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(54) **TEMPERATURE CONTROL MECHANISM**

TEMPERATURREGELMECHANISMUS

MECANISME DE CONTROLE DE TEMPERATURE

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Description

[0001] The present invention is concerned with a temperature control mechanism used in controlling temperature in preferably two compartment refrigerators.

[0002] In refrigerators with fresh food compartment and a freezer compartment, various methods of control are used to secure that such freezer and fresh food compartments remain at desired temperature ranges. In refrigerators where the desired temperature is provided by distributing cool air between various compartments, working periods of the compressor are adjusted in accordance with temperature sensed through thermostatic control device in fresh food compartment or freezer compartment and shutters, mechanic shutter, lids, gates and similar mechanisms are used to adjust air flow by reducing or widening the passage opening between the compartments. In general, adjustment of air passage opening between compartments is carried out by means of thermostatic control at distinct points. In the state-of-the art, there are also refrigerators where the control of air flow and the thermostat is effected from a same point but in such refrigerators additional connection elements located between the adjustment button and shutters to shut air passage opening as well as adjusting the same simultaneously are used. Furthermore, even if the adjustment of both thermostat and of air flow is carried out at the same point to ensure precise in adjustment, shutters are to be regulated by means of a second check.

[0003] In the US patent 3630046, the air flow duct between the freezer and fresh food compartments and damper which is opened or shut by an adjustment button is controlled and the thermostat adjustment is provided by a separate button.

[0004] In the US patent 3656314, air flow is regulated by means of a shutter in the form of letter L located into air passage opening. Control of the shutter and thermostat is ensured at distinct points.

[0005] In the US patent 3866437, air flow is controlled by means of a shutter having the form of letter T located inside the air passage opening. The shutter and thermostat control is carried out at distinct points.

[0006] Another temperature control mechanism is known from US 4009590.

[0007] In the US patent 4296611, shutters located into the air passage way have been divided into two groups at the side of freezer and that of fresh food compartment and opening and closing of dampers and adjusting the thermostat is possible by a single button simultaneously. Connection means between the dampers set at the side of the fresh food compartment and control button exist in the mechanism and a separate adjustment button for dampers is provided at the side of the freezer compartment.

[0008] The object of the present invention is to provide a single temperature control mechanism both to provide a thermostat control to adjust the temperature of the freezer and fresh food compartment and to control the

air flow between those compartments and also to provide a precise adjustment as well.

[0009] Temperature control mechanism realized to attain the object of this invention has been shown in drawings attached herewith, where:

Figure 1 is a schematic view of a refrigerator.

Figure 2 is an exploded view of a temperature control mechanism.

Figure 3 is a schematic fully covered view of a temperature control mechanism.

Figure 4 is a schematic half opened view of a temperature control mechanism.

Figure 5 is a schematic fully opened view of a temperature control mechanism.

Figure 6 is a schematic view of a temperature control mechanism in fast freezing position.

Figure 7 is a sectional view of a temperature control mechanism mounted on a refrigerator.

Figure 8 is a schematic view of a temperature control mechanism comprising a motion transmission means.

[0010] Parts shown in the drawings numbered one by one as follows :

1. Refrigerator
2. Fresh food compartment
3. Freezer compartment
4. Temperature control mechanism
5. Thermostat
6. Air passage opening
7. Thermostat holder
8. Shutter valve
9. Adjustment button
10. Slit
11. Thermostat shaft
12. Shutter valve shaft
13. Shaft bed
14. Motion transmission means.

[0011] Refrigerator (1) comprise a fresh food compartment (2) to preserve food, a freezer compartment (3) to store food by freezing, a temperature control mechanism (4) to adjust the temperature of the freezer (3) and fresh food (2) compartments.

[0012] The temperature control mechanism (4) comprises a thermostat (5) which adjusts the temperature of the fresh food compartment (1), an air passage opening (6) to ensure air passage between the freezer (3) and fresh food (2) compartments, a shutter valve (8) to adjust the air passage opening (6) according to the desired air flow, a thermostat holder (7) that accomodates the thermostat (5) and the said shutter valve (8), an adjustment button (9) for the rotation of the shutter valve (8) at the same time with regulating thermostat (5), a shaft bed (13) located at the centre of the adjustment button (9), a shutter valve shaft (12) to transmit the motion taken from the

shaft bed (13) to the shutter, a thermostat shaft (11) to transmit the motion generated by the shutter shaft (12) to the thermostat (5).

