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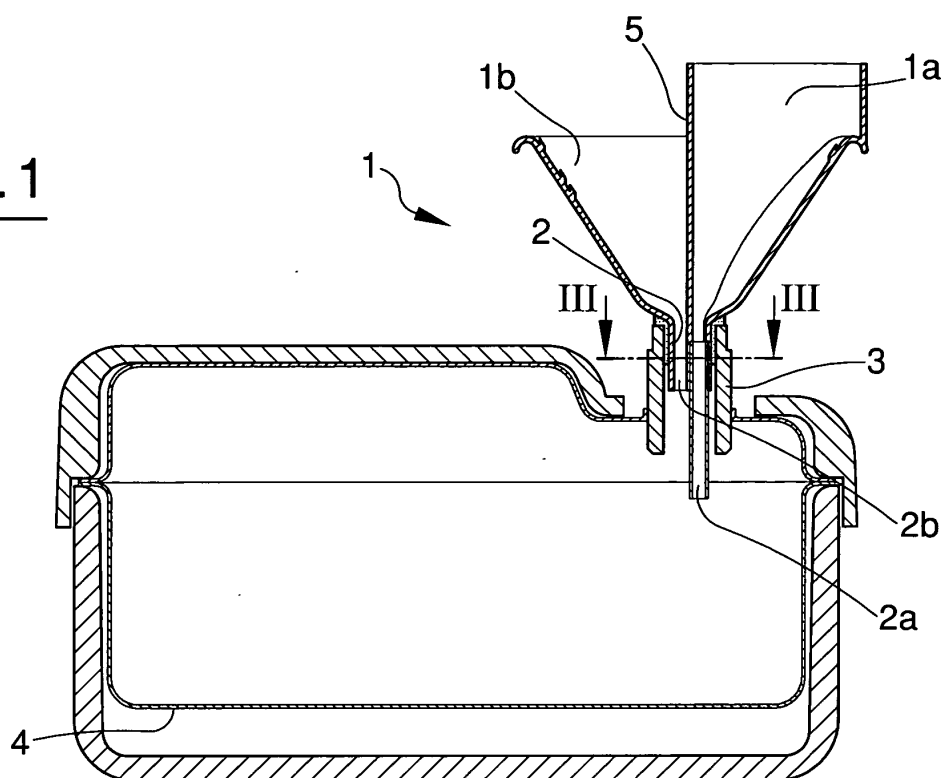
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(54) **A filling device for boilers and a filling process performed with the device.**

(57) In a filling device for boilers and a process for filling the boilers actuated with the device, the device comprises a funnel body (1) which is sealedly inserted in an inlet mouth (3) provided on the boiler (4), the funnel body (1) being subdivided into at least a first and a second part (1a, 1b), which are reciprocally non-communicating. Each of the parts (1a, 1b) exhibits an outlet mouth (2a,

2b) afforded internally of the outlet mouth (2) of the funnel body (1). The process for filling empty overheated boilers comprises sealed insertion on the inlet mouth of the boiler of two outlet mouths, introducing a small quantity of water through the first outlet mouth, and making the steam inside the boiler exit through the second outlet mouth. In a further stage, water is introduced through the second outlet mouth up until complete filling of the boiler.

Fig. 1



Description

[0001] The invention relates to a filling device for boilers and a filling process performed using the device. The process and the device are used for filling boilers for production of steam which overheat on finishing the water present inside them. The device and process are particularly applicable to boilers of small electrical domestic appliances, such as smoothing irons, steam cleaners and the like; the use of the device and process of the invention is however possible and advantageous in all cases in which heated water-filled tanks are used, such as, for example, car radiators and the like, which exhibit the same problems that will be described herein below.

[0002] It frequently occurs that tanks such as boilers in small domestic appliances destined to produce steam, but also cooling water tanks such as for example car radiators, run dry of water. In these cases the walls of the tanks heat up and it is therefore necessary to block the heat source and re-fill the tank with a quantity of water.

[0003] It is generally problematic to add water before the tank walls have cooled down, as the first water entering the tank transforms into steam, and as it exits from the inlet mouth of the tank, which has a rather limited section in relation to the internal section of the tank, it pushes the steam and entering water externalwards, with consequent undesired effects of causing puddles around the tank itself. In a case in which funnels are used for filling, reducing the above-mentioned section of the tank outlet even further, creating a water front above the outlet mouth, a "geyser effect" frequently obtains, causing violent upwards expulsion of the water contained in the funnel, with effects that can be not only irritating but also dangerous.

