

## Description

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The invention relates to a plug-in connection for the temporary fixing of an implement on a handle, comprising a socket and a spigot which can be fitted into one another without looseness, there being provided, for mutual fixing when fitted together, a resilient tongue on the one part, said tongue being provided with a retention claw and being engageable behind a retention surface on the other part, and an anti-rotation means which comprises a recess, open at the end face, on the one part, which recess can be pushed onto a radial projection on the other part without significant play in the circumferential direction.

A plug-in connection of the abovementioned type is known from CH-A-305,389. It is intended for connecting together a broom and the associated handle and comprises a large number of individual parts, which must be brought together in a complicated assembly operation to produce the ready-to-use unit. The expense resulting therefrom is considerable and hinders wider acceptance. The handling of the known design is also not very satisfactory. After the spigot has been fitted into the socket, it requires the additional actuation of a sliding sleeve. In the process, the latter takes up a position which, in mechanical terms, is not very stable, resulting in the additional disadvantage that unintentional release of the connection may occur even during the normal use of the implement which has been attached, for example a broom. Furthermore, because of the compact design of the individual parts included, the weight of the plug-in connection described above is comparatively high and is likewise an impediment to its use on lightweight implements, for example on a mop.

The object on which the invention is based is to demonstrate a plug-in connection which is easy to produce and easy to handle, and is distinguished by a particularly low weight in combination with great robustness and functional reliability and as a result is of universal application on any implement.

This object is achieved according to the

invention in the case of a plug-in connection of the type mentioned at the outset by the fact that the resilient tongue is fixed at the bottom part of the spigot, in that the resilient tongue surrounds the outside of the wall of the socket with a slight, substantially constant clearance, in that the projection is formed by a rib which extends parallel to the socket and in that on the one hand the resilient tongue and the spigot and on the other hand the rib, the socket and the bottom part are each formed in one piece.

The plug-in connection according to the invention comprises just two individual parts, produced in one piece, of which one is fixed on the handle and the other is fixed on the implement to which the handle is to be temporarily connected. The production of the two individual parts is extremely simple and can be effected using injection moulding processes known per se from thermoplastic materials. The production costs are correspondingly low.

The two individual parts comprise mating parts which can be fixed together in the direction of the handle and are provided both with an anti-rotation means and a cam-type locking means. As the two mating parts are fitted together, the anti-rotation means demands [sic] in engagement prior to the cam-type locking means, as a result of which it is ensured that the two individual parts are always fitted together in the correct relative rotational position. It is a significant advantage here that the activation of the anti-rotation means does not require a discernable expenditure of force.

The cam-type locking means comprises at least one resilient tongue, which is fixed on the bottom part of the spigot which is associated in an identical manner with the spigot both in the assembled condition and in the disassembled condition of the two individual parts. As a result, the resilient tongue is subjected to a brief deformation only during the fitting together or taking apart of the two individual parts, the original resilience thereby being retained over a long period even where

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thermoplastic materials are used for their production. When fitted together, the base part of the resilient tongue and the projecting part of the socket face one another in the same plane. In terms of statics, this is highly favourable and an increasing tendency to looseness need not be feared even after relatively long use.

In the projecting region, the resilient tongue is provided with a retention claw which can be caused to engage behind the retention surface of the socket by the exertion of a sufficiently large force in the direction of fitting. As a result, the fitting together of the two parts is extremely simple and does not require the actuation of additional elements. Taking apart the two individual parts is correspondingly simple too. Because of the - in the opening direction - acute-angled association of the retention surface and/or the retention claw surface coming into engagement with the retention surface, it likewise merely requires the exertion of a sufficiently large tensile force on the handle and leads to an easy release of the connection. When the two individual parts have been fitted together, a connection which is completely without looseness is nevertheless obtained, fully satisfying the profile of requirements, in terms of loading, of customary floor-care devices.

The socket and the spigot can each be associated either with the handle or with the implement, as desired. An embodiment in which the socket is associated with the implement is however preferred for reasons of statics.

