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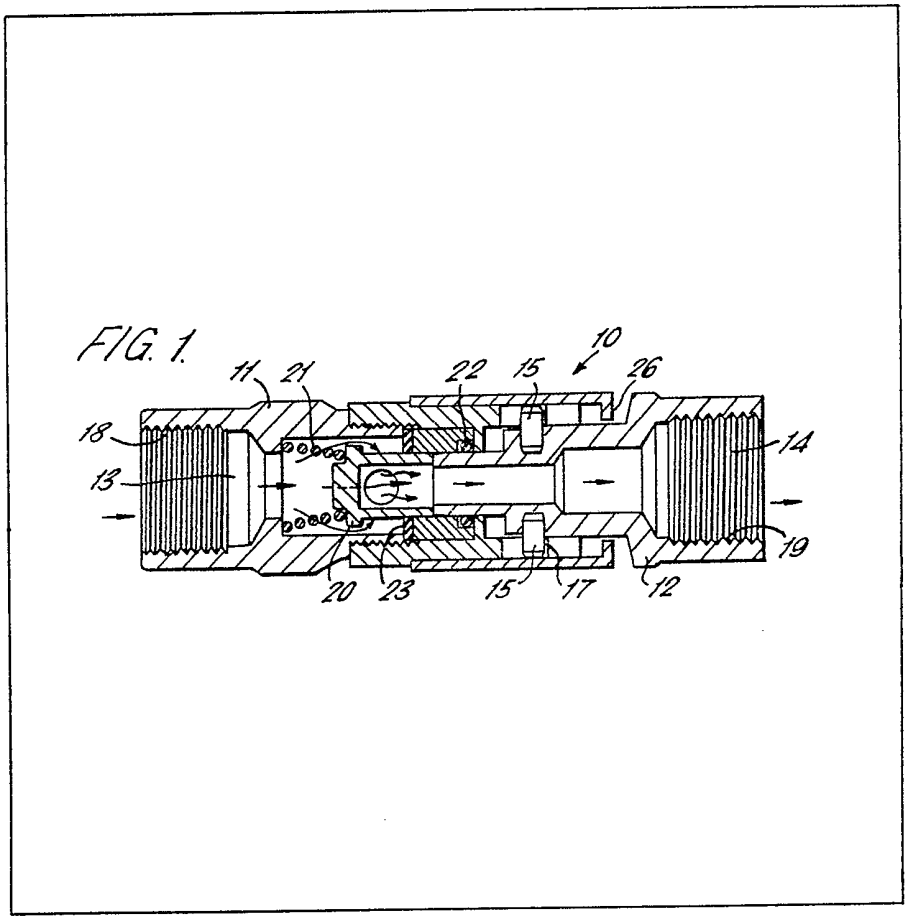
(71) Applicants
Compair Industrial Limited, P.O. Box 7, Broomwade Works, High Wycombe, Buckinghamshire, HP13 5SP
(72) Inventor
Raymond John Hall
(74) Agents
Boult, Wade & Tennant, 27 Furnival Street, London EC4A 1PQ

(54) **Pipe coupling**

(57) A compressed air pipe coupling 10 comprises a socket and a plug 12 fastened together by lugs 15 on the plug 12 engaging recesses 17 in slots 16 in the socket 11. In this first, fastened condition a valve 20 inside the socket 11 is held open by the plug 12 against the action of a spring 21. When the plug 12 is unfastened from the socket 11 there is a danger that the plug and socket will fly apart due to residual compressed air and the action of the spring 21. To avoid this danger a safety sleeve 25 is mounted around and attached to the socket 11, the sleeve 25 having an in-turned lip 26 which engages the lugs 15 as they leave the slots 16. To disconnect the plug 12 from the socket 11 the plug 12 must be rotated relative to the socket 11 and sleeve 25 until the lugs 15 can emerge through apertures 27 in the lip 26.



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1.