[0004] To prevent the above-described drawbacks it is necessary to wait, sometimes for considerable periods of time, for the tank walls to cool down such as to be able to perform the filling operations without any drawbacks. Waiting is not always convenient (in the case, for example, of a person engaged in ironing clothes, or a person waiting for a car radiator to cool before being able to re-fill it).

[0005] A further drawback which obtains during the filling of boilers and the like is due to the fact that, as the inlet mouth is small and there is often the necessity of using funnels or the like for the filling operation, which further reduce the visibility inside the tank to be filled, is that often an excessive quantity of water is added which, when the tank is full, exits from the tank and wets the surrounding zone.

[0006] The main aim of the present invention is to obviate the above-described drawbacks by providing a filling device which enables still-hot boilers or tanks to be filled up without causing drawbacks, and avoiding the spilling of water due to an over-filling of the tank.

[0007] An advantage of the invention is that it is extremely economical to make and very easy to use for the purpose of the present invention, even for inexpert people.

ple.

[0008] A further advantage of the invention is that it is not large and enables the process to be performed in any environment.

5 **[0009]** These aims and advantages and more besides are all attained by the invention, as it is characterised in the accompanying claims.

10 **[0010]** Further characteristics and advantages of the present invention will better emerge from the detailed description that follows of the process stages and of a preferred embodiment of the invention, illustrated by way of nonlimiting example in the appended figures of the drawings, in which:

15 figure 1 is a section of the device applied in a boiler; figure 2 is an exploded view of the various components of the device; figure 3 is a section of the insertion zone of the device mouth in the inlet mouth of the boiler, according to plane III-III of figure 1.

25 **[0011]** The filling device of the invention is used for filling boilers, tanks and the like. The device comprises a funnel body 1 which is open towards the outside and is provided with an outlet mouth 2, which is sealedly inserted on an inlet mouth 3 provided on the boiler 4. The funnel body 1 preferably exhibits a truncoconical shape with a conicity facing the outlet mouth 2 thereof; briefly, then, the body 1, as can be seen in a possible and preferably embodiment illustrated in the figures, is a sort of funnel with constructional characteristics which will be better described herein below.

30 **[0012]** The funnel body 1 is subdivided into a first part 1a and a second part 1b, each of which is open externalwise and exhibits an outlet mouth, respectively 2a and 2b, the outlet mouths 2a and 2b of the two parts of the funnel body 1 being afforded internally of the outlet mouth 2 of the funnel body 1 itself. The first part 1a is delimited by a cylindrical surface 5 which is afforded internally of the funnel body 1. The two parts into which the funnel body 1 is subdivided do not communicate with one another if not, obviously, via their externalwards openings and the outlet mouths thereof; in other words, there is no direct water passage from the first to the second part, and vice versa, of the funnel body 1.

45 **[0013]** For reasons which will better emerge herein below, the outlet mouth 2a of the first part 1a of the funnel body 1 exhibits a section that is smaller than the outlet mouth 2b of the second part 1b of the funnel body. Further, the externalwards opening of the first part 1a of the funnel is higher up, with respect to the inlet mouth 3 of the boiler 4, than the height of the externalwards opening of the second part of the funnel body 1.

50 **[0014]** The device of the invention further comprises a hollow elongate body 6, normally a small tube of plastic or metal material, an end of which is inserted solidly into the outlet mouth 1a of the first part of the funnel body 1, while another end thereof, when the funnel body 1 is in-

serted in the inlet mouth 3 of the boiler 4, opens internally of the boiler itself at a predetermined height which depends on the desired maximum level of the water in the tank when the tank is considered to be full. In substance, the elongate body 6, which can be of various lengths, has the function of "displacing" the outlet mouth 2a of the first part 1a of the funnel body 1 towards the inside of the tank, such as to regulate, in a way which will be more fully described herein below and with the simple substitution of the body 6, or with a change in the length thereof, the maximum height of the water head in the tank. A seal 7 is also included, which is interposed between the outlet mouth 2 of the funnel body 1 and the inlet mouth 3 of the boiler, the function of which is to ensure a seal between the outlet mouth 2 of the funnel body 1 and the inlet mouth 3 of the boiler. The seal 7 exhibits an internal hole of equal diameter to the external diameter of the outlet mouth 2 of the funnel body 1 and an external diameter which has at least a section of diameter which is equal to the diameter of the inlet mouth 3 of the boiler. In order to increase the seal, the seal 7 is also provided with a front seal surface which rests on the external bottom of the funnel body 1.