[0013] The circular motion generated by the adjustment button (9) is transmitted without using any auxiliary transmission means to the shaft bed (13) placed on the same axis from the said shaft bed (13) to shutter valve shaft (12) and from this latter to thermostat shaft (11).

[0014] While rotating, the shutter valve (8) is in the form of a helical cam to adjust the air passage opening (6) to a desired size.

[0015] The shutter valve (8) comprises a slit (10) which ensures a limited amount of air from the freezer compartment (3) to the fresh food compartment (2) when the refrigerator needs to consume less power for instance in the vacation mode.

[0016] While the shutter valve (8) is turned via the adjustment button (9) to adjust to the highest allowable temperature degree of the fresh food compartment (2) in vacation mode, the thermostat (5) is adjusted to the minimum position to allow minimum cooling. In this position shutter valve (8) completely closes the air passage opening (6), by means of the slit (10) minimum amount of air passes through the fresh food compartment (2) from the freezer compartment (3). (Figure 3).

[0017] For adjusting fresh food compartment (2) to the lowest allowable temperature value, the shutter valve (8) is rotated via adjustment button (9) to allow maximum air flow from the freezer compartment (3) to the fresh food compartment (2) which makes the air passage opening (6) fully opened, while at the same time the thermostat (5) is adjusted to a value that enables the cooling close to maximum (Figure 5).

[0018] When in the freezer compartment (3) fast freezing is to be performed while the thermostat (5) is adjusted to a threshold value to ensure maximum cooling, at the same time the shutter valve (8) is positioned to partially close air passage opening (6) to ensure fast cooling of the freezer compartment (3) and thus to prevent food that are present in the fresh food compartment (2) to be frozen due to the decrease of temperature in the fresh food compartment more than desired. (Figure 6).

[0019] In another embodiment of the invention, the temperature control mechanism (4) comprises a motion transmission element (14) to locate the thermostat (5) and the shutter valve (8) at distinct places inside the refrigerator (1) to control the performance of the thermostat (5) and the shutter valve (8) from a single point and to transmit the motion created by the adjustment button (9) to shutter valve (8) by connecting the shaft bed (13) which transmits the motion direct to the thermostat shaft (11) in the same time to the shutter valve shaft (12) (Figure 8).

[0020] Adjustment of the thermostat (5) and air flow from the freezer compartment (3) to the fresh food compartment (2) from a single point provides easiness and low cost wise manufacturing process. On the other hand, the special form of the shutter valve (8) allows a precise adjustment of the air flow.

[0021] The temperature control mechanism (4) according to this invention provides the refrigerator to operate efficiently in vacation mode or in fast freezing positions.

Claims

1. A refrigerator (1) comprising a fresh food compartment (2), a freezer compartment (3) and a temperature control mechanism (4), said temperature control mechanism (4) comprises a thermostat (5) to provide adjustment of temperature in the fresh food compartment (2), an air passage opening (6) to provide air passage between the freezer (3) and fresh food (2) compartments, a shutter valve (8) to adjust the air passage opening (6) according to a desired air flow, a thermostat holder (7) to accommodate the thermostat (5) and the shutter valve (8), an adjustment button (9) to rotate the shutter valve (8) with the thermostat (5), a shaft bed (13) located at the centre of the adjustment button (9), a shutter valve shaft (12) to transmit the motion from shaft bed (13) to the shutter valve (8) and a thermostat shaft (11) to transmit the motion generated by the shutter valve shaft (12) to the thermostat (5) said temperature control mechanism (4) being **characterized in that** the shutter valve (8) is in the form of a helical cam to adjust the air passage opening (6) to a desired size while a circular motion is performed around a centre.
2. A refrigerator (1) as in claim 1, **characterized in that** the circular motion generated by the adjustment button (9) is transmitted to shaft bed (13) situated on the same axis from the said shaft bed (13) to shutter valve shaft (12) and from this latter to the thermostat shaft (11), without using any auxiliary transmission means.
3. A refrigerator (1) as in claim 1, **characterized in that** the shutter valve (8) comprises a slit (10) which ensures a limited amount of air from the freezer compartment (3) to the fresh food compartment (2) when the refrigerator (1) needs to consume less power as when in vacation mode.
4. A refrigerator (1) as in claim 1, **characterized in that** when fast freezing is required in the freezer compartment (3), the thermostat (5) is adjusted to a threshold value for maximum cooling, in the same time, the shutter valve (8) is positioned to partially close air passage opening (6) for fast cooling in the freezer compartment (3) and thus to prevent food present in the fresh food compartment (2) to be frozen as a result of decreased temperature in the fresh food compartment (2) unnecessarily.
5. A refrigerator (1) as in claim 1, **characterized in that**

