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(54) **An electrostatic dust-collecting device**

(57) A static dust-collecting device installed in a housing (13) of a smoke exhaustion (1) is disclosed. The dust-collecting device (3) includes multiple tubes (31) carrying negative or positive charge. A driving member (33) carrying positive or negative charge is extended through each tube (31). The driving member (33) enables oil drops entrained in the smoke to entrain positive or negative charge, whereby the oil drops are attracted by the tube (31). The driving member (33) is driven by a driving mechanism (35,36,37) for driving a scraper (34) to axially move within the tube (31). The scraper (34) serves to scrape off oil dirt attaching to inner wall of the tube (31).

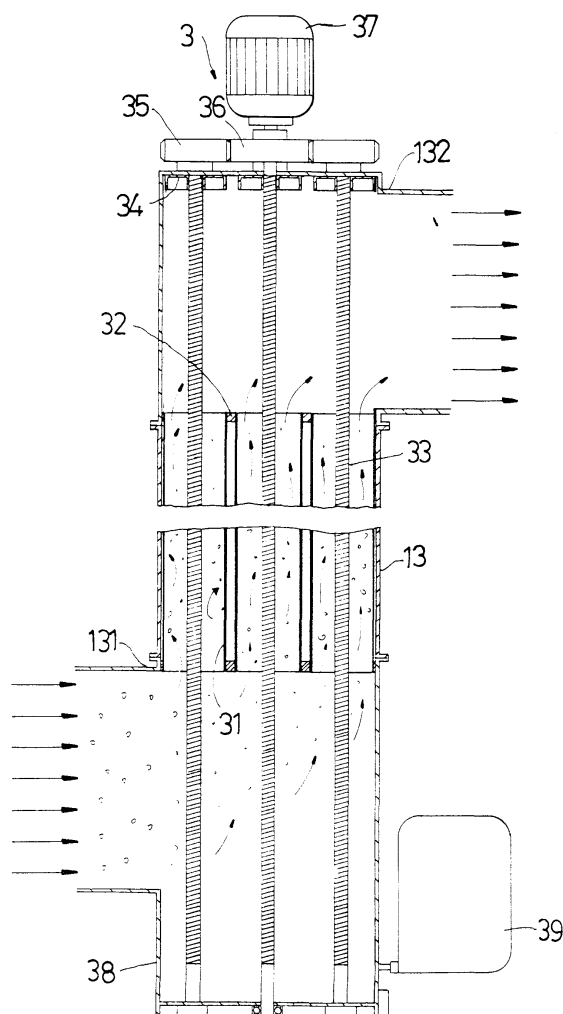


FIG. 2

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Description**BACKGROUND OF THE INVENTION**

[0001] The present invention relates to a static dust-collecting device, and more particularly to a static dust-collecting device installed in a smoke exhaustion for attracting oil drops.

[0002] Fig. 11 shows a conventional static dust-collecting device including an electro-separation section 61 which enables oil drops in the air to entrain charge. A dust-collecting section 62 formed by multiple vertical panels is disposed on rear side of the electro-separation section 61. Two scrapers 65 are disposed on two sides of each dust-collecting device 62. The scrapers 65 are driven by a motor 63 via thread rods 64 to move up and down for scraping off the oil dirt attaching to the dust-collecting section 62. The electro-separation section 61 makes the oil drops passing therethrough entrain charge to be attracted by the rearward dust-collecting section 62. The installation of the electro-separation section 61 leads to increment of cost for equipment.

[0003] Fig. 12 shows another type of static dust-collecting device including a dust-collecting section 72 formed by multiple circular dust-collecting boards 721 and driven by a shaft 71. Two sides of each dust-collecting board 721 are respectively disposed with scrapers 73. In such device, it is still necessary to install an electro-separation section 74 in front of the dust-collecting section 72. Therefore, the cost for equipment is still high.

[0004] Moreover, in the case that the above devices are installed in a housing having two open ends, some oil drops can pass through a part of the space of the housing without being electro-separated. Therefore, the oil drops can be hardly totally attracted.

SUMMARY OF THE INVENTION

[0005] It is therefore a primary object of the present invention to provide a static dust-collecting device installed in a housing of a smoke exhaustion. The dust-collecting device includes multiple tubes carrying negative or positive charge. A driving member carrying positive or negative charge is extended through each tube. The driving member is driven by a driving mechanism for driving a scraper to scrape off oil dirt attaching to inner wall of the tube. The driving member also enables oil drops entrained in the smoke to entrain positive or negative charge, whereby the oil drops are attracted by the tube. Therefore, the driving member also serves as an electro-separation section to reduce the manufacturing cost.

[0006] It is a further object of the present invention to provide the above static dust-collecting device in which the all the oil drops must pass through the tube so that the oil drops can be totally attracted.

[0007] The present invention can be best understood through the following description and accompanying

drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS**[0008]**

- Fig. 1 shows the installation of a first embodiment of the present invention in a smoke exhaustion;
- Fig. 2 is a sectional view of the first embodiment of the present invention;
- Fig. 3 is a perspective view of the first embodiment of the present invention;
- Fig. 4 is a perspective view showing the driving mechanism of the first embodiment of the present invention;
- Fig. 5 shows that the oil drops are attracted to attach to inner wall of the tube of the present invention;
- Fig. 6 shows that the nozzles inject washing detergent to wash the scrapers of the first embodiment of the present invention;
- Fig. 7 is a perspective view of a second embodiment of the present invention;
- Fig. 8 is a sectional view of the second embodiment of the present invention;
- Fig. 9 shows the operation of the second embodiment of the present invention;
- Fig. 10 shows the driving mechanism of a third embodiment of the present invention;
- Fig. 11 is a perspective view of a conventional static dust-collecting device; and
- Fig. 12 is a perspective view of another conventional static dust-collecting device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0009] Please refer to Figs. 1 to 6. According to a first embodiment, the present invention is installed in a smoke exhaustion 1 of a kitchen. The smoke exhaustion 1 has a smoke funnel 12 mounted above a cabinet (not shown). The smoke funnel 12 is connected with a housing 13 having two open ends and two turn sections 131, 132. The first turn section 131 has a washing sink 38 free from the path of the smoke path. An exhaustion fan 2 is installed at a rear end of the housing 13. A static dust-collecting device 3 is installed between the two turn sections 131, 132. The dust-collecting device 3 includes multiple circular tubes 31 made of metal. In the housing 13, a stopper board 32 is disposed at each end of the tubes 31 to block the space between the tubes 31, the interior of the housing 13, except the tubes 31, is in a sealed state. Two opposite sides of the tube 31 are respectively formed with two recessed guide sections 311. A guide bar 312 is connected with each end of the guide sections 311. The guide bar 312 has an inner face shaped as the inner face of the guide section 311. A

thread rod 33 is coaxially passed through and located in the tube 31 with two ends extending out of two ends of the tube 31. The thread rod 33 drives a scraper 34 screwed thereon to reciprocally move. The blade of the scraper 34 abuts against the inner wall of the tube 31. The two opposite sides of the scraper 34 are respectively formed with two recesses 341 engaged with the guide sections 311. A first end of each thread rod 33 is disposed with a driven gear 35 driven by the same driving gear 36 which is driven by a motor 37. The other end of the thread rod 33 extends into the washing sink 38. One side of the washing sink 38 is disposed with multiple nozzles 381 respectively aimed at the scrapers 34 lowered to a lowest position. The nozzles 381 serve to inject a washing detergent sent out by a pump 39.

