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(54) Improved laundry dryer with refreshment operation

Wäschetrockner mit Auffrischenfunktion

Sèche-linge avec fonction de rafraîchissement

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EP 1 990 466 B1

Description

[0001] The invention refers to an improved type of laundry drying machine, preferably for domestic use, able of implementing refreshing and anti-wrinkling treatment for the laundry load.

[0002] Drying machines are known, which are able of producing a kind of gaseous diffusion of liquid substances and to convey said substances into a drum containing laundry, with the purpose of carrying out a refreshing or anti-wrinkling treatment.

Often the substance used for the treatment is simply steam.

[0003] Moreover when the drying machine is of the condensation type, the condensed moisture generated by said drying and condensation process is used to transform it again into a steam flow, or simply into a diffusion of atomized moisture using ultra-sound techniques, to be diffused through said laundry load to obtain the wanted effect of refreshing and anti-wrinkling.

[0004] Such machines are in a detailed way described in EP-A-1887127, and in the documents therein cited, and mainly in DE-A-102 60 151, to which for brevity it is here referred.

[0005] In said documents it is shown that the moisture, which is condensed during the drying process, is again collected into a suitable collection tray , wherefrom it is again taken to be transformed into steam.

[0006] However it may happen that a part of the lint and of further material which is left during the drying process, inside the drum directly into the drying air-flow going out of the drum, are not intercepted by the specific air filter, which is generally placed just at the drum exit opening; in such a case, and mainly if said filter is a little clogged, said lint remain inside the drying air-flow, wherefrom they are obviously dragged into the condenser.

[0007] Here the moisture condensing effect easily causes also the consequent effect that such moisture, during and after the relevant condensation process, drags with it also some of such lint directly into the collecting tray of the condensed moisture.

[0008] If then, as described in the cited patents, said condensed moisture is taken to be transformed into steam to be conveyed into the drum, or to be diffused or sprayed by atomization, it happens that, after a certain operation period the lint therein contained are being assembled and grouped with each other, so causing the clogging or plugging of the nozzles or of the pumps treating said moisture, fully or partially endangering the refreshing or anti-wrinkling performances.

[0009] Not to speak of the undesired effect of re-introducing the same lint, just left away from the laundry load, again into the drying air-flow.

[0010] From US-A-2005 0278983 it is divulged a laundry drying machine apt of producing a steam flow into the drum or into the containers wherein the laundry load is contained.

[0011] The water which is needed, is supplied by a standard container, e.g. a bottle, and is soon properly filtered by a "filter vent" whose purpose is to intercept out of that water the there included the residual material possible therein included.

[0012] Said procedure however does not solve the above described problem with ref. to drying machines with rotating drum , both as that solution does not regard the condenser drying machines wherein the condensed moisture is re-used to produce steam, and as said vent filter is intended to separate the water flow from the air-flow, mixed to it.

[0013] The aim of the present invention is therefore to solve the noted problem and thus providing a laundry condenser drying machine allowing the user to implement a refreshing and anti-wrinkling treatment on the laundry load, consisting, without activating a drying cycle, in the production of an over-heated steam flow, which is being mixed to an air flow which is made to circulate in the same drying-air conduit, and to let said air-flow to circulate, mixed with said over-heated steam, across the rotating drum with the laundry load, without suffering any risk that the nozzles injecting out said over-heated steam be obstructed due to the lint accumulation, and without introducing again into circulation the same lint into the drying air conduit.

[0014] Advantages, objects and features of the invention will be set forth in the following description of a condenser laundry drying machine, wherein said over-heated steam is generated by a proper boiler, and is supplied by the moisture condensed in suitable trays, which is being pumped into a conduit conveying it towards said boiler; into said conduit a suitable removable filter is inserted , able of stopping all lint and foreign material out of the water-flow going into said boiler, so as to assure the water there arrived be properly clean and filtered.

[0015] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate a possible embodiment of the invention and together with the description serve to explain the principles of the invention.

[0016] In the drawings:

Figure 1 shows a schematic partial representation of the composition and of the connections of the hydraulic circuit of a laundry treatment machine according to the invention,

Figure 2 shows a perspective view of the valve 18, partly in transparency, of a laundry treating machine as per figure 1,

Figure 3 shows, in a perspective exploded view, the valve of fig. 2

Fig. 4 shows a perspective view of the valve of fig. 2 completely closed and mounted in the final arrangement,

Figures 5 and 6 show respective schematic section views of the valve according to the invention, in two respective different working status.

[0017] With ref to fig. 1, showing the schematic of the hydraulic circuit of a machine according to a prior art, and specifically of the machine described in EP-A-1 887 127a drying machine according to the prior art comprises a rotating drum, not shown, containing the drying laundry load, and which is crossed by an heated air flow; the moisture extracted from the laundry load during the drying process is being condensed by a proper condenser, and is collected by a collecting tray 12.

[0018] A pump 13 and a pipe 17 convey the condensate from the tray 12 to a main tank 14, which is removably associated to the machine and preferably placed in an upper region of the cabinet 2, so as to be easily extracted by the user.

[0019] A secondary tank 16 is provided to be in fluid communication with the condensate collection tray 12 by means of the pipe 17.

[0020] Valve means 18 control the condensate flows towards the main tank 14 and the secondary tank 16.

[0021] As it will be better understood later on, a specific embodiment and function of said valve means 18 will be the subject of the instant invention.

[0022] Pipe 17 branches in a plurality of conduits 19, 20 each of the reaching the respective tank 14, 16.

[0023] Secondary tank 16 is also hydraulically connected with a pipe 23 to an inlet opening steamgenerator 22 of know type, so that the liquor contained in tank 16 can be evaporated.

[0024] Steam produced by the generator 22 flows through a pipe 24 into the drum, or alternatively into the drying air conduit, not shown, for treating laundry.