the temperature control mechanism (4) comprises a motion transmission means (14), to accommodate the thermostat (5) and the shutter (8) control of the at distinct places inside the refrigerator (1) to provide performance of the thermostat (5) and the shutter valve (8) from a single point and to transmit the motion created by the adjustment button (9) to shutter valve (8) by connecting the shaft bed (13) which transmits the motion direct to the thermostat shaft (11) in the same time to the shutter valve shaft (12)

Patentansprüche

1. Kühlschrank (1), umfassend ein Fach für frische Lebensmittel (2), ein Tiefkühlfach (3) und einen Temperatursteuermechanismus (4), wobei der Temperatursteuermechanismus (4) ein Thermostat (5) umfasst, das die Einstellung der Temperatur im Fach für frische Lebensmittel (2) erlaubt, eine Luftdurchlassöffnung (6), die einen Luftdurchlass zwischen dem Tiefkühlfach (3) und dem Fach für frische Lebensmittel (2) ermöglicht, ein Absperrorgan (8), das die Luftdurchlassöffnung (6) entsprechend einer gewünschten Luftströmung einstellt, eine Thermostathalterung (7) zum Unterbringen des Thermostats (5) und des Absperrorgans (8), einen Einstellknopf (9) zum Drehen des Absperrorgans (8) zusammen mit dem Thermostat (5), ein Wellenlager (13) in der Mitte des Einstellknopfes (9), eine Absperrorganwelle (12) zum Übertragen der Bewegung vom Wellenlager (13) auf das Absperrorgan (8), und eine Thermostatwelle (11) zum Übertragen der Bewegung, die von der Absperrschieberwelle (12) erzeugt wird, auf das Thermostat (5), und wobei der Temperatursteuermechanismus (4) **dadurch gekennzeichnet, dass** das Absperrorgan (8) die Form eines schraubenförmigen Nockens aufweist, um die Luftdurchlassöffnung (6) auf eine gewünschte Größe einzustellen, wobei er eine Kreisbewegung um einen Mittelpunkt herum vollzieht.
2. Kühlschrank (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Kreisbewegung, die von dem Einstellknopf (9) erzeugt wird, auf das Wellenlager (13) auf derselben Achse wie vom Wellenlager (13) zur Absperrorganwelle (12) übertragen wird, und von dieser auf die Thermostatwelle (11), ohne dass zusätzliche Übertragungsmittel verwendet werden.
3. Kühlschrank (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Absperrorgan (8) einen Schlitz (10) umfasst, der sicherstellt, dass eine begrenzte Menge an Luft vom Tiefkühlfach (3) zum Fach für frische Lebensmittel (2) gelangt, wenn der Kühlschrank (1) weniger Energie benötigt als im Urлаbsmodus.

4. Kühlschrank (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** im Falle einer Schnellgefrierung im Tiefkühlfach (3) das Thermostat (5) auf einen Schwellenwert für maximales Kühlen eingestellt ist, wobei gleichzeitig das Absperrorgan (8) derart angeordnet ist, dass es zwecks Schnellkühlung des Tiefkühlfachs (3) die Luftdurchlassöffnung (6) teilweise verschließt, und auf diese Weise verhindert, dass Lebensmittel im Fach für frische Lebensmittel (2) aufgrund einer gesenkten Temperatur im Fach für frische Lebensmittel (2) unnötig gefroren werden.

