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(54) **Filtering unit for laundry washing machine**

(57) A filtering unit for a laundry washing machine provided with a washing tank and a drain pump (10) for the conveying of the washing water from the tank to a drain pipe (8) is provided. The unit (2) comprises a filter container (4; 400) in which a filter (15; 402) for the filtering of said washing water is housed, and the filter container (4; 400) is in flow connection with said washing tank through a tubular duct (5; 500). The filter (15; 402) is provided with holes (20; 404) on one end (19; 403)

that is normally associated with one end of said tubular duct (5; 500) and the unit (2) comprises a device (30; 300; 407) for moving the filter (15; 402) within the filter container (4; 400) from a first position (A; C) in which said holes (20; 404) are closed by the tubular duct (5; 500) to a second position (B; D) that allows to let said holes (20; 404) free in order to put said washing tank and said drain pipe (8) directly in communication for the outflow of the washing water in the case of obstruction of the filter (15; 402).

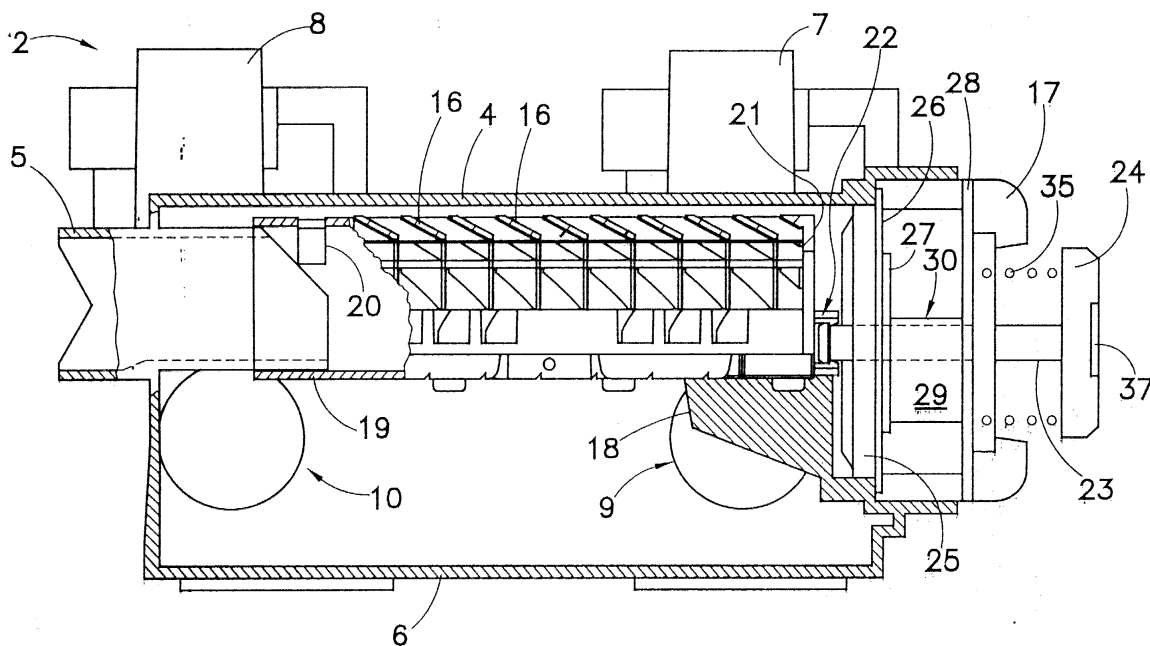


FIG. 3

Description

[0001] The present invention refers to a filtering unit for laundry washing machine, in particular for a household laundry washing machine.

[0002] In a common laundry washing machine the filtering action in output of the washing tank is carried out by a structure external to the washing tank. By means of a tubular duct the washing water flows into a filtering cartridge in which a rigid filter is present that is suitable to eliminate several debris and impurities which are present in the washing water. Subsequently this last is sucked by an appropriate hydraulic pump and it is expelled outside through an appropriate drain pipe, or it is recycled inside the tank. In modern washing machines the filtering device is located in the bottom zone of the structure of the cabinet that contains the washing machine, mainly for aesthetic needs.