[0025] When valve means 18 are in an open position, condensate liquor available in the tray 12 during or after a laundry drying operation is pumped by the pump 13 in the pipe 17 and divided between the principal tank 14 and the secondary tank 16. In this way a portion of the total amount of liquid extracted from laundry is saved in the secondary tank 16 and made available to be reused for a subsequent steam treatment. When valve means 18 are in a closed position all the amount of condensate liquor pumped from the tray 12 is flowed into the principal tank 14 though a opening 25 that is placed at the pipe 19 outlet when the machine is in use. Said opening 25 serves also as overflow opening allowing the condensate.

[0026] According to the invention, said valve 18 is selectively controllable in its operation, not only in the sense that it may be opened or closed by an external command, but also in the sense that it contains a type of filter, which will be better described later on, whose introduction in the valve body determines the opening of the same valve, and inversely whose disengagement from the valve body determines its closing.

[0027] With ref. to the figures from 2 to 6, said valve 18 is substancially shaped as an outer cylindrical, internally hollow body, 21; to one of its ends said pipe 17 is connected, into which the condensate, coming from the tray 12, is flowing.

[0028] On a side portion of said hollow body 21 an opening 40 is made, which branches out into the conduit 20 bound to said secondary tank 16.

[0029] Inside said hollow body 21 the actual filtering means 43 is lodged, which is made of a cylindrical element working as a support and a frame for a filtering septum 44 with very close mesh nets.

[0030] The working of said filter/valve 10 is as follows: when said filtering element 43 is being introduced into said hollow body 21, the condensed water coming from the pipe 17 enters said same hollow body and the filtering element 43, which is closed on the opposite end.

[0031] From the inside of said filtering element the condensed water, which may also be mixed with lint and foreign materials, filters trough the filtering septum 44, and gets out, flowing into the ring shaped inter-space between said septum and the inner surface of said hollow body.

[0032] From said gap the condensed water, then filtered, gets into said opening 40 and then, through said pipe 20, into said secondary tank 16.

[0033] The filtering element and its operation have been just described; in the following the valve 18 and its operation will be in detail explained.

[0034] With ref. to figures 6 and 7, said valve comprises said outer and hollow body 21, and is internally provided with an annular relief 45, which is coaxial and internally opened with an opening 46.

[0035] To its turn said filtering element 43 is provided to its end, turned to said pipe 17, with a first extension 47 apt of crossing said opening 46 and to contact, by pressure, an essentially flat and closing member 48, placed between the affluent mouth 17-A of said pipe 17 and said annular relief 45.

[0036] Advantageously said closing member 48 is provided towards said filtering element 43 with a corresponding and substantially coaxial and aligned second extension 48-A apt to engage said first extension 47.

[0037] The reciprocal sizes of said opening 46, of said annular relief 45 and of said closing member 48 are such that said closing member 48 is apt of abut up on said annular relief 45, and in this position said opening 46 is being fully closed.

[0038] A preferably spiral spring 50 is interposed between the inner end side of said hollow body 21, towards said pipe 17, and the side 48-B, in front of it, of said closing member 48; said spring works on compression, and is preferably pre-loaded.

[0039] The operation of said device is as follows:

- when the filtering element has to be extracted, it will be enough to disengage it from said outer body 21 according to known modes, for instance to reciprocally threated means 51, 52 , properly placed between the inner side of said outer body 21 and a respective portion, turned outbound, of said filtering element 43.-
- After having disengaged and extracted the filtering

element 43 (Fig. 6), the pressure of said first extension 47 against said second extension 48-B of said closing member 48 fails, said pressure keeping said closing member 48 away from said annular relief 45 (fig. 5);

- As said pressure fails, said closing member 48, due to the contrary action of said spring 50, is being moved going into contact with said relief 45, pushing against it, what causes the closure of said opening 46.

[0040] So said valve, generally identified as 18, is being automatically closed by the simple extraction of the filtering element 43 out of said outer body 21 (Fig. 6).

[0041] If on the contrary said filtering element is being introduced, the just described operations are obviously reversed (fig. 5), resulting in the opening of said valve, and the condensed moisture is:

- first of all filtered,
- and the made to flow into said conduit 20 to be let into said secondary tank 16.

[0042] It will be now clear to the man skilled in the art a further advantage of the invention: in the facts not only the sought result of filtering the condensed moisture directed to the secondary tank 16 is achieved, what is the main purpose of the invention, but a further useful result is obtained, consisting in the fact that, when one wishes to remove the filtering septum itself to carry out a normal cleaning or maintenance operation, said simple operation of filter extraction automatically blocks the condensed moisture inflow both into the secondary tank 16, what is the main goal, but also prevents any moisture leakage outside of the machine across the same opening from where the filtering septum itself is extracted.

[0043] With obvious and well imaginable drawbacks.

[0044] With ref. to fig. 3, a further improvement consists in the fact that said valve 18 is positioned in such a way that the filtering element 43 be directly accessible from the front machine, and that it can be extracted from, or engaged into said outer body 21, through the simple rotation of a control element, as a rotating knob 54, placed outside the filtering element 43 itself.

Claims

1. Household drying machine comprising:

- a rotating drum for the containment and the drying of a laundry load,
- an air circulation duct able of circulating a drying air flow across said drum,
- a moisture condenser (1) for the drying air, apt of intercepting the air-flow out of said drum,
- a tray (12) for the collection of the condensed moisture from said condenser (1),
- hydraulic means able of drawing at least a part of the water contained in said tray, and of conveying it into diffusion means (22), even at a steam state, or as a spray, directly into said drum, or into said air circulation duct,
- wherein said hydraulic means comprise an hydraulic pipe (17) going out of said tray (12) and eventually provided with a respective pump (13), able of transferring the water from said tray into said hydraulic pipe,
- which branches out (19) directly into a main tank (14) and, through a selectively controllable valve (18), into a secondary tank (16) which is connected to a channel (23) and to said diffusion or steaming means (22),
- **characterized in that** said selectively controllable valve (18) comprises a filtering means (43) able of filtering the liquid flow crossing it.

