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(11) Publication number:

**0 498 981 A1**

(12)

**EUROPEAN PATENT APPLICATION**(21) Application number: **91301191.2**(51) Int. Cl.<sup>5</sup>: **F04B 5/00, F04B 3/00**(22) Date of filing: **14.02.91**(43) Date of publication of application:  
**19.08.92 Bulletin 92/34**(84) Designated Contracting States:  
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**Sevenoaks, Kent TN13 2BN(GB)**(54) **Gas compressor.**

(57) The invention provides a gas compressor (10) comprising:

a single, straight, walled cylinder (12) having (a) a longitudinal axis (14), and (b) a single, circumferential wall; and

headers (20, 24) at opposite ends of said cylinder (12); wherein

one of said headers (20) has a tapped hole (28) formed in a surface thereof which opens onto said cylinder (12);

the other of said headers (24) has a tapped bore (38) opening therethrough; and

a first inlet valve (30) threadedly engaged with said tapped hole (28) and confined within said cylinder (12);

a second inlet valve (30a) threadedly engaged with said tapped bore (38) and confined within said cylinder (12);

said second inlet valve (30a) has a throughgoing bore formed therein which is coaxial with said tapped bore (38);

a piston rod (40) in penetration of said bores, and having one end thereof projecting outwardly from said other header (24);

a pair of discharge valves (46, 46a) coupled to said piston rod (40), and spaced apart along said rod (40), confined within said cylinder (12);

gas inlet ports (50, 50a) radially formed in said

cylinder (12) at opposite ends thereof; and  
a gas outlet port (52) formed in said cylinder intermediate said ends thereof.

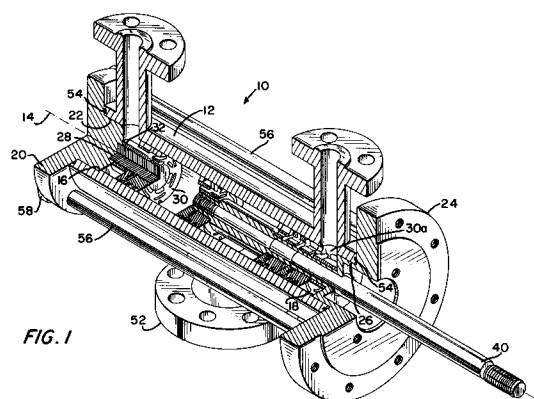


FIG. 1

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This invention pertains to gas compressors, and in particular to a gas compressor of novel design in which the compression cylinder thereof confines therewithin both the inlet and discharge valves, and the latter valves are piston ringed to serve as the gas compressing pistons.

Conventional, prior art gas compressors require inlet and discharge valves, and gas compressing pistons. Too, commonly, the valves are external to the compression cylinder.

It is an object of this invention to set forth a novel gas compressor which obviates any need for separate pistons, and such a compressor of simple, albeit efficient configuration.

Particularly, it is an object of this invention to set forth a gas compressor comprising a cylinder having a longitudinal axis; and headers at opposite ends of said cylinder; wherein one of said headers has a tapped hole formed in a surface thereof which opens onto said cylinder; the other of said headers has a tapped bore opening therethrough; and a first inlet valve threadedly engaged with said tapped hole and confined within said cylinder; a second inlet valve threadedly engaged with said tapped bore and confined within said cylinder; said second inlet valve has a throughgoing bore formed therein which is coaxial with said tapped bore; a piston rod in penetration of said bores, and having an end projecting outwardly from said other header; a pair of discharge valves coupled to said piston rod, and spaced apart along said rod, confined within said cylinder; gas inlet ports formed in said cylinder at opposite ends thereof; and a gas outlet port formed in said cylinder intermediate said ends thereof.

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 illustration of a gas compressor, according to an embodiment of the invention, the same being partly cut away along the axis thereof;

Figure 2 is a perspective illustration of the piston rod assembly of the Figure 1 embodiment, the same also being cut away in part;

Figure 3 is a partly cut away perspective illustration of the cylinder and porting; and

Figures 4 and 5 are cut away depictions of the frame header assembly and outer header assembly, respectively, showing the tie rods and the inlet valves.

As shown in the figures, the novel compressor 10 comprises a straight cylinder 12, having a longitudinal axis 14, with shouldered recesses 16 and 18 at opposite axial ends thereof. An outer header 20, having a prominent, circular land 22 in the

centre thereof, is set, with an O-ring for sealing, into the recess 16. Similarly, a frame header 24, which also has a prominent, circular land 26 in the centre thereof, is set too with an O-ring for sealing, into the recess 18.