When fitted together, the resilient tongue surrounds the outside of the wall of the socket with a slight, substantially constant clearance which corresponds essentially to the clearance between the inside of the socket and the spigot. The clearance is of such small dimensions that, taking into account the customary production tolerances and of dimensional changes arising from use, for example swelling of material as a consequence of wetting with water, easy fitting together is still just ensured. As a result, when angular displacements of the connected implement occur, the socket

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receives mechanical stiffening on the one hand by the resilient tongue and on the other hand by the spigot, this substantially increasing the load-bearing capacity of the connection. The advantage mentioned appears clearly particularly if the resilient tongue and the spigot have an essentially corresponding extension in the axial direction.

Particularly good wear resistance is obtained if, at least on the mutually facing sides, the resilient tongue, the spigot and the socket are bounded by surfaces associated in rotational symmetry with the plug-in connection. The surfaces are expediently of cylindrical construction and in this case can be produced in a particularly simple manner.

On the side facing the implement, the rib on the socket, which when the two individual parts have been fitted together, engages in a recess in the end of the spigot, and the bottom part of the socket are expediently connected in one piece. The presence of the rib thus results in an additional stiffening of the socket in mechanical terms.

The rib can be associated with the wall of the socket on the outside or on the inside.

In the former case, there is the advantage of particularly good stiffening of the socket in mechanical terms, and in the latter case there is the advantage of a concealed arrangement and a smooth exterior.

The risk of an accumulation of dirt during the normal use of the implement is thereby substantially reduced. Embodiments in which the socket is provided with ribs on the outside and the inside are also conceivable. To a certain extent, they combine the advantages of both embodiments.

The socket can be provided with a plurality of ribs distributed uniformly over the periphery and the spigot / or the resilient tongue can be provided with an equal number of recesses distributed uniformly over the periphery. In addition to an excellent anti-rotation means, there results in this case the advantage of a

mechanical stabilization of the socket against buckling loads coming from various directions. Relative to the weight of the plug-in connection, a particularly good stability is obtained.

5           If the socket is provided on the outside with a plurality of uniformly distributed ribs, the ribs should as far as possible be arranged in the gaps between neighbouring resilient tongues and have an essentially corresponding extension in the radial direction to the resilient  
10   tongues. In such an embodiment, when the two individual parts have been fitted together, the ribs complete the smooth surface of the resilient tongues in the gaps between them. The risk of an undesired accumulation of dirt is thereby markedly reduced.

15           The retention surface cooperating within the cam-type locking means of the plug-in connection according to the invention with the retention claw is expediently formed by that side of a retention rib which faces away from the opening of the socket, the retention rib extending  
20   transversely to the direction of the socket. A corresponding embodiment has the advantage that only a very brief deformation of the resilient tongue is required to cause the cam-type locking means to engage.

          Furthermore, this results in the advantage of an  
25   additional stiffening of the wall of the socket by the transversely extending retention rib.

          The retention surface and/or that surface of the retention claw which, when the parts have been fitted together, comes into engagement with the retention surface,  
30   are associated at an acute angle with the opening of the socket. This imposes an angle with the direction of the handle of no more than  $75^{\circ}$ , preferably an angle of between  $35$  and  $60^{\circ}$ . In a corresponding embodiment, the end face of the resilient tongue is correspondingly levelled  
35   on the inside. As a result, it is capable of sliding easily over the rib as the two individual parts are fitted together.

          Within the scope of what has been stated above, it is therefore also possible to provide a plurality of

retention ribs distributed uniformly on the periphery of the socket. Said ribs are expediently arranged in the gaps between external ribs, provided as anti-rotation means, on the socket and, with a view to achieving a further improvement in the mechanical strength of the socket, can be constructed such that they merge into the latter. By means of a hollow embodiment of the spigot, it is possible without significantly prejudicing the stability, to achieve a further reduction in the weight.

10 The plug-in connection according to the invention is distinguished by being particularly easy to handle and by its stability while being simple to produce. In addition, it is largely immune to wear and is light in weight, enabling its universal application in the fixing  
15 of a handle on any desired implement.

