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(54) **A gas fire**

(57) A gas fire comprising a housing internally provided with a combustion chamber, a gas burner unit fixedly disposed within said housing, a gas supply control unit, a gas supply line extendi ng between the gas supply control unit and the gas burner unit, an exhaust duct connected to the upper side of the combustion chamber for exhausting the combustion gases, and rotating means for rotating the housing comprising the gas burner unit about a vertical axis of rotation. The gas supply line comprises two gas supply pipe sections connecting to each other, which can rotate with respect to each other about an axis which coincides with the axis of rotation. One gas supply pipe section is positioned on the side of the gas supply control unit, comprising an upwardly extending first pipe section, and the other gas supply pipe section being positioned on the side of the gas burner unit, comprising a downwardly extending second pipe section. The second pipe section and the first pipe section enclose one another along a particular length of overlap, along at least which length of overlap the gas supply line extends concentrically with the axis of rotation of the housing.

FIG. 2

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Description

[0001] The invention relates to a gas fire comprising a housing internally provided with a combustion chamber, a gas burner unit fixedly disposed within said housing, a gas supply control unit, a gas supply line extending between the gas supply control unit and the gas burner unit, an exhaust duct connected to the upper side of the combustion chamber for exhausting the combustion gases, and rotating means for rotating the housing comprising the gas burner unit about a vertical axis of rotation, said gas supply line comprising two gas supply pipe sections connecting to each other, which can rotate with respect to each other about an axis which coincides with said axis of rotation, one gas supply pipe section being positioned on the side of the gas supply control unit, comprising an upwardly extending first pipe section, and the other gas supply pipe section being positioned on the side of the gas burner unit, comprising a downwardly extending second pipe section.

[0002] A so-called open-type gas fire is marketed under the name of "Fuga". With open-type gas fires, oxygen required for the combustion in the combustion chamber of gas flowing out of the gas burner unit is taken from the space in which the gas fire is disposed. What is special about the "Fuga" type gas fire is the fact that the housing comprising the gas burner unit is rotatable about a vertical axis, which implies that besides the housing also the flame image rotates, so that said flame image may be directed at any desired angle in a particular space. The housing is to that end rotatably mounted on a base in which the gas supply control unit is accommodated. A flexible hose extends as the gas supply line from a coupling on said gas supply control unit to the gas burner unit, to which it eccentrically connects by means of a coupl i ng. The flexibility of the hose as well as the gas-tightness of the couplings between the hose on the one hand and the gas supply control unit and the gas burner unit on the other hand come into play when the housing is rotated. For various reasons such a gas fire does not meet the requirements that obtain for a gas fire suitable for the closed-circuit combustion process, wherein the required oxygen is not taken from the atmosphere directly surrounding the gas fire but from the atmosphere surrounding the space in which the gas fire is disposed. Generally, said latter atmosphere is the open air. Closed-type gas fires are characterized by a housing which is substantially closed. The aforesaid reasons are in particular connected with the use of rubber in the couplings and in the flexible hose that are accommodated in the base, which is considered to constitute a potential risk of leakage of gas by the inspection authorities.

[0003] A gas fire as referred to in the introduction is described in US patent No. 3,482,821, more specifically with reference to Figures 7-10 thereof. Said gas fire is likewise of the open type and forms part of a two-sided open fireplace comprising a rotatable housing. On one side of the housing, conventional combustion of solid fuel such as coal or wood takes place, whilst on the other side of the housing the gas fire is present. The supply of gas takes place via a gas supply line comprising two gas pipe sections, which extend concentrically with the axis of rotation of the housing in part, and which connect to each other via a rotatable coupling. In practice the reliability as regards the gastightness of such rotatable couplings has appeared to be low, partially because of the fact that it is necessary to use a rubber sealing material, so that the use of such couplings for closed-type gas fires is not permitted by the inspection authorities.