[0003] During a washing operation of the washing machine it is possible that the great amount of debris and filaments present in the washing water obstructs the slits of the filter thus preventing the outflow of the washing water from the same filtering device and therefore preventing the drain outside through the appropriate drain pipe. In such case the operator is forced to interrupt the washing operation of the washing machine and to extract the filter for the cleaning of the same. Such operation is to be burdensome since it forces the user to collect with means of fortune all the washing water remaining in the tank, which tends to outflow through the mouth of the filter, or to collect the washing water contained in the tank by means of the drain pipe once this has been extracted from the back of the washing machine and laid on the ground.

[0004] In view of the state of the art herein described, scope of the present invention is to realise a filtering unit for washing machine that solves the aforesaid disadvantage.

[0005] According to the present invention, such scope has been attained by means of a filtering unit for a laundry washing machine provided with a washing tank and a drain pump for the conveying of the washing water from the tank to a drain pipe, said unit comprising a filter container in which a filter for the filtering of said washing water is housed, said filter container being in flow connection with said washing tank through a tubular duct, characterized in that said filter is provided with holes on one end normally associated with one end of said tubular duct and said unit comprises a device for moving said filter within said filter container between a first position in which said holes are closed by the tubular duct to a second position that allows to let said holes free in order to put said washing tank and said drain pipe directly in communication for the outflow of the washing water in case of obstruction of the filter.

[0006] Owing to the present invention it is possible to realise a filtering unit for laundry washing machine provided with a device that allows the evacuation of the

washing water from the tank in the presence of totally obstructed filter by means of the pump and the drain pipe.

[0007] The characteristics and the advantages of the present invention will become evident from the following detailed description of some embodiments thereof, that are illustrated as a non-limiting example in the enclosed drawings, in which:

Figure 1 is a front view of a front load laundry washing machine provided with a filtering unit according to a first embodiment of the present invention;

Figure 2 is a section view according to a vertical plane of the filtering unit in Figure 1 with filter in normal position;

Figure 3 is a section view according to a vertical plane of the filtering unit in Figure 1 with filter moved toward the right;

Figure 4 is a top view of the single filter moving device of the filtering unit with the filter as in Figure 2;

Figure 5 is a top view of the single filter moving device of the filtering unit with the filter as in Figure 3;

Figure 6 is a section of the filter moving device of figure 4 according to the line VI-VI;

Figure 7 is a top view of a filter moving device according to a second embodiment of the filtering unit with the filter as in Figure 2;

Figure 8 is a top view of the filter moving device according to the second embodiment of the filtering unit with the filter as in Figure 3;

Figure 9 is a partially sectioned schematic view according to a vertical plane of a filtering unit according to a third embodiment of the invention with filter in normal position;

Figure 10 is a partially sectioned schematic view according to a vertical plane of a filtering unit according to the third embodiment of the invention wherein the filter is rotated;

Figure 11 is a view in section according to the line XI-XI of the filtering unit in Figure 9.

[0008] With reference to Figure 1 a front load laundry washing-machine 1 is shown with filtering unit 2 positioned in the bottom zone of a cabinet 3 containing the laundry washing machine 1.

[0009] The filtering unit 2 shown more in detail in Figures 2 and 3 comprises a filter container 4 connected with a tubular duct 5 that is suitable to take the washing water that outflows from a washing tank (not visible in the figures) of the laundry washing machine 1. The filter container 4 is integral with a tank 6 that is suitable to contain the back flow water from the delivery pipes 7 and 8 respectively of a recycling pump 9 and a drain pump 10 that are schematically shown in Figures 2 and 3. The filter container 4 has cylindrical shape and it contains in the top part a filter 15 that is suitable to eliminate from the washing water debris and impurities coming from the tubular duct 5. The filter 15 is made up of a

body with upper slits 16 that are tilted in order to facilitate the extraction of toothpicks or other pointed objects without inconveniences and that is provided with a handle 17 for its extraction from the container 4. This last is provided, in its bottom part under the filter 15, with a partition 18 that prevents the outflow of the back flow water from the drain pipe 8 or from the recycle pipe 7 from the same tank 6.