The header 20 has a tapped hole 28 formed in the land 22. An inlet valve 30, having a threaded stub 32, is threadedly engaged with the hole 28. Valve 30, of the one-way, check type, has an annular body 34 with piston ring grooves 36 formed thereabout (in which to receive piston rings). The land 26 in the frame header 24 also has a tapped bore 38 formed therein; it threadedly receives a second inlet valve 30a. Valve 30a, however, is centrally bored to accommodate therethrough a piston rod 40.

The piston rod 40 penetrates the tapped bore 38 and is slidably engaged with the central bore in the valve 30a. One end of the piston rod 40 projects outwardly from the header 24, via one end thereof, and into the cylinder 12 via the opposite end thereof. The termination of the in-cylinder end of the rod 40 is threaded; too, intermediate the length of the rod 40 there is a shoulder 42. A tubular spacer 44, internally threaded at one end thereof, and externally threaded at opposite ends thereof, is set against the shoulder 42, and threadedly engaged with the threaded termination of the rod 40. A pair of discharge valves 46 and 46a, the same having annular bodies 48, are centrally threaded and threadedly engaged with external threads of the spacer 44. Valves 46 and 46a, too, are of the one-way, check type, and also have piston ring grooves formed thereabout in which to nest piston rings for sealing against the inner surface of the cylinder 12.

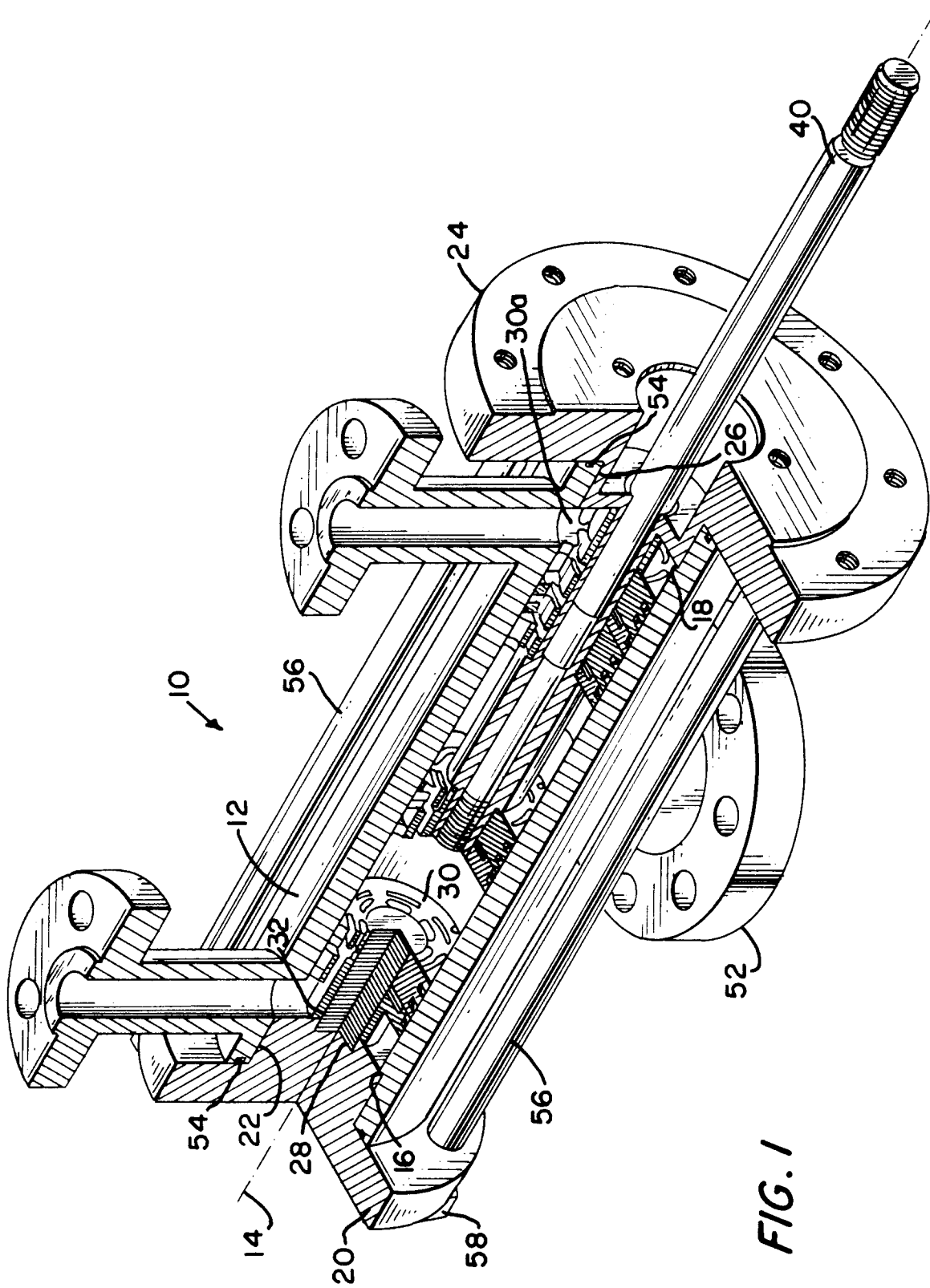
A pair of inlet ports 50 and 50a are formed in the cylinder 12, adjacent to the axial ends thereof, the same opening onto the inlet valves 30 and 30a. Intermediate the length of the cylinder 12 there is also formed a single discharge port 52. Ends of the cylinder 12 abut the headers 20 and 24 and nest, in grooves formed therefor, O-ring seals 54. Tie rods 56, fastened in the header 24, and in penetration of the header 20, receive nuts 58 on the threaded ends thereof and clamp the cylinder 12 and the headers 20 and 24 securely together. Inlet conduits 60 and 60a are welded to the cylinder 12 for communication with the ports 50 and 50a, and a discharge conduit 52 is similarly welded to the cylinder 12 for communication with the discharge port 52.

