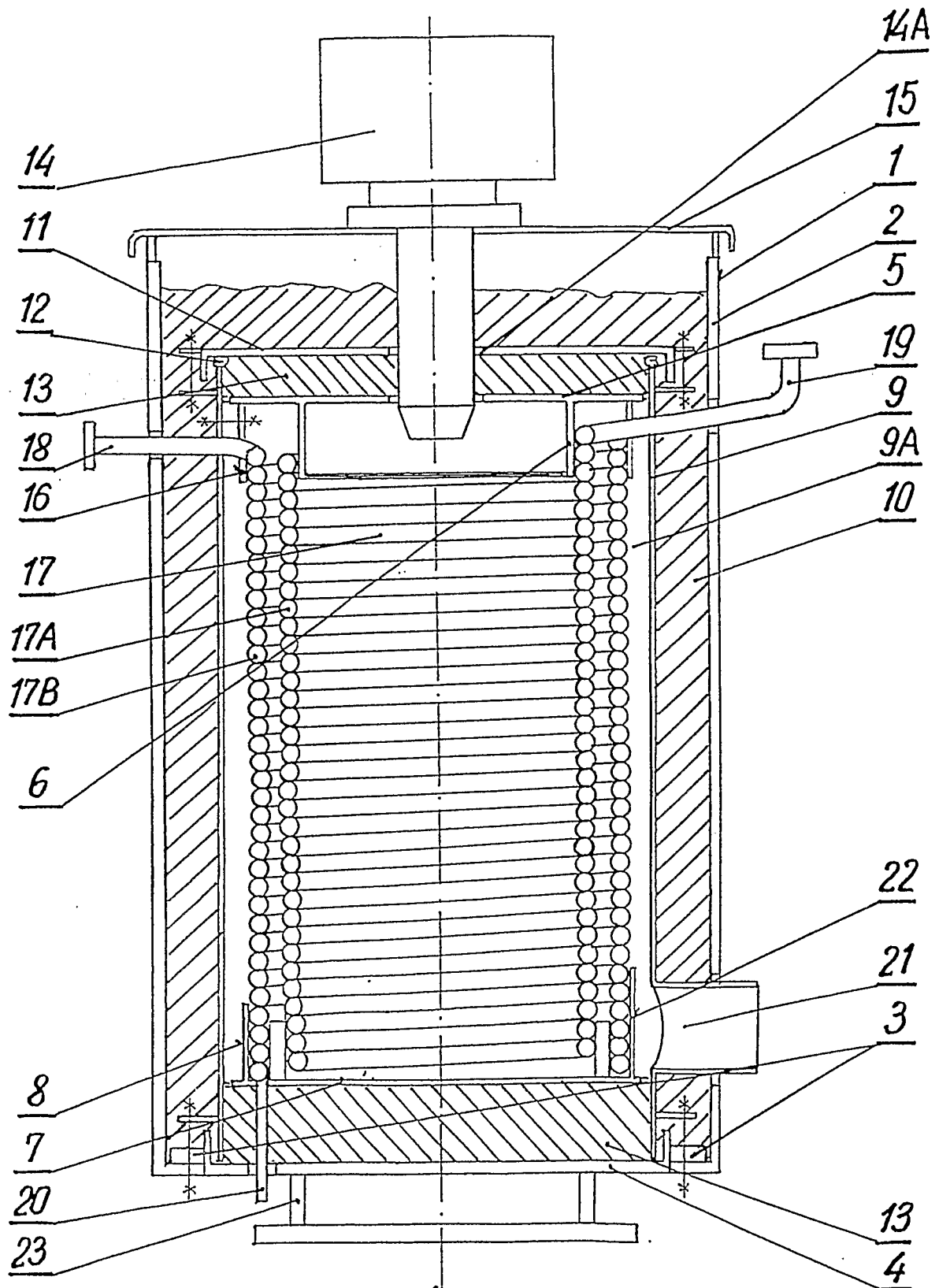
Patent Claim

The stem generator that consists of an external jacket, separated from combustion chamber casing by insulation, where the combustion chamber is closed from the top and bottom with covers, along with a coil placed inside, forming three-draught exhaust gas circulation; and where a burner is built-in in the upper part of the generator, with flame directed vertically downwards, **characterised by the fact that** the space of combustion chamber (9A) is limited with an upper reversible cover (5), a lower reversible cover (7) and a cylindrical casing (9) of the combustion chamber (9A), which is closed with an upper cover (11) and a lower cover (4) that are connected with the cylindrical casing (9) of the combustion chamber (9A) in a separable way and the joint is sealed with cord (12); whilst the upper cover (11) of the combustion chamber, under which there is insulation (13) resting on the upper reversible cover (5), set loosely towards the cylindrical casing (9) of the combustion chamber (9A) supported on slings (16) of a coil pipe (17), where the slings (16) are connected with the cylindrical casing (9) of the combustion chamber (9A) in a separable way, and the upper reversible cover (5) has a flange (6) slid inside the coil pipe internal coil (17A) and sealed with cord and where the coil pipe (17) has two counter-twisted internal coils (17A) and external coils (17B) in the form of cylinders formed by adjacent coils placed coaxially one inside the other, where the cylinder length L in relation to the internal diameter $\varnothing_{wzw}$ of internal coil (17A) is within the range of $L = (3.3 \div 5.0) \times \varnothing_{wzw}$, and the ratio of the internal diameter $\varnothing_{wzz}$ of external coil (17B) to the internal diameter $\varnothing_{wzw}$ of internal coil (17A) equals $\varnothing_{wzz} / \varnothing_{wzw} = 1.30 \div 1.5$, and at the bottom, the external coils (17B) of the coil pipe (17) are encircled with a ring (8) sealed with cord (12), which is attached to the lower reversible cover (7)

