

Description

The invention relates to couplings and, more particularly to a quick connect/disconnect coupling. The invention is particularly applicable to valved couplings when used for high pressure hydraulic systems and will be described with particular reference thereto. However, features and embodiments of the invention have broader aspects and may be used with other fittings or fluid devices such as valves, check valves, tube connectors or the like. In addition, quick connect/disconnect couplings of the type under consideration can be used as is well known for many different types of fluid systems.

Quick connect/disconnect couplings of the type contemplated herein are shown and described in US-A-4 596,272 and US-A- 4,637,432. Generally, however, the coupling assemblies shown therein include cooperating body and stem coupling assemblies comprising interfitting female and male components respectively. The body or female coupling assembly has an axially movable slide which moves from a closed position engaging a body valve when the assemblies are in a disconnected relationship to a position wherein the slide is open and spaced from the body valve when the two coupling assemblies are in a connected position. The slide is continually biased toward a closed position so that it automatically closes when the coupling assemblies are disconnected. Moreover, positive slide moving catch means are provided such that as the male or stem coupling assembly is moved to a disconnected position the slide is positively moved to a closed position.

The couplings of the prior patents also include a safety catch and interlock mechanism which greatly reduces the possibility of inadvertent disconnection of the coupled components. In particular, the disconnect assembly requires two separate movements in two directions before release can take place.

The subject invention incorporates features of the two prior U. S. patents in a simplified structure which also permits significant improvements in both operation and strength to be achieved while retaining the beneficial aspects of the prior designs.

US-A- 4086939 discloses a coupling member for a quick connect/disconnect coupling comprising: an elongated hollow body; a valve internally supported in said hollow body and defining therewith an annular chamber having an axially open end for receiving a mating coupling component; a slide sleeve supported by said body for axial movement in said annular chamber between a closed position engaging said valve and an open position axially displaced from said valve; and a substantially cylindrical wiper member mounted for sliding movement on said slide sleeve and having an end face which substantially fills the open end of said annular chamber.

The present invention is characterised by at least

one slide closing hook for moving said slide sleeve to said closed position, said closing hook having a body located radially outward of said cylindrical wiper member and a finger portion extending radially inwardly through an opening in said cylindrical wiper member into driving engagement with said slide sleeve.

EP-A- 0233766 discloses a coupling member for a quick connect/disconnect coupling having slide closing hooks for moving a slide sleeve to a closed position engaging a valve member. However, the wiper member is absent as is the annular chamber to receive the mating coupling component and to be closed off by the wiper member.

Preferably, interengaging surface means are provided between the cylindrical wiper member and the hook to prevent radial separation of the hook and the wiper member while permitting relative axial movement therebetween.

The interrelationship between the cylindrical wiper member, the slide sleeve, and the slide closing hook, results in an arrangement wherein the open annular end of the body member is closed by the cylindrical wiper member when the component is in a disconnected condition. Moreover, however, total functioning of the automatic slide closing hook can take place even with the addition of the wiper member. In addition, the wiper member preferably has a resilient sealing lip which extends inwardly into sliding engagement with the outer surface of the cylindrical slide sleeve to thereby maintain the slide sleeve in a clean condition and prevent the entry of dirt and foreign materials into the inner chamber of the coupling component.

Preferably, and in accordance with a more limited aspect of the invention, the slide closing hook member is maintained in position by cooperating interengaging surfaces on the cylindrical wiper member and the hook. The interengaging surfaces are such as to allow free relative axial movement of the hook relative to the wiper member so that proper functioning of each component can take place.

The coupling member also preferably includes a plurality of radially movable locking dog members which are carried by the body radially outwardly of the annular chamber for selectively connecting the coupling member to the mating stem coupling component. A control sleeve surrounds the body and is axially movable thereon for controlling the radial movement of the locking dog members and maintaining them in their inward locked position when the coupling component and its mating coupling component are in a connected relationship. Preferably, the wiper member and the locking dog members are related such that, when the coupling component is in a disconnected position the wiper member moves to an axial location wherein it acts to limit the radial inward movement of the locking dogs to maintain them

spaced radially outwardly sufficiently to allow connection with the stem coupling component to take place.

The dog members may be carried on diametrically opposite sides of the body in radially extending openings which permit movement of the locking dog members along a radial path between a first radially inner position for connecting a cooperating coupling component and a second radially outer position for permitting disconnection of the cooperating coupling component.

Preferably, the hollow body is provided with a substantially oval or elliptical cross-section in planes perpendicular to the longitudinal axis with the major axis of the elliptical cross-section lying substantially perpendicular to the radial path of movement of the detent means.

Preferably, the control sleeve which controls the movement of the detents also has a substantially elliptical outer cross-section in planes perpendicular to the longitudinal axis. It is positioned such that the major axis of its elliptical cross-section is perpendicular to the major axis of the body. The substantially oval or elliptical configuration of the body and the control sleeve offers distinct advantages for the subject design. In particular, the oval body and oval sleeve maintain their orientation relative to one another after assembly without requiring any special guides, grooves or the like. Additionally, the oval shapes permit the user of the assembly to rapidly ascertain the location of the sleeve and a safety operating button and the like. Moreover, the non-circular or elliptical cross-section part permit the material of the housing to be located where it is most needed and further allows the overall envelope of the resulting assembly to be reduced.