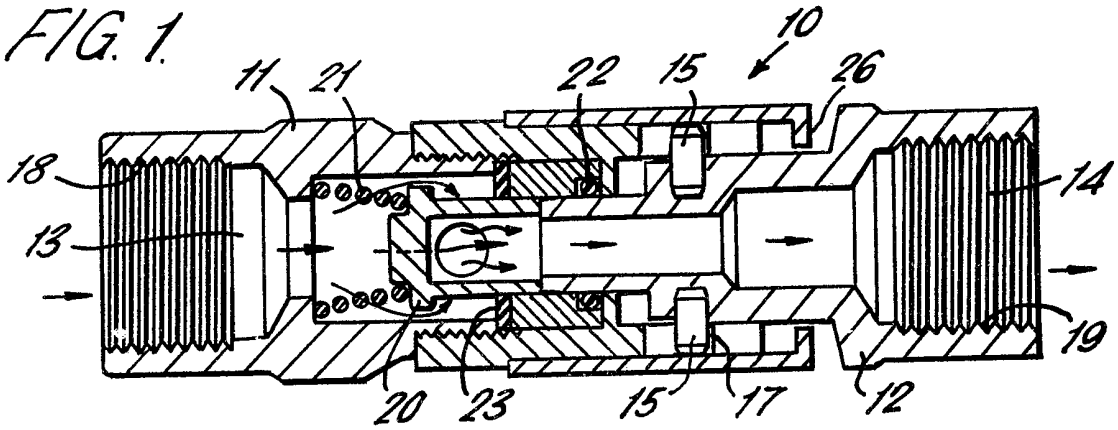


FIG. 2.

