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(54) Liquid filter for a vacuum cleaner

(57) To establish in the vacuum cleaner reservoir of a vacuum cleaner a wet sprinkling process to take away from ambient air and /or from air sucked up at least the dust, such reservoir is provided with a chain of components comprised by:a removable tubular appendix (2) ; a bag-like multitask filter (101); a multitask flanged drum (5), whose upper flange (55) provides a "u" cross- sectioned water tight channel.and whose bottom flange (5') includes a number of sprinkling passages (100); an annular droplet wall or dam (6); a four-legged spacer or support (12); a filter (8) made by mineral imputrescible fibres; and a water pool . The optimum of the members of the chain may be determined by the formula:

$$\text{Efficiency } E = \frac{Q \cdot D}{T \cdot 1 + (u_0 \pm u_e)};$$

wherein

Q = Fluid flow; D= Degree of drop distribution T= Water transfer;

u_0= Optimal wetting (of the filter) u_e= Actual wetting (of the filter)

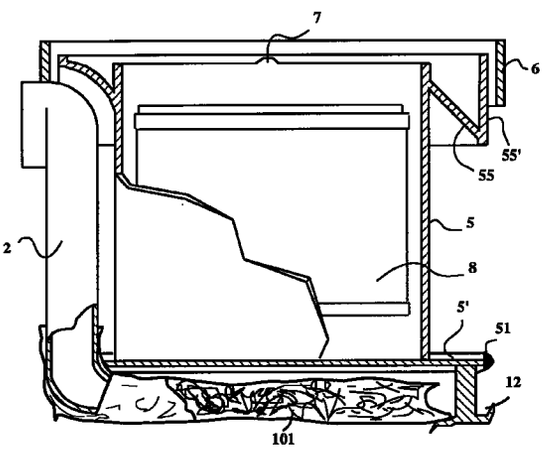

FIG. 7

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Description

Conventionally an apparatus, which sucks up dust etc.or vacuum cleaner is conventionally comprised by an electric motor unit, including substantially an air compressor. Of such air compressor is used the air intake to produce and maintain into the vacuum cleaner reservoir a condition of vacuum which draws therein air Such reservoir is equipped with a fitting . Such fitting is used to connect one end of a hose whose other end receives the equipment nose pieces of various shape, not shown, to suck up dust etc. from floors, carpets, walls furniture etc.. The air incoming through the fitting at high speed entrains therewith the dust and also other particles up to a size of a few mm which are stopped by a dry filter.

The operating process of a conventional vacuum cleaner, duly provided with a dry filter is conditioned by a multitude of factors. The process is determined and limited by the dry filter and by its condition of obstruction or becoming durty. such becoming durty or obstruction begins presently with the use and determines the series of becoming following phases. The phases determined by the dry filter are substantially three: a first phase, mainly comprised by solids up to a few mm entrained to the threshold of filter (specially when the filter is still clean) whereby drop on the bottom of reservoir and thus may be easily perceived and disposed; a second phase comprised by solids which having not enough weight to precipitate rest on the surface of the filter even for the reason that they have a dimension not so small to pass through the filter pores thus providing the third phase. The third phase, comprised by the dust or powder having a particle dimension smaller than the pores of the filter, is sent back in the ambient air and flies everywhere. The second phase which durten the filter and form layers thereon is not at all elimined but moved on the filter in a transient manner. It may be eliminated only disposing the filter. Reasonable conditions may be provided only changing very frequently the filter. But this would create heavier problems than eliminating the dust in other ways . Whereas using the vacuum cleaner without changing the filter, any sucking up would be in a short time impossible with the risk to burn the electric motor and of scattering the dust inside and outside of the vacuum cleaner with damage to the ambient and to the same vacuum cleaner.

Perhaps due to these drawbacks that it was considered necessary to increase the utility of the vacuum cleaners rendering them adapted to suck up liquids by providing them with a floating valve which forbids to the water sucked up and sent into the vacuum cleaner reservoir from entering into the electric motor unit of the vacuum cleaner. Of course when the so arranged apparatus is used to suck up liquids the dry filter is removed. Thus the vacuum cleaner reservoir and the same apparatus structure are already adapted to receive the liquid. The same fitting for the possible connection of the sucking up hose at a level higher than that at which the floating valve intervenes. Such external use of liquid could be of help also for eliminating the dust.

Thus the vacuum cleaner of the present state of the art have the drawback to be unable to capture the dust and particularly the finest fractions thereof. More than that the vacuum cleaner has the perverse power to entrain and move the dust even that at rest thus complicating the problem . The worsening is important since only after some hours that is after that the dust is again at rest it is possible to use the remedy which perhaps could be used before.

The invention as claimed is intended to remedy these drawbacks. The inventor with ingenious perception has conceived a chain of members adapted to establish in a reservoir equipped vacuum cleaner a wet sprinkling process to take away from ambient air and /or from air sucked up at least the dust.

In a vacuum cleaner of the kind equipped to suck up even the liquid and just starting from such condition the reservoir of a conventional vacuum cleaner is equipped with a chain of members comprising one or more or preferably all the following means:

a) a removable tubular appendix having the shape of a smoking pipe i.e. its longitudinal axis is in the form of "S" . Such removable tubular appendix or connector is coupled with its upper end into the inner opening of the fitting equipping the conventional vacuum cleaner, reservoir, wherein the, conventional fitting, receives one end of the hose whose other end receives the equipment nose pieces. At least the appendix hollow has variable cross-section shape and constant cross-section area. Its outlet end matches the bottom of the vacuum cleaner reservoir . In fact it runs substantially parallel thereto; such outlet end being adapted to receive:

b) a bag-like multitask filter having substantially the shape of an urinal, particularly made of nonvowen tissue, wherein its inlet mouth and its inlet neck are adapted to be worn on the outlet bottom end of the removable tubular appendix by an elastic band.

c) a multitask flanged drum, having relatively complex set of dimensions and structural features. It fills almost all the inner room of the reservoir of the vacuum cleaner. The drum is comprised by a main central cylindrical body occupying about 2/3 of diameter of the vacuum cleaner reservoir. The bottom of the main central cylindrical body is provided with a complanar flange whose edge is provided with a gasket (51) to seal its coupling with the inner wall of the reservoir. The main central cylindrical body is provided upwardly with four equispaced merlons . At a short distance below the bottom of the merlons is provided an outwardly projecting slanting wall having a width which is about one half of the width of said bottom flange and as well as comprising at its outer edge an upright cylindrical wall, extending upwardly beyond the wall of the body drum including, the merlons as well as the same slanting wall. Such walls,

together with the upper section of the outer wall of the drum body, comprise a sealed through-like channel unit. Such upper and bottom crowns are provided in the same radial position with an interruption to leave space to and to match with the removable tubular appendix of a). The bottom flange includes as well as a number of sprinkling passages distributed along two parallel circumferences extending on an arch of 260º excluding the section thereof cooperating with said removable tubular appendix;

d) an annular droplet wall or dam to be hang from the bottom wall of the electric motor unit (01) of the conventional and having a diameter such that it stands parallel outwardly from said channel;

e) a four-legged spacer or support spacing the bottom of the reel-like multitask flanged drum from the bottom of the reservoir of the vacuum cleaner, providing the interspace to receive the bag-like multitask filter and respectively the water pool.. And more than that its legs are provided with such an height to be of help to the user of the vacuum cleaner in filling the pool of the following item g);

f) a filter made by mineral imputrescible fibres and adapted to operate in wet conditions;

g) a water pool.

