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(54) **High speed circular knitting machine with a floss blowing and heat dissipating apparatus**

Hochgeschwindigkeitsrundstrickmaschine mit einer Faserabfällenluftblas- und
Wärmeabfuhrvorrichtung

Métier à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et dissiper la chaleur

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a high speed circular knitting machine having a floss blowing and heat dissipating apparatus according to the preamble of claim 1.

BACKGROUND OF THE INVENTION

[0002] Operation of a conventional circular knitting machine generally includes the steps of yarn supplying, knitting and fabric winding. During knitting operation the cylinder rotates about the center of the circular knitting machine. There are cams surrounding the cylinder that have tracks to direct needles located in the needle troughs of the cylinder to move up and down. Meanwhile sinkers are moved forwards in correspondance to the needles to proceed with the knitting operation. In order to smooth the knitting operation, the supplying yarns must be stretched tightly. The yarns often generate lint or floss during operations of yarn sinking, yarn directing and yarn feeding. If the floss is not removed, it tends to clog various elements of the circular knitting machine and affect the smoothness of knitting operation, and even shorten the life span of the circular knitting machine. Moreover, if the floss and the yarns are woven into the fabric, fabric defects are formed and fabric quality is impacted. In addition, during knitting operation, constant friction occurs between the needles and the troughs of the cylinder, and a high temperature over 90 degrees centigrade is often generated. Such a high temperature causes heat expansion that affects operation of various elements. The yarns also could not withstand such a high temperature, which results in yarn rupturing and defective finished products.

[0003] To remedy the aforesaid problems, many floss blowing or heat dissipating apparatus have been developed. For instance, U.S. patent No. 5,737,942 entitled "MEANS FOR DETERRING LINT AND DEBRIS ACCUMULATION ON THE KNITTING ELEMENTS OF A CIRCULAR KNITTING MACHINE" has a curved plate interposed between a horizontal frame plate and a circular frame plate and a straddle seat to form an air chamber. Through an air pump and an air supply hose, pressurized air is delivered into the air chamber. The pressurized air is dispersed naturally to the cylinder and other elements through an annular gap formed between the straddle seat and the circular frame plate to blow away the floss and achieve a cooling effect. While the conventional technique mentioned above can blow away the floss and disperse heat, it still has drawbacks remained to be overcome, notably the pressurized air has to fill the air chamber before blowing to the cylinder through the annular gap above the straddle seat. As the air chamber is closed on three sides and open on an upper side (the upper side of the straddle seat being open), the pressurized air is dispersed through the gap above the straddle seat and

lost before the air chamber is filled. Hence the effect of floss blowing and cooling is not desirable. The air pump has to be operated at the maximum capacity to generate more pressurized air faster to achieve the desired result.

This causes overloading of the air pump. When the circular knitting machine is operated over a long period of time, overloading of the air pump generates high temperature and shortens the lift span. Therefore it takes a higher cost to meet the purpose of floss blowing and cooling. This does not make economic sense.

[0004] Another U.S. patent No. 6,199,408 entitled "Cooling apparatus for knitting components" includes a cover located between an intermediate ring and a lower ring, and a cylindrical chamber formed between a needle-selecting actuator and the cover. There is a ventilator fan located on the cover to draw external air into the chamber. Channeling by an opening of the chamber enables dissipating heat generated on the cylinder and the surrounding operation elements. However, it also has the same drawbacks as U.S. patent No. 5,737,942, but fares even worse in terms of the effect of floss blowing and cooling effect. All the problems of the conventional techniques, such as poor floss blowing and cooling effect, and overloading of the air pump, are still pending to be resolved.

[0005] DE 32 19 467 A1 discloses a circular knitting machine according to the preamble of claim 1. Despite various efforts in the prior art, there still exists a need to further improve the floss blowing and cooling effect of circular knitting machines.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a high speed circular knitting machine according to the preamble of claim 1, having an improved floss blowing and cooling effect.

[0007] According to the present invention there is provided a high speed circular knitting machine having a floss blowing and heat dissipating apparatus. The high speed circular knitting machine has a plurality of air vents to converge pressurized air to generate strong airflow to blow away the floss from those locations where the floss most likely accumulates such as the straddle seats, cylinder and needles. Thereby usage of the pressurized air can be reduced, and the life span of the airflow generator can be extended. Temperature generated due to friction between the cylinder troughs and needles is lower. An optimal cooling effect can be achieved.

[0008] To achieve the foregoing object, the floss blowing and heat dissipating apparatus for high speed circular knitting machines according to the invention has a cylinder in a circular knitting machine rotating about a axis in the center. The cylinder has a plurality of needle troughs. Each needle trough holds a needle or a sinker. The cylinder is surrounded by a circular frame plate mounted onto a frame plate bracket and a plurality of straddle seats mounted onto a horizontal frame plate. Each of the straddle seats has a cam to guide and direct the needle to

move up and down to perform a knitting operation. The floss blowing and heat dissipating apparatus includes an airflow generator to generate pressurized air which is delivered through an air directing hose, and a plurality of annular ducts located on the periphery of the cylinder and the straddle seats. The annular ducts have a passage with openings on two ends and a plurality of air vents close to the cylinder and the straddle seats. The air vents communicate with the passage. At least one air intake connector is provided to bridge the annular ducts to channel the pressurized air to the passage. Thereby the pressurized air can be ejected through the air vents and blow forcefully towards the straddle seats, cylinder and needles to carry away the floss and heat accumulated thereon.

[0009] The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is a plane view of the invention installed on a high speed circular knitting machine.

FIG. 2 is a fragmentary perspective view of a first embodiment of the invention.

FIG. 3 is another fragmentary perspective view of the first embodiment of the invention viewing from another angle.

FIG. 4 is a fragmentary perspective view of the first embodiment of the invention showing the air intake connector and the annular duct in a connecting condition.

FIG. 5 is a fragmentary sectional view of the first embodiment of the invention showing the annular duct and surrounding facilities.

FIG. 6 is a fragmentary sectional view of the first embodiment of the invention showing the fastening structure of the annular duct.

FIG. 7 is a fragmentary sectional view of the first embodiment of the invention showing air intake and air ejection of the annular duct.

FIG. 8 is a fragmentary perspective view of a second embodiment serving to improve an understanding of the invention.

