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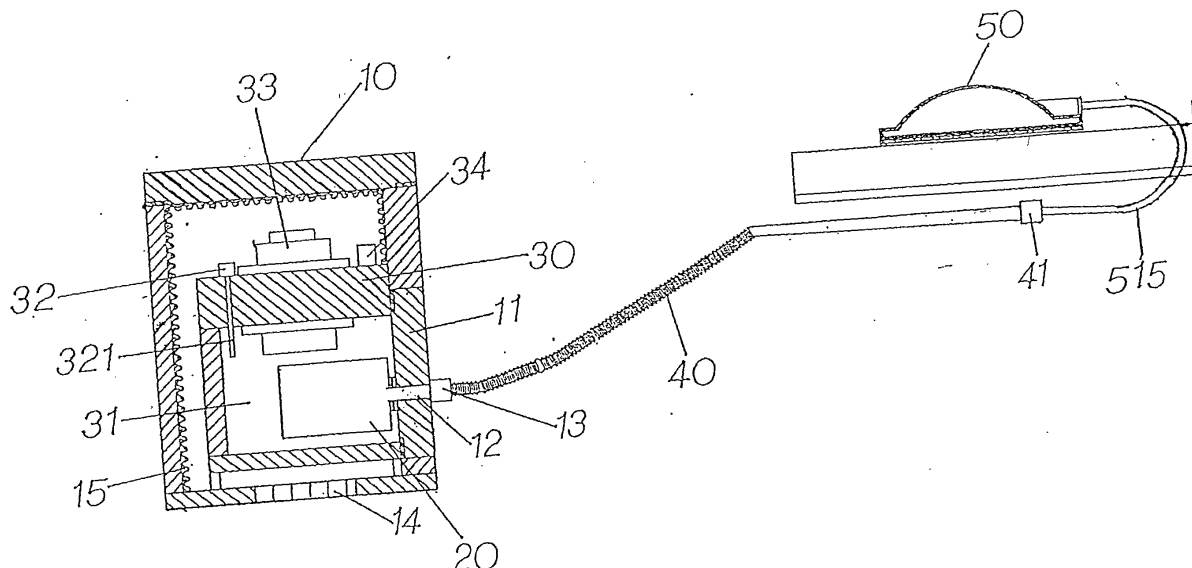
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(54) **A dust collecting apparatus for eraser**

(57) A dust collecting apparatus for an eraser or the like dust producing or generating devices and an eraser provided therewith.

The dust collecting apparatus consists of an eraser (50), a dust collecting bag (20), a dust-conducting pipes

and components (40) and a housing structure which includes an external housing (10) and an interior housing (30) wherein the external housing comprises a number of switches and display lamps, an opening (106) for bag swapping and a vacuum exhaust vent (14).



**FIG. 1**

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a dust collecting apparatus for eraser or the like dust producing or generating devices and to an eraser provided therewith. Particularly, a power supply automatic-safe-breaking device, lots of display lamps, controlling and collecting components disposed within the present invention by an optimum design for appropriate utilizing to erase something such as written letters, characters on the black-board or the like without remains or contamination in the air.

### BACKGROUND OF THE INVENTION

**[0002]** The conventional dust collecting apparatus or the like, having no power supply automatic-safe-breaking device, in which the power supply shall not be cut off since the said apparatus been using but had not continue been used for a long, time. So the power supply of the said apparatus is still on, which may cause the said apparatus burning out. Furthermore, some users with no conscious about the said apparatus' latest or real situation when they use the said apparatus which also causing the said apparatus burning out or broken or unpredictable happened. This is necessary for researching, improving and disclosing in the present invention.

**[0003]** Accordingly, it is an object of the invention herein, to provide a power supply automatic-safe-breaking device mounted on the housing for protecting the said apparatus.

**[0004]** Accordingly, it is another object herein, to provide lots of functional display lamps and controlling components disposed on the housing or for reminding the user how is present and real situation and for working dust-inhaling in the said apparatus.

**[0005]** This object is fulfilled by a dust collecting apparatus for eraser having the features disclosed in claim 1. Preferred embodiments are defined in the dependent subclaims.

**[0006]** In order to describe in detail the objects, characteristics and functions of the present invention, an example of embodiment and figures, relevant of the present invention is as follows:

### DESCRIPTION OF THE FIGURES

#### **[0007]**

Fig. 1 is the diagrammatic sketch of the entirely structure of the invention.

Fig. 2 is the diagrammatic sketch of front view of the housing

Fig. 3 is the diagrammatic sketch of perspective view of the housing

Fig. 4 is the diagrammatic sketch of fragmentary

view of dust-collecting bag and straight pipe

Fig. 5 is the diagrammatic sketch of fragmentary view of straight pipe and connector Fig. 6 is the diagrammatic sketch of combination of straight pipe and connector

Fig. 7 is the diagrammatic sketch of inhaling device and connector

Fig. 8 is the diagrammatic sketch of outlook view of eraser

Fig. 9 is the diagrammatic sketch of sectional view of eraser

Fig. 10 is the diagrammatic sketch of eraser and positioned tank

Fig. 11 is the diagrammatic sketch of combination of eraser and positioned tank

Fig. 12 is the diagrammatic sketch of practical example

### DESCRIPTION OF TERMS

#### **[0008]**

(10) external housing (101) power supply switch

(102) sensing switch (103) operation display lamp

(104) bag-swapping display lamp

(105) power supply automatic cut-off display lamp

(106) opening (11) door leaf

(111) hollow hole (112) sticking belt (band)

(12) straight pipe (121) joint end

(13) jointing head (131) interlocking components

(14) exhaust vent (15) muting device

(16) external space (20) dust collecting bag

(21) dust inlet (22) sticking surface

(30) interior housing (31) interior space

(32) sensing elements (321) sensing bar

(33) inhaling components (331) base of housing

(332) fan-extracting motor (333) muting device

(334) outlet (335) filter

(336) inlet

(34) power supply automatic cut-off device

(40) dust-conducting pipes and components

(41) jointing head (50) eraser

(501) capacity chamber (502) vacuum chamber

(51) holder (511) starting button

(512) stopping button (513) jointing head

(514) digital wireless-remote controlling device

(515) jointing pipe (52) dust-conducting base layer

(521) dust-conducting tunnel (522) dust-conducting hole

(53) connection panel (531) hollow hole

(532) connection surface (54) erasing tissue

(541) hollow hole      (542) sticking surface  
 (543) erasing surface      (60) positioned tank  
 (61) bottom chassis      (62) convex pillar  
 (621) edge opening section      (63) elastic film

## DETAILED DESCRIPTION OF THE PRESENT INVENTION

**[0009]** As follows, please refer to Fig. 1 shown as the present invention, a dust collecting apparatus for eraser is described. It consists of an eraser, a dust collecting bag (20), a dust-conducting pipes and components (40) and a housing structure which includes an external housing (10) and an interior housing (30), in which:

**[0010]** Please refer to Fig. 2, 3, and 4, the external housing (10) is fabricated by solidly jointing plates therein, a power supply switch (101), a sensing switch (102), an operation display lamp (103), a bag-swapping display lamp (104) and a power supply automatic cut-off display lamp (105) are disposed on one of front-lateral side of the external housing (10), as well as a certain place of the external housing (10) been opened a opening (106) for bag swapping (shown as Fig. 4). Also, a vacuum exhaust vent (14) is mounted on the bottom chassis external housing (10) and a muting device (15) is disposed in the interior of external housing (10) for isolating and absorbing the noise came from the inhaling components or the like.