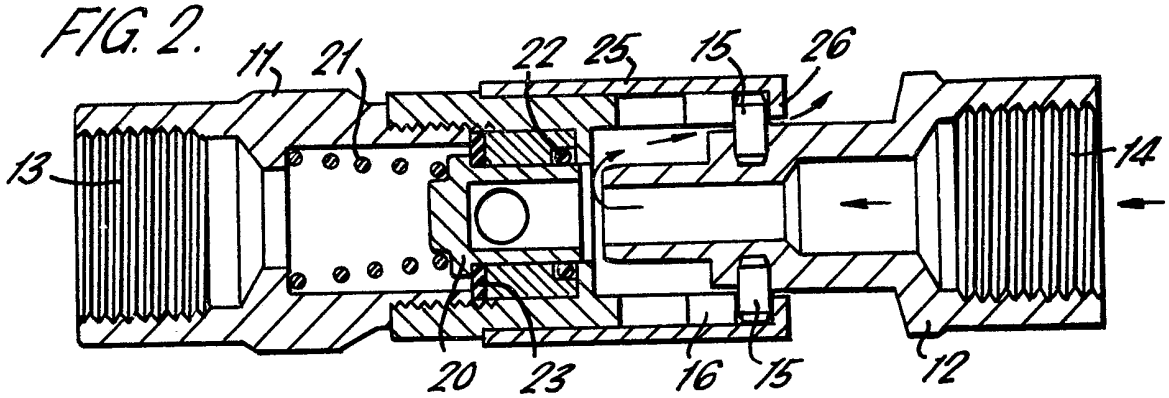


FIG. 3

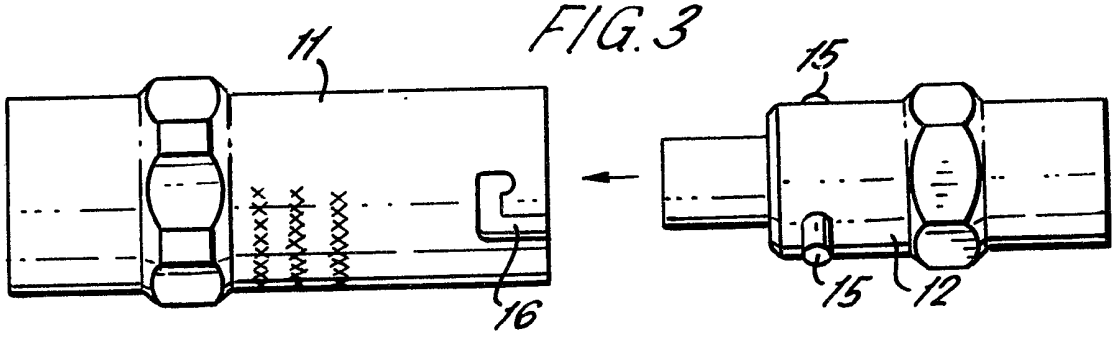


FIG. 4.

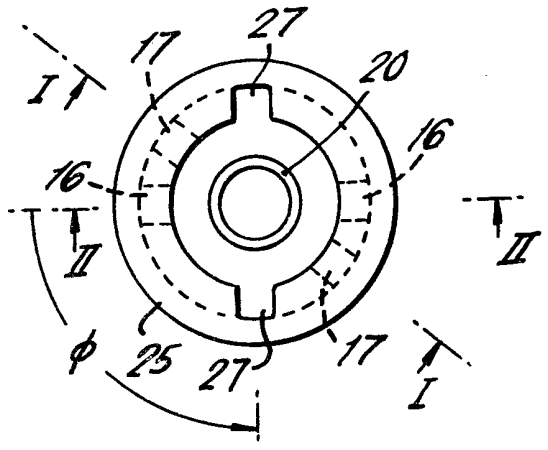


FIG. 5.

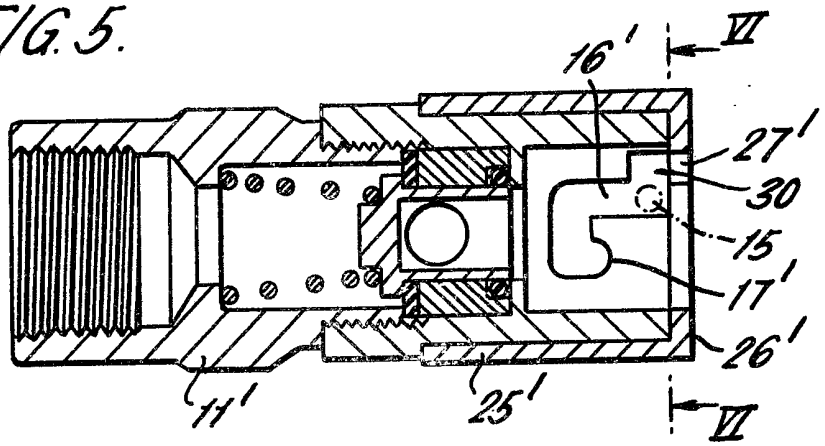


FIG. 6.

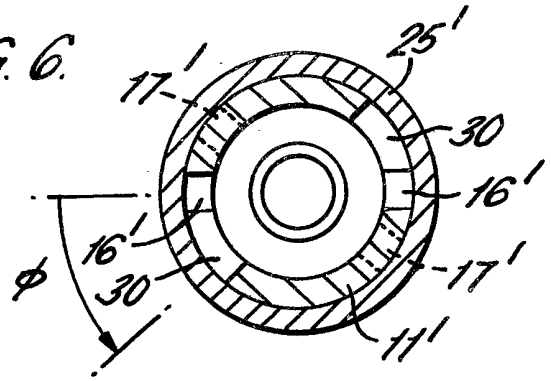


FIG. 7.

