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(54) **Valve assembly, for use with a straight-cylinder having a gas-compression chamber.**

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Description

This invention pertains to valves, i.e., gas-control valves, and valve assemblies for use in, and in combination with, straight-cylinder, gas-compression chambers, and in particular to such valves and valve assemblies in which the same are configured for confinement within such straight-cylinder, gas-compression chambers, but one configuration of valve serves for either gas inlet or gas discharge, and said one valve configuration is piston-ringed in order that the same serves as well as a gas-compressing piston when reciprocably disposed within such an aforesaid cylinder.

Prior art gas compressors, typically, employ both inlet and discharge valves, and gas compressing pistons, and commonly the valves are externally mounted to the gas-compressing chamber. DE-C-688429 discloses the combination of a gas-control valve and a straight cylinder, gas compression chamber having end closures, said gas-control valve being reciprocally confined within, and sealingly engaged with the inner surface of the gas-compression chamber.

It is an object of this invention to set forth a novel valve assembly, for use in combination with a straight-cylinder, gas-compression chamber, in which the discharge valve embodiments thereof serve, as well, as gas-compressing pistons.

It is also an object of this invention to disclose a gas-control valve, in combination with a straight-cylinder, gas-compression chamber, which serves as either gas inlet or gas discharge, and which is piston-ringed, or otherwise peripherally sealed with replaceable seals, to function, also, as a gas-compressing piston.

Particularly it is an object of this invention to set forth the combination of a gas-control valve and a straight-cylinder, gas-compression chamber having end closures, the gas control valve being reciprocably confined within, and sealingly engaged with the inner surface of, said gas-compression chamber, characterized in that the combination further comprises:

a ported valve seat;

a ported valve guard;

a ported valve plate interposed between said seat and guard and

a bolt for mounting of said seat guard and plate thereon, having (a) external threads formed thereon, and (b) an annular shoulder formed thereabout; wherein

said seat guard, and plate are centrally apertured;

said guard is set about said bolt and against said shoulder

said seat is (a) internally threaded, (b) threadedly engaged with said bolt threads, and (c) has replaceable sealing means engaged with the periphery thereof:

said seat and guard are circular; and including

a dampening plate interposed between said valve plate and said valve guard and wherein

said valve guard and said dampening plate have mutually confronting peripheral surfaces;

said peripheral surface of said guard is circular; and

said peripheral surface of said dampening plate is trochoidal.

Another object of this invention is to set forth the combination of a gas-control valve and a straight-cylinder, gas-compression chamber having centrally threaded end closures, the gas-control valve being confined within said gas-compression chamber and sealingly engaged with the inner surface of said chamber, the combination further comprising:

a ported valve seat;

a ported valve guard;

a ported valve plate interposed between said seat and guard and

a bolt for mounting of said seat guard and plate thereon, having (a) external threads formed thereon, and (b) an annular shoulder formed thereabout; wherein

said seat, guard, and plate are centrally apertured;

said guard is set about said bolt and against said shoulder;

said seat is (a) internally threaded, (b) threadedly engaged with said bolt threads, and (c) has replaceable sealing means engaged with the periphery thereof; and

said bolt is threadedly engaged with one of said centrally-threaded end closures of said chamber.

Yet another object of this invention is to disclose a valve assembly for use in combination with an straight-cylinder, gas-compression chamber comprising:

a bolt;

said bolt having (a) external threads formed thereon at opposite ends thereof, and (b) annular shoulders formed thereabout, intermediate said threaded, opposite ends;

a pair of ported valve seats;

a pair of ported valve guards; and

a pair of ported valve plates; wherein

each seat and guard has one of said valve plates interposed therebetween;

said seats, guards and valve plates are centrally apertured;

each guard is set about said bolt, and against one of said shoulders; and

each seat is (a) internally threaded, (b) threadedly engaged with one of said opposite ends of said bolt and (c) has replaceable sealing means engaged with the periphery thereof; wherein

said seats and guards are circular; and including

a dampening plate interposed between each said valve plate and valve guard;

each said valve guard and dampening plate have mutually confronting, peripheral surfaces;

said peripheral surface of each of said guards is circular; and

said peripheral surface of each of said dampening plates is trochoidal.

Further objects of this invention, as well as the novel features thereof, will become more apparent by reference to the following description, taken in conjunction with the accompanying figures, in which:

Figure 1 is a perspective, partially cross-sectioned illustration of a straight -cylinder, gas-compression chamber, in which the novel valves and valve assemblies are confined;

Figure 2 is a perspective, exploded view of the novel valve assembly, albeit showing but one of the two discharge valves thereof;

Figure 3A is a perspective, exploded view of one of the inlet gas-control valves;

Figure 3B shares the view of Figure 3A, representing the other of the inlet gas -control valves; figures 2, 3A and 3B also being partially cross-sectioned;

Figure 4 is a plan view of the valve plate and dampening plate of the novel valve; and

Figure 5 is an enlarged, cross-sectional view, taken through a limited, center portion of a discharge valve according to the invention.

As shown in Figure 1, a straight cylinder 10 defines therewithin a gas-comprssion chamber 12. Ends of the cylinder have centrally-threaded end closures 14 and 16. The end closures are held fast to the ends of the cylinder 10 by means of tie bolts 18 (only two of the four thereof being visible). The cylinder 10 has gas inlet ports 20 formed therein for admission of gas via inlet conduits 22 (shown only in phantom). The cylinder also has a gas discharge port 24 formed therein intermediate the ends thereof.

End closure 14 threadedly receives the central bolt of an inlet valve 26, whereas end closure 16 threadedly receives the central bolt of an inlet valve 28. Therebetween, reciprocably mounted within the chamber 12, is the novel valve assembly 30.

