

Description

Background

Chokes are used in flow lines to create a restriction in the flow. In many applications of chokes, the high velocity flow or the entrained moisture or particles are particularly damaging to the tip of the choke valve member. In such applications, the tip is made of an erosion resistant material, such as tungsten carbide. Rather than make the whole of the needle or valve member out of the erosion resistant material, the tips are made to be replaced.

Prior to the present invention, such tips have been silver brazed onto the needle stem. Few are qualified to perform this silver brazing so that it is difficult to replace a tip and have it properly installed.

Threading of the tungsten carbide tip would be advantageous except that forming threads in tungsten carbide is an expensive operation.

U. S. Patent No. 852,844 discloses a refractory stopper which includes internal threads and a nut embedded in the stopper through which the threads extend so that the stopper can be threaded onto the stem.

U. S. Patent No. 1,499,433 discloses a throttle valve in which the tip is attached to the stem with a ring positioned in a groove in the stem and a plug threaded into the tip and engaging the ring to thereby secure the tip to the stem.

U. S. Patent No. 1,831,713, with features as listed in the preamble of claim 1, discloses a choke or adjustable flow bean in which the tip is threaded onto the stem into abutment with disc which is secured to the stem with a set screw being used to prevent the unthreading of the tip from the head.

U. S. Patent No. 1,911,905 discloses a choke or adjustable flow bean in which the tip is secured to the stem by a pin extending through the stem and through the outer portion of the tip which surrounds the stem and through the stem.

U.S. Patent No. 3,262,673 discloses another stopper structure which includes a split sleeve positioned in a stem groove and having external threads which are adapted to engage within internal threads in the stem opening in the stopper.

U.S. Patent No. 3,693,732 discloses a well control choke in which the stem is surrounded by a sleeve which receives a plug in an enlarged recess in its outer end which extends beyond the end of the stem and is held in position by the threading of the plug onto the end of the stem.

U.S. Patent No. 3,761,053 discloses a needle valve in which the needle is replaceable and is provided with a spherical end which is received within a slot in the stem or is secured by a collar

retaining it against the end of the stem.

U.S. Patent No. 4,337,920 discloses another method of securing a wear-resistant sleeve-type valve member to its stem in a choke which is subject to high temperatures and extreme erosion conditions. This includes the utilization of annular spring positioned around the stem and within the wear-resistant sleeve.

An object of the present invention is to provide an improved choke in which a worn, wear-resistant valve member tip is easily and quickly replaceable.

According to one aspect of the present invention there is provided a choke comprising a body having an internal valve chamber with an inlet and an outlet communicating through the body into the valve chamber, a seat positioned within said valve chamber surrounding the opening of the outlet into the valve chamber, a valve member positioned within said valve chamber and including a stem and a wear-resistant tip, means connected to said stem to move said stem and said tip toward and away from said seat to control flow therethrough, said stem being threaded on its end for fastening to said tip, said tip having an internal cylindrical recess, characterised in that an annular groove is provided in the surface of said recess, and a sleeve is slidably inserted into said recess and has internal threads which mate with the threads on the stem and has a shank a portion of which is swaged into the groove in said recess to secure said sleeve insert within said recess, the remaining portion of the shank being positioned in said recess.

According to another aspect of the present invention there is provided a replaceable choke tip comprising a tip body having an exterior surface adapted to coact to control flow through a choke, a bore into the end of the tip body opposite to said exterior surface and characterised by an annular groove in said bore spaced inwardly from said surface, and a sleeve slidably inserted into said bore, said sleeve having internal threads and a shank, a portion of which is swaged into said groove to secure said sleeve within said bore.

The invention will be described now by way of example only, with particular reference to the accompanying drawings. In the drawings:

Figure 1 is a sectional view of the improved choke of the present invention;

Figure 2 is a sectional view of the improved replaceable wear-resistant tip of the present invention;

Figure 3 is a sectional view of the improved tip with its sleeve insert secured therein; and

Figure 4 is a sectional view of the improved tip secured onto the threaded end of the stem.