[0010] The filter 15 is provided on one end 19, external to the tubular duct 5 and arranged around it, with holes 20 that during the normal operation of the laundry washing-machine do not allow the water flow outside since they are closed by the duct 5. On its other end 21, opposite to the end 19, the filter 15 is hooked in 22 to a pin 23 that is integral in the other end with a disc 24.

[0011] Between the handle 17 and the filter 15 a disc 25 is arranged that is the housing of a gasket 26 for the abutment on the tank 6 and of a gasket 27 for the sliding of the pin 23. The disc 25 is held by a threaded plug 28 that is fixedly mounted to the handle 17 once that such plug 28 is screwed into the tank 6.

[0012] A body 29 that is part of a device 30 for moving in horizontal manner the filter 15 inside the tank 6 and better visible in Figures 4-6 is integral with the plug 28. The body 29 has substantially a semicircle shape and it is provided on top with a rectilinear guide 31 cross-sectional to the body 29, as shown in Figure 6, in which a top end 32 of a pin 33 can slide. This last has a bottom end 40 on which a heart shaped cavity 34 of the pin 23 can slide. A spring 35 connected to the disc 24 integral with the pin 23 is also associated with the plug 28; an external button 37 for the operation of the device 30 is connected to the disc 24.

[0013] With the filter 15 in the normal position of Figure 2 the pin 33 is in a position A in the cavity 34 of the pin 23 that is in proximity of one end of the cavity 34, as visible in Figures 4 and 6. By operating on the button 37 the cavity 34 is minimally moved on the left so as to unlock the pin 33 from its position A; subsequently the spring 35 thrusts the disc 24 toward the right and the top end 32 of the pin 33 is free to slide in the rectilinear guide 31 and the heart shaped cavity 34, being thrust by the action of the spring 35, is moved toward the right thus sliding on the bottom end 40 of the pin 33. At end of stroke the pin 33 is in a position B, opposite to the position A, in proximity of an end of the cavity 34, as visible in Figure 5. The filter 15 integral with to the pin 23 is moved toward the right so as to let free the holes 20 that were previously closed by the tubular duct 5 connected with the laundry washing tank of the washing machine 1, as visible in Figure 3. In this way if during a washing operation of the laundry washing machine 1 the slits 16 of the filter 15 are obstructed by filaments and impurities of the washing water coming from the tank, the movement toward the left of the filter 15 allows the outflow of the washing water through the holes 20 and the subsequent drain on the outside through the normal drain pump 10 and the appropriate pipe 8.

[0014] In order to bring the filter 15 back in its normal position of Figure 2 it is necessary to operate on the disc 24 so as to compress the spring 35 and to make the cavity 34 slide on the bottom end 40 of the pin 33 in order to bring the same pin 33 back in the lock position A in Figure 4.

[0015] For the assembly of the pin 33 some holes, not shown in the figures, are provided both in the rectilinear guide 31 of the body 29 and in the heart shaped cavity 34.

[0016] As an alternative the filter 15 can have a single opportunely pierced tubular structure.

[0017] It is also possible that the tank 6 and the partition 18 are not present in the filtering unit 2 where the filter container 4 has a cylindrical shape and it is always connected with the drain pump 10 by respective drain pipe 8.

[0018] In a second embodiment of the present invention a filtering unit 2 that is different from the previous filtering unit above described, only in a different device 300 for moving the filter, visible in Figures 7 and 8, in the absence of springs is described. Such device 300 comprises a rectilinear hollow guide 301 that is obtained in the pin 23 and a body 302, integral with the plug 28, to which a pin 303 on whose bottom end said rectilinear guide 301 can slide is connected. The pin 23 that, as already said, is connected on one end to the filter 15, is integral on its other end with the handle 304 external to the filter container 4.

[0019] With the filter 15 in the normal position of Figure 2, the pin 303 is in a position A in the rectilinear guide 301 of the pin 23 in proximity of one end of the guide 301, as visible in Figure 7. By operating on the handle 304 by an operation of handling and movement toward the right, looking at Figure 7, an user allows the movement toward the right of the pin 23 since the rectilinear guide 301 can slide on the bottom end of the pin 303. At end of stroke the pin 303 is in a position B, opposite to the position A, in proximity of the other end of the guide 301, as visible in Figure 8. The movement of the pin 23 and therefore of the filter 15 toward the right, allows to let the holes 20 free for the flow of the washing water coming from the tubular duct 5 connected with the washing tank of the laundry washing machine 1.