FIG. 9 is a fragmentary perspective view of a third embodiment serving to improve an understanding of

the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] Please refer to FIGS. 1 through 6 for a first embodiment of a circular knitting machine having a floss blowing and heat dissipating apparatus according to the invention. The circular knitting machine 1 has a cylinder 16 which can rotate about a center axis. The cylinder 16 has a plurality of needle troughs 18, and each of the needle troughs 18 holds a needle 17 or a sinker (not shown in the drawings). The cylinder 16 is surrounded by a circular frame plate 13 mounted onto a frame plate bracket 12 and a plurality of straddle seats 11 mounted onto a horizontal frame plate 14. The frame plate bracket 12 is mounted onto a holding ring 15. Each of the straddle seats 11 has a cam (not shown in the drawings). When the cylinder 16 rotates, the cam drives the needle 17 up and down to perform a knitting operation. The floss blowing and heat dissipating apparatus 10 includes an airflow generator 60 which may be a blower or an air pump to generate pressurized air to be delivered through an air directing hose 61, a plurality of annular ducts 20 which are located on the periphery of the cylinder 16 and straddle seats 11, and mounted beneath the circular frame plate 13 through an anchor rack 21. The annular ducts 20 have a passage 40 with two open ends. The annular ducts 20 close to the cylinder 16 and straddle seats 11 have a plurality of air vents 22 communicating with the passage 40. At least one air intake connector 30 is provided to bridge the annular ducts 20. The air intake connector 30 has an air inlet 31 to channel the pressurized air into the passage 40. The junctures of the air intake connector 30 and the annular ducts 20 have connection ports 32 and 33 that are coupled through a connection duct 50 (referring FIG. 4). Aside from connecting the annular ducts 20 through the air intake connector 30, they also may be coupled directly through the connection duct 50. By means of the construction set forth above, the pressurized air can be ejected forcefully through the air vents 22 towards the straddle seats 11, cylinder 16 and needles 17 to carry away the accumulating floss and heat.

[0012] Refer to FIG. 7 for air intake and ejection of the annular ducts in the first embodiment. The pressurized air ejected through the air vents 22 mainly is directed to an upper inclined surface of the straddle seats 11 so that the pressurized air can be diverted or refracted upwards towards the cylinder 16 and needles 17 to carry away the floss and heat accumulating on the straddle seats 11, cylinder 16 and needles 17.

[0013] Refer to FIG. 8 for a second embodiment which serves to improve the understanding of the invention. The embodiment differs from the first embodiment in that the air inlet 31 is formed directly on one annular duct 20, and in that the annular ducts 20 are coupled tightly by a connection duct 50. Hence the pressurized air can be

ejected forcefully through the air vents 22 towards the straddle seats 11, cylinder 16 and needles 17 to carry away the floss and heat accumulating thereon.

[0014] Refer to FIG. 9 for a third embodiment which serves to improve the understanding of the invention. This embodiment differs from the first embodiment in that only one annular duct 20 is provided beneath the circular frame plate 13. The annular duct 20 also has an air inlet 31 to channel the pressurized air to the air vents 22 for ejection forcefully towards the straddle seats 11, cylinder 16 and needles 17 to carry away the floss and heat accumulating thereon.

[0015] While the preferred embodiment of the invention has been set forth for the purpose of disclosure, modifications of the disclosed embodiment of the invention as well as other embodiments thereof may occur to those skilled in the art. Accordingly, the appended claims are intended to cover all embodiments which do not depart from the spirit and scope of the invention.

Claims

1. A high speed circular knitting machine having a floss blowing and heat dissipating apparatus, said high speed circular knitting machine (1) having a cylinder (16) rotating about a center axis, the cylinder (16) having a plurality of needle troughs each holding a needle (17) or a sinker, and being surrounded by a circular frame plate (13) mounted onto a frame plate bracket (12) and a plurality of straddle seats (11) mounted onto a horizontal frame plate (14), each of the straddle seats (11) having a cam to drive the needle (17) up and down while the cylinder (16) rotates to perform knitting operation, said floss blowing and heat dissipating apparatus comprising:

an airflow generator (60) to generate pressurized air which is delivered through an air directing hose (61); and
a plurality of annular ducts (20) which are located on the periphery of the cylinder (16) and the straddle seats (11) and have a passage (40) which has two open ends, and have a plurality of air vents (22) on the annular ducts (20) close to the cylinder (16) and the straddle seats (11) communicating with the passage (40);

characterized in that said floss blowing and dissipating apparatus further comprises at least one air intake connector (30) bridging the annular ducts (20) and having an air inlet (31) to channel the pressurized air to the passage (40); wherein the pressurized air is ejected through the air vents (22) to blow forcefully towards the straddle seats (11), the cylinder (16) and the needle (17) to carry away floss and heat accumulating thereon.

2. The high speed circular knitting machine having a floss blowing and heat dissipating apparatus of claim 1, wherein the air intake connector (30) and the annular ducts (20) are coupled through a connection duct (50).
3. The high speed circular knitting machine having a floss blowing and heat dissipating apparatus of claim 1, wherein the annular ducts (20) are coupled through a connection duct (50).
4. The high speed circular knitting machine having a floss blowing and heat dissipating apparatus of any of the preceding claims, wherein the pressurized air ejected through the air vents (22) is directed to an upper inclined surface of the straddle seats (11) so that the pressurized air is diverted upwards towards the cylinder (16) and the needle (17) to carry away the floss and heat accumulating thereon.
5. The high speed circular knitting machine having a floss blowing and heat dissipating apparatus of any of the preceding claims, wherein the annular ducts (20) are mounted beneath the circular frame plate (13) through an anchor rack (21).
6. The high speed circular knitting machine having a floss blowing and heat dissipating apparatus of any of the preceding claims, wherein the airflow generator (60) is selectively a blower or an air pump.

Patentansprüche

1. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung, welche Hochgeschwindigkeits-Rundstrickmaschine (1) einen Zylinder (16) aufweist, der sich um eine zentrale Achse dreht, wobei der Zylinder (16) eine Mehrzahl von Nadelwannen, die jeweils eine Stricknadel (17) oder eine Einschließpaline aufnehmen und von einem kreisförmigen Rahmenblech (13) umgeben sind, das auf einen Rahmenblech-Träger (12) montiert ist, und eine Mehrzahl von Klammersitzen (11) aufweist, die auf ein horizontales Rahmenblech (14) montiert sind, wobei jeder der Klammersitze (11) einen Nocken bzw. Steuerkörper aufweist, um die Nadel (17) aufwärts und abwärts zu treiben, während sich der Zylinder (16) dreht, um einen Strickvorgang auszuführen, welche Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung umfasst:

einen Luftströmungserzeuger (60), um Druckluft zu erzeugen, die über einen Lufteitschlauch (61) angegeben wird; und

eine Mehrzahl von ringförmigen Röhren (20), die sich auf dem Umfang des Zylinders (16) und den Klammersitzen (11) befinden und einen Kanal (40) aufweisen, der zwei offene Enden aufweist, und die eine Mehrzahl von Luftauslasslöchern (22) auf den ringförmigen Röhren (20) in der Nähe des Zylinders (16) und der Klammersitze (11) aufweisen, welche mit dem Kanal (40) in Verbindung stehen;

dadurch gekennzeichnet, dass die Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung außerdem zumindest ein Lufteinlass-Verbindungsstück (30) umfasst, welches die ringförmigen Röhren (20) miteinander verbindet und einen Lufteinlass (31) aufweist, um die Druckluft in den Kanal (40) durchzulassen; wobei die Druckluft über die Luftauslasslöcher (22) ausgestoßen wird, um kräftig gegen die Klammersitze (11), den Zylinder (16) und die Nadeln (17) zu blasen, um Faserabfälle und eine Wärmeansammlung darauf zu beseitigen.

2. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung nach Anspruch 1, wobei das Lufteinlass-Verbindungsstück (30) und die ringförmigen Röhren (20) über ein Verbindungsrohr (50) miteinander verbunden sind.

3. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung nach Anspruch 1, wobei die ringförmigen Röhren (20) über ein Verbindungsrohr (50) miteinander verbunden sind.

4. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung nach einem der vorherigen Ansprüche, wobei die Druckluft, die über die Luftauslasslöcher (22) ausgestoßen wird, auf eine obere geneigte Fläche der Klammersitze (11) gerichtet ist, so dass die Druckluft aufwärts zu dem Zylinder (16) und der Nadel (17) umgelenkt wird, um die Faserabfälle und Wärmeansammlung darauf abzuführen.

5. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung nach einem der vorherigen Ansprüche, wobei die ringförmigen Röhren (20) unterhalb des kreisförmigen Rahmenblechs (13) mit Hilfe eines Befestigungsgestells (21) montiert sind.

6. Hochgeschwindigkeits-Rundstrickmaschine mit einer Faserabfälle-Blasvorrichtung und Wärmeabfuhrvorrichtung nach einem der vorhergehenden Ansprüche, wobei der Luftströmungserzeuger (60) wahlweise ein Gebläse oder eine Luftpumpeinrichtung ist.

tung ist.

Revendications

1. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur, ladite machine à tricoter circulaire à grande vitesse (1) comprenant un cylindre (16) tournant autour d'un axe central, le cylindre (16) comprenant une pluralité de boîtes à aiguille contenant chacune une aiguille (17) ou une platine, et étant entourée par une plaque à cadre circulaire (13) montée sur un support de plaque à cadre (12) et une pluralité de bases de cavalier (11) montées sur une plaque à cadre horizontale (14), chacune des bases de cavalier (11) comportant une came pour entraîner l'aiguille (17) vers le haut et vers le bas pendant que le cylindre (16) tourne pour réaliser l'opération de tricotage, ledit appareil pour souffler la bourre et pour dissiper la chaleur comprenant :

un générateur de flux d'air (60) pour générer de l'air pressurisé délivré à travers un tuyau de direction d'air (61) ; et

une pluralité de conduits annulaires (20) situés à la périphérie du cylindre (16) et des bases de cavalier (11) et comportant un passage (40) comprenant deux extrémités ouvertes, et comportant une pluralité d'évents (22) sur les conduits annulaires (20) près du cylindre (16) et des bases de cavalier (11) en communication avec le passage (40) ;

caractérisé en ce que ledit appareil pour souffler la bourre et pour dissiper la chaleur comprend au moins un connecteur d'admission (30) raccordant les conduits annulaires (20) et comportant une entrée d'air (31) pour canaliser l'air pressurisé dans le passage (40) ; dans lequel l'air pressurisé est éjecté à travers les événements (22) pour souffler avec force vers les bases de cavalier (11), le cylindre (16) et l'aiguille (17) pour éloigner la bourre et la chaleur accumulée sur celle-ci.

2. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur selon la revendication 1, dans laquelle le connecteur d'admission d'air (30) et les conduits annulaires (20) sont couplés au travers d'un conduit de raccordement (50).

3. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur selon la revendication 1, dans laquelle les conduits annulaires (20) sont couplés au travers d'un conduit de raccordement (50).

4. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur selon l'une quelconque des revendications précédentes, dans laquelle l'air pressurisé éjecté à travers les événements (22) est dirigé vers une surface supérieure inclinée des bases de cavalier (11) de telle sorte que l'air pressurisé soit détourné vers le haut en direction du cylindre (16) et l'aiguille (17) pour éloigner la bourre et la chaleur accumulée sur celle-ci. 5 10
5. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur selon l'une quelconque des revendications précédentes, dans laquelle les conduits annulaires (20) sont montés en dessous de la plaque à cadre circulaire (13) à travers un râtelier de fixation (21). 15
6. Machine à tricoter circulaire à grande vitesse avec un appareil pour souffler la bourre et pour dissiper la chaleur selon l'une quelconque des revendications précédentes, dans laquelle le générateur de flux d'air (60) est sélectivement un ventilateur ou une pompe à air. 20 25