- 5 -

loosely set in the combustion chamber cylindrical casing (9) placed on insulation (13) that is on the lower cover (4), tightly joint with cylindrical casing (9) and where that casing (9) is provided with an opening of exhaust gas outlet (21) above the edge of lower reversible cover (7), and a shield (22), placed in the diameter of that opening (21) near the coil pipe external coil (17B), has an area at least equal to or larger than the area of the outlet opening (21).

- 1/2 -



- 2/2 -

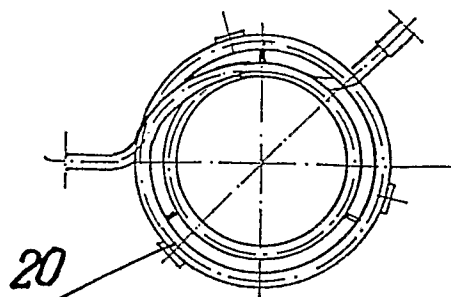


Fig. 4

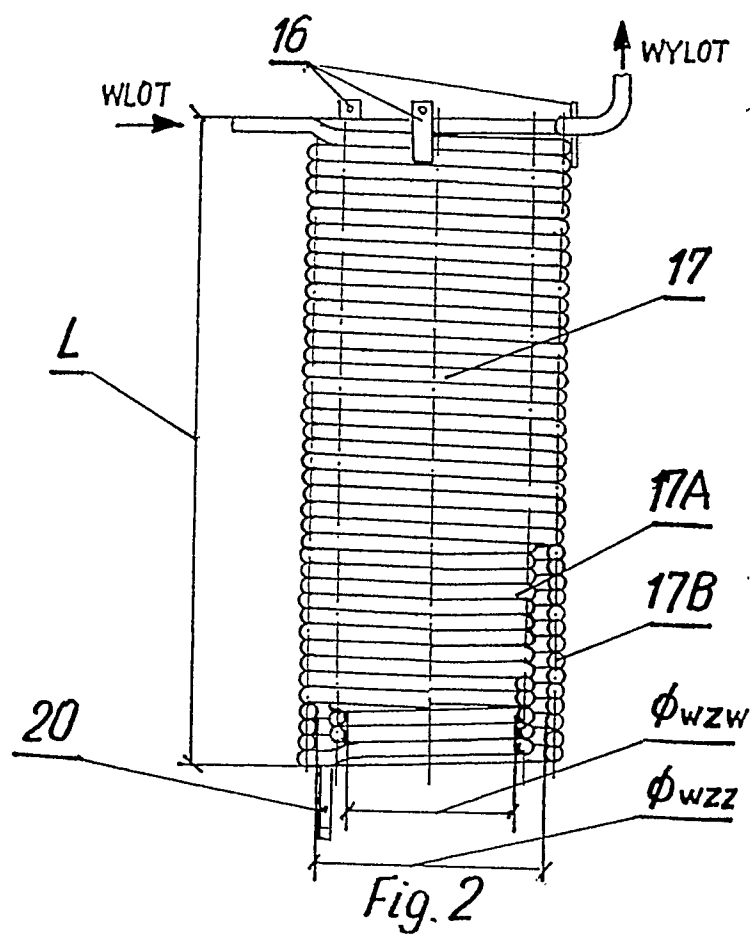


Fig. 2

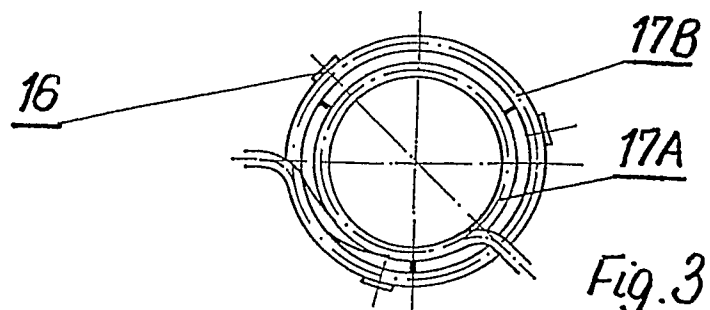


Fig. 3