Nivid Search

Sample Report - Invalidity

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Objective and Scope

Subject Matter

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Objective and Scope: Subject Matter

The objective of the search is to find and report prior art from Patents and Non Patent literature against the **all claims of the target patent EP 2484XXX B1.**

1. A method of controlling an operating temperature of an air compressor, the method comprising
compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3), separating in the oil separator (3) the air and the oil from one another,
supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,
controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,
controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member, **characterised in that** the dimension of the controlling member is changed by an external command as necessary.

2. A method as claimed in claim 1, **characterized by** constricting the flow of the oil supplied to cooling by the thermostatic valve based on a change in dimension of a controlling member.

3. A method as claimed in claim 1 or 2, **characterized by** the controlling member including an expansion material, whereby the change in dimension of the controlling member is based on thermal expansion of the expansion material and the dimension of the controlling member is changed by changing the temperature of the controlling material by an external command.

4. A method as claimed in claim 3, **characterized by** the external command controlling an additional heating to heat the expansion material.

5. A method as claimed in any one of the preceding claims, **characterized by** the thermostatic valve being a three-way thermostatic valve which, in a manner controllable by external control, separates a necessary amount of the oil to flow to the cooling and past it.

6. Equipment for controlling an operating temperature of an air compressor, the equipment comprising a compressor element (1) for compressing a mixture of air and oil, an oil separator (3) for separating the air and the oil from one another, an oil cooler (8) for cooling the separated oil when necessary and a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary, wherein the thermostatic valve is provided with a controlling member based on a change in dimension and **characterised in that** the equipment includes a control unit (12) whereto at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data, whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

7. Equipment as claimed in claim 6, **characterized in that** the controlling member changing its dimension comprises an expansion element (20).

8. Equipment as claimed in claim 7, **characterized in that** the equipment comprises means for changing the temperature of the expansion element (20).

9. Equipment as claimed in claim 8, **characterized in that** the thermostatic valve (11) comprises an electric resistor (23) for heating the expansion element (20).

10. Equipment as claimed in any one of claims 6 to 9, **characterized in that** the thermostatic valve is a three-way thermostatic valve configured by external control in a controllable manner to separate a necessary amount of the oil to flow to the oil cooler (8) and to the bypass pipe (10) so as to bypass the oil cooler (8).

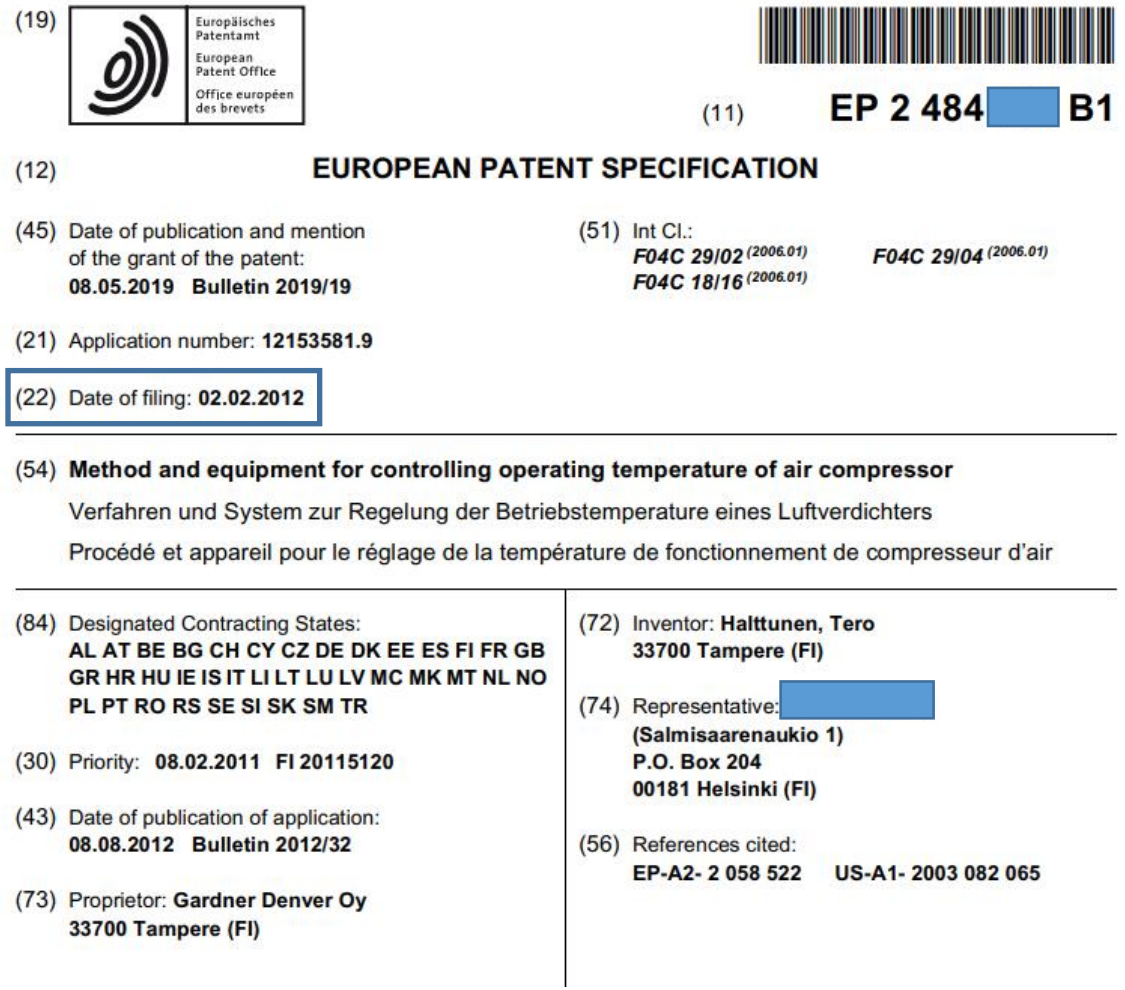
Objective and Scope: Prior Art Considerations