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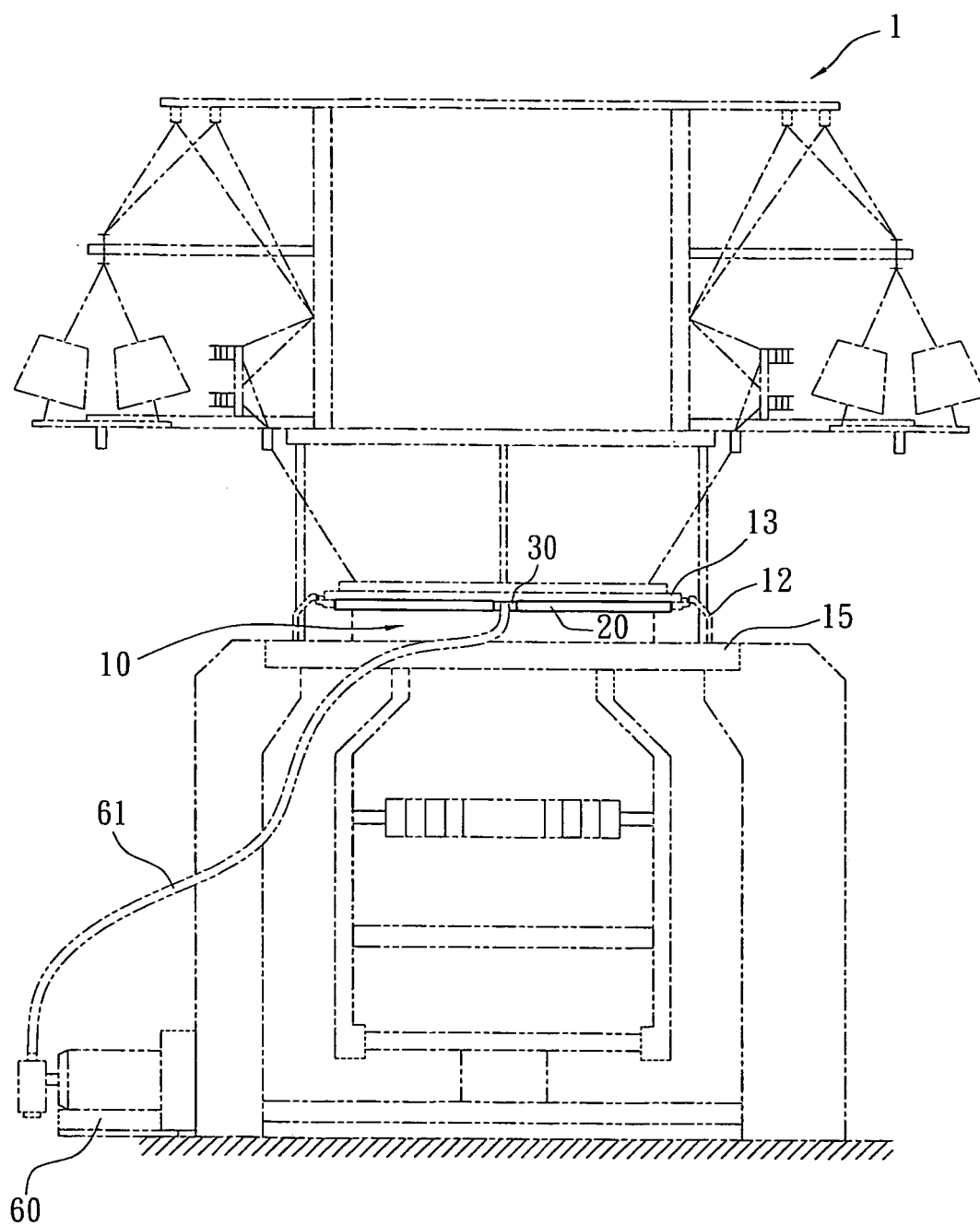