**[0011]** Please refer to Fig. 2, 3 and 9, shown the power supply switch (101) and sensing switch (102) of the front-lateral side are correspondingly to connect the power supply and inhaling components (33). The power supply switch (101) is of a manual-controlling type and its action dominates the entirely power supply on or off in the present invention. The sensing switch (102) and digital wireless-remote controlling device (514) are correspondingly and by means said device (514) transmits the signals onto the sensing switch (102) for switching the power of inhaling components (33) on or off. While the inhaling components (33) are operating that the operation display lamp (103) shows "green", in contrast, the operation display lamp (103) shows "red". The bag-swapping display lamp (104) and sensing elements (32) are in the same controlling circuit loop, as the sensing elements (32) detect the dust collecting bag (20) of interior space (31) having accumulated a certain preset amount of dust and no more amount of dust can be inhaled. Under this circumstance, the vacuum value will raise up and reach a certain value, in which a signal will be generated from the sensing elements (32) and switching the bag-swapping display lamp (104) on for reminding the user to renew a dust bag. For the power supply automatic cut-off display lamp (105), power supply automatic cut-off device (34) and power supply switch (101) are in the same controlled circuit loop, the function of power supply automatic cut-off will be operating and cut off the power when the user uses said apparatus and then stops using it in a certain period that

is over the preset timing. So the power supply automatic cut-off display lamp (105) will enlighten for reminding the power of the said apparatus been totally cut off. The next user must turn on the power supply switch (101), then use it again.

**[0012]** Please refer to Fig. 3 and 4, the opening (106) is designed for taking out or replacing the dust collecting bag (20). A door leaf (11) is disposed at the opening (106) by bias-pivot rotating for closing or opening to protect the internal section of the housing.

**[0013]** Please refer to Fig. 2, 3, 5 and 6, a hollow hole (111) is mounted on the middle of the door leaf (11), and the hollow hole (111) is for disposing a straight pipe (12). One end of the straight pipe (12) is inwardly to the housing and interlocks with dust collecting bag (20), the other end is outwardly to the housing and sets a interlocking component (131). The outward end has a jointing head (13) to secure joint with the interlocking components (131) by means of a hooked-locked approach and to connect with dust-conducting pipes and components (40). The rear side of door leaf (11) has a hooked-surface sticking belt (112), as the sticking belt (112) and dust collecting bag (20) are struck on the sticking surface (22) that, also, shall be fixing and bounding the dust collecting bag (20), in which the sticking belt (112) is arranged at the surrounding of hollow hole (111) of the door leaf (11).

**[0014]** Please refer to Fig. 4, the dust collecting bag (20) is capillary-mesh-filter-layers-bag-like and made of ventilating materials only for the air passing through, not for dust or the like. Surrounding the outer of dust inlet (21) of dust collecting bag (20) is a sticking surface (22) with fluff materials or the like materials for using in dust collection. Since the dust collecting bag (20) and the straight pipe (12) of door leaf (11) are interlocked, the sticking surface (22) of dust inlet (21) and the sticking belt (112) of door leaf (11) will be adhered together for convenient taking off or replacing the dust collecting bag (20).

**[0015]** Please refer to Fig. 1, the dust-conducting pipes and components (40) are used as a conduit to the dust collecting bag (20) for the dust blowing into. One end of dust-conducting pipes and components (40) joints to the jointing head (13) of straight pipe (12), and the other end joints to one end of jointing pipe (515) (shown as Fig. 8), then put the other of jointing pipe (515) joint with the jointing head (513) of eraser (50). Thus a channel is formed for the dust being inhaled into the dust collecting bag (20).

**[0016]** Please refer to Fig. 3 and 4, the external space (16) is made of noise-proof materials and disposed in the interior of the external housing (10). The said device is for absorbing the noises while the inhaling components (33) in operating, and the exhaust vent (14) is for exhausting the air while the inhaling components (33) are working and inhaling the air into.

**[0017]** Please refer to Fig. 1, 3 and 4, the interior housing (30) is fabricated by a number of plates and ar-

ranged at the external space (16) of the external housing (10). Only one lateral side of interior housing (30) is empty, means having no plate, to correspond the opening (106) for tightening and fixing proposals. As the opening (106) of external housing (10) being bias-pivot rotated and outwardly opened-unfolded, the interior space (31) of interior housing (30) is visible, wherein the inward end of jointing head (13) at the straight pipe (12) will lots easier joint with the dust collecting bag (20) which is placed at the interior space (31) of interior housing (30).

**[0018]** Please refer Fig. 2, 3 and 4, the panel of interior housing (30), where a sensing element (32), an inhaling component (33) and a power supply automatic cut-off device (34) are mounted on. The sensing bar (321) is disposed on the sensing elements (32) and pass through the upper panel of interior housing (30) to reach the deep place of interior space (31). The sensing elements (32) and bag-swapping display lamp (104) are connected in the same circuit loop, as dust of the dust collecting bag (20) in the interior space (31) has been reached a certain amount, the filter layer of dust collecting bag (20), also, will be stuffy and causing the blowing-out air lessening and lessening. Under this circumstance, the inhaling component (33) is still going on inhaling the air, but the air is blocked by the filter-layer of dust collecting bag (20) that made the inhaling components (33) can only inhale the air of interior space (31). Since the vacuum-scale of interior space (31) raises up and up, meanwhile the sensing bar (321) of sensing elements (32) will go on detecting the vacuum-scale of interior space (31), until said scale raised up to a certain value, then the sensing elements (32) shall transmit a signal to enlighten the bag-swapping display lamp (104) for reminding that is the time to renew a dust collecting bag (20).

**[0019]** Please refer to Fig. 7, surrounding the external circumference of the inhaling components (33) is a base of a housing (331) with its hollow structure where, an outlet (334) is set around and cycled said housing (331), a muting device (333) is mounted in and around the interior circumference of the said housing (331), and a tank is set at the central-middle of the said housing (331) herein a muting device (333) is mounted around the interior circumference of the tank and a fan-extracting motor (332) is also disposed in the tank, and a filter (335) is mounted at the bottom of the housing (331). The base of housing (331) is for shielding the fan-extracting motor (332) and the muting device (333), of the muting device (333) is for absorbing the noises came from the operating fan-extracting motor (332), the outlet (334) is for inhaling in the exhausted air while the fan-extracting motor (332) is operating and the filter (335) is for filtering the inhaled air with tiny dusts while the fan-extracting motor (332) is working. Hence, a muting effect and no more floating dust shall come to and fill with the fan-extracting motor (332) or the interior section of base of housing (331).

**[0020]** Please refer to Fig. 1, 3 and 4, the power supply automatic cut-off device (34) is for prolonging the lifecycle of this dust collecting apparatus for an eraser. Means the power supply switch (101) is on, but said apparatus been stopped using for a while, so the power of said apparatus is still on that may shorten its life. Under this circumstance, a preset timing has been set in the power supply automatic cut-off device (34) for cutting off the power supply since the suspended period of the said apparatus is over.

**[0021]** Please refer to Fig.8 and 9, the eraser (50) is divided into two compartments, one is a holder (51) and the other one is an erasing tissue (54), in which:

**[0022]** The holder (51) is a housing with a hollow structure in its interior and bottom, so a capacity chamber (501) and a vacuum chamber (502) can be easier mounted in its compartment. A starting button (511) and stopping button (512) are disposed on the bottom surface of the holder (51), a jointing head (513) is disposed on the terminate end of holder (51), and a dust-conducting base layer (52) is allocated on the bottom section of holder (51) where a connection panel (53) is interlocked with the bottom surface of dust-conducting base layer (52).

**[0023]** Please refer to the Fig. 8 and 9, the capacity chamber (501) is for placing the digital wireless-remote controlling device (514), wherein the digital wireless-remote controlling device (514) is corresponding to the sensing switch (102) and is switching on/off and transmitting the signal thereto the sensing switch (102) for remote controlling the operation and stop of the inhaling components (33). As respective pressing a touch on the starting button (511) stopping button (512), the digital wireless-remote controlling device (514) will be controlled by them and to distal govern the inhaling components (33) is on or stop working. The vacuum chamber (502) and jointing head (513) are conductive, as the dust is blowing into vacuum chamber (502) which will take this advantage and blowing out from jointing head (513), then renter into jointing pipe (515).