Jurisdiction: Global

Types of documents: Patents and Other literature

Date restriction: Documents published before 2nd February, 2012 (filing date);

Or EP patent documents filed before 2nd February, 2012



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(54) **Method and equipment for controlling operating temperature of air compressor**
Verfahren und System zur Regelung der Betriebstemperature eines Luftverdichters
Procédé et appareil pour le réglage de la température de fonctionnement de compresseur d'air

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(56) References cited:
EP-A2- 2 058 522 **US-A1- 2003 082 065**

Results

Results: Summary

EP2458219B1 : This patent reference from *GUSTAV WAHLER* defines a device which comprises a refrigerant circuit that is provided between compressor and cooler. The coolant discharged from the cooler is made to flow through a valve unit comprising valve housing with actuating element and valve element, so as to regulate the flow of coolant towards compressor via bypass path. The actuating element of valve unit is formed as an electrically heated thermostatic working element.

EP1937977B1 : This patent reference from *ATLAS COPCO* is a cited reference that discloses a device comprising a mixing valve with an inlet and outlets connected to an injection pipe, and bypass with one of the outlets. A measuring unit is connected to a control device to control the mixing valve for adjustment of a compressed air temperature by adjusting flow distribution through the mixing valve. The unit has a temperature sensor determining the compressed temperature in an oil separator. The mixing valve has an electric actuator that is connected to the control device. The control device has a control algorithm calculating lowest possible compressed temperature.

Results: Relevancy Table

Claim 1 of EP 2484XXX B1	EP2458219B1
A method of controlling an operating temperature of an air compressor,	I
the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),	I
separating in the oil separator (3) the air and the oil from one another,	✓
supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,	✓
controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,	✓
controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,	✓
characterized in that the dimension of the controlling member is changed by an external command as necessary.	✓

Result Categorization	
Category X	Documents disclosing all the features of the subject matter and considered a prior art under section 102 of U.S.C 35
Category Y	Documents disclosing some of the features of the subject matter and considered a prior art under section 103 of U.S.C 35

✓ : Fully Mapped
I : Inferred Mapping
× : No Excerpts found

Results: Relevancy Table

Claim 2 of EP 2484XXX B1	EP2458219B1
A method as claimed in claim 1, characterized by constricting the flow of the oil supplied to cooling by the thermostatic valve based on a change in dimension of a controlling member.	I

Claim 3 of EP 2484XXX B1	EP2458219B1
A method as claimed in claim 1 or 2, characterized by the controlling member including an expansion material, whereby the change in dimension of the controlling member is based on thermal expansion of the expansion material and the dimension of the controlling member is changed by changing the temperature of the controlling material by an external command.	I

Claim 4 of EP 2484XXX B1	EP2458219B1
A method as claimed in claim 3, characterized by the external command controlling an additional heating to heat the expansion material.	I

Claim 5 of EP 2484XXX B1	EP2458219B1
A method as claimed in any one of the preceding claims, characterized by the thermostatic valve being a three-way thermostatic valve which, in a manner controllable by external control, separates a necessary amount of the oil to flow to the cooling and past it.	I

Result Categorization	
Category X	Documents disclosing all the features of the subject matter and considered a prior art under section 102 of U.S.C 35
Category Y	Documents disclosing some of the features of the subject matter and considered a prior art under section 103 of U.S.C 35

✓ : Fully Mapped
I : Inferred Mapping
× : No Excerpts found

Results: Relevancy Table

Claim 6 of EP 2484XXX B1	EP2458219B1
Equipment for controlling an operating temperature of an air compressor,	✓
the equipment comprising a compressor element (1) for compressing a mixture of air and oil,	✓
an oil separator (3) for separating the air and the oil from one another,	✓
an oil cooler (8) for cooling the separated oil when necessary and	✓
a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,	✓
wherein the thermostatic valve is provided with a controlling member based on a change in dimension and	✓
characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,	✓
whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.	✓

Result Categorization	
Category X	Documents disclosing all the features of the subject matter and considered a prior art under section 102 of U.S.C 35
Category Y	Documents disclosing some of the features of the subject matter and considered a prior art under section 103 of U.S.C 35

✓ : Fully Mapped
I : Inferred Mapping
× : No Excerpts found

Results: Relevancy Table

Claim 7 of EP 2484XXX B1	EP2458219B1
Equipment as claimed in claim 6, characterized in that the controlling member changing its dimension comprises an expansion element (20).	✓

Claim 8 of EP 2484XXX B1	EP2458219B1
Equipment as claimed in claim 7, characterized in that the equipment comprises means for changing the temperature of the expansion element (20).	✓

Claim 9 of EP 2484XXX B1	EP2458219B1
Equipment as claimed in claim 8, characterized in that the thermostatic valve (11) comprises an electric resistor (23) for heating the expansion element (20).	I

Claim 10 of EP 2484XXX B1	EP2458219B1
Equipment as claimed in any one of claims 6 to 9, characterized in that the thermostatic valve is a three-way thermostatic valve configured by external control in a controllable manner to separate a necessary amount of the oil to flow to the oil cooler (8) and to the bypass pipe (10) so as to bypass the oil cooler (8).	I