[0004] The object of the invention is to provide a simplified construction of the gas fire as referred to in the introduction, which is not only suitable for the open-circuit combustion process but also, and even especially so, for use with a closed-type gas fire. A typical difference between the closed-circuit combustion process and the open-circuit combustion process is the higher efficiency of the closed-circuit combustion process and the lower gas consumption that is connected therewith. Because of this the closed-circuit combustion process, unlike the open-circuit combustion process, is quite suitable for use as the main heat source for a space in which a gas fire is disposed. Characteristic of the invention is the fact that the second pipe section and the first pipe section enclose one another along a particular length of overlap, along at least which length of overlap the gas supply line extends concentrically with the axis of rotation of the housing. This obviates the need to use a flexible hose as (part of) the gas supply line and rubber-containing couplings in order to enable rotation of the housing comprising the gas burner uni t. In this way an important reason why prior art gas fires comprising a rotating combustion chamber are not suitable for use with the closed-circuit combustion process is removed, which does not exclude anyway that the gas fire according to the invention is not suitable for use with the open-circuit combustion process. Since the gas supply line is concentric with the axis of rotation of the housing over the length of the overlap, neither one of the two pipe sections will have to deform during rotation of the housing, which considerably reduces the risk of a gas leak. The gas supply line connection according to the invention is very simple as regards its construction.

[0005] It is strongly preferred for the first pipe section and the second pipe section to enclose one another without coming into contact with each other, which implies that a gap is present between the first pipe section and the second pipe section. Air required for the combustion process can be sucked in via said gap because of the Venturi effect. The intake of air in this manner, which air is to be mixed with the gas being supplied to the gas burner unit, is in particular advantageous for the combustion process because the gas is pre-heated by the intake air. This has a favourable effect at least as regards the colour of the flame image.

[0006] Preferably, the second pipe section encloses

the first pipe section, so that the gap between the inner side of the second pipe section and the outer side of the first pipe section is open at the bottom side in the case of a contactless situation in accordance with the preceding preferred embodiment, and air can be sucked in from below through said gap because of the Venturi effect that occurs in the direction of the gas flow through the gas supply line.

[0007] A very suitable length of the overlap at least equals the dimension of the gap between the inner side of the second pipe section and the outer side of the first pipe section. In this way an adequate intake of oxygen is obtained.

[0008] In addition to that it is very advantageous if the dimension of the gap between the first pipe section and the second pipe section is at least 1 mm, more preferably at least 2 mm, since such dimensions enable contactless and thus noiseless rotation, without any wear, of the first pipe section and the second pipe section with respect to each other. In addition, a gap of such dimensions facilitates the fitting of the two pipe sections over one another during installation.

[0009] Preferably, the gas supply control unit is accommodated in a base, with respect to which the housing can rotate about the axis of rotation, and the direct surroundings of the length of overlap between the first and the second pipe section are present within the housing, which is sealed gastight from said base. The effect that is achieved in this manner is that less stringent requirements need to be made with regard to the gasti ghtness of such a base, which can also be considered as a housing, since the air within the base is not used for the combustion process. An important additional advantage of this is that the temperature within the base will run up less high, thus decreasing the thermal load on the gas supply control unit.

[0010] In another advantageous embodiment, the exhaust duct comprises two exhaust duct sections connecting to each other, an upper, first exhaust duct section of which is fixedly disposed in the space in which the gas fire is present, and a lower, second exhaust duct section is fixedly connected to the housing, wherein the first exhaust duct section and the second exhaust duct section are rotatable with respect to each other about an axis that coincides with the axis of rotation. The advantages that are obtained in this manner are comparable to the advantages described above with regard to the use of two gas supply pipe sections connecting to each other, which pipe sections are rotatable with respect to each other about an axis that coincides with the axis of rotation. After all, the advantageous features described above also obviate the need to use flexible elements for the exhaust duct, which flexible elements involve a certain safety risk, especially as the gas fire gets older. The second exhaust duct section will rotate along with the housing upon rotation of the housing, whilst the first exhaust duct section does not rotate along therewith, without this leading to problems at the connection between the two exhaust duct sections.