**[0024]** Please refer to Fig.9, the central portion of one side of dust-conducting base layer (52) been opened as slot for mounting a dust-conducting hole (522), the panel of dust-conducting base layer (52) been opened for mounting lots of dust-conducting tunnels (521) with radiated arrangement and concentrated to the central of the dust-conducting base layer (52), the dust-conducting tunnel (521) and dust-conducting hole (522) are intersected and form a space for introducing the dust. The dust-conducting hole (522) of dust-conducting base layer (52) is corresponding to the vacuum chamber (502) of holder (51), means said dust will float through the dust-conducting tunnel (521), the dust-conducting hole (522) and then reach the vacuum chamber (502).

**[0025]** The bottom of dust-conducting base layer (52) is connected to a connection panel (53), of its dimension is the same as the erasing tissue (54). Several hollow holes (531) are allocated on the connection panel (53),

and one surface of connection panel (53) is hooked-like and the connection surface (532) for sticking the erasing tissue (54) of the hollow hole (531) are as conduits for the dust.

**[0026]** Again, please refer to Fig.9, one surface of the erasing tissue (54) is the sticking surface (542) with fluff materials, the other surface is the erasing surface (543) with lots of hollow holes (541) on it. Sticking the erasing tissue (54) and connection panel (53) by means of the connection surface (532) of connection panel (53) to corresponding adhere on the sticking surface (542). The erasing surface (543) of erasing tissue (54) is for erasing something during its up and down operation on the desired place by pressing the erasing tissue (54), wherein the hollow hole (541) will be an inlet for dust and those dusts will be inhaled into the inhaling components (33) with its strong suction power and forward to dust collecting bag (20), hence the hollow hole (541) will be the first conduit of dusts.

**[0027]** For the erasing tissue (54) and connection panel (53) are adhered together, as the erasing tissue (54) is broken or exhausted or other else which can be torn off for convenient renewing a new erasing tissue (54) anytime.

**[0028]** Please refer to Fig. 10 and 11, a positioned tank (60) is set below a blackboard and a convex pillar (62) is set at the bottom chassis (61) of positioned tank (60). The convex pillar (62) has a hollow shape and an elastic film (63) is mounted on its edge opening section (621), wherein the convex pillar (62) is aligned and responds every hollow hole (541) of erasing tissue (54), where for placing the retired eraser (50) at the positioned tank (60).

**[0029]** Please refer to Fig. 1, 2, 8 and 9, since switched the power supply switch (101) of external housing (10) to "on" position, the power supply will be conducting to the said a dust collecting apparatus for eraser under a standby status. As the eraser (50) being using to erase something, by a slight pressing to the starting button (511) of holder (51) where a start signal will soon be transmitted via digital wireless-remote controlling device (514) onto and received by the sensing switch (102), then a command will be transmitted and reaches the inhaling components (33) for commanding the inhaling components (33) going on air-inhaling, so the dusts generated from the operating of the erasing will be inhaled into the inhaling components (33) and inwardly into the dust collecting bag (20) of interior housing (30).

**[0030]** Please refer to Fig. 9, the dusts must enter the hollow hole (541) of erasing tissue (54) at first and then pass the dust-conducting tunnel (521), dust-conducting hole (522) through vacuum chamber (502). As the dusts reach the vacuum chamber (502), of them will via an opening and then enter the jointing pipe (515), pass through the dust-conducting pipes and components (40), and lastly said dusts will be inhaled into the dust collecting bag (20).

**[0031]** Please refer to Fig. 10, 11 and 12, the shape of the blackboard in the classroom is rectangle. The length of the jointing pipe (515) may be too long and more inconvenient for the user if only one eraser being or been used in the classroom, so two erasers (50) will be appreciated. But, when the two erasers (50) being used at the classroom, as one of the erasers (50) is on duty for erasing something by pressing the starting button (511) for starting the inhaling components (33) on duty, the eraser (50) will be operating the dust-inhaling. The other eraser (50) not on duty shall take action as the duty one eraser (50) does, for the real situation is that only an eraser (50) is erasing something but the other eraser (50) is operating its dust-inhaling, which making the function of dust-inhaling is not very effective. So a solution is that, as one eraser been using on its duty and the other eraser will be placed at positioned tank (60) on its free by its hollow hole (541) of erasing tissue (54) to correspond the convex pillar (62) of the tank (60) for placing into the positioned tank (60). As one of eraser (50) is on duty, the other eraser (50) is free and taking dusts-inhaling either. But the free eraser (50) will inhale the edge opening section (621) of convex pillar (62) as air-flowing to project the edge opening section (621) as a ball like for blocking the conduit of eraser (50), hence the eraser (50) can not be in vacuum as well as the function of dusts-inhaling is as normal.

## Claims

### 1. A dust collecting apparatus for an eraser, comprising:

a housing structure fabricated by plate members divided into two compartments, external housing (10) and interior housing (30), wherein a set of inhaling components (33) mounted in the external housing (10) and at the bottom place of the internal housing (30), a dust collecting bag (20) placed in the external housing (10) and interlocked with the straight pipe (12) of a door leaf (11), a set of dust-conducting pipes and components, and an eraser (50) by means of the jointing pipe (515) allocated at its opening to interlock the dust-conducting pipes and components; a muting device (15; 333) disposed in the interior of external housing (10) and lots of switches (101, 102) and display lamps (103, 104, 105) mounted on one of front-lateral side of the said device; an interior housing (30) disposed in the external housing (10), and a set of inhaling components (33), sensing elements (32) and a power supply automatic cut-off device (34) mounted in the interior housing (30); a set of interlocking components (131) allocat-

- ed at one end of the straight pipe (12), by means of a certain section of the said components to interlock the jointing head (513) for hooking-locking the jointing head (513); the eraser (50) is divided into two portions, holder (51) and erasing tissue (54) herein, one side of the tissue (54) having a fluffy surface for adhering with the connection panel (53) of said holder (51), and lots of hollow holes (531) arranged in the said tissue (54); a set of starting and stopping buttons (511, 512) disposed at the bottom place of said holder (51); the bottom chassis (61) of said holder (51) defined as a dust-conducting base layer (52), a connection panel (53) is disposed on the bottom surface of said layer (52) herein, one surface of the said panel (53) is hooked-like and having a sheet of sticking belt (band) (112) and numbers of hollow holes (531) to correspondingly adhere upon the fluffy surface of the said tissue (54); a positioned tank (60) is arranged at a certain bottom place of a blackboard for placing said eraser.
2. A dust collecting apparatus according to claim 1, wherein the muting device (15, 333) acts by means of cotton or similar materials for isolating and absorbing the noise caused by operating said inhaling components (33).
  3. A dust collecting apparatus according to claim 1 or 2, wherein the front-lateral panel of said external disposed kinds of switches and lamps are power supply switch (101), sensing switch (102), bag-swapping display lamp (104), power supply automatic cut-off lamp (105) and operation display lamp (103).
  4. A dust collecting apparatus according to claim 1 to 3, wherein the power supply automatic cut-off device (34) for the user using said apparatus, then stop using and suspending over a preset timing but forgot turning off the power whenever, the power supply will be automatic cut off and reswitched on by the next user who needs using.
  5. A dust collecting apparatus according to claim 1 to 4, wherein the muting device (15; 333) disposed in said inhaling components (33) for absorbing the noise caused by the running motor of said inhaling components (33) of said device can be used in a classroom or the like.
  6. A dust collecting apparatus according to claim 1 to 5, wherein the sensing components are connected with the bag-swapping display lamp (104), when the sensing elements (32) detecting the vacuum scale of the interior housing (30) reaching above a certain preset value whenever, the sensing elements (32) are transmitting a signal thereto and enlightening the bag-swapping display (104) for reminding the user to renew a dust collecting bag (20).
  7. A dust collecting apparatus according to claim 1 to 6, wherein the hollow holes (531) of the eraser's tissue (54) and the holder's bottom surface are correspondingly, adhering the erasing tissue (54) on the bottom surface of the holder (51) when the inhaling components (33) are operating to inhale something, wherein all of the hollow holes (531) can be used as channels for the eraser (50) to inhale the dust into, therefore as the eraser (50) is damaged or unavailable in which the used eraser (50) can be torn off for replacing a new one.
  8. A dust collecting apparatus according to claim 1 to 7, wherein the set of starting and stopping buttons (511, 512) is allocated on a certain place of said holder (51), of them respective connecting with the digital wireless-remote controlling device (514) which also corresponds to the sensing switch for controlling the inhaling components (33) by slightly pressing the starting/stopping button (511, 512), wherein a signal is sent via the digital wireless-remote controlling device (514) and transmitting said signal onto the sensing device for controlling the inhaling components (33) on duty/free.
  9. A dust collecting apparatus according to claim 1 to 8, wherein a number of convex pillars (62) with hollow structure are disposed on the bottom chassis (61) of the positioned tank (60) where, an elastic film (63) is disposed on the bottom edge of every convex pillar (62).
  10. A dust collecting apparatus according to claim 1 to 9, wherein the set of interlocking components is mounted at one end of the straight pipe (12) for securely interlocking the straight pipe (12) and the jointing head (513) by a hooked-locking approach.