[0010] In use, the present invention is first installed in the housing 13. The motor 37, driving gear 36 and driven gear 35 are disposed on outer side of the second turn section 132 of the housing 13. The smoke exhaustion 1 is installed in the kitchen for exhausting smoke entraining numerous oil drops. The thread rod 33 is connected with a positive electrode to carry positive charge. The tube 31 is connected with a negative electrode to carry negative charge. When the smoke is sucked by the exhaust fan 2, the smoke is collected by the smoke funnel 12 and gets into the housing 13 and the tube 31. With the thread rod 33 carrying positive charge, when the oil drops pass through the thread rod 33, the oil drops will entrain positive charge. Due to attraction between positive and negative charge, when the oil drops entraining positive charge move through the tube 31, the oil drops will be attracted by the tube 31 carrying negative charge. Therefore, the oil drops will attach to the inner wall of the tube 31 and the smoke passing through the tube 31 will become clean air.

[0011] After a period of use, the oil drops accumulating on the inner wall of the tube 31 will form a layer of oil dirt which will deteriorate the attraction of the tube 31 to the oil drops. Therefore, it will be necessary to clear up the oil dirt.

[0012] When cleaning up the oil dirt, the power for the thread rod 33 and the tube 31 is first turned off. Then the motor 37 is powered on to drive the driving gear 36 to rotate. Accordingly, the driven gears 35 are driven by the driving gear 36 to rotate for driving the thread rod 33. When the thread rod 33 is rotated, the recesses 341 of the scraper 34 are engaged with the guide sections 311 of the tube 31 so that the scraper 34 is prevented from rotating and will move toward the other end. Therefore, the scraper 34 will go into the tube 31 to scrape off the oil dirt therein as shown in Fig. 5. After the scraper 34 passes through the tube 31, the inner wall of the tube 31 is cleaned up and the scraper 34 carries the oil dirt out. At this time, the pump 39 is activated and the washing detergent is injected from the nozzles 381 to the scraper 34 for washing the same as shown in Fig. 6. After cleaned, the washing detergent flowing into the washing sink 38 is drained. Finally, the scraper 34 is re-

stored to its home position for next use.

[0013] According to the above arrangement, during the smoke exhaustion procedure, the oil drops entrained by the smoke can be effectively attracted to attach to the inner wall of the tube without attaching to the exhaust fan 2. Also, the amount of the oil dirt accumulating in the housing 13 will be greatly reduced. Therefore, the cleaning of the smoke exhaustion can be facilitated. In addition, the exhausted air is free from any oil drop so that the problem of environment protection can be eliminated. Moreover, the thread rod 33 is able to drive the scraper 34 to scrape off the oil dirt. Also, the thread rod 33 carries positive charge, enabling the oil drops getting into the static dust-collecting device 3 to entrain positive charge. Therefore, the thread rod 33 serves as the electro-separation section of a conventional static dust-collecting device so as to reduce the cost for the device.

[0014] Referring to Figs. 7 to 9, according to a second embodiment of the present invention, the housing 41 has a rectangular cross-section. Multiple tubes 42 with rectangular cross-section are disposed in the housing 41. Two ends of the tube 42 are connected with multiple guide bars 43. A reciprocally movable scraper 44 is disposed in each tube 42. The scraper 44 is driven by a endless loop-like steel cable 45 driven by a first motor 46. In one end of the housing 41 is disposed a brush 48 driven by a second motor 47. In this embodiment, the housing 41 is free from any turn section as seen in the first embodiment.

[0015] When cleaning the oil dirt, the motor 46 drives the steel cable 45 to move and drive the scraper 44 to scrape off the oil dirt in the tube 42. When the scraper 44 moves to the brush 48, the second motor 47 drives the brush 48 to clean up the scraper 44. The guide bars 43 serve to guide the scraper 44 without deflection, whereby when the scraper 44 returns to its home position, the scraper 44 can still smoothly get into the tube 42.

[0016] Referring to Fig. 10, according to a third embodiment of the present invention, the driven gear 51 at one end of the thread rod 33 is driven by a spiral rod 52 instead of the driving gear. The spiral rod 52 is driven by a motor 54 disposed on one side of the housing 53. The spiral rod 52 serves to drive multiple driven gears 51 at one time so that the thread rods 33 can be effectively rotated and the occupied space is reduced.

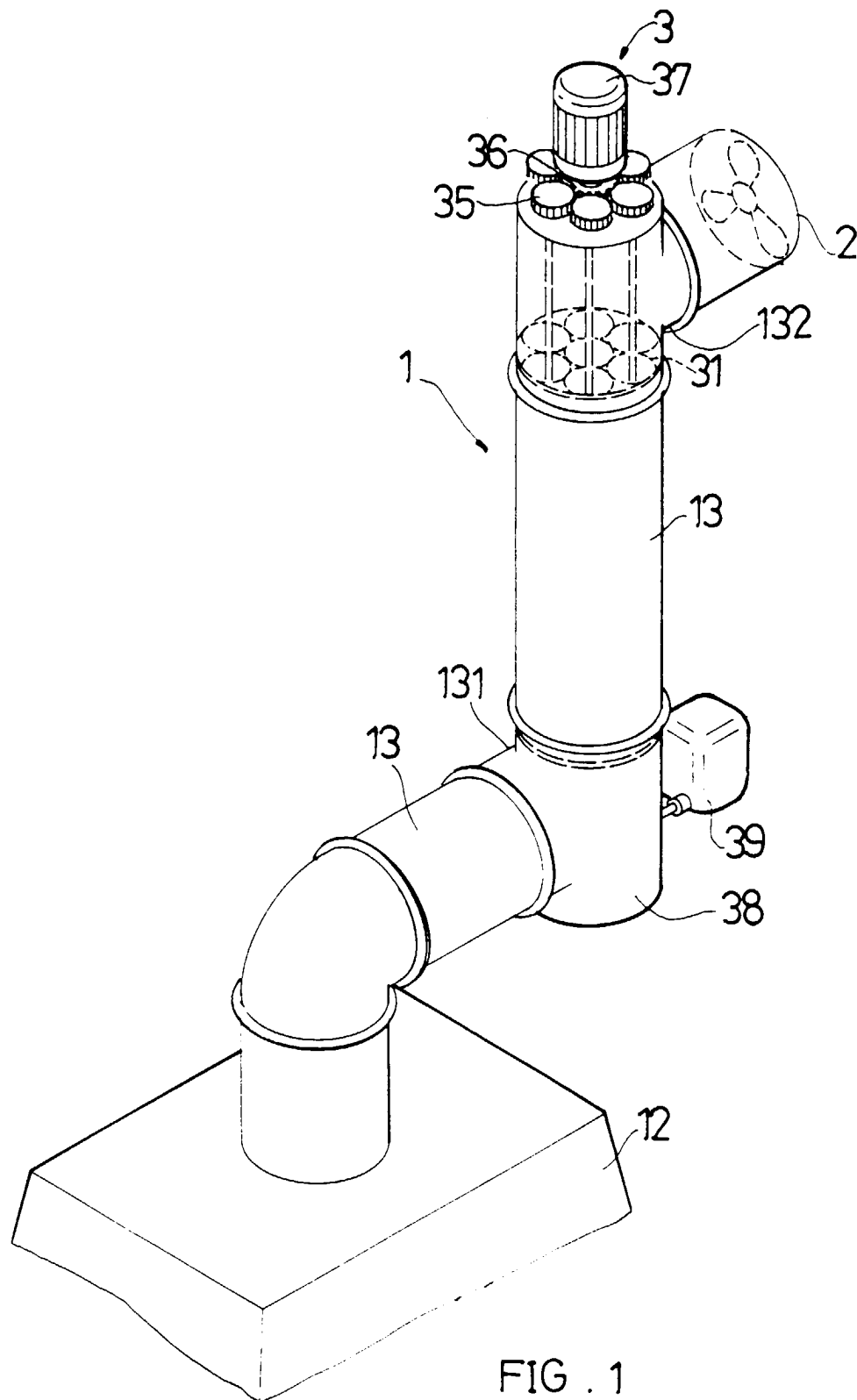
[0017] In the above embodiments, alternatively, the tube can carry positive charge, while the thread rod can carry negative charge.

