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(54) Instantaneous accumulating steam generator

Schnelldampferzeuger mit Speicherwirkung

Générateur de vapeur instantané à accumulation

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(56) References cited:
EP-A- 0 323 939 **WO-A-83/01101**
WO-A-87/05681 **WO-A-88/00316**
DE-A- 3 532 261 **GB-A- 623 154**
US-A- 1 430 927 **US-A- 1 504 251**
US-A- 2 220 353 **US-A- 2 478 569**

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Description

The present invention refers to an instantaneous accumulating steam generator.

It is known that, in prior art instantaneous steam generators, unbalance conditions occur between steam consumption and steam generation inside the steam chamber.

This is due to the chamber internal volume and to the internal pressure decrease range that brings about an increase in water level, thus decreasing the steam volume.

Moreover, the flange surface allows a humidity entrainment due to the pressure decrease occurring during the steam flow from steam chamber to solenoid valve.

Resistances usually have poor wear resistance due both to the high temperature and to the reduced water volume created by the pressure decrease range.

GB-A-623 154, which represents the closest prior art, discloses an accumulating steam generator as described in the preamble of Claim 1.

Object of the present invention is to overcome said drawbacks by providing a steam generator of the above-mentioned type in which the amount of produced steam and the amount of required steam are balanced, without creating a strong condensate entrainment and without excessively stressing the resistances.

A further object of the steam generator according to the invention is to avoid false level signals on the internal probe, due to condensate deposit formation on the probe after the entrainment occurring on the flange.

These and further objects together with other features and advantages, are attained by the instantaneous steam generator of the invention, as claimed in Claim 1.

Further characteristics and advantages of the invention will appear from the following detailed description of an embodiment thereof, given as a non-limiting example, with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation view of a longitudinal section of the steam generator of the invention;

Fig. 2 is a top plan view of the boiler of said generator;

Fig. 3 is a side elevation view of a longitudinal section of the outlet conveyor applied to an outlet opening of said boiler;

Fig. 4 is a side elevation view of a longitudinal section of the inlet conveyor or mouth applied to the inlet opening of the steam vessel or "plenum chamber" applied to the boiler.

As clearly shown in the Figures, the steam generator of the invention comprises substantially a small boiler 1 to which a cover 5 is sealingly fixed in 3; this cover 5 is usually plane and is secured in place by a plurality of through bolts 7 extending through said cover 5 and a

suitable circular projection 9 provided on the outside cylindrical wall of the boiler 1.

Centrally to the cover 5, a central, funnelled steam conveyor 11 is provided, from the inside to the outside of the steam chamber 13, designed in such a way as to gently draw steam from inside said steam chamber 13.

For that purpose, said conveyor 11 is of a winding shape, with neck 15 in the Venturi-like tube (see Fig. 3), said neck being adapted so as to facilitate and speed up the steam flow from the boiler 1 to a vessel 17 located downstream.

Said vessel 17 is provided outside the generator boiler 1, and it is centrally located with respect to the conveyor 11, and operates as steam "plenum chamber".

The steam enters said vessel 17 through an inlet conveyor 19, also equipped with neck 21 in the Venturi-like tube, said inlet conveyor 19 being aligned with the outlet conveyor 11 from the boiler 1 and completing the function of softening for the steam flow from said boiler 1 to said vessel 17.

The steam will be sent to users through an outlet hole 21, provided in the Figure on top of the vessel 17, and also equipped with funnelled mouth.

The probe 23 inside the boiler 1 is equipped with a protection chamber 25 for protecting the stem 27 of said probe 23 from condensate deposit formation caused by the pressure decrease occurring on the flange lower surface as well as from false water level signals, caused by the displacement of said water volume by pressure decrease.

The resistances 29, with which the boiler 1 is equipped, are provided at a very long distance between end portion 31 thereof and flange 5, in order to avoid those strong, sudden changes of temperature to which usual resistances are subject.

As for the rest, the resistances 29 are of the same type so far used in these steam generators.

40 Claims

1. Accumulating steam generator comprising a boiler (1) with a cover (5) being sealingly fixed thereto by a plurality of through bolts (7) extending through the cover (5) and a suitable circular flange (9) provided on the outside cylindrical wall of the boiler (1), the boiler (1) and cover (5) enclosing a steam chamber (13), and resistance heating elements (29) extending through the cover (5), characterized by:

a central funnelled steam outlet orifice (11) having curved walls to enable a smooth discharge flow of steam from the steam chamber (13),
a steam accumulator vessel (17) located outside of the boiler (1) for receiving steam from the outlet orifice (11) along a common axis, the accumulator vessel having an outlet hole (21)

for delivering steam to a user without fluctuations in the balance of water and steam inside the boiler (1),

a water level probe (23) having a probe stem (27) which is arranged inside the boiler (1) and surrounded by a protection chamber (25) for protecting the probe stem (27) against condensate deposits generating false water level signals, and

the resistance heating elements (29) being outwardly extended to create a distance between outer end portions (31) thereof and the cover (5) sufficient to avoid strong and sudden temperature changes of the heating elements (29).