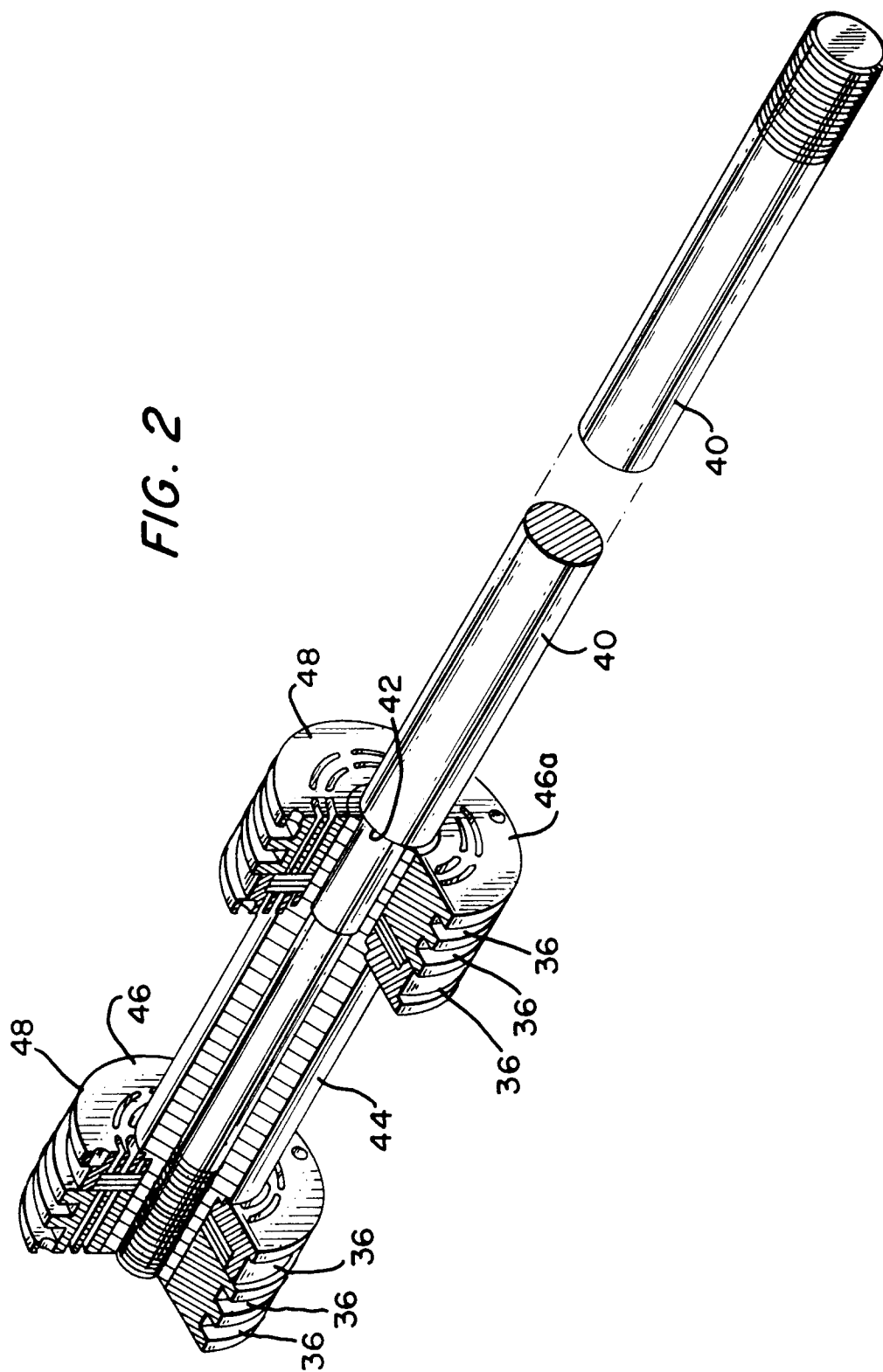
The simplicity of the configuration of the compressor 10, in this embodiment thereof, can readily be seen; the same offers manufacturing and maintenance ease. More significantly, pistons per se are not required, as the valves 46 and 46a serve the double purpose of piston-compression of the gas,