[0015] The figures illustrate an externally-cylindrical seal, i.e. having all the external sections equal to the section of the inlet mouth 3 of the boiler; this type of seal is suitable only for boilers having an inlet mouth of a diameter equal to the external diameter of the seal. It is however possible to make a seal having an external truncated-conical shape, i.e. having external diameter sections that decrease in a downwards direction; in this way the device can be adapted to boilers having different inlet mouth dimensions.

[0016] It would also be possible to use a screw coupling between the device and the boiler, with interposing of a seal ring; this solution would however lead to greater constructional difficulties and would reduce the versatility of the device.

[0017] It would, finally, be possible not to use any seal and to rely, for the seal between the boiler and the funnel body 1, solely on the contact between the external surface of the outlet mouth of the funnel body and the internal surface of the boiler mouth; this solution would lead, however, to a drop in performance of the device.

[0018] With the above-described device the process for filling boilers can be carried out, of which the various stages will be described herein below, used for filling empty and overheated boilers without having to wait for the walls of the boiler to cool down.

[0019] The first and a second inlet mouths are inserted on the inlet mouth of the boiler inlet: with the present device, this stage is done by inserting the outlet mouth 2 of the device, which internally comprises the first and the second outlet mouths 2a and 2b, which also function as the two introduction mouths of the water into the boiler.

[0020] A small quantity of water is then poured into the boiler, through the first outlet mouth 2a, above which outlet mouth 2a a predetermined water head is located, represented by water which has been poured into the first zone 1a of the device. The section of the outlet mouth 2a is rather small, and the water poured into the zone 1a enters in small doses into the boiler. Note that there is no fixed rule as to the shapes and sizes of the components of the device, in particular the outlet mouth 2a, but they must be such as to enable the described operations to take place; as for the outlet mouth 2a, a circular section having a diameter of a few millimetres is preferred, such as to enable introduction of water in small quantities.

[0021] The water entering the boiler comes into contact with the overheated internal walls of the boiler, at least partially vaporises and begins to cool the boiler walls; during this stage there is a contemporaneous exit of the steam produced internally of the boiler through the second outlet mouth 2b, i.e. the outlet mouth 2b of the second zone 1b of the funnel body 1, which is free towards the outside.

[0022] The water is introduced into the boiler through the second outlet mouth 2b, with a predetermined water head represented by the water which is poured into the second part 1b of the funnel body 1; in this way the second outlet mouth 2b is closed and exit of the gassy phase and an entry of air into the tank is at least temporarily closed (note that the first mouth 2a is closed by the water head present in the first zone 1a).

[0023] The water which enters the boiler, in a considerable quantity given the greater surface area of the outlet mouth 2b, causes, apart from a further cooling of the internal walls of the boiler, the condensation of at least part of the steam contained in the boiler and the consequent creation of a degree of depression internally of the boiler itself. This internal depression in the boiler causes aspiration of the water heads present on the first and second inlet mouths, i.e. the aspiration of all the water in the first and second zones 1a, 1b of the funnel body 1, without causing any spraying of water towards the outside environment.

[0024] Further introduction of water through the second outlet mouth 2b and the contemporaneous exit of the gassy phase present in the boiler through the first outlet mouth 2a, which in the meantime has opened, the water head present in the first zone 1a having been sucked internally of the boiler, means the filling of the boiler can be completed with no further problems.

[0025] When the water level in the boiler reaches the predetermined level defined by the position of the second end of the elongate body 6, the first outlet mouth 2a is closed by the water itself and blocks, so the gassy phase no longer exits through the first mouth; the pressure inside the boiler increases and water inlet from the second outlet mouth 2b is stopped. The user thus receives the indication of the fact that the water in the boiler has reached the desired level.

[0026] At this point the inlet mouths are removed from the inlet of the boiler, i.e. the seal between the filling device and the inlet mouth of the boiler is removed, such that the inside of the boiler re-establishes connection with

the outside, causing inlet of air into the boiler and the consequent fall, internally of the boiler, of the water still present in the inlet mouths, i.e. in particular in the zone 1b of the funnel body 1. In this way, taking care only that the volume in the second zone 1b is lower than the volume which is free internally of the boiler when the water level reaches the predetermined level, the risk of overflowing of water due to excessive filling is obviated.