2. Drying machine according to claim 1, **characterized in that** said filtering means (43) can be detached, and preferably extracted, from the body (21) of said valve (18).

3. Drying machine according to claim 2, **characterized in that** said filtering means (43), when introduced into said valve (18), allows the liquid flow, and that when extracted from said valve, the inlet access of said pipe (17) into said valve is automatically closed.

4. Drying machine according to claim 3, **characterized in that** said valve (18) is shaped as an hollow body (21), one end of it being connected to said pipe (17).

5. Drying machine according to claims 3 or 4, **characterized in that** said channel (23), inflowing into said secondary tank (16), is connected to a side portion od said hollow body (21) through a respective opening (40).

6. Drying machine according to one of the claims 4 or 5, **characterized in that** said filtering means (43) comprises a filtering septum (44), preferably provided with close mesh nets.

7. Drying machine according to claim 6, **characterized in that** said hollow body (21) is provided on its inner surface with an annular relief (45) with an inner opening (46), that a closing member (48) is interposed between said annular relief (45) and the inlet mouth (17-A) of said pipe (17), and is able of closing said inner opening (46), **in that** said filtering means is solidly connected to a first extension (47) turned to said closing member (48) and that said first extension (47) is able to selectively engage by pushing with said closing means (48) so as to allow the liquid flow circulation across said inner opening (46), or to prevent said circulation.

8. Drying machine according to claim 7, **characterized in that** between said closing member (48) and said first extension (47) a second extension (48-A) is provided, which is firmly associated to said closing member (48) and is apt to contact and be pressed by said first extension (47).

9. Drying machine according to claim 8, **characterized in that** said valve (18) is provided with an elastic means (50), interposed between said closing member (48) and the inner end side (55) which is turned to the inlet access of said pipe (17), of said hollow body (20).

10. Drying machine according to any of the previous claims, **characterized in that** said hollow body (20) and said filtering element (43) can be reciprocally engaged and dis-engaged, preferably through a threading coupling.

11. Drying machine according to any of the previous claims, **characterized in that** said filtering means (43) comprises a control means, preferably a rotating knob, placed and accessible on the front side of said machine, apt to selectively engage or disengage it out of said hollow body (20).

Patentansprüche

1. Haushalttrockenmaschine, die Folgendes umfasst:

   - eine rotierende Trommel zur Aufnahme und zum Trocknen einer Wäscheladung, eine Luftzirkulationsleitung, die geeignet ist, einen Trokkenluftstrom durch die Trommel zu zirkulieren,
   - einen Feuchtigkeitskondensator (1) für die Trockenluft, der geeignet ist, den Luftstrom aus der Trommel heraus abzufangen,
   - eine Wanne (12) zum Sammeln der kondensierten Feuchtigkeit von dem Kondensator (1),
   - ein hydraulisches Mittel, das geeignet ist, wenigstens einen Teil des in der Wanne enthaltenen Wassers anzuziehen und dieses auch in einem Dampfzustand oder als Spray in ein Diffusionsmittel (22) direkt in die Trommel oder in die Luftzirkulationsleitung zu transportieren,
   - wobei das hydraulische Mittel ein hydraulisches Rohr (17) umfasst, das aus der Wanne (12) heraus führt, und mit einer entsprechenden Pumpe (13) versehen ist, die geeignet ist, das Wasser von der Wanne in das hydraulische Rohr zu transportieren,
   - das direkt in einen Haupttank (14) abzweigt (19) und durch ein selektiv steuerbares Ventil (18) in einen sekundären Tank (16) führt, der mit einem Kanal (23) und dem Diffusions- oder Verdampfungsmittel (22) verbunden ist,
   - **dadurch gekennzeichnet, dass** das selektiv steuerbare Ventil (18) ein Filtermittel (43) umfasst, das geeignet ist, die durchströmende Flüssigkeit zu filtern.

2. Trockenmaschine gemäß Anspruch 1, **dadurch gekennzeichnet, dass** das Filtermittel (43) vom Körper (21) des Ventils (18) getrennt und vorzugsweise aus diesem heraus genommen werden kann.

3. Trockenmaschine gemäß Anspruch 2, **dadurch gekennzeichnet, dass** das Filtermittel (43), wenn es in das Ventil (18) eingeführt ist, den Flüssigkeitsstrom ermöglicht, und dass, wenn es von dem Ventil heraus genommen ist, die Einlassöffnung des Rohres (17) in das Ventil automatisch geschlossen wird.

4. Trockenmaschine gemäß Anspruch 3, **dadurch gekennzeichnet, dass** das Ventil (18) als Hohlkörper (21) gebildet ist, dessen eines Ende mit dem Rohr (17) verbunden ist.

5. Trockenmaschine gemäß Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** der Kanal (23), der in den sekundären Tank (16) mündet, über eine entsprechende Öffnung (40) mit einem Seitenabschnitt des Hohlkörpers (21) verbunden ist.

6. Trockenmaschine gemäß einem der Ansprüche 4 oder 5, **dadurch gekennzeichnet, dass** das Filtermittel (43) ein Filterseptum (44) umfasst, das vorzugsweise mit engmaschigen Netzen versehen ist.

7. Trockenmaschine gemäß Anspruch 6, **dadurch gekennzeichnet, dass** der Hohlkörper (21) an seiner Innenfläche mit einem ringförmigen Relief (45) mit einer inneren Öffnung (46) versehen ist, dass zwischen dem ringförmigen Relief (45) und der Einlassmündung (17-A) des Rohres (17) ein Schließelement (48) eingesetzt ist und in der Lage ist, die innere Öffnung (46) zu schließen, wobei das Filtermittel fest mit einer ersten Verlängerung (47) verbunden ist, die zu dem Schließelement (48) gedreht ist, und dass die erste Verlängerung (47) geeignet ist, selektiv mit dem Schließelement (48) durch Drükken in Eingriff zu gehen, so dass die Flüssigkeitsstromzirkulation über die innere Öffnung (46) ermöglicht oder diese Zirkulation verhindert wird.