Result Categorization	
Category X	Documents disclosing all the features of the subject matter and considered a prior art under section 102 of U.S.C 35
Category Y	Documents disclosing some of the features of the subject matter and considered a prior art under section 103 of U.S.C 35

✓ : Fully Mapped
I : Inferred Mapping
× : No Excerpts found

Results: #1 EP2458219B1(Bibliographic)

Title	Publication Date	Filing Date	Priority Date	Assignee	Inventor(s)
DEVICE FOR CONTROLLING THE COOLANT FLOW WHEN COMPACTING	May 30, 2012	August 17, 2011	November 30, 2010	GUSTAV WAHLER	Bernd Bareis | Markus Gebauer

Abstract

The device has refrigerant circuit that is provided between compressor and cooler. The coolant discharged from the cooler is made to flow through a valve unit (22) comprising valve housing (30) with actuating element (31) and valve element (32), so as to regulate the flow of coolant towards compressor via bypass path (24). The actuating element of valve unit is formed as an electrically heated thermostatic working element (42).

Relevant Image

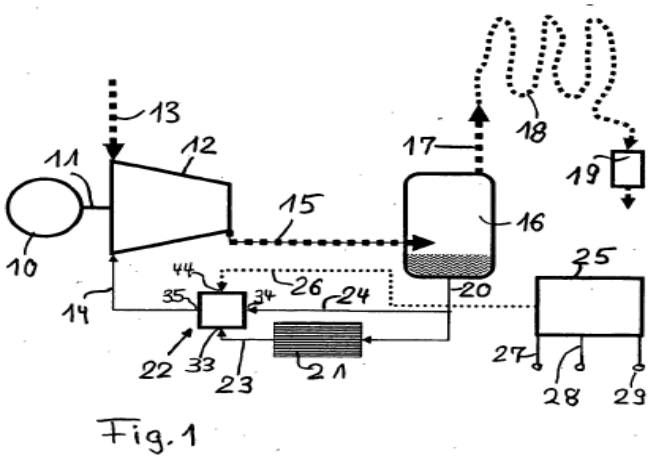


Fig. 1

Results: #1 EP2458219B1 (Mapping 1.1)

Claim 1 of EP 2484XXX B2

A method of controlling an operating temperature of an air compressor,

the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),
a plurality of independently controlled thermoelectric modules,

separating in the oil separator (3) the air and the oil from one another,

supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,

controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,

controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,

characterized in that the dimension of the controlling member is changed by an external command as necessary.

Excerpts from EP2458219B1

[Claims]

1. Device for controlling the coolant flow in compressors (12) as a function of influencing variables, such as the coolant temperature or the like, with a valve which can be switched into the coolant circuit between the compressor (12) and a cooler (21) for the coolant and through which the coolant can flow (22) with an actuating element (31) for a valve element (32) in the valve housing (30) for regulating the coolant flow from the cooler (21) and / or a bypass (24) to the compressor (12), ……

[Para 0011]

…A liquid coolant, in particular oil, is also fed to the compressor 12 via a line 14.

Eminence Observation:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

[Para 0011]

1 schematically shows a compressor 12 driven by means of a drive 10 via a drive shaft 11, through which **air is drawn in at 13 from the environment and which is compressed in the compressor 12.**

A liquid coolant, in particular oil, is also fed to the compressor 12 via a line 14.

[Para 0012]

This coolant is used for lubrication and cools the sucked and compressed air. **The compressed air / oil mixture is fed via a line 15 leading this to an oil separator 16, in which the compressed air / oil mixture is separated** ……

Eminence Observation:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

Results: #1 EP2458219B1 (Mapping 1.2)

Claim 1 of EP 2484XXX B2

A method of controlling an operating temperature of an air compressor,

the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),
a plurality of independently controlled thermoelectric modules,

separating in the oil separator (3) the air and the oil from one another,

supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,

controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,

controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,

characterized in that the dimension of the controlling member is changed by an external command as necessary.

Excerpts from EP2458219B1

[Para 0012]

This coolant is used for lubrication and cools the sucked and compressed air. **The compressed air / oil mixture is fed via a line 15 leading this to an oil separator 16, in which the compressed air / oil mixture is separated, the compressed air being discharged via the compressed air line 17 and from there being fed to a consumer 19 via a schematically indicated consumer line 18…..**

[Para 0013]

The separated oil is collected in the oil separator 16 and fed to a cooler 21 for cooling via an oil line 20. Between the line 14 leading to the compressor 12 and the oil cooler 21 there is a valve 22 in the coolant flow, to which the oil from the cooler 21 is fed via the line 23. **The cooler 21 is short-circuited via a bypass line 24, which branches off from the line 20 and leads to the valve 22.**

[Para 0015]

Details of the valve 22 are explained in more detail below with reference to FIG. 2. **In the exemplary embodiment shown in FIG. 1, the valve 22 is arranged between the cooler 21 and the compressor 12. Instead of this, an arrangement between the oil separator 16 and the cooler 21 with correspondingly different flow directions is also possible, the bypass line 24 then departing from the valve 22 and being connected to the line 14.**

[Para 0016]

The valve 22 contains an actuating element 31 for a valve element 32 in an essentially tubular housing 30. **It serves to regulate the coolant flow in the direction of arrow 23 coming from the cooler 21 and / or coming from the bypass line 24 according to arrow 24 according to arrow 14 back to the compressor 12.**

Results: #1 EP2458219B1 (Mapping 1.3)

Claim 1 of EP 2484XXX B2

A method of controlling an operating temperature of an air compressor,

the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),
a plurality of independently controlled thermoelectric modules,

separating in the oil separator (3) the air and the oil from one another,

supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,

controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,

controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,

characterized in that the dimension of the controlling member is changed by an external command as necessary.