Figure 2 shows the valve assembly 30 in greatly englarged detail. It comprises a bolt 32 which is hollow, and which has external threads formed thereon at opposite ends thereof. The assembly comprises a pair of valve sets 33; as one is identical to the other, only one such set is shown. The bolt 32 has shoulders 34 formed thereabout, and spaced apart, adjacent to the opposite ends thereof. Assembled, each shoulder 34 receives a ported, valve guard 36 thereagainst, the guard being centrally apertured. The guard 36 has a peripheral wall 38 in which is received a dampening plate 40. Compression springs 42, which are nested in blind holes 44 formed in the guard 36, bear against the underside of the dampening plate. A guide ring 46, which has a reduced diameter portion 46a at one end thereof, is received in the apertured center of the dampening plate 40. Ring 46 is provided to limit the lift of the dampening plate 40. Set about the bolt 32 is a valve plate 48, it too being centrally apertured, slidably to receive the guide ring therewithin. Compression springs 50, which also are nested in blind holes 52 formed in the guard 36, are in penetration of holes 54 formed therefor in the dampening plate 40, and bias the valve plate 48 away from the guard 38. The dampening plate 40, biased away from the guard 36 by springs 42, cooperates with the springs 50 to dampen an impact of the valve plate 48 with the guard 36. Plate 40 intercepts plate 48 when the latter closes toward guard 36. A centrally apertured and threaded valve seat 56 is threadedly engaged with the threads at one end of the bolt 32. With its threaded engagement with the bolt 32, the seat 56 clamps together the guard 36, plate 40, guide ring 46, and valve plate 48; too, it holds in position a rider ring 58 which is set about the wall 38 and against a lip 60 which circumscribes the guard, 36.

The guide ring 46 keeps the dampening plate 40 distanced from the valve seat 56, however the plate 48 freely translates along the outer surface of the ring 46. The ring 46 sets against the seat 56 at one end thereof, and the opposite end of ring 46 sets against the guard 36. An outer shoulder 46b, formed on the ring 46, limits the lift of the plate 40 to the minimal depth of the reduced diameter portion 46a, in that the plate 40 closes against the shoulder 46b.

As is quite conventional, and as can be seen in the figures, and in particular Figure 5, the guard 36, dampening plate 40 and valve plate 48, have mutually aligned ports formed therein to permit the flow of gas directly therethrough. The valve seat 56, too, is ported; however the ports therein are not in alignment with the ports in guard 36, plate 40, and plate 48. Rather, the ports in valve seat 56 are occluded by the plate 48. Plate 48 must remove from the seat 56 to permit fluid flow through the seat 56. When When assembly 30 translates to the right (with reference to Figure 1) a gas pressure, built up in the chamber 12 between Assembly 30 and inlet valve 28, causes plate 48 to remove from the seat 56; this allows the pressured gas to pass through the aforesaid porting in plate 48, plate 40 and guard 36, for exit thereof through the discharge port 24. When the assembly 30 translates to the left (Figure 1), the plate 48 closes against the seat 56 and, consequently, a vacuum pressure is created between assembly 30 and inlet valve 28. This causes an ingestion of gas, via port 20, into chamber 12. Valve assembly 30, with both valve sets 33 emplaced thereon, is reciprocable in chamber 12 and, consequently, one of the sets 33 is closed while the other is open to the flow therethrough of gas. Bolt 32 is threaded internally, at 62, threadedly

to receive the threaded end of a piston rod 64. The latter is so-called, in that the valve assembly 30 functions as a dual-headed piston. The valve seat 56 has a pair of grooves 66 formed therein and thereabout. The grooves 66 receive piston rings 68 herein to effect a sealing engagement thereof with the inner surface of the chamber 12. By this expedient, with identical valve sets 33 on opposite ends of the bolt 32, the valve sets serve as the pistons, and are wholly confined within the chamber, functioning as well as the discharge valves. An alignment pin 69 is received in holes provided therefor in guard 36 and seat 56, at ends of the pin 69, and the pin penetrates the plates 40 and 48, to keep all cited components properly aligned.

In Figures 3A and 3B, same or similar index numbers, as those shown in Figure 1 and 2, denote same or similar elements.

Figure 3A depicts an inlet valve which is received in the end closure 16, and it is identical, in all respects except one, to valve set(s) 33 of Figure 2. Instead of bolt 32, it has a bolt 32a. The latter is of short length and is hollow. The hollow interior accommodates the reciprocation of the piston rod 64. The porting of components shown in Figure 3A is such (and, again, identical to the valve sets 33) as to close against the flow of gas as the valve assembly 30 approaches, and to open as the valve assembly moves away therefrom.

In Figure 3B is depicted another inlet valve, albeit the one received in the end closure 14. Save for the central bolt 32b, it too is identical to valve sets 33. Whereas bolt 32a of Figure 3A is hollow, to receive the piston rod 64, bolt 34b is of solid cross-section. For simplicity, Figures 3A and 3B share the depiction of the components of each inlet valve; the only difference therebetween reside in the center bolts 32a (Figure 3A) and 32b (Figure 3B). They are otherwise identical.

Figure 4 illustrates a particularly novel feature of the valve sets 33, the same being a plan view of the dampening plate 40 and valve guard 36. The inner periphery fo the wall 38 is truly circular, whereas the confronting periphery of the dampening plate is trochoidal. Consequently, chordal voids 70 are formed between the aforesaid peripheries to enhance gas flow therethrough. The voids 70 present large, open areas, between the peripheral wall 38 of guard 36 and the plate 40, to allow gas to course freely therethrough into the outermost ports in guard 36. The trochoidal configuration of the dampening plate 40 defines portions of the plate with relatively narrow and wide sectors. The holes 54, provided in plate 40 for the springs 50, are formed in the wider sectors of the plate, as shown in Figure 4.

