one another.

According to an aspect, there is provided a pipe connection, comprising a ball joint having shell parts, pipe connection means at the ends of the shell parts which face away from each other and which are to be connected to a respective pipe section, which shell parts surround one another in a contacting manner, each define a respective longitudinal centre line and are rotatable in relation to one another between an aligned position, in which the longitudinal centre lines coincide, and a rotated position, in which the longitudinal centre lines form an angle with one another which differs from zero, wherein the shell parts together enclose an axial passage which extends between the ends of the shell parts, a sealing element between the outermost shell part and the innermost shell part, and a lining which extends between the outermost shell part and the corresponding pipe connection means, wherein the outermost shell part comprises shell part halves which enclose the innermost shell part ~~which extends between the outermost shell part and the corresponding pipe connection means~~, wherein the contacting surfaces of the innermost shell part and of the outermost shell part are spherical, characterized in that the lining has a shape closely following the path of the innermost shell part while this is being rotated upon adjusting the ball joint, and in that ~~said~~ the inner ~~lining~~ surface of the lining and ~~said~~ the outer surface of the innermost shell part lie entirely free in relation to one another, wherein a flow guide is provided in the innermost shell part the flow guide widening in the form of a trumpet to the end of the innermost shell part and extending beyond the end of the innermost shell part which adjoins the lining, and having a nose end lying close up to the inner surface of the lining in the extreme rotated positions of the innermost shell part.

In the pipe connection according to an embodiment of the invention, the lining closely follows the path of the innermost shell part while this is being rotated upon adjusting the ball joint. Thus, only a small gap, preferably with an essentially uniform thickness, is present between the outer surface of the innermost shell part and the lining. Thus, although liquid etc may fill said gap, no vortices will occur as a result of the very limited gap space. Thus, the outer surface of the innermost shell part will no longer be subjected to the abrasive influence of the transported materials. The lining surface may be essentially spherical.

In order to further improve the flow characteristics of the pipe connection, a flow guide may be provided in the innermost shell part. Such flow guide protects the inner

surface of the innermost shell part. Preferably, the flow guide may have a cylindrically and/or spherically curved inner flow guide surface. Best results are obtained in case the flow guide extends beyond the end of the inner shell part which adjoins the lining . Thus, the flow guide may have a nose end which lies free in relation to the lining surface. The nose end and the lining surface may enclose a gap, the size of which is essentially identical to the gap between the lining surface and the outer surface of the inner shell part. Thereby, the innermost shell part is fully protected against the flowing materials.

In order to streamline the flow in a proper manner, the flow guide may comprise a flow guide part which is located close to the pipe connection means of the innermost shell part which is essentially cylindrical. Additionally, the flow guide may comprises a further, adjacent flow guide part which is located close to the outermost shell part and which is designed as widening in the form of a cone or trumpet. The latter embodiment has a free cross sectional flow area which remains essentially unobstructed even in the most extreme rotated positions of the shell parts with respect to each other. This represents a further advantage in comparison to the prior art pipe connection, the latter one exhibiting an increasing reduction of the free cross sectional flow area when rotating the shell parts with respect to each other.

Depending on the materials to be transported, the flow guide comprises a specific wear resistant material, such as hardened steel or white-cast iron. Also, the lining comprises such wear resistant material. These materials are selected on the basis of the resistance against the abrasive and possibly chemical properties of the transported

Claims

1. Pipe connection, comprising a ball joint having shell parts, pipe connection means at the ends of the shell parts which face away from each other and which are to be connected to a respective pipe section, which shell parts surround one another in a contacting manner, each define a respective longitudinal centre line and are rotatable in relation to one another between an aligned position, in which the longitudinal centre lines coincide, and a rotated position, in which the longitudinal centre lines form an angle with one another which differs from zero, wherein the shell parts together enclose an axial passage which extends between the ends of the shell parts, a sealing element between the outermost shell part and the innermost shell part, and a lining which extends between the outermost shell part and the corresponding pipe connection means, wherein the outermost shell part comprises shell part halves which enclose the innermost shell part ~~which extends between the outermost shell part and the corresponding pipe connection means~~, wherein the contacting surfaces of the innermost shell part and of the outermost shell part are spherical, characterized in that the lining has a shape closely following the path of the innermost shell part while this is being rotated upon adjusting the ball joint, and in that ~~said~~ the inner ~~lining~~ surface of the lining and ~~said~~ the outer surface of the innermost shell part lie entirely free in relation to one another, wherein a flow guide is provided in the innermost shell part the flow guide widening in the form of a trumpet to the end of the innermost shell part and extending beyond the end of the innermost shell part which adjoins the lining, and having a nose end lying close up to the inner surface of the lining in the extreme rotated positions of the innermost shell part.

2. Pipe connection according to claim 1, wherein a yoke is attached to the one of the shell part halves of outermost shell part, a gland ring being provided which constitutes the other shell part half of the outermost shell part and which cooperates with said yoke.

3. Pipe connection according to any of the preceding claims, wherein the inner ~~lining~~ surface of the lining and the outer surface of the innermost shell part enclose a

gap with an essentially uniform thickness.

4. Pipe connection according to one of the preceding claims, wherein the inner ~~lining~~ surface of the lining is essentially spherical.

5. Pipe connection according to Claim 4, wherein the flow guide has a cylindrically and/or spherically curved inner flow guide surface.

6. Pipe connection according to any of Claims 1-5, wherein the nose end lies free in relation to the ~~lining~~ inner surface of the lining.

7. Pipe connection according to Claim 6, wherein the nose end and the ~~lining~~ inner surface of the lining enclose a gap, the size of which is essentially identical to the gap between the ~~lining~~ inner surface of the lining and the outer surface of the innermost shell part.

8. Pipe connection according to one of Claims 1-7, wherein the flow guide comprises a flow guide part which is located close to the pipe connection means of the innermost shell part and which is essentially cylindrical.

9. Pipe connection according to one of Claims 1-8, wherein the flow guide comprises a flow guide part which is located close to the outermost shell part and which is designed as widening in the form of a cone or trumpet.

10. Pipe connection according to one of Claims 1-9, wherein the flow guide comprises a hardened material.

11. Pipe connection according to one of the preceding claims, wherein the lining comprises a hardened material.

12. Pipe connection according to one of the preceding claims, wherein the pipe connection means comprise welding sleeves.

13. Pipe connection according to any of the preceding claims, wherein the pipe connection means comprise connection flanges.

14. Pipe connection according to any of the preceding claims, wherein a case is provided which extends between the outer shell part and the corresponding pipe connection means, said case being releasably connected to the outer shell part, and the lining being enclosed between facing abutments on the outer shell part and the case.