[0027] The inlet mouths are then completely removed from the inlet mouths of the boiler, i.e. the filling device is completely removed, and a cap of usual type (not illustrated in the figures of the drawings) is used to close the inlet mouth of the boiler, which can then return to its normal operation.

Claims

1. A filling device for boilers, **characterised in that** it comprises a funnel body (1), open towards an outside environment, provided with an outlet mouth (2) which is sealedly inserted in an inlet mouth (3) provided on the boiler (4); the funnel body (1) is subdivided into at least a first part (1a) and a second part (1b), which are reciprocally non-communicating, each of which is open towards the outside environment and exhibits an outlet mouth (2a, 2b); the outlet mouths (2a, 2b) of the parts (1a, 1b) of the funnel body (1) are afforded internally of the outlet mouth (2) of the funnel body (1).
2. The device of claim 1, **characterised in that** the outlet mouth (2a) of the first part (1a) of the funnel body (1) exhibits a smaller section than the outlet mouth (2b) of the second part (1b) of the funnel body.
3. The device of claim 1, **characterised in that:** the funnel body (1) exhibits a truncoconical shape having a conicity thereof facing towards the outlet mouth (2) thereof; the first part (1a) being delimited by a cylindrical surface (5) afforded internally of the funnel body (1).
4. The device of claim 1, **characterised in that** it comprises a hollow elongate body (6), an end of which inserts in the outlet mouth (2a) of the first part of the funnel body (1) and a second end which opens internally of the boiler (4), at a predetermined height therein, when the funnel body (1) is inserted in the inlet mouth (3) of the boiler.
5. The device of claim 1, **characterised in that** it comprises a tubular seal (7), interposed between the outlet mouth (2) of the funnel body (1) and the inlet mouth (3) of the boiler, which exhibits an internal hole having a diameter which is equal to an external diameter of the outlet hole (2) of the funnel body (1) and an external diameter having at least a diameter

section which is equal to a diameter section of the inlet mouth (3) of the boiler.

6. The device of claim 1, **characterised in that** the opening towards the outside environment of the first part of the funnel is at a higher level, with respect to the inlet mouth of the boiler, than the height of the opening towards the outside of the second part of the funnel.
7. The filling process of boilers performed using the device of the preceding claims, to be used for filling empty overheated boilers having a water inlet mouth, **characterised in that** it comprises following stages: sealed insertion on the inlet mouth of the boiler of a first outlet mouth and a second outlet mouth; introduction into the boiler of a small quantity of water through the first outlet mouth, on which first outlet mouth a water head of a predetermined height is established, the small quantity of water coming into contact with overheated internal walls of the boiler and vaporising at least partially and initiating a cooling stage of the walls of the boiler; a contemporaneous free outward exiting through the second outlet mouth of steam produced internally of the boiler; a following introduction of water into the boiler through the second outlet mouth, with a predetermined water head destined to close the second outlet mouth, which causes condensation of at least a part of the steam contained in the boiler and a further cooling of the internal walls of the boiler, with a consequent creation of a degree of depression internally of the boiler; aspiration of the water heads present on the first outlet mouth and the second outlet mouth caused by the degree of depression created internally of the boiler; further introduction of water through the second outlet mouth and a contemporaneous exit of a gassy phase present internally of the boiler through the first outlet mouth freed of the water head, up to completion of filling; extraction of the first outlet mouth and the second outlet mouth of the boiler and closure of the inlet mouth.
8. The process of claim 7, **characterised in that** the first outlet mouth is closed by the water present in the boiler when the water reaches a predetermined level, such as to block exit of the gassy phase through the first outlet mouth, increasing pressure internally of the boiler and interrupting inlet of water from the second outlet mouth; extraction of the first and second outlet mouths from the inlet mouth of the boiler such as to re-establish connection with the outside environment of the boiler and to cause a fall of the water still present on the outlet mouths internally of the boiler.