Claims

1. The combination of a gas-control valve (30) and a straight-cylinder, gas-compression chamber (12) having end closures (14, 16), the gas control valve being reciprocably confined within, and sealingly engaged with the inner surface of, said gas-compression chamber, characterized in that the combination further comprises:

   a ported valve seat (56);

   a ported valve guard (36);

   a ported valve plate (48) interposed between said seat (56) and guard (36); and

   a bolt (32), for mounting of said seat (56), guard (36) and plate (48) thereon, having (a) external threads formed thereon, and (b) an annular shoulder (34) formed thereabout; wherein

   said seat (56), guard (36), and plate (48) are centrally apertured;

   said guard (36) is set about said bolt (32), and against said shoulder (34);

   said seat (56) is (a) internally threaded, (b) threadedly engaged with said bolt threads, and (c) has replaceable sealing means (68) engaged with the periphery (66) thereof:

   said seat (56) and guard (36) are circular; and including

   a dampening plate (40) interposed between said valve plate (48) and said valve guard (36); and wherein

   said valve guard (36) and said dampening plate (40) have mutually confronting peripheral surfaces;

   said peripheral surface of said guard (36) is circular; and

   said peripheral surface of said dampening plate (40) is trochoidal.

2. A combination according to claim 1, wherein:

   said valve seat (56) has a plurality of grooves formed therein and about the periphery thereof; and

   piston rings (68) are set in said grooves.

3. A combination according to claim 1, wherein:

   said bolt (32) is hollow.

4. A combination according to claim 1, wherein:

   said bolt (32) is hollow, and has internal threads formed therein.

5. A combination according to claim 4, further including:

   a piston rod (64), threaded at an end thereof, threadedly engaged with said internal threads of said hollow bolt (32), and in penetration of one of said end closures (14, 16).

6. A combination according to claim 1, further including:

means interposed between said valve guard (36) and said valve plate (48) biasing said valve plate (48) toward said valve seat (56); and

said biasing means is in penetration of said dampening plate (40).

7. The combination of a gas-control valve (26,28) and a straight-cylinder, gas-compression chamber (12) having centrally-threaded end closures (14, 16), the gas-control valve being confined within said gas-compression chamber (12) and sealingly engaged with the inner surface of said chamber (12), the combination further comprising:

a ported valve seat (56);

a ported valve guard (36);

a ported valve plate (48) interposed between said seat (56) and guard (36); and

a bolt (32), for mounting of said seat (56), guard (36) and plate (48) thereon, having (a) external threads formed thereon, and (b) an annular shoulder (34) formed thereabout; wherein

said seat (56), guard (36), and plate (48) are centrally apertured;

said guard (36) is set about said bolt (32), and against said shoulder (34);

said seat (56) is (a) internally threaded, (b) threadedly engaged with said bolt threads, and (c) has replaceable sealing means (68) engaged with the periphery thereof; and

said bolt (32) is threadedly engaged with one of said centrally-threaded end closures of said chamber (12).

8. A combination according to claim 7, wherein:

said bolt (32) is hollow.

9. A combination according to claim 7, wherein:

said bolt (32) is solid in cross-section.

10. A valve assembly (30), for use in combination with a straight-cylinder, gas-compression chamber (12), comprising:

a bolt (32);

said bolt (32) having (a) external threads formed thereon at opposite ends thereof, and (b) annular shoulders (34) formed thereabout, intermediate said threaded, opposite ends;

a pair of ported valve seats (56);

a pair of ported valve guards (36); and

a pair of ported valve plates (48); wherein

each seat (56) and guard (36) has one of said valve plates (48) interposed therebetween;

said seats (56), guards (36) and valve plates (48) are centrally apertured;

each guard (36) is set about said bolt (32), and against one of said shoulders (34); and

each seat (56) is (a) internally threaded, (b) threadedly engaged with one of said opposite ends of said bolt (32), and (c) has replaceable sealing means (68) engaged with the periphery thereof; wherein

said seats (56) and guards (36) are circular; and including

a dampening plate (40) interposed between each said valve plate (48) and valve guard (36);

each said valve guard (36) and dampening plate (40) have mutually confronting, peripheral surfaces;

said peripheral surface of each of said guards (36) is circular; and

said peripheral surface of each of said dampening plates (40) is trochoidal.

11. A valve assembly (30), according to claim 10, wherein:

said bolt (32) is hollow, and has threads formed therein.

Patentansprüche

1. Die Kombination aus einem Gas-Steuerventil (30) und einem geraden Zylinder mit Gaskompressionskammer (12) mit Endverschlüssen (14, 16), in der das Gassteuerventil hin- und herbewegbar eingeschlossen ist und dichtend mit der inneren Oberfläche der Gaskompressionskammer im Eingriff steht, dadurch gekennzeichnet, daß die Kombination weiterhin folgendes umfaßt:
einen mit Öffnung versehenen Ventilsitz (56);
einen mit Öffnung versehenen Ventilanschlag (36);
eine mit Öffnung versehene Ventilplatte (48), die zwischem dem Sitz (56) und dem Anschlag (36) gelegen ist;
und einen Schraubenbolzen (32) zum Befestigen des Sitzes (56), des Anschlages (36) und der Platte (48) auf ihm mit (a) äußeren Gewinden, die auf ihm ausgeformt sind, und (b) einer ringförmigen Schulter (34), die um ihn herum ausgeformt ist; wobei
der Sitz (56), der Anschlag (36) und die Platte (48) zentral geöffnet sind;
der Anschlag (36) um den Bolzen (32) gesetzt ist und gegen die Schulter (34) anstößt;
der Sitz (56) (a) innen mit Gewinde versehen ist, (b) durch Schrauben mit den Bolzengewinden im Eingriff steht und (c) ersetzbare Dichtungseinrichtungen (68) hat, die mit seinem Umfang (66) im Eingriff stehen;
der Sitz (56) und der Anschlag (36) kreisförmig sind und eine Dämpfungsplatte (40), die zwi-

schen der Ventilplatte (48) und dem Ventilanschlag (36) gelegen ist, einschließen;und
der Ventilanschlag (36) und die Dämpfungsplatte (40) sich einander gegenüberliegende Umfangsoberflächen aufweisen;
die Umfangsfläche des Anschlages (36) kreisförmig ist und
die Umfangsoberfläche der Dämpfungsplatte (40) trochoidenförmig ist.