Excerpts from EP2458219B1

[Para 0014]

…**The temperature and / or quantity of the coolant flow, in particular oil flow, which leads via line 14 to the compressor 12, is controlled by means of the valve 22, depending on the oil temperature.**

[Para 0023]

This can counteract the risk of condensate formation during compression if the temperature of the coolant is too low, by increasing the oil temperature, at the same time reducing the wear on the compressor 12. Too high oil temperatures can lead to oil loss via the compressed air line and to faster aging of the oil. This can be countered automatically by increased cooling and thus lower coolant temperature. At low ambient temperatures and high air humidity there is a risk that the compressed air in the compressed air line cools down considerably and this leads to icing when the line is relaxed and, above all, in the connected consumer 19.

[Para 0015]

In the exemplary embodiment shown in FIG. 1, the valve 22 is arranged between the cooler 21 and the compressor 12. Instead of this, an arrangement between the oil separator 16 and the cooler 21 with correspondingly different flow directions is also possible, the bypass line 24 then departing from the valve 22 and being connected to the line 14.

[Para 0016]

It serves to regulate the coolant flow in the direction of arrow 23 coming from the cooler 21 and / or coming from the bypass line 24 according to arrow 24 according to arrow 14 back to the compressor 12.

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, …..

Results: #1 EP2458219B1 (Mapping 1.4)

Claim 1 of EP 2484XXX B2

A method of controlling an operating temperature of an air compressor,

the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),
a plurality of independently controlled thermoelectric modules,

separating in the oil separator (3) the air and the oil from one another,

supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,

controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,

controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,

characterized in that the dimension of the controlling member is changed by an external command as necessary.

Excerpts from EP2458219B1

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. **This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43.**

[Para 006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible.

Results: #1 EP2458219B1 (Mapping 1.5)

Claim 2 of EP 2484XXX B2

A method as claimed in claim 1, characterized by constricting the flow of the oil supplied to cooling by the thermostatic valve based on a change in dimension of a controlling member.

Excerpts from EP2458219B1

[Para 0006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible. Is the ambient temperature z. B. high and the humidity low, the coolant temperature can be low. **Accordingly, the working area of the thermostatic working element is adjusted in such a way that an earlier opening with accompanying earlier cooling takes place due to electrical heating. Conversely, e.g. B. when the ambient temperature is low and the ambient air has a high level of humidity, taking into account this state, a change in the working range of the thermostatic working element can be achieved by controlled heating such that the actuating element with the valve element opens the valve later and thus a higher temperature of the Coolant, especially oil, allows.**

IEBS Comment:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

Results: #1 EP2458219B1 (Mapping 1.6)

Claim 3 of EP 2484XXX B2

A method as claimed in claim 1 or 2, characterized by **the controlling member including an expansion material, whereby the change in dimension of the controlling member is based on thermal expansion of the expansion material and the dimension of the controlling member is changed by changing the temperature of the controlling material by an external command.**

Excerpts from EP2458219B1

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. **This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43.**

[Para 006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible.

Eminence Observation:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

Results: #1 EP2458219B1 (Mapping 1.7)

Claim 4 of EP 2484XXX B2

A method as claimed in claim 3, characterized by the external command controlling an additional heating to heat the expansion material.

Excerpts from EP2458219B1

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. **This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43**.

[Para 006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible.

Eminence Observation:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

Results: #1 EP2458219B1 (Mapping 1.8)

Claim 5 of EP 2484XXX B2

A method as claimed in any one of the preceding claims, characterized by the thermostatic valve being a three-way thermostatic valve which, in a manner controllable by external control, separates a necessary amount of the oil to flow to the cooling and past it.

Excerpts from EP2458219B1

[Para 0006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible. Is the ambient temperature z. B. high and the humidity low, the coolant temperature can be low. Accordingly, **the working area of the thermostatic working element is adjusted in such a way that an earlier opening with accompanying earlier cooling takes place due to electrical heating. Conversely, e.g. B. when the ambient temperature is low and the ambient air has a high level of humidity, taking into account this state, a change in the working range of the thermostatic working element can be achieved by controlled heating such that the actuating element with the valve element opens the valve later and thus a higher temperature of the Coolant, especially oil, allows.**

Eminence Observation:

The device for controlling the temperature is disclosed and operates in a similar manner. However, the method of operation is not explicitly disclosed.

Results: #1 EP2458219B1 (Mapping 1.9)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Claims]

1. Device for controlling the coolant flow in compressors (12) as a function of influencing variables, such as the coolant temperature or the like, with a valve which can be switched into the coolant circuit between the compressor (12) and a cooler (21) for the coolant and through which the coolant can flow (22) with an actuating element (31) for a valve element (32) in the valve housing (30) for regulating the coolant flow from the cooler (21) and / or a bypass (24) to the compressor (12), characterized in that Actuating element (31) is designed as an electrically heated thermostatic working element (42).

[Para 0011]

1 schematically shows a compressor 12 driven by means of a drive 10 via a drive shaft 11, through which **air is drawn in at 13 from the environment and which is compressed in the compressor 12.**

A liquid coolant, in particular oil, is also fed to the compressor 12 via a line 14.

