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3,101,488

AIR PURIFYING AND VENTILATING MEANS FOR BEDS

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2 Sheets-Sheet 1

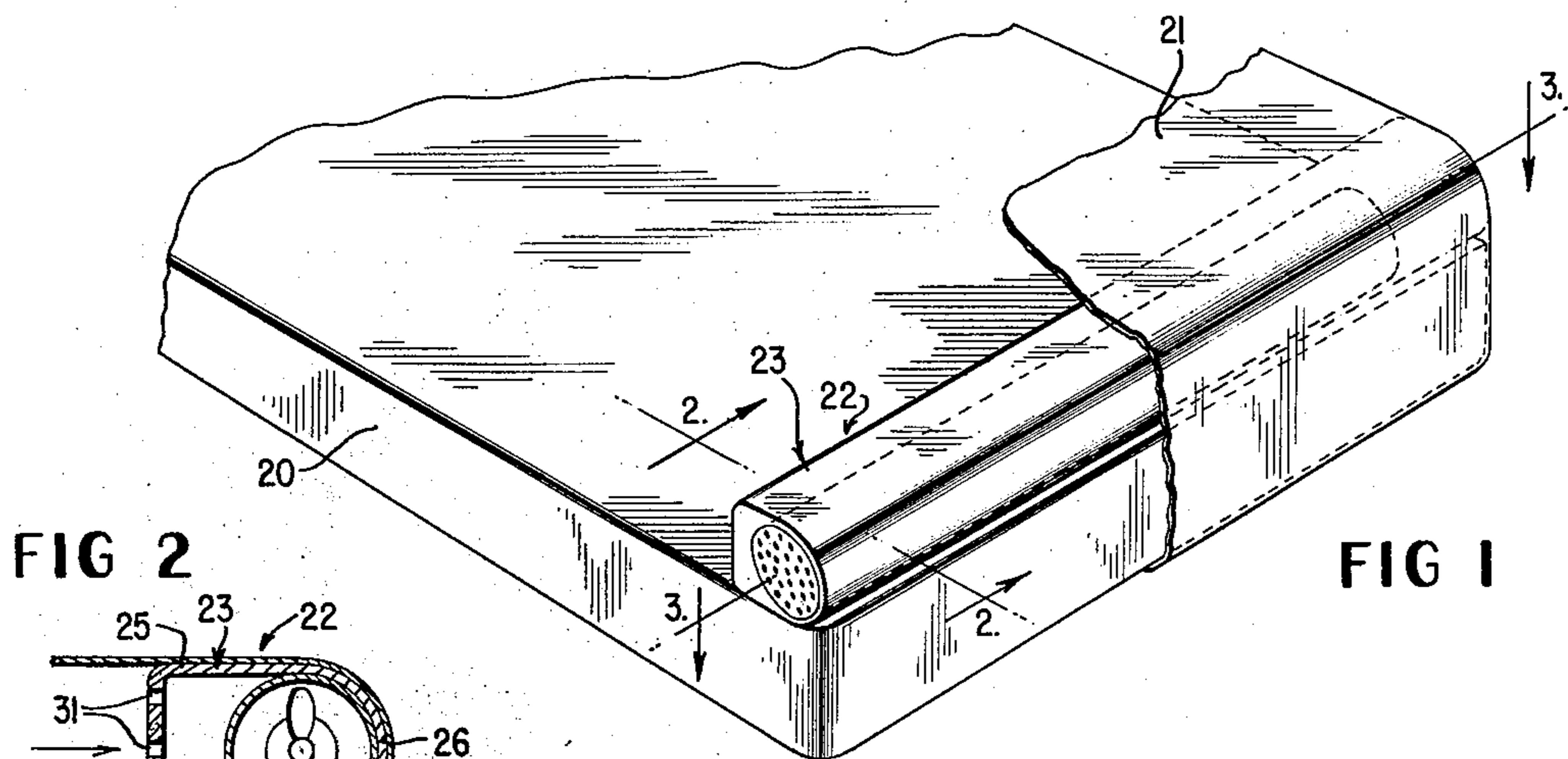


FIG 1

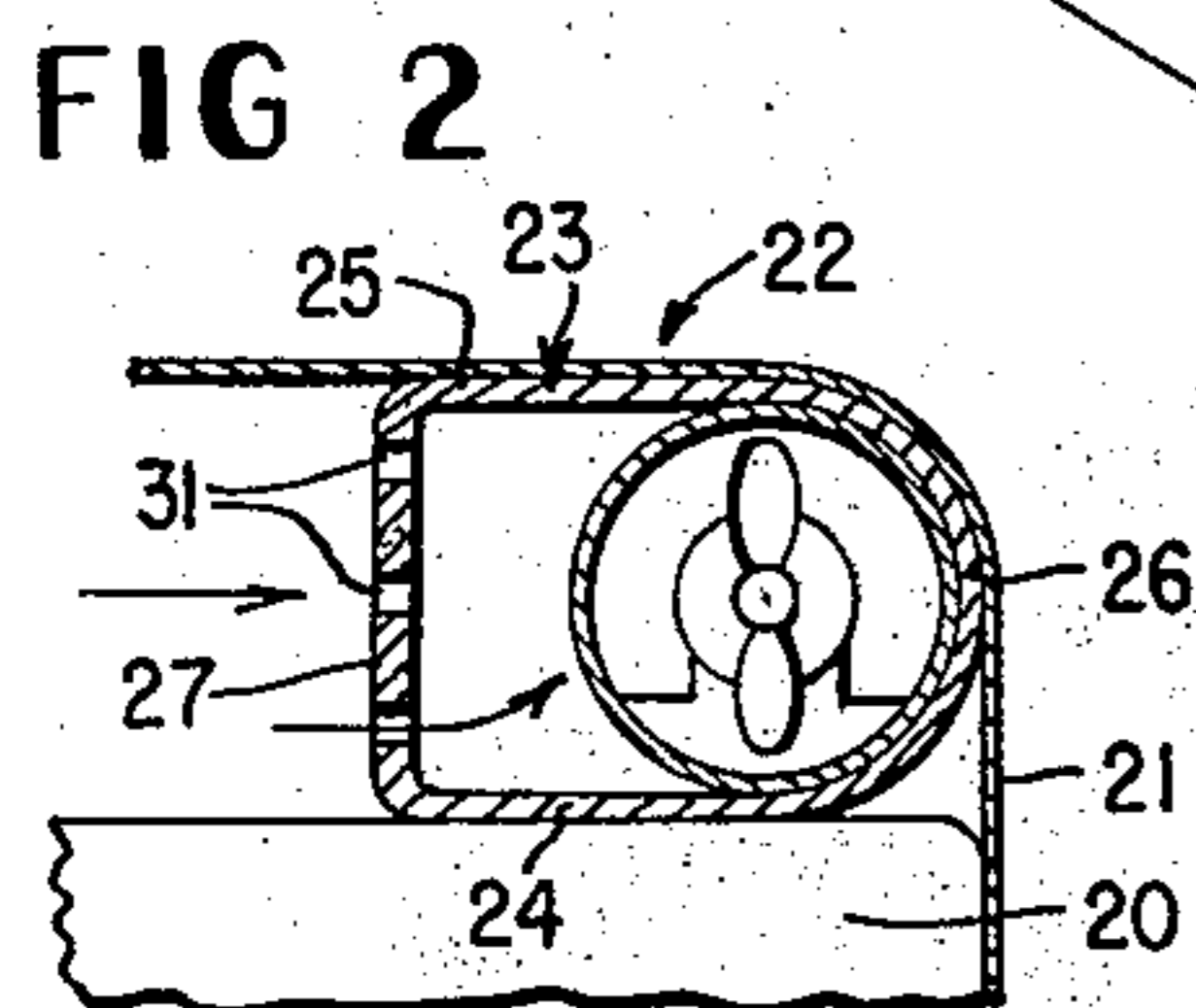


FIG 2