The dog members may be received in respective slots formed through the body transversely of the longitudinal axis. Preferably, each of the slots has a rectangular inner opening which joins the slot with the annular chamber. Moreover, each of the dog members also has a rectangular end portion which extends through the opening into the annular chamber. The rectangular opening and the rectangular portion on the dog members are sized and related such that the rectangular portion of the dog member is always in the rectangular inner opening throughout all radial movement of the dog members. This assures lateral support for the dog members when they are displaced radially outwardly. A benefit of this arrangement is that the locking dog bearing area and strength can be increased without decreasing the overall strength of the housing. This arrangement works in conjunction with the elliptical or oval configuration of the housing end slot to produce a coupling assembly which has great strength and is particular suited for extremely high pressure use.

As can be seen from the foregoing, an object of

the invention is the provision of a quick connect/disconnect coupling design which is highly effective and particularly suited for extremely high pressure use.

A further object of the invention in a preferred embodiment, is the provision of a quick connect/disconnect coupling of the type described wherein the housing and control slide component have an extremely efficient design which permits the body material to be most efficiently utilized.

Another object of the invention is the provision of a quick connect coupling wherein slide closing hooks are related to a slide wiper member in a manner which allows the outer open end of the coupling to be closed during the periods when the coupling is in a disconnected relationship.

A still further object of the invention in a preferred embodiment, is the provision of a coupling of the general type described wherein the wiper member further functions to maintain the locking dogs in their outer position during periods when the coupling is disconnected.

Yet another object of the invention in a preferred embodiment, is the provision of a quick connect/disconnect type coupling which can be provided with a keyed arrangement to allow only selected coupling pairs to be joined in flow relationship.

Yet another object of a preferred embodiment is the provision of a coupling of the general type described wherein the body and operating slide have a non-circular cross section that facilitate use of the coupling assembly.

The invention is further described, by way of example, with reference to the accompanying drawings, wherein:

Figure 1 is a side elevational view showing body and stem coupling components in a disconnected position but aligned preparatory to being connected;

Figure 2 is an end view of the body coupling component, taken on line 2-2 of Figure 1;

Figure 3 is a longitudinal sectional view, taken on line 3-3 of Figure 2, showing the internal construction and elements of the body component of the coupling assembly;

Figure 3A is an enlarged view of the end portion of the body valve element D (the seal elements are shown in a non-sealed condition);

Figure 4 is a cross-sectional view taken on line 4-4 of Figure 3;

Figure 5 is a longitudinal sectional view of the stem coupling component (the view is taken on line 5-5) of Figure 1;

Figure 6 is a longitudinal sectional view of the coupling assembly showing the stem and body components in a connected position;

Figure 7 is a greatly enlarged view of the circled area of Figure 6;

Figure 7A is a cross sectional view taken on line

7A-7A of Figure 7;

Figure 8 is a cross-sectional view taken on line 8-8 of Figure 6; and

Figures 9 to 13 are perspective views of various coupling components.

Figure 1 shows a mating pair of body and stem coupling members or assemblies A and B respectively. In Figure 1, the coupling components are in a disconnected relationship but in alignment as they are about to be connected upon movement axially towards one another.

As illustrated in Figure 3, the body assembly A includes a main body assembly C which has a substantially annular configuration and carries a body valve element D axially therein. A slide valve assembly E is carried within the annular chamber and mounted for axial sliding movement between an axially outer position (as shown in Figure 3) wherein it is sealingly engaged with the valve element D to a leftward position wherein flow can take place through the assembly. The slide sleeve assembly E is normally continually biased to the right as illustrated in Figure 3 by a compression type coil spring 12.

Referring to Figure 5, the stem assembly B includes an elongated hollow stem body assembly F which houses a poppet valve element G that is carried and guided by a guide assembly H. An elongated compression type coil spring 14 functions to maintain the poppet element G continually biased to the left hand closed position illustrated in Figure 5. In this position, the poppet element G cooperates with the seal assembly 16 to close the passage through the stem body assembly F.

When mated body and stem assemblies are to be joined they are positioned in the aligned relationship illustrated in Figure 1. As they are brought axially together to move them to the coupled position illustrated in Figure 6, the small diameter stem end of the stem body assembly F comes into engagement with the outer end of slide assembly E of body assembly A. As the two components are moved towards one another, the slide sleeve assembly E is moved to a left hand position as illustrated in Figure 6. Simultaneously with this final assembly movement, the poppet valve element G is driven to the right against the bias of spring 14. As the assemblies are moved to the Figure 6 position, sleeve hook assemblies J and the locking dog detent assemblies K move to their locked position to maintain the components in the coupled condition of Figure 6. When the assemblies are in their coupled or connected position, the parts are arranged generally as shown in Figure 6 and fluid flow can take place through the connected assemblies.

Referring again more particularly to Figures 2 through 4, the body C of body assembly A comprises a first body component 16 which has a reduced diameter right hand end portion 18 and a central stepped diameter passage 20 formed therethrough. The left

hand end of passage 20 is provided with suitable threads or other connecting means to allow the body assembly A to be connected to associated fluid lines. Joined to body component 16 is an outer sleeve like body component 22. In the embodiment under consideration, the body component 22 is releasably joined to body component 16 by suitable threads 24. A relatively short cylindrical abutment sleeve or housing member 26 having a radially inwardly extending flange 28 is located radially outwardly of the left hand end (as viewed in Figure 2) of the body component 22. It is held and clamped in position by having its inwardly extending end flange 28 captured between the threadedly connected body components 16 and 22.

