

### LANCE HOLDER FOR COMPACT LANCE

The invention concerns a lance holder for a large diameter oxygen lance incorporating a head for attaching the lance and a slag backflow safety device installed in a housing located between the lance and the oxygen hose, such safety device being in the form of a valve which, on destruction of safety devices through the penetration of slag, is pressed onto the valve seat.

Lance holders with a corresponding attachment head and security against slag backflow serve to reliably hold the lance required for refining and also, for example, at the end or interruption of the blowing operation to prevent backflowing slag from reaching the oxygen. For this purpose the DE-C-2 327 595 has a sintered metal gas-permeable disc positioned shortly before the oxygen hose which should prevent the slag backflow. This mechanical checking of the slag backflow does not fulfil the requirements placed on it where larger volumes of oxygen have to be passed through because a sintered metal disc then naturally leads to difficulties. The valve arrangement located ahead of the gas-permeable disc represents a second safety device against slag backflow, whereby this valve closes if the seal located above it is

burnt on account of a slag backflow. DE-B-2 447 732 also discloses a slag backflow safety device consisting of valve cones that can be thrust against each other, whereby the corresponding valve cone is pressed into the sealing surface via a safety device that melts on contact with the slag in order to prevent the passage of the slag and simultaneously the flow of the oxygen. The disadvantage is that problems also occur here if by oversight or through impacts the lance detaches itself from the holder, which then results in the oxygen flow causing "whipping" of the lance holder and the end of the hose. This could be hazardous for the operators. Particularly with large diameter lances, alone already on account of the heavy weight of the lance, insufficient attachment with the clamping head can lead to such inadvertent detachment of the lance and thus to a hazard in the above-stated way.

The invention is based on the problem of safely preventing the hazardous "whipping" of a lance holder equipped with a slag backflow safety device and the hose when the lance has slipped out of the lance holder.

In accordance with the invention the problem is solved by the fact that the slag backflow safety device is preceeded by a valve disc that on introduction of the lance can move against the force of a spring and for this

purpose a buffer sleeve is located on the lance side and adapted to the lance diameter, said valve disc having tapered sealing surfaces abutting a narrowing of the internal bore. This surprisingly provides a lance holder in which the oxygen flow is automatically stopped if for any reason the lance should accidentally fall out of the lance holder. Independent of this the slag backflow safety device has a likewise secure action and closes the oxygen hose off from dangerous slag flow so that this can also not present a hazard. Moreover, it is advantageous that the oxygen flow is only opened when the lance is correctly introduced into the lance holder, i.e. when the lance has thrust the valve disc back against the force of the spring in order then to be fixed via the clamping head. This double security meets the particular need of the operator working with this equipment, whereby with large diameter lances and correspondingly larger volumes of oxygen flowing through them it is advantageous that the kick-back occurring through the discharging oxygen can be safely compensated, especially as indicated with a lance that has fallen out.

In accordance with the purpose of the invention a helical compression spring is located between the buffer sleeve and valve disc assembly and the top edge of the narrow section. This arrangement ensures that during its

introduction the lance is accurately centrally guided in the direction of the valve disc so that the valve disc is also uniformly thrust out of its closed position. The helical compression spring, which is cleverly as it were part of the actual buffer sleeve, ensures that the valve disc is not thrust back further than is absolutely necessary. It is rather the fact that on introduction of the lance the operator very quickly realizes that he has displaced the valve and has thus preparatorily opened the feed for the oxygen. The buffer sleeve is somewhat shorter than the corresponding recess or internal bore in the holder housing so that the corresponding abutment accordingly provides the operator with a signal. The helical compression spring simultaneously prevents canting of the valve disc on account of its reliable guidance. Ever more safe seating of the valve disc is ensured through the connection of the buffer sleeve with the valve disc because it is loaded by two springs.