[0018] It is to be understood that the above description and drawings are only used for illustrating some embodiments of the present invention, not intended to limit the scope thereof. Any variation and derivation from the above description and drawings should be included in the scope of the present invention.

Claims

1. A static dust-collecting device installed in a housing of a smoke exhaustion (1), the dust-collecting device (3) comprising multiple tubes (31) carrying negative or positive charge, a driving member (33) carrying charge opposite to the charge of said multiple tubes (31), said driving member being extended through each tube (31), the driving member (33) enabling oil drops entrained by air to entrain positive or negative charge, whereby the oil drops are attracted by the tube (31), the driving member (33) being driven by a driving mechanism (35,36,37) for driving a scraper (34) to axially move within the tube (31), the scraper (34) serving to scrape off oil dirt attaching to an inner wall of the tube (31). 5
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2. A static dust-collecting device as claimed in claim 1, wherein in the housing (13), a stopper board (32) is disposed at each end of the tubes (31) to block the space between the tubes (31). 20
3. A static dust-collecting device as claimed in claim 1, wherein two opposite sides of the tube (31) are respectively formed with two recessed guide sections (311), a guide bar (312) being connected with each end of the guide sections (311), the guide bar (312) having an inner face shaped as an inner face of the guide section (311), two opposite sides of the scraper (34) being respectively formed with two recesses (341) engaged with the guide sections (311). 25
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4. A static dust-collecting device as claimed in claim 1, wherein the driving member (33) is a thread rod (33) coaxially passed through and located in the tube (31) with two ends extending out of two ends of the tube (31), one end of the thread rod (33) being drivingly connected to a motor (37) for rotating the thread rod (33). 35
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5. A static dust-collecting device as claimed in claim 1, wherein one end of the housing (13) is disposed with a washing sink (38), one side of the washing sink (38) being disposed with multiple nozzles (381) respectively aimed at the scrapers (34) lowered to a lowest position, the nozzles (381) serving to inject a washing detergent sent out by a pump (39). 45
6. A static dust-collecting device as claimed in claim 1, wherein the driving member (33) is a steel cable (45) extending through the housing (13). 50

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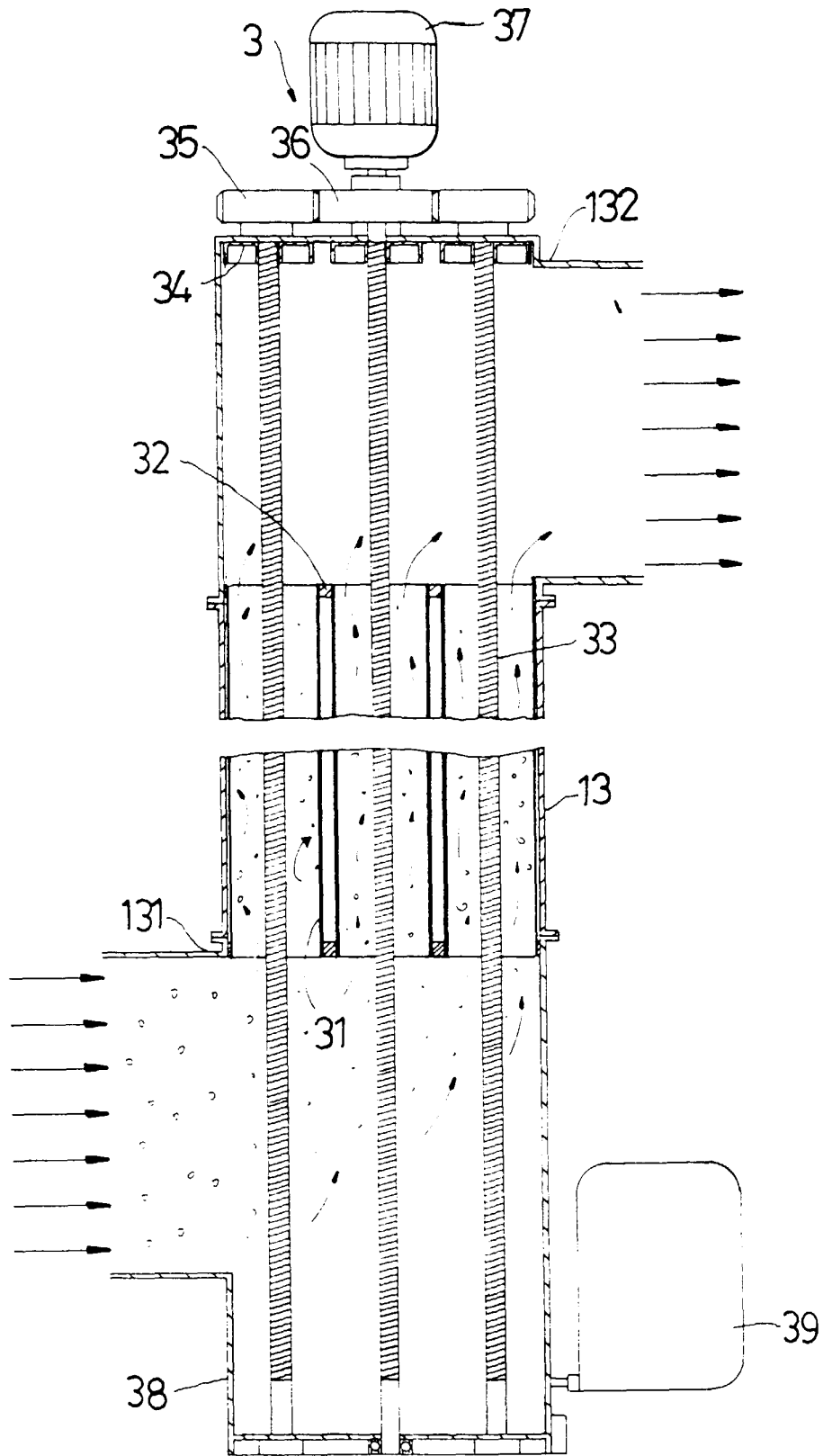


