

ROTARY COMPRESSORS HAVING BACKFLOWPREVENTING VALVES

This invention relates to rotary compressors for compressing oil entraining refrigerants having backflow preventing valves.

The typical refrigerant rotary compressor for a refrigeration system has a number of moving parts which require lubrication in operation. This is typically accomplished by providing lubricating oil, a portion of which is typically entrained in the refrigerant and passed through the compressor to lubricate the moving parts. As the oil-entraining refrigerant passes through the compressor, the oil is deposited upon the compressor's components. While this accomplishes the desirable result of lubricating the compressor components to provide longer life and lower maintenance, it is often detrimental to the operation of certain components in the refrigerant compressor. For example, in many typical rotary refrigerant compressors, it is necessary to provide a backflow preventing valve. This valve serves to prevent reverse rotation of the compressor components caused by a backflow of refrigerant at high or discharge pressure when the refrigerant compressor is not in operation.

One configuration of a typical refrigerant compressor discharge valve is shown in the Japanese patent 62-150592. This valve is simply a resilient flap member retained by a bolt or screw. It can readily be appreciated that this valve suffers from two severe deficiencies, the first being inherent in the flexible nature of the valve, in that the material selected for the valve is potentially subject to failure through fatigue induced by the constant cycling operation of the valve from open to closed, and the second being the surface tension developed between the valve and the member upon which it resides due to the oil deposited thereon from the oil entraining refrigerant. It is desirable to provide a backflow preventing valve which is not subject to these limitations.

An alternative approach is to provide a detached valve member moving between a closed position covering a discharge port and an open position wherein the valve member is seated against a valve stop member. While this eliminates the potential failure of the valve element due to fatigue, this does not overcome the problem of oil tension developing between the valve element and the adjacent components. This problem is recognized, for example, in US Patent Number 4,580,604. It can readily be seen that the oil film developed between the valve element and the valve stop in the open

position likewise precludes refrigerant from promptly forcing the valve element to the closed position, thus permitting a period of refrigerant backflow. This condition occurs when the compressor ceases operation and the refrigerant pressure in the discharge port becomes less than the refrigerant pressure exterior the discharge port.

In consideration of the foregoing, it is an object of the invention to provide a rotary compressor with a backflow preventing valve which more rapidly responds to changes in pressure in the discharge port of the compressor than the prior valves discussed above.

The invention includes a rotary compressor for compressing an oil-entraining refrigerant provided with a backflow preventing valve for a discharge port, comprising:

a substantially planar valve element having an open position for allowing flow through said discharge port and a closed position for covering said discharge port for preventing backflow through said discharge port;

a substantially planar valve stop member having a valve stop surface for engaging said valve element in the open position; and

spaced apart means for supporting said valve stop member in a substantially parallel spaced relation with respect to a fixed member in which said discharge port

is provided, said spaced apart valve stop member support means further comprising means for guiding said valve element between the open position and the closed position, said valve stop surface having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve element in the open position and said valve stop surface, said valve stop surface having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve element in the open position and said valve stop surface.

The invention also includes a rotary compressor for compressing an oil-entraining refrigerant provided with a backflow preventing valve for a discharge port, comprising:

a substantially planar valve stop member having a valve stop surface;

a substantially planar valve element; and

spaced apart means for supporting said valve stop member in a substantially parallel spaced relation with respect to a fixed member in which said discharge port is provided, said spaced apart valve stop member support

means further including means for guiding said valve element;

5 said valve element having an open position for allowing flow through said discharge port and a closed position for preventing backflow through said discharge port, said valve element further including a valve stop contacting surface for engaging said valve stop surface in the open position, said valve stop contacting surface
10 further having an oil channeling portion for collecting and channeling liquid oil residue deposited on said

valve stop contacting surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve stop contacting surface and said valve stop surface, when said valve is in the open position.