The subject-matter of the present invention is further explained below with reference to the attached drawing, in which:

Figure 1 shows the two individual parts of the  
20 plug-in connection according to the invention immediately prior to being fitted together

Figure 2 shows the individual part having the socket, in plan view

Figure 3 shows the individual part having the  
25 spigot, in a view from below

Figure 4 shows the individual part having the spigot, partially cut away

Figure 5 shows the two individual parts when fitted together

30 Figure 6 shows the two fitted-together individual parts in cross-section

Figure 7 shows the two fitted-together individual parts in longitudinal section.

The individual parts 1, 2 illustrated in Figure 1  
35 are of rotationally symmetrical configuration, this being interrupted at only a few locations by recesses or ribs. Both individual parts are produced independently of one another using the injection moulding process. Each is composed of any of the relevant materials used but are

preferably composed of PVC or polypropylene.

The individual part 1 having the socket 5 is provided at the bottom with a bottom part 3, which can simultaneously form part of the adjoining implement, for example part of the strand holding device of a mop.

The socket 5 is of hollow-cylindrical construction and is provided on the outside with a rib 6 which extends in the longitudinal direction, serves as anti-rotation means and is at the same time constructed of one piece with the socket and merging into the base part 3. A further rib is provided in a similar manner on the rear side (not visible) of the socket 5.

Retention ribs 7 which extend transversely to the direction of the handle and form part of the cam-type locking means explained at greater length below can furthermore be seen on the outside of the socket 2. The retention ribs 7 are likewise formed of one piece with the socket 5.

The individual part 2 comprises the spigot 11, which is fixed on the broom handle 4 and is provided at the end with a recess 13 opened in the direction of the handle. Said recess forms part of the anti-rotation means, which will be discussed again later.

The spigot 11 is surrounded on the outside by resilient tongues 12 which are distributed uniformly over the periphery and are separated from one other in the circumferential direction by recesses 15. As a result, the resilient tongues can perform a radial spring movement in their projecting part.

Figure 2 illustrates the relative arrangement of the ribs 6, 8, 9 serving as anti-rotation means, the retention ribs 7 and the socket 5 to the base part 3. It can be clearly seen that all the ribs have essentially been distributed uniformly. A uniform stiffening of the socket in all directions is thereby obtained. The base part 3 is additionally provided with a central bottom opening 18. This serves to receive a secondary fixing part (not shown) of the attached implement.

Figure 3 illustrates the construction and

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relative arrangement of the spigot 11 and the resilient tongue 12. It can be seen that the spigot is provided with a central recess and that further recesses 13, 14, 15 distributed uniformly over the periphery are provided between the individual resilient tongues and in the end face of the spigot. Said recesses 13, 14, 15 surround the ribs 6, 8, 9 on the first individual part with a slight clearance in the circumferential direction after the spigot 11 has been fitted into the socket 5, as a result of which a relative rotation is excluded. The fitted-together condition is shown in Figure 5, in front view.

In Figure 4, the second individual part 2 is illustrated in semi-sectioned representation in order to show that the resilient tongues 12 extend essentially parallel to the hollow-cylindrical spigot 11. In the forward-projecting region, they are provided on the inside with a depression extending transversely to the direction of the handle 4, in order to form a retention claw. At the end face, the resilient tongues 12 are furthermore provided with the run-in bevel 17 in order to permit the overcoming of the retention ribs 7 when the spigot 11 is pressed axially into the socket 1.

The retention claw then snaps in behind the retention rib 7, as a result of which a good safeguard against an undesired release of the attached implement is achieved in addition to the axial fixing. The recesses 13, 14 of the spigot 11 on the end face are of varying depth in order to ensure that the handle and the attached implement are in correct relative rotational arrangement. A construction in accordance with this has proven to be expedient in order to ensure that the suspension eye present at the upper end of the handle 4 and not shown in the drawing is always in the same relative arrangement to the attached implement. This results in advantages both for handling and for storage.

Figure 6 shows the two individual parts 1, 2 fitted together, in cross-section. The ribs 6 engage in the spaces between the resilient tongues 12 and have a radial

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extension which corresponds to that of the resilient tongues. As a result, the external contour of the fully assembled unit is thus smooth-surfaced, this being highly advantageous in terms of hygiene.