8. Trockenmaschine gemäß Anspruch 7, **dadurch gekennzeichnet, dass** zwischen dem Schließelement (48) und der ersten Verlängerung (47) eine zweite Verlängerung (48-A) vorgesehen ist, die fest mit dem Schließelement (48) verbunden ist, und die geeignet ist, die erste Verlängerung (47) zu kontaktieren und von dieser gedrückt zu werden.

9. Trockenmaschine gemäß Anspruch 8, **dadurch ge-**

kennzeichnet, dass das Ventil (18) mit einem elastischen Mittel (50) ausgestattet ist, das zwischen dem Schließelement (48) und der inneren Abschlussseite (55) des Hohlkörpers (20), die zu der Einlassöffnung des Rohres (17) gedreht ist, eingesetzt ist.

10. Trockenmaschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** der Hohlkörper (20) und das Filterelement (43) vorzugsweise über eine Gewindekopplung wechselseitig in Eingriff treten und den Eingriff lösen können.

11. Trockenmaschine gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Filtermittel (43) ein Steuermittel umfasst, vorzugsweise einen Drehknopf, der an der Vorderseite der Maschine platziert und zugänglich ist, und der geeignet ist, dieses selektiv mit dem Hohlkörper (20) in Eingriff zu bringen oder daraus zu lösen.

Revendications

1. Sèche-linge domestique comprenant :

un tambour rotatif pour le confinement et le séchage d'une charge de linge,
un conduit de circulation d'air pouvant faire circuler un écoulement d'air de séchage sur ledit tambour,
un condensateur d'humidité (1) pour l'air de séchage, approprié pour intercepter l'écoulement d'air à l'extérieur dudit tambour,
un plateau (12) pour la collecte de l'humidité condensée dudit condenseur (1),
des moyens hydrauliques appropriés pour aspirer au moins une partie de l'eau contenue dans ledit plateau, et pour la transporter dans des moyens de diffusion (22), même dans un état de vapeur, ou en tant que pulvérisation, directement dans ledit tambour, ou dans ledit conduit de circulation d'air,
dans lequel lesdits moyens hydrauliques comprennent un tuyau hydraulique (17) sortant dudit plateau (12) et finalement prévu avec une pompe (13) respective, appropriée pour transférer l'eau dudit plateau dans ledit tuyau hydraulique, qui se ramifie (19) directement en un réservoir principal (14) et, par le biais d'une soupape sélectivement contrôlable (18), dans un réservoir secondaire (16) qui est raccordé à un canal (23) et auxdits moyens de diffusion ou de production de vapeur (22),
caractérisé en ce que ladite soupape sélectivement contrôlable (18) comprend des moyens de filtration (43) appropriés pour filtrer l'écoulement de liquide la traversant.

2. Sèche-linge selon la revendication 1, **caractérisé en ce que** lesdits moyens de filtration (43) peuvent être détachés, et de préférence extraits du corps (21) de ladite soupape (18).

3. Sèche-linge selon la revendication 2, **caractérisé en ce que** lesdits moyens de filtration (43), lorsqu'ils sont introduits dans ladite soupape (18), permettent l'écoulement du liquide, et **en ce que** lorsqu'ils sont extraits de ladite soupape, l'accès d'entrée dudit tuyau (17) dans ladite soupape est automatiquement fermé.

4. Sèche-linge selon la revendication 3, **caractérisé en ce que** ladite soupape (18) est formée comme un corps creux (21), une extrémité de cette dernière étant raccordée audit tuyau (17).

5. Sèche-linge selon la revendication 3 ou 4, **caractérisé en ce que** ledit canal (23), s'écoulant dans ledit réservoir secondaire (16), est raccordé à une partie latérale dudit corps creux (21) par une ouverture (40) respective.

6. Sèche-linge selon l'une quelconque des revendications 4 ou 5, **caractérisé en ce que** lesdits moyens de filtration (43) comprennent un septum de filtration (44), de préférence prévu avec des filets à mailles fermées.

7. Sèche-linge selon la revendication 6, **caractérisé en ce que** ledit corps creux (21) est prévu sur sa surface interne avec un relief annulaire (45) avec une ouverture interne (46), **en ce qu'**un élément de fermeture (48) est intercalé entre ledit relief annulaire (45) et l'embouchure d'entrée (17-A) dudit tuyau (17) et est capable de fermer ladite ouverture interne (46), **en ce que** lesdits moyens de filtration sont solidement raccordés à une première extension (47) tournée vers ledit élément de fermeture (48) et **en ce que** ladite première extension (47) peut se mettre en prise sélectivement par poussée avec lesdits moyens de fermeture (48) afin de permettre la circulation d'écoulement de liquide sur ladite ouverture interne (46) ou d'empêcher ladite circulation.

8. Sèche-linge selon la revendication 7, **caractérisé en ce qu'**entre ledit élément de fermeture (48) et ladite première extension (47), on prévoit une deuxième extension (48-A) qui est fermement associée audit élément de fermeture (48) et est appropriée pour entrer en contact et être comprimée par ladite première extension (47).

9. Sèche-linge selon la revendication 8, **caractérisé en ce que** ladite soupape (18) est prévue avec des moyens élastiques (50), intercalés entre ledit élément de fermeture (48) et le côté d'extrémité interne

(55) qui est tourné vers l'accès d'entrée dudit tuyau (17) dudit corps creux (20).

10. Sèche-linge selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit corps creux (20) et ledit élément de filtration (43) peuvent être mis en prise et dégagés de manière réciproque, de préférence par le biais d'un couplage de filetage.

11. Sèche-linge selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens de filtration (43) comprennent des moyens de commande, de préférence un bouton rotatif, placés et accessibles sur le côté avant de ladite machine, appropriés pour le mettre en prise ou le dégager sélectivement dudit corps creux (20).