[0011] In order to adapt the gas fire in an advantageous manner for use of the closed-circuit combustion principle, the exhaust duct is preferably surrounded along at least part of its length by a concentric portion of an air supply duct, which opens near the gas burner unit. Through said air supply duct, oxygen required for the combustion process is supplied to the gas burner unit from a location outside the space in which the gas fire is disposed.

[0012] Also with regard to the air supply duct, major advantages can be obtained if the air supply duct comprises two air supply duct sections connecting to each other, an upper, first air supply duct section of which is fixedly disposed in the space in which the gas fire is present, and a lower, second air supply duct section is fixedly connected to the housing, wherein the first air supply duct section and the second air supply duct section are rotatable with respect to each other about an axis that coincides with the axis of rotation. Similar to the situation with regard to the exhaust duct in the preferred embodiment as described above, only the second air supply duct section will rotate along with the housing, which will not give rise to any spatial problems upon rotation of the housing, because of the concentric connection of the two air supply duct sections.

[0013] A very advantageous embodiment of the gas fire according to the invention is characterized in that the air supply duct extends fully outside the housing. As a result, essential constructional differences between a housing of a gas fire for the open-circuit combustion process and a housing of a gas fire for the closed-circuit combustion process are not required, so that it is possible to use substantially identical housings for both combustion processes.

[0014] In order to prevent false air being sucked into the air supply duct at the transition between the two air supply duct sections, the air supply duct is preferably surrounded by a clamping strap at the location where the two air supply duct sections connect to each other, which clamping strap engages at least one of the two air supply duct sections and which is lined with a sealing material on the inner side. Felt is a very suitable sealing material.

[0015] The invention will be explained in more detail hereinafter by means of the description of a preferred embodiment of a gas fire according to the invention. In the description, reference will be made to the following Figures:

Figure 1 is a schematic, vertical cross-sectional view of a preferred embodiment of a gas fire according to the invention;

Figure 2 is a schematic, vertical cross-sectional view perpendicular to the view of Figure 1 of the gas fire that is shown in Figure 1;

Figure 3 is a more detailed vertical, cross-sectional view of the area indicated at III in Figure 1;

Figure 4 is a more detailed vertical, cross-sectional view of the area indicated at IV in Figure 1; and
Figure 5 is a vertical cross-sectional view comparable to the view of Figure 4 of another preferred embodiment of a gas fire according to the invention.

[0016] The Figures 1 and 2 are two schematic, mutually perpendicular, vertical cross-sectional views of a gas fire 1 which, as will become apparent hereinafter, is suitable for the closed-circuit combustion process. The gas fire 1 comprises a closed housing 2. The interior of the housing 2 can be reached by opening a door (not shown) at the front side 37 of the gas fire 1. The interior of the housing 2 is visible from the outside through a window in said door. Present in the interior of the housing 2, at the bottom side thereof, is a gas burner 7 for creating a flame image above said gas burner. A radiation screen 6 is disposed a limited distance from the rear side of the housing 2. Any excess oxygen is discharged between the radiation screen 6 and the rear side of the housing 2. An exhaust duct 11 connects to the upper side of the housing 2 for exhausting combustion gases, as indicated by the arrows 38, to a location above the ceiling 10 of the space 45 in which the gas fire 1 is disposed.

[0017] A supply duct 12 forming part of a supply line for oxygen extends around said exhaust duct 11. Said supply duct, which starts above the ceiling 10, supplies oxygen to the bottom side of the combustion chamber 5 extending above the gas burner 7, in front of the radiation screen 6, via the tubular supply duct 12 and the bypass supply duct 13 connecting thereto, which likewise forms part of said supply line, as indicated by the arrows 39. Thus the oxygen required for the combustion process above the gas burner 7 is not taken from the space 45 in which the gas fire 1 is disposed, which space extends between the floor 9 on which the gas fire 1 is supported and the ceiling 10, but from a location outside said space, which is typical of the closed-circuit combustion process.