2. Steam generator according to claim 1, characterized in that the outlet orifice (11) comprises a first orifice part formed as a Venturi-like tube with a throat (15) adapted to facilitate and accelerate the discharge flow of the steam from the boiler (1) to the accumulator vessel (17), and a second orifice part (19) which is aligned with said first orifice part downstream thereof and also formed as a Venturi-like tube comprising a throat (21).
3. Steam generator according to claim 1 or 2, characterized in that the outlet hole (21) is provided at the top side of the accumulator vessel (17) and equipped with a funneled mouth.

Patentansprüche

1. Dampferzeuger mit Speicherwirkung, der einen Heißwasserspeicher (1) aufweist, auf dem eine Abdeckung (5) mit einer Vielzahl von Durchsteckbolzen (7) abgedichtet befestigt ist, die durch die Abdeckung (5) und einen geeigneten umlaufenden Flansch (9) ragen, der an der äußeren zylindrischen Wand des Heißwasserspeichers (1) vorgesehen ist, der zusammen mit der Abdeckung (5), durch die Widerstandsheizelemente (29) ragen, eine Dampfkammer (13) begrenzt, dadurch gekennzeichnet, daß der Dampferzeuger einen zentralen, trichterartigen Dampfauslaß (11) aufweist, der mit gekrümmten Wänden versehen ist, um einen gleichmäßigen Austritt des Dampfstromes aus der Dampfkammer (13) zu gewährleisten,

daß der Dampferzeuger einen Dampfspeicherkessel (17) aufweist, der außerhalb des Heißwasserbehälters (1) angeordnet und dem Dampf aus dem Auslaß (11) entlang einer gemeinsamen Achse zuführbar ist, daß der Speicherkessel eine Auslaßöffnung (21) hat, um Dampf an einen Verbraucher ohne Schwankungen im Gleichgewicht zwischen Wasser

und Dampf innerhalb des Heißwasserspeichers (1) zu liefern,

daß der Dampferzeuger eine Wasserstandsanzeige (23) mit einem Sondenstab (27) aufweist, der innerhalb des Heißwasserspeichers (1) angeordnet und von einer Schutzkammer (25) umgeben ist, die den Sondenstab (27) gegen Kondensatablagerungen schützt, die zu unrichtigen Wasserstandsangaben führen, und das die Widerstandsheizelemente (29) so weit nach außen ragen, daß ihre außen liegenden Enden (31) von der Abdeckung (5) ausreichend Abstand haben, um starke und plötzliche Temperaturschwankungen der Heizelemente (29) zu verhindern.

2. Dampferzeuger nach Anspruch 1, dadurch gekennzeichnet, daß der Auslaß (11) einen ersten Auslaßabschnitt, der nach Art eines Venturirohres mit einer Verengung (15) ausgebildet, um den Durchtritt des Dampfes vom Heißwasserspeicher (1) zum Dampfkessel (17) zu erleichtern und zu beschleunigen, und einen zweiten Auslaßabschnitt (19) aufweist, der mit dem ersten, darunter liegenden Auslaßabschnitt (15) verbunden ist und der ebenfalls nach Art eines Venturirohres mit einer Verengung (21) ausgebildet ist.
3. Dampferzeuger nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Auslaßöffnung (21) an der Oberseite des Speicherkessels (17) vorgesehen ist und eine trichterartige Austrittsöffnung aufweist.

Revendications

1. Générateur de vapeur à accumulation comprenant une chaudière (1), comportant un couvercle (5) fixé hermétiquement à elle par une pluralité de boulons traversants (7) s'étendant à travers le couvercle (5) et une bride circulaire appropriée (9), prévue sur la paroi cylindrique extérieure de la chaudière (1), la chaudière (1) et le couvercle (5) définissant une chambre à vapeur (13), et des éléments de chauffage à résistance électrique (29) s'étendant à travers le couvercle (5), caractérisé par :

un orifice central de sortie de vapeur en forme d'entonnoir (11) présentant des parois courbes pour permettre un flux d'évacuation régulier de vapeur provenant de la chambre à vapeur (13), une enceinte d'accumulation de vapeur (17), placée à l'extérieur de la chaudière (1) pour recevoir la vapeur à partir de l'orifice de sortie (11) le long d'un axe commun, l'enceinte d'accumulation présentant un orifice de sortie (21) pour

délivrer de la vapeur à un utilisateur, sans fluctuations dans l'équilibre eau - vapeur à l'intérieur de la chaudière (1),

une sonde de niveau d'eau (23) comportant une tige de sonde (27) qui est disposée à l'intérieur de la chaudière (1) et entourée d'une chambre de protection (25) pour protéger la tige de sonde (27) des dépôts de condensation produisant des signaux erronés de niveau d'eau , et

des éléments de chauffage à résistance électrique (29) , s'étendant vers l'extérieur pour créer une distance entre leurs parties d'extrémité extérieures (31) et le couvercle (5) suffisante pour éviter des variations fortes et brusques de température des éléments chauffants (29).