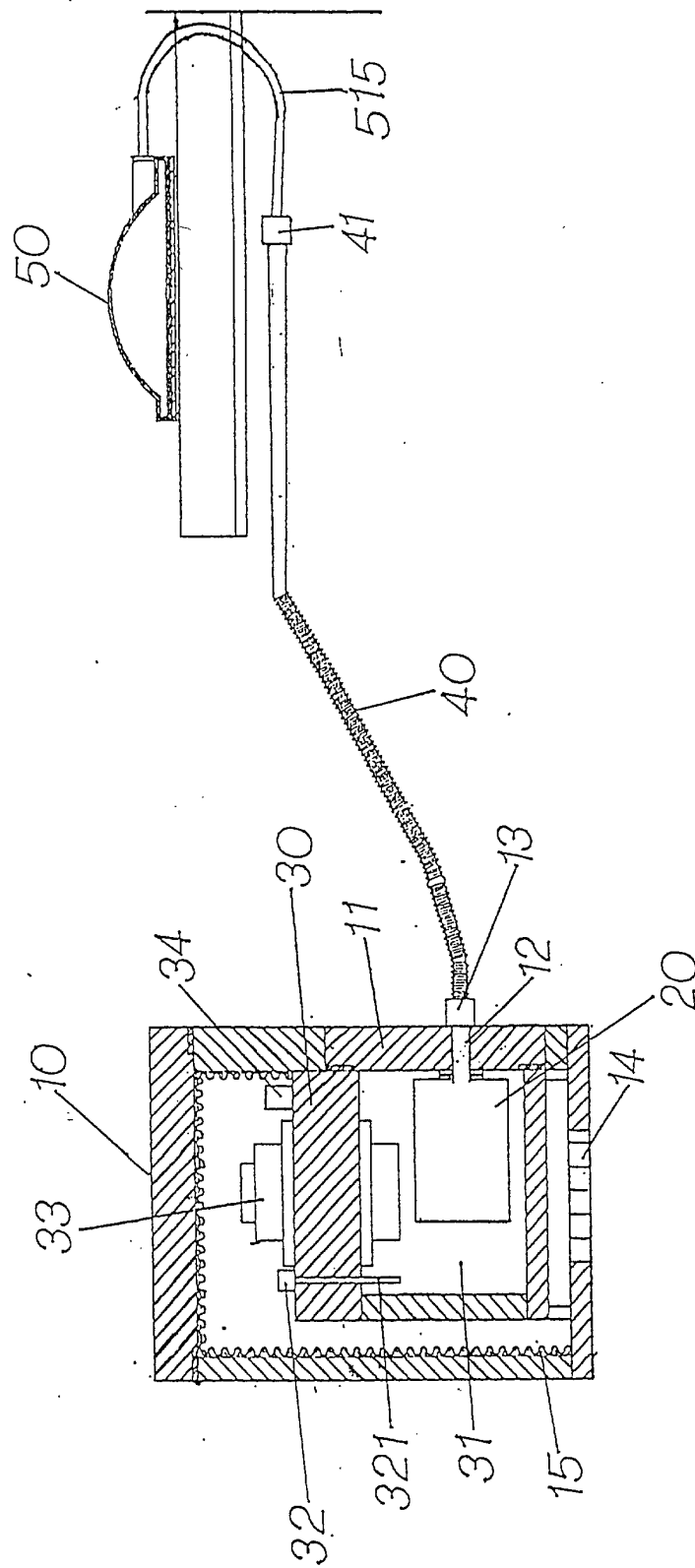


FIG. 1

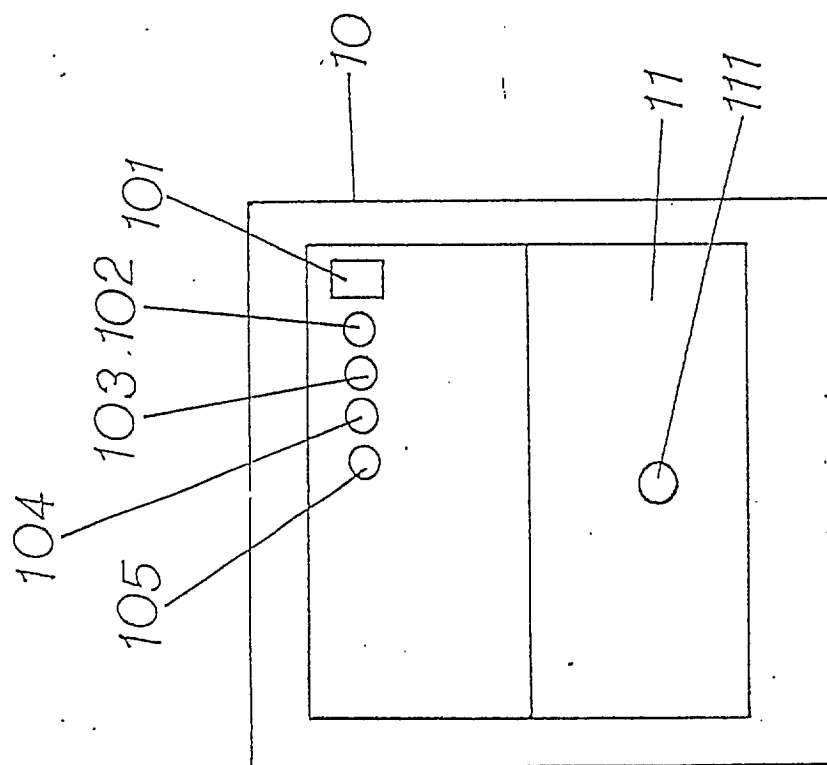


FIG. 2



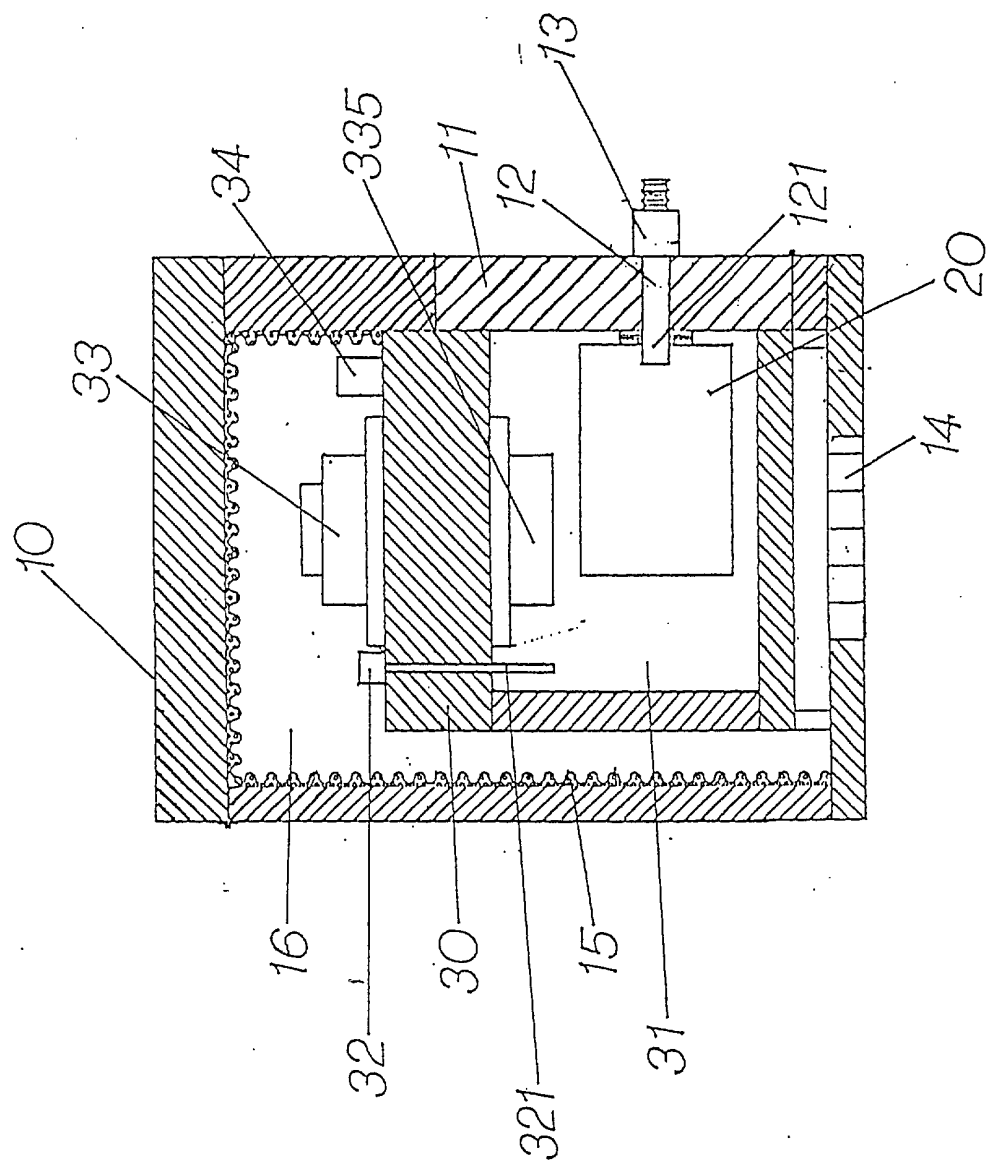


FIG.3

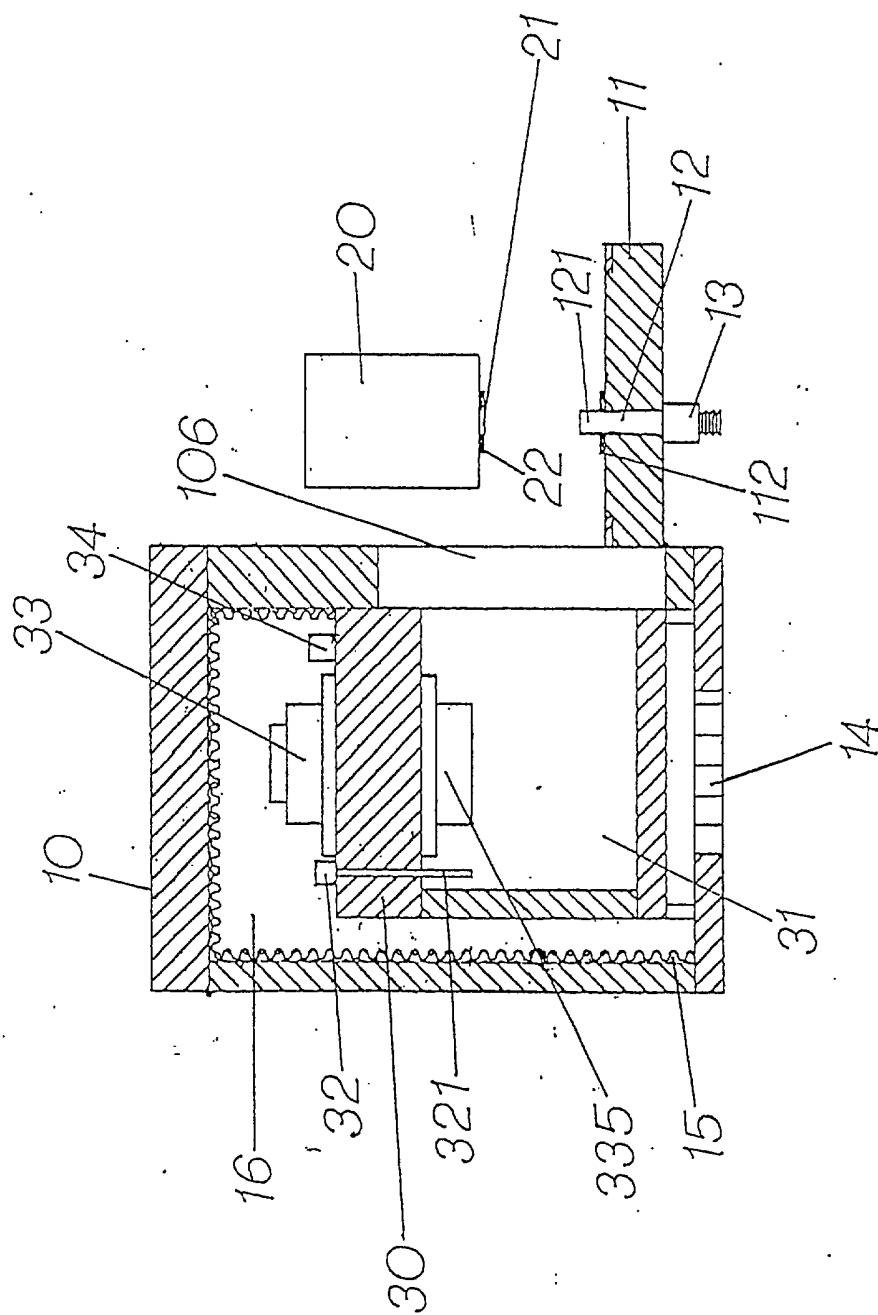