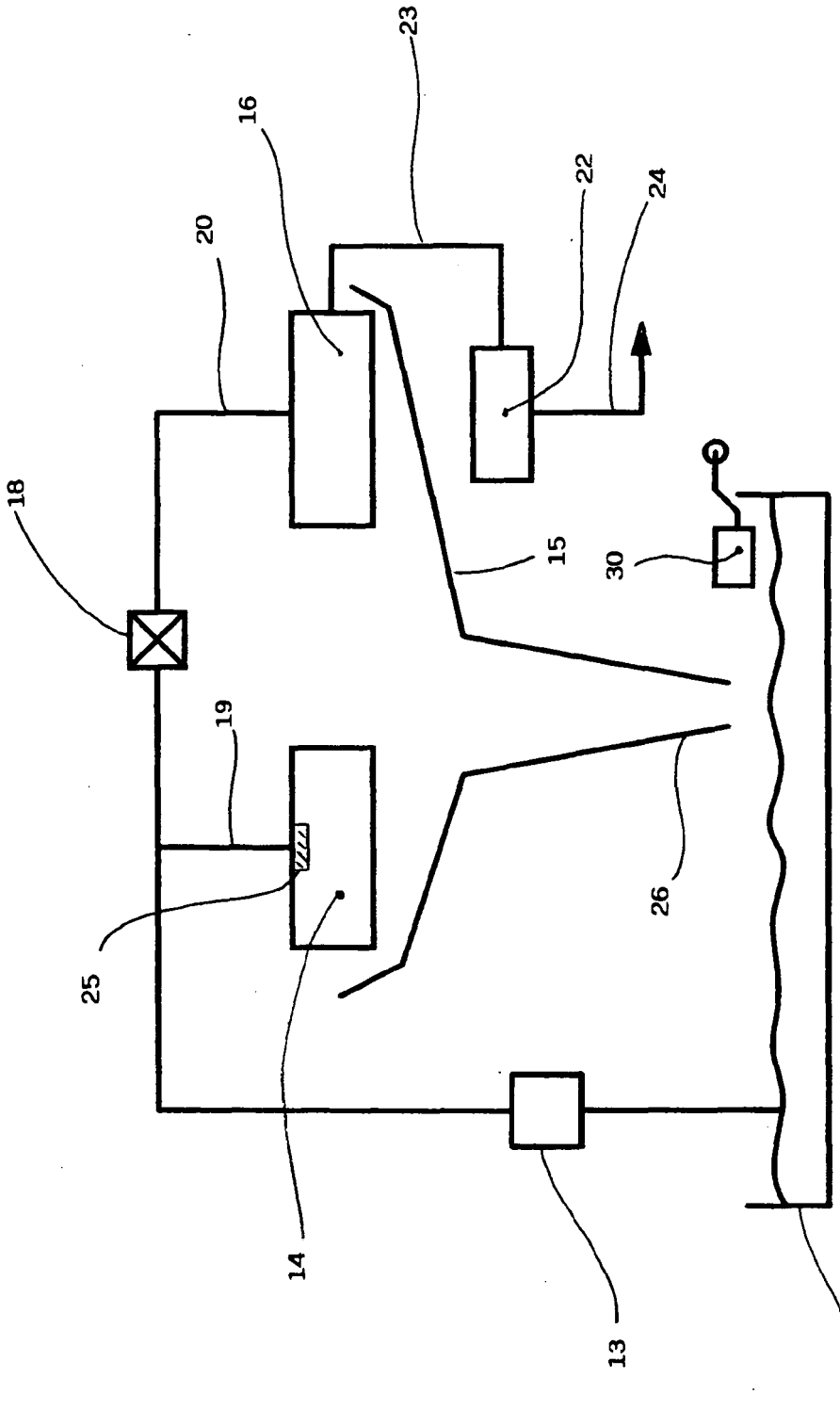
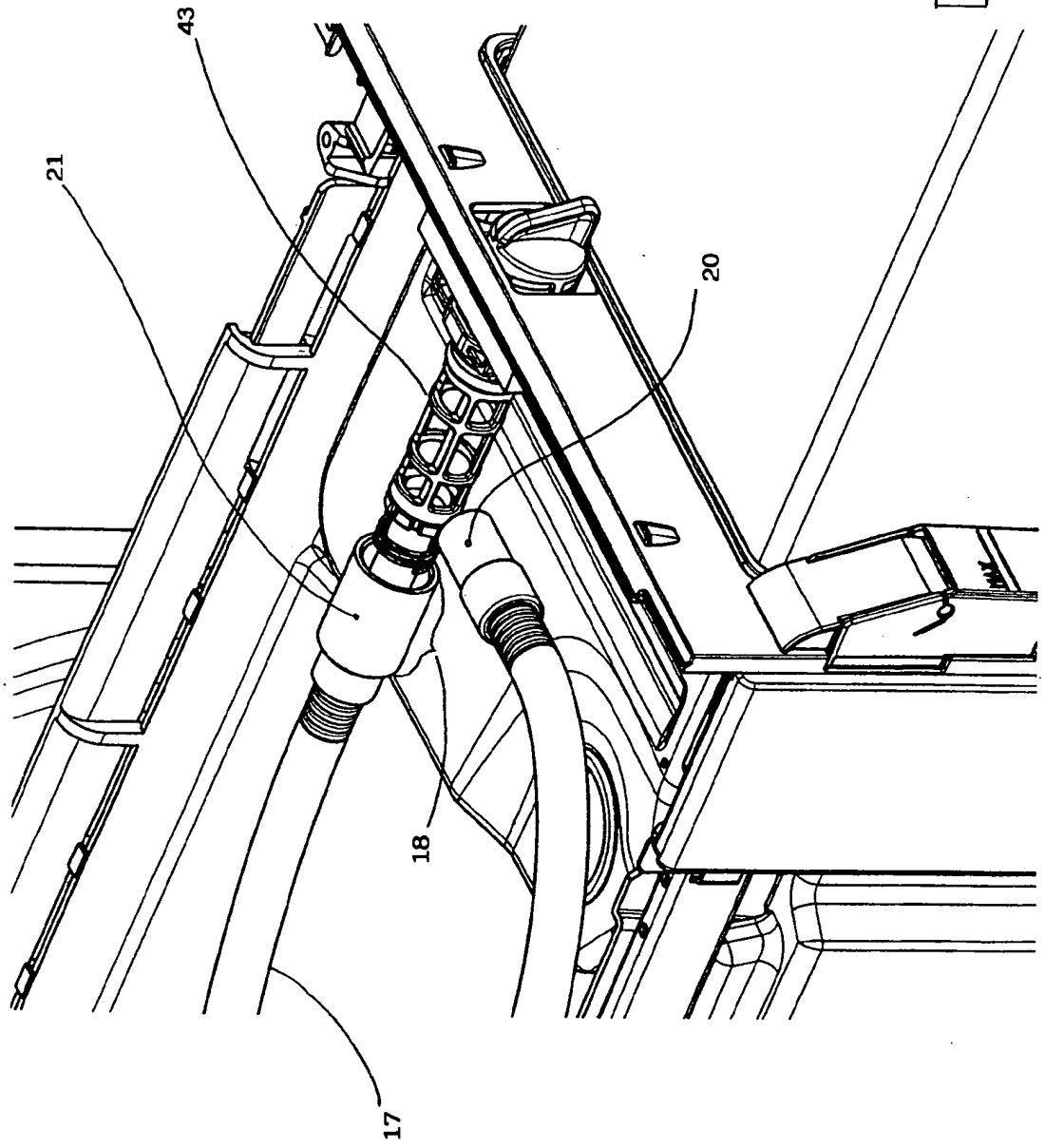