Description of the Preferred Embodiments

A choke 10 is illustrated in Figure 1 and includes body 12 with inlet 14 and outlet 16 communicating through body 12 into interior valve chamber 18. Valve seat 20 is positioned within valve chamber 18 in position surrounding the opening of outlet 16 into valve chamber 18. Valve seat 20 is suitably secured as by threading within outlet 16 and includes flange 22 which engages surface 24 of counterbore 26 in the opening of outlet 16 into valve chamber 18 and wear-resistant seat insert 28.

Valve member 30 includes stem 32 extending through opening 34 in body 12 and through sleeve 36 which is secured therein by clamp ring 38. The portion of stem 32 within sleeve 36 is threaded into the threads on the interior of sleeve 36 and is moved by handwheel 40 rotating stem 32 and because of its threaded engagement within sleeve 36 causes valve member 30 to move toward and away from valve seat 20 to control flow therethrough. Tip 42 is secured to the inner end of valve member 30.

Tip 42 is a wear-resistant replaceable unit and, as shown in FIGURE 2, includes body 44 which has a tapered conical surface 46 to coact with valve seat insert 28. A suitable material for tip 42 is tungsten carbide. A means is provided for securing tip 42 onto the threaded end of stem 32. Such securing means includes sleeve 48 which has outer flange 50, shank portion 52 and internal threads 54. Tip body 44 includes bore 56 in its end opposite surface 46 with counterbore 58 to provide surface 60 surrounding bore 56. Groove 62 is provided in the interior of bore 56. Sleeve 48 is positioned within bore 56 with flange 50 in engagement with surface 60. Shank portion 52 is swaged into groove 62 to secure sleeve 48 in its position as shown in FIGURE 3.

Such securing means provides the securing of tip 42 on stem 32 by threading threaded pin 64 of stem 32 into sleeve threads 54. The end of stem 32 includes radial flange 66 providing annular surface 68 surrounding reduced portion 70 of stem 32 which fits into counterbore 58 as shown in FIGURE 4. Pin 64 which extends beyond portion 70 is threaded into threads 54 of sleeve 48. Assembly of tip body 44 onto stem 32 is complete when flange surface 68 of stem 32 engages end surface 72 of tip body 44. In this position shoulder 74 between pin 64 and reduced portion 70 is positioned a slight distance from engagement with flange 50 of sleeve 48.

It is preferred that sleeve 48 be a product as described above and as provided by the B. F. Goodrich Company under the trademark "Rivut." The material of sleeve 48 should be selected to withstand the conditions to be encountered within

choke 10. Generally, the material of sleeve 48 would preferably be stainless steel.

With the improved tip of the present invention, sleeve 48 can be assembled within tip body 44 at the factory and shipped to a customer's location for use as a replacement of a worn or damaged tip at the point of usage so that it is only necessary to shut down the system and bleed the pressure from choke 10 to disassemble the components and replace the used tip body with a new tip body. No silver brazing or complex assembly is required for this replacement. Also, the improved tip is relatively simple to construct and does not involve the expensive process of having to form internal threads within the tungsten carbide tip.

Claims

1. A choke comprising a body (12) having an internal valve chamber (18) with an inlet (14) and an outlet (16) communicating through the body into the valve chamber, a seat (20) positioned within said valve chamber surrounding the opening of the outlet into the valve chamber, a valve member (30) positioned within said valve chamber and including a stem (32) and a wear-resistant tip (42), means (40) connected to said stem to move said stem and said tip toward and away from said seat to control flow therethrough, said stem (32) being threaded on its end for fastening to said tip (42), said tip (42) having an internal cylindrical recess (56), characterised in that an annular groove (62) is provided in the surface of said recess, and a sleeve (48) is slidably inserted into said recess and has internal threads (54) which mate with the threads on the stem (32) and has a shank (52) a portion of which is swaged into the groove (62) in said recess to secure said sleeve insert within said recess, the remaining portion of the shank being positioned in said recess.
2. A choke according to claim 1 wherein said wear-resistant tip (42) is formed from tungsten carbide.
3. A choke according to claim 1 wherein said sleeve insert (48) includes an outwardly extending flange (50) positioned against the surface surrounding the tip recess.
4. A choke according to claim 1 wherein said stem (32) includes a radial flange (66) surrounding the threaded end to provide a radially extending annular surface for engaging the surface of said tip (42) surrounding the internal cylindrical recess therein.