The invention also includes a hermetic scroll compressor having a refrigerant backflow preventing valve, said hermetic compressor comprised of:

a first scroll element disposed in said hermetic scroll compressor to divide said scroll compressor into a suction pressure portion and a discharge pressure portion, said scroll element defining a discharge port for directing oil-entraining refrigerant to the discharge pressure portion, said first scroll element further including a first upstanding involute wrap thereon;

a second scroll element disposed in said hermetic scroll compressor for orbital movement with respect to said first scroll element, said second scroll element having a second upstanding involute wrap for interleaving engagement with said first involute wrap;

means for orbitally driving said second scroll element disposed in said suction pressure portion of said hermetic scroll compressor;

a substantially planar valve element having an open position for allowing flow through said discharge port

and a closed position for covering said discharge port for preventing backflow through said discharge port;

5 a valve stop member having a valve stop surface for engaging said valve element in the open position, said valve stop surface having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop surface by the oil-entraining refrigerant, in order to reduce oil surface tension between said valve element in the open position and said
10 valve stop surface; and spaced apart means for supporting said valve stop member spaced from said discharge port, which spaced apart supporting means further comprise means for guiding said valve element between said open and closed positions.

15 The invention also includes a hermetic scroll compressor having a refrigerant backflow preventing valve, said hermetic compressor comprised of:

a first scroll element disposed in said hermetic scroll compressor to divide said scroll compressor into
20 a suction pressure portion and a discharge pressure portion, said scroll element defining a discharge port for directing oil-entraining refrigerant to the discharge pressure portion, said first scroll element further including a first upstanding involute wrap
25 thereon;

a second scroll element disposed in said hermetic

scroll compressor for orbital movement with respect to said first scroll element, said second scroll element having a second upstanding involute wrap for interleaving engagement with said first involute wrap;

5 means for orbitally driving said second scroll element disposed in said suction pressure portion of said hermetic scroll compressor;

a valve stop member having a valve stop surface;

10 a valve element having an open position for allowing flow through said discharge port and a closed position, for preventing backflow through said discharge port, said valve element further including a valve stop contacting surface for engaging said valve stop surface in the open position, said valve stop contacting surface
15 further having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop contacting surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve stop contacting surface, and said
20 valve stop surface, when said valve is in the open position; and

spaced apart means for supporting said valve stop member spaced from said discharge port, which spaced apart supporting means further comprise means for
25 guiding said valve element between said open and closed positions.

The invention also includes a rotary compressor for compressing oil-entraining refrigerant provided with a backflow preventing valve for a discharge port comprising a valve element movable between a valve closed position and a valve open position, a valve stop member having a valve stop surface for engaging a valve stop contacting surface of the valve element when the latter is in said valve open position, said surfaces defining through-channels therebetween when in engagement for channeling liquid oil residue therebetween in order to reduce surface tension between the valve element and valve stop member, and spaced apart means for supporting said valve stop member spaced from said discharge port, which spaced apart supporting means further comprise means for guiding said valve element between said open and closed positions.

In order that the invention may be well understood, some embodiments thereof, which are given by way of example only will now be described with reference to the accompanying drawings, in which:

Figure 1 shows a cross-sectional view of a backflow preventing valve, visible in the partial cutaway view of a hermetic rotary scroll-type refrigerant compressor.

Figure 2 is a top view of the backflow preventing valve visible in a partial cutaway cross-section of the

refrigerant compressor taken along section line 2-2 of Figure 1.

5 Figure 3 is a cross-sectional view of the backflow preventing valve taken along section line 3-3 of Figure 2, showing the valve element in the closed position.

Figure 3A is a top view of the valve element.

10 Figure 4 is a cross-sectional view of the backflow preventing valve taken along section line 3-3 of Figure 2, showing the valve element in the open position.

Figure 5 is a view of the valve stop surface as taken along line 5-5 of Figure 3.

15 Figure 6 is a cross-sectional view of an alternative embodiment of the backflow preventing valve as taken along section line 3-3 of Figure 2.

Figure 7 is a view of the valve stop surface of the valve stop member of the alternative embodiment as taken along line 7-7 of Figure 6.

5 Figure 8 is a cross-sectional view of a second alternative embodiment of the backflow preventing valve as taken along section line 3-3 of Figure 2.

Figure 9 is a view of the second alternative embodiment of the backflow preventing valve as taken along line 9-9 of Figure 8.

10 Figure 10 shows a third alternative embodiment of the backflow preventing valve as taken along section line 3-3 of Figure 2.