Fig. 1

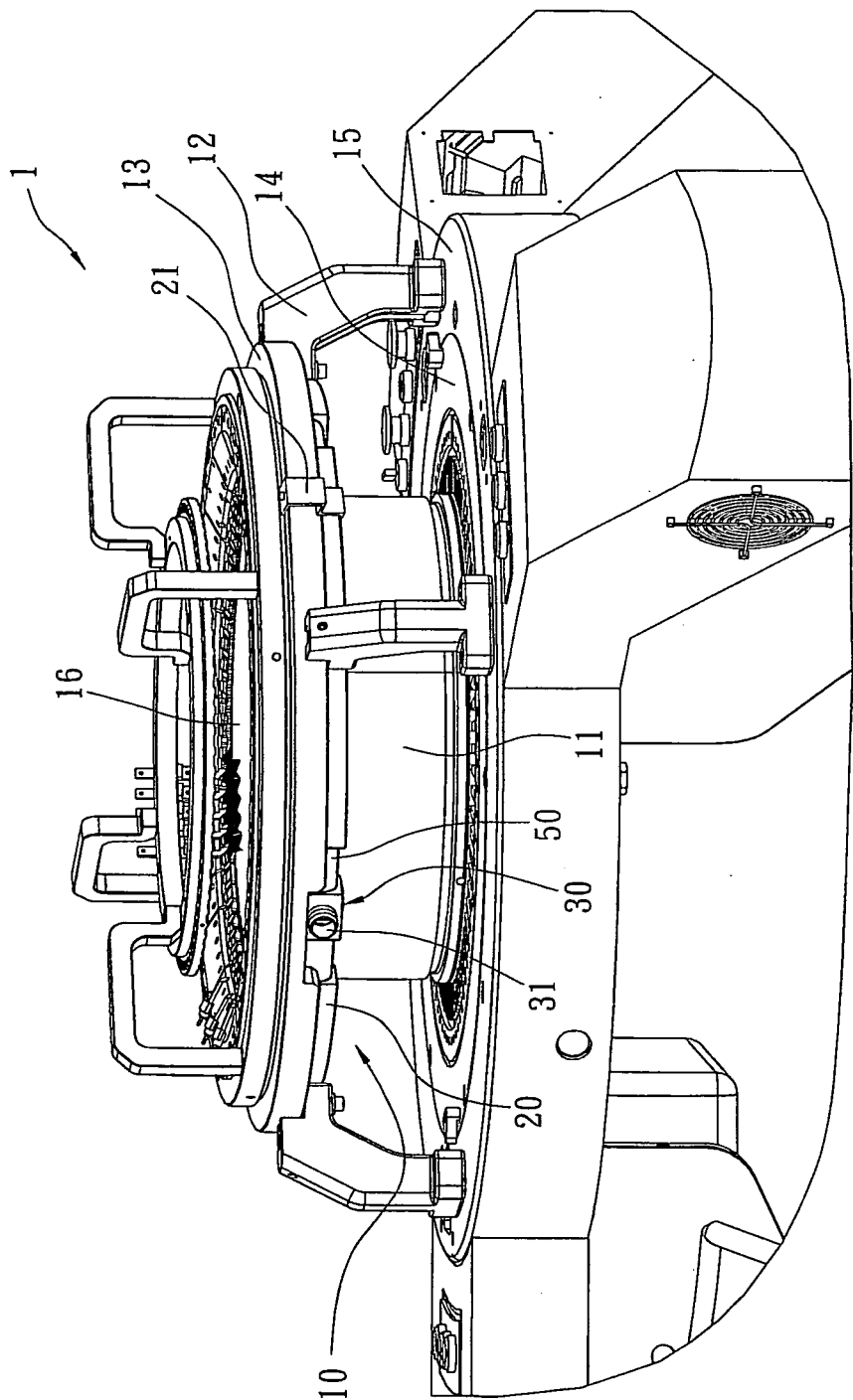


Fig. 2

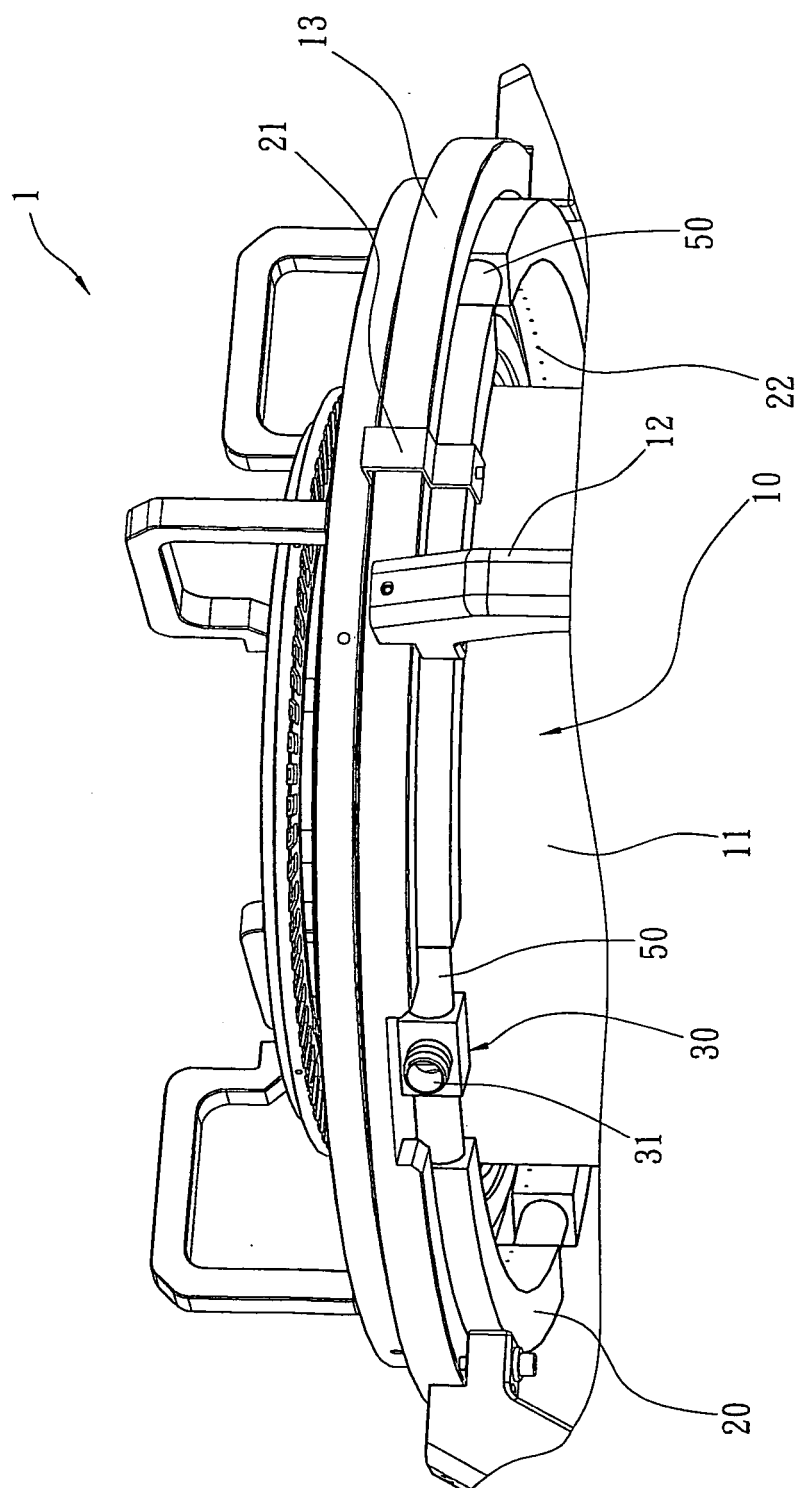


Fig. 3