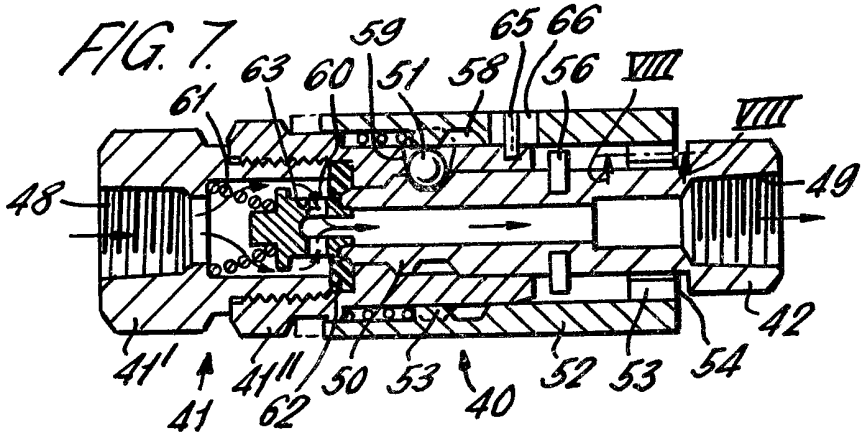
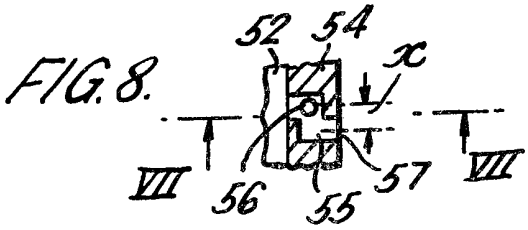


FIG. 8.



SPECIFICATION
Pipe coupling

This invention relates to bayonet pipe couplings, and specifically, though not exclusively, to safety couplings for connecting lengths of pipe together for conveying compressed air, gases or liquids from one location to another.

Several known types of bayonet pipe coupling for compressed air supplies comprise male and female parts which open an internal valve during connection. The danger with these couplings is that during disconnection of the coupling, the male plug can fly apart from the female socket due to residual internal air pressure in the hose connected to the male plug, particularly if the male plug is not gripped tightly during the disconnection. The resultant whipping air hose can cause injury to bystanders and to the person disconnecting the coupling.

The invention provides a bayonet pipe coupling comprising a socket with a first passageway therethrough, a plug with a second passageway therethrough for communication with the first passageway, means for releasably fastening the plug and socket together, valve means in the socket for closing off the first passageway and opening when the plug and socket are fastened together to connect the first passageway to the second passageway, and means for limiting movement of the plug away from the socket when fastening means is released, the limiting means being arranged such that to disconnect the plug from the socket the plug must be rotated relative to the socket.

Some embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1 and 2 are longitudinal sectional views of a compressed air pipe coupling embodying the invention, showing first and second conditions respectively,

Figure 3 is a side elevation of the pipe coupling as in Figure 1 with the safety sleeve removed for clarity,

Figure 4 is an end elevation of the socket of the coupling of Figures 1 and 2, taken in the direction of the arrows in Figure 3, and showing the safety sleeve in position, the section planes of Figures 1 and 2 being indicated by the lines I—I and II—II respectively,

Figure 5 is a longitudinal sectional elevation of a modified socket and safety sleeve,

Figure 6 is a transverse sectional view taken along the plane indicated by the line VI—VI in Figure 5,

Figure 7 is a longitudinal sectional elevation of a second embodiment of the invention, and

Figure 8 is a scrap sectional view taken along the plane indicated by the line VIII—VIII in Figure 7, the section plane of Figure 7 being indicated by the line VII—VII.

A compressed air pipe coupling generally designated 10 comprises a socket 11 and a plug 12, the socket 11 and plug 12 having first and second passageways 13 and 14 respectively. The socket 11 is connected to a compressed air source by means of a threaded bore 18, and the plug 12 is connected to tubing (not shown) by means of the threaded bore 19 for conveying the compressed air to the location where it is required.