FIG.4

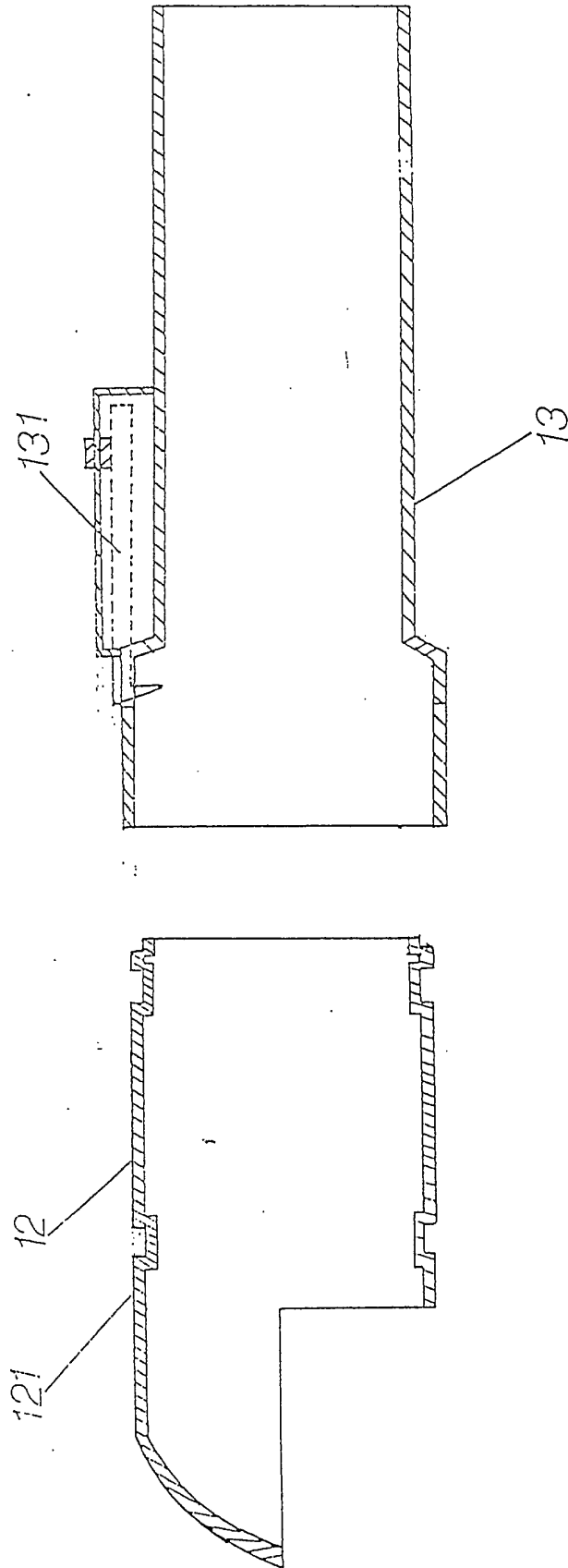


FIG. 5

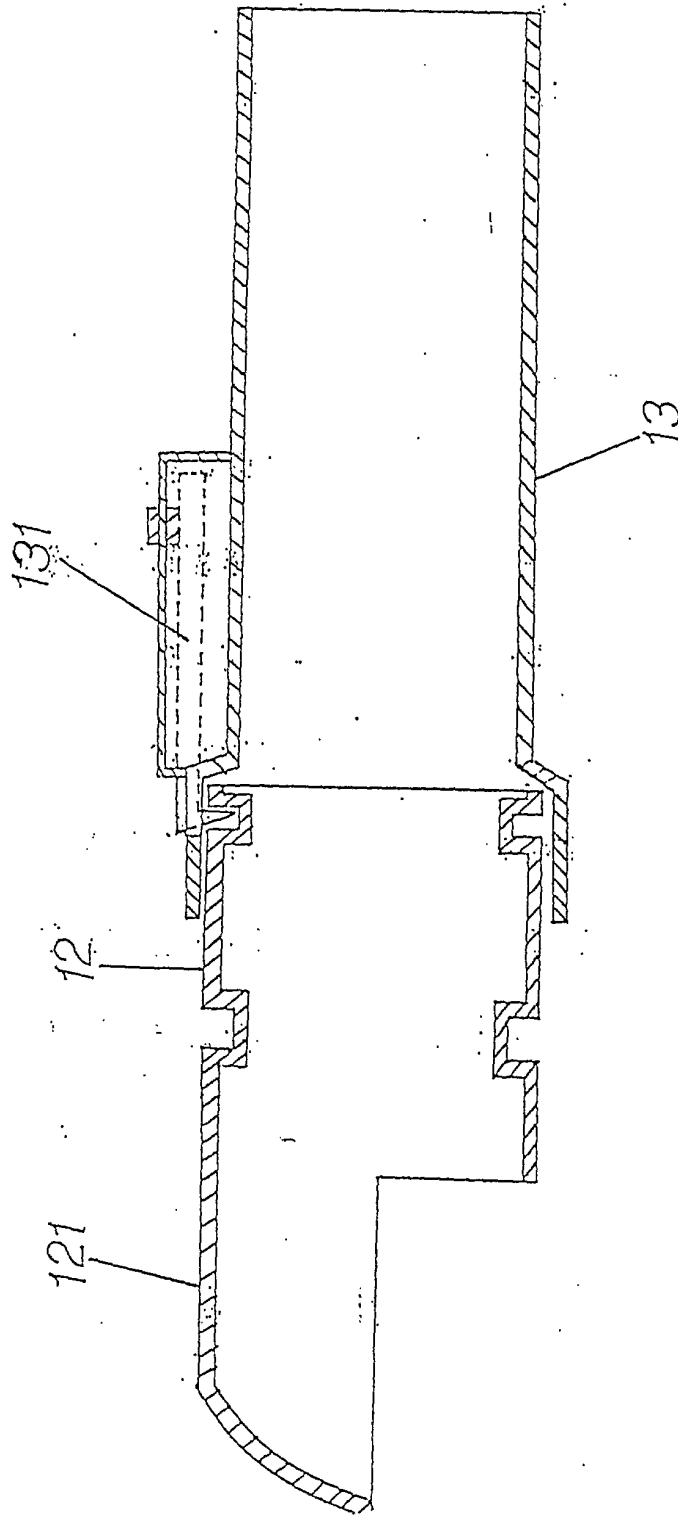


FIG.6

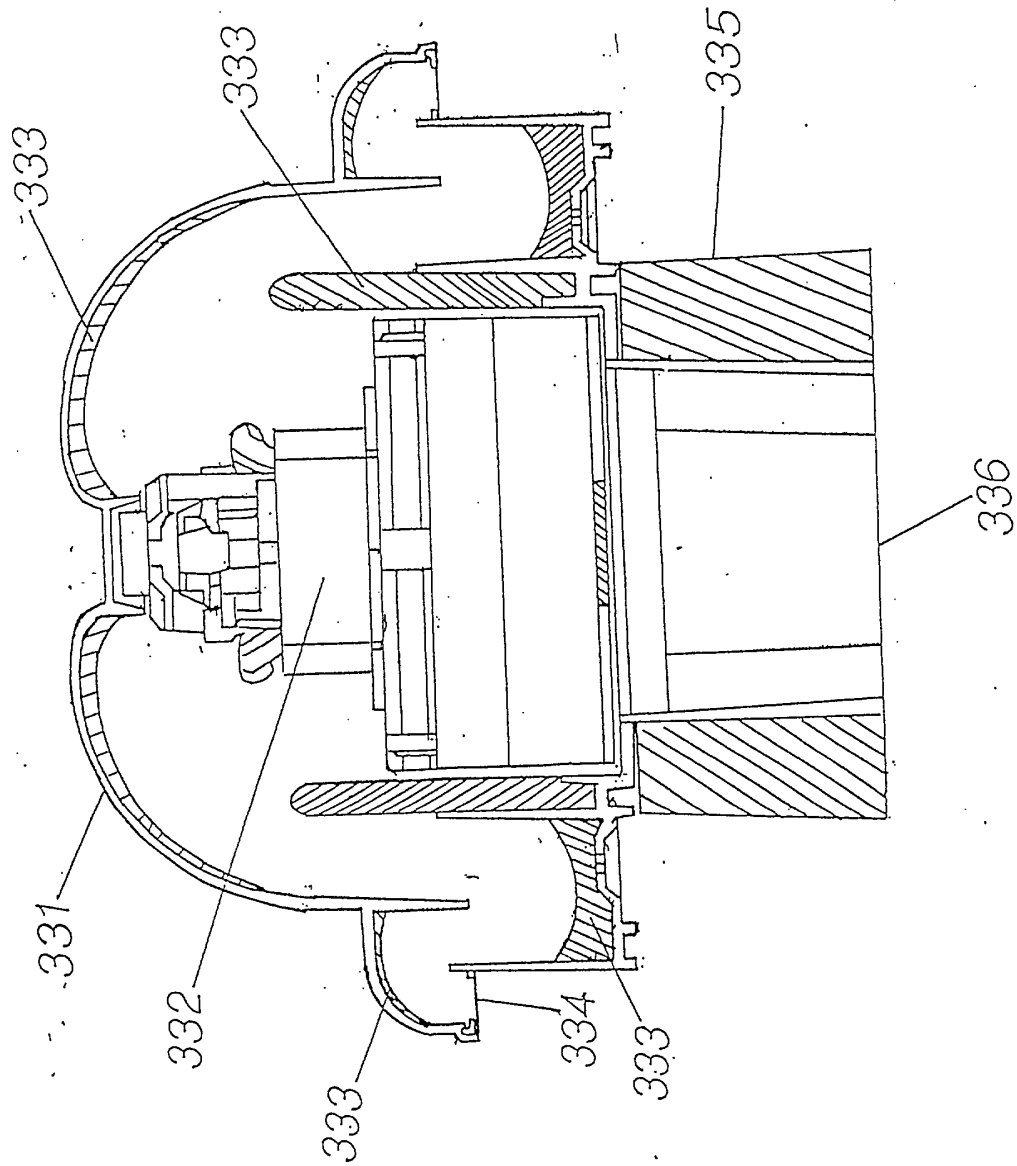


FIG. 7

