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(54) **Scroll-type apparatus**

(57) A pump of the scroll-type comprising a first scroll member having an end plate and extending outwardly therefrom an involute spiral wrap; a second scroll member having an end plate and extending outwardly therefrom an involute spiral wrap; the spiral wraps of the respective scroll members mating such that when said first scroll member orbits relative to the axis of the second scroll member the walls of the two involute wraps define crescent shape volumes which become smaller and smaller as they move from the periphery to the centre of the mating scroll members, in which the innermost end of the involute wrap of at least one scroll member is so shaped that as the orbiting scroll member translates its complete locus there is little or no space for any fluid to remain within the pump.

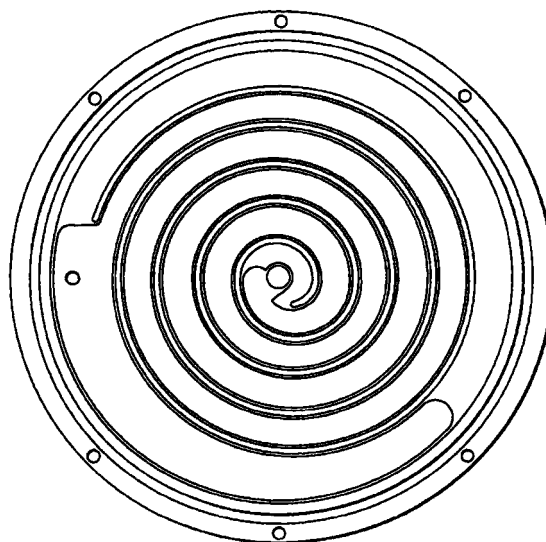


FIG. 4

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Description

[0001] The present invention relates to pumps or compressors of the scroll-type.

[0002] Scroll mechanisms are used in both compressors and vacuum pumps. In both cases the mechanism comprises a pair of mating scroll members, each of which has an involute spiral wrap of similar shape mounted on a respective end plate. Usually, one scroll member is held fixed and the other is movable to orbit but not to rotate about the axis of the fixed scroll member which is held by a mechanism such as an Oldham ring or other known anti-rotating device.

[0003] The walls of the two involute wraps define crescent shaped volumes which become smaller and smaller as they move from the periphery to the centre of the mating scroll members as the orbiting scroll member revolves. In this way, it is possible to trap a volume of gas between the orbiting scroll member and a fixed scroll member thereby to urge the gas from one end of the respective spirals to the other. In a vacuum pump in particular, the gas enters via a pump inlet at the periphery of the scroll members and exits via a pump outlet at the centre of the scroll members.

[0004] When a scroll-type vacuum pump stops rotating any gas that is compressed to a higher pressure than the inlet pressure contained within it will tend to expand back towards the pump inlet, which potentially can raise the pressure in the apparatus being subjected to a vacuum. This is referred to as "suckback". The amount of suckback from a scroll vacuum pump is reduced if the high pressure gas volume towards the centre of the pump is minimised.

[0005] It is an aim of the present invention to provide an apparatus of the scroll-type which minimises or eliminates suckback.

[0006] According to the present invention, the scroll member for use in a scroll-type apparatus comprises an end plate and an involute spiral wrap attached to and extending outwardly from said end plate, the innermost end of the involute wrap being so shaped that, as the orbiting scroll translates its complete locus there is little or no space for any gas to remain within the pump.

[0007] An embodiment of the invention will now be described, by way of example, reference being made to the Figures of the accompanying diagrammatic drawings in which:

Figure 1 is a cross-section through a known scroll-type apparatus;

Figure 2 is a perspective view of the movable scroll member of the apparatus of Figure 1 illustrating the innermost portion of the involute wrap;

Figure 3 is a plan view of the movable scroll member illustrated in Figure 2; and

Figure 4 is a plan view similar to Figure 3 but illustrating a modification to the innermost portion of the involute wrap according to the present invention.

[0008] Referring first to Figures 1 and 2 which illustrate a known scroll-type apparatus 10 which includes a housing 12 in which is mounted a fixed scroll member 14 and an orbiting or movable scroll member 16. Each scroll member 14, 16 includes an end plate 4, 6 to which is attached and from which extends outwardly therefrom an involute spiral wrap 20, 18. In practice, the orbiting scroll member 16 is attached to a drive shaft (not shown) or caused to orbit through the use of a suitable peripheral drive mechanism. In operation, the orbiting scroll member 16 is driven such that it describes an orbit while the two scroll members are maintained in a fixed angular relationship. In its orbiting motion, the orbiting scroll member 16 defines one or more moving fluid pockets in a manner known per se. Thus, fluid being pumped is taken through an inlet line in to the periphery of the scroll members and is introduced in to the pockets and compressed as the pockets become smaller in volume as they approach the central pocket 30.