A pair of lugs 15 mounted on the plug 12 engage in generally L-shaped slots 16 formed in the socket 11. The slots 16 are shaped to define recesses 17 therein for retaining the lugs 15 whereby the plug 12 is fastened to the socket 11, as in Figure 1 which shows the coupling 10 in a first condition. In this first condition a valve 20 is held open by the plug 12 against the action of a spring 21 to admit compressed air from the first passageway 13 to the second passageway 14, as shown by the arrows. The joint between the two passageways 13 and 14 is maintained fluid-tight by means of an annular rubber seal 22.

A safety sleeve 25 is mounted around and secured to the socket 11 by crimping, pinning or some other suitable means. The sleeve 25 is formed with an in-turned lip 26 spaced from the end of the socket 11 and shaped so as to retain the lugs 15 when they leave the slots 16 but having apertures 27 in the lip 26 to release the lugs 15 and therefore the plug 12 therefrom. Figure 2 shows the coupling in a second condition in which the plug 12 is unfastened from the socket 11 but is prevented from being disconnected therefrom by the lip 26 which retains the lugs 15. In this second condition the spring 21 has urged the valve 20 into contact with a rubber seating 23 thus sealing off the passageway 13, and residual compressed air in the passageway 14 and the tubing connected thereto (not shown) is allowed to exhaust to the ambient atmosphere, as shown by the arrows. To bring the coupling to a third condition in which the plug 12 is disconnected from the socket 1, the plug 12 must be rotated from the second condition through the angle φ indicated in Figure 4 so that the lugs 15 can then emerge through the apertures 27.

Figure 5 shows a modified socket 11′ and a shorter sleeve 25′ of which the in-turned lip 26′ is not spaced from the end of the socket 11′. Modified slots 16′ in the socket 11′ are formed with enlarged openings 30 extending part-circumferentially from the ends of the slots 16′. The other elements of the socket 11′ are similar to those of the socket 11.

In this embodiment, on releasing the lugs 15 from the recesses 17′ to unfasten the plug 12 from the socket 11′, the lugs 15 are moved along the slots 16′ to the position shown in ghost lines in Figure 5, this being the second condition, from which to disconnect the plug 12 from the socket 11′ the plug 12 must be rotated through the angle φ' so as to move the lugs 15 along the enlarged openings 30 until they can emerge through apertures 27′ formed in the lip 26′.

It is of course possible for the sleeves 25 or 25′ to be formed integrally with the sockets 11 or 11′.

Figures 7 and 8 show a second embodiment of the invention, being a pipe coupling generally

designated 40 having a plug 42 and a socket 41 having two threadedly engaging sections 41′ and 41″. Threaded bores 48 and 49 in the socket 41 and plug 42 respectively are similar to and for the same purpose as the threaded bores 18 and 19. The plug 42 is formed with a shoulder 50 and is fastened to the socket 41 by means of a plurality of stainless steel balls 51 arranged to engage the shoulder 50 as shown. The balls 51 are located in tapered holes 59 in the socket 41, the holes 59 having a smallest diameter of slightly less than that of the balls 51.

A spring-biased safety sleeve 52, also serving as means for urging the balls 51 into contact with the shoulder 50 by virtue of an annular ridge 53, is formed with an in-turned lip 54 having two stepped channels 55 terminating in apertures 57 shaped so as to allow therethrough lugs 56 mounted on the plug 42. A pin 65 mounted on the socket 41 locates in a slot 66 in the sleeve 52 for preventing rotation of the sleeve 52 about the socket 41.

Flow of compressed air from the socket 41 is controlled by a valve 60 biased by a spring 61 towards a rubber seating 62 and actuated by the end of the plug 42. When the valve 60 is open, holes 63 in the valve 60 are exposed, thus allowing compressed air to pass from the socket 41 to the plug 42.