15 Figure 11 is a view of the valve element of the third alternative embodiment taken along line 11-11 of Figure 10.

Figure 12 is a fourth alternative embodiment of the backflow preventing valve taken along section line 3-3 of Figure 2.

20 Figure 13 is a view of the valve element of the fourth alternative embodiment as taken along line 13-13 of Figure 12.

Figure 14 is a fifth alternative embodiment of the backflow preventing valve as taken along section line 3-3 of Figure 2.

25 Figure 15 is a view of the valve element of the fifth alternative embodiment shown along line 15-15 of

Figure 14.

A refrigerant compressor system generally denoted by reference numeral 20 is shown in Figure 1. Refrigerant compressor system 20 is a rotary compressor housed in a hermetic shell 22. The refrigerant compressor system 20 is not shown in Figure 1 in detail, since details regarding the compressor need not be disclosed to understand the form and function of the backflow preventing valve. By way of example only, the operation of the valve in a scroll-type refrigerant compressor system is described. It is to be understood that such a valve would be equally suitable for use in a rolling piston, screw, or other rotary compressor.

Disposed within the hermetic shell 22 is a fixed scroll 24 having a centrally located aperture defining a discharge port 26. An orbiting scroll 28 is disposed in a parallel spaced relationship with respect to the fixed scroll 24. A fixed involute wrap 30 is disposed on the fixed scroll 24, and an orbiting involute wrap 32 is disposed on the orbiting scroll 28 such that the respective involute wraps are in interleaving engagement defining a plurality of pockets having volume decreasing toward the centre of the respective wraps. A swing-link mechanism 34 provides for orbital, non-rotating motion of the orbiting scroll 28.

The fixed scroll member 24 further serves to divide

the hermetic shell 22 into a discharge pressure portion 36 and a suction pressure portion 38. It is to be understood that the division of the hermetic shell 22 into the discharge pressure portion 36 and the suction pressure portion 38 could be accomplished in the rotary compressor by other means such as an independent barrier member, and that the use of the fixed scroll member 24 is not to be taken as limiting. A suction port 40 is provided to admit suction pressure refrigerant to the suction pressure portion 38 of the hermetic shell 22, and a discharge port 42 is provided to remove discharge pressure refrigerant from the discharge pressure portion 36 of the hermetic shell 22.

The refrigerant compressor system 20 is driven by an internal electric motor 50 disposed within the suction pressure portion 38 of the hermetic shell 22. The electric motor 50 includes a stator 52 and a rotor 54. A drive shaft 56 passes through the rotor 54, with its lower end extending into a reservoir of oil 58. Disposed at the lower distal end of the drive shaft 56 is a centrifugal oil pump 60 operative to cause oil 58 to flow upward through an internal bore 62 within the drive shaft 56. The oil thus forced upward through the internal bore 62 lubricates surfaces subject to friction within the compressor system 20 such as the upper and lower drive shaft main bearings 64. After passing

through and lubricating the bearings 64, the oil returns to the reservoir 58, flowing downwardly through and around the stator 52 and rotor 54 coils, the framework 66 and the interior of the suction pressure portion 38.

5 The drive shaft bearings 64 are supported in a framework 66 which is attached to the hermetic shell 22 and includes other bearings and structure necessary to support the orbiting scroll member 28. This framework 66 as well as the bearings and structure for supporting
10 the motor 50 are not disclosed in detail, as they are believed to be generally understood in the art and not crucial to the understanding of the operation of the backflow preventing valve.

 Referring now generally to Figures 1 through 15, a
15 backflow preventing valve assembly 100 is generally shown disposed atop the fixed scroll member 24 adjacent the discharge port 26. The valve assembly 100 is comprised of a valve stop member 120, a valve element 140, and spaced apart means for supporting the valve
20 stop member 120 in a substantially parallel spaced relationship with the fixed scroll member 24, which spaced apart means also comprise means for guiding the valve element 140 between an open position and a closed position. The above-mentioned spaced apart means are

fully disclosed hereinbelow. The valve element 140 is disposed with respect to the discharge port 26 of the fixed scroll member 24 such that, in the closed position, the valve element 140 prevents a backflow of oil-entraining refrigerant from the discharge pressure portion 36 into the discharge port 26. In the open position, the valve element 140 rests against a valve stop member surface 122, thus permitting refrigerant to flow from the discharge port 26 to the discharge pressure portion 36 of the hermetic shell 22.