The chain of members from a) to g), duly applied to a vacuum cleaner reservoir of a conventional vacuum cleaner establish therein a process of operation completely different from the conventional which is proper of the vacuum cleaner as such. Such process includes:

I) the provision of a depression successively into the inner chamber, the upper section of the outer chamber and the bottom section of the outer chamber of the reel-like multitask flanged drum;

II) such depression directly applied into such chambers impinges on a water column comprised by said water pool, through said sprinkling passages facing toward the water surface of the water column or pool, wherein:

III) the water column or pool soaks said bag-like multitask filter and the outlet bottom mouth of the removable tubular appendix appended to the fitting comprising the base suction inlet, whereby:

IV) the air drawn in and the solids entrained thereby, through the fitting are forced through the walls of the bag-like filter and the water column or pool; inside the bag-like multitask filter are sieved aside all the air entrained solids of larger dimension than the filter pores, while such filter pores in conjunction with the air flow and pool water provide firstly an incipient mixing air-water-air entrained solids and secondly an incipient sprinkling;

V) the chambers) and their interpassages and mainly the sprinkling passages through the flange of the reel-like multitask flanged drum, whereby the dusty solids, emerging from the filter pores, are caused to move from the air to the sprinkled water droplets.

VI) The stripped air flow continue its way to the cleaner outlet, as clean air, while the chambers exert an influence on the air lacking droplets loaded with matter received from the air, populating the upper section, to manifest a tendency.

VII) Such pooling or merging with precipitation occurs within the annular column over said sprinkling passages and with increasing intensity from the bottom to the top and with neglecting intensity inside of the reel-like multitask flanged drum, whereby the filter made by mineral imputrescible fibres and adapted to operate in wet conditions is reached substantially only by clean air and microparticle of water entrained therewith, which are sieved out from the filter, whose pores grows more and more with the wetting

It is thus evident as, in the same contest, but through the chain of members, in accordance with the invention, it is possible to perform a process completely different from the original one. Of course, the vacuum cleaner equipped in accordance with the invention, does not loose its identity and way to operate in a conventional way. Whereas it acquires a new one which is different and optional.

In practice the chain of members in accordance with the invention was embodied in conventional vacuum cleaner and experiments were run to obtain optimum performances from such model. However the specific and general, teachings obtained in the matter permit not only to improve any known vacuum cleaner but even to provide arrangements which effectively eliminate the dust according to the invention.

Of the optimum criterion a graph and a demonstrative formula have been provided which are essential to progress further in the matter

The formula is

$$\text{Efficiency } E = \frac{Q \cdot D}{T \cdot 1 + (u_0 \pm u_e)};$$

wherein

Q = Fluid flow;

D= Degree of drop distribution

T= Water transfer;

u_0= Optimal wetting (of the filter)

u_e= Actual wetting (of the filter)

One way of carrying out the invention is described in detail below , with reference to drawings which illustrate a specific embodiment in which:

Figure 1 is a demonstrative graph, indicating the influence of filter obstruction, on the performances during three steps of distribution taking place in a conventional vacuum cleaner, i.e., before the application of the chain of members in accordance with the present invention.

Figure 2 is substantially a repetition of the demonstrative graph of figure 1 but referring to the efficiency of the chain of members in accordance with the present invention, respectively to the efficiency, of the same vacuum cleaner equipped with the chain of members in accordance with the present invention.

Figure 3 is demonstrative graph being of help in designing the members of the chain and for obtaining from each of them optimum performances. In the graph are shown on cartesian coordinates: in ordinates the air flow Q and in abscissae the air velocity V, which are referred to three ranges of air flow velocity which may be selected by a potentiometer. Such ranges are shown as descending curves r, s, t, as well as five ranges of cross-sections i, ii, iii, iv, v, which are shown as radii whose value, read in clockwise direction, has a decreasing meaning in function of the radius angle. The graph provides a field H of operability, wherein the specific optimum parameters can be selected.

Figure 4 shows in cross-section, in a very schematic fashion, a conventional vacuum cleaner, of the kind in which the chain of members in accordance with the present invention is applicable, but in an attitude adapted to check the performances of the graph of figure 1.

Figure 5 is substantially a repetition of figure 4, but wherein the same vacuum cleaner is in an attitude adapted to conventionally suck up liquid; in fact its reservoir is shown as containing, enough liquid to provide the shutting of the conventional floating valve.

Figure 6 is an exploded view of the members of the chain in accordance with the present invention.

Figure 7 shows partly in front view and partly in cross section the assembled chain of members.

Figure 8 shows a scheme of the running process in accordance with the present invention.

Referring now to the figures 4, 5, 8, 9 of the drawings, an apparatus 0, which sucks up dust etc.or vacuum cleaner is conventionally comprised by an electric motor unit 01 including substantially an air compressor. Of such air compressor is used the air intake to produce and maintain into the vacuum cleaner reservoir 02 a condition of vacuum which draws therein air Such reservoir 02 is equipped with a fitting 03. Such fitting 03 is used to connect one end of a hose whose other end receives the equipment nose pieces of various shape, not shown, to suck up dust etc. from floors, carpets, walls furniture etc.. The air incoming through the fitting at high speed entrains therewith the dust and also other particles up to a size of a few mm which are stopped by a dry filter 04.

The vacuum cleaner 0 taken as reference (figure 1) is a conventional apparatus conventional manufactured by the applicant "GISOWATT" with the mark "LAVAMATIC" (not registered); it is is conventionally comprised by an electric motor unit 01 having the power of 1100 W capable of providing with a wheel having a diameter of mm 150 a head of 2150 mm H_2O on an intake having a diameter of 58 mm. The electric panel of such apparatus 0 includes a potentiometer having a scale graduated from 1 to 3. On the air intake 011 of the unit 01 is provided a filter 012 which is a dry filter having pores of 0,8 microns. The vacuum cleaner reservoir 02 of this vacuum cleaner 0 is substantially cylindrical and has a diameter of the inner hollow of 320 mm and a height of 250 mm. Such hollow is enhanced by a central bottom depression 02' and reduced by a corresponding descending projection 01' of the unit 01.