[Para 0012]

This coolant is used for lubrication and cools the sucked and compressed air. **The compressed air / oil mixture is fed via a line 15 leading this to an oil separator 16,** in which the compressed air / oil mixture is separated, the compressed air being discharged via the compressed air line 17 and from there being fed to a consumer 19 via a schematically indicated consumer line 18 , For example, tools operated with compressed air can be considered as consumers, e.g. B. hammers, impact wrenches, grinders, chisels or the like.

Results: #1 EP2458219B1 (Mapping 1.10)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Para 0012]

This coolant is used for lubrication and cools the sucked and compressed air. **The compressed air / oil mixture is fed via a line 15 leading this to an oil separator 16, in which the compressed air / oil mixture is separated, the compressed air being discharged via the compressed air line 17** and from there being fed to a consumer 19 via a schematically indicated consumer line 18 , For example, tools operated with compressed air can be considered as consumers, e.g. B. hammers, impact wrenches, grinders, chisels or the like.

[Para 0013]

The separated oil is collected in the oil separator 16 and fed to a cooler 21 for cooling via an oil line 20. Between the line 14 leading to the compressor 12 and the oil cooler 21 there is a valve 22 in the coolant flow, to which the oil from the cooler 21 is fed via the line 23. The cooler 21 is short-circuited via a bypass line 24, which branches off from the line 20 and leads to the valve 22.

Results: #1 EP2458219B1 (Mapping 1.11)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Para 0014]

…The temperature and / or quantity of the coolant flow, in particular oil flow, which leads via line 14 to the compressor 12, is controlled by means of the valve 22, depending on the oil temperature. In addition to this, the valve 22 and thus the temperature and / or amount of the oil is controlled via the control device 25 as a function of various external influencing variables, in particular environmental variables, this also taking place automatically.

[Para 0023]

…By means of the described device for controlling the coolant flow, the temperature of the coolant, in particular of the oil, can thus be regulated as a function of the load condition of the compressor 12 and additionally automatically as a function of ambient conditions, such as air temperature, air humidity, air pressure or the like. **This can counteract the risk of condensate formation during compression if the temperature of the coolant is too low, by increasing the oil temperature, at the same time reducing the wear on the compressor 12. Too high oil temperatures can lead to oil loss via the compressed air line and to faster aging of the oil. This can be countered automatically by increased cooling and thus lower coolant temperature. At low ambient temperatures and high air humidity there is a risk that the compressed air in the compressed air line cools down considerably and this leads to icing when the line is relaxed and, above all, in the connected consumer 19.**

Results: #1 EP2458219B1 (Mapping 1.12)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Para 0015]

Details of the valve 22 are explained in more detail below with reference to FIG. 2. **In the exemplary embodiment shown in FIG. 1, the valve 22 is arranged between the cooler 21 and the compressor 12. Instead of this, an arrangement between the oil separator 16 and the cooler 21 with correspondingly different flow directions is also possible, the bypass line 24 then departing from the valve 22 and being connected to the line 14.**

[Para 0016]

The valve 22 contains an actuating element 31 for a valve element 32 in an essentially tubular housing 30. **It serves to regulate the coolant flow in the direction of arrow 23 coming from the cooler 21 and / or coming from the bypass line 24 according to arrow 24 according to arrow 14 back to the compressor 12.**

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43.

Results: #1 EP2458219B1 (Mapping 1.13)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Para 006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible.

[Para 0023]

It is also advantageous that the reaction time of the valve 22 to the transition to the open position is shortened. **By means of the described device for controlling the coolant flow, the temperature of the coolant, in particular of the oil, can thus be regulated as a function of the load condition of the compressor 12 and additionally automatically as a function of ambient conditions, such as air temperature, air humidity, air pressure or the like. This can counteract the risk of condensate formation during compression if the temperature of the coolant is too low, by increasing the oil temperature, at the same time reducing the wear on the compressor 12. Too high oil temperatures can lead to oil loss via the compressed air line and to faster aging of the oil.** This can be countered automatically by increased cooling and thus lower coolant temperature. At low ambient temperatures and high air humidity there is a risk that the compressed air in the compressed air line cools down considerably and this leads to icing when the line is relaxed and, above all, in the connected consumer 19.

Results: #1 EP2458219B1 (Mapping 1.14)

Claim 6 of EP 2484XXX B2

Equipment for controlling an operating temperature of an air compressor,

the equipment comprising a compressor element (1) for compressing a mixture of air and oil,

an oil separator (3) for separating the air and the oil from one another,

an oil cooler (8) for cooling the separated oil when necessary and

a thermostatic valve (11) which, on the basis of the temperature of the separated oil, is configured to direct a necessary amount of the oil to flow to the oil cooler (8) and to a bypass pipe (10) so as to bypass the oil cooler (8) as necessary,

wherein the thermostatic valve is provided with a controlling member based on a change in dimension and

characterized in that the equipment includes a control unit (12) where to at least one piece of input data (13, 14, 15) influencing determination of the magnitude of the condensation point of the air contained in the oil reservoir (3) or the operating temperature (16) of the oil reservoir (3) are input as input data,

whereby the control unit (12) is configured to send a control command (18) to the thermostatic valve (11) to change the dimension of the controlling member as necessary.

Excerpts from EP2458219B1

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. **This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43.**

[Para 006]

The energization of the electrically heated thermostatic working element is controlled by a control device which is supplied with environmental parameters such as temperature, air humidity or the like which are detected by sensors and which generates control signals corresponding to a programmed characteristic diagram, which are supplied to the thermostatic working element, in dependence thereon the electrical heating is controlled accordingly. In this way, an automatic adjustment in the coolant circuit is possible.