FIG 3

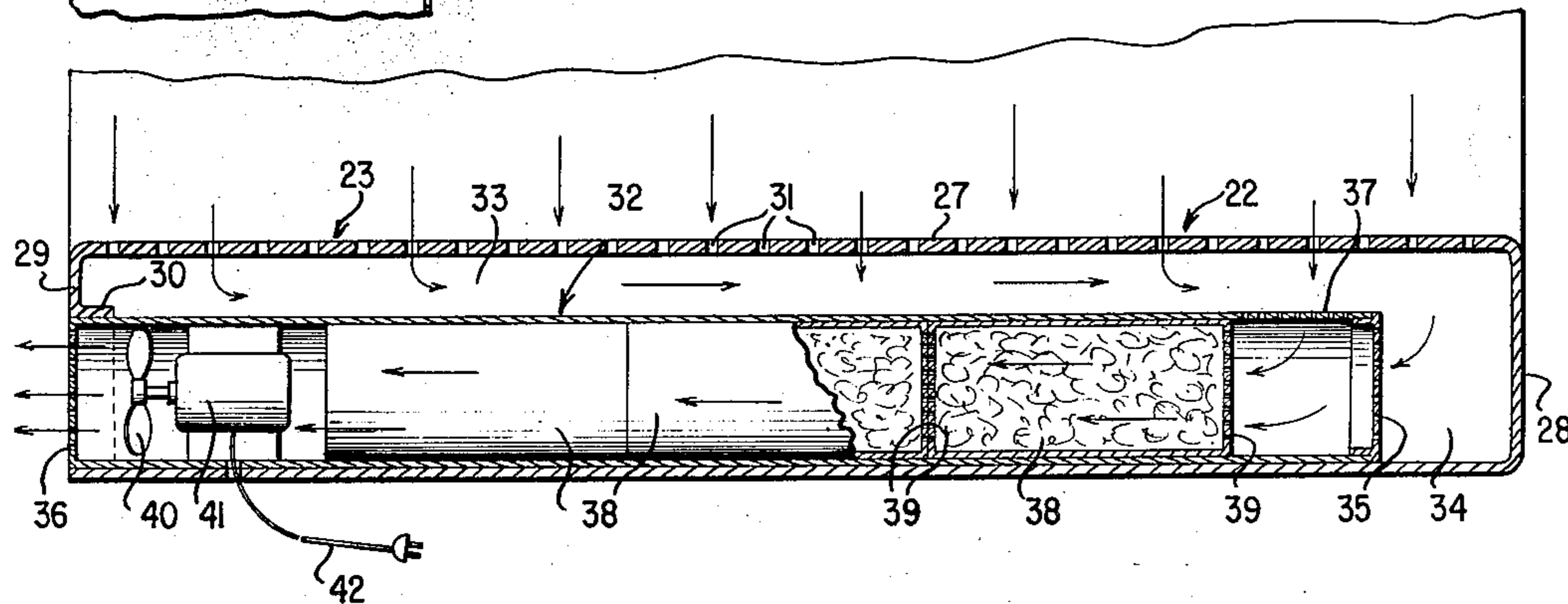


FIG 4

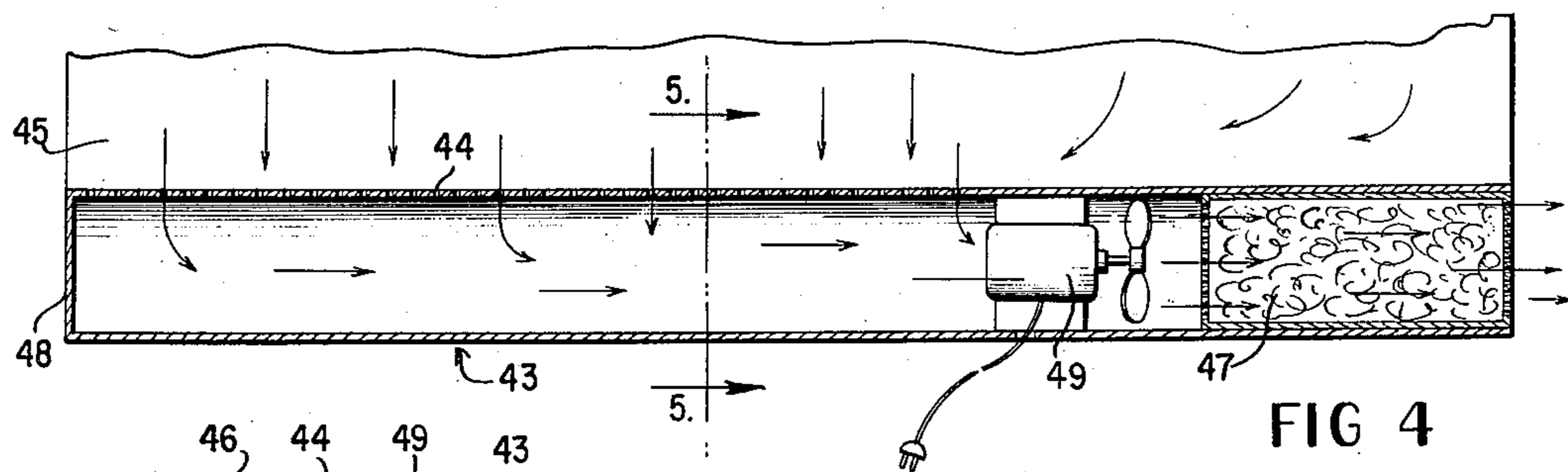
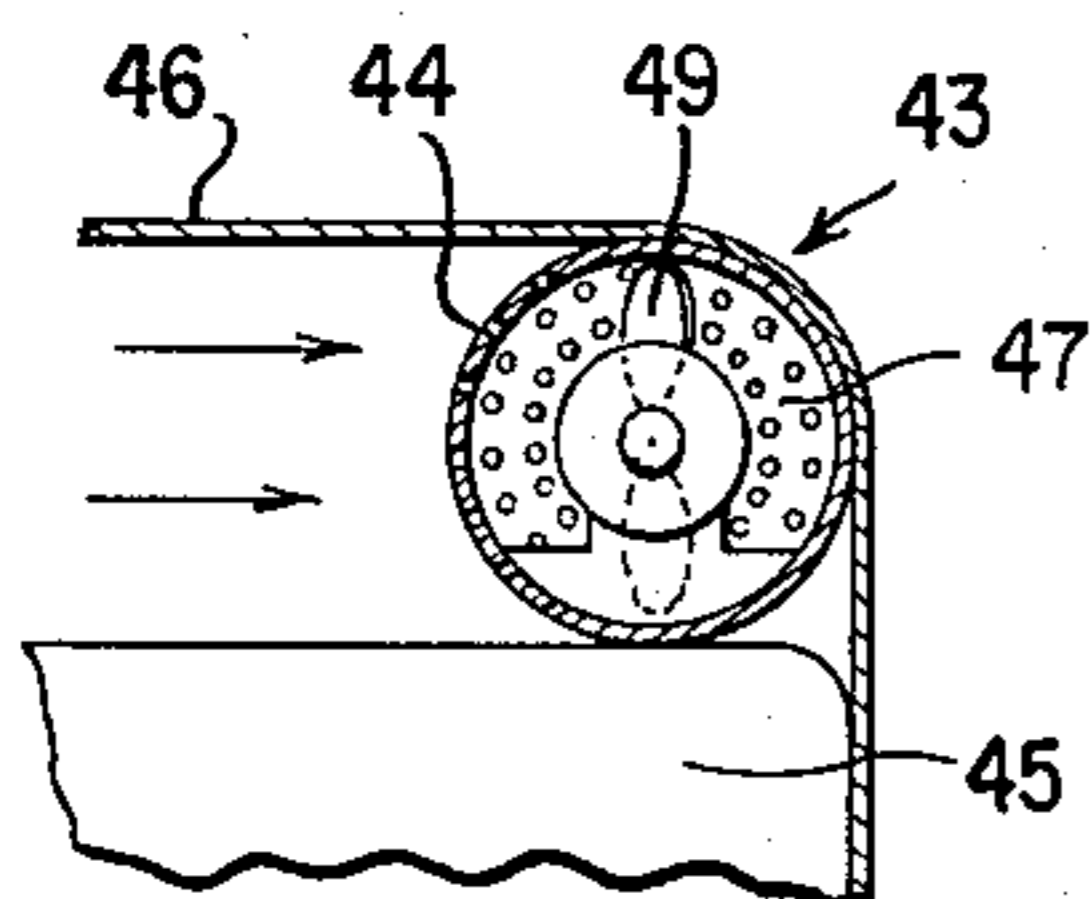