2. Eine Kombination nach Anspruch 1, bei der in dem Ventilsitz (56) eine Vielzahl von Nuten um seinen Umfang herum ausgeformt ist und Kolbenringe (68) in die Nuten eingesetzt sind.

3. Eine Kombination nach Anspruch 1, bei der der Schraubenbolzen (32) hohl ist.

4. Eine Kombination nach Anspruch 1, bei der der Schaubenbolzen (32) hohl ist und in seinem Inneren Gewinde angeformt hat.

5. Eine Kombination nach Anspruch 4, die weiterhin eine Kolbenstange (64) umfaßt, die an ihrem einen Ende mit Schraubgewinde versehen ist, durch Schrauben mit den Innengewinden des hohlen Schraubenbolzens (32) im Eingriff steht und durch einen der Endverschlüsse (14, 16) hindurchreicht.

6. Eine Kombination nach Anspruch 1, die weiterhin eine Einrichtung umfaßt, die zwischen dem Ventilanschlag (36) und der Ventilplatte (48) gelegen ist, die die Ventilplatte (48) in Richtung auf den Ventilsitz (56) vorspannt, und wobei die Vorspanneinrichtung durch die Dämpfungsplatte (40) hindurchreicht.

7. Die Kombination eines Gassteuerventils (26, 28) und eines geraden Zylinders mit Gaskompressionskammer (12) mit Endverschlüssen (14, 16) mit zentralen Gewinden, bei der das Gassteuerventil innerhalb der Gaskompressionskammer (12) eingeschlossen istund abdichtend mit der inneren Oberfläche der Kammer (12) im Eingriff steht, wobei die Kombination weiterhin folgendes umfaßt:
einen mit Öffnung versehenen Ventilsitz (56);
einen mit Öffnung versehenen Ventilanschlag (36);
eine mit öffnung versehene Ventilplatte (48), die zwischen dem Sitz (56) und dem Anschlag (36) gelegen ist; und
einen Schraubenbolzen (32) zum Befestigen des Sitzes (56), des Anschlags (36) und der Platte (48) auf ihm mit (a) äußeren auf ihm ausgeformten Gewinden und (b) einerum ihn herum ausgeformten ringförmigen Schulter (34); wobei
der Sitz (56), der Anschlag (36) und die Platte (48) mit zentraler Öffnung versehen sind;
der Anschlag (36) um den Bolzen (32) herum eingesetzt ist und gegen die Schulter (34) anstößt;
der Sitz (56) (a) innen mit Gewinde versehen ist, (b) durch Schrauben mit den Schraubengewinden im Eingriff steht und (c) ersetzbare Dichtungseinrichtungen (68) aufweist, die mit seinem Umfang im Eingriff stehen; und
der Bolzen (32) durch Schrauben mit einem der mit zentralem Gewinde versehenen Endverschlüsse der Kammer (12) im Eingriff steht.

8. Eine Kombination nach Anspruch 7, bei der der Bolzen (32) hohl ist.

9. Eine Kombination nach Anspruch 7, bei der der Bolzen (32) im Querschnitt massiv ist.

10. Eine Ventilanordnung (30) für die Verwendung in Kombination mit einem geraden Zylinder mit Gaskompressionskammer (12), umfassend:
einen Schraubenbolzen (32);
wobei auf dem Bolzen (32) (a) Außengewinde an seinen entgegengesetzten Enden ausgeformt sind und (b) ringförmige Schultern (34) um ihn herum zwischen den besagten mit Schraubengewinde versehenen gegenüberliegenden Enden ausgeformt sind;
ein Paar mit Öffnungen versehene Sitze (56);
ein Paar mit Öffnungen versehene Ventilanschläge (36) und ein Paar mit Öffnungen versehene Ventilplatten (48);
wobei zwischen jedem Sitz (56) und Anschlag (36) eine der Ventilplatten (48) eingeschoben gelegen ist;
die Sitze (56), die Anschläge (36) und die Ventilplatten (48) zentral mit Öffnung versehen sind;
jeder Anschlag (36) um den Schraubenbolzen (32) gesetzt ist und gegen eine der Schultern (34) anstößt;
und jeder Sitz (56) (a) mit Innengewinde versehen ist, (b) durch Schrauben mit einem der gegenüberliegenden Enden des Bolzens (32) im Eingriff steht und (c) ersetzbare Dichtungseinrichtungen (68) aufweist, die mit seinem Umfang im Eingriff stehen;
wobei die Sitze (56) und die Anschläge (36) kreisförmig sind und
eine Dämpfungsplatte (40), die zwischen jeder Ventilplatte (48) und Ventilanschlag (36) eingeschoben gelegen ist, einschließen;
jeder Ventilanschlag (36) und die Dämpfungsplatte (40) einander gegenüberliegende Umfangsoberflächen aufweisen;
die Umfangsoberfläche von jedem dieser Anschläge (36) kreisförmig ist und
die Umfangsoberfläche von jeder dieser Dämp-

fungsplatten (40) trochoidenförmig ist.

11. Eine Ventilanordnung (30) nach Anspruch 10, bei der der Bolzen (32) hohl ist und innen in ihm Gewinde ausgeformt sind.