5           It can furthermore be seen that the sleeve 5 is supported continuously on the inside by the spigot 11 and on the outside by the resilient tongues 12. It thereby receives considerable stiffening in mechanical terms, and this is further increased by the fact that the ribs 6, 9  
10 are constructed so as to merge integrally into the bottom part of the socket 5.

          The fully assembled unit is illustrated in longitudinal section in Figure 7. In this case too, it can be seen that the socket 5 is surrounded on the outside and  
15 the inside with a narrow clearance, on the one hand by the resilient tongues 12 and on the other hand by the spigot 11. Both have an essentially corresponding extension in the radial direction, as a result of which the supporting forces exerted by them complement one another.  
20 The spigot 11 is hollow on the inside, thereby creating space for anchoring aids (not shown) of connected implements, which penetrate through the bottom opening 18.

          On comparison of Figures 4 and 7, it can be seen that the resilient tongues 12 do not experience any de-  
25 formation either when the individual parts have been fitted together or when they have been taken apart. Even where thermoplastic materials having a tendency for cold flow are used, it is therefore possible to guarantee a long-term connection without looseness between the two  
30 individual parts 1, 2.

          The retention rib 7 extends transversely to the direction of the handle 4 and is bounded on both sides in the axial direction by surfaces extending perpendicular to the direction of the handle 4. The surface 16 of the  
35 retention claw grips below it, said surface enclosing an angle of  $55^{\circ}$  with the extension of the handle. As a result, the exertion of a tensile force on the handle 4 causes the forward end of the resilient tongues 12 to move away from the outside of the socket 11, until the

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retention claw slides away over the retention rib 7. The remainder of the movement apart can occur without the exertion of force.

When the two individual parts 1 and 2 are fitted together, the process is repeated in the reverse direction. In this case, the run-in bevel 17 comes to rest on the upper boundary surface of the retention rib 7 and, when further pressure is exerted causes the forward end of the resilient tongue 12 to move away temporarily from the outside of the spigot 11. The process is ended by the snapping in of the retention claw behind the retention rib 7.

Figure 7 furthermore shows how the ribs 8, 9 engage in the recess 13, 14 of the spigot. It can clearly be seen that, after the two individual parts have been fitted together, there is only a slight play between the recesses and the ribs in the circumferential direction. As a result, the connection proves to be extremely rotationally stable and without looseness.

Patent claims

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1. Plug-in connection for the temporary fixing of an implement on a handle, comprising a socket (5) and a spigot (11) which can be fitted into one another without looseness, there being provided, for mutual fixing when fitted together, a resilient tongue (12) on the one part, said tongue being provided with a retention claw (16) and being engageable behind a retention rib (7) on the other part, and an anti-rotation means which comprises a recess (13, 14, 15), open at the end face, on the one part, which recess can be pushed onto a radial projection on the other part without significant play in the circumferential direction, characterized in that the resilient tongue (12) is fixed at the bottom part of the spigot (11), in that the resilient tongue surrounds the outside of the wall of the socket (5) with a slight, substantially constant clearance, in that the projection is formed by a rib (6, 8, 9) which extends parallel to the socket (11) and in that on the one hand the resilient tongue (12) and the spigot (11) and on the other hand the rib (6, 8, 9), the socket (5) and the bottom part (3) are each formed in one piece.
2. Plug-in connection according to Claim 1, characterized in that the resilient tongue (12) and the spigot (11) have an essentially corresponding extension in the axial direction.
3. Plug-in connection according to Claims 1 to 2, characterized in that, at least on the mutually facing sides, the resilient tongue (12), the spigot (11) and the socket (5) are bounded by surfaces associated in rotational symmetry with the plug-in connection.
4. Plug-in connection according to Claim 3, characterized in that the surfaces are of cylindrical construction.
5. Plug-in connection according to Claims 1 to 4, characterized in that the rib (6, 8, 9), the socket (5) and the bottom part (3) are connected in one piece on the implement side.
6. Plug-in connection according to Claims 1 to 5,



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characterized in that the rib (6, 8, 9) is associated with the wall of the socket on the outside and/or the inside.