FIG 5



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FIG 6

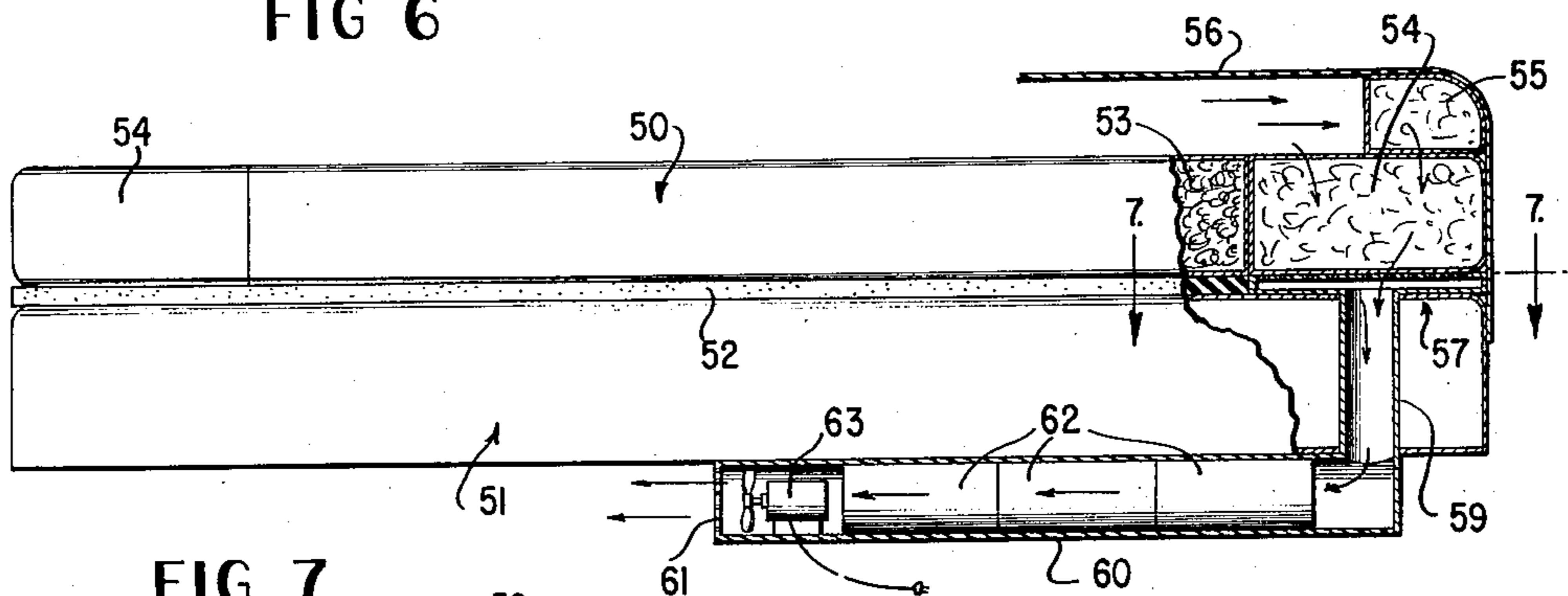


