

The present invention relates to an apparatus for the heat treatment and/or dampening of bobbins, cops and/or cones, an elongate, evacuable steam vessel being provided.

In spinning technology, it has long been known and is conventional to dampen yarns. Steam vessels in which the cops are arranged above a heated water bath in a saturated steam atmosphere, which are described in FR-A-2 614 633, have proved to be particularly successful. To this end, the cops have to be removed from the spinning machine, treated in the steam vessel and then supplied to the bobbin-winding machine. In the case of plants known hitherto, this requires a separate transporting system, which requires a very large amount of space. There is as a result also the risk of materials being mixed up.

Moreover, FR-A-1 087 510 disclosed an apparatus for the dyeing or other treatment of cops. According to this document, treatment is effected under pressure in a closable container. The (dyeing) liquid can flow in two directions through the cops. The (dyeing) liquid either flows from the inside, through a conical support provided with many holes, radially outwards through the thread body, or it flows in the opposite direction radially inwards through the thread body.

The object of the invention is to provide an apparatus for the heat treatment and/or dampening of cops, in which the heat treatment can be carried out with a minimum of expense and requires alterations to the entire plant which require a minimum of additional space. Furthermore, the flow of material is to be integrated into the work sequence in optimum manner; the necessary transportation distances are to be minimal.

This object is achieved in that the steam vessel (2) is constructed to be channel-shaped and vertically adjustable, or in that the steam vessel is constructed to be closed, channel-shaped and open at its two end sides, and in that these end sides are connected to at least one conveyor, the steam vessel (2)

being composed of a plurality of elements (3-5), which are arranged one behind the other and together form the channel-shaped steam vessel (2), and being in operative connection with a steam generating means (2) arranged outside the steam vessel (2).

Both embodiment variants according to the invention enable the heat treatment process to be adapted to textile machines or to integrate this process into the flow of material.

Advantageous further developments of the subject of the invention are described in dependent claims.

The entry of steam into the steam container can be interrupted by blocking off steam access openings in a simple manner, by two mutually displaceable apertured metal sheets, Claim 2.

The water quantity is controlled in an equally simple manner in accordance with Claim 3.

The cover of the steam vessel does not in the opened state obstruct the transportation of the cops into the steam vessel or from the steam vessel to the conveyor by means of the removal apparatus if the steam vessel has a cover which is coupled by means of a hinge on the side wall of the steam vessel facing the winding heads, according to Claim 4.

Constructionwise, it is particularly simple if the cover, according to Claim 5, is constructed such that it can be actuated by means of a lifting cylinder secured to the side wall and an extension arm of the cover.

In order to reduce the mass in a vertically adjustable steam vessel, an embodiment according to Claim 6, in which the cover can be moved in and out by way of a horizontal extension arm, is recommended.

The individual elements are constructed in optimum manner according to the further, advantageous further development according to Claim 7.

The embodiment according to Claim 8 reduces the heat losses in the steam vessel.

As a result of the construction according to Claim 9, vacuums can also be produced in a steam vessel which is open on the end side.

The process sequence can also be optimized in this way depending on the batch size and clock times.

Conveyors having guide rails according to Claim 10 for receiving slide bodies are particularly simple.

The individual regions or chamber segments in the steam vessel are preferably supplied according to Claim 11.

The arrangement of the running rail in the closable steam vessel according to Claim 12, on which the cones or cops are suspended with the aid of travelling crabs, has the advantage that filling of the cops or cones is facilitated. As a result of the arrangement of a plurality of travelling crabs, the steam vessel can be exploited more effectively.

The hot air nozzles according to Claim 13 prevent the formation of condensation on the travelling crabs and thus a soiling of the cops or cones.

The pivotal running rails according to Claim 14 simplify the introduction of the cops into the steam vessel.