In operation, the electric motor 50 is energized causing the rotor 54 and the drive shaft 56 to rotate. This rotation is translated by the swing-link mechanism 34 to cause orbital non-rotating movement of the orbiting scroll member 28 with respect to the fixed scroll member 24. The interleaving fixed involute wrap 30 and orbiting involute wrap 32 thus generate a plurality of pockets of decreasing volume from the radially outer ends of the respective wraps toward the centre of the respective wraps.

During the operation of the electric motor 50, refrigerant gas is drawn into the suction pressure portion 38 through the suction port 40 from the refrigeration system (not shown). The refrigerant gas then circulates through the components of the electric motor 50, contacting and entraining in the refrigerant

gas flow a portion of the oil returning to the reservoir of oil 58. The oil-entraining refrigerant is then compressed in the plurality of pockets defined by the interleaving wraps of the respective scrolls and ejected
5 through the discharge port 26. The ejected oil-entraining refrigerant forces the valve element 140 to the open position, permitting the now discharge pressure refrigerant to be exhausted to the discharge pressure portion 36 and returned to the refrigeration system
10 through the discharge port 42.

Upon de-energization of the electric motor 50, the valve element 140 immediately moves to a closed position, whereby the valve element 140 is disposed about the discharge port 26 in a covering manner. This
15 prevents a backflow of refrigerant from the discharge pressure portion 36 into the discharge port 26.

This is more clearly depicted in Figures 3 and 4, wherein the valve element 140 is shown in cross-section view. In Figure 3, the valve element is shown in the
20 closed position, sealingly covering the bore defining the discharge port 26. In Figure 4, the valve element 140 is shown disposed against the valve stop surface 122 of the valve stop member 120, thus permitting a flow of oil-entraining refrigerant through the discharge port
25 26.

Referring generally to Figures 3 through 15, the

spaced apart means for supporting the valve stop member 120 positionally with respect to the fixed scroll member 24 are clearly disclosed, and comprise two bolts 124, each passing through a respective bore 126 and extending into threaded holes 25 having threads sized to receive securingly the bolts 124. The bores 126 are located at the respective distal ends of the valve stop member 120, and the bores 126 and holes 25 are further disposed in axial alignment.

A tubular guide collar 130 is fixed adjacent each distal end of the valve stop member 120, between the valve stop member 120 and the fixed scroll member 24. Each guide collar 130 has an exterior guide surface 132 for slideably engaging a portion of the valve element 140. Each guide collar 130 is in co-axial alignment with the bores 126 of the valve stop member 120 so that the bolts 124 pass through the guide collars 130 and serve to retain positionally the guide collars 130. The guide collars 130 maintain the valve stop member 120 in a parallel, spaced relationship with respect to the fixed scroll member 24.

The general form of the valve element 140, as seen in Figure 3A, is a substantially thin, planar element having oppositely disposed ends 144, each comprised of two hemispheric lobes 145 with an arcuate portion 146 of a circle defined therebetween for closely fitting about

the guide surface 132 of the guide collar 130. The radius of the arcuate portion 146 of the end 144 is sized to provide a clearance of several thousandths of one inch (several 0.025 mm) preventing binding between the valve element 140 and the guide collars 130 to allow free movement of the valve element.

The valve stop surface 122 includes an oil channeling portion 150. This oil channeling portion 150 is disposed at least between the bores 126 of the valve stop member 120, however, the oil channeling portion 150 may extend across the entire valve stop surface 122. In the preferred embodiment, the oil channeling portion 150 is comprised of a series of grooves 154. The grooves 154 include two sides 156 extending from the valve stop surface 122 to a base 158 which is parallel the valve stop surface 122 and spaced a distance D from the valve stop surface 122. Each groove 154 is spaced from the adjacent respective groove by land 152 which is of a width L. Each groove is spaced a width W from the next respective groove. The width W is the sum of the width of the base 158 and the land 152. The preferred embodiment, shown in Figures 3 through 5, includes grooves where W is within the range of 0.12 to 0.15 inches (3.05 to 3.81 mm), the width of lands L is within the range of 0.055 to 0.080 inches (1.4 to 2.03 mm), and the depth D of the grooves 154 is within the range of

0.002 to 0.010 inches (0.05 to 0.25 mm).