FIG 7

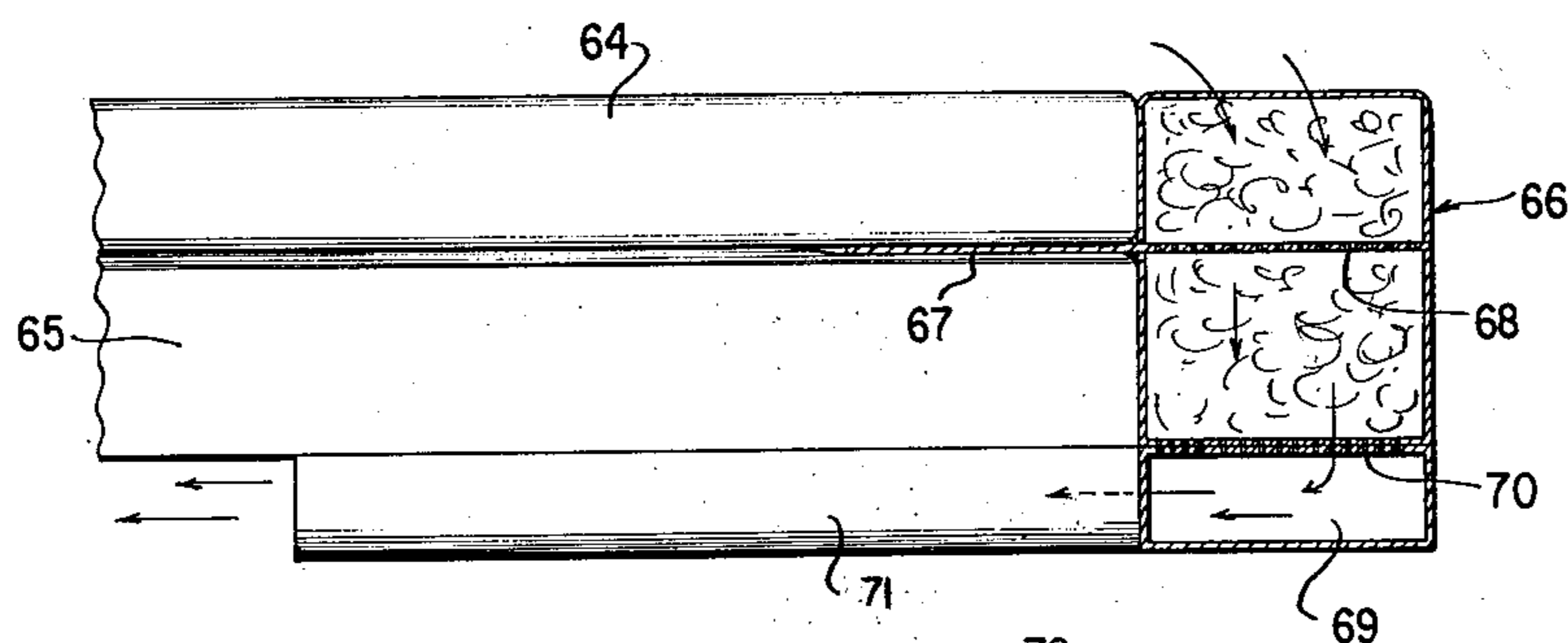
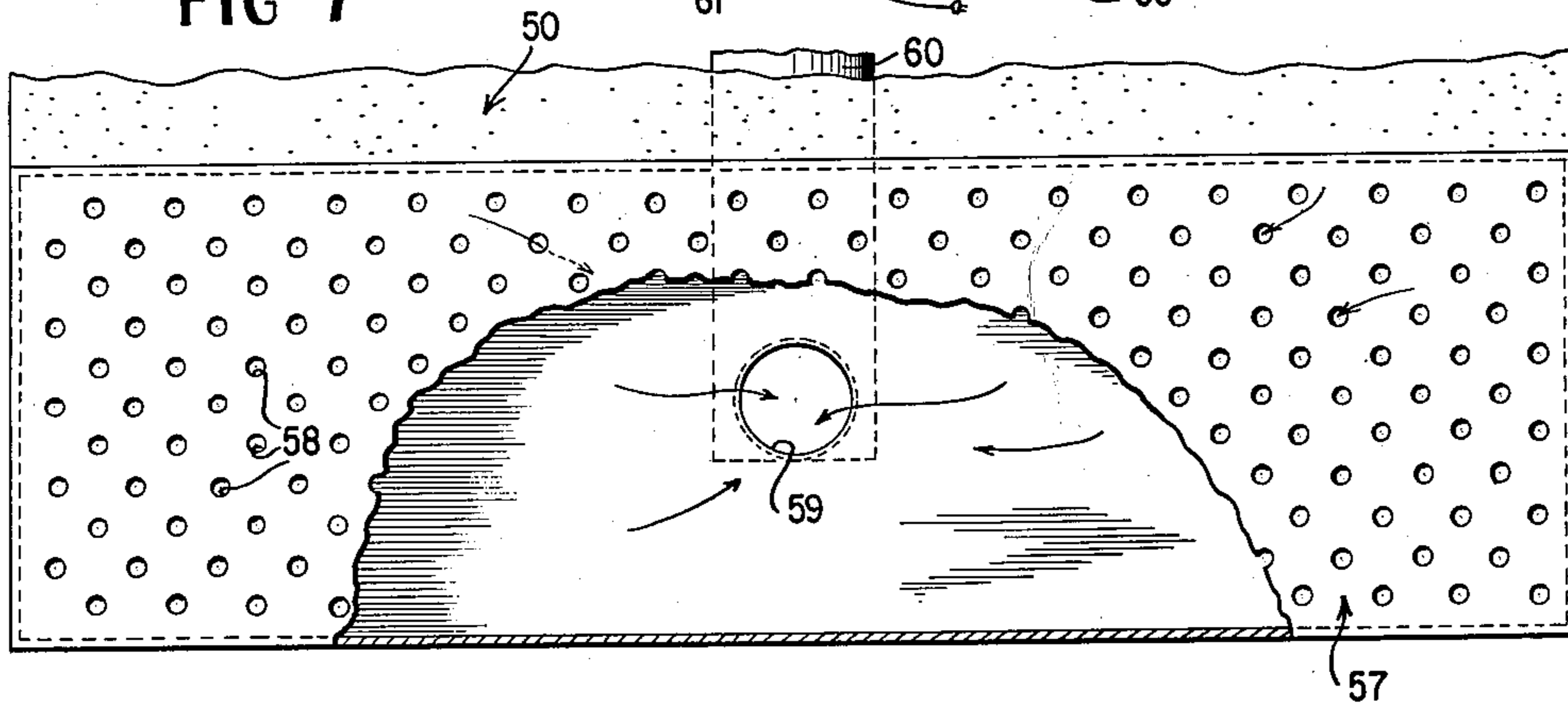