The subject of the invention will be described in more detail below with reference to drawings, in which:

Fig. 1 shows a vertically adjustable steam channel which is

arranged below a conveyor in front of a bobbin-winding plant,

Fig. 2a shows a travelling crab of a conveyor with suspended cone,

Fig. 2b shows a vertically adjustable steam channel arranged on a stand,

Fig. 3 shows the schematic illustration of a spinning machine with a steam channel located above it,

Fig. 4 shows a closed steam vessel for through-feed processes,

Fig. 5 shows the end side of the steam vessel for cones,

Fig. 6 shows a perpendicular section through a steam vessel embodiment,

Fig. 7 shows a perpendicular section through a lower region of a steam vessel modified by comparison with Fig. 6,

Fig. 8 shows a side view of a closed tubular steam vessel for through-feed processes according to a further embodiment,

Fig. 9 shows a cross-section along the line IX-IX, through the steam vessel illustrated in Fig. 8, and

Fig. 10 shows a cross-section through a steam vessel, through which a plurality of travelling crabs parallel to one another are guided according to Figs. 1 and 2a.

Fig. 1 shows, in a schematic illustration, a vertically adjustable steam vessel 2. The latter is mounted upstream of a spinning machine 13 and is vertically guided on guide rails 8. Located above the steam vessel is a conveyor 16, a rail with travelling crabs to which cones 15 are coupled.

The construction of the conveyor 16 can be seen in more detail in Fig. 2a, two rollers 6 being guided in a corresponding running rail 17.

The vertical adjustment of the steam vessel 2 can be explained with reference to Fig. 2b: the steam vessel 2, which is autonomous per se, with its cover 7, which by way of an extension arm 20, a hinge 19 and a lifting cylinder 21 with a projection 22 is arranged such that it can be coupled to a side wall 18¹. By way of a cable 9 with a drive motor 10 and deflection rollers 25, the entire steam vessel 2 is raised with the aid of the bearers 14, with the cover opened, until the cops 15 on the conveyor 16, Fig. 2a, are unlatched in a manner known per se and are centred in a respective slide and supporting body 31. The arrangement in Fig. 2b is constructed to be autonomous as a result of its stands 38 with supports 39 and supporting parts 40. The supplies to the ascension lines 27, 27a (steam and vacuum) are guided by way of flexible hoses to a supply unit (not illustrated).

In similar manner, a further steam vessel 2 is arranged above a bobbin-winding machine 12, Fig. 3; here it is located in the axis of symmetry together with the conveyor 16 located above it. In this embodiment, the steam vessel 2 is constructed in modular manner from individual elements, a head element 3, intermediate elements 4 and 5 and a further end element (not illustrated). Thus, heat-expansion problems can be solved at the same time. A steam and vacuum device 10' is located at the bobbin-winding machine 12; the supply lines (not illustrated) are guided to the elements of the steam vessel 2.

The embodiments in Fig. 4 and Fig. 5 show a channel-shaped steam vessel 2" incorporated in the flow of material between a spinning machine 1 and a bobbin-winding machine 12. A conveyor 16', a guide rail with a dovetail-shaped profile 16a, leads through an

¹ Translator's Note: There appears to be an omission here.

upwardly closed steam channel 2". Slide bodies 31 bear cops 15' in Fig. 4 and are pushed through the channel in a pulsed manner. In order to reduce the friction resistance, the slide bodies 31 have cutouts 32 which, depending on the system, also serve to convey by way of cam wheels.

The division of the channel-shaped steam vessel 2" into individual chamber segments adapted to the process is effected by the introduction of flat slides 35' (not illustrated) into slots 35 running transversely with respect to the steam space.

Bores or supporting pins 31" corresponding to the cops, bobbin or cone are arranged in each slide body 31.

As a result of an end-side covering 36, Fig. 5, whereof the opening 37 is matched to the shape of the body to be dampened, in this case a cone 15, heat and flow losses can be reduced.