Results: #1 EP2458219B1 (Mapping 1.15)

Claim 9 of EP 2484XXX B2

Equipment as claimed in claim 8, characterized in that the thermostatic valve (11) comprises an electric resistor (23) for heating the expansion element (20).

Excerpts from EP2458219B1

[Para 0019]

The valve 22 has an electrically heated thermostatic working element 42 as the actuating element 31, which in a housing 43 contains an expansion material, e.g. B. wax contains, into which a working piston 44 plunges deeply in a manner not visible, which is led out of the housing 43 in FIG. 2 above. The heating of the working element 42 is formed from at least one electrical heating element (not shown further), which is contained in the interior of the working piston 44. **This electrical heating element is energized and controlled via the control line 26 by means of the control device 25, so that the internal heating of the working piston 44 influences the expansion material in the interior of the housing 43.**

Eminence Observation:

It is disclosed that that the valve comprises an electrical heating element. However, it is not explicitly disclosed that the electrical heating element is an electric resistor.

Results: #1 EP2458219B1 (Mapping 1.16)

Claim 10 of EP 2484XXX B2

Equipment as claimed in any one of claims 6 to 9, characterized in that the thermostatic valve is a three-way thermostatic valve configured by external control in a controllable manner to separate a necessary amount of the oil to flow to the oil cooler (8) and to the bypass pipe (10) so as to bypass the oil cooler (8).

Excerpts from EP2458219B1

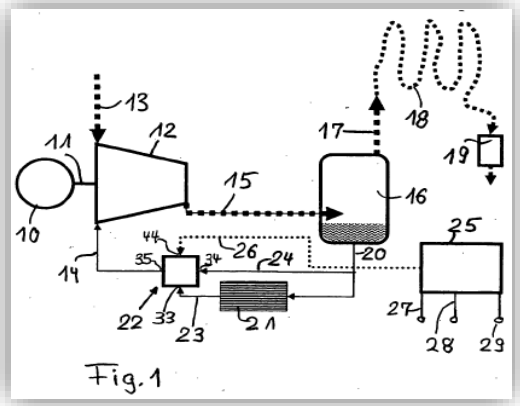


Fig. 1

[Para 0013]

The separated oil is collected in the oil separator 16 and fed to a cooler 21 for cooling via an oil line 20. Between the line 14 leading to the compressor 12 and the oil cooler 21 **there is a valve 22 in the coolant flow, to which the oil from the cooler 21 is fed via the line 23. The cooler 21 is short-circuited via a bypass line 24, which branches off from the line 20 and leads to the valve 22.**

[Para 0015]

…In the exemplary embodiment shown in FIG. 1, the valve 22 is arranged between the cooler 21 and the compressor 12. **Instead of this, an arrangement between the oil separator 16 and the cooler 21 with correspondingly different flow directions is also possible, the bypass line 24 then departing from the valve 22 and being connected to the line 14.**

Eminence Observation:

In this reference, the valve is arranged between the cooler and the compressor, so in this case it has two inlets and a single outlet (from image and text). It is also disclosed that the valve could also be arranged between the separator and cooler and the bypass line departs from the valve, so in this case, the valve would have one inlet and two outlets in a manner similar to that of the subject patent.

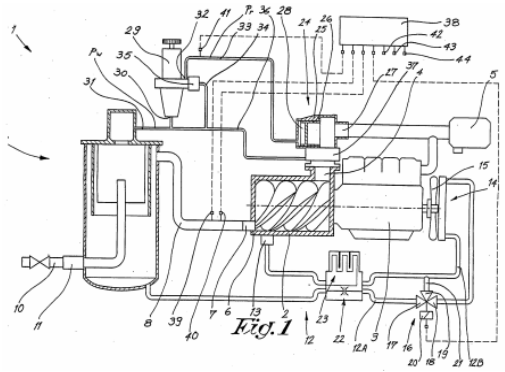
Results: #2 EP1937977B1 - Cited (Bibliographic)

Title	Publication Date	Filing Date	Priority Date	Assignee	Inventor(s)
DEVICE TO PREVENT THE FORMATION OF CONDENSATE IN COMPRESSED GAS AND COMPRESSOR UNIT EQUIPPED WITH SUCH A DEVICE	July 2, 2008	October 16, 2006	October 21, 2005	ATLAS COPCO	Ivo Daniels et. Al

Abstract

Device to prevent the formation of condensate in compressed gas coming from an oil-injected compressor element (2) which is connected to an oil separator (9) which is connected to the above-mentioned compressor element (2) by means of an injection pipe (12), and whereby a cooler (14) is provided in the above-mentioned injection pipe (12) which can be bridged by means of a bypass (21), characterized in that it is provided with a controlled mixing valve (16) which is connected to the above-mentioned injection pipe (12) and to the above-mentioned bypass (21), and with a control device (38) for controlling said mixing valve (16) for the adjustment of the compressed air temperature (Tw) by adjusting the flow distribution through the mixing valve (16).

Relevant Image



Results: #2 EP1937977B1 - Cited (Mapping)

Claim 1 of EP 2484XXX B2

A method of controlling an operating temperature of an air compressor,

the method comprising compressing by a compressor element (1) a mixture of air and oil and supplying it to an oil separator (3),
a plurality of independently controlled thermoelectric modules,

separating in the oil separator (3) the air and the oil from one another,

supplying oil to an oil circulating pipe (7) for the purpose of returning it to the compressor element and supplying at least some of the oil flowing in the oil circulating pipe (7) to cooling when necessary,

controlling the operating temperature (17) of the compressor by the amount of oil to be supplied to cooling such that the operating temperature is as low as possible but nevertheless so high that no condensation point is reached,

controlling the amount of oil to be supplied to cooling by a thermostatic valve (11) based on a change in dimension of a controlling member,

characterized in that the dimension of the controlling member is changed by an external command as necessary.