7. Plug-in connection according to Claims 1 to 6, characterized in that the socket (5) is provided with a plurality of ribs (6, 8, 9) distributed uniformly over the periphery, and in that the spigot (11) and/or the resilient tongue (12) is/are provided with an equal number of recesses (13, 14, 15) distributed uniformly over the periphery and of a construction corresponding to the ribs.

8. Plug-in connection according to Claim 7, characterized in that, on the outside, the socket (5) is provided with uniformly distributed ribs (6), in that the ribs are arranged in the gaps between neighbouring resilient tongues (12), and in that the ribs and the resilient tongues have an essentially corresponding extension transverse to the axis of the plug-in connection.

9. Plug-in connection according to Claim 8, characterized in that the retention surface is formed by that side of a retention rib (7) which faces away from the opening of the socket (5), and in that the retention rib extends transversely to the direction of the socket (5).

10. Plug-in connection according to Claim 9, characterized in that a plurality of retention ribs (7) distributed uniformly on the periphery of the socket are provided, and in that the retention ribs and the ribs (6, 8, 9) are constructed such that they merge into one another.

11. Plug-in connection according to Claims 1 to 10, characterized in that the spigot (11) surrounds a recess opened at the end face.



## Claims

1. Plug-in connection for the temporary fixing of an implement on a handle, comprising a socket (5) and a spigot (11) which can be fitted into one another without looseness, there being provided, for mutual fixing when fitted together, a resilient tongue (12) on the one part, said tongue being provided with a retention claw (16) and being engageable behind a retention surface (7) on the other part, and an anti-rotation means which comprises a recess (13, 14, 15), open at the end face, on the one part, which recess can be pushed onto a radial projection on the other part without significant play in the circumferential direction, characterized in that the resilient tongue (12) is fixed at the bottom part of the spigot (11), in that the resilient tongue surrounds the outside of the wall of the socket (5) with a slight, substantially constant clearance, in that the projection is formed by a rib (6, 8, 9) which extends parallel to the socket (11) and in that on the one hand the resilient tongue (12) and the spigot (11) and on the other hand the rib (6, 8, 9), the socket (5) and the bottom part (3) are each formed in one piece.

2. Plug-in connection according to Claim 1, characterized in that the resilient tongue (12) and the spigot (11) have an essentially corresponding extension in the axial direction.

3. Plug-in connection according to Claims 1 to 2, characterized in that, at least on the mutually facing sides, the resilient tongue (12), the spigot (11) and the socket (5) are bounded by surfaces associated in rotational symmetry with the plug-in connection.

4. Plug-in connection according to Claim 3, characterized in that the surfaces are of cylindrical construction.

5. Plug-in connection according to Claims 1 to 4, characterized in that, the rib (6, 8, 9), the socket (5) and the bottom part (3) are connected in one piece on the implement side.

6. Plug-in connection according to Claims 1 to 5, characterized in that the rib (6, 8, 9) is associated with the wall of the socket on the outside and/or the inside.

7. Plug-in connection according to Claims 1 to 6, characterized in that the socket (5) is provided with a plurality of ribs (6, 8, 9) distributed uniformly over the periphery, and in that the spigot (11) and/or the resilient tongue (12) is/are provided with an equal number of recesses (13, 14, 15) distributed uniformly over the periphery and of a construction corresponding to the ribs.

8. Plug-in connection according to Claim 7, characterized in that, on the outside, the socket (5) is provided with uniformly distributed ribs (6), in that the ribs are arranged in the gaps between neighbouring resilient tongues (12), and in that the ribs and the resilient tongues have an essentially corresponding extension transverse to the axis of the plug-in connection.

9. Plug-in connection according to Claim 8, characterized in that the retention surface is formed by that side of a retention rib (7) which faces away from the opening of the socket (5), and in that the retention rib extends transversely to the direction of the socket (5).