The steam vessel 2, Fig. 6, has a water channel 26 which is circular in cross-section. From the latter, an ascension line 27 leads upwards into the water bath space 24 of the steam vessel 2. A shut-off valve 28 serves to be able to open or close the ascension line 27. The water bath covering 23 in turn serves to support the cops 15 introduced into the steam vessel 2. A cable channel 29 which runs parallel to the water channel 26 and in which electrical lines 30 run can also be seen in Fig. 6; likewise sealing elements 2' can be seen in the region of the cover 7.

In the embodiment according to Fig. 7, the water bath space 24 is covered by two apertured metal sheets 33, 34 located one above the other. The lower apertured metal sheet 33 is fixedly connected to the walls of the steam vessel 2. The upper apertured metal sheet 34 can be displaced in the longitudinal direction on the lower apertured metal sheet 33. As a result, it is possible to block off the water bath space 24 from the rest of the interior of the steam vessel 2. The water bath covering

23 here also serves as a bearer for the cops 15 (not illustrated in Fig. 7).

According to Figs. 8 and 9, the steam vessel 50 is of tubular construction and contains in its interior a running rail 17', as is already illustrated in Fig. 2a. On these running rails 17', travelling crabs 51 with the cops 15 can be guided through the steam vessel 50. This steam vessel 50 can be raised and lowered - as shown with reference to Figs. 1 and 2b. The steam vessel 50 can be closed at both ends by a respective removable cover 52. In the position of the steam vessel 50 shown in Fig. 8, the running rail 17' is located at the same height as two further running rails 53 and 54 arranged to the right and to the left of the steam vessel, i.e. the running rail 17' lies flush with the two running rails 53 and 54. A respective pivotal running rail section 55 and 56 is coupled to the ends of these two running rails 53 and 54 [sic]. These two running rail sections 55 and 56 can be folded down - as indicated by dot-and-dash lines - so that the travelling crabs 51 can be displaced from the running rail 53 over the running rail section 55 onto the running rail 17' in the interior of the steam vessel 50. The travelling crabs 51 can then be displaced from the running rail 17' in the interior of the steam vessel 50 over the running rail section 56 onto the right-hand running rail 54, as soon as the steaming process in the interior of the steam vessel 50 is complete.

Two actuating cylinders 57 and 58 are provided for pivoting the two running rail sections 55 and 56. These actuating cylinders 57 and 58 are pivotally coupled to the running rails 53 and 54 respectively. Located in each actuating cylinder 57, 58 is a piston which is coupled to the corresponding running rail section 55 or 56 by way of a piston rod. However, before the running rail sections 55 and 56 can be pivoted, the two covers 52 at the two ends of the steam container 50 have to be removed. A water bath space 24, as has already been described in detail with reference to Figs. 6 and 7, is located below the cops or bobbins 15.

The steam vessel 50 according to Fig. 10 is distinguished from the steam vessel 50 illustrated in Fig. 9 substantially only in that instead of a single running rail 17' four running rails 17' are arranged parallel to one another in the interior of the steam vessel. These can then either all four be filled with cops or bobbins 15 at the same time, or, with the aid of the running rail 53 illustrated in Fig. 8 and the running rail section 55, one after the other of the four running rails 17' can be filled in the interior of the steam vessel 50 with cops 15 located in baskets 61.

According to Figs. 9 and 10, the bobbins 15 are located in baskets 61 which are suspended on the travelling crabs 51. Rollers 6 are guided in a corresponding running rail 17' in the case of this travelling crab 51 too. In contrast to the rollers shown in Fig. 2a, the rollers shown in Figs. 9 and 10 are arranged at an inclination, as a result of which better guidance is ensured.

With the aid of hot air nozzles 62, according to Figs. 9 and 10 the formation of condensation on the travelling crabs 51 or on the baskets 61 is prevented.