FIG. 1

FIG. 2



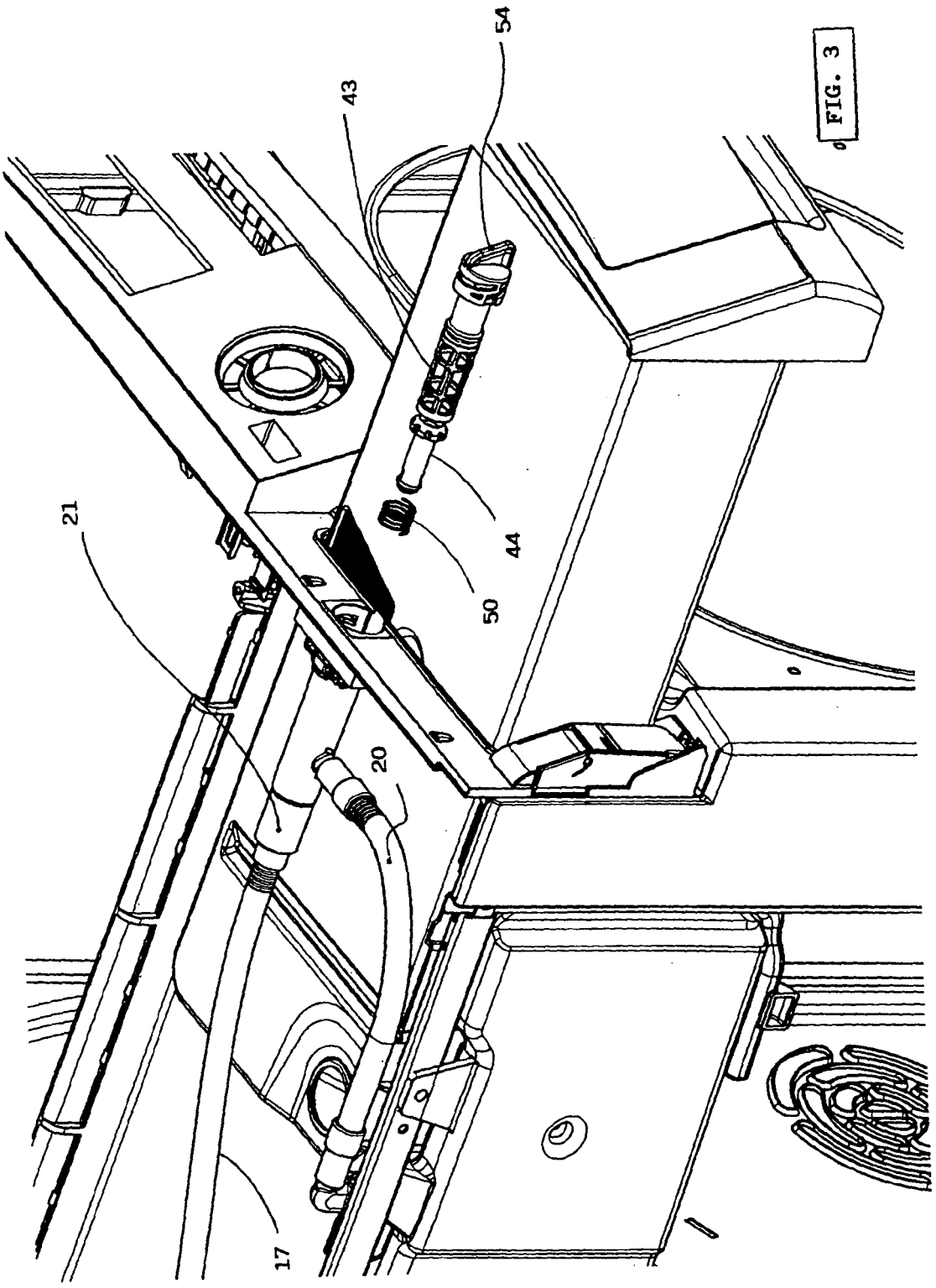


FIG. 3

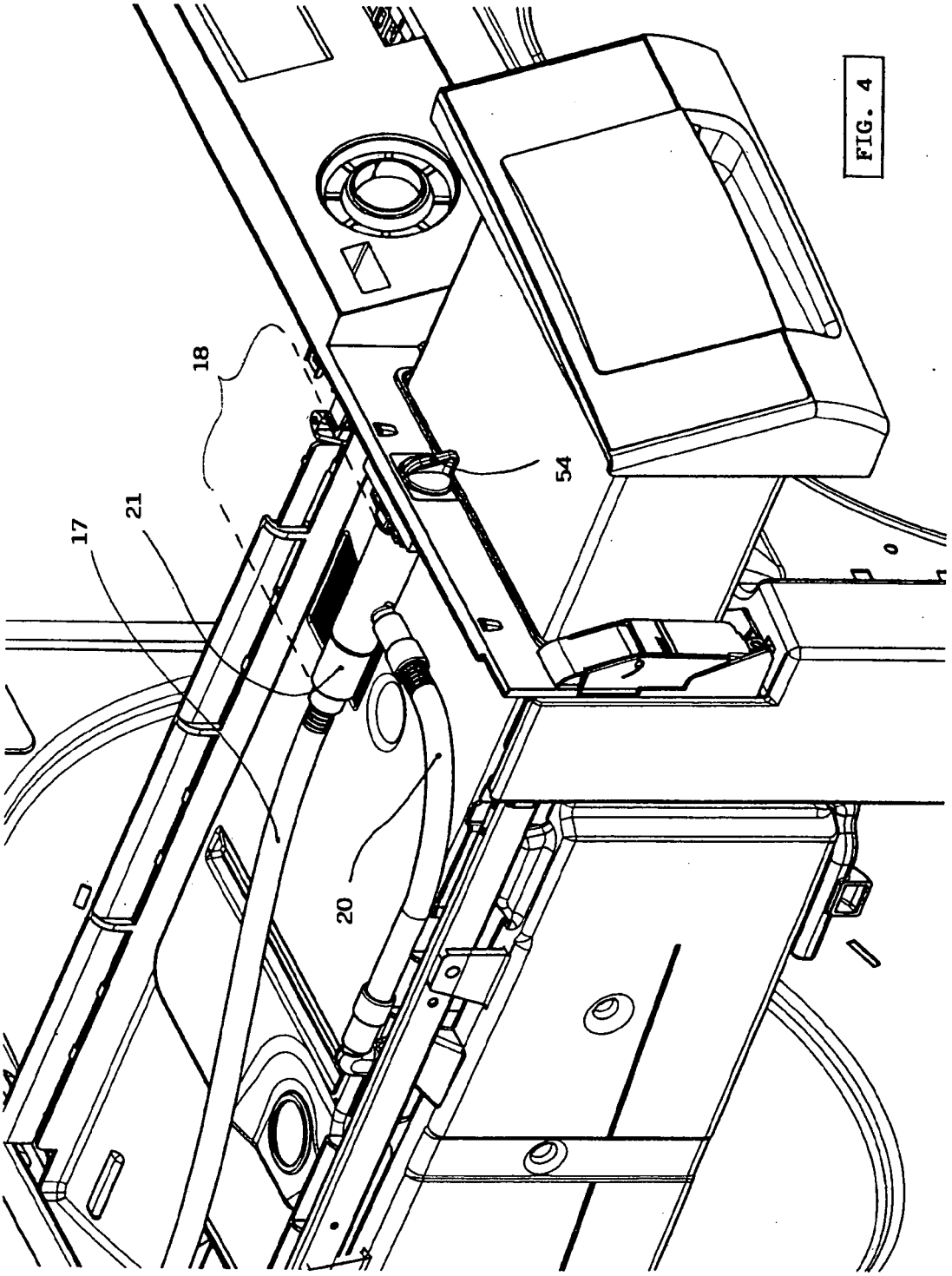