Figures 6 and 7 show a first alternative embodiment. Again, the valve stop member 120a is secured by bolts 124a passing through bores 126a into threaded holes 25a of the fixed scroll member 24a. The valve stop member 120a is maintained in a substantially parallel spaced relationship with respect to the fixed scroll member 24a by guide collars 130a disposed axially about the bolts 124a. The grooves 154a are comprised of two sides 156a extending angularly into the valve stop member 120a to define and include an angle. The included angle may be for example in the range of 60 to 100 degrees but would preferably be 90 degrees. As in the preferred embodiment, the grooves are separated by lands 152a. The width of L_1 of lands 152a would be within the range of 0.05 to 0.10 inches (1.27 to 2.54 mm), and the total width W_1 between each respective groove 154a would be preferably within the range of 0.10 to 0.15 inches (2.54 to 3.81 mm).

A second alternative embodiment is shown in Figures 8 and 9. This second alternative embodiment includes valve stop member 120b which is cast with integral guide collars 130b. The oil channeling portion 150b in this embodiment includes a plurality of protuberances 160b which may be in the form of hemispheres or cones extending from the valve stop surface 122b toward the

fixed scroll member 24b for contacting the valve element 140b. These protuberances 160b may have a diameter in the preferred range of 0.1 to 0.2 inches (2.54 to 5.08 mm) at the base thereof, and extend a distance D_2 in the range of 0.005 to 0.015 inches (0.13 to 0.38 mm) from the valve stop surface 122b. While it would be possible to form these protuberances 160b by machining of the adjacent valve stop surface 122b, these protuberances 160b would be more suitably formed by casting or forging the valve stop member 120b to include the protuberances 160b. It should also be noted that the application of a cast or forged valve stop member 120 having integral guide collars 130 would be feasible for any of the embodiments of the subject invention and, therefore, should not be taken as limited in application to any one embodiment.

A third alternative embodiment of the subject invention, shown in Figures 10 and 11, includes a planar valve stop surface 122c on the valve stop member 120c. In this embodiment, the valve element 140c includes a stop surface 142c with an oil channeling portion 170c. The oil channeling portion 170c includes a series of lands 172c and grooves 174c. As with the grooves in the valve stop surface of the preferred embodiment, the grooves 174c are defined by perpendicular sides 176c extending into the body of the valve element 140c to a

base 178c at a depth D_3 . The depth D_3 should be in the range of 0.002 to 0.010 inches (0.05 to 0.25 mm). The sides 176c of grooves 174c are parallel and parallel to the sides 176c of the adjacent respective grooves 174c.

5 The grooves 174c are spaced at a distance W_3 , which is the sum of the width of the base 178c and the width L_3 of the land 172c, and should be in the range of 0.010 to 0.15 inches (0.25 to 3.81 mm).

A fourth alternative embodiment is shown in Figures 10 12 and 13. As with the foregoing embodiment, the valve element 140d includes an oil channeling portion 170d. In this embodiment the oil channeling portion comprises a plurality of protuberances 180d. These protuberances 180d should be spaced apart a distance w in the range of 15 0.100 to 0.200 inches (2.54 to 5.08 mm). Each protuberance 180d may be of hemispherical or conical form with a diameter d_4 at the base in the range of 0.1 to 0.2 inches (2.54 to 5.08 mm) and a height of D_4 in the range of 0.002 to 0.010 inches (0.05 to 0.25 mm) for 20 contacting the planar surface 122d of the valve stop member 120d. The protuberances may be formed by forging or stamping of the valve element 140d.

A fifth alternative embodiment is shown in Figures 14 and 15, wherein the oil channeling portion 170e of 25 the valve element 140e includes a series of grooves 174e extending angularly into the body of the valve element

140e and terminating in an included angle therein. As with the first alternative embodiment, the grooves 174e defined by the sides 176e are parallel and spaced apart by lands 172e of width L_1 , which is in the range of 0.05 to 0.10 inches (1.27 to 3.81 mm), such that the total width W_1 between the adjacent grooves 174e is in the range of 0.10 to 0.15 inches (2.54 to 3.81mm).