The basic conducting of the process, the selection of the steam pressure, the temperatures and the addition of any chemicals are known in particular in the case of yarn dampening. Cf. Freddy Wanger, *Chemiefasern/Textilindustrie* [= Chemical fibres/textile industry], Vol. 30/82, 1980, pp. 888-890; *Melliand Textilberichte* 66, 1985, pp. 525-526; *Textilbetrieb*, Vogel-Verlag Würzburg, 1981, issue 7/8. The subject of the invention can be adapted to any desired process and operating conditions.

The term "heat treatment" used in the claim of course also includes sterilization procedures, as are used for example in the production of sanitary articles, dressings, gauze pads, etc.



Claims

1. An apparatus for the heat treatment and/or dampening of bobbins, cops and/or cones, the latter being introduced by way of a conveyor belt into a steam vessel and there being subjected to a heat treatment in vacuo while being heated by steam, characterized in that the steam vessel (2) is constructed to be channel-shaped and vertically adjustable, or closed, channel-shaped and open at its two end sides and these end sides are connected to at least one conveyor, the steam vessel (2) being composed of a plurality of elements (3 - 5), which are arranged one behind the other and together form the channel-shaped steam vessel (2), and being in operative connection with a steam generating means arranged outside the steam vessel (2).
2. Apparatus according to Claim 1, characterized in that a water bath space (24) covered by an apertured metal sheet (33) is provided in the steam vessel (2), and in that a second apertured metal sheet (34) of the steam vessel (2) is displaceably arranged on this apertured metal sheet (33) in order to block off the water bath space (24).
3. Apparatus according to Claim 1, characterized in that the steam vessel (2) is arranged above a water channel (26), and in that ascension lines (27) provided with a shut-off valve (28) lead from this water channel (26) to the water bath space (24) of the steam vessel (2).
4. Apparatus according to Claim 1, characterized in that the steam vessel (2) has a cover (7) which is coupled by means of a hinge (19) and is lockable, on a side wall (18) of the steam vessel (2).
5. Apparatus according to Claim 4, characterized in that the cover (7) is constructed such that it can be actuated by means of a lifting cylinder (21) secured to the side wall (18) and an



extension arm (20) of the cover (7).

6. Apparatus according to Claim 1, characterized in that the steam vessel (2) has a horizontally displaceable and lockable cover.

7. Apparatus according to Claim 1, characterized in that the steam vessel (2) is formed from a head element (3), at least one intermediate element (4, 5) and an end element, the head element (3) having connections for the vacuum and aerating line, temperature sensors, pressure sensors, a water supply connection and a drive for the cover (7) of the steam vessel (2), each intermediate element (4, 5) having a heating element, a cover (7) and a connection for a water level sensor, and the end element having a heating element, a further cover (7) of the steam vessel (2) and a ventilation connection.

8. Apparatus according to Claim 1, characterized in that the end sides of the steam vessel (2) have openings matched to the profile of a bobbin or of a cop or matched to a cone.

9. Apparatus according to Claim 8, characterized in that the steam vessel (2) can be divided up into individual chamber segments by sliders running transversely with respect to the steam space.

10. Apparatus according to Claim 1 or one of Claims 8 or 9, characterized in that guide rails for slide bodies having central pegs are provided in the steam vessel (2).

11. Apparatus according to Claim 1 or 10, characterized in that aerating and de-aerating devices are provided in the steam vessel (2).

12. Apparatus according to Claim 1 or one of Claims 8 or 9, characterized in that at least one running rail (17') is located in a channel-shaped steam vessel (50) which can be closed on the



end side and on which the cones or cops (15) are suspended with the aid of travelling crabs (51).

13. Apparatus according to Claim 1 or 12, characterized in that hot air nozzles (62) are provided in the region of the travelling crabs (51), which prevent the formation of condensation.

14. Apparatus according to Claim 1 or one of Claims 12 or 13, characterized in that the running rail (17') in the steam vessel (50) can be connected by way of pivotal running rail sections (55 and 56) to running rails (53, 54) outside the steam vessel (50).