FIG. 4

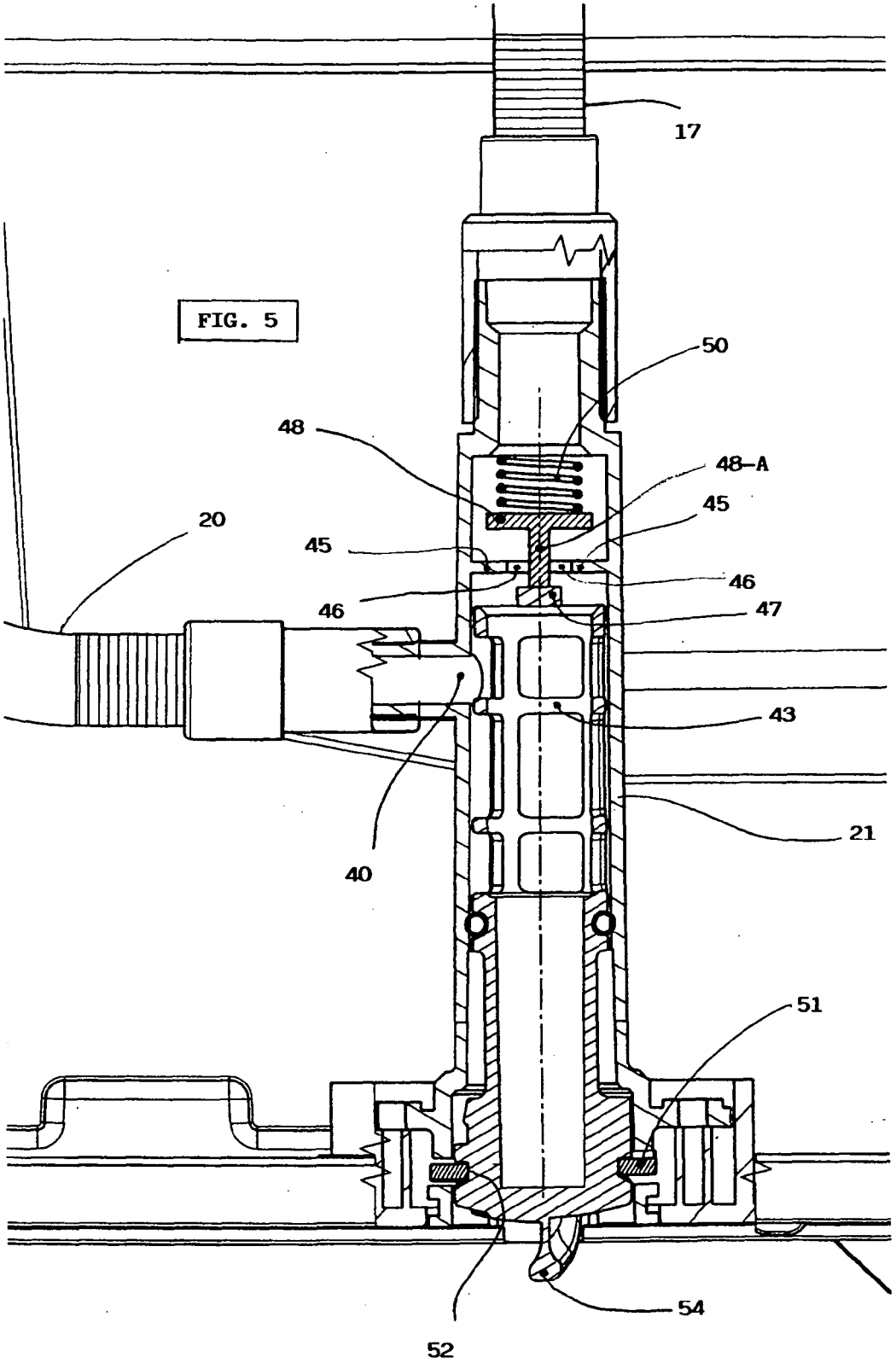
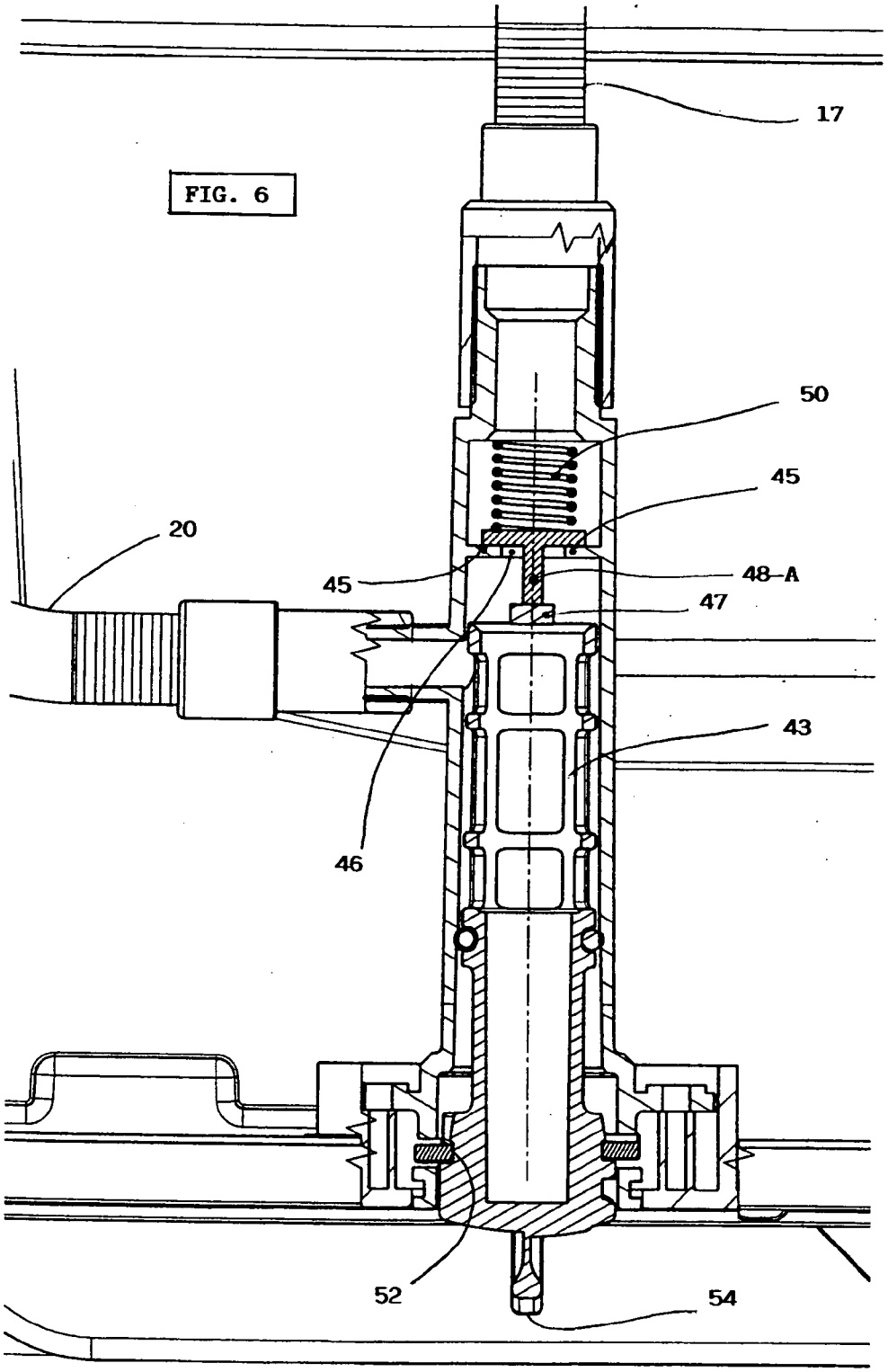


FIG. 5

FIG. 6



REFERENCES CITED IN THE DESCRIPTION

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