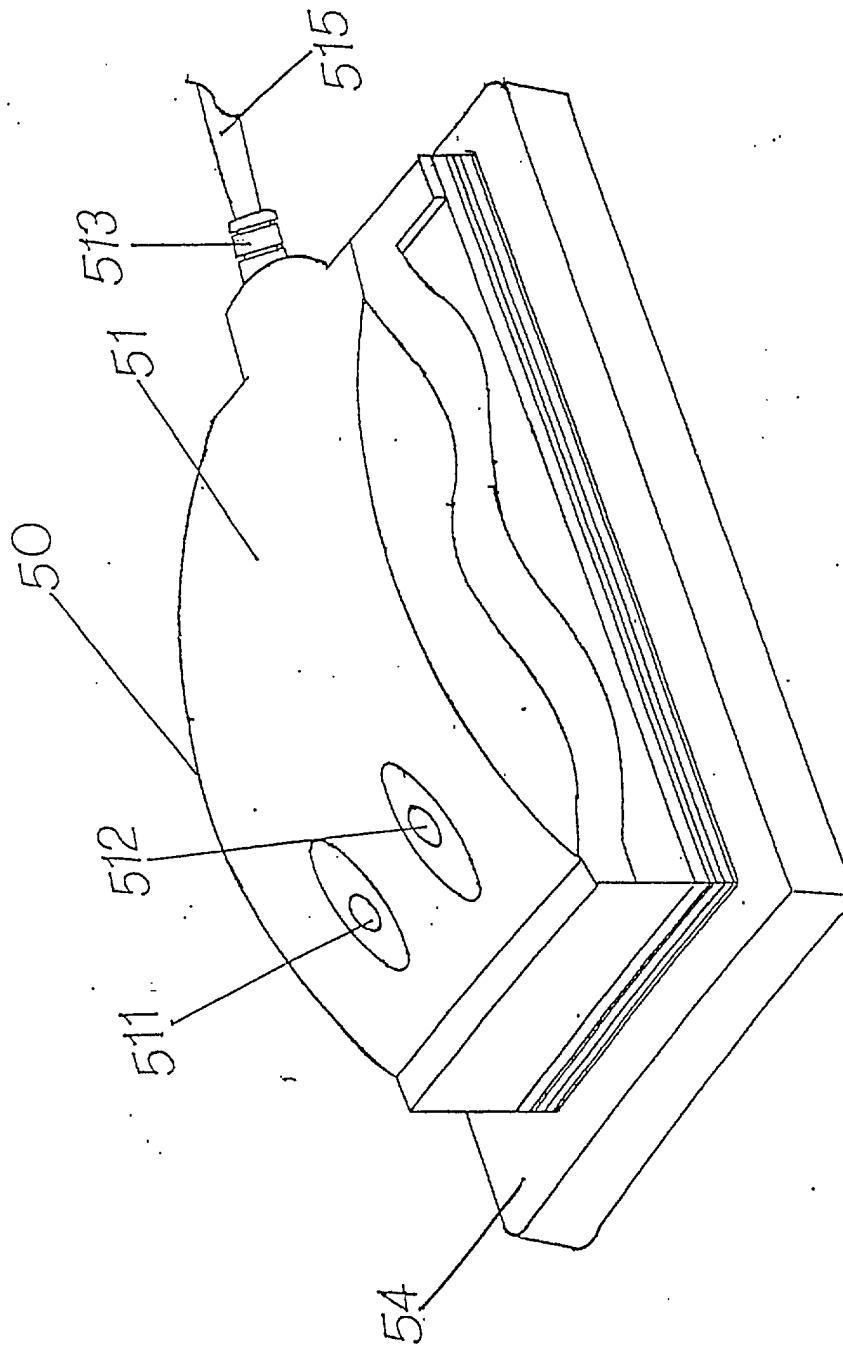


FIG. 8

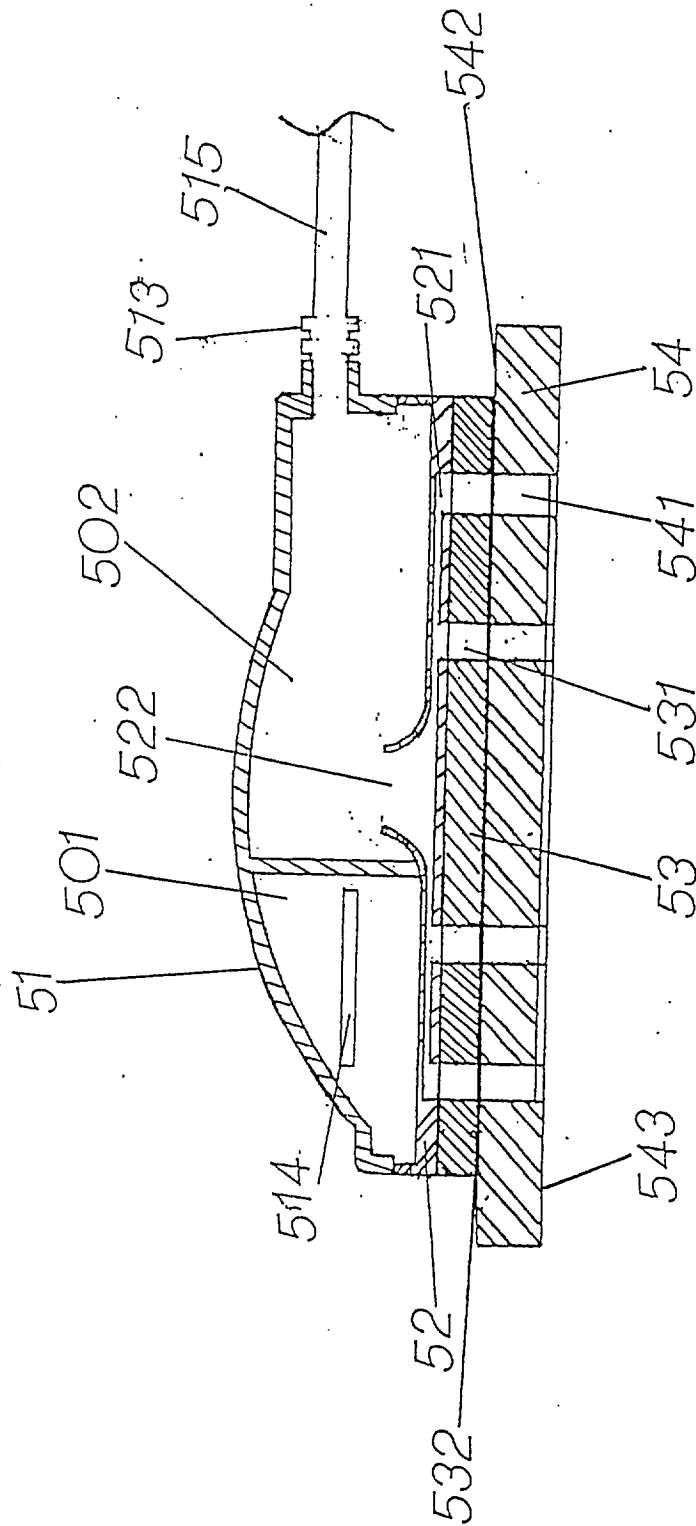


FIG. 9

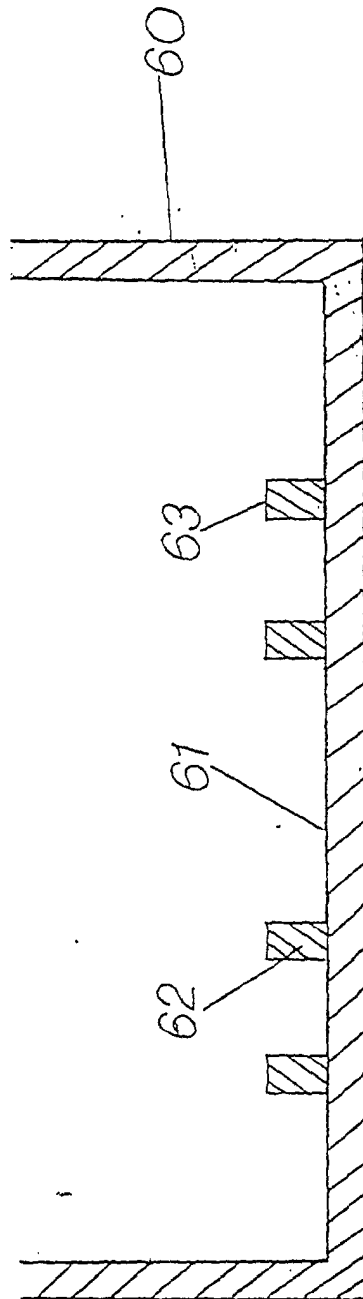


FIG. 10



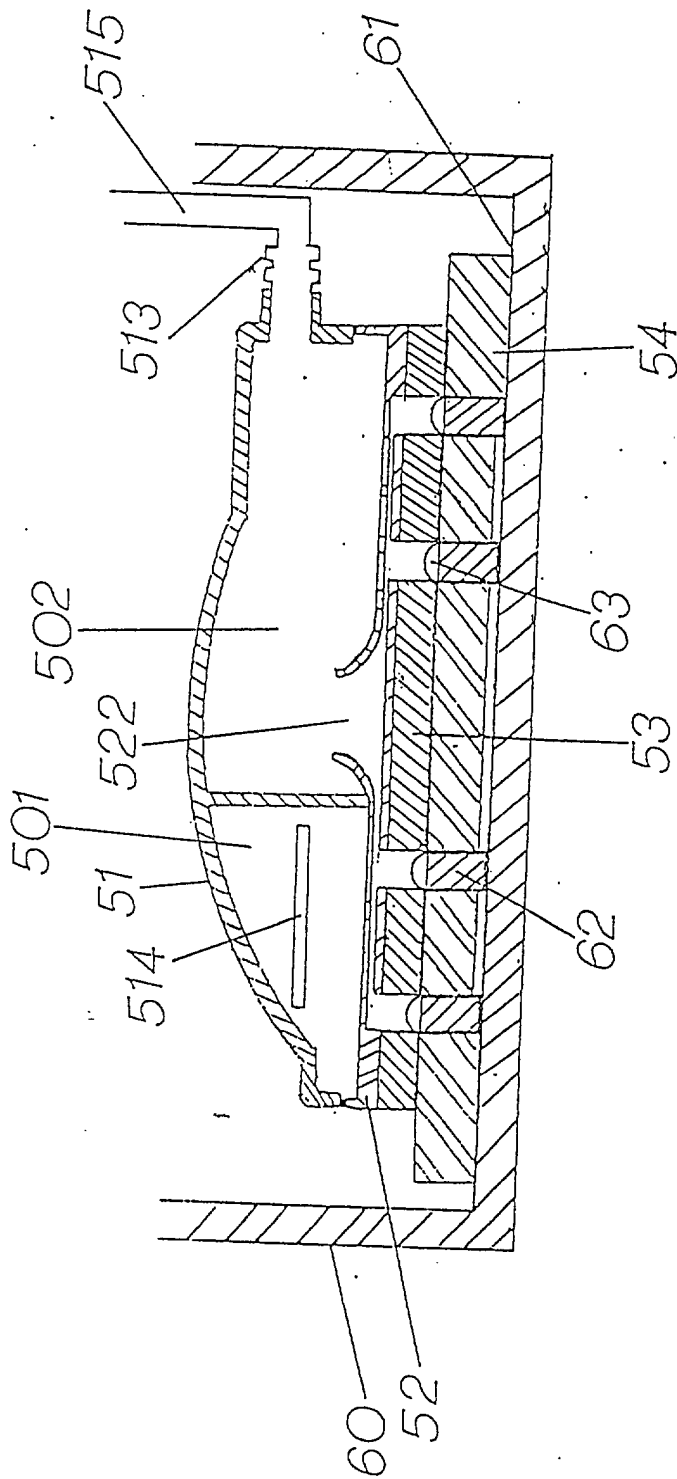