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Valve member 30 includes stem 32 extending through opening 34 in body 12 and through sleeve 36 which is secured therein by clamp ring 38. The portion of stem 32 within sleeve 36 is threaded into the threads on the interior of sleeve 36 and is moved by handwheel 40 rotating stem 32 and because of its threaded engagement within sleeve 36 causes valve member 30 to move toward and away from valve seat 20 to control flow therethrough. Tip 42 is secured to the inner end of valve member 30.

Tip 42 is a wear-resistant replaceable unit and, as shown in FIGURE 2, includes body 44 which has a tapered conical surface 46 to coact with valve seat insert 28. A suitable material for tip 42 is tungsten carbide. A means is provided for securing tip 42 onto the threaded end of stem 32. Such securing means includes sleeve 48 which has outer flange 50, shank portion 52 and internal threads 54. Tip body 44 includes bore 56 in its end opposite surface 46 with counterbore 58 to provide surface 60 surrounding bore 56. Groove 62 is provided in the interior of bore 56. Sleeve 48 is positioned within bore 56 with flange 50 in engagement with surface 60. Shank portion 52 is swaged into groove 62 to secure sleeve 48 in its position as shown in FIGURE 3.

Such securing means provides the securing of tip 42 on stem 32 by threading threaded pin 64 of stem 32 into sleeve threads 54. The end of stem 32 includes radial flange 66 providing annular surface 68 surrounding reduced portion 70 of stem 32 which fits into counterbore 58 as shown in FIGURE 4. Pin 64 which extends beyond portion 70 is threaded into threads 54 of sleeve 48. Assembly of tip body 44 onto stem 32 is complete when flange surface 68 of stem 32 engages end surface 72 of tip body 44. In this position shoulder 74 between pin 64 and reduced portion 70 is positioned a slight distance from engagement with flange 50 of sleeve 48.

It is preferred that sleeve 48 be a product as described above and as provided by the B. F. Goodrich Company under the trademark "Rivut." The material of sleeve 48 should be selected to withstand the conditions to be encountered within

choke 10. Generally, the material of sleeve 48 would preferably be stainless steel.

With the improved tip of the present invention, sleeve 48 can be assembled within tip body 44 at the factory and shipped to a customer's location for use as a replacement of a worn or damaged tip at the point of usage so that it is only necessary to shut down the system and bleed the pressure from choke 10 to disassemble the components and replace the used tip body with a new tip body. No silver brazing or complex assembly is required for this replacement. Also, the improved tip is relatively simple to construct and does not involve the expensive process of having to form internal threads within the tungsten carbide tip.

Claims

1. A choke comprising a body (12) having an internal valve chamber (18) with an inlet (14) and an outlet (16) communicating through the body into the valve chamber, a seat (20) positioned within said valve chamber surrounding the opening of the outlet into the valve chamber, a valve member (30) positioned within said valve chamber and including a stem (32) and a wear-resistant tip (42), means (40) connected to said stem to move said stem and said tip toward and away from said seat to control flow therethrough, said stem (32) being threaded on its end for fastening to said tip (42), said tip (42) having an internal cylindrical recess (56), characterised in that an annular groove (62) is provided in the surface of said recess, and a sleeve (48) is slidably inserted into said recess and has internal threads (54) which mate with the threads on the stem (32) and has a shank (52) a portion of which is swaged into the groove (62) in said recess to secure said sleeve insert within said recess, the remaining portion of the shank being positioned in said recess.
2. A choke according to claim 1 wherein said wear-resistant tip (42) is formed from tungsten carbide.
3. A choke according to claim 1 wherein said sleeve insert (48) includes an outwardly extending flange (50) positioned against the surface surrounding the tip recess.
4. A choke according to claim 1 wherein said stem (32) includes a radial flange (66) surrounding the threaded end to provide a radially extending annular surface for engaging the surface of said tip (42) surrounding the internal cylindrical recess therein.