[0018] The housing 2 is supported on a base 8, which can also be considered to be a closed housing, whose wall is likewise provided with a closable opening (not shown), which gives access to the interior of the base 8. Mounted within the base 8 is a gas control block 15, which controls the supply of gas to the gas burner 7 via the gas supply line 40. The gas burner 7 comprises a burner box 21, which is closed at the upper side by a porous ceramic plate 20, through which gas can escape. The gas control block 15, to which gas is supplied via the gas supply line 26, may be arranged for manual operation but it may also be arranged for operation by remote control.

[0019] The housing 2 rests with its bottom side 19 on the upper side 18 of the base 8 via balls 17, which are accommodated in bores that are arranged in regularly spaced-apart relationship along the circumference of a bearing disc extending between the base 8 and the housing 2. All this is shown in Figure 4. A bearing bushing 23 connecting the interior of the chamber 8 to the interior of the housing 2 extends through the upper side 18 of the base 8, through the bearing plate 16 and through the bottom side 19 of the housing 2. The bearing disc 16 and the housing 2 can rotate about said bearing bushing 23, during which rotation the balls 17 roll on the upper side 18 of the base 8. This enables rotation of the housing 2 around the axis of rotation 4 as indicated by the arrow 3. Said rotation can be effected either through manual manipulation of the housing 2 or by means of a separate drive unit (not shown), which can be operated by means of a remote control unit, for example. The gas burner 7 is fixedly connected to the housing 2 (in a manner which is not shown), which implies that the housing 2, the gas burner 7 and possibly a flame image above the gas burner 7 will jointly rotate about the axis of rotation 4. This makes it possible to position the flame image in a desired direction, thus ensuring an optimum view of the flame image at all times, independently of the exact position of the viewer in the space 45 in which the gas fire 1 is disposed.

[0020] In order to enable such a rotation of the housing 2 with the burner 7 about the axis of rotation 4, the gas supply line 40 comprises a pipe 22 having a central axis 41, which is connected to the gas burner 7 in the centre of the bottom side of the burner box 21 thereof, and which extends vertically downwards. The gas supply line 40 further comprises a second pipe section 24 having a central axis 42, which is in direct communication with the gas control block 15 via a horizontal pipe 25, which is connected to the bottom side of the pipe section 24. The central axes 41 and 42 are concentric with each other and are likewise aligned with the axis of rotation 4. The inside diameter of the pipe 22 is greater than the outside diameter of the pipe section 24, as a result of which the latter pipe section 24 can (partially) extend within the bottom side of the pipe 22, with a gap 36 being present between the pipe 22 and the pipe section 24 along a particular length of overlap. The length of said overlap is 20 mm, whilst the dimension of the gap is 2.5 mm. Said values on the one hand effect an adequate intake of oxygen through the gap, as will be explained in more detail yet hereinafter, whilst on the other hand the pipe 22 can easily be slipped over the pipe section 24 upon installation of the gas fire 1, without the pipe 22 and the pipe section 24 coming into contact with each other during rotation with respect to each other, not even if there is a slight degree of eccentricity. Due to the fact that the central axes 41 and 42 and the axis of rotation 4 are mutually aligned, rotation of the housing 2 with the gas burner 7 does not spatially affect the configuration of the gas supply line 40 at all.

[0021] A part 39a of the oxygen that enters the interior of the housing 2 at the mouth 35 of the bypass supply duct 13 will directly be used for the combustion process that takes place above the gas burner 7. The part 39b of the oxygen being supplied will reach the interior of the

base 8 via the bore in the bearing bush 23 (arrow 43), where it will be sucked into the gap 36 as a result of the Venturi effect (arrow 44). Thus, gas being supplied to the gas burner 7 is mixed with oxygen to a limited degree before the gas reaches the gas burner 7, which has a positive effect on the quality of the flame.