To confirm what said in the foreword and referring to the graph of figure 1, by using vacuum cleaner of Fig. 4, a mixture which may be classified as including three phases: a first phase f1, mainly comprised by solids up to a few mm entrained to the threshold of filter 04 (specially when the filter is still clean) whereby drop on the bottom of reservoir 02 and thus m ay be easily perceived and disposed; a second phase f2 comprised by solids which having not enough weight to precipitate rest on the on the surface of filter 04 even for the reason, that they have a dimension not so small to pass through the filter pores thus providing the third phase f3. The third phase, comprised by the dust or powder having a particle dimension smaller than the pores of the filter 04 is sent back in the and flies everywhere. From the graph of figure 1 which shows in abscissae the time and in ordinate the quantity which may be sucked up it may be understood. At the beginning when the filter is virgin all the available material of the three phases f1, f2, f3, is entrained by the air and reaches the filter. However in this case only the phase f2 is of interest since the phase f1 falls at the feet of the filter 04 and the phase f3 passes beyond while the phase f2 start presently to obstruct filter 04 which by degree looses its filtering capacity. This reduction of power of the filter is such that the phases f1, f2, f3 are re sucked up less and less until the filter 04 is completely obstruct. Until the unobstructed pores of the filter 04 leave the phase f3 to pass therethrough it does not impact thereto. However as soon as even the phase f2 is impeded to pass through the open pores remained in the filter stop for a short time a reduced portion of phase f3. The graph shows that while the phases f1 and f2 have a trend rapidly descending the phase 3 has an imperceptible increasing trend. Correspondingly, however while the phases f1 ed f2 have not been sucked up the phase f3 was sucked up and mainly f3' brought again in the ambient air. It is evident that the reference vacuum cleaner cannot in any case eliminate the phase f3 from the ambient air and that any intervention made on the same make the thing worse.

The reference vacuum cleaner is adapted to assume even the attitude shown in figure 5 whereby conventionally liquid may be sucked up. In this figure is shown a floating valve as well as the capacity of the reference vacuum cleaner reservoir to contain liquid up to a certain quote; all these features being propaedeutic to the

enrichment of the vacuum cleaner with the chain of members according to the present invention.

Referring now to the figures from 6 to 9, according to the present invention, a chain of members to equip the hollow of a reservoir of a conventional vacuum cleaner of the kind equipped with a floating valve comprises:

a) a removable tubular appendix 2 substantially in the shape of a smoking pipe i.e. its longitudinal axis is in the "S" form: This removable tubular appendix (2) with its inlet mouth or inlet upper end it may be fit into the outlet opening of the conventional fitting (03) of the vacuum cleaner reservoir, wherein conventionally to its inlet is connected the hose outlet, whose inlet receives the equipment nose pieces. Its hollow has variable cross-section shape and constant cross-section area. Its outlet end matches the bottom (10) of the vacuum cleaner reservoir (1) being substantially parallel thereto, such outlet end being adapted to receive b), i.e.,

b) a bag-like multitask filter having substantially the shape of an urinal, particularly made of nonvowen tissue. Its inlet mouth and its inlet neck are adapted to be worn on the outlet bottom end of the removable tubular appendix a by an elastic band.

c) a multitask flanged drum, having relatively complex set of dimensions and structural features. It fills almost all the inner room of the reservoir of the vacuum cleaner . The drum is comprised by a main central cylindrical body occupying about 2/3 of diameter of the vacuum cleaner reservoir. The bottom of the main central cylindrical body is provided with a complanar flange whose edge is provided with a gasket (51) to seal its coupling with the inner wall of the reservoir. The main central cylindrical body is provided upwardly with four equispaced merlons . At a short distance below the bottom of the merlons is provided an outwardly projecting slanting wall having a width which is about one half of the width of said bottom flange and as well as comprising at its outer edge an upright cylindrical wall, extending upwardly beyond the wall of the body drum including the merlons as well as the same slanting wall. Such walls, together with the upper section of the outer wall of the drum body, comprise a sealed through-like channel unit. Such upper and bottom crowns are provided in the same radial position with an interruption to leave space to and to match with the removable tubular appendix of a). The bottom flange includes as well as a number of sprinkiing passages distributed along two parallel circumferences extending on an arch of 260º excluding the section thereof cooperating with said removable tubular appendix;

d) an annular droplet wall or dam ((6) to be hang from the bottom wall of the electric motor unit (01) of the conventional vacuum cleaner and having a diameter such that it stands parallel outwardly from said channel (55");

e) a four-legged spacer or support (12) spacing the bottom ("'50) of the reel-like multitask flanged drum (5) from the bottom (10) of the reservoir (1) of the vacuum cleaner providing the interspace to provide the bag-like multitask filter and respectively the water pool (11), wherein its legs (12') are provided with such an height to be of help to the user in filling the pool (11) of the following item g);

f) a filter (8) made by mineral imputrescible fibres and adapted to operate in wet conditions;

g) a water pool (11) providing a water column.

The chain of members from a) to g), duly applied to a vacuum cleaner reservoir of a conventional vacuum cleaner establish therein a process of operation completely different from the conventional which is proper of the vacuum cleaner as such. Such process includes:

I) to provide a depression successively into the inner chamber ('5), the upper section ("5) of the outer chamber ("'5) and the bottom section ("'5) of the outer chamber ("'5) of the reel-like multitask hanged drum (5);

II) such depression directly applied into such chambers ('5, "5, "'5, ""5) is applied to a water column comprised by said water pool (11) through said sprinkling passages (100) facing toward the water surface of water column, or pool (11), wherein:

III) the water column or pool (11) soaks said bag-like multitask filter and the outlet bottom mouth of the removable tubular appendix (2) appended to the fitting (03) comprising the base suction inlet,

Considered in backward direction the air drawn in and the solids entrained thereby, through the fitting 03 are forced through the walls of the bag-like filter (101) and the water column or pool; inside the bag-like multitask filter 101 are sieved aside all the air entrained solids of larger dimension than the filter pores, while such filter pores, in conjunction with the air flow and pool water provide, firstly an incipient mixing air-water-air entrained solids and secondly an incipient sprinkling. The chambers ('5, "5, "'5; ""5) and their interpassages and mainly the sprinkiing passages (100) through the flange of the reel-like multitask flanged drum 5 whereby the dusty solids, emerging from the filter pores, are caused to move from the air to the sprinkled water droplets. Since the area of the chambers ('5, "5, "'5, ""5) is very ample correspondingly high is the trend of the droplets to gather, join, or pool and precipitate (figure 8). Such pooling with precipitation occurs within the annular column over said sprinkiing passages and with increasing intensity from the bottom to the tope and with neglectible intensity inside of the reel-like multitask hanged drum 5. Thus only the clean air reaches the filter 8; such clean air may contain a few water micro-particles which are necessary to provide a good operation of the filter 8 made of mineral fibres.

It is thus evident as in the same contest but with the chain of members according to the invention it is possible to provide a process completely different from the conventional one. Of course, the vacuum cleaner equipped in accordance with the invention, does not loose its identity and way to operate in a conventional way. Whereas it acquires a new one which is different and optional.

In practice the chain of members in accordance with the invention was embodied in conventional vacuum cleaner and experiments were run to obtain optimum performances from such model. However the specific and general teachings obtained in the matter permit not only to improve any known vacuum cleaner but even to provide arrangements which effectively eliminate the dust according to the invention.

Of the optimum criterion a graph and a demonstrative formula have been provided which are essential to progress further in the matter.