FIG 8

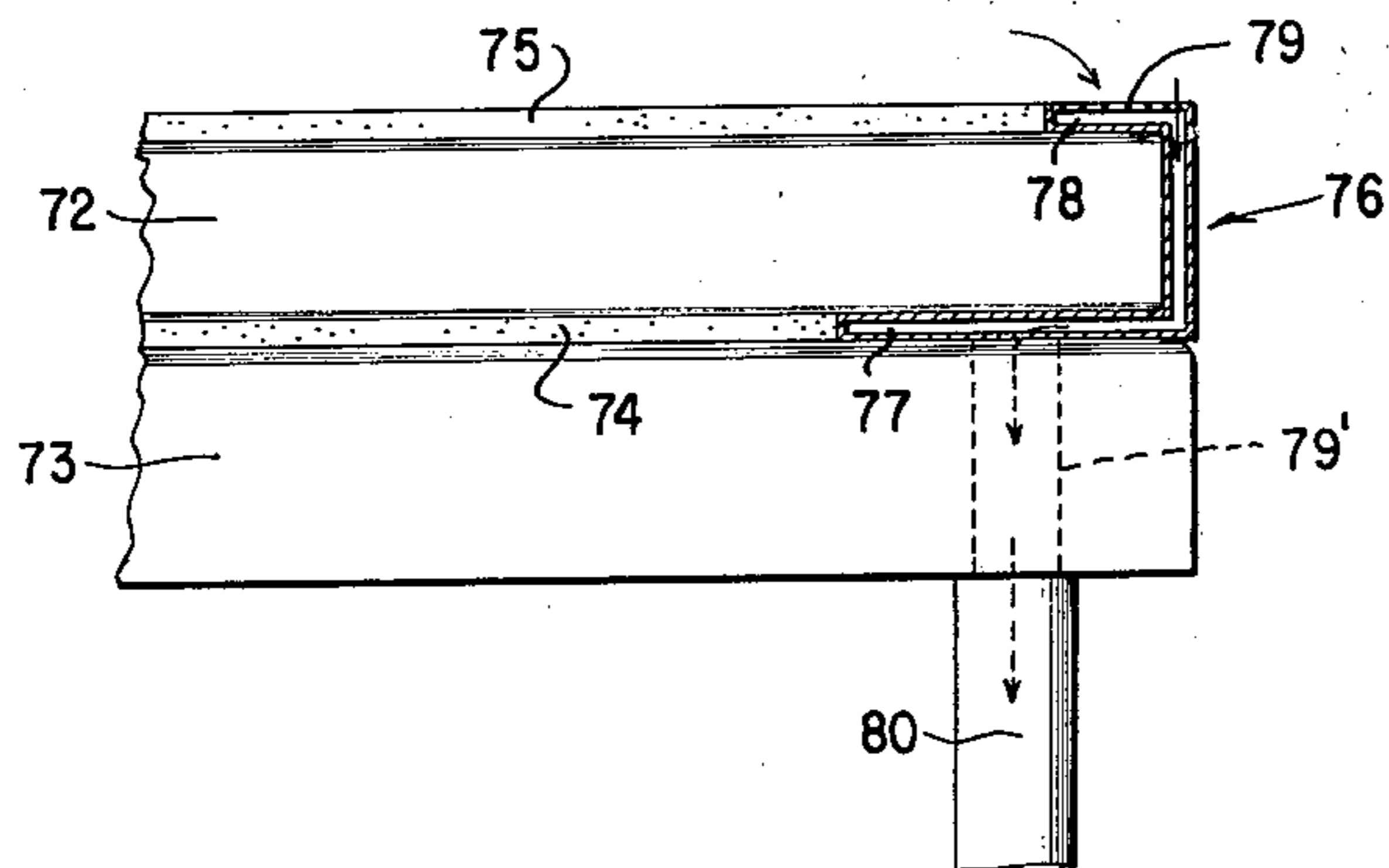


FIG 9

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AIR PURIFYING AND VENTILATING MEANS FOR BEDS

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2 Claims. (Cl. 5—347)

This invention relates to air purifying and ventilating means for sick room beds of invalid patients and the like.

In nursing homes, hospitals or in private homes where invalid patients with certain diseases and afflictions are bedridden, a problem arises in connection with foul odors emanating from the patient's body, open wounds and the like. No ready means is available for purifying the air in and around the bed or for ventilating the bed, and soon the entire bedroom may become permeated and this is a hardship not only to the patient, but to those caring for him and other occupants of adjacent areas.

The object of this invention is to provide simplified and effective means for overcoming the above situation in sick rooms of nursing homes and the like, said means adapted to efficiently ventilate the bed beneath the bedclothing and to purify the foul air so as to render the same substantially odor-free when the same is discharged from the bed.

Another object is to provide means of the above-mentioned character which also aids in cooling the bedridden patient, thereby reducing excessive perspiration, bed sores, etc.

A further object is to provide means of the above-mentioned character which may form a simple portable attachment for any bed or a permanent fixture for special hospital beds or the like.

A further object is to provide in apparatus of the mentioned character air purifying cannister or filter means which are readily removable and replaceable at relatively little expense.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

FIGURE 1 is a fragmentary perspective view of a bed equipped with air purifying and ventilating means according to one preferred embodiment of the invention,

FIGURE 2 is an enlarged fragmentary transverse vertical section taken on line 2—2 of FIGURE 1,

FIGURE 3 is an enlarged fragmentary horizontal section taken on line 3—3 of FIGURE 1,

FIGURE 4 is a view similar to FIGURE 3 illustrating a somewhat simplified modification of the invention,

FIGURE 5 is a fragmentary vertical section taken on line 5—5 of FIGURE 4,

FIGURE 6 is a side elevational view partly in vertical section of a further modification of the invention,

FIGURE 7 is an enlarged fragmentary horizontal section taken on line 7—7 of FIGURE 6,

FIGURE 8 is a fragmentary side elevation partly in vertical section of a further modification,

FIGURE 9 is a similar view of still another modification of the invention.