FIG. 2

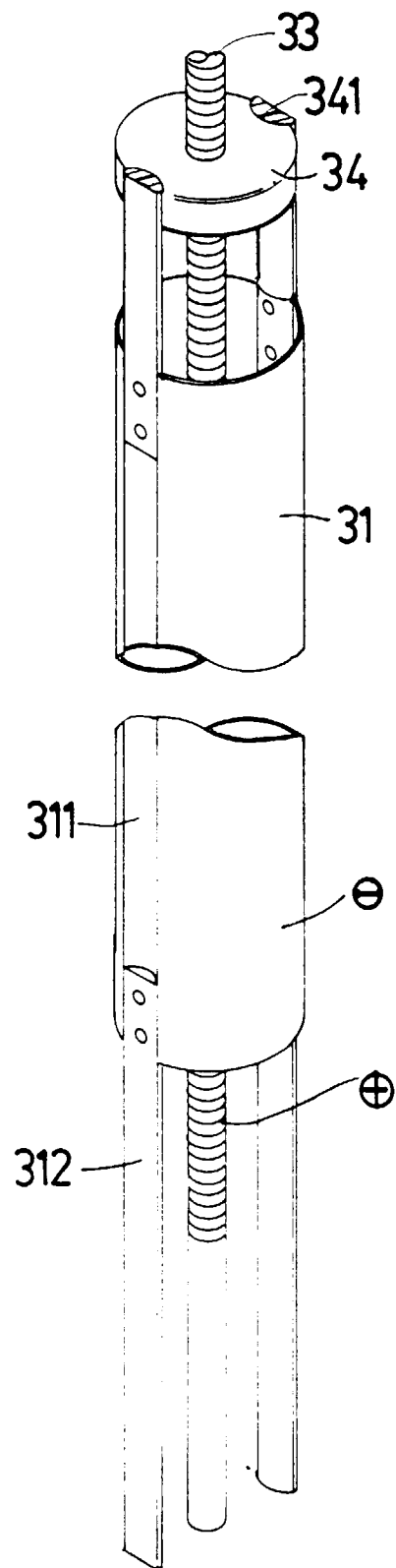


FIG . 3

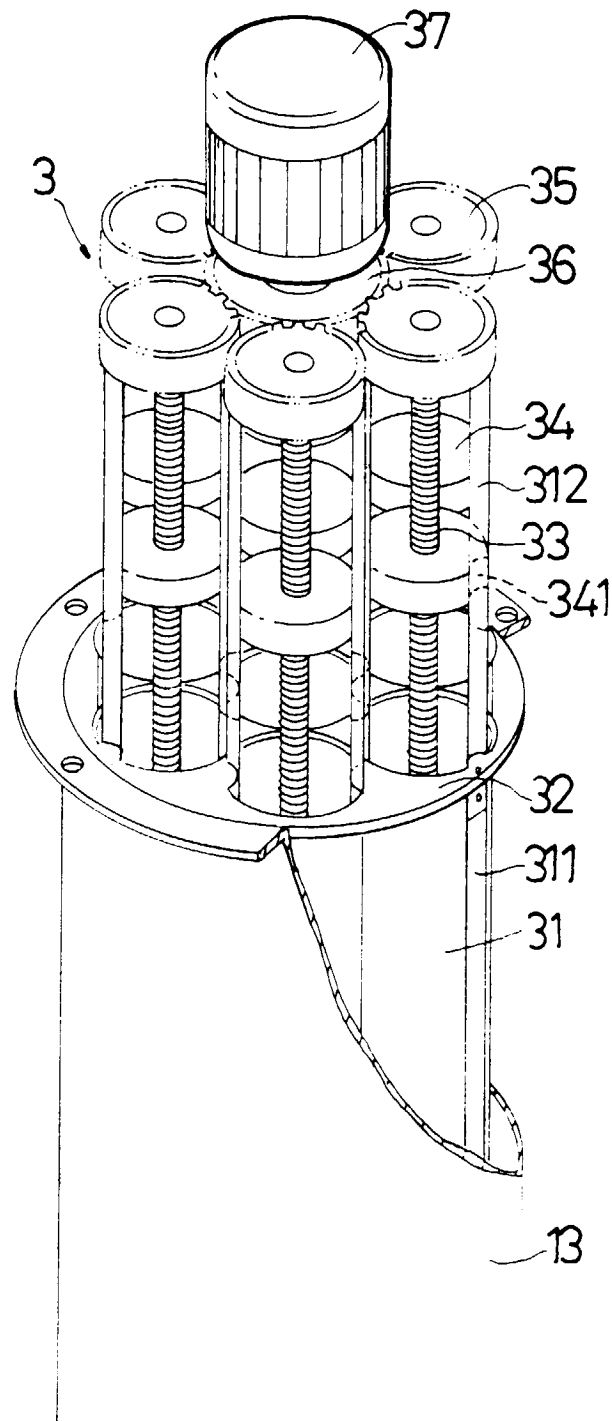


FIG . 4