The formula is

$$\text{Efficiency } E = \frac{Q \cdot D}{T \cdot 1+(u_0 \pm u_e)};$$

wherein

Q = Fluid flow;

D= Degree of drop distribution

T= Water transfer;

u_0= Optimum wetting (of the filter)

u_e= Actual wetting (of the filter)

Referring to the graph of figure 2, therein is shown that the filter 8 does not determine any longer the process, since by using the aforesaid formula the process made to occur upstream of the filter. In fact upstream of the filter is provided an intense sprinkling with scattering of water drops and frequent impact with the air and the matter entrained thereby. The trend of the air to leave its load of water, dust is almost absolute whereby the air reaching the filter should contain only droplet so small that the constant wet condition of the filter is not disturbed. On the other hand the air flow dries the exceeding water from the filter; while if there is any bad functioning the drops falling down from the filter are received by the hollow of the drum body. A small quantity of water in such hollow 50 is tolerated provided that it is not sufficient to be sucked up instead of the air

Claims

1. In a vacuum cleaner of the kind equipped to suck up even the liquids, a chain of members characterized in that it comprises one or more or preferably all the following means:

   a) a removable tubular appendix (2) substantially in the shape of a smoking pipe i.e. its longitudinal axis is in the "S" form, whereby with its inlet mouth or inlet upper end it may be fit into the outlet opening of the conventional fitting (03) of the vacuum cleaner reservoir (wherein conventionally to its inlet is connected the hose outlet, whose inlet receives the equipment nose pieces) its hollow having variable cross-section shape and constant cross-section area and its outlet end matches, the bottom (10) of the vacuum cleaner reservoir (1) being substantially parallel thereto, such outlet end being adapted to receive b), i, e.,

   b) a bag-like multitask filler (101) having substantially the shape of an urinal, particularly made of nonvowen tissue, wherein its inlet mouth and its inlet neck are adapted to be worn on the outlet bottom end of the removable tubular appendix (2) by an elastic band (20).

   c) a multitask flanged drum (5), filling almost all the inner room of the reservoir (1) of the vacuum cleaner (0). comprising a main central cylindrical body (50) occupying about 2/3 of diameter of the vacuum cleaner reservoir (1), its bottom being complanar with a flange (5') including a number of sprinkling passages (100), wherein the edge of such flange (5') is provided with a gasket (51) to seal its coupling with the inner wall of the reservoir (1); said main central cylindrical body (50) being provided upwardly with four equispaced merlons (7), wherein just at the bottom of the merlons is provided an outwardly projecting slanting wall (55), having a width which is about one half of the width of said bottom flange (5'), such wall (55) comprising at its outer edge an upright cylindrical wall (55'), extending upwardly beyond the wall of the body drum including the merlons (7) as well as the same slanting wall (55), whereby such walls (55, 55') together with the upper section ('50) of the outer wall ("50) of the drum body (50), comprise together a sealed through-like channel (55"), the upper channel (55") and the bottom flange (5') being radially interrupted to leave space and match the removable tubular appendix (2), said sprinkling passages (100) provided into the bottom flange (5') being distributed along two parallel circumferences extending on an arch of 260º excluding the section thereof cooperating with said removable tubular appendix (2).

   d) an annular droplet wall or dam ((6) to be hang from the bottom wall of the electric motor unit (01) of the conventional vacuum cleaner and having a diameter such that it stands parallel outwardly from said channel (55");

   e) a four-legged spacer or support (12) spacing the bottom ('"50) of the reel-like multitask flanged drum (5) from the bottom (10) of the reservoir (1) of the vacuum cleaner providing the interspace to provide the bag-like multitask filter and respectively the water pool (11), wherein its legs (12') are provided with such an height to be of help to the user in filling the pool (11) of the following item g);

f) a filter (8) made by mineral imputrescible fibres and adapted to operate in wet conditions;

g) a water pool (11) providing a water column.

2. Operating process of the chain of members as claimed in claim 1, included in a conventional vacuum cleaner (0) of the kind equipped to suck up even the liquid, characterized in that it comprises:

I) to provide a depression successively into the inner chamber ('5), the upper section (''5) of the outer chamber (''''5) and the bottom section (''''5) of the outer chamber (''''5) of the reel-like multitask flanged drum (5);

II) such depression directly applied into such chambers ('5, ''5, ''''5, ''''5) is applied to a water column comprised by said water pool (11) through said sprinkling passages (100) facing toward the water surface of water column or pool (11), wherein:

III) the water column or pool (11) soaks said bag-like multitask filter and the outlet bottom mouth of the removable tubular appendix (2) appended to the fitting (03) comprising the base suction inlet, whereby:

IV) the air drawn in from the fitting (03) and the solids entrained thereby, are forced through the walls of the bag-like multitask filter (101) as well as through the water column or pool (11); inside the bag-like multitask filter are sieved aside all the air entrained solids of larger dimension than the filter pores, while such filter pores in conjunction with the air flow and pool water provide: firstly an incipient mixing air-water-air entrained solids, and secondly an incipient sprinkling

V) the chambers ('5, ''5, ''''5, ''''5) and their interpassages and mainly the sprinkling passages (100) through the flange of the reel-like multitask flanged drum (5) enhance said incipient sprinkling providing an intense sprinkling, whereby the dusty solids ,emerging from the filter pores, are caused to move from the air to the sprinkled water droplets.

VI) The stripped air flow continue its way to the cleaner outlet, as clean air while the chambers ('5, ''5, ''''5, ''''5) exert an influence on the air lacking, droplets loaded with matter received from the air, populating the upper section, to manifest a tendency: 1) to merge each other and/or one another; 2) to thicken and/or gather; 3 to precipitate back into the water pool.

VII) Such pooling or merging with precipitation occurs within the annular column over, said sprinkling passages and with increasing intensity from the bottom to the top and with neglecting intensity inside of the reel-like multitask flanged drum, whereby the filter (8) made by mineral imputrescible fibres and adapted to operate in wet conditions is reached substantially only by clean air and water micro-particle entrained therewith which are sieved out from the filter whose pores grows more and more small leaving only the air flow to pass through.

3. Process as claimed in claim 2, characterized in that the optimum parameters are determined in accordance with the following formula:

$$\text{Efficiency } E = \frac{Q \cdot D}{T \cdot 1 + (u_0 \pm u_e)};$$

wherein
Q = Fluid flow;
D= Degree of drop distribution
T= Water transfer;
u_0= Optimal wetting (of filter 8)
u_e= Actual wetting (of the filter)

4. Process as claimed in claim 2, characterized in than it the optimum parameters are determined in accordance with the graph of figure 3 wherein are shown in ordinates the air flow Q and in abscissae the air velocity V which are referred to three ranges of air flow velocity which may be selected by a potentiometer which are shown as descending curves r, s, t, as well as five ranges of cross-sections i, ii, iii, iv, v, which are shown as radii whose value, read in clockwise direction, has a decreasing meaning in function of the radius angle, whereby, an operability field H is given wherein the specific optimal parameters can be selected.

5. Means as claimed in claim 1, characterized in that said passages (100) totalling altogether a cross-section which is equal to the cross-section of the removable tubular appendix (2).

6. Means as claimed in claim 5, characterized in that said passages (100) have each a cross-section of 16 mm^2.

7. Means as claimed in claim 5, characterized in that said passages (100) have square cross-section.

8. Means as claimed in claim 1, characterized, in that said bag-like multitask filter (101) has substantially the shape of an urinal.

9. Means as claimed in claim 8, characterized in that said bag-like multitask filter (101) is made of nonvowen tissue.

10. Means as claimed in claim 1, characterized in that it the upper section ('50) of the outer wall (''50) of the drum body (50), comprise together a sealed through-like channel (55'').