5. A choke according to claim 1 wherein said sleeve insert (48) is formed from stainless steel.
6. A choke according to claim 1 wherein said sleeve insert (48) includes internal threads extending from one end thereof to a shank portion (52) of said insert and a radially extending flange (50) on the end of the shank portion opposite said threaded portion, a counterbore (58) into said tip to provide a radial surface surrounding said bore (56), said sleeve flange (50) engaging said radial surface surrounding said bore.
7. A replaceable choke tip comprising a tip body (44) having an exterior surface adapted to coact to control flow through a choke, a bore (56) into the end of the tip body opposite to said exterior surface and characterised by an annular groove (62) in said bore (56) spaced inwardly from said surface, and a sleeve (48) slidably inserted into said bore, said sleeve having internal threads (54) and a shank (52), a portion of which is swaged into said groove (62) to secure said sleeve (48) within said bore (56).
8. A replaceable choke tip according to claim 7 wherein said tip body (44) is formed from a wear-resistant material.
9. A replaceable choke tip according to claim 7 wherein said tip body (44) is formed from tungsten carbide.
10. A replaceable choke tip according to claim 7 wherein said body (44) includes a counterbore (58) into the tip body around said bore (56) to provide a surface surrounding said bore, and said sleeve (48) includes an outwardly extending flange (50) positioned against said surface surrounding said bore.
11. A replaceable choke tip according to claim 7 wherein said internal threads (54) are selected to mate with threads on a stem on which the tip (42) is to be installed.
12. A replaceable choke tip according to claim 7 wherein said sleeve (48) is formed from stainless steel.

Patentansprüche

1. Drossel mit einem Körper (12), der eine innere Ventilkammer (18) mit einem Einlaß (14) und einem Auslaß (16) hat, die durch den Körper in

die Ventilkammer hinein miteinander verbunden sind, einem Sitz (20), der innerhalb der Ventilkammer angeordnet ist und die Öffnung des Auslasses in die Ventilkammer umgibt, einem Ventiltail (30), das innerhalb der Ventilkammer angeordnet ist und einen Schaft (32) und eine verschleißfeste Spitze (42) aufweist, Mitteln (40), die mit dem Schaft verbunden sind, um den Schaft und die Spitze in Richtung auf den und weg von dem Sitz zu bewegen, um die Strömung dadurch zu regeln, wobei der Schaft (32) an seinem Ende mit Gewindegängen zur Befestigung der Spitze (42) versehen ist, wobei die Spitze (42) einen inneren zylindrischen Rezens (56) hat, dadurch gekennzeichnet, daß eine ringförmige Nut (62) in der Oberfläche des Rezens vorgesehen ist, und eine Buchse (48) verschieblich in den Rezens eingesetzt ist und innere Gewindegänge (54) hat, die den Gewindegängen auf dem Schaft (32) entsprechen und einen Schaft (52) hat, wovon ein Bereich in die Nut (62) in dem Rezens eingezogen ist, um den Buchseneinsatz in dem Rezens zu befestigen, wobei der verbleibende Bereich des Schaftes in dem Rezens angeordnet ist.