Fixedly mounted within the reduced diameter end portion of body component 16 is the body valve assembly D. Body valve assembly D includes an elongated rigid body or bolt portion 30 which terminates in a substantially cylindrical valve section 32. As best shown in Figure 4, the body section 30 is flat and of a width "W" to be closely received in the reduced diameter portion of passage 20. This results in a pair of flow passages 33 on opposite sides of the bolt portion 30. In the embodiment under consideration, the body valve D is mechanically joined to body component 16 by three axially displaced equal crimps 34. In particular, the exterior of the bolt portion 30 of the body valve D is provided with three equally spaced grooves or slots 36 on each lateral edge thereof. The material of the reduced diameter section of body 16 is thereafter mechanically crimped into the grooves 36 firmly locking the body valve D in position. In conjunction with this assembly, the body 30 includes radially outwardly extending shoulder or flange portions 38 which are located at a diameter greater than the internal diameter of the reduced diameter section of passageway 20. Additionally, this assists in locating the bolt portion 30 for the crimping operation, the radial dimension of the sections 38 is greater than the minimum internal diameter of the slide sleeve assembly E. As will subsequently be apparent, this acts to prevent the body valve from being expelled from the assembly if failure occurs.

As best shown in Figures 2 and 4, body component 22 preferably has a substantially elliptical or oval exterior shape in planes perpendicular to the longitudinal axis. It is positioned with the major axis of the ellipse to extend coextensive with centerline C₁. The minor axis is located on centerline axis C₂. The center of element 22 has a cylindrical bore 40 which cooperates with the reduced diameter section of component 16 to define an outwardly open annular chamber 42.

Mounted within annular chamber 42 for axial sliding movement on the reduced diameter section of body section 16 is the previously mentioned slide sleeve assembly E. The assembly E comprises a substantially cylindrical slide sleeve member 44 which has a stepped internal passageway including a first

section 46 which is sized to be closely received on the exterior of the reduced diameter section of body section 16. A reduced diameter section 48 is sized so as to closely and sealingly receive the cylindrical end section 32 of the body valve D in the manner illustrated in Figure 3. The exterior of sleeve 44 has a radially outward extending flange 50 which is sized to be received closely within the major internal diameter of body section 22. Slide sleeve member 44 is continually biased to the right hand position illustrated in Figure 3 by the previously mentioned compression spring 12. Movement to the right is limited by engagement of the flange 50 with the internal shoulder 52 formed in body section 22. The arrangement of the flange 50 and internal shoulder 52 which limits movement of the sleeve member 44 produces both structural and functional advantages. More particularly, because the body bolt 30 is not required to restrain the sleeve member 44, the bolt can be small and of lesser cross-section thus allowing greater flow area and reduced flow resistance. In addition, with the subject design axial pressure thrust is contained and resisted by the body section 22 in both the coupled and uncoupled conditions. Because of this, no additional material or strength considerations are required.

A suitable O-ring seal 54 and a backup ring 56 are carried within an external circumferential groove formed on the right hand end of the reduced diameter portion 18 of body component 16. This provides a fluid tight seal between the sliding surfaces of the sleeve member 44 and the reduced diameter section of body member 16.

Sealing between the right hand and/or cylindrical portion 32 of the body valve D and the interior reduced diameter section 48 of the slide element 44 is accomplished by an improved seal assembly best illustrated in Figure 3A. As shown in Figure 3A, the cylindrical section 32 of the body valve D is provided with a circumferentially extending contoured groove 58 including a relatively shallow axially outward groove section 60 and a significantly deeper groove section 62. This arrangement allows use of a continuous PTFE ring 64 to function as a backup ring for the associated O-ring seal element 66. As can be seen from Figure 3A, the arrangement of the contoured groove 58 is such that the effective outer diameters of the backup ring and O-ring are the same but they can have significantly different internal diameters. This allows the use of a continuous backup ring of relatively low elasticity PTFE since the backup ring is not required to be greatly elongated during its installation in the backup ring portion of the groove 58. Thus, a solid backup ring can be employed in a one piece O-ring groove in conjunction with an O-ring having a large wire diameter to toroidal diameter ratio. This provides distinct operating advantages without increasing manufacturing problems.

With particular importance to the subject invention is the construction of the slide hook assembly J and its operational relationship to the wiper can assembly I. Referring in particular to Figures 3, 7 and 9, the overall arrangement of the wiper can assembly I can be understood. As shown therein, the wiper can assembly I includes a substantially cylindrical thin metal can like element 70 having a cylindrical configuration and a radially inwardly extending forward flange or end wall 72. The main body portion of the can element 70 has an opened internal diameter sized so as to allow it to be closely and slidably received on the outer surface of the intermediate portion of sleeve member 44. The inner diameter of the flange end section 72 is, however, only slightly larger than the outer diameter of the reduced diameter outer end portion of the sleeve member 44. The relationship of the end face 72 to the body member 22 and the sleeve member 44 is best illustrated in Figure 2. The end wall or flange 72 acts to substantially completely fill or, in effect, close the outer end of the body member A when the coupling is in a disconnected condition as shown in Figures 2 and 3. This prevents dirt and foreign materials from entering into the internal mechanism of the coupling. To further enhance this function of the wiper can element 70 a circumferentially continuous resilient wiper member 74 is carried by the flange section 72 and is sized so that its inner diameter is slightly smaller than the outer diameter of the end section of member 44. This produces a movable seal and wiping element as the can element 70 is axially moved relative to the sleeve member 44. The resilient wiper member 74 is firmly maintained in position adjacent the flange 72 by a metal backup ring 76 which is maintained in engagement against the rear side of the wiper ring 74 by a compression spring 78. As best seen in Figure 3, the compression spring 78 has a substantially conical shape and acts between a shoulder on sleeve member 44 and the backup ring 76. Additionally, the compression spring 78 acts to maintain the wiper can element 70 continually biased towards the open outer end of the body assembly A.