[0009] As previously explained when a vacuum pump stops rotating any gas that has been compressed to a higher pressure than the inlet pressure will expand back towards the pump inlet potentially raising the pressure of the equipment being subject to the vacuum. The present invention assumes the use of a self-closing exhaust valve that prevents gas from the exhaust system returning to the pump.

[0010] According to the present invention, by changing the profile of the last piece of the involute wrap as illustrated in Figure 4 on one or both scroll wraps such that as the orbiting scroll translate it completes its locus there is little or no space for any gas to remain and this will minimise or eliminate any potential for suckback.

[0011] As shown the dead space at the innermost involute wrap is effectively filled and the concave surface 32 helps increase the sealing point in contact.

Claims

1. A pump of the scroll-type comprising a first scroll member having an end plate and extending outwardly therefrom an involute spiral wrap; a second scroll member having an end plate and extending outwardly therefrom an involute spiral wrap; the spiral wraps of the respective scroll members mating such that when said first scroll member orbits relative to the axis of the second scroll member the walls of the two involute wraps define crescent shape volumes which become smaller and smaller as they move from the periphery to the centre of the mating scroll members, in which the innermost end of the involute wrap of at least one scroll member is so shaped that as the orbiting scroll member trans-

lates its complete locus there is little or no space for any fluid to remain within the pump.

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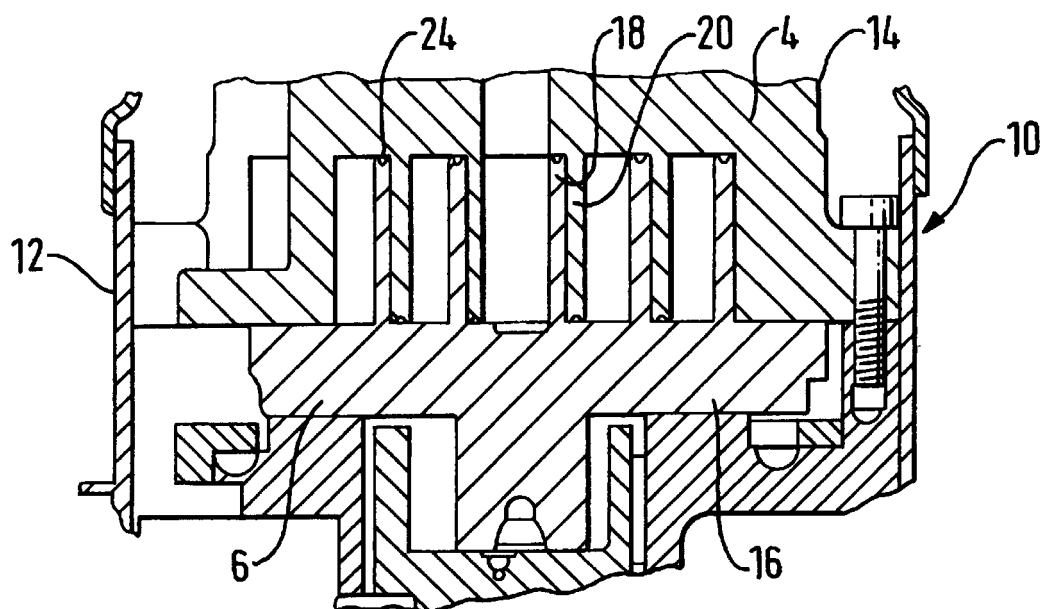