Revendications

1. Combinaison d'une vanne de régulation de gaz (30) et d'une chambre de compression de gaz (12) à cylindre droit ayant des fermetures terminales (14,16), la vanne de régulation de gaz étant confinée alternativement à l'intérieur de ladite chambre de compression de gaz et mise en contact hermétique avec la face interne de ladite chambre de compression de gaz, caractérisée en ce que la combinaison comprend en outre :

- un siège de vanne (56) à orifice;
- une butée de vanne (36) à orifice;
- une plaque de vanne (48) à orifice interposée entre ledit siège (56) et ladite butée (36); et
- un boulon (32) pour le montage dudit siège (56), de ladite butée (36) et de ladite plaque (48) sur celle-ci, ayant (a) des filets mâles formés sur lui, et (b) un épaulement annulaire (34) formé autour de lui ; dans laquelle :
  - . lesdits siège (56), butée (36) et plaque (48) comportent un orifice central ;
  - . ladite butée (36) est positionnée autour dudit boulon (32) et contre ledit épaulement (34) ;
  - . ledit siège (56) est (a) fileté intérieurement, (b) mis en prise par vissage avec lesdits filets de boulon, et (c) a un moyen d'étanchéité remplaçable (68) en contact avec sa périphérie (66) :
  - . ledit siège (56) et ladite butée (36) sont circulaires ; et comprenant :
- une plaque d'amortissement (40) interposée entre ladite plaque de vanne (48) et ladite butée de vanne (36); et dans laquelle :
  - . ladite butée de vanne (36) et ladite plaque d'amortissement (40) ont des surfaces périphériques se faisant face ;
  - . ladite surface périphérique de ladite butée (36) est circulaire ; et
  - . ladite surface périphérique de ladite plaque d'amortissement (40) est trochoïdale.

2. Combinaison selon la revendication 1, dans laquelle :

. ledit siège de vanne (56) a une pluralité de rainures formées dans son intérieur et autour de sa périphérie ; et

. des segments de piston (68) sont positionnés dans lesdites rainures ;

3. Combinaison selon la revendication 1, dans laquelle :

. ledit boulon (32) est creux.

4. Combinaison selon la revendication 1, dans laquelle :

. ledit boulon (32) est creux et a des filets femelles formés dans son intérieur.

5. Combinaison selon la revendication 4, comprenant en outre :

- une tige de piston (64) filetée à l'une de ses extrêmités, mise en prise par vissage avec lesdits filets femelles dudit boulon creux (32) et dans la perforation de l'une desdites fermetures terminales (14, 16).

6. Combinaison selon la revendication 1, comprenant en outre :

- un moyen interposé entre ladite butée de vanne (36) et ladite plaque de vanne (48) faisant revenir ladite plaque de vanne (48) vers ledit siège de vanne (56); et

. ledit dispositif de rappel se trouve dans la perforation de ladite plaque d'amortissement (40).

7. Combinaison d'une vanne de régulation de gaz (26, 23) et d'une chambre de compression de gaz (12) à cylindre droit ayant des fermetures terminales à filetage axial (14,16), la vanne de régulation de gaz étant confinée à l'intérieur de ladite chambre de compression de gaz (12) et en contact hermétique avec la face interne de ladite chambre (12), la combinaison comprenant en outre :

- un siège de vanne (56) à orifice ;
- une butée de vanne (36) à orifice ;
- une plaque de vanne (48) à orifice interposée entre ledit siège (56) et ladite butée (36) ; et
- un boulon (32) pour le montage dudit siège (56), de ladite butée (36) et de ladite plaque (48) sur celle-ci, ayant (a) des filets mâles formés sur lui, et (b) un épaulement annulaire (34) formé autour de lui ; dans laquelle :
  - . ledit siège (56), ladite butée (36) et ladite plaque (48) comportent un orifice central ;
  - . ladite butée (36) est positionée autour dudit boulon (32) et contre ledit épaulement (34) ;
  - . ledit siège (56) est (a) fileté intérieurement, (b) mis en prise par vissage avec

lesdits filets du boulon, et (c) a un moyen d'étanchéité remplaçable (68) en contact avec sa périphérie ; et

. ledit boulon (32) est mis en prise par vissage avec l'une desdites fermetures terminales à filetage axial de ladite chambre (12).

8. Combinaison selon la revendication 7, dans laquelle :

. ledit boulon (32) est creux.

9. Combinaison selon la revendication 7, dans laquelle :

. ledit boulon (32) est plein dans la section transversale.

10. Agencement de vanne (30) pour emploi en combinaison avec une chambre de compression de gaz (12) à cylindre droit, comprenant :

- un boulon (32) ;
- ledit boulon (32) ayant (a) des filets mâles formés sur lui à ses extrêmités opposées, et (b) des épaulements annulaires (34) formés autour de lui, entre lesdites extrêmités filetées opposées ;
- une paire de sièges de vanne (56) à orifice ;
- une paire de butées de vanne (36) à orifice ; et
- une paire de plaques de vanne (48) à orifice ; dans lequel :
  - . chaque siège (56) et chaque butée (36) a l'une desdites plaques de vanne (48) interposée entre eux ;
  - . lesdits sièges (56) ; lesdites butées (36) et plaques de vanne (48) comportent un orifice central ;
  - . chaque butée (36) est positionnée autour dudit boulon (32) et contre l'un desdits épaulements (34) ; et
  - . chaque siège (56) est (a) fileté intérieurement, (b) mis en prise par vissage avec l'une desdites extrêmités opposées dudit boulon (32), et (c) a un moyen d'étanchéité remplaçable (68) en contact avec sa périphérie ; dans lequel :
  - . lesdits sièges (56) et lesdites butées (36) sont circulaires ; et comprenant :
- une plaque d'amortissement (40) interposée entre chacune desdites plaques de vanne (48) et butées de vanne (36) ;
  - . chacune desdites butées de vanne (36) et plaques d'amortissement (40) a des surfaces périphériques se faisant face ;
  - . ladite surface périphérique de chacune desdites butées (36) est circulaire ; et
  - . ladite surface périphérique de chacune desdites plaques d'amortissement (40) est trochoïdale.