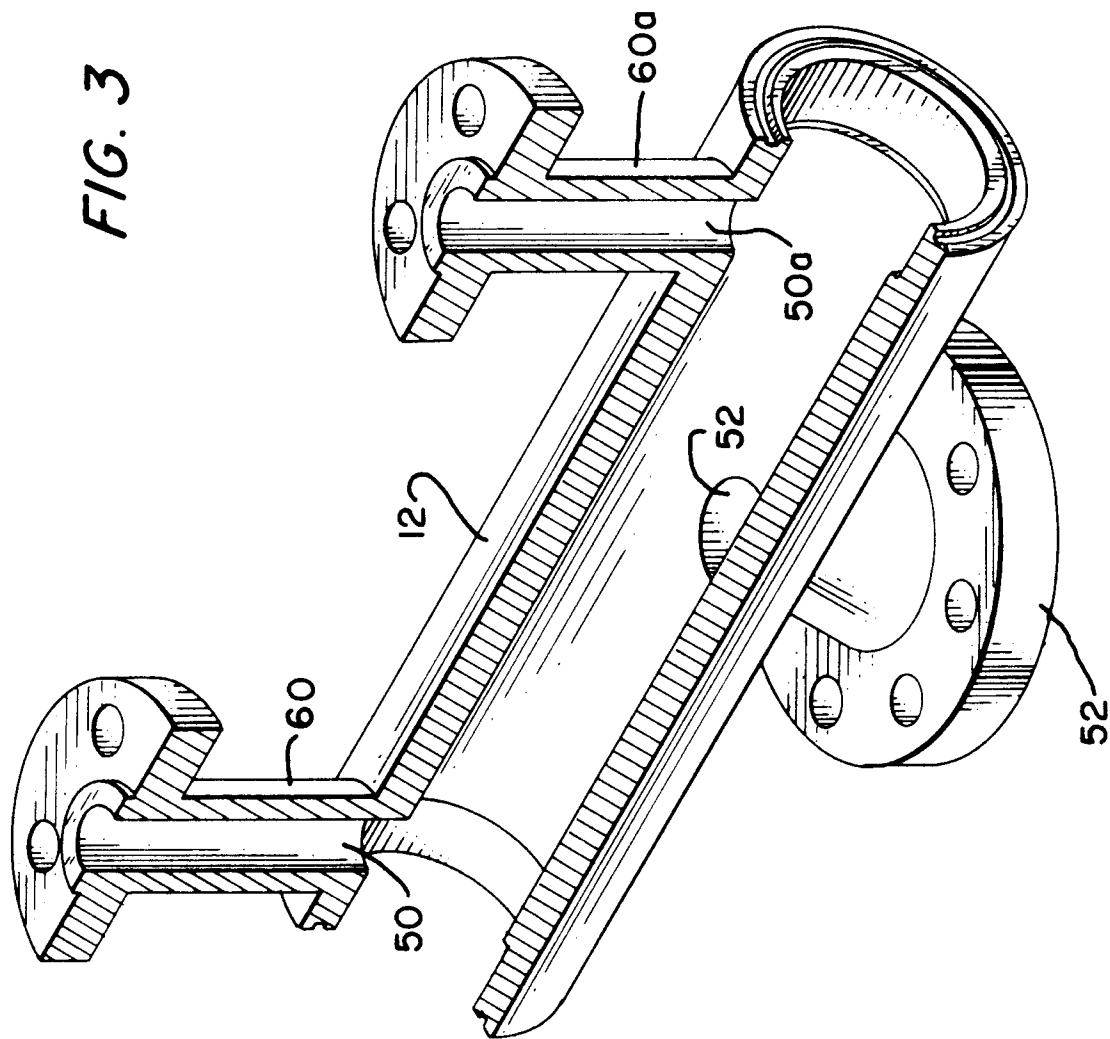
and valved discharge of the compressed gas. Only inlet and discharge ports need to be formed in the cylinder 12, as the valves 30 and 30a, and 46 and 46a are confined within the cylinder. The headers 20 and 24 fit firmly into the ends of the simple, straight cylinder 12, and only tie rods are required to clamp the assembly together.