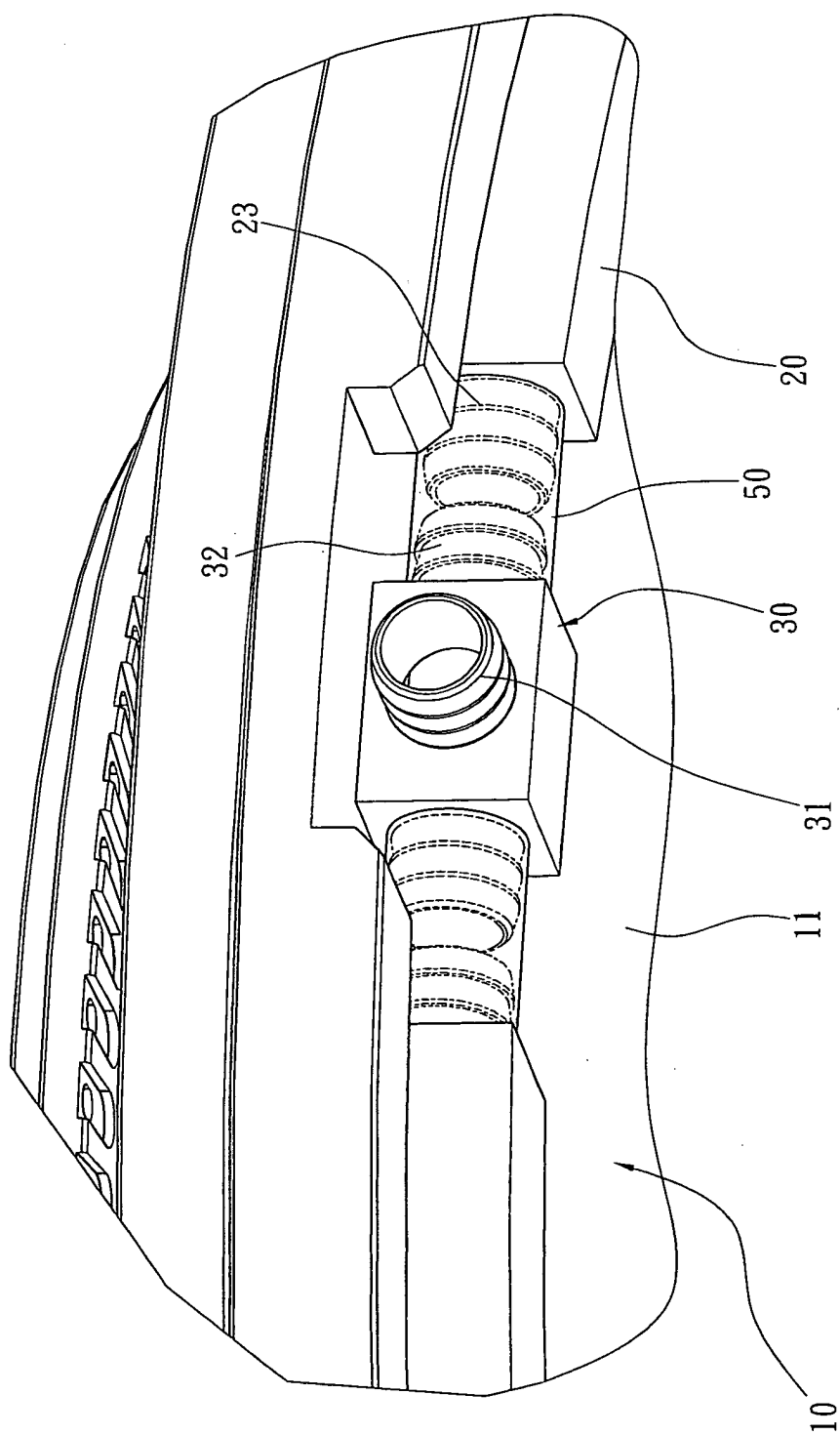


Fig. 4

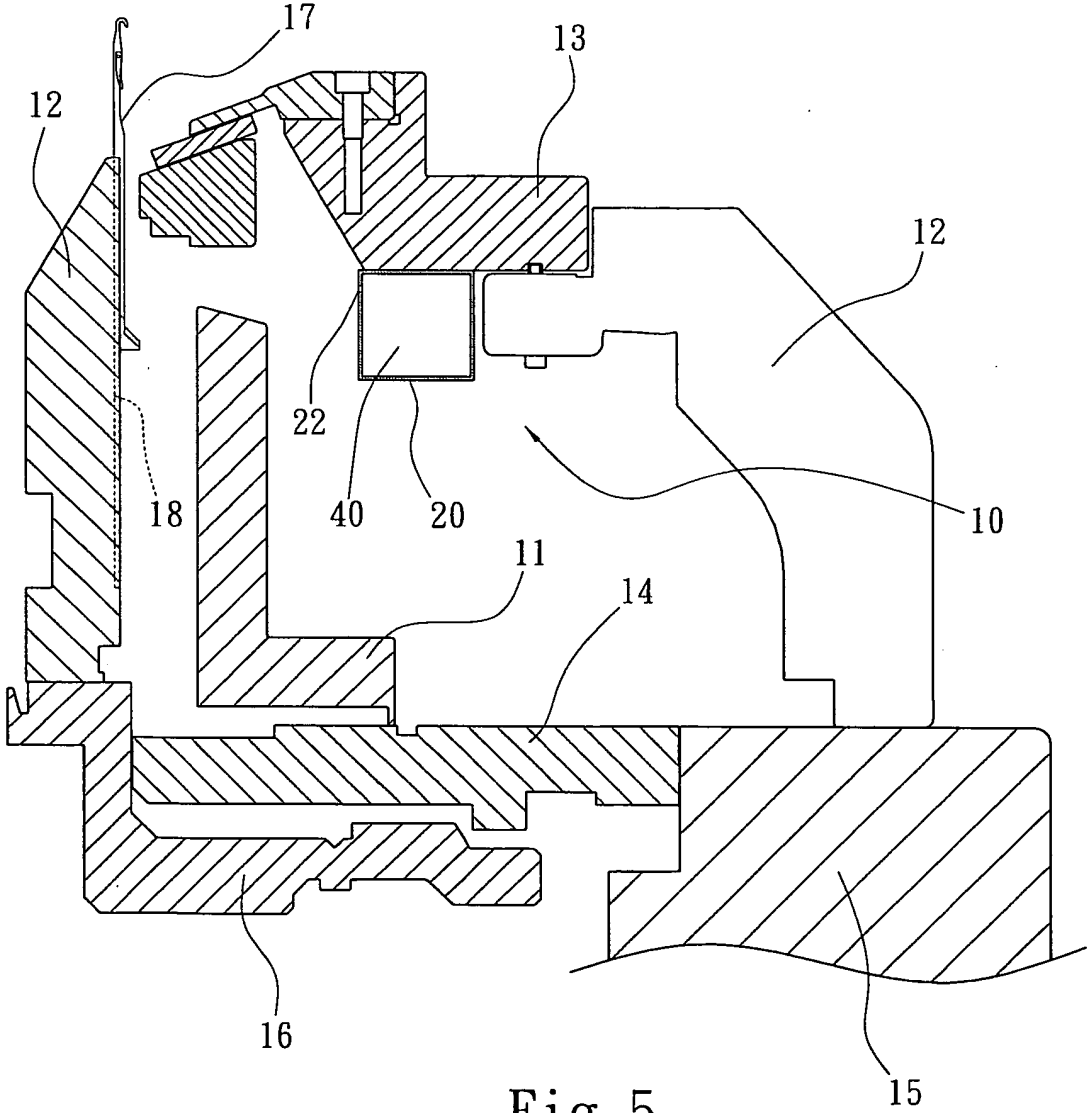


Fig. 5

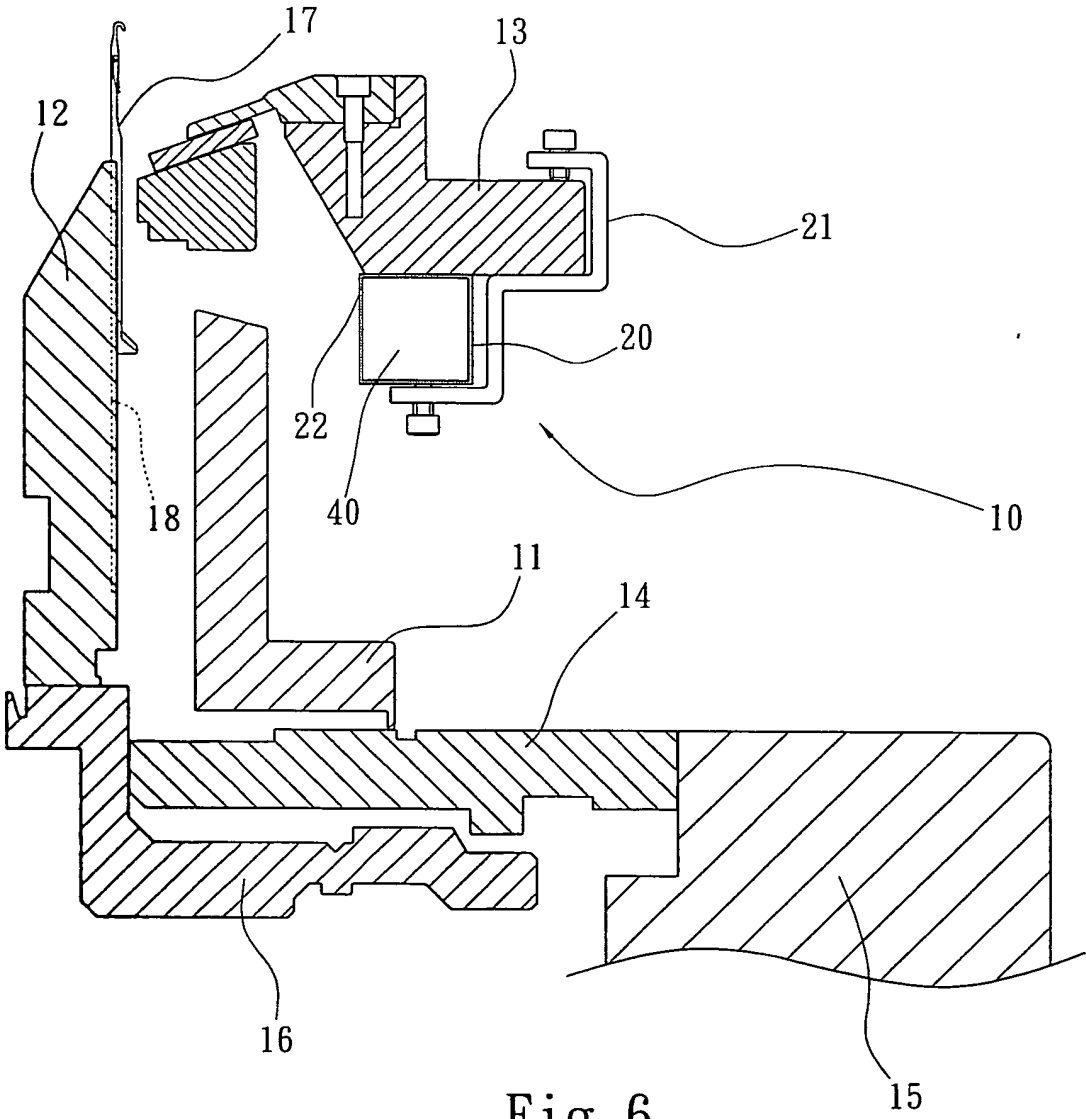