11. Agencement de vanne (30), selon la revendication (10,) dans lequel :

. ledit boulon (32) est creux et a des filets formés dans son intérieur.

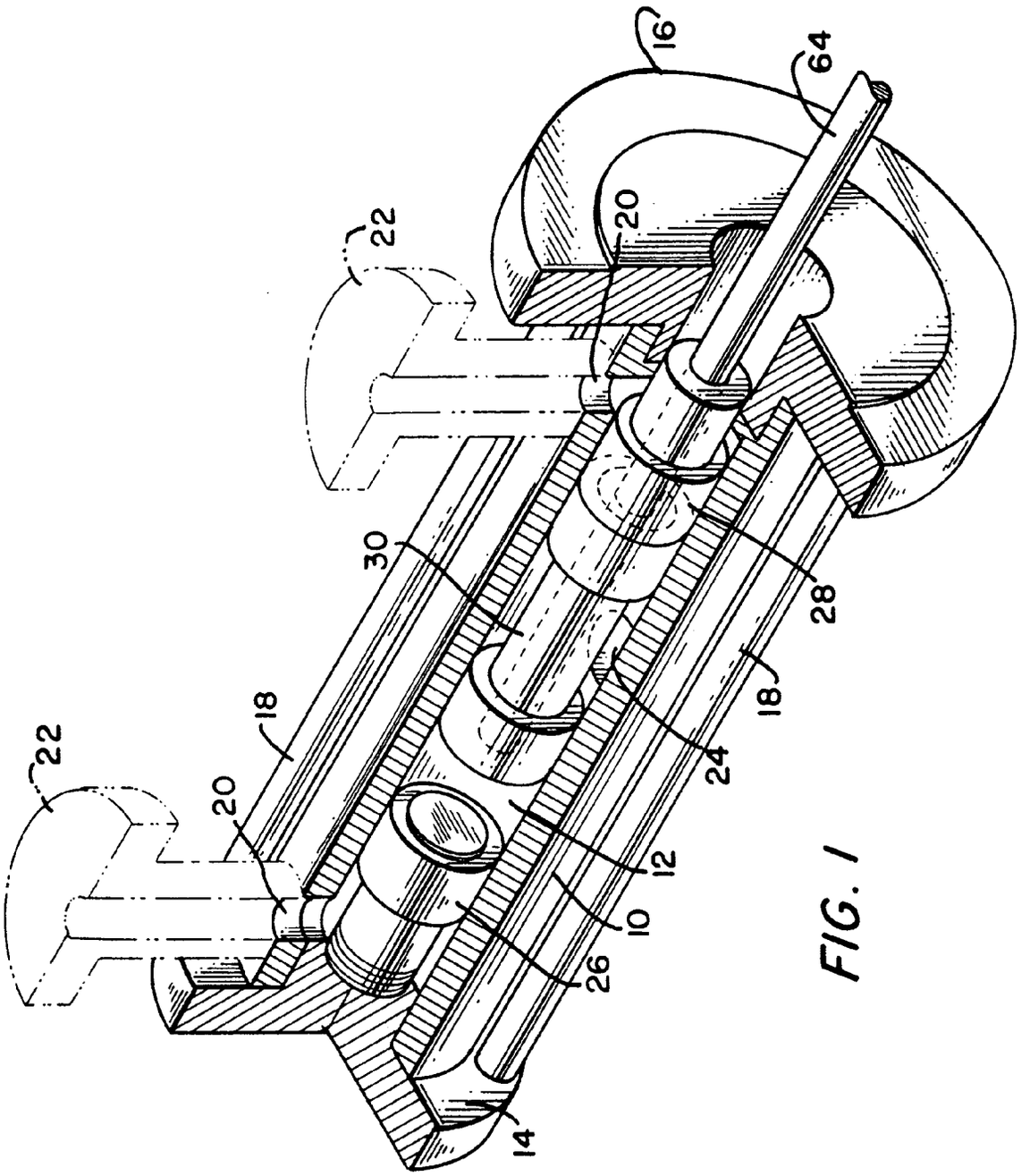
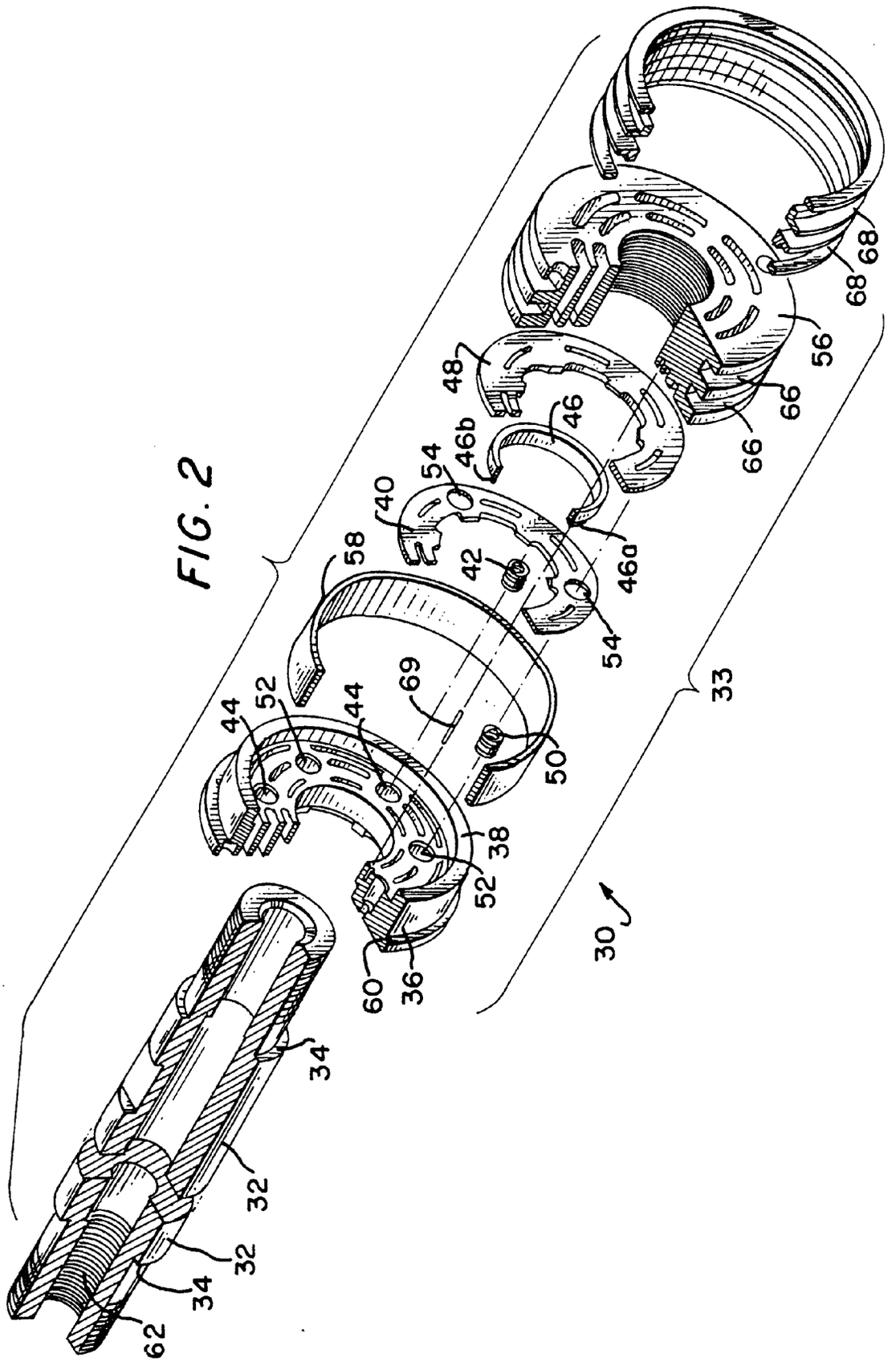