5. Kühlschrank (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Temperatursteuermechanismus (4) ein Bewegungsübertragungsmittel (14) umfasst, das die Steuerung des Thermostats (5) und des Absperrorgans (8) an bestimmten Orten im Inneren des Kühlschranks (1) aufnimmt, um die Leistung des Thermostats (5) und des Absperrorgans (8) von einem einzelnen Punkt aus bereitzustellen, und um die Bewegung, die vom Einstellknopf (9) erzeugt wird, auf das Absperrorgan (8) zu übertragen, indem das Wellenlager (13), das die Bewegung direkt auf die Thermostatwelle (11) überträgt, gleichzeitig mit der Absperrorganwelle (12) verbunden wird.

Revendications

1. Un réfrigérateur (1) comprenant un compartiment de denrées fraîches (2), un compartiment congélateur (3) et un mécanisme de contrôle de température (4), ledit mécanisme de contrôle de température (4) comprend un thermostat (5) pour permettre l'ajustement de la température dans le compartiment de denrées fraîches (2), un orifice de passage de l'air (6) pour fournir un passage d'air entre le congélateur (3) et des compartiments de denrées fraîches (2), un clapet d'obturation (8) pour régler l'ouverture du passage d'air (6) selon le débit d'air souhaité, un porteur de thermostat (7) pour recevoir le thermostat (5) et le clapet d'obturation (8), un bouton de réglage (9) pour faire pivoter le clapet d'obturation (8) avec le thermostat (5), un lit d'arbre (13) situé au centre du bouton de réglage (9), un arbre de clapet d'obturation (12) pour transmettre le mouvement du lit d'arbre (13) au clapet d'obturation (8) et un arbre de thermostat (11) pour transmettre le mouvement généré par l'arbre de clapet d'obturation (12) au thermostat (5), **caractérisé en ce que** le clapet d'obturation (8) est sous la forme d'une came hélicoïdale pour ajuster l'ouverture du passage de l'air (6) à la taille désirée lorsqu'un mouvement circulaire est effectué autour d'un centre.
2. Un réfrigérateur (1) selon la Revendication 1, **caractérisé en ce que** le mouvement circulaire généré

par le bouton de réglage (9) est transmis au lit d'arbre (13) situé sur le même axe que celui dudit lit d'arbre (13) à l'arbre de clapet d'obturation (12) et que celui de cette dernière à l'arbre de thermostat (11), sans utiliser aucun moyen auxiliaire de transmission.

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3. Un réfrigérateur (1) selon la Revendication 1, **caractérisé en ce que** le clapet d'obturation (8) comprend une fente (10) qui assure une quantité limitée d'air provenant du compartiment congélateur (3) pour le compartiment des denrées fraîches (2) lorsque le réfrigérateur (1) a besoin de consommer moins d'électricité que lorsqu'il en mode vacances. 10
4. Un réfrigérateur (1) selon la Revendication 1, **caractérisé en ce que en ce que** lorsque la congélation rapide est nécessaire dans le compartiment congélateur (3), le thermostat (5) est ajusté à une valeur seuil pour le refroidissement maximum, en même temps, le clapet d'obturation (8) est bien placé pour fermer partiellement l'ouverture de passage de l'air (6) pour le refroidissement rapide dans le compartiment congélateur (3) et donc pour éviter que les aliments présents dans le compartiment des denrées fraîches (2) soient gelés en raison de la diminution de température dans le compartiment des denrées fraîches (2) inutilement. 15
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5. Un réfrigérateur (1) selon la Revendication 1, **caractérisé en ce que** le mécanisme de contrôle de la température (4) comprend un moyen de transmission de mouvement (14), pour accueillir contrôle du thermostat (5) et de l'obturateur (8) aux lieux distincts à l'intérieur du réfrigérateur (1) pour fournir des performances du thermostat (5) et du clapet d'obturation (8) à partir d'un seul point et pour transmettre le mouvement créé par le bouton de réglage (9) du clapet d'obturation (8) en reliant le lit d'arbre (13) qui transmet le mouvement direct à l'arbre du thermostat (11) en même temps à l'arbre de clapet d'obturation (12). 30
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Figure 1