The limit of outer movement of the wiper can assembly I is defined by the slide hook assembly J. As illustrated in Figures 2, 3, 7 and 10, the subject device uses two slide hook members 80 located on diametrically opposite sides of the sleeve member 44. The hook members 80 have the overall configuration best seen in Figure 10 and include an inwardly extending hook portion 82 which is received in a circumferential groove 84 formed in sleeve member 44 at the general location illustrated. The hook members 80 are maintained in engagement with the groove 84 by their relationship with the cylindrical wiper can element 70. As illustrated in Figures 7, 7A, and 9 the wiper can element 70 includes elongated slots 86 through which the hook portions 82 extend. Additionally, each hook

portion 82 is provided with inwardly extending side grooves 88 that receive the sides of the slot 86. As illustrated in Figure 9, entry of the hook portion 82 during assembly can take place through a slightly widened part 87 in the slot 86. The relationship thus far described allows the wiper can element to move axially relative to the slide hook while permitting the hook member 80 to maintain positive engagement with the groove 84 in the sleeve member 44. Additionally, as best illustrated in Figures 2 and 4, the slide hook members 80 and the wiper can element 70 are axially guided by elongated slots 90 formed radially outwardly from the interior surface of bore 40 of body member 22. As illustrated, the grooves are located in diametrically opposite sides and are sized so as to closely receive the sides of the respective slide hook members 80. This maintains the slide hook members oriented in the position shown and prevents rotation of the wiper can assembly I.

The relationship of the slide hook members 80 to the stem coupling component B will subsequently be described in conjunction with the description of the stem coupling component. For the present, however, and continuing with the description of the body component assembly A, the assembly further includes the locking dog detent assembly K which functions to maintain the body assembly A and the stem assembly in the connected relationship shown in Figure 6 until it is desired to release the locking dogs. As best illustrated in Figures 2, 3 and 8 there are two locking dog elements 94 positioned on diametrically opposite sides of body assembly A and mounted for radial movement towards and away from the axial centerline along centerline C₂. The locking dog elements 94 have the general configuration best shown in Figure 11. In particular, the locking dog elements 94 have opposed substantially parallel side walls 96 and 98 (see Figure 3) which are sized so as to be closely and slidably received in a transversely extending slot 100 formed through body component 22. The slots 100 guide the radial movement of the dog elements 94 and constrain them against undesired axial movement. The locking dog elements are constrained against circumferential movement by having a lower rectangular end section 102 which extends through a rectangular opening connecting between slot 100 and the annular chamber within body component 22. This rectangular opening is provided by a longitudinally extending slot 104 formed from the inner wall 40 of component 22.

The radial movement of the locking dog elements 98 is controlled by an external control sleeve 110 which is mounted for axial sliding movement between an outermost coupled position illustrated in Figure 6 and an innermost uncoupled position illustrated in Figure 3. In the embodiment under consideration, the control sleeve 110, as well as the previously discussed body component 22, is formed from powdered

metal and has the exterior configuration best seen in Figures 1 through 4. As illustrated therein, sleeve 110 has an internal open configuration to closely receive the exterior of body component 22. The exterior configuration of control sleeve 110 preferably has an oval or substantially elliptical shape with the major axis of the ellipse extending in the direction of centerline C₂. As is apparent from Figures 2 and 4, the oval or elliptical exterior surfaces of the body component 22 and the oval inner opening of control sleeve 110 maintain the desired circumferential orientation between these components and, further, allow the body end sleeve to have maximum strength in those areas and directions where such strength is required.

As illustrated in Figures 2 and 3, the control sleeve 110 includes a longitudinally extending groove 112 that is positioned to engage the lateral ends of the dog elements 94. In addition, the groove is contoured as best shown in Figure 3. The groove 112 has a maximum radial depth at the outer end to permit the individual dog elements 94 to assume their radially outermost position and permit the sleeve member 44 to assume the right hand closed position. However, when the components are in the coupled position shown in Figure 6, the sleeve member 44 and the wiper can element 70 are in their maximum left hand position and the dog elements 94 have then moved radially inwardly into engaged position with the stem portion 152 of stem assembly B as illustrated.

In order to allow the control sleeve 110 to properly perform its function, it is maintained under a continual bias to the right towards the position shown in Figure 6. Movement to the right is limited by engagement of the axially inner end of groove 112 with the radially outer edge of the associated dog elements 94. Biasing of the control sleeve 110 is accomplished by a compression spring 116 which acts between the end wall 28 of sleeve 26 and the end of the sleeve 110.