FIG. 1

FIG. 2


62
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46a
46b
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68
33
30

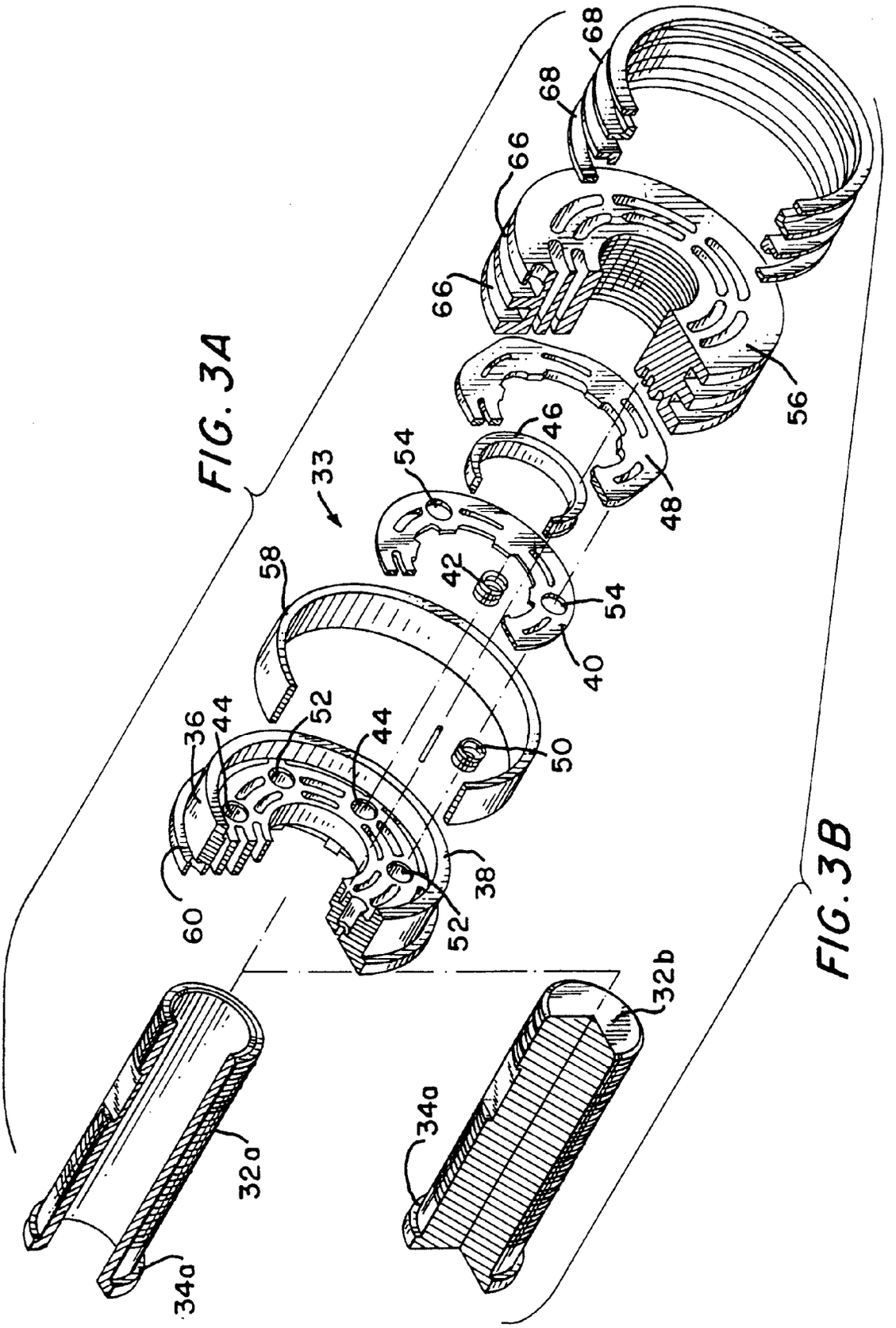
FIG. 3A
FIG. 3B
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32b
34a
32a
34a