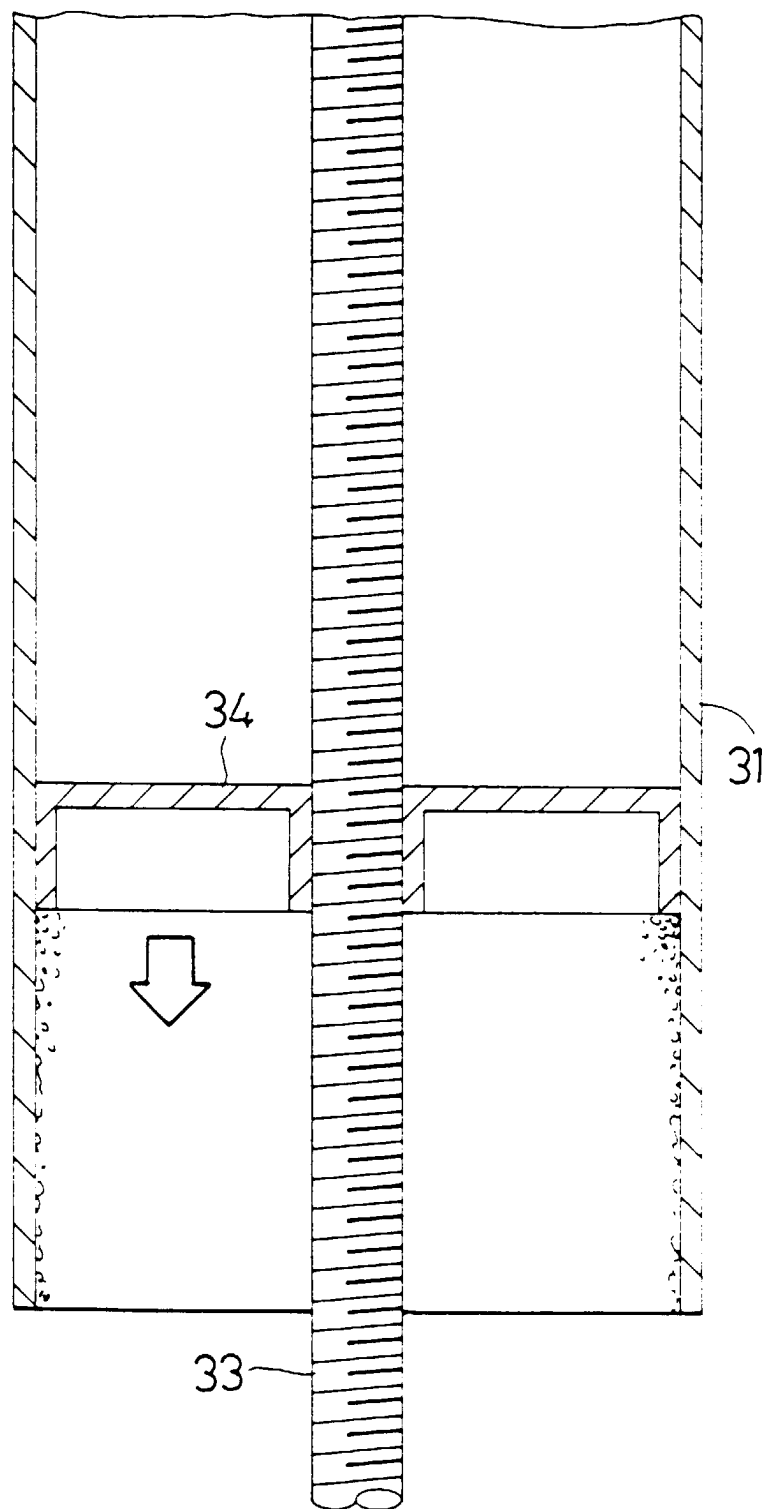


FIG . 5

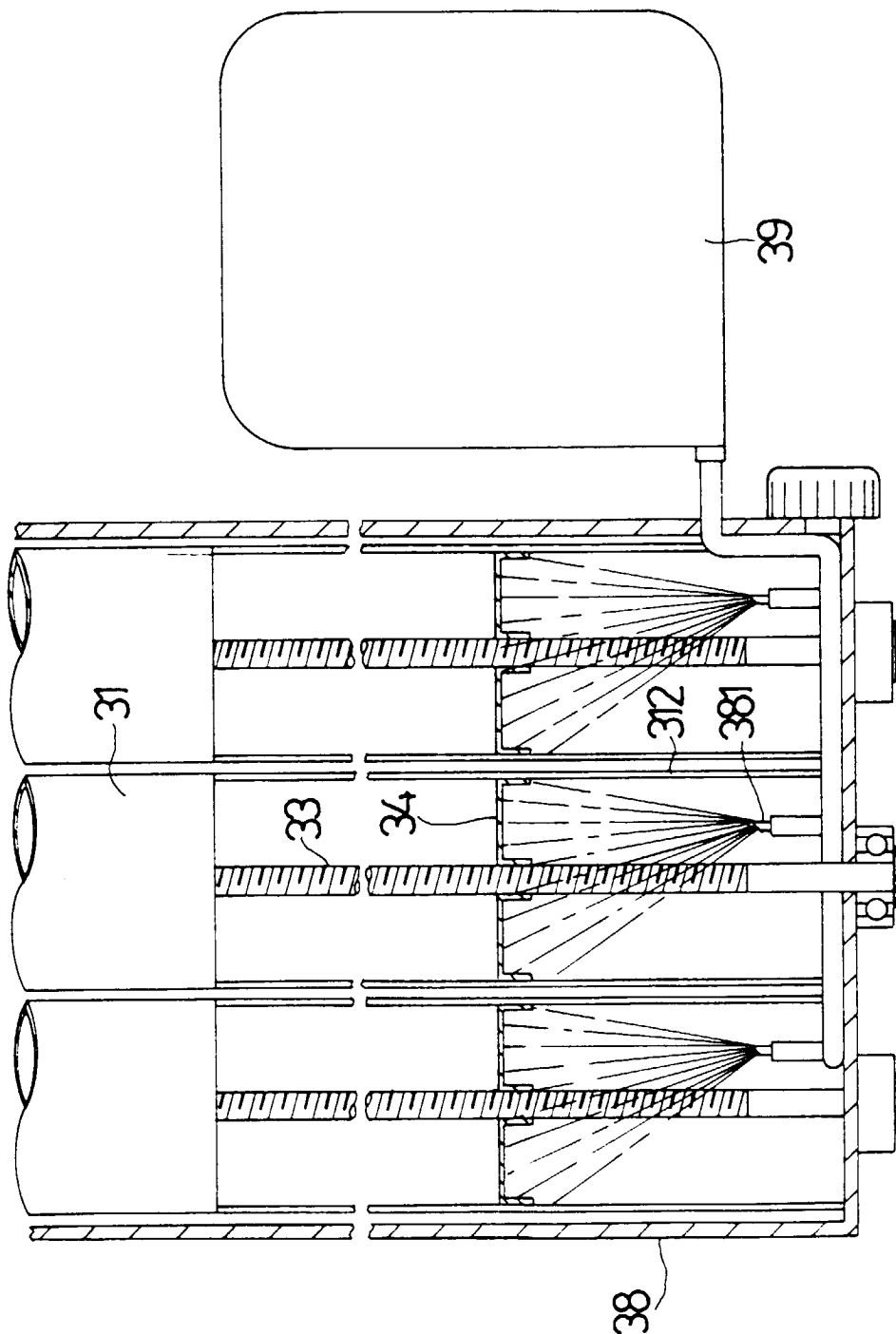
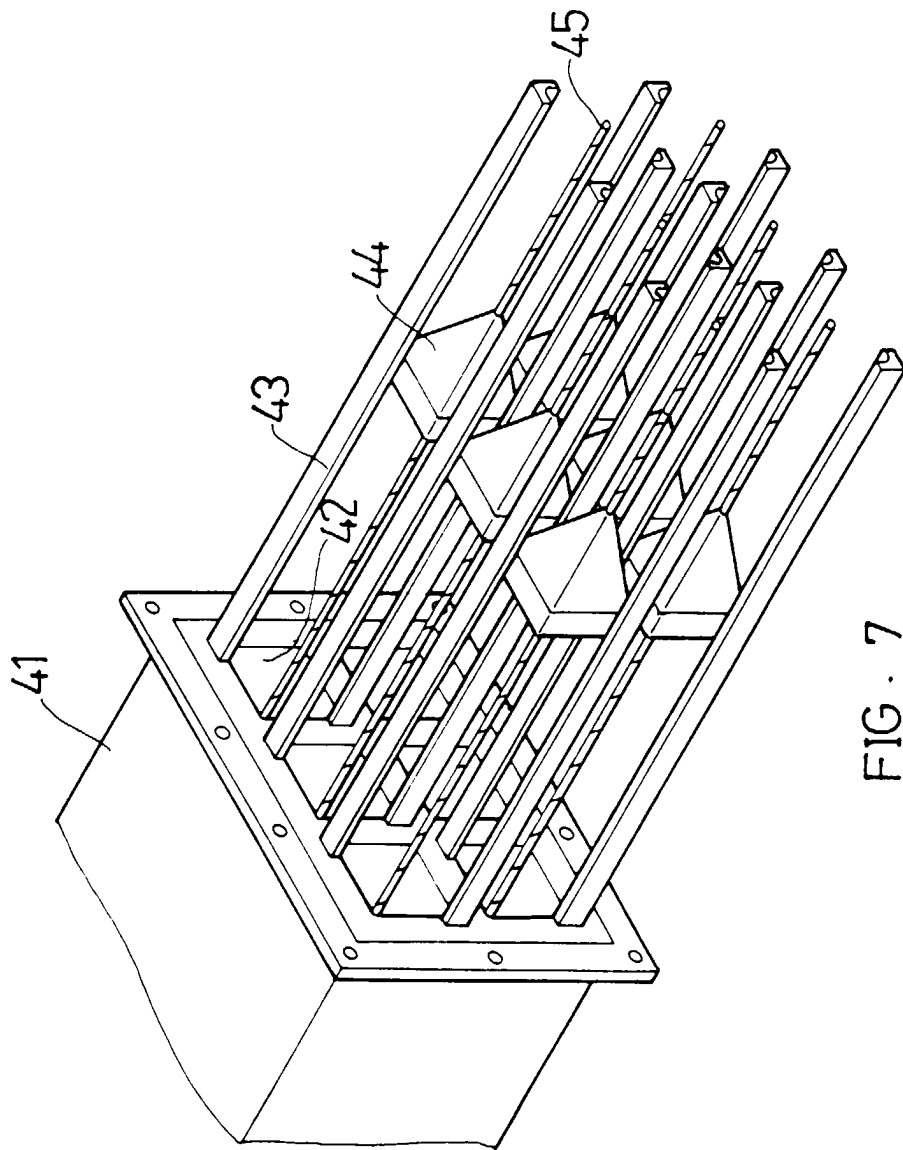