Excerpts from EP1937977B1

[Description]

According to the invention, the compressor unit 1 is provided with a device to prevent the formation of condensate in the compressed gas, which device is provided with a mixing valve 16 which is in this case made as a controlled 3-way mixing valve with an inlet 17, two outlets 18 and 19 and an electric actuator 20 and which is connected to the above-mentioned injection pipe 12 with its inlet 17 and with an outlet 18, in particular to the first part 12A of this injection pipe 12 which extends between the oil separator 9 and the cooler 14.

[Description]

In the first part 12A of the above-mentioned injection pipe 12 is provided a thermostatic bypass valve 22 of a known type between the oil separator 9 and the mixing valve 16 which can bridge the above-mentioned cooler 14 as it is connected to the above-mentioned second part 12B of the injection pipe 12.

[Description]

To this end, the mixing valve 16 can also be used as a thermostatic bypass valve to bridge the cooler 14, **to which end the control device 38 can be provided with an algorithm which controls the mixing valve 16 in such a manner that the entire flow of the inlet 17 is sent through the bypass 21 as long as the oil temperature remains under a preset value.**

[Description]

The output value of step 151 is applied to a signal generator 153 which produces an appropriate control signal which serves as the output value 0 of the control device 38 and which is applied to the electric actuator 20 of the mixing valve 16 in order to adjust the flow distribution of the lubricating and cooling oil through this mixing valve 16, and to thus adjust the compressed air temperature in accordance with the load condition and the ambient conditions of the compressor unit 1.

Search Approach

Methodology

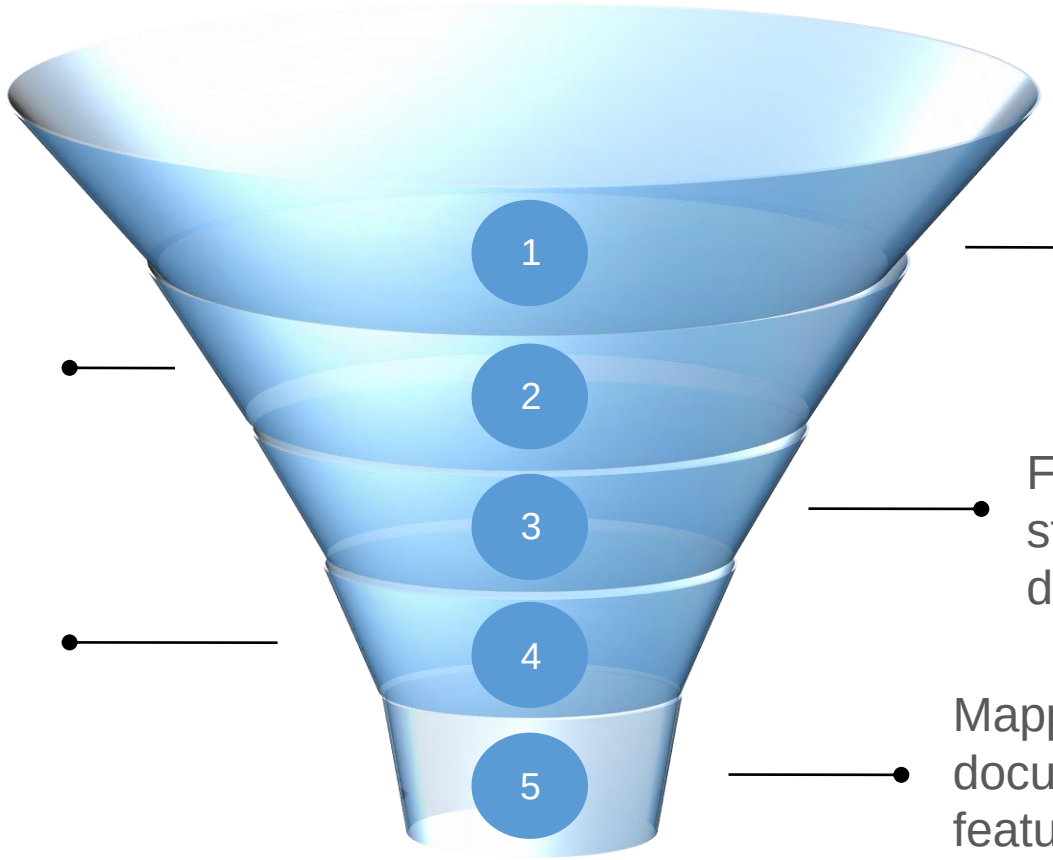
Keywords

Classifications

Strings

Search Approach: Methodology

Following search approach was implemented during the execution of the search:



1. Analyzing the subject matter of target patent.
2. Identifying relevant keywords and classifications pertaining to the subject matter.
3. Framing indicative search strategies for searching in the databases
4. Analysis of retrieved patent/non-patent documents
5. Mapping excerpts from relevant documents against the claim features of target patent.