10. Plug-in connection according to Claim 9,

characterized in that a plurality of retention ribs (7) distributed uniformly on the periphery of the socket are provided, and in that the retention ribs and the ribs (6, 8, 9) are constructed such that they merge into one another.

11. Plug-in connection according to Claims 1 to 10, characterized in that the spigot (11) surrounds a recess opened at the end face.

## Revendications

1. Assemblage à emboîtement pour la fixation amovible d'un outil sur un manche comprenant une douille (5) et une broche (11) qui peuvent être assemblées l'une dans l'autre sans ballotement, tandis que la fixation mutuelle à l'état assemblé est assurée au moyen d'une languette élastique (12) d'un des composants, pourvue d'une griffe de fixation (16), cette languette pouvant venir s'encliqueter derrière une nervure de fixation (7) de l'autre composant et une sécurité contre le pivotement, constituée d'un orifice (13, 14, 15) d'un des composants ouvert sur la face frontale et pouvant venir s'ajuster sans jeu notable en direction de la périphérie sur une saillie radiale de l'autre composant, caractérisé en ce que la languette élastique (12) est fixée à la partie inférieure de la broche (11), que la languette élastique entoure la paroi de la douille (5) extérieurement et à une faible distance essentiellement constante, que la saillie est constituée par une nervure (6, 8, 9) qui s'étend parallèlement à la douille (9) et que la languette élastique (12) et la broche (11) d'une part, ainsi que la nervure (6, 8, 9), la douille (5) et la pièce de fond (3), d'autre part, sont réalisées chacune d'une pièce.

2. Assemblage à emboîtement selon la revendication 1, caractérisé en ce que la languette élastique (12) et la broche (11) présentent, en direction axiale, des extensions qui sont essentiellement en correspondance.

3. Assemblage à emboîtement selon les revendications 1 et 2, caractérisé en ce que la languette élastique (12), la broche (11) et la douille (5) sont limitées, au moins sur leurs faces tournées l'une vers l'autre, par des surfaces présentant une symétrie de rotation par rapport à l'assemblage à emboîtement.

4. Assemblage à emboîtement selon la revendication 3, caractérisé en ce que les surfaces ont une forme cylindrique.

5. Assemblage à emboîtement selon les revendications 1 à 4, caractérisé en ce que les nervures (6, 8, 9), la douille (5) et la partie de fond (3) sont assemblées d'une pièce sur la face tournée vers l'outil.

6. Assemblage à emboîtement selon les revendications 1 à 5, caractérisé en ce que la nervure (6, 8, 9) est disposée à l'intérieur et/ou à l'extérieur de la paroi de la douille.

7. Assemblage à emboîtement selon les revendications 1 à 6, caractérisé en ce que la douille (5) est pourvue de plusieurs nervures (6, 8, 9) réparties uniformément sur la périphérie et que la





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broche (11) et ou la languette élastique (12) sont pourvues d'un nombre égal de cavités (13, 14, 15) réparties uniformément sur la périphérie et disposées en correspondance avec les nervures.

8. Assemblage à emboîtement selon la revendication 7, caractérise en ce que la douille (5) est pourvue extérieurement de nervures (6) réparties uniformément, que les nervures sont disposées dans les intervalles entre les languettes élastiques voisines (12) et que les nervures et les languettes élastiques présentent une extension essentiellement en correspondance, transversalement par rapport à l'axe de l'assemblage à emboîtement.

9. Assemblage à emboîtement selon la revendication 8, caractérisé en ce que la surface de

maintien est constituée par la face d'une nervure de fixation (7) opposée à la paroi de la douille (5) et que la nervure de fixation s'étend transversalement par rapport à la direction de la douille (5).

5 10. Assemblage à emboîtement selon la revendication 9, caractérisé en ce que plusieurs nervures de fixation (7), réparties uniformément sur la périphérie de la douille, sont prévues et que les nervures de fixation et les nervures (6, 8, 9) sont réalisées de façon à se continuer les unes les autres.

10 15 11. Assemblage à emboîtement selon les revendications 1 à 10, caractérisé en ce que la broche (11) entoure un orifice ouvert sur la face frontale.