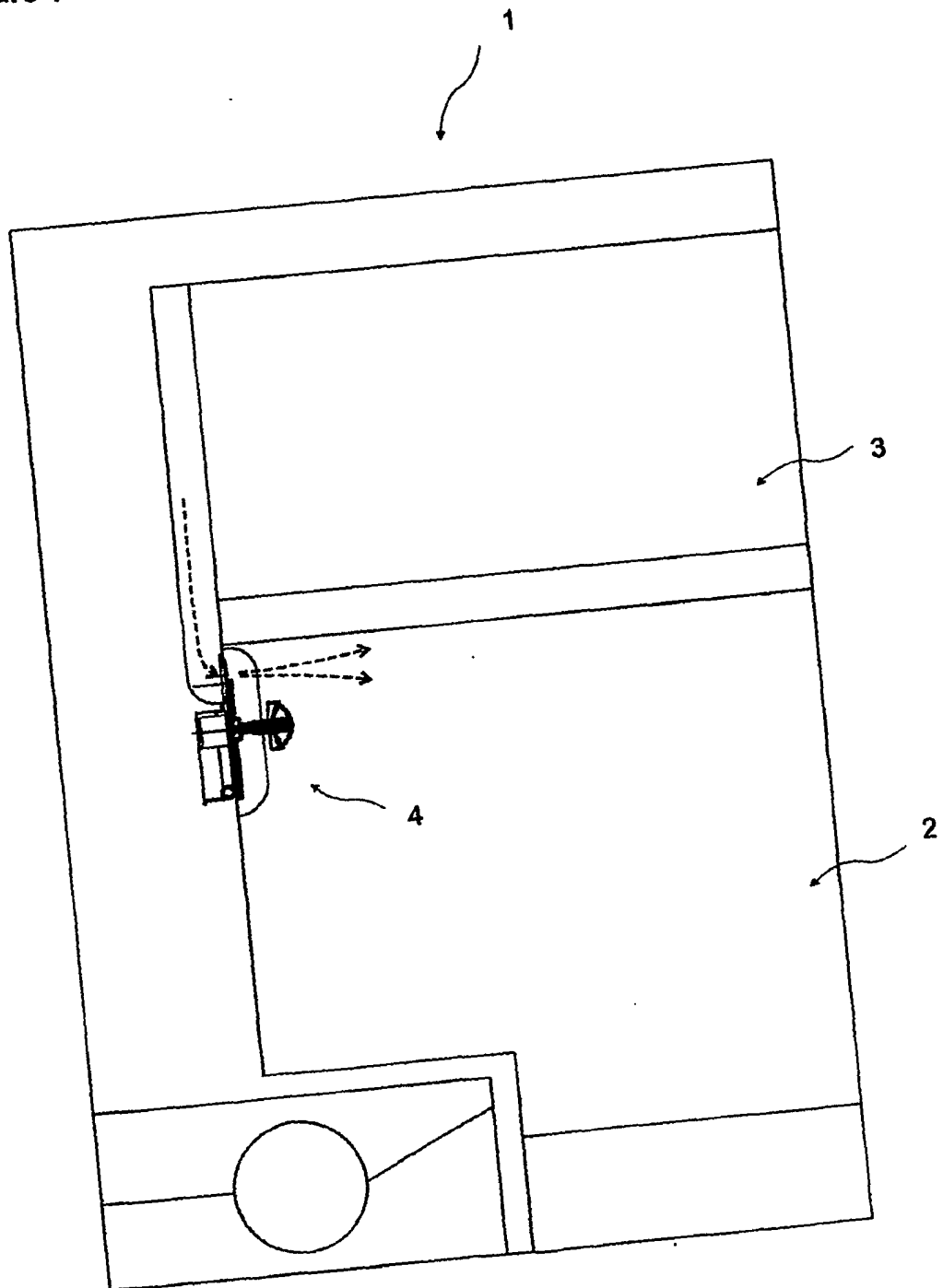


Figure 2

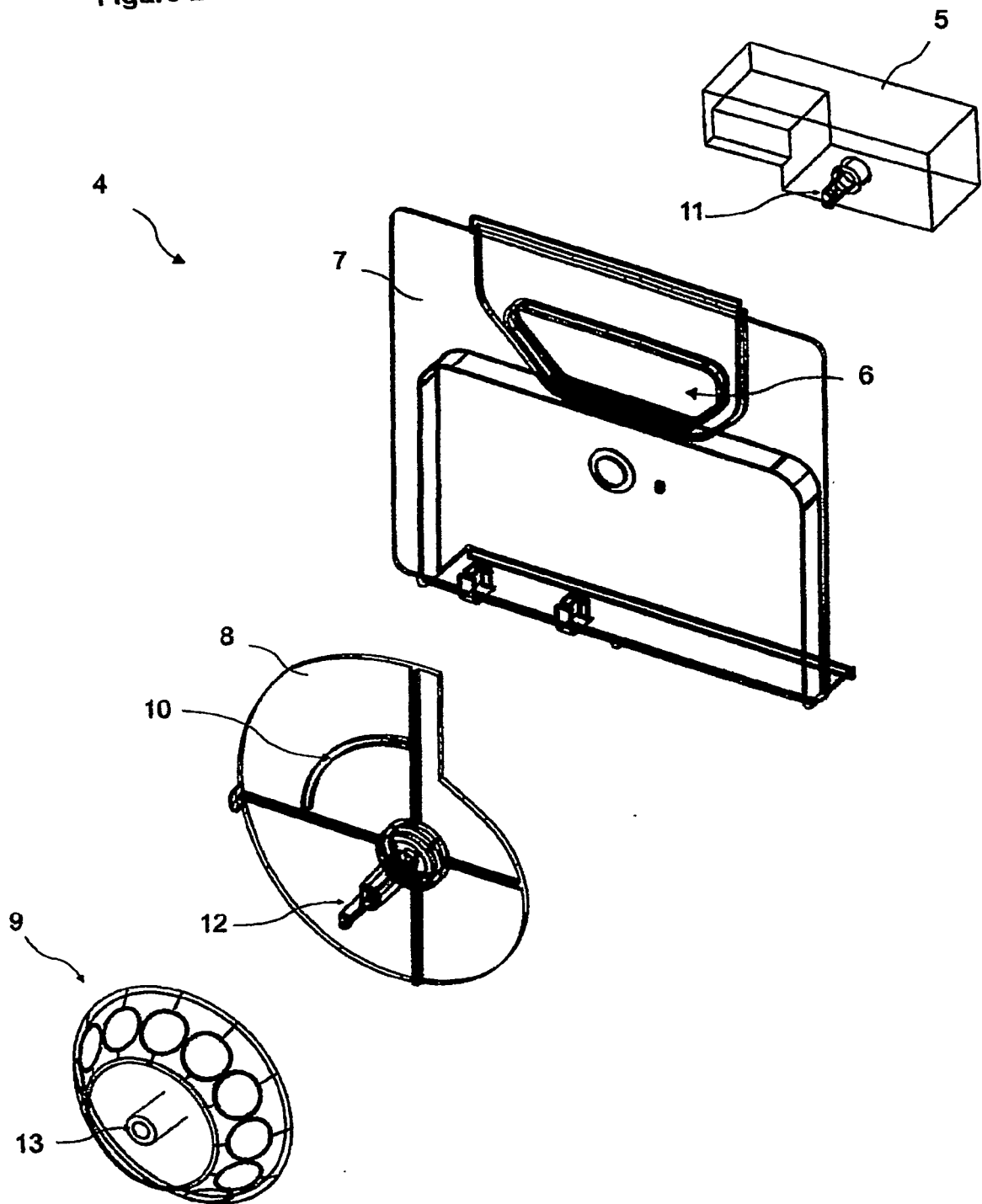


Figure 3