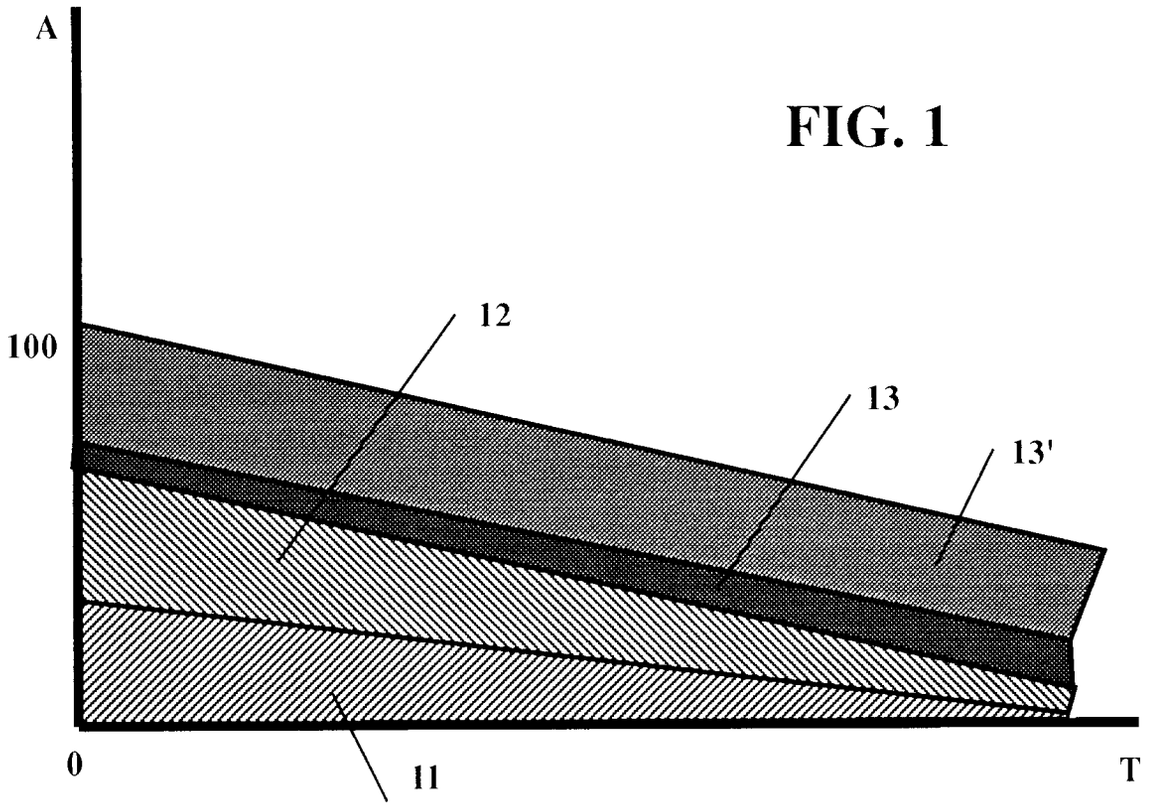

FIG. 1

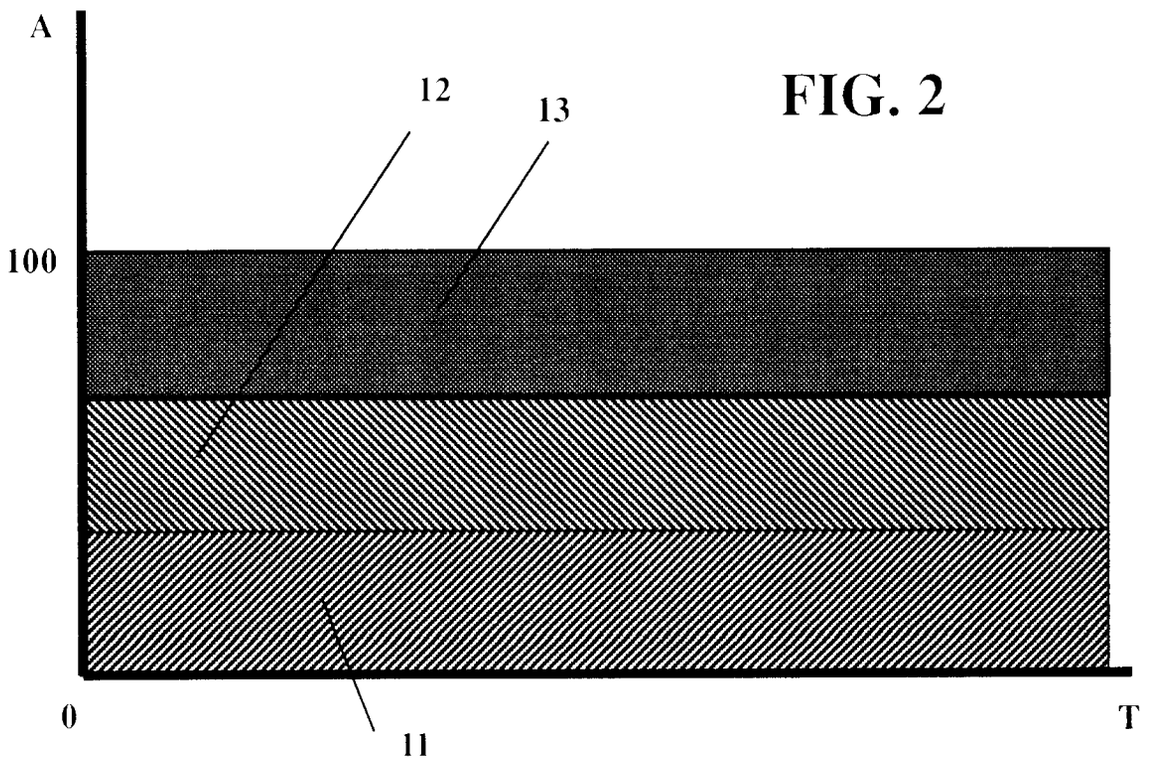

FIG. 2