[0022] Like the gas supply line 40, the exhaust duct 11 for combustion gases and the supply duct 12 for fresh oxygen are divided into two sections that are rotatable with respect to each other. This will be explained in more detail with reference to Figure 3. The exhaust duct 11 comprises a pipe section 28, which is fixedly connected to the upper side 27 of the housing 2, so that it rotates along with the housing 2 about the axis of rotation. A second pipe section 33 connects to the upper side of the pipe section 28 with some overlap, is, the inside diameter of which second pipe section 33 is slightly greater than the outside diameter of the pipe section 28, as a result of which space is available in the overlap area for accommodating a suitable seal 31 between the two pipe sections. Such a seal 31 may be a fire-resistant cord, for example, provided with a suitable layer of grease. The second pipe section 33 is fixedly connected to the ceiling 10 in a manner which is not shown, and consequently it cannot rotate. Since the central axes of the pipe sections 28 and 33 are concentric with each other on the one hand and, moreover, with the axis of rotation 4 on the other hand, rotation of the housing 2 with the pipe section 28 can take place without any problem, during which rotation the two pipe sections 28 and 33 will continue to correctly connect to each other.

[0023] A similar advantage applies to the supply duct 12 comprising a pipe section 29, which is fixedly connected to the pipe section 28, and a second pipe section 32, whose inside diameter is slightly greater than the outside diameter of the pipe section 29, as a result of which the pipe section 32 can enclose the pipe section 29 in an overlap area between the pipe sections 29 and 32. Fresh oxygen is sucked in via the tubular space between the respective pipe sections 28 and 33 on the one hand and the pipe sections 29 and 32 on the other hand, which oxygen is taken over by the bypass supply duct 13 via the connection 34 to end up at the mouth 35 in the combustion chamber 5 within the housing 2. In order to prevent (false) air being sucked in from the space 45 via a gap that may be present between the pipe sections 29 and 32, a stainless steel clamping strap 30 is fitted round the bottom side of the tube section 32 and the upper side of the tube section 29 at the location where the two pipe sections 29 and 32 connect to each other. The clamping strap 30 is lined with felt 46 on the inner side. Because of the greater diameter of the pipe section 32, the clamping strap 30 clamps down on the outside of the pipe section 32. The elastic properties of the felt material enable the felt material 46 to bridge the difference in outside diameter between the pipe sections 32 and 29, which thus forms an adequate seal of the gap between the pipe sections 29 and 32. In addition to its sealing function, the clamping strap 30 also has a guiding function, imparting radial stiffness to the tube sections 29 and 32.

[0024] Since the fresh air is not supplied to the gas burner 7 via the interior of the housing 2, the design of the housing 2 is quite suitable for use both with the closed-circuit combustion process and with the open-circuit combustion process. In the latter case, the exhaust duct 11 and the bypass supply duct 13 can simply be left out, in which case the mouth 35 is closed, of course. This advantage is basically unrelated to the fact that the gas fire 1 is rotatable about the axis of rotation 4, it could just as well apply to non-rotatable gas fires.

[0025] As an aside it is noted that the gas fire 1 comprises a casing (not shown) substantially consisting of the housing 2 together with the bypass supply duct 13, as well as a decorative pipe (not shown), which is suspended from the ceiling 10 and which encloses the exhaust duct 1 and the supply duct 12 for the greater part. The casing and the decorative pipe have a primarily visual function.

[0026] Figure 5 is a vertical, cross-sectional view, comparable to the view of Figure 4, of another closed-type gas fire according to the invention. Parts that are (substantially) identical to each other are indicated by the same numerals, so that said parts require no additional explanation. An important aspect of the present embodiment is the construction of the bearing bush 61, which has a closed bottom 62, through which a pipe section 603 extends. Above the bottom 62, the pipe section 63 is concentrically enclosed by the pipe section 64, without coming into contact therewith, which pipe section 64 connects to the bottom of the burner box 21. Because of the bottom 62 of the bearing bush 61, the interior of the housing 2 is sealed gastight from the interior of the base 8, so that the ai r/oxygen that is sucked into the pipe section 64 via the gap between the pipe sections 63, 64 comes only from the interior of the housing 2 and not from the interior of the base 8. In the first place, this makes it possible to use a simple construction of the base 8 as regards the gas tightness thereof, whilst in addition the thermal load, in particular on the gas control block 15 within the base 8, is decreased.