In the drawings, wherein for the purpose of illustration are shown preferred embodiments of the invention, attention is directed first to FIGURES 1 through 3, wherein the numeral 20 designates a bed mattress, the remainder of the bed being omitted for the purpose of simplification. The numeral 21 designates a sheet, blanket or other conventional bed clothing which may be tucked under the mattress 20 at the foot of the bed in the usual manner.

The apparatus forming the subject matter of the in-

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vention is designated in its entirety by the numeral 22, and comprises an elongated hollow casing or shell 23 which may span the foot of the mattress 20 transversely and rest directly upon the same without attaching means as shown in FIGURE 1. The bed clothing 21 aids in maintaining the apparatus 22 properly positioned at the foot of the bed without the necessity for special attaching means.

The casing 23 may be formed of sheet metal, plastics material or any other desired material, and includes a preferably flat bottom wall 24 to engage the top face of the mattress, a parallel top wall 25 and an integral rounded side wall 26 parallel to the foot of the bed and adjacent the foot end of the mattress. A vertical side wall 27 is secured integrally to the top and bottom walls 25 and 24 and extends at right angles thereto and is opposite and spaced from and parallel to the rounded side wall 26. The casing 23 has one end wall 28 which may be imperforate, as shown, or perforated, if preferred. The opposite end wall 29 of the casing has a relatively large eccentric opening therethrough, defined by inwardly projecting tubular flange 30. The vertical side wall 27 is provided over substantially the entire area with a multiplicity of small apertures 31 for the free passage of air from within the bed, beneath the bed clothing 21.

Disposed preferably removably within the casing 23 is an elongated cylindrical tubular inner casing 32 which may have one end fitting snugly inside of flange 30 and its opposite end spaced from the end wall 28. The inner casing 32 is spaced laterally from the vertical side wall 27 to provide a longitudinal air passage 33 between the inner and outer casings, leading to an end passage 34 between the end wall 28 and a perforated removable end cap 35 for the inner casing 32. The inner casing 32 has a perforated end wall 36 remote from the cap 35 and flush with the end wall 29 of outer casing 23. A side wall portion 37 of inner casing 32 may also be perforated as shown in FIGURE 3 for the free passage of air into the casing 32 from the passages 33 and 34 as shown by the arrows in FIGURE 3.

Disposed removably within the inner casing 32 are one or more cylindrical cannisters or cartridges 38 containing activated charcoal particles, paper or the like coated with activated carbon, odor absorbing chemical crystals and/or disinfecting material or other foul air purifying material, well known to those skilled in the art and conventional in nature. The cartridges 38 have perforated end walls 39 to facilitate the free passage of air therethrough serially as shown by the arrows in FIGURE 3. The walls of the cartridges 38 may be sheet metal, paper or the like and the cartridges may be thrown away after they lose their effectiveness and may be readily replaced by new cartridges in the inner casing 32. If preferred, a single cartridge may be employed or any desired number of cartridges may be employed in the casing 32.

A small electric fan 40 having a motor 41 is fixedly secured bodily in one end portion of the inner casing 32, between the adjacent cartridge 38 and the perforated end wall 36, and an electric cord 42 leading from the fan motor extends to any convenient electrical wall outlet of the bedroom.

In use, with the unit 22 installed in the bed as shown, and with the fan 40 in operation, the foul air beneath the bedclothing 21 is drawn by suction through the apertures 31 and through the passages 33 and 34 and through the perforated portions 35 and 37 of inner casing 32. The foul air then flows through the purifying material of the several cartridges 38 and after purification therein is expelled by the fan 40 through the perforated end wall 36. Purified air discharging from the end wall 36 may circulate back into the air of the room, or if preferred, the air may be conveyed through any suitable hose or

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conduit, not shown, out through an open window or the like.

In addition to purifying the air and thereby ridding the room of foul odors, the apparatus ventilates the sick room bed in a general manner and causes fresh air to flow from the head of the bed toward the foot thereof to thereby cool the bed occupant which is highly desirable in the case of certain patients who are continuously bedridden.

In FIGURES 4 and 5, there is shown a somewhat simplified embodiment of the invention wherein the outer casing 22 is eliminated. With reference to these figures, an elongated cylindrical tubular casing 43 having a perforated side wall portion 44 is disposed directly upon the foot of the mattress 45 beneath the bedclothing 46. An air purifying cartridge 47 of the same type previously described is mounted removably in one end portion of the casing 43, the opposite end wall 48 thereof being preferably closed or imperforate. A fan 49 similar or identical to the previously described fan 40 is mounted within the casing 43, inwardly of the cartridge 47 and within an imperforate portion of the casing 43, the perforated wall portion 44 thereof extending for a major portion of the length of the tubular casing as indicated in FIGURE 4.

The use or operation of the embodiment shown in FIGURES 4 and 5 is substantially the same as previously described in connection with FIGURES 1-3, and in light of the foregoing description and the arrows indicating the flow of air in FIGURE 4, no further description of operation is believed to be necessary for a proper understanding of the invention by those skilled in the art.

In FIGURES 6 and 7, there is shown another modification, wherein the apparatus of the invention may form a permanent or non-portable attachment for an invalid bed or the like.

With reference to FIGURES 6 and 7, a bed mattress 50 is provided atop a suitable box spring 51, and the mattress and spring may be separated by a pad 52 of rubber, felt or the like. The mattress 50 has a central body portion 53 of relatively high density material substantially impervious to gas or air. Preferably at the head and foot portions of the mattress, the same is provided with separate or integral relatively short portions 54 containing relatively low density filler material through which gas or air may pass relatively freely. The mattress portions 54 preferably extend transversely for the entire width of the mattress and box spring. A separate bolster section 55 of the same low density material as the mattress portions 54 may be set atop the foot portion of the mattress to maintain the bedclothing 56 somewhat elevated from the air pervious portion 54, as shown in FIGURE 6.