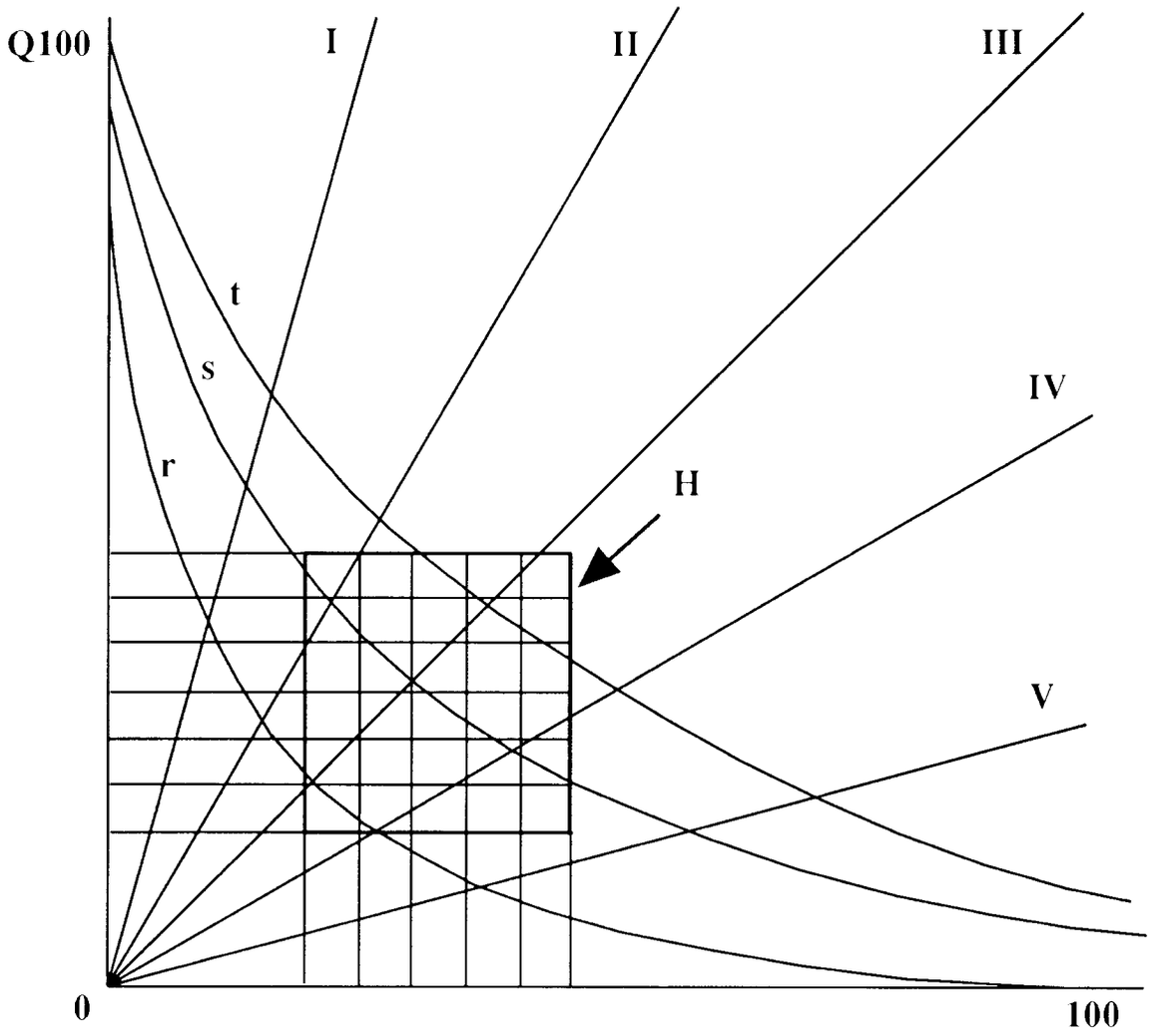

FIG. 3

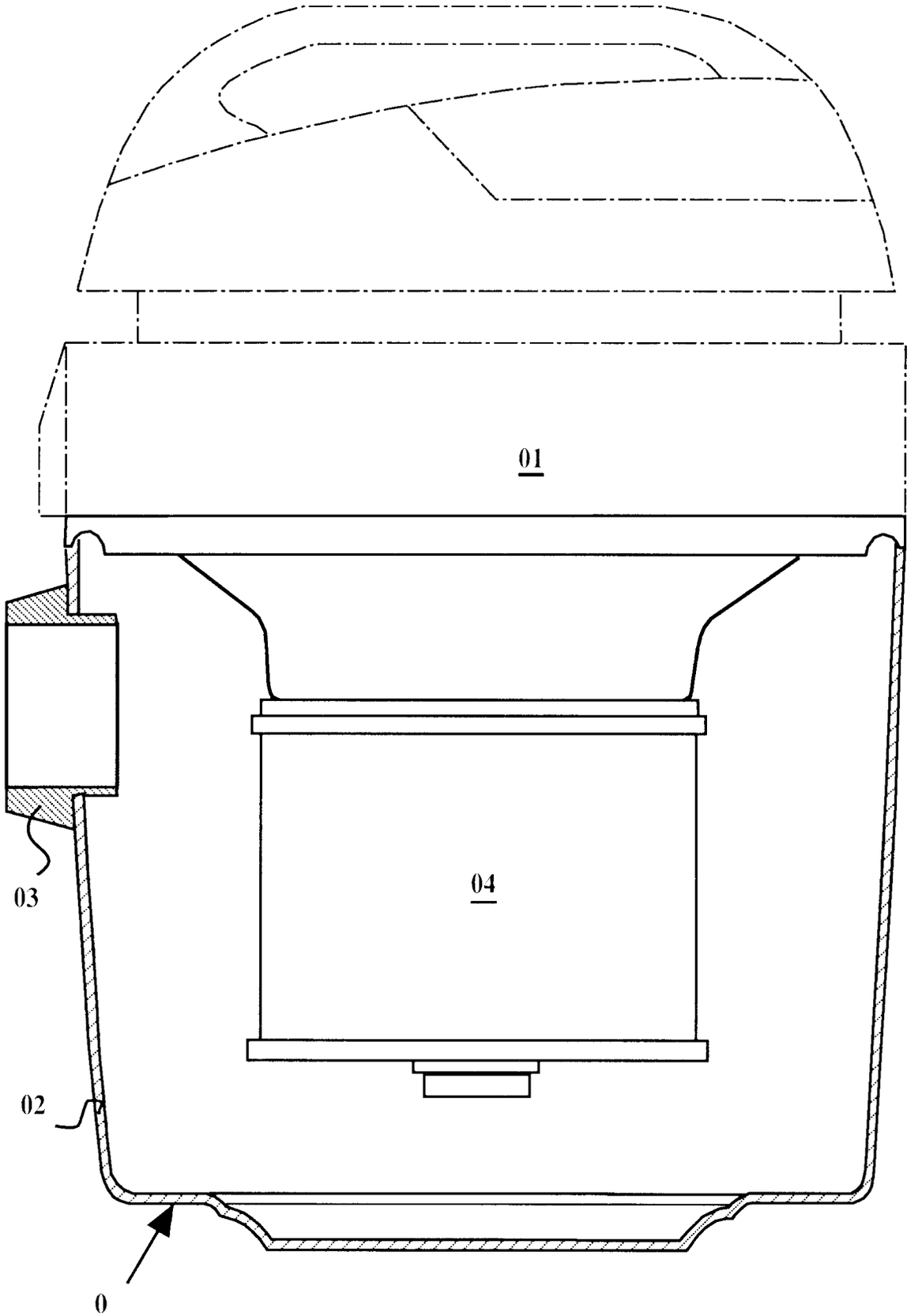

FIG. 4