FIG. 1

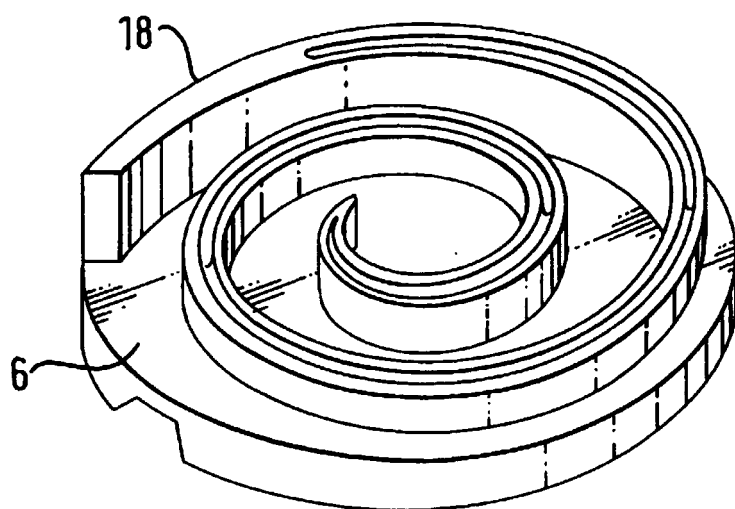


FIG. 2

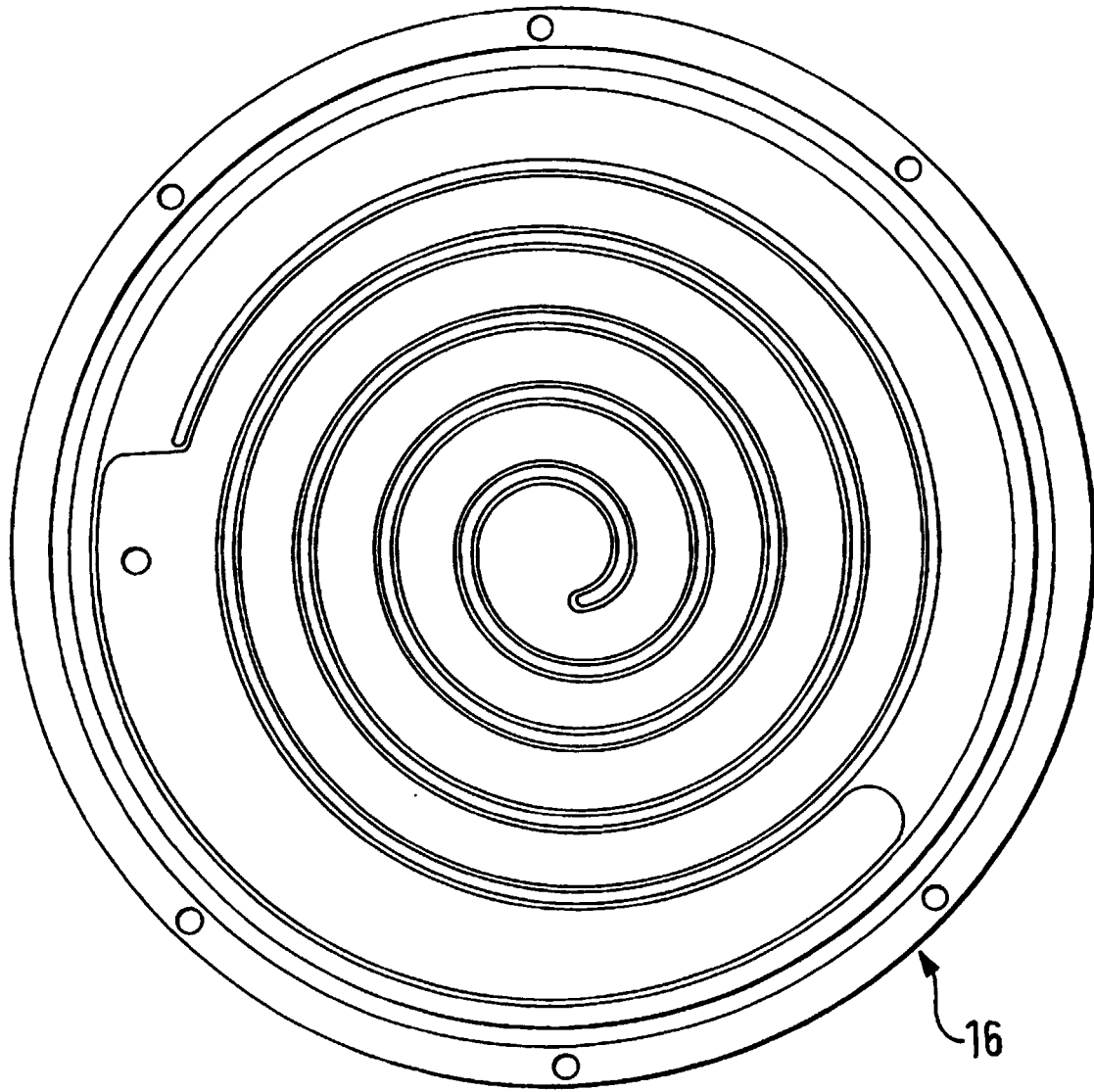


FIG.3

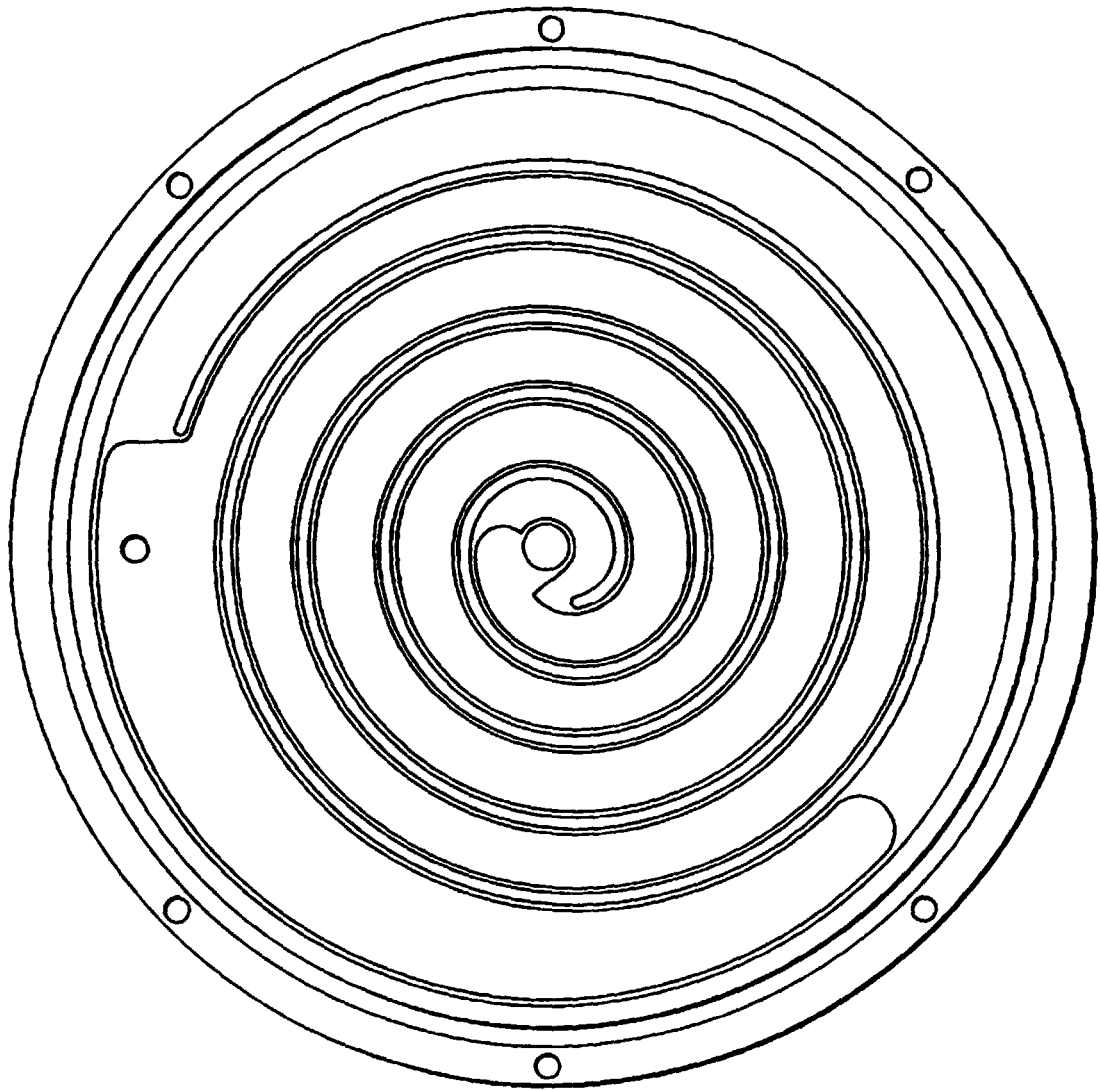


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 3947

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 August 2000	Examiner Kapoulas, T
CATEGORY OF CITED DOCUMENTS 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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 00 30 3947

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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