FIG. 11

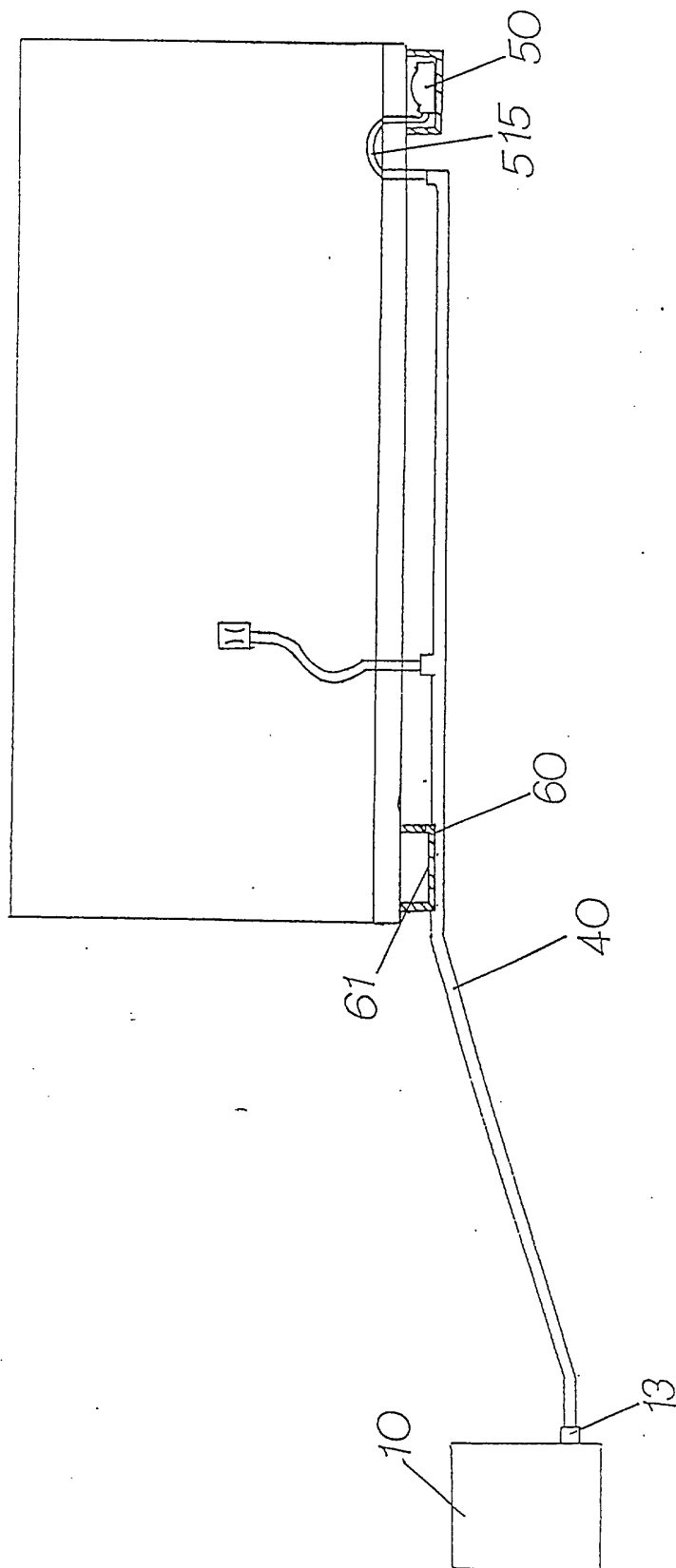


FIG. 12



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 01 11 9698

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)
Y	DE 200 15 503 U (LIU TE HSI) 7 December 2000 (2000-12-07) * page 3, line 22 - page 10, line 15; claims; figures *	1-10	B43L21/02
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