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A connecting apparatus for a plastic pipe

1. Field of the Invention

The invention relates to a connecting apparatus for a plastic pipe whose connecting end is held between a sleeve and a connecting nipple which forms an outside cone expanding towards the free end of the nipple as a counter-cone for a conical clamping ring which is axially displaceable on the connecting nipple and whose barb-like retaining claws which cooperate with the inside jacket of the plastic pipe protrude radially to the outside.

2. Description of the Prior Art

In order to create a connecting apparatus for a plastic pipe which ensures a tension-proof clamping of the connecting ends of plastic pipes of a given nominal diameter substantially independent of the respective outside diameter it is known (EP 1150056 A2) to claw the inside jacket of the plastic pipe with a clamping ring. For this purpose, the slit clamping ring which is provided with retaining claws is held on a connecting nipple which forms an outside cone expanding towards the free nipple end, so that the clamping ring can be slid with its inside cone against the free nipple end onto the outside cone under respective expansion of the ring. If after sliding the connecting end onto the connecting nipple beyond the clamping ring the plastic pipe is subject to a withdrawing tensile stress, the barb-like retaining claws which protrude against the inside jacket of the pipe penetrate the pipe jacket in an interlocking manner, with the widening of the clamping ring linked to the axial withdrawing movement along the counter-cone leading to a respective fixing of the connecting end of the plastic pipe on the connecting nipple, since the sleeve enclosing the connecting

end in the region of the connecting nipple prevents an impermissible widening of the connecting end, which is thus additionally subject to radial clamping between the clamping ring and the sleeve. Despite these measures, the retaining forces exerted via the clamping ring between the sleeve and the connecting nipple on the plastic pipe may be insufficient in the case of high axial loads in order to exclude the withdrawal of the connecting end of the plastic pipe from the connecting apparatus.

SUMMARY OF THE INVENTION

The invention is thus based on the object of improving a connecting apparatus for a plastic pipe of the kind mentioned above in such a way that even in the case of high withdrawal forces the connecting end of the plastic pipe can be anchored in a secure manner.

This object is achieved by the invention in such a way that the sleeve comprises barb-like retaining claws which cooperate with the outside jacket of the plastic pipe and protrude radially to the inside, and comprises at least one longitudinal slit in an axial section in the area of the clamping ring.

As a result of the inwardly protruding retaining claws, an additional anchoring of the connecting end of the plastic pipe in the connecting apparatus is achieved against withdrawal because the retaining claws, as a result of their barbed shape, penetrate the outside jacket of the plastic pipe and exert an increased retaining force on the connecting end of the plastic pipe via the retaining claws which have penetrated the outside jacket in an interlocking manner, which only occurs under the condition however that the outside jacket was not injured by the retaining teeth of the sleeve protruding against the outside jacket during the insertion of the connecting end between the connecting nipple and the sleeve. This likelihood exists due to the larger tolerance range for the outside diameter of the plastic pipe in comparison with the inside diameter, especially when sliding on the connecting end onto the conical clamping ring which causes a wid-

ening of the inserted connecting end. In order to avoid such an injury to the outside jacket of the plastic pipe, the sleeve is provided with a slit configuration at least in the area of the clamping ring, so that the retaining claws which slide with their backs onto the outside jacket of the connecting end can yield radially under respective widening of the sleeve prior to the penetration of their backs into the outside jacket. This widening feature of the sleeve does not impair the interlocking penetration of the retaining claws in the outside jacket during an axial loading in the withdrawal direction because in this case the retaining claws will penetrate the outside jacket with the claw breast as a result of their barbed shape.

It is understood that the widening of the sleeve which is enabled by the slitting must not endanger the necessary clamping of the connecting end of the plastic pipe between the sleeve and clamping ring. For this reason, an axially continually slit sleeve is disadvantageous. Especially advantageous constructional conditions are obtained in this connection when the sleeve comprises longitudinal slits which are evenly distributed over the circumference in at least two successive axial sections, which slits extend in an angular offset manner against each other in sections. Closed circumferential areas which remain between the individual axial sections may under certain circumstances limit the necessary widening capability of the sleeve. In order to avoid such a limitation, the longitudinal slits of the sleeve can open into expanded bores, with the bores being situated on a common circumference of the sleeve on sections which are adjacent to the mutually facing ends of the longitudinal slits. This measure not only ensures an advantageous widening behavior of the sleeve, but also avoids notching effects in the area of the ends of the narrow longitudinal slits which occur otherwise.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the invention is shown by way of example in the drawings, wherein:

Fig. 1 shows a connecting apparatus in accordance with the invention for a plastic pipe in a simplified longitudinal sectional view;

Fig. 2 shows the sleeve enclosing the connecting end of the plastic pipe in a sectional view along the line II-II of Fig. 1;

Fig. 3 shows a sectional view along line III-III of Fig. 2, and

Fig. 4 shows a sectional view along the line IV-IV of Fig. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The illustrated connecting apparatus for a plastic pipe 1 comprises a metallic connecting nipple 2 with a stop flange 3 which is set back relative to the free nipple end and which is overlapped in the manner of a snap-in connection for example by a sleeve 4 enclosing the connecting nipple 2 in a concentric manner at a distance thereof. A slit clamping sleeve 5 is held in an axially displaceable manner on the connecting nipple 2, which sleeve is provided with an inside cone 6 expanding towards the free end of the nipple. Said inside cone 6 cooperates with a counter-cone 7 which is formed on the connecting nipple 2 as an outside cone expanding towards the free end of the nipple. On the outside of the clamping ring 5 which is opposite of the inside cone 6, barb-like retaining claws 8 are provided which extend radially to the outside against the connecting end 9 of the plastic pipe 1 which is pushed forward against the stop flange 3 between sleeve 4 and the connecting nipple 2. The leak-proof connection between the plastic pipe 1 and the connecting nipple 2 is ensured by ring seals 10.