In order to permit the coupled assembly to be uncoupled from the position shown in Figure 6, it is necessary to slide the control sleeve 110 to the left to bring the radially outer sections 113 of grooves 112 into alignment with their respective locking dog element. This position is shown in Figure 3. In order to move the control sleeve 110 to the position shown in Figure 3, it must be moved against the bias of the spring 116. In addition, the subject device includes a lock button assembly 120 which prevents inadvertent release movement of the sleeve 110 by requiring a separate radial inward movement of the lock button assembly 120 before it is possible to slide the control sleeve 110 against the bias of spring 116. As best illustrated in Figures 3, 6 and 12, the lock button assembly 120 includes a stamped metal lock button element 122 which is suitably mounted in an opening 124 formed through the control sleeve 110. This allows the outer surface of the button element 122 to be exposed for manual access. The button element 122 is

maintained in its operating position by a leaf spring element 126 (see Figures 3 and 12) which has an end portion 128 suitably received in a recess formed in the interior of the control sleeve 110. The upper end or left hand portion of the leaf spring 126 is suitably received under the button element 122 and maintains it biased to the position shown in Figure 6. In the Figure 6 position, the pair of stop elements 130 extend upwardly from the surface of button element 122 to a position for engagement with the end 26A of sleeve 26. As shown in Figure 6, this prevents axial movement of operating sleeve 110 unless the button 122 is pivoted inwardly to a position wherein the elements 130 can pass under the sleeve 26. Figure 3 illustrates the button element 122 in this depressed position. The button element 122 is arranged such that, considering the positioning of the spring 126 and the shape of the button element 122, rotation of this button during the release operation takes place about the inner corner of opening 124. Since the rotation is about an axis that is further inward than the outside diameter of the control sleeve release is less likely to be a problem with this particular design.

Referring to Figures 5 and 6, the stem assembly B comprises a main stem body assembly F which is a two part assembly comprises a main body component 150 and a threadedly connected stem component 152. The main body component 150 is substantially cylindrical with external wrench flats as shown in Figure 1. A first end 154 is suitably provided with internal threads to permit connection of the stem assembly to associated piping, tubing or the like. The second end 156 is threadedly connected to the stem component 152 and sealing between the components 150 and 152 is accomplished by a seal ring 158 captured between suitable internal shoulders. The stem component 152 is provided with a stepped diameter internal passageway 160 which terminates in a reduced diameter outer end which receives the substantially cylindrical poppet valve element G. A suitable O-ring 162 and an associated backup ring 164 are received in a groove 166 formed about the inner end of stem component 152. The O-ring 162 is sized so as to be closely received about the outer surface of the poppet element G to provide a fluid tight seal relative thereto. Outward movement of the poppet element is limited by cooperating shoulder 170 and 172 formed on the poppet element and the passageway 160 respectively.

As previously mentioned, the poppet element G is maintained continually under a bias towards the position illustrated in Figure 5 by the previously mentioned spring 14 and the guide assembly H.

The guide assembly H is best shown in Figure 13 and comprises a first support member 176 which is comprised of two substantially T-shaped components 177, 178 which are interfitted as shown to provide a support base and upwardly extending guide stem

180. The support base and the guide stem have a substantially X-shaped configuration in planes transverse to their longitudinal axis. A movable guide member 182 is provided with a central elongated slot 184 to provide a pair of legs 186 which can extend on diametrically opposite sides of the guide stem 180 for guide movement relative thereto. A pointed outer end 188 on the member 182 is arranged to engage within an internal bore 190 formed in the poppet element G. This assembly guides the poppet element G during reciprocatory movement from the position shown in Figure 5 to the open position shown in Figure 6. The exterior surface of the stem component 152 is provided with a pair of axially spaced circumferentially extending grooves 200 and 202. The axially outer groove 200 is arranged to provide a point of engagement for the slide hook members 80. As illustrated in Figure 7, the hook member 80 has an inwardly extending hook end portion 204 which is adapted to be received within the groove 200 when the components are in the coupled position of Figures 6 and 7. Similarly, the groove 202 is arranged to receive the locking dog elements 94 and maintain the components in the coupled position shown in Figure 6. The contour of the groove 202 is such as to provide a camming action against the suitable inclined inner end of the locking dog elements 94. Thus, when the control sleeve 110 is moved to its leftmost position, the stem assembly B can be withdrawn from the body assembly A. During this withdrawal motion, the locking dog elements 98 are cammed outwardly and the sleeve member 44 is pulled to the closed position of Figure 3 because of the engagement between the slide hook members 80 and the groove 200 in stem component 152. When the slide hook members 80 reach the position shown in Figure 3 a radial relief section 210 in groove 90 allows the slide hook members 80 to move radially outwardly, releasing the stem component 152.

The design of the slide hook members 80 and their relationship to the stem coupling assembly B is such that the design can readily be used to provide a keyed arrangement between various different coupling members. By shaping or modifying the configuration of the stem engaging portion of the hook member 80, and by changing its axial length relative to the stem, it is possible to limit the stem assemblies which can be connected with any particular body assembly. This provides an extremely simple and rapid way of assuring that only matched pairs of body and stem coupling assemblies can be joined. Thus, matched, coded coupling sets can be provided merely by changing the stem component 152 on the stem coupling assembly and the pairs of hook elements 80. If there is not a proper match between the hook portion of the slide hook member 80 and the groove 202 of the mating stem, it is not possible for the components to be assembled. This is apparent from FIGURE

3. That is, if the hook member 80 cannot move radially inwardly into engagement in a corresponding groove 202 on the stem coupling assembly B, it cannot pivot inwardly to fit within the radially reduced section of groove 90. This prevents axial engagement and connection of the components.