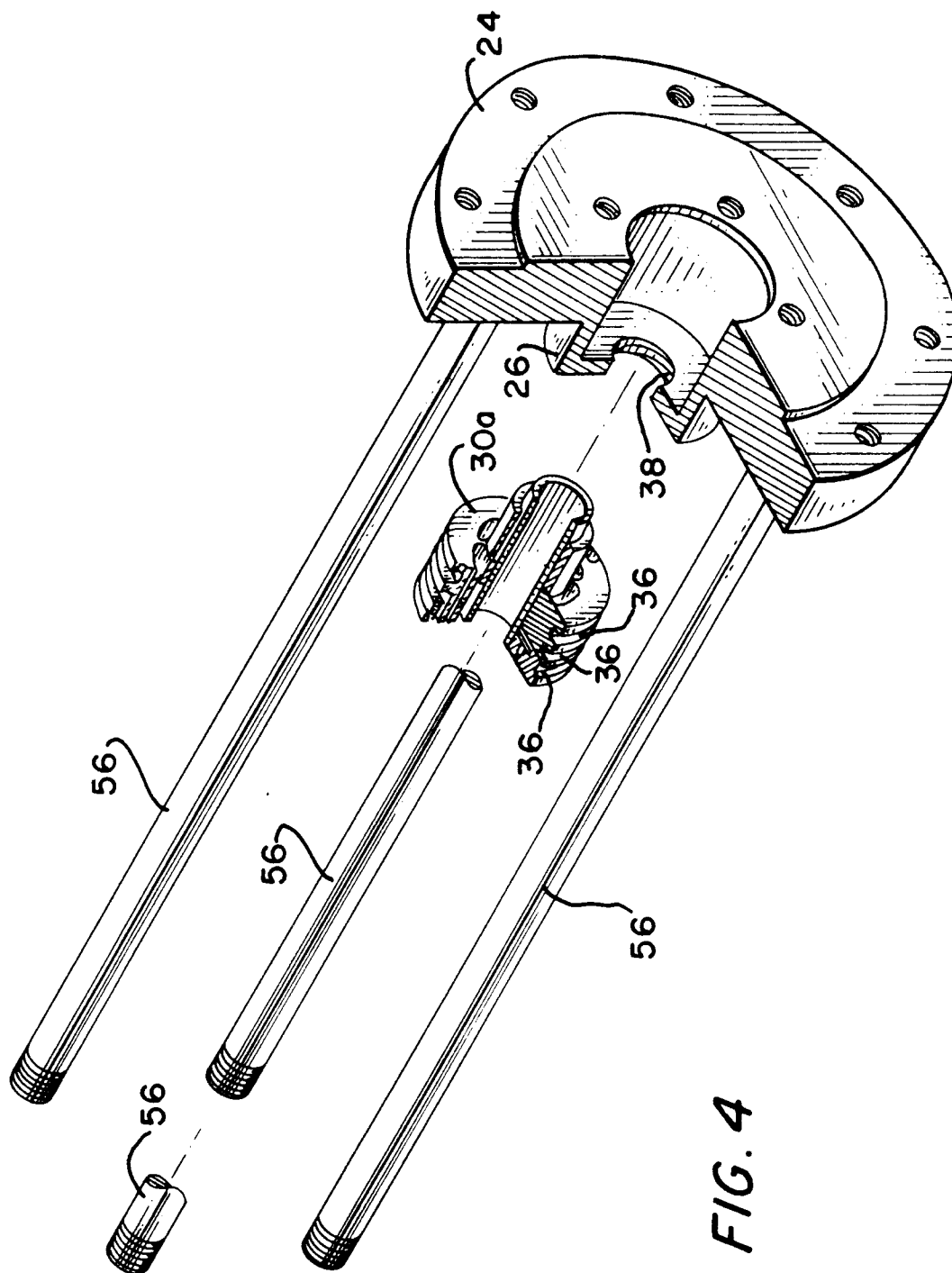
### Claims

1. A gas compressor (10), comprising:
  - a single, straight, walled cylinder (12) having (a) a longitudinal axis (14), and (b) a single, circumferential wall; and
  - headers (20, 24) at opposite ends of said cylinder (12); wherein
  - one of said headers (20) has a tapped hole (28) formed in a surface thereof which opens onto said cylinder (12);
  - the other of said headers (24) has a tapped bore (38) opening therethrough; and
  - a first inlet valve (30) threadedly engaged with said tapped hole (28) and confined within said cylinder (12);
  - a second inlet valve (30a) threadedly engaged with said tapped bore (38) and confined within said cylinder (12);
  - said second inlet valve (30a) has a throughgoing bore formed therein which is co-axial with said tapped bore (38);
  - a piston rod (40) in penetration of said bores, and having one end thereof projecting outwardly from said other header (24);
  - a pair of discharge valves (46, 46a) coupled to said piston rod (40), and spaced apart along said rod (40), confined within said cylinder (12);
  - gas inlet ports (50, 50a) radially formed in said cylinder (12) at opposite ends thereof; and
  - a gas outlet port (52) formed in said cylinder intermediate said ends thereof.
2. A gas compressor according to claim 1, wherein:
  - said inlet ports (50, 50a) open directly onto said cylinder-confined inlet valves (30, 30a).
3. A gas compressor, according to claim 1, wherein:
  - said discharge valves (46, 46a) have annular bodies (48); and
  - said bodies (48) have piston ring grooves formed thereon to accommodate therein piston rings for effecting sealing engagement with said cylinder (12).