Fig. 6

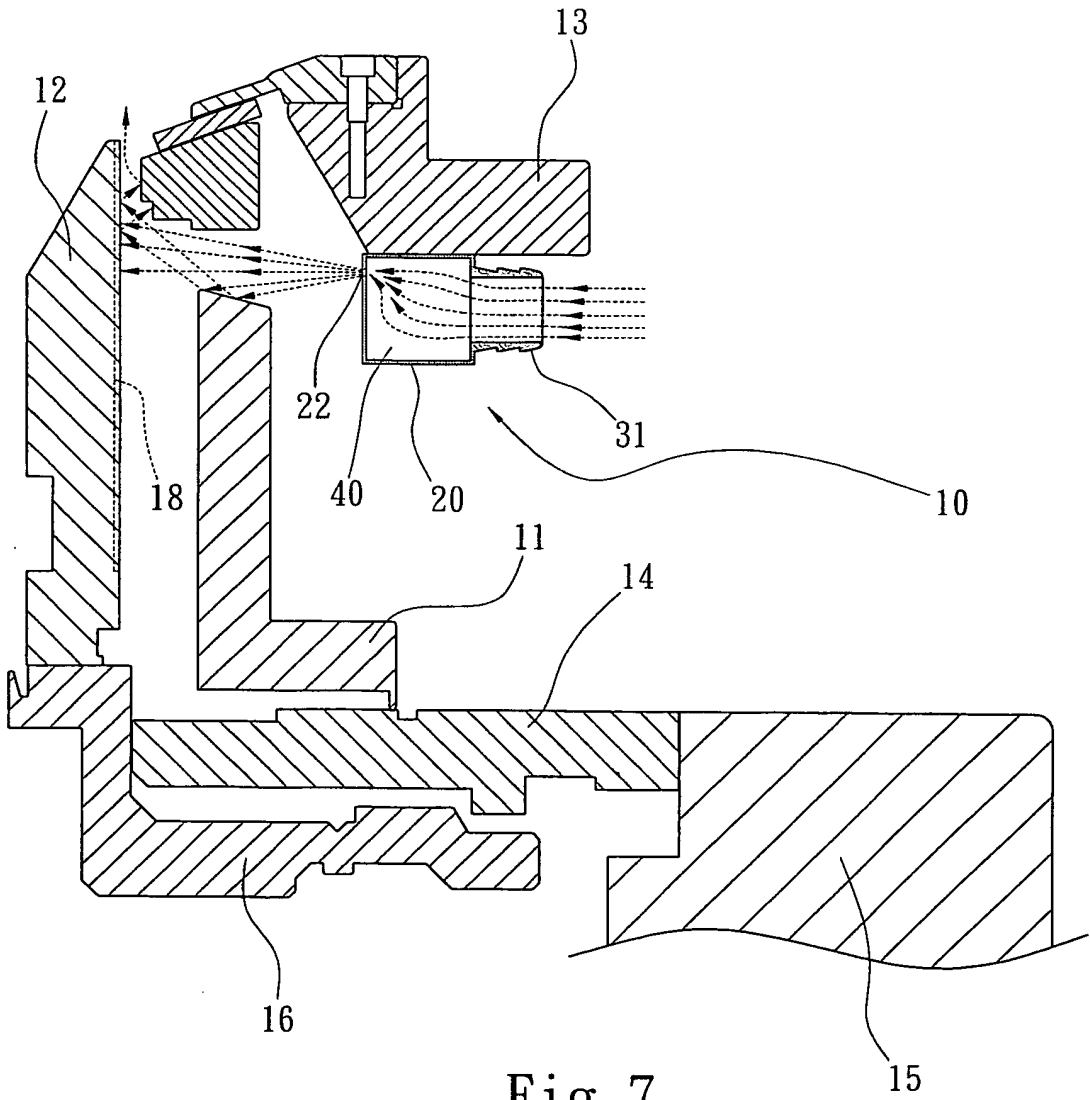


Fig. 7

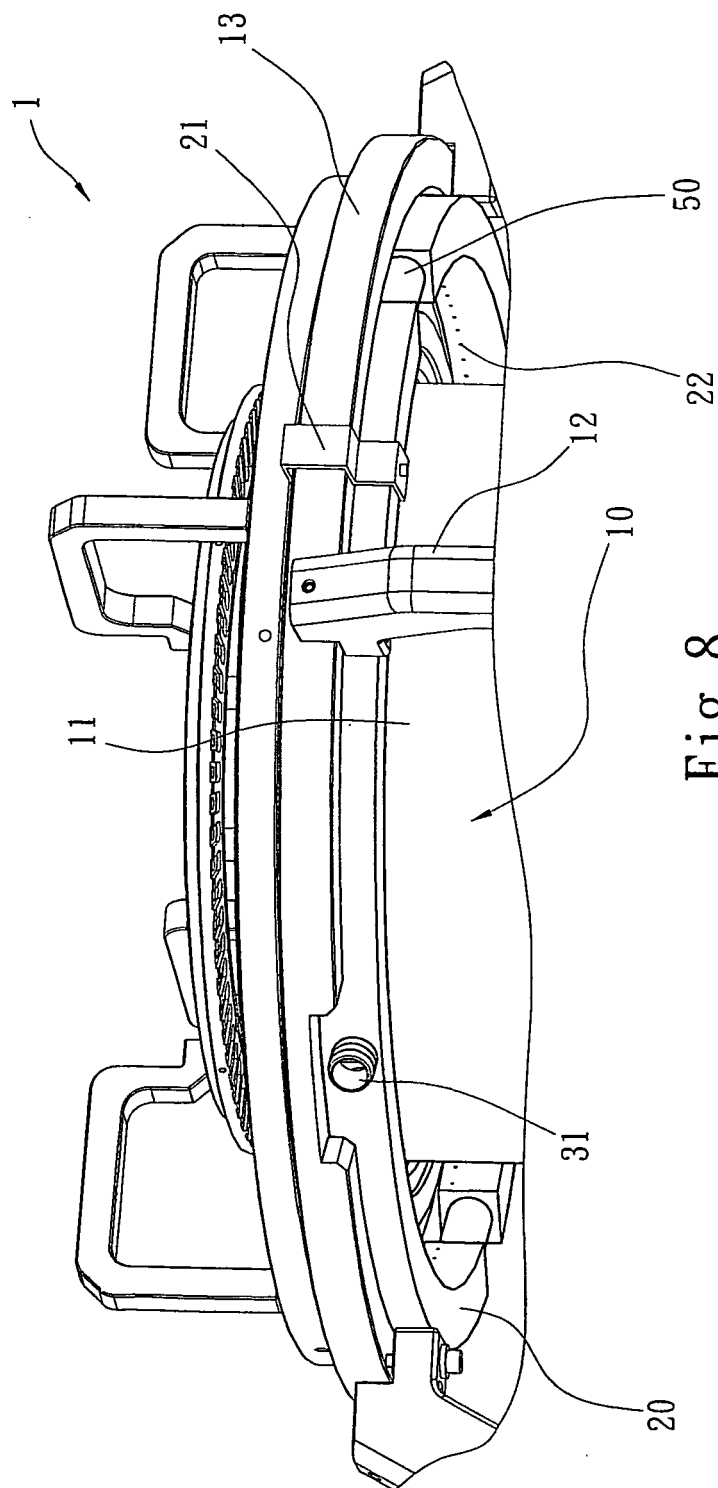
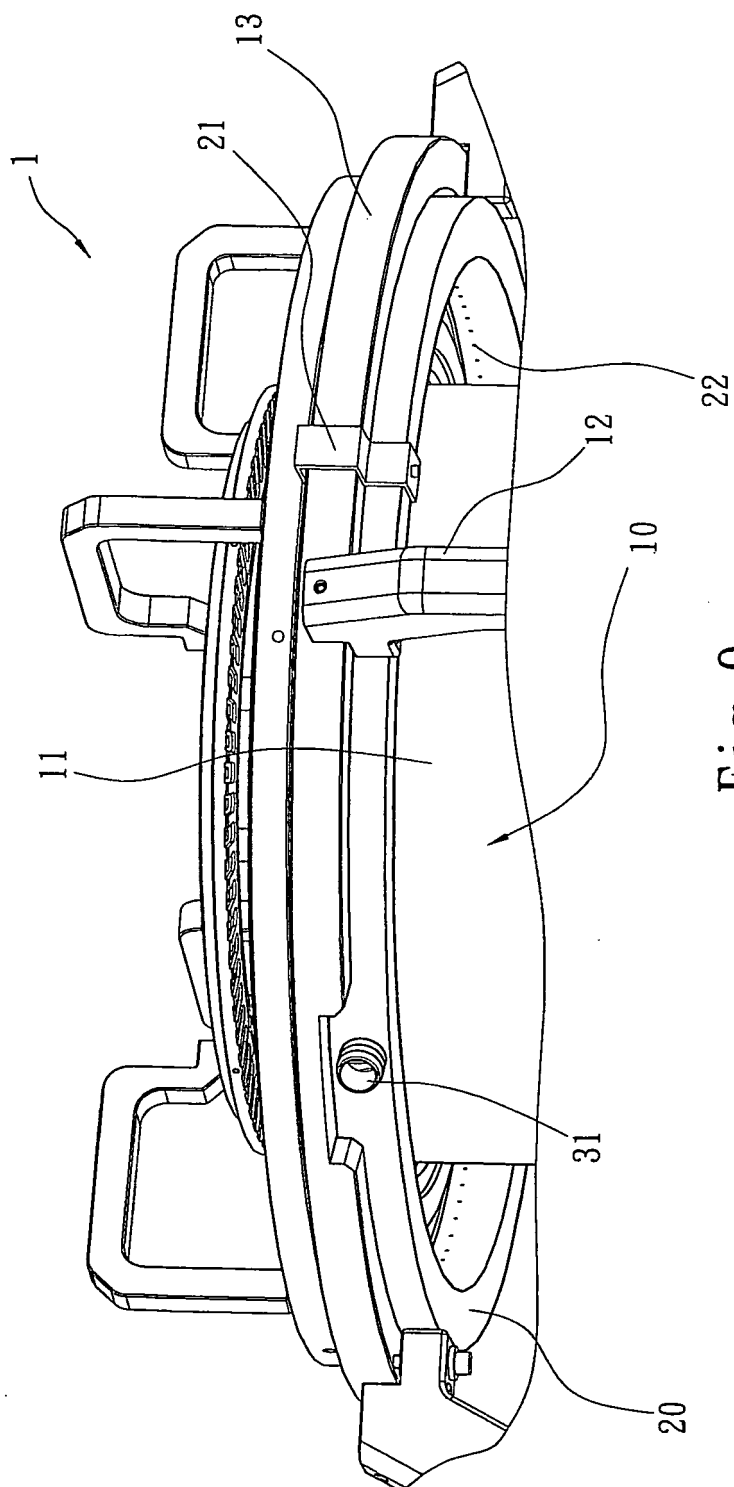


Fig. 8



Fi. 6

REFERENCES CITED IN THE DESCRIPTION

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