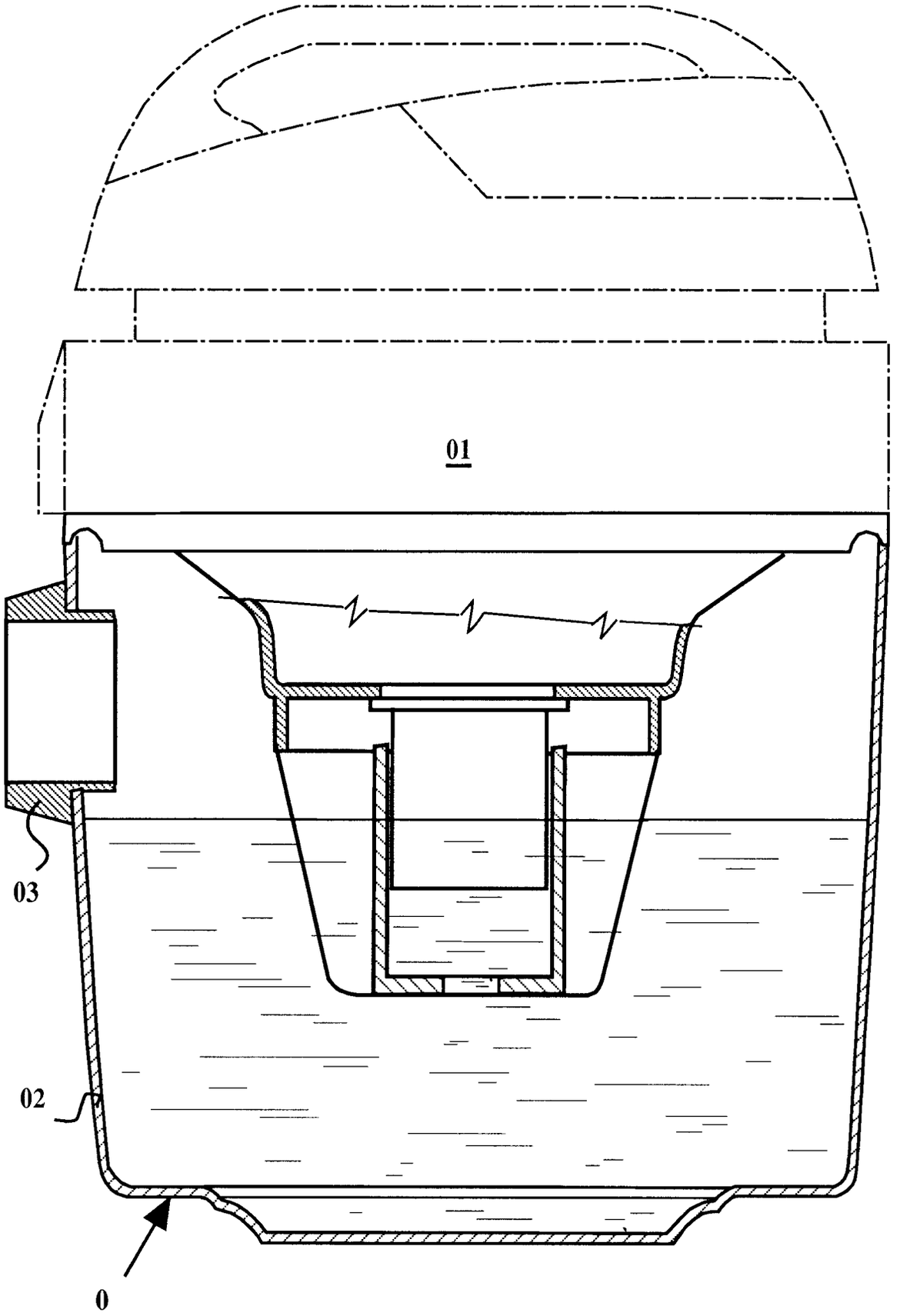

FIG. 5

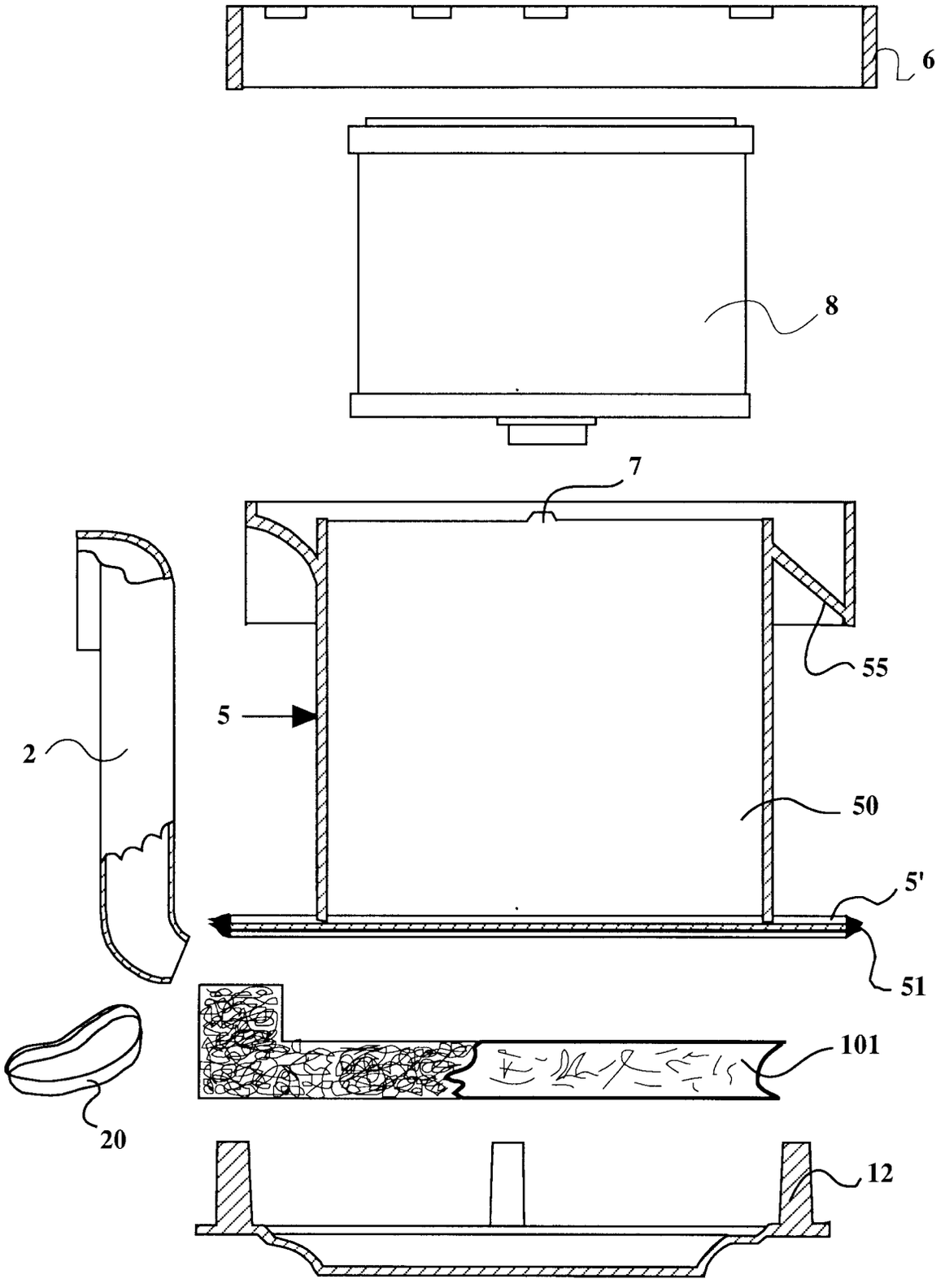

FIG. 6