4. A gas compressor, according to claim 3, wherein:
  - the end of said piston rod (40) which is opposite said projecting end thereof is threaded; and further including
  - a tubular spacer (44), internally and externally threaded, is threadedly engaged with said threaded, opposite end of said piston rod (40);
  - said bodies (48) are internally threaded; and
  - said bodies (48) are threadedly engaged with said tubular spacer (44).
5. A gas compressor, according to claim 4, wherein:
  - said spacer (44) is externally threaded, as aforesaid, at opposite ends thereof; and
  - said bodies (48) are threadedly engaged with said spacer (44) at said threaded ends of said spacer (44).
6. A gas compressor, according to claim 1, wherein:
  - opposite axial ends of said cylinder (12) have shouldered recesses (16, 18) formed therein;
  - said headers (20, 24) have circular lands (22, 26) in the centres thereof; and
  - said lands (22, 26) are set into said shouldered recesses (16, 18).
7. A gas compressor, according to claim 6, further including:
  - seals (54) interposed between said headers (20, 24) and said opposite axial ends of said cylinder (12).
8. A gas compressor, according to claim 6, further including:
  - tie rods (56) fastened to said headers (20, 24) securing said headers (20, 24) to opposite axial ends of said cylinder (12).
9. A gas compressor, according to claim 4, wherein:
  - said spacer (44), discharge valves (46, 46a), and said cylinder (12) cooperatively define, within said cylinder, a fixed volume, gas-discharge chamber which opens onto said outlet port (52).
10. A gas compressor, according to claim 3, wherein:
  - said discharge valves (46, 46a) comprise gas compressing pistons.