Claims

1. A gas fire comprising a housing internally provided with a combustion chamber, a gas burner unit fixedly disposed within said housing, a gas supply control unit, a gas supply line extending between the gas supply control unit and the gas burner unit, an exhaust duct connected to the upper side of the combustion chamber for exhausting the combustion gases, and rotating means for rotating the housing comprising the gas burner unit about a vertical axis of rotation, said gas supply line comprising two gas supply pipe sections connecting to each

other, which can rotate with respect to each other about an axis which coincides with said axis of rotation, one gas supply pipe section being positioned on the side of the gas supply control unit, comprising an upwardly extending first pipe section, and the other gas supply pipe section being positioned on the side of the gas burner unit, comprising a downwardly extending second pipe section, **characterized in that** the second pipe section and the first pipe section enclose one another along a particular length of overlap, along at least which length of overlap the gas supply line extends concentrically with the axis of rotation of the housing.

2. A gas fire according to claim 1, **characterized in that** the first pipe section and the second pipe section enclose one another without coming into contact with each other.

3. A gas fire according to claim 2, **characterized in that** said second pipe section encloses said first pipe section.

4. A gas fire according to any one of the preceding claims, **characterized in that** the length of the overlap at least equals the dimension of a gap between the second pipe section and the first pipe section.

5. A gas fire according to any one of the preceding claims, **characterized in that** the dimension of a gap between the first pipe section and the second pipe section is at least 1 mm, preferably at least 2 mm.

6. A gas fire according to any one of the preceding claims, **characterized in that** the gas supply control unit is accommodated in a base, with respect to which the housing can rotate about the axis of rotation, and **in that** the direct surroundings of the length of overlap between the first and the second pipe section are present within the housing, which is sealed gastight from said base.

7. A gas fire according to any one of the preceding claims, **characterized in that** the exhaust duct comprises two exhaust duct sections connecting to each other, an upper, first exhaust duct section of which is fixedly disposed in the space in which the gas fire is present, and a lower, second exhaust duct section is fixedly connected to the housing, wherein the first exhaust duct section and the second exhaust duct section are rotatable with respect to each other about an axis that coincides with the axis of rotation.

8. A gas fire according to any one of the preceding claims, **characterized in that** the exhaust duct is surrounded along at least part of its length by a concentric portion of an air supply duct, which opens near the gas burner unit.

9. A gas fire according to claim 8, **characterized in that** the air supply duct comprises two air supply duct sections connecting to each other, an upper, first air supply duct section of which is fixedly disposed in the space in which the gas fire is present, and a lower, second air supply duct section is fixedly connected to the housing, wherein the first air supply duct section and the second air supply duct section are rotatable with respect to each other about an axis that coincides with the axis of rotation.

10. A gas fire according to claim 8 or 9, **characterized in that** the air supply duct extends fully outside the housing.

11. A gas fire according to claim 9 or 10, **characterized in that** the air supply duct is surrounded by a clamping strap at the location where the two air supply duct sections connect to each other, which clamping strap engages at least one of the two air supply duct sections and which is lined with a sealing material on the inner side.

12. A gas fire according to any one of the preceding claims, **characterized in that** said housing is at least substantially closed.

FIG. 1

FIG. 2

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FIG. 3

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FIG. 4

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 1937

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	US 3 842 821 A (JURIS A) 22 October 1974 (1974-10-22) * column 3, line 65 - column 4, line 49; figure 9 * ---	1	F24C3/00
A	GB 441 859 A (CHARLES HENRY DENT) 27 January 1936 (1936-01-27) * page 4, line 27 - line 90; figures * ---	1	
A	GB 367 448 A (JOHN ABRAM MOFFAT) 22 February 1932 (1932-02-22) * page 3, line 2 - line 31; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F24C
F24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 January 2004	Vanheusden, J

CATEGORY OF CITED DOCUMENTS

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15-01-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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GB 367448 A	22-02-1932	NONE	

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