FIG . 6



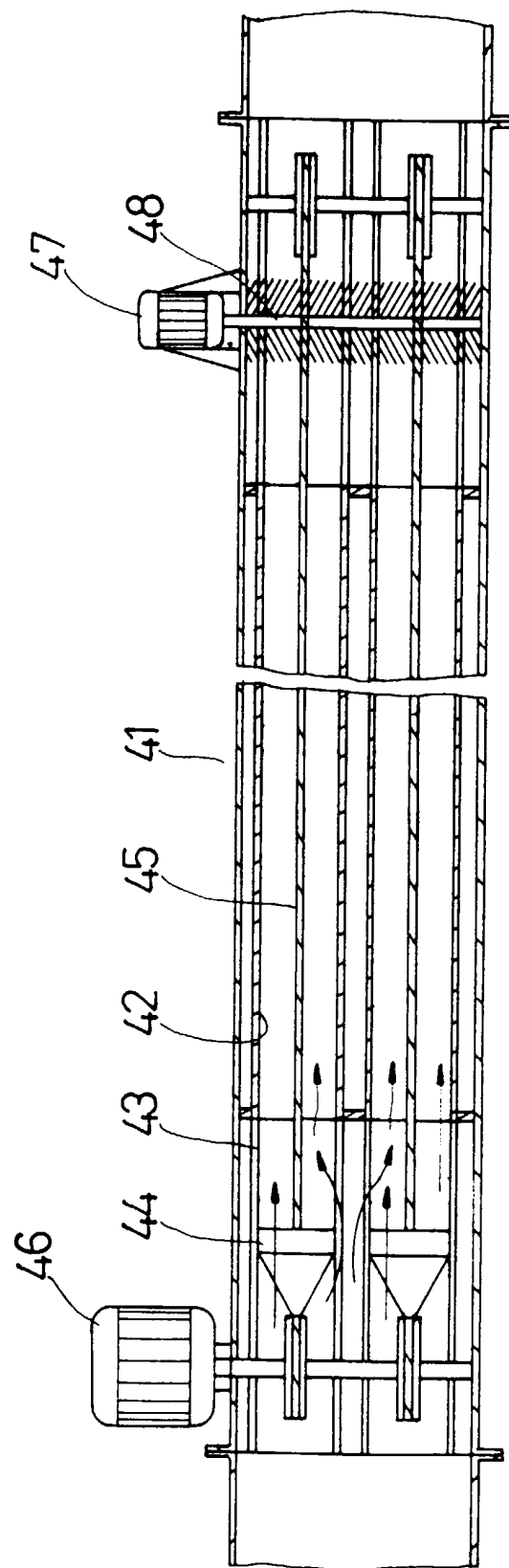


FIG. 8