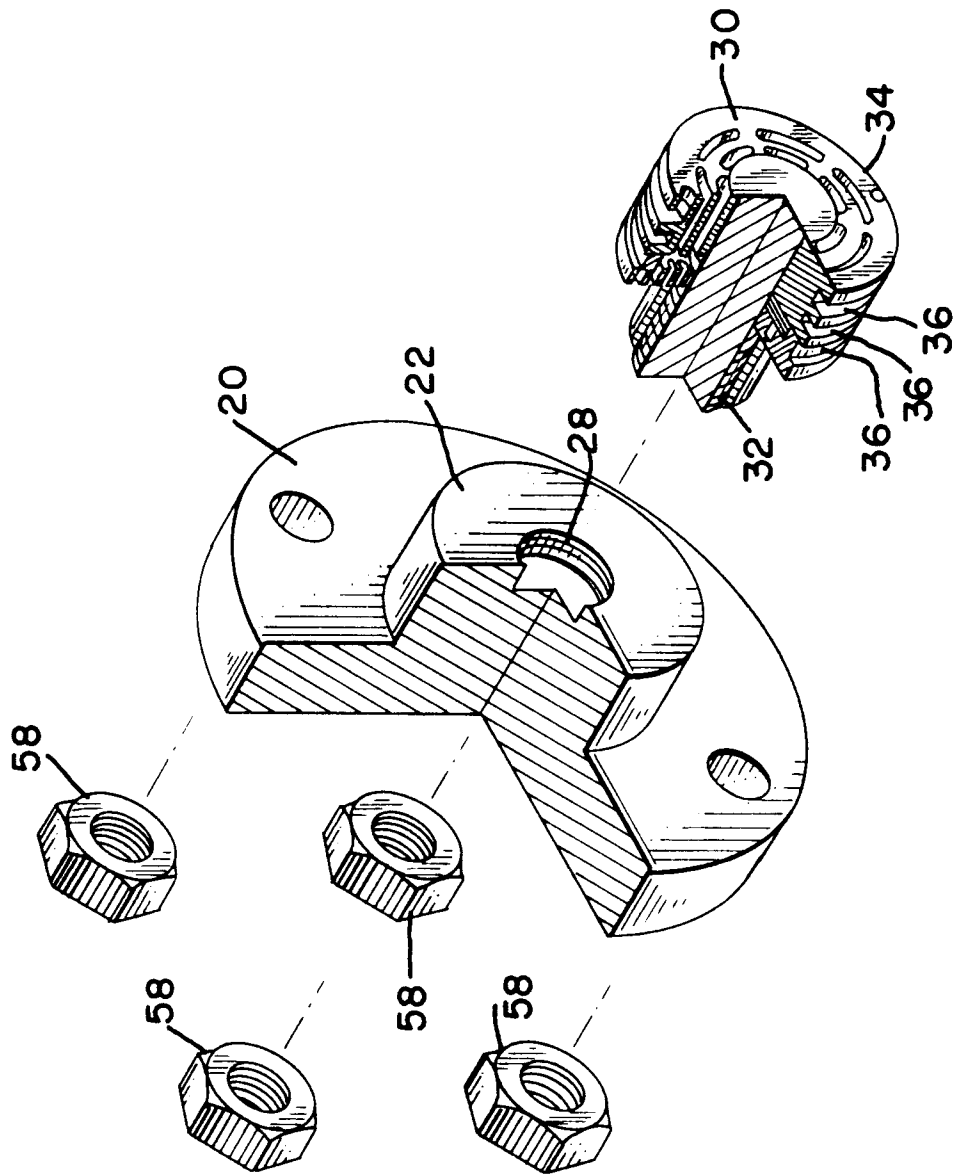


FIG. 5





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## EUROPEAN SEARCH REPORT

Application Number

EP 91 30 1191

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
E	US-A-5 011 383 (DRESSER-RAND COMP.) * the whole document *	1-10	F04B5/00 F04B3/00
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X	FR-A-786 969 (ET. LIEBAULT) * page 1, line 1 - page 2, line 35; figures *	1,2	
Y		3-6,9,10	
A		8	
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Y	US-A-1 602 193 (GARBER) * page 1, line 67 - page 3, line 26; figures *	3-6,9,10	
A		1,2	
	---		
A	US-A-4 072 210 (CHIEN) * column 3, line 46 - column 6, line 11; figures 1-7 *	1,7	
	---		
A	US-A-4 679 994 (BROWN) * column 2, line 29 - column 4, line 54; figures 2,3 *	1,7	
	---		
A	US-A-1 568 776 (SMITH) * page 1, line 53 - page 3, line 47; figures *	1-3,6	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
	-----		F04B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 OCTOBER 1991	Examiner VON ARX H. P.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			