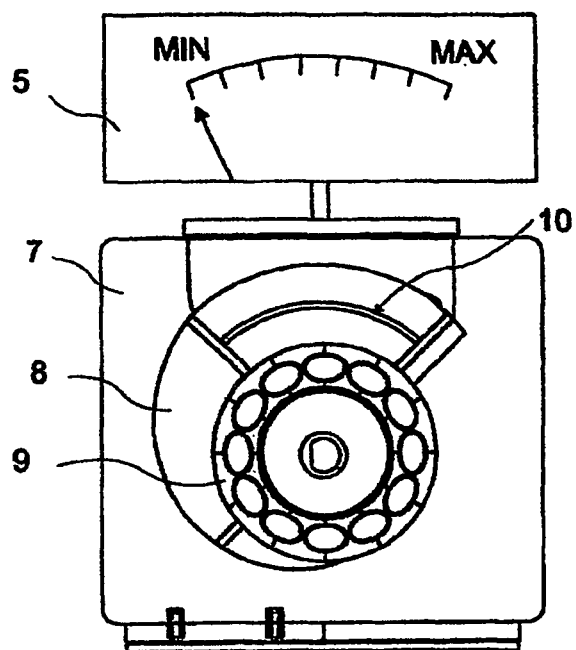


Figure 4

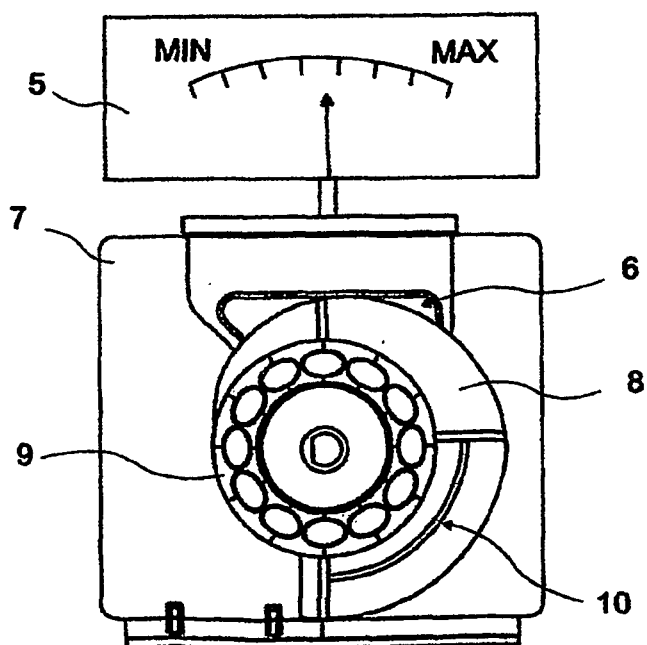


Figure 5

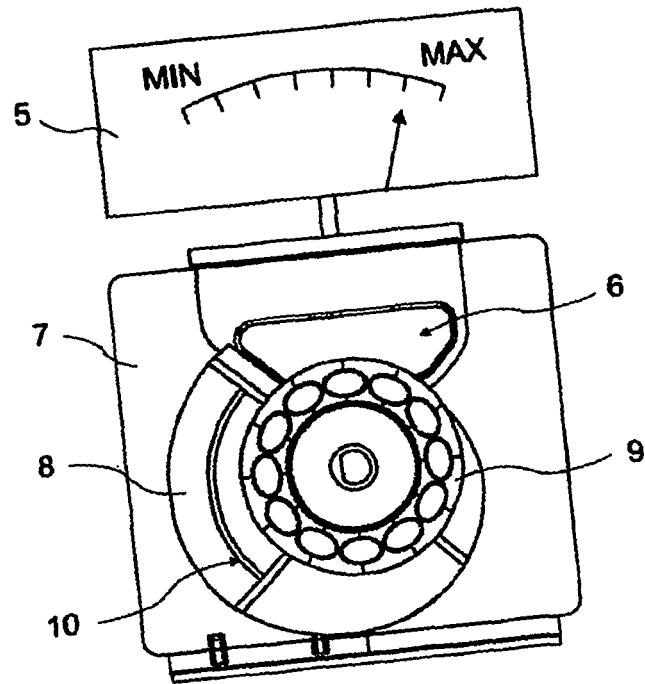