2. Drossel nach Anspruch 1, wobei die verschleißfeste Spitze (42) aus Wolframkarbid besteht.
3. Drossel nach Anspruch 1, wobei der Buchseneinsatz (48) einen sich nach außen erstreckenden Flansch (50) aufweist, der gegen die Oberfläche angeordnet ist, welche den Rezens der Spitze umgibt.
4. Drossel nach Anspruch 1, wobei der Schaft (32) einen radialen Flansch (66) aufweist, der das mit Gewindegängen versehene Ende umgibt, um eine sich radial erstreckende ringförmige Oberfläche zum Zusammenwirken mit der Oberfläche der Spitze (42) zur Verfügung zu stellen, welche den inneren zylindrischen Rezens darin umgibt.
5. Drossel nach Anspruch 1, wobei der Buchseneinsatz (48) aus rostfreiem Stahl besteht.
6. Drossel nach Anspruch 1, wobei der Buchseneinsatz (48) innere Gewindegänge aufweist, die sich von einem Ende davon zu einem Schaftbereich (52) des Einsatzes erstrecken, und einen sich radial erstreckenden Flansch (50) am Ende des Schaftbereiches gegenüberliegend dem mit Gewindegängen versehenen Bereich, eine zylindrische Senkbohrung (58) in der Spitze, um eine radiale Oberfläche zur Verfügung





zu stellen, welche die Bohrung (56) umgibt, wobei der Buchsenflansch (50) mit der radialen Oberfläche, welche die Bohrung umgibt, zusammenwirkt.

7. Auswechselbare Drosselspitze mit einem Spitzenkörper (44), der eine äußere Oberfläche hat, die dazu angepaßt ist, mit der zu regelnden Strömung durch eine Drossel zusammenzuwirken, einer Bohrung (56) in dem Ende des Spitzenkörpers gegenüberliegend der äußeren Oberfläche und gekennzeichnet durch eine ringförmige Nut (62) in der Bohrung (56), die nach innen von der Oberfläche beabstandet ist, und eine Buchse (48), die verschieblich in die Bohrung eingesetzt ist, wobei die Buchse innere Gewindegänge (54) hat und einen Schaft (52), von dem ein Bereich in die Nut (62) eingezogen ist, um die Buchse (48) innerhalb der Bohrung (56) zu befestigen.
8. Auswechselbare Drosselspitze nach Anspruch 7, wobei der Spitzenkörper (44) aus einem verschleißfesten Material besteht.
9. Auswechselbare Drosselspitze nach Anspruch 7, wobei der Spitzenkörper (44) aus Wolframkarbid besteht.
10. Auswechselbare Drosselspitze nach Anspruch 7, wobei der Körper (44) eine zylindrische Senkbohrung (58) in dem Spitzenkörper um die Bohrung (56) herum aufweist, um eine Fläche zur Verfügung zu stellen, welche die Bohrung umgibt und wobei die Buchse (48) einen sich nach außen erstreckenden Flansch (50) aufweist, der gegen die die Bohrung umgebende Oberfläche angeordnet ist.
11. Auswechselbare Drosselspitze nach Anspruch 7, wobei die inneren Gewindegänge (54) derart ausgewählt sind, daß sie den Gewindegängen auf dem Schaft entsprechen, auf den die Spitze (42) aufgesetzt wird.
12. Auswechselbare Drosselspitze nach Anspruch 7, wobei die Buchse (48) aus rostfreiem Stahl besteht.

Revendications

1. Dispositif d'étranglement, comprenant un corps (12) ayant une chambre intérieure (18) de soupape pourvue d'une entrée (14) et d'une sortie (16) communiquant, à travers le corps, avec la chambre de soupape, un siège (20) positionné à l'intérieur de ladite chambre de soupape, entourant l'ouverture de la sortie débouchant