Fig. 1

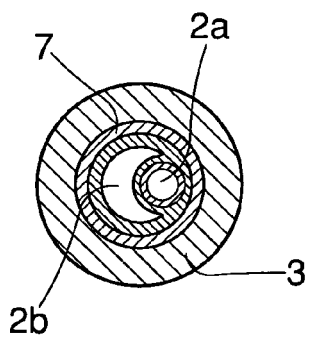
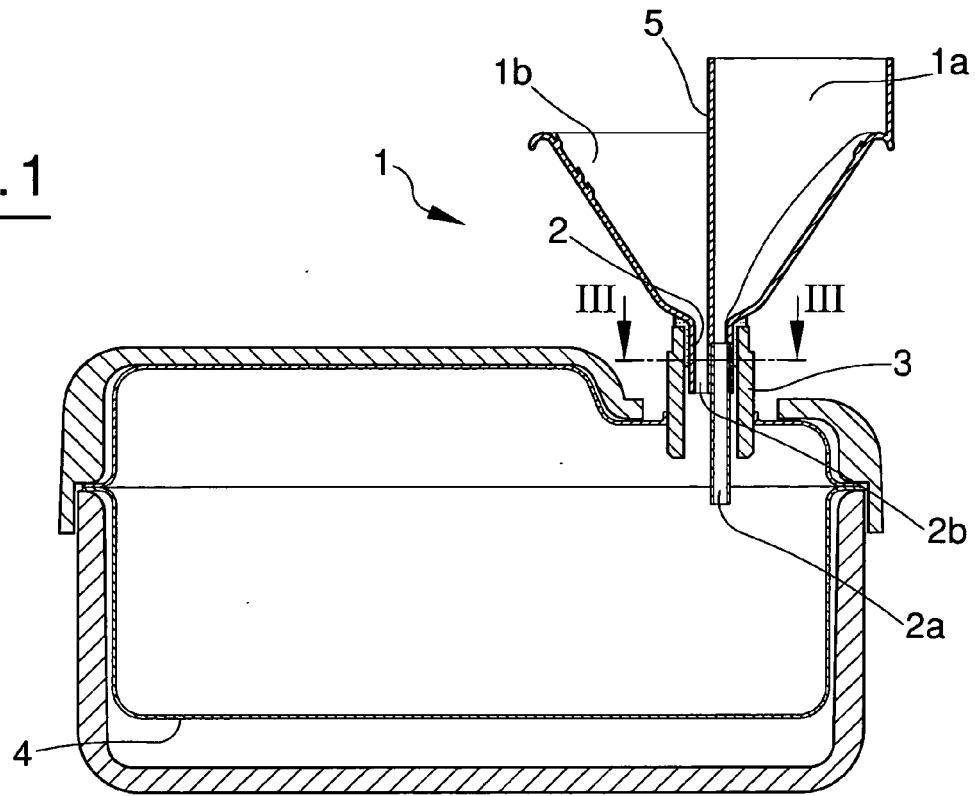


Fig. 3

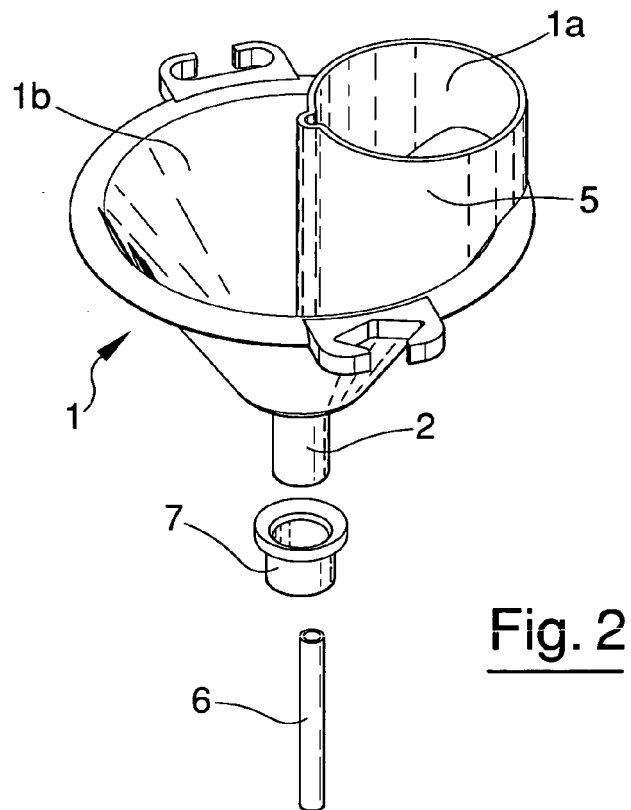


Fig. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5191

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Place of search The Hague		Date of completion of the search 11 August 2008	Examiner Martínez Navarro, A
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