A shallow transversely elongated flat rectangular duct 57 is interposed between the air pervious mattress portion 54 and the adjacent end portion of the box spring 51, the pad 52 being foreshortened as shown in FIGURE 6. The top wall only of the shallow box-like duct 57 is apertured at a multiplicity of points over its entire area, as shown at 58, the side, end and bottom walls of the shallow duct 57 are imperforate.

A depending tubular conduit 59 of considerable size is connected with the bottom wall of the duct 57 centrally thereof and the conduit 59 communicates directly with the interior of the duct 57 and passes vertically through the box spring 51, as shown.

Beneath the box spring 51, the lower end of conduit 59 is connected with a horizontal elongated cylindrical tubular casing 60 which may be secured in any suitable manner to the bottom of the box spring or supported from below or from the floor, if preferred. The casing 60 has a perforated discharge end 61 and contains a desired number of air purifying cartridges 62 of the type previously described. An electric fan 63 is mounted within the casing 60 in advance of the cartridges 62, as shown.

In operation, the fan 63 develops suction through the

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cartridges 62 and the foul air from beneath the bed covering 66 which cannot pass through the dense portion 53 of the mattress is drawn through the low density foot portion 54 and bolster 55 and through the perforated top wall of the duct 57 to the interior thereof. From this duct, the foul air flows downwardly through the conduit 59 and then through the air purifying cartridges 62, and is finally expelled as pure and odor-free air at the perforated end wall 61.

The mattress 50 is reversible end-for-end so that the other low density portion 54 may be utilized when desired. If preferred, only one end of the mattress 50 need be provided with a low density portion 64, integral therewith or formed separately. The shallow box-like duct 57 has approximately the same thickness as the spacer pad 52 and does not interfere with the normal flatness of the mattress and box spring. The apparatus of FIGURES 6 and 7 like the prior embodiments of the invention serves the dual purpose of purifying the air and cooling or ventilating the bed.

In FIGURE 8, a further modification is shown, wherein a conventional mattress 64 and box spring 65 are illustrated. A separately formed bolster portion 66 of low density material through which air may readily pass is disposed at the foot end of the mattress and box spring and detachably secured thereto by an extension plate 67 which engages between the mattress and box spring and spans the same transversely and is held in place by the weight of the mattress. A perforated portion 68 of plate 67 extends inside of the air permeable bolster 66 to lend support to the same.

A duct 69 having a perforated top wall 70 is secured to the bottom of the bolster 66 to receive the air flowing downwardly therethrough in the direction of the arrows, such air coming from beneath the bed covers, not shown. The duct 69 spans the bed transversely with the bolster 66 and at its center communicates with a horizontal cylindrical tubular casing 71 which may be identical in construction with the casing 60 and may contain identical cartridges 62 and fan 63 shown in FIGURE 6.

The use or operation of the apparatus in FIGURE 8 is substantially the same as described in connection with FIGURE 6 and should be obvious without the necessity for further explanation.

In FIGURE 9, still another modification of the invention is illustrated, wherein a bed mattress 72 and underlying box spring 73 are separated by a spacer pad 74, and a similar pad 75 is preferably disposed upon the top face of the mattress. A generally C-shaped duct 76 which is hollow has a lower horizontal portion 77 thereof disposed and clamped between the foot portion of the mattress and the box spring 73, the pad 74 being foreshortened at the foot end of the mattress as shown. The top horizontal section 78 of duct 76 overlies the foot of the mattress and has a perforated top wall 79 through which the foul air from beneath the bedclothing, not shown in FIGURE 9, may enter the duct 76, the latter preferably extending for the full width of the mattress at the foot thereof. The lower portion 77 of duct 76 communicates near the center of the bed with a vertical conduit 79', similar to the conduit 59 of FIGURE 6, and the lower end of conduit 79' is connected with a tubular casing 80 which contains the previously described air purifying cartridges and electric fan to create suction in the duct 76.

The use or operation of the device for purifying the air and ventilating the bed is substantially the same as previously described above in connection with the several other embodiments of the invention.

It is also contemplated within the scope of this invention to employ other conventional and well known air purifying means within or in place of the cartridge or cannister means 38, 47 and 62 above described. For example, certain well-known electronic and/or radiant energy purifying means including ultra-violet light energy means may be employed within the inner casing 32, FIGURE 3, and

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within the corresponding casings shown and described in the other embodiments of the invention. The air purifying means may be mechanical, chemical, electrical or radiant energy in nature.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

Having thus described my invention, I claim:

1. An air purifying and ventilating device for invalid beds and the like comprising an outer casing for disposition upon the bed mattress beneath the bedclothing and having a perforated wall, an inner casing disposed within the outer casing and spaced from said perforated wall and having a perforated portion, at least one air purifying cartridge removably mounted in the inner casing, and a fan disposed within the inner casing to draw air through the outer and inner casings and said cartridge.

2. The invention as defined by claim 1, and wherein the

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outer and inner casings are elongated and substantially tubular and generally coextensive for substantially spanning a bed mattress transversely, and a plurality of said cartridges within said inner casing in end-to-end series relation and collectively occupying a major portion of the length of the inner casing, said fan within the inner casing located near one end thereof in advance of said cartridges, said inner casing having a perforated end wall adjacent said fan.

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