Figure 6

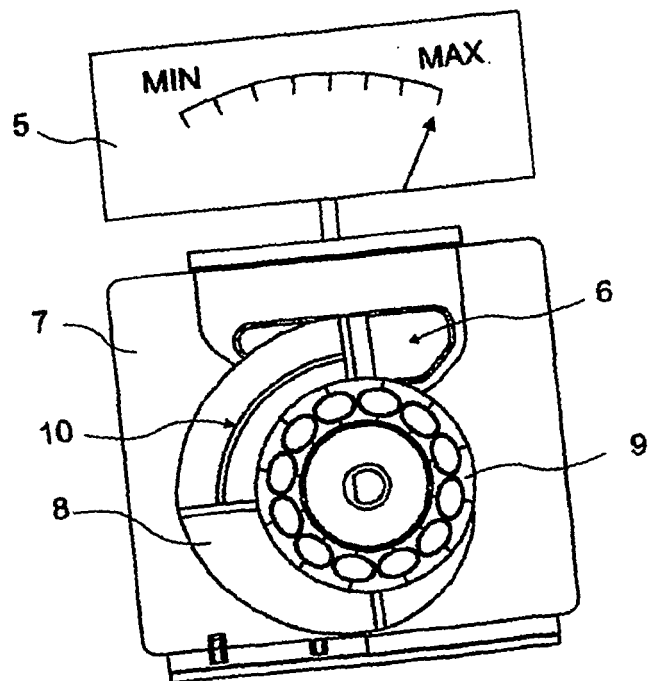


Figure 7

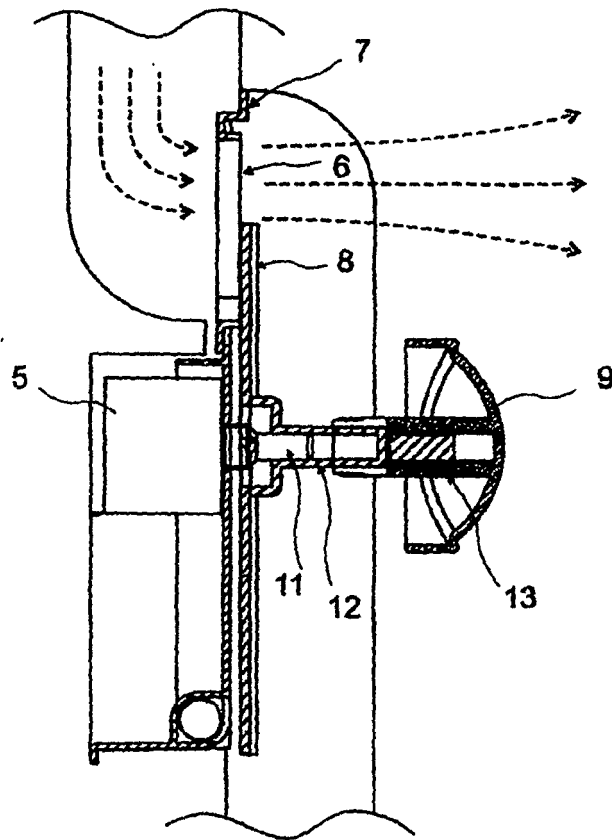