dans la chambre de soupape, un élément (30) de soupape positionné à l'intérieur de ladite chambre de soupape et comprenant une tige (32) et un cône (42) résistant à l'usure, des moyens (40) reliés à ladite tige de manière à déplacer ladite tige et ledit cône de manière à les approcher et à les éloigner du dit siège, de façon à régler le flux à travers celui-ci, ladite tige (32) étant filetée à son extrémité en vue de fixer ledit cône (42), ledit cône (42) comprenant un chambrage cylindrique intérieur (56), caractérisé en ce qu'une rainure annulaire (62) est prévue à la surface du dit chambrage, et en ce qu'un manchon (48) est inséré de façon coulissante dans ledit chambrage et présente un filetage intérieur (54) qui se conjugue avec le filetage extérieur ménagé sur la tige (32), et comporte un fût (52), dont une partie est refoulée dans la rainure (62) réalisée dans ledit chambrage, de manière à bloquer ledit insert-manchon dans ledit chambrage, la partie restante du fût étant positionnée dans ledit chambrage.

2. Dispositif d'étranglement selon la revendication 1, dans lequel ledit cône (42) résistant à l'usure est réalisé en carbure de tungstène.
3. Dispositif d'étranglement selon la revendication 1, dans lequel ledit insert-manchon (48) comprend une collerette (50) s'étendant vers l'extérieur, se plaçant en appui sur la surface entourant le chambrage du cône.
4. Dispositif d'étranglement selon la revendication 1, dans lequel ladite tige (32) comprend une collerette radiale (66) entourant l'extrémité filetée, de manière à constituer une surface annulaire s'étendant radialement, destinée à entrer en engagement avec la surface du dit cône (42), entourant le chambrage cylindrique intérieur réalisé dans celui-ci.
5. Dispositif d'étranglement selon la revendication 1, dans lequel ledit insert-manchon (48) est réalisé en acier inoxydable.
6. Dispositif d'étranglement selon la revendication 1, dans lequel ledit insert-manchon (48) comprend un filetage intérieur s'étendant depuis une extrémité de l'insert vers une partie (52) de fût du dit insert, et une collerette (50) s'étendant radialement, située à l'extrémité de la partie de fût, qui est opposée à ladite partie filetée, et comprenant un lamage (58) réalisé dans ledit cône, destiné à constituer une surface radiale entourant ledit lamage (58), ladite collerette (50) du manchon entrant en engage-



ment avec ladite surface radiale entourant ledit alésage.

7. Cône d'étranglement remplaçable, comprenant un corps (44) de cône ayant une surface extérieure adaptée pour agir de manière à régler le débit passant à travers un dispositif d'étranglement, un alésage (56) ménagé dans l'extrémité du corps du cône, qui est opposée à ladite surface extérieure, et caractérisé par une rainure annulaire (62) réalisée dans ledit alésage (56), espacée vers l'intérieur par rapport à ladite surface, et un manchon (48) inséré de façon coulissante dans ledit alésage, ledit manchon présentant un filetage intérieur (54) et un fût (52) dont une partie est refoulée dans ladite rainure (62) de manière à bloquer ledit manchon (48) à l'intérieur du dit alésage (56). 5
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- Cône d'étranglement remplaçable selon la revendication 7, dans lequel ledit corps (44) du cône est réalisé en une matière résistant à l'usure. 20
9. Cône d'étranglement remplaçable selon la revendication 7, dans lequel ledit corps (44) du cône est réalisé en carbure de tungstène. 25
10. Cône d'étranglement remplaçable selon la revendication 7, dans lequel ledit corps (44) comprend un lamage (58) ménagé dans le corps du cône, autour du dit alésage (56), de manière à constituer une surface entourant ledit alésage, et dans lequel ledit manchon (48) comprend une collerette (50) s'étendant vers l'extérieur, positionnée en appui sur ladite surface entourant ledit alésage. 30
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- Cône d'étranglement remplaçable selon la revendication 7, dans lequel ledit filetage intérieur (54) est sélectionné de manière à se conjuguer avec un filetage réalisé sur une tige, sur laquelle le cône (42) doit être installé. 40
12. Cône d'étranglement remplaçable selon la revendication 7, dans lequel ledit manchon (48) est réalisé en acier inoxydable. 45

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