The numeric valves set forth herein are intended to aid in the understanding of the subject invention, and are in no sense to be taken as limitations upon the practice or interpretation of the spirit of the invention, as the actual valves will vary in different embodiments according to the principles herein disclosed.

Preferably the components of the subject invention are formed of suitable steel alloys, and except as noted for certain embodiments, the grooves 154 in the valve stop member 120 and the grooves 174 in the valve element 140 are readily formed by forging or milling of the respective component. Such techniques of manufacture are well known in the art and need not be described herein. Referring generally to Figures 3 through 15, the form of the valve stop member 120 can be seen to be generally rectilinear having planar and parallel top, bottom and side surfaces. The embodiments of the valve stop member 120 shown include protuberances which are

hemispheric or arcuate portions of an included circle. Neither the specific shape nor the specific protuberances are necessary to the operation of the backflow preventing valve, provided that the valve stop member 120 includes an oil channeling portion 150 or that the valve element 140 includes an oil channeling portion 170 for channeling oil from the backflow preventing valve assembly 100.

The operation of the compressor system 20 having been generally described hereinbefore, it is readily apparent that the backflow preventing valve assembly 100 is directly in the path of oil-entraining refrigerant being discharged through the discharge port 26. A portion of the oil entrained in the refrigerant is deposited upon the valve element 140 and the valve stop member 120. When the valve element 140 is forced to the open position against the stop surface 122 by the pressure of the discharging refrigerant, the oil thus deposited flows into the grooves 154 or 174 and is channelled from the backflow preventing valve assembly 100. When the compressor system 20 ceases operation, no substantial amount of oil remains between the valve element 140 and the valve stop member 120, thereby permitting the valve element 140 to instantly react to the cessation of pressure from the discharging refrigerant and thereby to rapidly drop to the closed

position for preventing reverse rotation of the compressor system 20 caused by backflow of the refrigerant.

5 Modifications to the preferred embodiment of the subject invention will be apparent to those skilled in the art within the scope of the claims that follow herein.



CLAIMS:

1. A rotary compressor for compressing an oil-entraining refrigerant provided with a backflow preventing valve for a discharge port, comprising:

5 a substantially planar valve element having an open position for allowing flow through said discharge port and a closed position for covering said discharge port for preventing backflow through said discharge port;

10 a substantially planar valve stop member having a valve stop surface for engaging said valve element in the open position; and

spaced apart means for supporting said valve stop member in a substantially parallel spaced relation with respect to a fixed member in which said discharge port is provided, said spaced apart valve stop member support means further comprising means for guiding said valve element between the open position and the closed position, said valve stop surface having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve element in the open position and said valve stop surface.

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2. A compressor as set forth in claim 1, wherein said oil channeling portion is comprised of a plurality of interconnected paths.

5 3. A compressor as set forth in claim 1, wherein said oil channeling portion is comprised of a plurality of spaced raised protuberances directed toward said valve element.

10 4. A compressor as set forth in claim 1, wherein said oil channeling portion is comprised of a series of grooves.

5. A compressor as set forth in claim 4, wherein each said groove is further spaced in a parallel manner with respect to the adjacent said groove.

15 6. A compressor as set forth in claim 4 or 5, wherein said grooves are further defined by a plurality of separating land portions.

7. A rotary compressor for compressing an oil-entraining refrigerant provided with a backflow preventing valve for a discharge port, comprising:
20 a substantially planar valve stop member having a valve stop surface;



a substantially planar valve element;

spaced apart means for supporting said valve stop member in a substantially parallel spaced relation with respect to a fixed member in which said discharge port is provided, said spaced apart valve stop member support means further including means for guiding said valve element; and

said valve element having an open position for allowing flow through said discharge port and a closed position for preventing backflow through said discharge port, said valve element further including a valve stop contacting surface for engaging said valve stop surface in the open position, said valve stop contacting surface further having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop contacting surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve stop contacting surface and said valve stop surface, when said valve is in the open position.

8. A compressor as set forth in claim 7, wherein said oil-channeling portion of said valve stop contacting surface is comprised of a plurality of interconnected paths.