Search Approach: Keywords

Terms	Keywords
COMPRESSOR	(COMPRESSOR? OR (((PRESSURE+ OR COMPRES+) 3D (DEVICE? OR MACHINE? OR APPARATUS)) 10D (AIR OR GAS?? OR FLUID?)))
OIL SEPARATOR	(((OIL OR LUBRICA+ OR FLUID) 5D (SEPARATE+ OR RESERVOIR?)) OR ((PRESSURE OR MIXING) 3D CHAMBER)))
TEMPERATURE CONTROL	(TEMPERAT+ OR HEAT OR THERMAL) 7D (CONTROL OR MONITOR+ OR MANAG+ OR)
THERMOSTATIC VALVE	(THERMOSTAT+ OR WAX OR ((THERMAL OR EXPAND+ OR CONTRACT+) 3D (ELEMENT? OR VALV?)))
EXTERNAL CONTROL	(((EXTERNAL OR ACTIVE+ OR COMPUTER+ OR AUTOMAT+) 5D (CONTROL+ OR COMMAND+ OR SIGNAL)) OR ALGORITHM+ OR PROGRAM+)
OIL	(OIL OR FLUID+ OR LUBRICA+)

Search Approach: Classifications (1.1)

IPC/CPC	Definitions
F04C29/04	COMPONENT PARTS, DETAILS OR ACCESSORIES OF PUMPS OR PUMPING INSTALLATIONS, NOT PROVIDED FOR IN GROUPS F04C18/00 - F04C28/00-HEATING; COOLING ; HEAT INSULATION
F04B39/0207	COMPONENT PARTS, DETAILS, OR ACCESSORIES, OF PUMPS OR PUMPING SYSTEMS, NOT OTHERWISE PROVIDED FOR IN, OR OF INTEREST APART FROM, GROUPS F04B25/00 - F04B37/00 -LUBRICATION -WITH LUBRICATION CONTROL SYSTEMS
F04B39/06	COMPONENT PARTS, DETAILS, OR ACCESSORIES, OF PUMPS OR PUMPING SYSTEMS, NOT OTHERWISE PROVIDED FOR IN, OR OF INTEREST APART FROM, GROUPS F04B25/00 - F04B37/00 -COOLING ; HEATING; PREVENTION OF FREEZING
F04B49/10	CONTROL -OTHER SAFETY MEASURES
F04C29/021	COMPONENT PARTS, DETAILS OR ACCESSORIES OF PUMPS OR PUMPING INSTALLATIONS, NOT PROVIDED FOR IN GROUPS F04C18/00 - F04C28/00-LUBRICATION ; LUBRICANT SEPARATION -CONTROL SYSTEMS FOR THE CIRCULATION OF THE LUBRICANT
F04C29/026	COMPONENT PARTS, DETAILS OR ACCESSORIES OF PUMPS OR PUMPING INSTALLATIONS, NOT PROVIDED FOR IN GROUPS F04C18/00 - F04C28/00-LUBRICATION ; LUBRICANT SEPARATION -LUBRICANT SEPARATION

Search Approach: Classifications (1.2)

IPC/CPC	Definitions
F04B2201/0402	PUMP PARAMETERS-CARTER PARAMETERS-LUBRICATING OIL TEMPERATURE
F04B2201/0403	PUMP PARAMETERS-CARTER PARAMETERS-CARTER HOUSING TEMPERATURE
F04B2201/0801	PUMP PARAMETERS-CYLINDER OR HOUSING PARAMETERS-TEMPERATURE
F04C18/16	ROTARY-PISTON PUMPS SPECIALLY ADAPTED FOR ELASTIC FLUIDS -OF INTERMESHING-ENGAGEMENT TYPE, I.E. WITH ENGAGEMENT OF CO-OPERATING MEMBERS SIMILAR TO THAT OF TOOTHED GEARING-OF OTHER THAN INTERNAL-AXIS TYPE-WITH TOOTHED ROTARY PISTONS-WITH HELICAL TEETH, E.G. CHEVRON-SHAPED, SCREW TYPE FOR NON-PARALLEL AXES OF MOVEMENT F04C18/48
F04C2270/225	CONTROL; MONITORING OR SAFETY ARRANGEMENTS-TEMPERATURE DIFFERENCE-CONTROLLED OR REGULATED
F05C2251/042	MATERIAL PROPERTIES-THERMAL PROPERTIES-EXPANSIVITY

Search Approach: Strings

S.No	String
1	**Full Text:** (OIL SEPARATOR) **AND** (TEMPERATURE CONTROL) **AND** ((THERMOSTATIC VALVE) ***AND*** **Title, Abstract and claims:** (COMPRESSOR)
2	**Full Text:** ((OIL) **P** (TEMPERATURE CONTROL)) **AND** ((THERMOSTATIC VALVE) **10D** (EXTERNAL CONTROL)) ***AND*** **Title, Abstract and claims:** (COMPRESSOR)
3	**Full Text:** ((COMPRESSOR) **15D** (TEMPERATURE CONTROL)) **AND** ((THERMOSTATIC VALVE) **S** (EXTERNAL CONTROL))
4	**Full Text:** ((THERMOSTATIC VALVE) **P** (EXTERNAL CONTROL)) ***AND*** **RELEVANT IPC/CPC Classifications**

Search Approach: Databases used

Patent databases

- Thomson innovation
- Questel orbit
- LexisNexis
- PatBase
- Free Patents Online
- USTO
- Espacenet
- InPass
- J-PlatPat
- KIPRIS
- CNIPA
- CIPO
- CAS REGISTRY/DGENE/PCTGEN/USGENE hosted by STN
- GENSEQ
- Patome
- Patentscope

Non-Patent database

- Google Scholar
- Science Direct
- CiteseerX
- Scopus
- Web of Science, Thomson Innovation
- LexisNexis
- Springer link
- JournalSeek
- Embase
- Ei Compendex
- INSPEC
- Non-Patent Conference proceedings
- ACM digital library
- IOP
- 99 Resources
- Open Thesis
- Dissertation Abstract Online

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