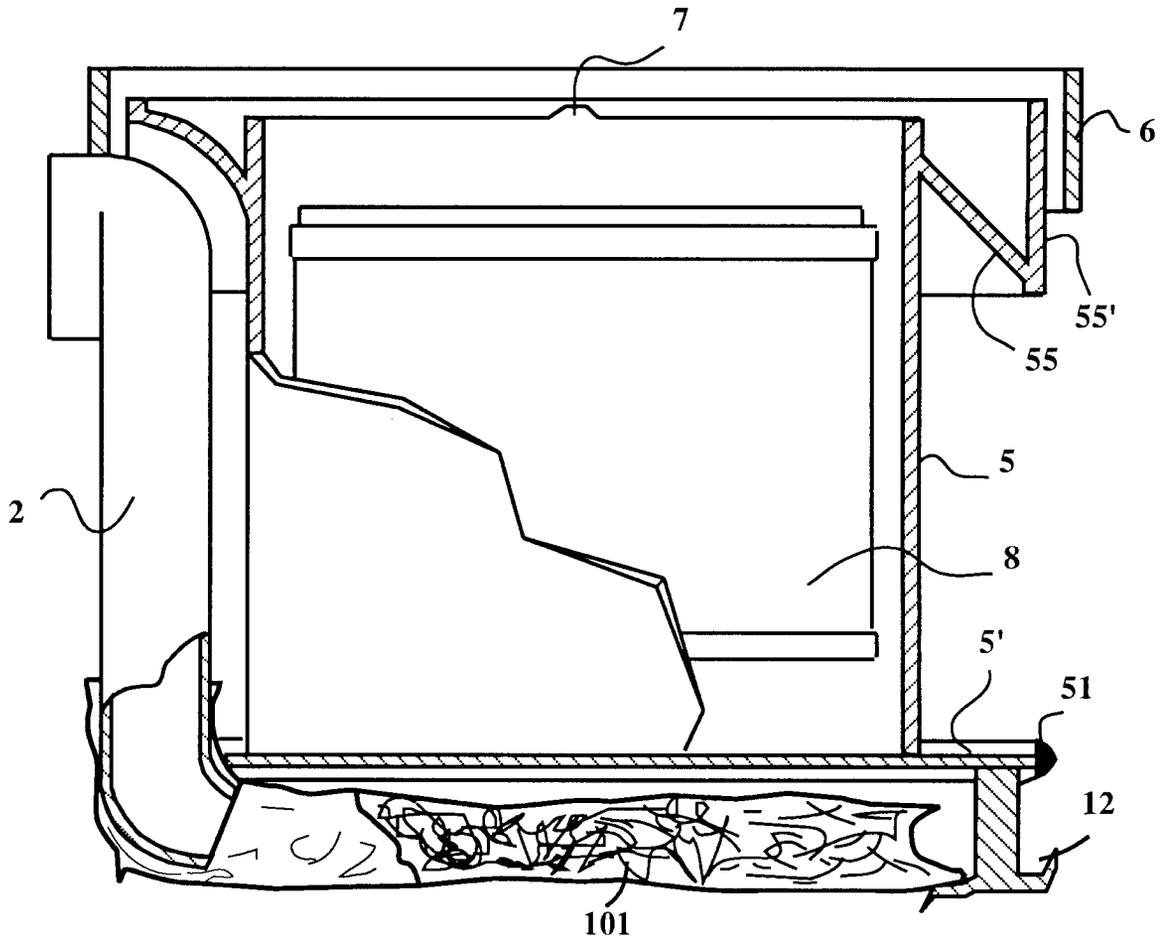

FIG. 7

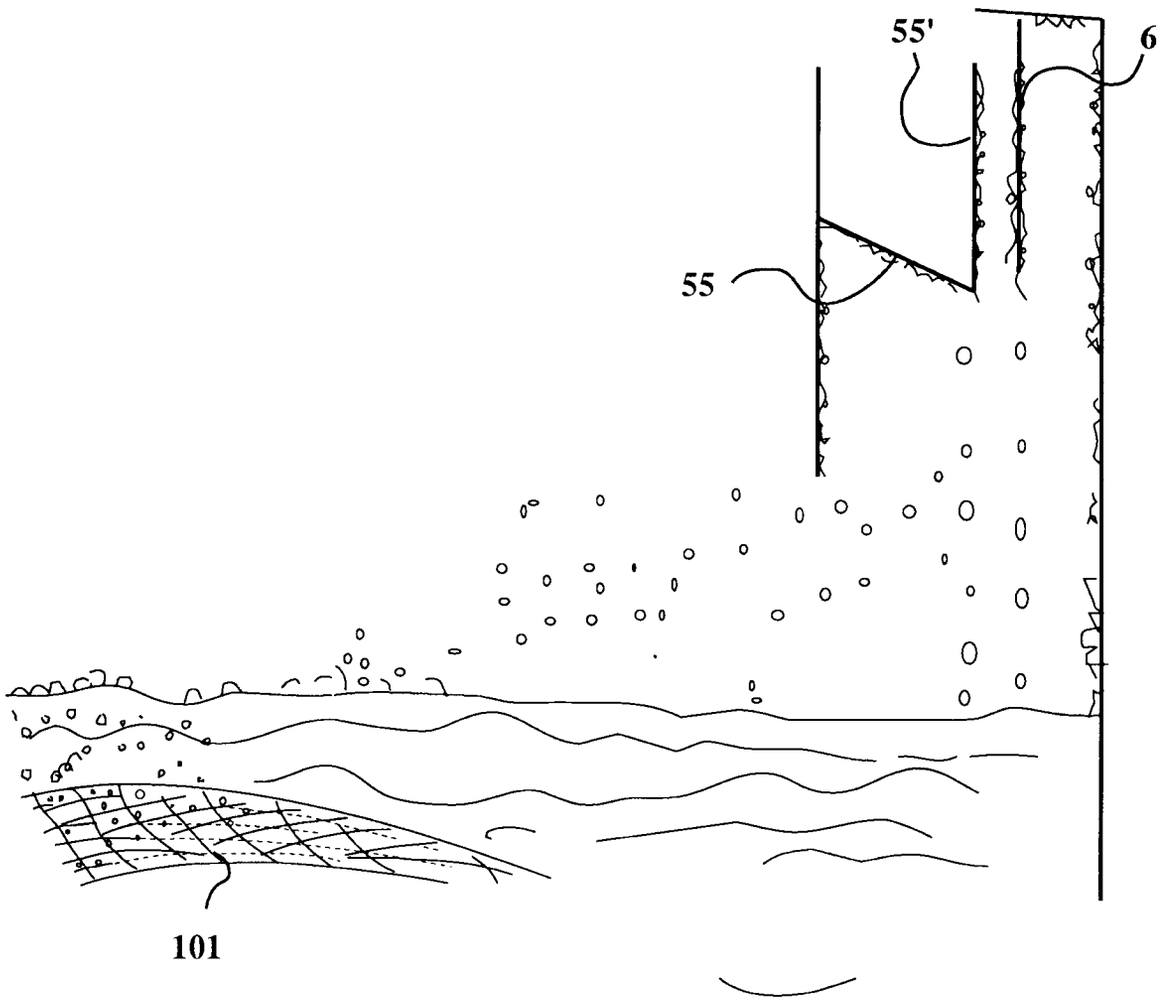

FIG. 8