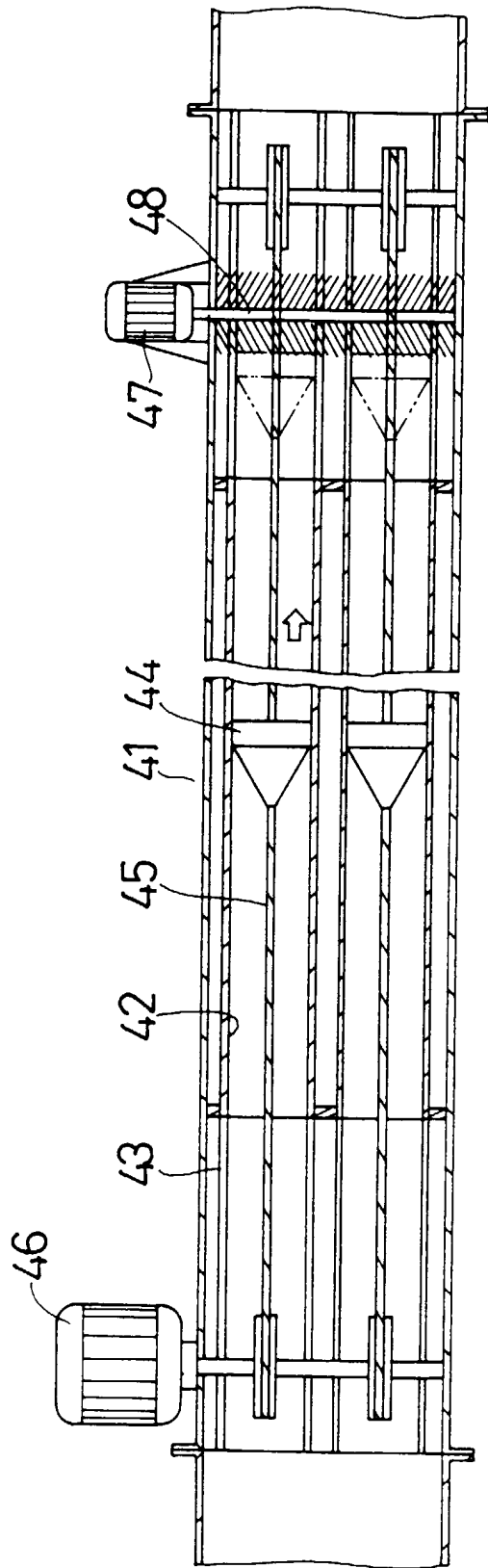
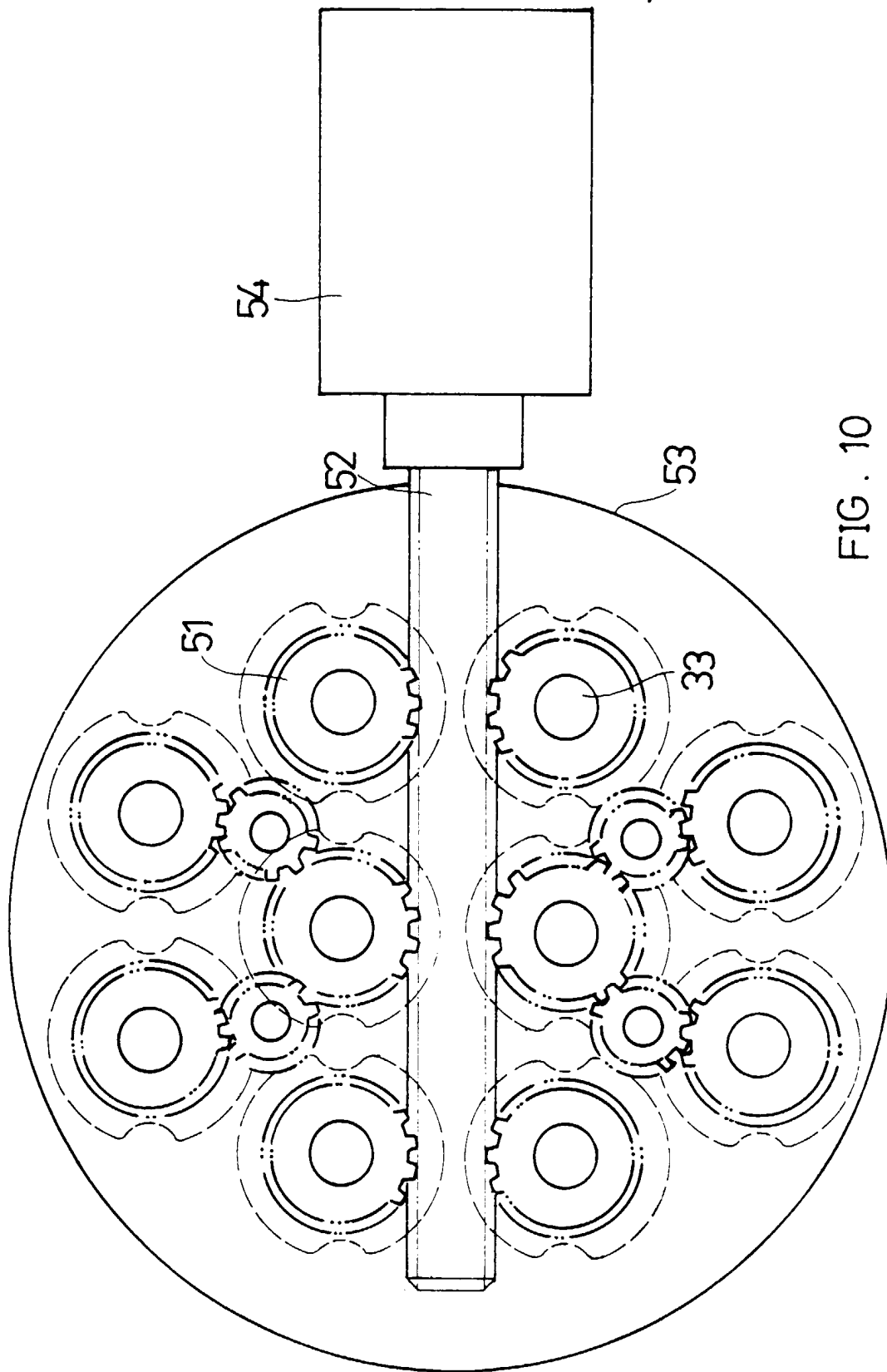