In order to facilitate assembly, the invention provides for the fact that the valve disc and buffer sleeve are detachably joined together with screws. This enables the valve disc as such to be inserted into the holder housing from one side whilst the actual buffer sleeve is introduced from the other side. The connection via screws then ensures a safe arrangement and position,

whereby the valve disc is loaded by the spring supported on or at a Seeger circlip and at the same time by the helical compression spring. The corresponding screws can easily be reached from the outside for slackening and/or tightening.

Advantageous uniform flow of the oxygen within the lance holder is ensured because from the top of the valve disc and almost up to the top edge of the narrow bore the buffer sleeve has large radial cutouts in its wall. With the opening of the slag backflow valve located behind the valve disc the gas can thus flow past the valve disc into the buffer sleeve and thence through the lance and into the melt.

The invention is particularly distinguished by the fact that it provides a safety device for the lance holder that is very reliable and covers all eventualities, whereby optimization is advantageously achieved through the double security. It also achieves a compact lance which, on account of the clever arrangement and alignment of the individual valves and shut-offs, is very stout and small in diameter and, above all, is also very safe in its operation.

Further details and advantages of the subject matter of the invention are contained in the following descriptions of the associated drawings, Fig. 1, Fig. 2,

which show a preferred embodiment with the requisite details and individual components:

Fig. 1. Longitudinal section through a lance holder and

Fig. 2. Enlarged section with an inserted lance.

The lance holder (1) shown in Fig. 1 is for holding relatively large diameter lances in order that these can be connected to the oxygen hose. The lance holder (1) has a tubular shaped extended housing (2), the top end forming the clamping head (3) and the lower end forming the rear part (4) which is necessary for connection to the oxygen hose. The slag backflow safety device (5) is housed within the tubular shaped housing (2), the former being later explained in more detail. The hose is connected to the threaded connection (6).

The gripping chuck is indicated by (7), via which the correspondingly inserted tube or the lance is attached to the lance holder (1). Sealing at the top is via the O-ring (8). Item (9) indicates a set screw whilst (10) is the sealing sleeve which houses a seal (11) which, when pulling or pushing in the lance, lays around it and provides the necessary seal so that oxygen cannot flow past the outside of the lance. (12) is the pressure sleeve and (13) the threaded ring, whereby the latter as well as the gripping piece (14) and the lever

(15) effect the clamping of the lance holder (1) in order to connect the lance holder (1) and the lance together.

Approximately in the middle of the lance holder (1) there is a disc valve (18) which, as can be seen from Fig. 1, closes the passage through the lance holder (1), i.e. its internal bore (23) when no lance is in said holder. The valve disc (18) is loaded by a spring (19) so that, as explained, it seals in the seat when no lance is in the holder. The valve disc (18) is connected to a buffer sleeve (20) via removable screws (31) in order to effect shifting of the valve disc (18) by the introduced lance. Namely, when a lance is pushed into the buffer sleeve (20) or into the enlargement (27) in its top end (26), the buffer sleeve (20) pushes the valve disc (18) out of its contact with the sealing surface (21) at the narrowing diameter. Sealing surfaces (21) and shoulder (24) are then no longer in contact so that the oxygen coming from below can here flow past without difficulties. Fig. 2 clearly shows that not only the sealing surface (21) but also the shoulder (24) are provided with corresponding tapers in order in this way to achieve a plane seal.

The buffer sleeve (20) fits into the internal bore (23), whereby a region is provided in which the buffer (29) of the buffer sleeve (20) acts on the top edge (28)

of the narrow section (22) when introduction of the lance is intended to open the valve disc (18). The buffer (29) is here in the form of a helical compression spring (30) that provides for the fact that during the pushing in of the buffer sleeve (20) the corresponding increasing resistance enables the operator to correctly recognize that the lance is entered sufficiently far into the lance holder (1).