9. A compressor as set forth in claim 7, wherein said oil channeling portion of said valve stop contacting surface is comprised of a plurality of spaced, raised protuberances directed toward said valve stop surface.

10. A compressor as set forth in claim 7, wherein said oil channeling portion of said valve stop contacting surface is comprised of a series of grooves.

11. A compressor as set forth in claim 10, wherein each said groove is spaced in a parallel manner from each adjacent said groove.

12. A compressor as set forth in claim 11, wherein said grooves are further defined by a plurality of separating land portions.

13. A hermetic scroll compressor having a refrigerant backflow preventing valve, said hermetic compressor comprised of:

a first scroll element disposed in said hermetic scroll compressor to divide said scroll compressor into a suction pressure portion and a discharge pressure portion, said scroll element defining a



discharge port for directing oil-entraining refrigerant to the discharge pressure portion, said first scroll element further including a first upstanding involute wrap thereon;

5 a second scroll element disposed in said hermetic scroll compressor for orbital movement with respect to said first scroll element, said second scroll element having a second upstanding involute wrap for interleaving engagement with said first involute wrap;

10 means for orbitally driving said second scroll element disposed in said suction pressure portion of said hermetic scroll compressor;

 a substantially planar valve element having an open position for allowing flow through said discharge
15 port and a closed position for covering said discharge port for preventing backflow through said discharge port;

 a valve stop member having a valve stop surface for engaging said valve element in the open position,
20 said valve stop surface having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop surface by the oil-entraining refrigerant, in order to reduce oil surface tension between said valve element in the open
25 position and said valve stop surface; and

 spaced apart means for supporting said valve stop



member spaced from said discharge port, which spaced apart supporting means further comprise means for guiding said valve element between said open and closed positions.

- 5 14. A hermetic scroll compressor having a refrigerant backflow preventing valve, said hermetic compressor comprised of:

10 a first scroll element disposed in said hermetic scroll compressor to divide said scroll compressor into a suction pressure portion and a discharge pressure portion, said scroll element defining a discharge port for directing oil-entraining refrigerant to the discharge pressure portion, said first scroll element further including a first
15 upstanding involute wrap thereon;

 a second scroll element disposed in said hermetic scroll compressor for orbital movement with respect to said first scroll element, said second scroll element having a second upstanding involute wrap for
20 interleaving engagement with said first involute wrap;

 means for orbitally driving said second scroll element disposed in said suction pressure portion of said hermetic scroll compressor;

 a valve stop member having a valve stop surface;
25 a valve element having an open position for

allowing flow through said discharge port and a closed position, for preventing backflow through said discharge port, said valve element further including a valve stop contacting surface for engaging said valve stop surface in the open position, said valve stop contacting surface further having an oil channeling portion for collecting and channeling liquid oil residue deposited on said valve stop contacting surface by the oil-entraining refrigerant in order to reduce oil surface tension between said valve stop contacting surface and said valve stop surface, when said valve is in the open position; and spaced apart means for supporting said valve stop member spaced from said discharge port, which spaced apart supporting means further comprise means for guiding said valve element between said open and closed positions.

15. A rotary compressor for compressing oil-entraining refrigerant provided with a backflow preventing valve for a discharge port comprising a valve element movable between a valve closed position and a valve open position, a valve stop member having a valve stop surface for engaging a valve stop contacting surface of the valve element when the



latter is in said valve open position, said surfaces defining through-channels therebetween when in engagement for channeling liquid oil residue therebetween in order to reduce surface tension
5 between the valve element and valve stop, and spaced apart means for supporting said valve stop member spaced from said discharge port, which spaced apart supporting means further comprise means for guiding said valve element between said open and closed
10 positions.

16. A compressor as set forth in claim 15, wherein said through-channels are formed by providing recesses in or projections on at least one of said surfaces.

17. A compressor as set forth in claim 15 or 16,
15 wherein said through-channels are continuous linear channels.

18. A compressor discharge valve for a refrigerant compressor, substantially as hereinbefore described with reference to Figures 3 to 5, 6 and 7, 8 and 9, 10
20 and 11, 12 and 13, or 14 and 15 of the accompanying drawings.