2. Générateur de vapeur selon la revendication 1, caractérisé en ce que l'orifice de sortie (11) comprend une première partie d' orifice formée comme un tube de type Venturi , présentant un étranglement (15) adapté pour faciliter et accélérer le flux de décharge de la vapeur provenant de la chaudière (1) vers l'enceinte d'accumulation (17) , et une seconde partie d'orifice (19) qui est alignée avec ladite première partie d'orifice en aval de celle-ci et formée également comme un tube de type Venturi , présentant un étranglement (21).

3. Générateur de vapeur selon la revendication 1 ou 2, caractérisé en ce que l'ouverture de sortie (21) est prévue au niveau du côté supérieur de l'enceinte d'accumulation (17) et munie d'une ouverture en forme d'entonnoir.

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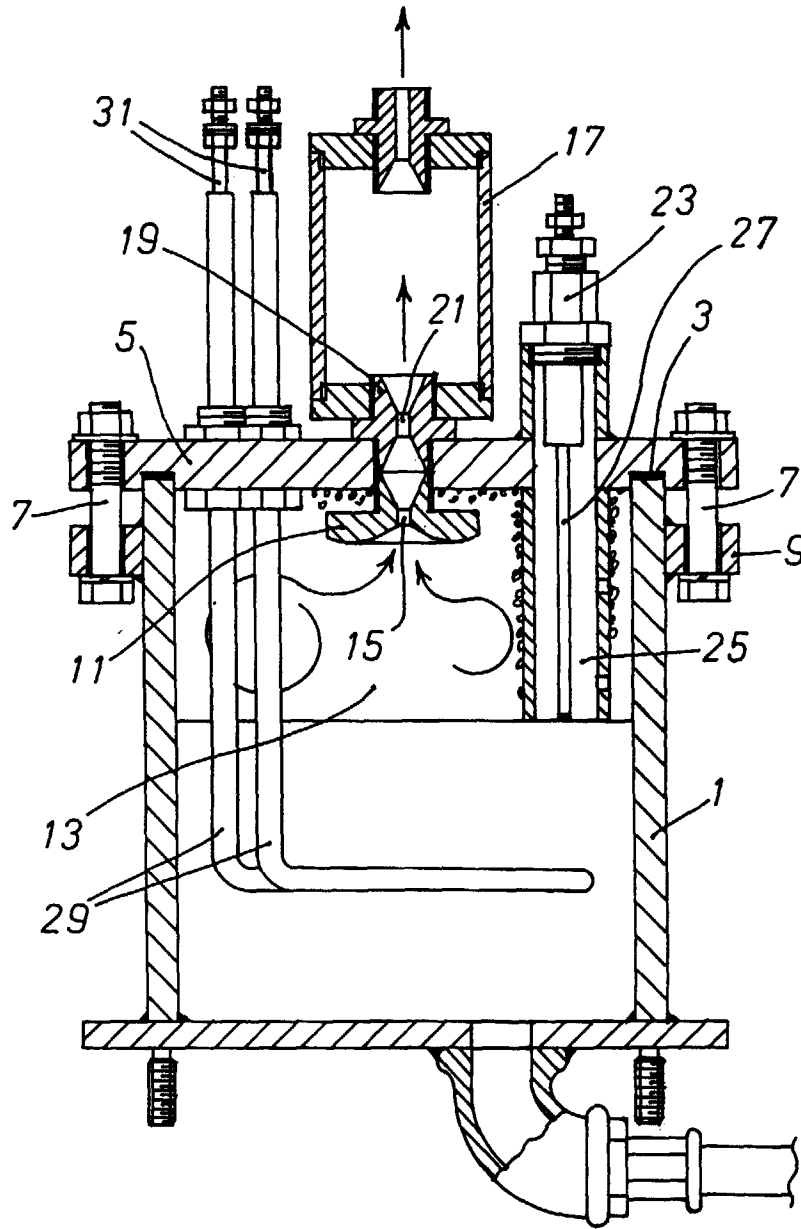


FIG. 1