FIG. 9



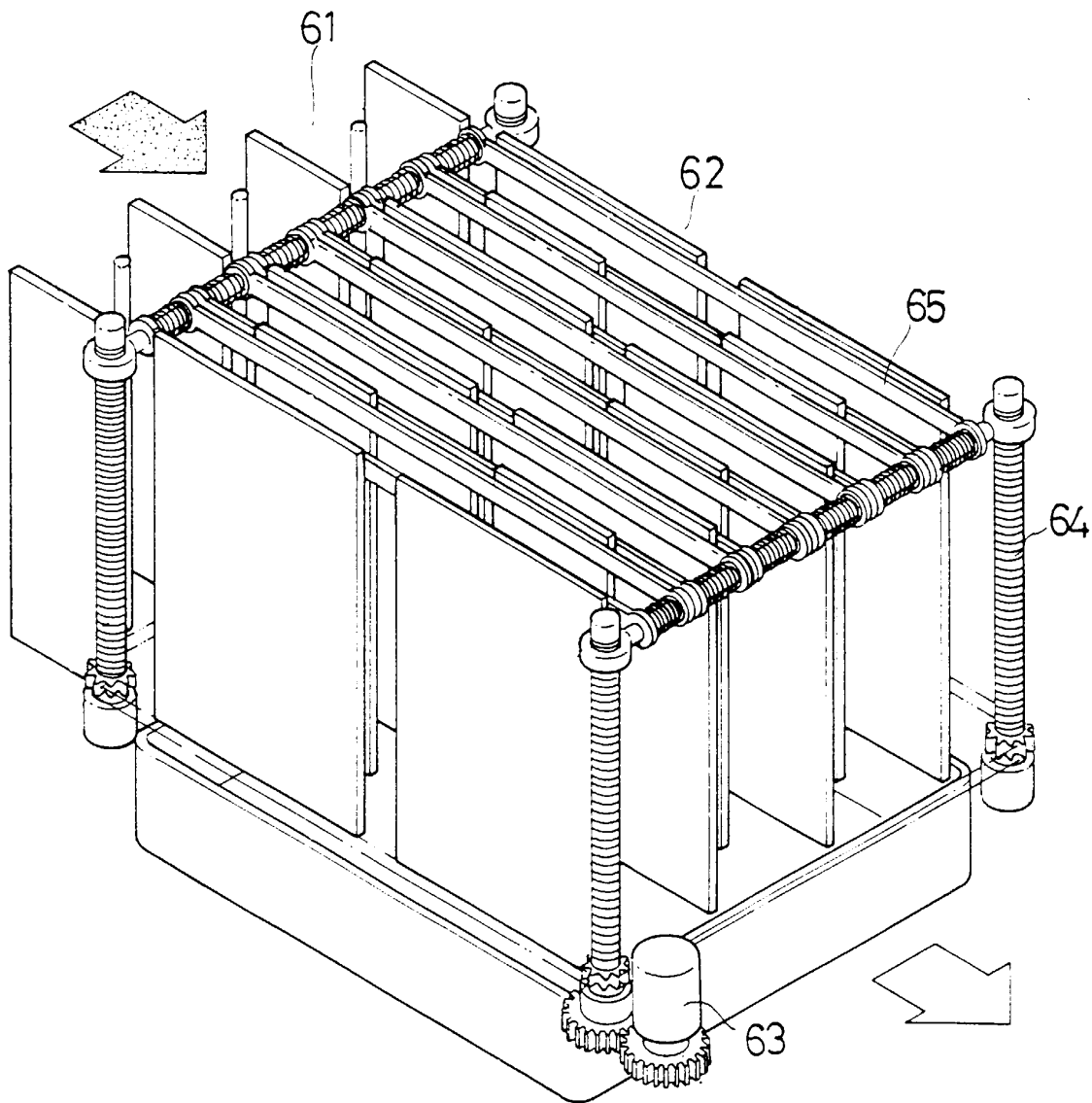


FIG. 11
PRIOR ART

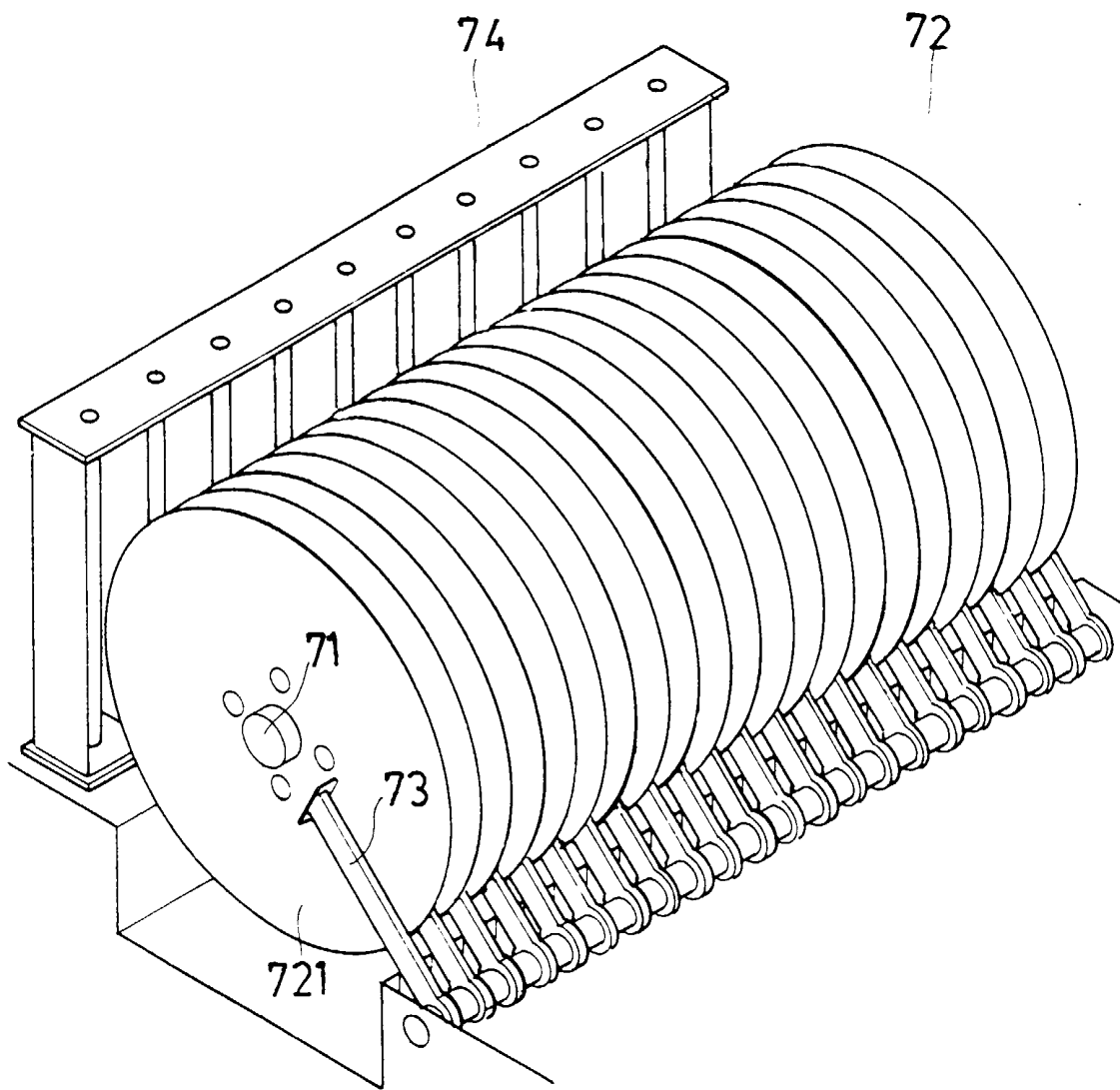


FIG. 12
PRIOR ART



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EUROPEAN SEARCH REPORT

Application Number
EP 99 10 5789

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
Y	EP 0 433 152 A (COMMISSARIAT ENERGIE ATOMIQUE) 19 June 1991 (1991-06-19) * column 4, line 12 - column 5, line 2 *	1,6	B03C3/74 B03C3/10
A	* column 5, line 41 - line 45; claims 1,3,5,11; figures 2,3 *	2	
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A	* column 2, line 35 - column 3, line 59 * * column 5, line 21 - line 31; claims 1,8; figure 3 *	4,5	
A	US 2 547 902 A (J.E BURTON) 3 April 1951 (1951-04-03)		
			TECHNICAL FIELDS SEARCHED
			B03C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		22 July 1999	Decanniere, L
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 5789

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22-07-1999

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