Claims

1. A coupling member for a quick connect/disconnect coupling comprising: an elongated hollow body (A); a valve (D) internally supported in said hollow body (A) and defining therewith an annular chamber having an axially open end for receiving a mating coupling component (B); a slide sleeve (E) supported by said body (A) for axial movement in said annular chamber between a closed position engaging said valve (D) and an open position axially displaced from said valve; and a substantially cylindrical wiper member (I) mounted for sliding movement on said slide sleeve (E) and having an end face which substantially fills the open end of said annular chamber; characterized by at least one slide closing hook (J) for moving said slide sleeve (E) to said closed position, said closing hook (J) having a body located radially outward of said cylindrical wiper member (I) and a finger portion (82) extending radially inwardly through an opening in said cylindrical wiper member (I) into driving engagement with said slide sleeve (E).
2. A coupling member as claimed in claim 1, wherein the hook (J) is engaged with said cylindrical wiper member (I) to prevent radial separation of said hook and said wiper member while permitting relative axial movement.
3. A coupling member as claimed in claim 1 or 2, including biasing means (12,78) for maintaining said slide sleeve (E) and said wiper member (I) axially biased towards said open end of said annular chamber.
4. A coupling member as claimed in claim 1, 2 or 3, wherein said hollow body (A) has groove means (90) for axially guiding said closing hook (J) and said wiper member (I).
5. A coupling member as claimed in any of claims 1 to 4, wherein said hook (J) includes an outer free end spaced axially from said finger (82) and having a portion (204) adapted to engage a mating coupling component.
6. A coupling member as claimed in any of claims 1 to 5, wherein said cylindrical wiper member (I)

has a resilient seal (74) extending substantially radially inwardly from said end face into sealing engagement with said slide sleeve (E).

7. A coupling member as claimed in any of claims 1 to 6, in which a plurality of said slide closing hooks (J) is positioned at circumferentially spaced locations about said slide sleeve (E).
8. A coupling member as claimed in any of claims 1 to 7 in which radially movable locking dogs (K) are carried by said body (A) radially outwardly of said annular chamber for selectively connecting said coupling member to a mating coupling component; and in which a control sleeve (110) surrounds said body (A) for controlling the radial movement of said locking dogs (K).
9. A coupling member as claimed in claim 8, wherein said cylindrical wiper member (I) is located to limit the radially inward movement of said locking dogs (K) when said wiper member is in its axially outermost position.
10. A coupling member as claimed in claim 8 or 9, wherein said body (A) has a substantially elliptical cross-section in planes perpendicular to its longitudinal axis and said locking dogs (K) are constrained to move radially substantially along the minor axis of said elliptical cross-section.
11. A coupling member as claimed in claim 8, 9 or 10, wherein said control sleeve (110) has a substantially elliptical outer cross-section in planes perpendicular to the longitudinal axis of the coupling and passing through said locking dogs (K).
12. A coupling member as claimed in claims 10 and 11, wherein the major axis of the elliptical cross-section of said control sleeve (110) is substantially perpendicular to the major axis of the elliptical cross-section of said body (A).
13. A coupling member as claimed in any preceding claim, wherein said slide sleeve (E) has a substantially cylindrical configuration and is mounted circumferentially of said valve (D).

Patentansprüche

1. Kupplungsteil für eine Schnellverbindungs- und schnellösekupplung mit den folgenden Merkmalen: ein längliches, hohles Gehäuse (A); ein Ventil (D), das intern im genannten hohen Gehäuse (A) getragen ist und mit diesem eine Ringkammer festlegt, die ein axial offenes Ende zur Aufnahme einer passenden Kupplungskomponente (B) auf-



3. That is, if the hook member 80 cannot move radially inwardly into engagement in a corresponding groove 202 on the stem coupling assembly B, it cannot pivot inwardly to fit within the radially reduced section of groove 90. This prevents axial engagement and connection of the components.

Claims

1. A coupling member for a quick connect/disconnect coupling comprising: an elongated hollow body (A); a valve (D) internally supported in said hollow body (A) and defining therewith an annular chamber having an axially open end for receiving a mating coupling component (B); a slide sleeve (E) supported by said body (A) for axial movement in said annular chamber between a closed position engaging said valve (D) and an open position axially displaced from said valve; and a substantially cylindrical wiper member (I) mounted for sliding movement on said slide sleeve (E) and having an end face which substantially fills the open end of said annular chamber; characterized by at least one slide closing hook (J) for moving said slide sleeve (E) to said closed position, said closing hook (J) having a body located radially outward of said cylindrical wiper member (I) and a finger portion (82) extending radially inwardly through an opening in said cylindrical wiper member (I) into driving engagement with said slide sleeve (E).
2. A coupling member as claimed in claim 1, wherein the hook (J) is engaged with said cylindrical wiper member (I) to prevent radial separation of said hook and said wiper member while permitting relative axial movement.
3. A coupling member as claimed in claim 1 or 2, including biasing means (12,78) for maintaining said slide sleeve (E) and said wiper member (I) axially biased towards said open end of said annular chamber.
4. A coupling member as claimed in claim 1, 2 or 3, wherein said hollow body (A) has groove means (90) for axially guiding said closing hook (J) and said wiper member (I).
5. A coupling member as claimed in any of claims 1 to 4, wherein said hook (J) includes an outer free end spaced axially from said finger (82) and having a portion (204) adapted to engage a mating coupling component.
6. A coupling member as claimed in any of claims 1 to 5, wherein said cylindrical wiper member (I)

has a resilient seal (74) extending substantially radially inwardly from said end face into sealing engagement with said slide sleeve (E).