To connect the plug 42 and socket 41 together, the sleeve 52 is first moved to the position shown in ghost lines so that the balls 51 are free to move into a recess 58 behind the ridge 53. The plug is inserted into the sleeve 52 in such a manner that the lugs 56 pass along the channels 55. The plug 42 is then pushed home into the socket 41 thus opening the valve 60, and the safety sleeve 52 is allowed to spring back to the position shown in solid lines in Figure 7, thereby urging the balls 51 into engagement with the shoulder 50 of the plug 42. The coupling is then in its first condition with the plug 42 and socket 41 fastened together and compressed air flowing from the socket 41 to the plug 42 as shown by the arrows.

To unfasten the plug 42 from the socket 41, the sleeve 52 is slid to the position shown in ghost lines in Figure 7 thus releasing the balls 51. The plug 42 may then be moved out of the socket 41 until the lugs 56 abut the steps in the channels 55, as shown in Figure 8, the coupling then being in its second condition. To disconnect the plug 42 from the socket 41 the plug 42 must be rotated so that the lugs 56 move through the distance *x*, whereupon the plug 42 and socket 41 may be pulled apart.

The principal advantage of these embodiments is that when the plug and socket are unfastened they cannot be disconnected in a single longitudinal movement: instead, the plug must be rotated relative to the socket from the second condition. Hence it is not possible for the plug to be expelled from the socket merely because of the spring (21 or 61) or residual compressed air in the tubing connected to the plug, and the risk of injury therefrom is avoided.

A further advantage of the embodiment of Figures 1 to 4 is that an existing pipe coupling as pictured in Figure 3 may be readily fitted with a safety sleeve 25 to produce that embodiment. Furthermore, to produce the embodiments of Figures 5 and 6, an existing pipe coupling as pictured in Figure 3 need only have its slots 16 modified accordingly and a safety sleeve 25′ fitted.

CLAIMS

1. A bayonet pipe coupling comprising a socket with a first passageway therethrough, a plug with a second passageway therethrough for communication with the first passageway, means for releasably fastening the plug and socket together, valve means in the socket for closing off the first passageway and opening when the plug and socket are fastened together to connect the first passageway to the second passageway, and means for limiting movement of the plug away from the socket when the fastening means is released, the limiting means being arranged such that to disconnect the plug from the socket the plug must be rotated relative to the socket.

2. A pipe coupling as claimed in claim 1 which, when the plug is unfastened but not disconnected from the socket, provides access from the second passageway to atmosphere.

3. A pipe coupling as claimed in either claim 1 or claim 2 in which the valve means comprises a spring-biased valve opened by the plug when the plug is fastened to the socket.

4. A pipe coupling as claimed in any preceding claim in which the plug is provided with lugs projecting transversely therefrom.

5. A pipe coupling as claimed in claim 4 in which the limiting means comprises a sleeve having an in-turned lip, which sleeve is mounted around the socket with the lip projecting over the edge of the socket so as to surround the plug when the plug and socket are fastened together and so that the lip limits the movement of the lugs and therefore of the plug away from the socket when the fastening means is released, the lip being formed with an aperture for each lug for passage of one of the lugs therethrough, the apertures being positioned such that on release of the fastening means the plug must be rotated relative to the socket to pass the lugs through the apertures.

6. A pipe coupling as claimed in claim 5 in which the sleeve is fixed to the socket and in which the fastening means comprises generally L-shaped slots formed in the socket for engagement by the lugs.

7. A pipe coupling as claimed in claim 6 in which the lip is spaced from the end of the socket to allow passage of the lugs between the socket and the lip when being brought into register with the apertures.

8. A pipe coupling as claimed in claim 6 in which the lip abuts the end of the socket and the slots have a portion at their open end extended part-circumferentially to allow passage of the lugs

therealong when being brought into register with the apertures.

9. A pipe coupling as claimed in claim 5 in which the sleeve is slidable relative to the socket and in which the fastening means comprises a set of spheres arranged in the socket to engage a shoulder formed on the plug, the spheres being urgeable.

10. A pipe coupling substantially as hereinbefore described with reference to and as shown in Figures 1 to 4, or Figures 1 to 4 as modified by Figures 5 and 6, or Figures 7 and 8.

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