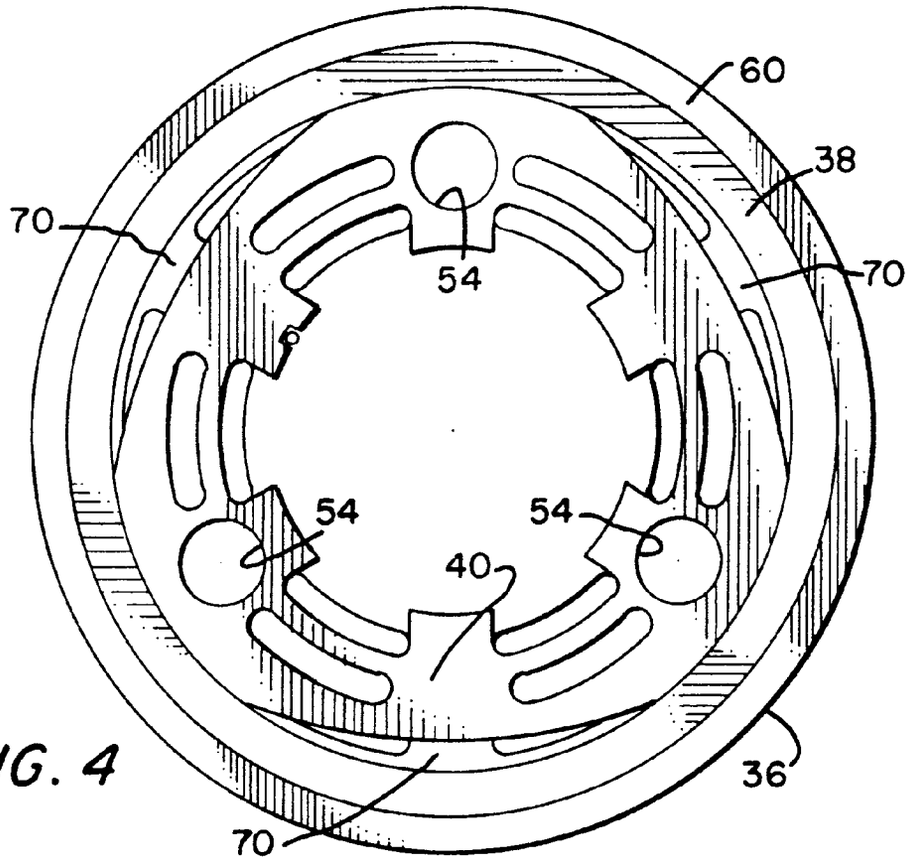

FIG. 4

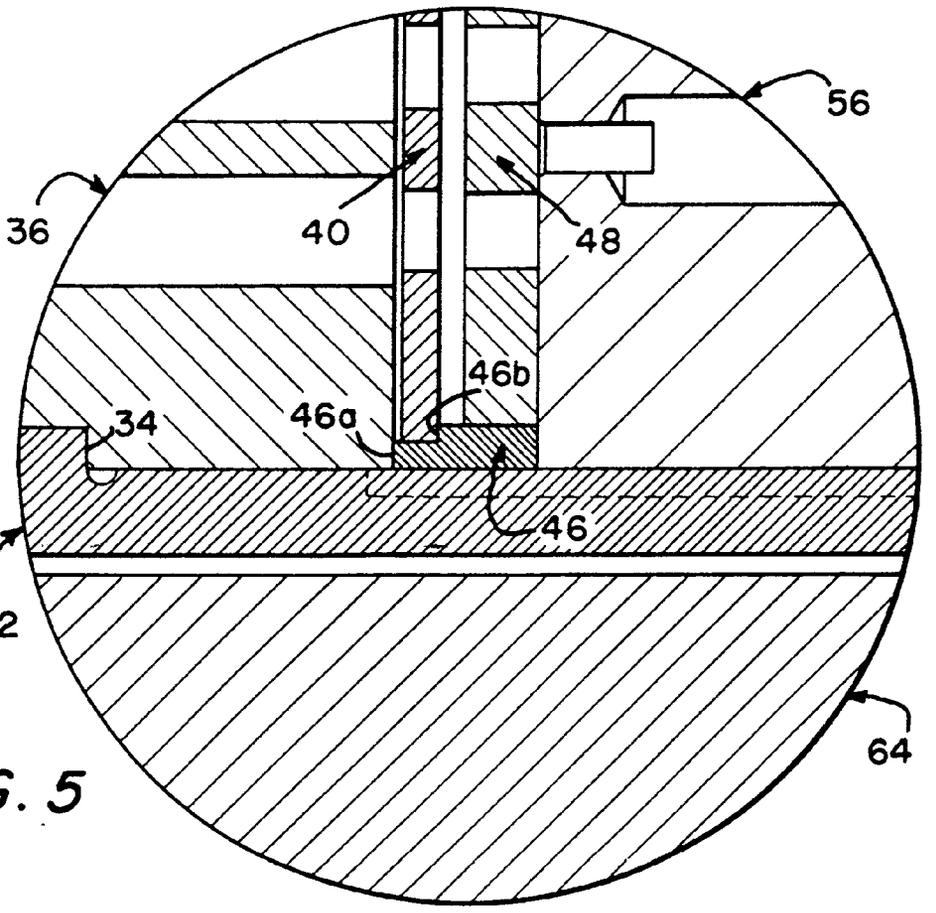

FIG. 5