7. A coupling member as claimed in any of claims 1 to 6, in which a plurality of said slide closing hooks (J) is positioned at circumferentially spaced locations about said slide sleeve (E).
8. A coupling member as claimed in any of claims 1 to 7 in which radially movable locking dogs (K) are carried by said body (A) radially outwardly of said annular chamber for selectively connecting said coupling member to a mating coupling component; and in which a control sleeve (110) surrounds said body (A) for controlling the radial movement of said locking dogs (K).
9. A coupling member as claimed in claim 8, wherein said cylindrical wiper member (I) is located to limit the radially inward movement of said locking dogs (K) when said wiper member is in its axially outermost position.
10. A coupling member as claimed in claim 8 or 9, wherein said body (A) has a substantially elliptical cross-section in planes perpendicular to its longitudinal axis and said locking dogs (K) are constrained to move radially substantially along the minor axis of said elliptical cross-section.
11. A coupling member as claimed in claim 8, 9 or 10, wherein said control sleeve (110) has a substantially elliptical outer cross-section in planes perpendicular to the longitudinal axis of the coupling and passing through said locking dogs (K).
12. A coupling member as claimed in claims 10 and 11, wherein the major axis of the elliptical cross-section of said control sleeve (110) is substantially perpendicular to the major axis of the elliptical cross-section of said body (A).
13. A coupling member as claimed in any preceding claim, wherein said slide sleeve (E) has a substantially cylindrical configuration and is mounted circumferentially of said valve (D).

Patentansprüche

1. Kupplungsteil für eine Schnellverbindungs- und schnelllösekupplung mit den folgenden Merkmalen: ein längliches, hohles Gehäuse (A); ein Ventil (D), das intern im genannten hohen Gehäuse (A) getragen ist und mit diesem eine Ringkammer festlegt, die ein axial offenes Ende zur Aufnahme einer passenden Kupplungskomponente (B) auf-



- weist; eine Schiebehülse (E), die vom genannten Gehäuse (A) für die axiale Bewegung in der genannten Ringkammer zwischen einer geschlossenen Lage, in der sie in das genannte Ventil (D) eingreift, und einer offenen Lage, die gegenüber dem genannten Ventil axial versetzt ist, getragen ist; und ein im wesentlichen zylindrisches Wischerteil (I), das für die Verschiebewegung an der genannten Schiebehülse (E) angebracht ist und eine Endfläche aufweist, die im wesentlichen das offene Ende der genannten Ringkammer ausfüllt; gekennzeichnet durch mindestens einen Schließhaken (J) zum Bewegen der genannten Schiebehülse (E) in die genannte geschlossene Lage, wobei der genannte Schließhaken (J) einen Körper aufweist, der radial außerhalb des zylindrischen Wischerteils (I) angeordnet ist, sowie einen Fingerabschnitt (82), der sich radial einwärts durch eine Öffnung im genannten zylindrischen Wischerteil (I) bis in Antriebsengriff mit der genannten Schiebehülse (E) erstreckt.
2. Kupplungsteil nach Anspruch 1, worin der Haken (J) in das genannte zylindrische Wischerteil (I) eingreift, um die radiale Trennung des genannten Hakens und des genannten Wischerteils zu vermeiden, während eine axiale Relativbewegung gestattet ist.
 3. Kupplungsteil nach Anspruch 1 oder 2, mit einer Vorspanneinrichtung (12, 78), um die genannte Schiebehülse (E) und das genannte Wischerteil (I) axial zum genannten offenen Ende der genannten Ringkammer hin vorbelastet zu halten.
 4. Kupplungsteil nach Anspruch 1, 2 oder 3, worin das genannte hohle Gehäuse (A) eine Nuteinrichtung (90) zum axialen Führen des genannten Schließhakens (J) und des genannten Wischerteils (I) aufweist.
 5. Kupplungsteil nach irgendeinem der Ansprüche 1 bis 4, worin der genannte Haken (J) ein äußeres freies Ende umfaßt, das einen Axialabstand zum genannten Finger (82) aufweist und einen Abschnitt (204) hat, der dazu eingerichtet ist, in eine dazu passende Kupplungskomponente einzugreifen.
 6. Kupplungsteil nach irgendeinem der Ansprüche 1 bis 5, worin das genannte zylindrische Wischerteil (I) eine federnde Dichtung (74) aufweist, die sich im wesentlichen radial von der genannten Endfläche nach innen bis in Dichtungseingriff mit der genannten Schiebehülse (E) erstreckt.
 7. Kupplungsteil nach irgendeinem der Ansprüche 1 bis 6, worin eine Anzahl der genannten Schließhaken (J) an mit Umfangsabstand angeordneten Stellen rund um die genannte Schiebehülse (E) angeordnet ist.
 8. Kupplungsteil nach irgendeinem der Ansprüche 1 bis 7, worin radial bewegliche Sperrnasen (K) vom genannten Gehäuse (A) radial außerhalb der genannten Ringkammer getragen sind, um wahlweise das Kupplungsteil mit einer passenden Kupplungskomponente zu verbinden; und worin eine Steuerhülse (110) das genannte Gehäuse (A) umgibt, um die Radialbewegung der genannten Sperrnasen (K) zu steuern.
 9. Kupplungsteil nach Anspruch 8, worin das genannte zylindrische Wischerteil (I) so angeordnet ist, daß es die radial einwärts gerichtete Bewegung der genannten Sperrnasen (K) begrenzt, wenn sich das Wischerteil in seiner axial äußersten Lage befindet.
 10. Kupplungsteil nach Anspruch 8 oder 9, worin das genannte Gehäuse (A) einen im wesentlichen elliptischen Querschnitt in Ebenen senkrecht zu seiner Längsachse aufweist, und die Sperrnasen (K) gezwungen sind, sich radial im wesentlichen längs der Nebenachse des genannten elliptischen Querschnitts zu bewegen.
 11. Kupplungsteil nach Anspruch 8, 9 oder 10, worin die genannte Steuerhülse (110) einen im wesentlichen elliptischen äußeren Querschnitt in Ebenen senkrecht zur Längsachse der Kupplung aufweist und durch die genannten Sperrnasen (K) hindurchläuft.
 12. Kupplungsteil nach Anspruch 10 und 11, worin die Hauptachse des elliptischen Querschnitts der genannten Steuerhülse (110) im wesentlichen senkrecht steht zur Hauptachse des elliptischen Querschnitts des Gehäuses (A).
 13. Kupplungsteil nach irgendeinem vorangehenden Anspruch, worin die genannte Schiebehülse (E) eine im wesentlichen zylindrische Ausbildung aufweist und in Umfangsrichtung des genannten Ventils (D) angebracht ist.