When the connecting end 9 of the plastic pipe 1 is slid on the connecting nipple 2 up to the face-side stop on the stop flange 3, the connecting end 9 of plastic pipe 1 is also slide over the clamping ring 5 and its retaining claws 8, with the clamping ring 5 resting on the stop flange 3 in its free axial displacement capability provided in this embodiment between the stop flange 3 and the counter-cone 7. Due to the favorable dimensional stability of the plastic pipe 1 in the area of the nominal diameter relating to the flow cross section, the secure en-

trainment of the clamping ring 5 over the retaining claws 8 can be expected when the plastic pipe 1 is subjected to a tensile load in the withdrawal direction. Said withdrawal movement slides the clamping ring 5 with its inside cone 6 onto the counter-cone 7, so that the clamping ring 5 is widened, which is accompanied by a fixed clawing between the clamping ring 5 and the connecting end 9 of the plastic pipe 1.

In order to improve the anchoring of the plastic pipe 1 in the connecting apparatus against withdrawal, the sleeve 4 is also provided on its inside with barb-like retaining claws 11 which, in the case of a withdrawal movement of the connecting end 9 of the plastic pipe 1, will penetrate the optionally reinforced outside jacket of the plastic pipe 1, especially when the connecting end 9 is pushed radially to the outside against the sleeve 4 when the clamping ring 5 runs up the counter-cone 7. The precondition for a respective improvement in the anchoring of the plastic pipe 1 in the connecting apparatus is however that the outside jacket is not injured by the retaining claws 11 of the sleeve 4 during the insertion of the connecting end 9 between the connecting nipple 2 and the sleeve 4. Notice must be taken in this context that the outside diameter of plastic pipes of the same nominal diameter is subject to fluctuations in a larger tolerance range, so that the likelihood of injury of the outside jacket of plastic pipe 1 during the insertion of connecting end 9 into the connecting apparatus cannot be denied. In order to avoid such a likelihood of injury of the outside jacket, the sleeve 4 is provided with longitudinal slits 12, 13, starting from its face side facing the stop flange 3. Said longitudinal slits 12, 13 which are situated in pairs diametrically opposite each other are provided in two axial sections of the sleeve 4, namely in the effective area of the clamping sleeve 5, with the arrangement being made in such a way that the longitudinal slits 12 of the one axial section extend angularly offset by 90° relative to the longitudinal slits 13 of the adjacent section of sleeve 4. The longitudinal slits 12 open into expanded bores 14 in order to prevent notching effects in the area of the ends of the slits. The expanded bores 14 of the mutually facing ends of longitudinal slits 12, 13 of adjacent sleeve sections lie on a common sleeve circumference, thus creating advanta-

geous preconditions for the insertion of the connecting end 9 of the plastic pipe 1 between the connecting nipple 2 and the sleeve 4 concerning the widening of the sleeve 4 in the region of clamping sleeve 5 as enabled by the chosen arrangement of the longitudinal slits 12, 13, this being without having to fear any likelihood of injury of the outside jacket of the plastic pipe 1 by retaining claws 11 of sleeve 4. The backs of the retaining claws 11 which slide onto the outside jacket of the plastic pipe 1 can yield to a sufficient extent radially to the outside as a result of the widening of the sleeve as enabled by the longitudinal slits 12, 13 in order to avoid cutting into the outside jacket of plastic pipe 1 when the connecting end 9 is slid onto the clamping ring 5. Since the retaining claws 11 act with their steep breast on the outside jacket of the plastic pipe when the plastic pipe 1 is withdrawn from the connecting apparatus, the radially outwardly facing force components remain limited, so that despite the slitting of the sleeve 4 an interlocking clawing is ensured between sleeve 4 and the outside jacket of plastic pipe 1 by the retaining claws 11.

CLAIMS:

1. A connecting apparatus for a plastic pipe whose connecting end is held between a sleeve and a connecting nipple which forms an outside cone expanding towards the free end of the nipple as a counter-cone for a conical clamping ring which is axially displaceable on the connecting nipple and whose barb-like retaining claws which cooperate with the inside jacket of the plastic pipe protrude radially to the outside, characterized in that the sleeve (4) comprises barb-like retaining claws (11) which cooperate with the outside jacket of the plastic pipe (1) and protrude radially to the inside, and comprises at least one longitudinal slit (12, 13) in an axial section in the area of the clamping ring (5).
2. A connecting apparatus according to claim 1, characterized in that the sleeve (4) comprises longitudinal slits (12, 13) which are evenly distributed over the circumference in at least two successive axial sections and which extend in certain sections in an angular offset manner relative to each other.
3. A connecting apparatus according to claim 2, characterized in that the longitudinal slits (12, 13) of the sleeve (4) open into expanded bores (14), with the bores (14) being situated on a common circumference of the sleeve on sections which are adjacent to the mutually facing ends of the longitudinal slits (12, 13).