The spring (19) of the valve disc (18) is supported on the opposite side of said valve disc by means of a Seeger circlip (32). The Seeger circlip can be seen in both Fig. 1 and Fig. 2. It is installed in an annular groove in the housing. In the region of the valve disc (18) the buffer sleeve (20) has radial recesses (33, 34) in order to facilitate the flow of oxygen and its entry into the inside of the lance. The recesses (33, 34) are of a large cross-section in order to enable the passage of sufficient volumes of oxygen.

Threaded pin (35) is attached to a conical sieve at a soldered joint (36). The soldered joint is so formed and sized that with the occurrence of slag at this point the threaded pin (35) becomes detached so that the valve cone (38), which can be seen in Fig. 1, snaps into the corresponding sealing seat. The conical sieve (37) ensures that the slag is initially retained at least

until the soldered joint (36) is destroyed and the closing of the valve thus initiated.

The valve cone (38) is loaded via spring (39) that is supported on the inner part of the slag backflow safety device (5). Said safety device (5) has a guide (40) for the valve cone (38), on which the free end (41) of threaded pin (35) acts, the centering pin (43) engaging in the corresponding sleeve (44, 45) in valve cone (38) and valve cone (46) respectively. The outer ring (49) of the guide (40) is fixed when screwing the housing (2) and rear part (4) together and thus ensures accurate guidance of both valve cones (38) and (46) via the centering pin (43). Whilst the valve cone (38) is loaded by spring (39), valve cone (46) is loaded by spring (47). Because this valve cone is displaced by the oxygen pressure, spring (47) is not as strong as spring (39). With the penetration of slag spring (39) must indeed rapidly and reliably press the valve cone (38) into its seat. In an emergency this operation is moreover assisted by the discharging oxygen. The outer ring (49) is sealed by an O-ring (48) so that, despite the high pressure of the oxygen, no gas can leak out at this point.

Fig. 2 shows the moment at which the lance (50) is pushed into the housing (2) or lance holder (1)

respectively. The buffer sleeve (20) is not displaced and the valve disc (18) is still in its closed position. If the lance (50) is pushed further in the buffer sleeve (20) moves valve disc (18) off its seat. Then, with the feeding of oxygen and the corresponding displacement of valve cone (46), the oxygen can flow through the housing (2) and the lance (50). If now, through oversight or unsatisfactory operation of the gripping chuck (7), the lance (50) is withdrawn from the lance holder (1), the spring (19) automatically thrusts the valve disc into its seat. This immediately cuts off the oxygen flow and safely prevents "whipping" of the lance holder and hose which, especially with lance holders with a large cross-section, can be very dangerous.

## CLAIMS

1. Lance holder for a large diameter oxygen lance, incorporating a head for attaching the lance and a slag backflow safety device installed in a housing located between the lance and the oxygen hose, such safety device being in the form of a valve which, on destruction of safety devices through the penetration of slag, is pressed onto the valve seat, characterized by the fact that the slag backflow safety device (5) is preceded by a valve disc (18) which on introduction of the lance (50) is moved against the force of a spring (19) and hereto has an already known buffer sleeve (20) located on the lance side and adapted to the lance diameter, said valve disc having tapered sealing surfaces (21) abutting a narrowing (22) of the internal bore (23).
2. Lance holder in accordance with Claim 1, characterized by the fact that a helical compression spring (30) is located between the buffer sleeve (20) connected to the valve disc (18) and the top edge (28) of the narrow section (22).
3. Lance holder in accordance with Claim 1, characterized by the fact that the valve disc (18) and the buffer sleeve (20) are detachably connected together by screws (21).
4. Lance holder in accordance with Claim 1,



characterized by the fact that the spring (19) loading the valve disc (18) is clamped between the valve disc and a Seeger circlip (32).

5. Lance holder in accordance with Claim 1, characterized by the fact that at the level of the valve disc (18) the buffer sleeve (20) has large cross-section radial recesses (33), (34) which extend almost up to the top edge (28) of the narrow section (22).