Revendications

1. Organe de couplage pour un couplage rapide de connexion/déconnexion, comprenant: un corps creux allongé (A); une soupape (D) montée à l'intérieur dudit corps creux (A) et définissant avec lui une chambre annulaire présentant une extrémité axialement ouverte pour recevoir un composant de couplage par raccordement (B); un man-



- chon coulissant (E) supporté par ledit corps (A) pour effectuer un déplacement axial dans ladite chambre annulaire, entre une position fermée en contact avec ladite soupape (D) et une position ouverte déplacée axialement de ladite soupape; et un organe frotteur (I) sensiblement cylindrique monté pour effectuer un mouvement coulissant sur ledit manchon coulissant (E) et présentant une face d'extrémité qui remplit sensiblement l'extrémité ouverte de ladite chambre annulaire; caractérisé par au moins un crochet de fermeture coulissant (J) pour déplacer ledit manchon coulissant (E) vers ladite position fermée, ledit crochet de fermeture (J) présentant un corps situé radialement à l'extérieur dudit organe frotteur cylindrique (I) et une partie de doigt (82) s'étendant radialement vers l'intérieur, à travers une ouverture ménagée dans ledit organe frotteur cylindrique (I), pour venir en contact d'entraînement avec ledit manchon coulissant (E).
2. Organe de couplage selon la revendication 1, dans lequel le crochet (J) est mis en contact avec ledit organe frotteur cylindrique (I), pour empêcher une séparation radiale entre ledit crochet et ledit organe frotteur, tout en permettant un mouvement axial relatif.
 3. Organe de couplage selon la revendication 1 ou 2, comprenant des moyens de rappel (12, 78) pour maintenir ledit manchon coulissant (E) et ledit organe frotteur (I) rappelés axialement vers ladite extrémité ouverte de ladite chambre annulaire.
 4. Organe de couplage selon la revendication 1, 2 ou 3, dans lequel ledit corps creux (A) présente des moyens formant gorge (90) pour guider axialement ledit crochet de fermeture (J) et ledit organe frotteur (I).
 5. Organe de couplage selon l'une quelconque des revendications 1 à 4, dans lequel ledit crochet (J) comprend une extrémité libre extérieure, espacée axialement dudit doigt (82) et présentant une partie (204) adaptée pour venir au contact d'une partie de couplage par raccordement.
 6. Organe de couplage selon l'une quelconque des revendications 1 à 5, dans lequel ledit organe frotteur cylindrique (I) présente un joint d'étanchéité élastique (74) s'étendant sensiblement radialement vers l'intérieur de ladite face d'extrémité, pour venir en contact étanche avec ledit manchon coulissant (E).
 7. Organe de couplage selon l'une quelconque des revendications 1 à 6, dans lequel une pluralité desdits crochets de fermeture coulissants (J) est placée en des emplacements espacés circonférentiellement autour dudit manchon coulissant (E).
 8. Organe de couplage selon l'une quelconque des revendications 1 à 7, dans lequel des crabots de blocage (K) susceptibles de se déplacer radialement sont supportés par ledit corps (A), radialement à l'extérieur de ladite chambre annulaire, pour connecter sélectivement ledit organe de couplage à un composant de couplage par raccordement, et dans lequel un manchon de commande (110) entoure ledit corps (A) pour commander le mouvement radial desdits crabots de blocage (K).
 9. Organe de couplage selon la revendication 8, dans lequel ledit organe frotteur cylindrique (I) est disposé de manière à limiter le mouvement radial intérieur desdits crabots de blocage (K) lorsque ledit organe frotteur se trouve dans sa position axialement la plus extérieure.
 10. Organe de couplage selon la revendication 8 ou 9, dans lequel ledit corps (A) présente une section transversale sensiblement elliptique dans des plans perpendiculaires à son axe longitudinal et lesdits crabots de blocage (K) sont forcés à se déplacer radialement sensiblement le long du petit axe de ladite section transversale elliptique.
 11. Organe de couplage selon la revendication 8, 9 ou 10, dans lequel ledit manchon de commande (110) présente une section transversale extérieure sensiblement elliptique dans des plans perpendiculaires à l'axe longitudinal du raccord et passant par lesdits crabots de blocage (K).
 12. Organe de couplage selon les revendications 10 et 11, dans lequel l'axe principal de la section transversale elliptique dudit manchon de commande (110) est sensiblement perpendiculaire à l'axe principal de la section transversale elliptique dudit corps (A).
 13. Organe de couplage selon l'une quelconque des revendications précédentes, dans lequel ledit manchon coulissant (E) présente une configuration sensiblement cylindrique et est monté de façon circonférentielle par rapport à ladite soupape (D).