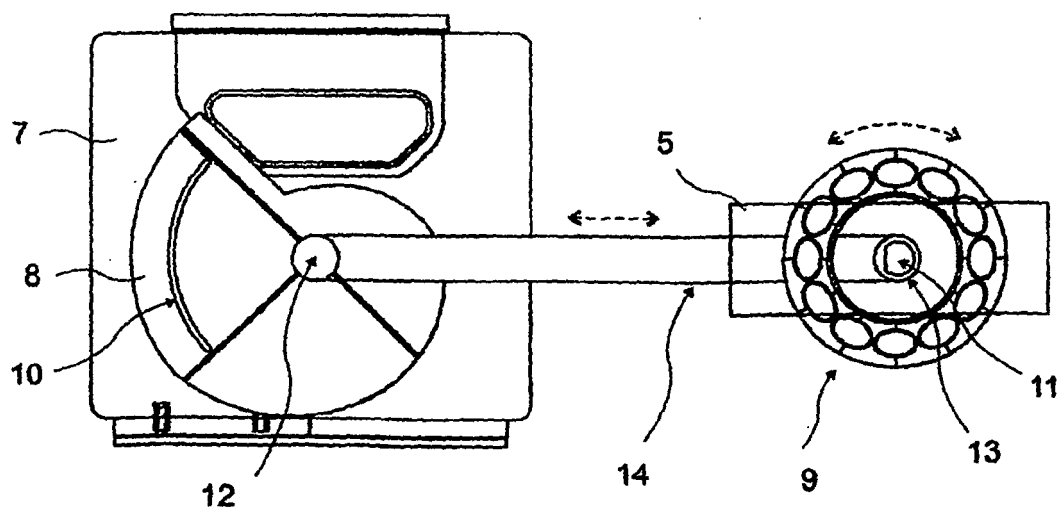


Figure 8



REFERENCES CITED IN THE DESCRIPTION

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