[0020] A filtering unit 2 according to a third embodiment of the present invention is described in Figures 9-11. Said filtering unit 2 comprises a filter container 400, connected in a central part of one its end 401 to a tubular duct 500 that is suitable to take the washing water that outflows from the washing tank, not shown in the figures, and that must be discharged the drain pump 10, schematically shown in the figures, through a drain pipe 8. The filter container 400 has a cylindrical shape and it contains a filter 402 having an opportunely pierced tubular structure in order to eliminate debris and impurities from the washing water coming from the tubular duct 500 and it is provided with an external handle 410 that is integral with a plug 411. The filter 402 on one end 403,

external to the tubular duct 500 but arranged around it, is provided with holes 404 that during the normal operation of the laundry washing machine 1 do not allow the outflow of the water as they are closed by the duct 500. On other end 405 the filter 402 is connected with a pin 406 externally connected with the handle 407. The tubular duct 500 is provided on one end internal to the filter 402 with the holes 501 both on the bottom as well as on top.

[0021] With the filter 402 in the position C, shown in the Figures 9 and 11, the holes 404 of the filter 402 are closed by the tubular duct 500. If a user operates on the handle 407 thus exerting onto same a rotation movement substantially of 90 degrees, the filter 402 gets in a position D in which the holes 404 will correspond to the holes 501 of the duct 500, as shown in Figure 10. This allows the outflow of the washing water coming from the duct 500 from the holes 401 and 501 in the case of obstruction of the holes of the filter 402.

Claims

1. Filtering unit for a laundry washing machine provided with a washing tank and a drain pump (10) for the conveying of the washing water from the tank to a drain pipe (8), said unit (2) comprising a filter container (4; 400) in which a filter (15; 402) for the filtering of said washing water is housed, said filter container (4; 400) being in flow connection with said washing tank through a tubular duct (5; 500), **characterised in that** said filter (15; 402) is provided with holes (20; 404) on one end (19; 403) that is normally associated with one end of said tubular duct (5; 500) and said unit (2) comprises a device (30; 300; 407) for moving said filter (15; 402) within the filter container (4; 400) from a first position (A; C) in which said holes (20; 404) are closed by the tubular duct (5; 500) to a second position (B; D) that allows to let said holes (20; 404) free in order to put said washing tank and said drain pipe (8) directly in communication for the outflow of the washing water in the case of obstruction of the filter (15; 402).
2. Unit according to claim 1, **characterised in that** said filter (15) is movable longitudinally.
3. Unit according to claim 2, **characterised in that** said device (30; 300) for moving the filter (15) comprises a mobile part (23, 24, 34; 23, 301) connected with the filter and a fixed part (29, 31; 302, 303) associated with a handle (17) for the opening of the filter container (4).
4. Unit according to claim 3, **characterised in that** said fixed part (29, 31) of the device (30) for moving the filter comprises a guide (31) in which one end (32) of a pin (33) can slide while on the other end (40) of said pin (33) a heart shaped cavity (34) can slide that is integral with the mobile part (23, 24, 34) of said device (30).
5. Unit according to claim 4, **characterised in that** in said first (A) and in said second (B) position said heart shaped cavity (34) of the mobile part (23, 24, 34) of the device (30) is in locking engagement with said pin (33).
6. Unit according to claim 5, **characterised in that** said mobile part (24) is connected with said fixed part (28) by means of elastic means (35) that determine said second position of filter (15) by extending.
7. Unit according to claim 6, **characterised in that** said mobile part (24) is associated with a button (37) situated in proximity of the handle (17) for the opening of the filter container (4).
8. Unit according to claim 3, **characterised in that** said mobile part (23, 301) comprises a hollow rectilinear guide (301) that can slide on a pin (303) connected with said fixed part (302), being said hollow rectilinear guide (301) in locking engagement with said pin (303) in said first (A) and said second position (B).
9. Unit according to claim 2, **characterised in that** it comprises a sealing wall (26) of the filter container (4) and a sealing gasket (27) for the sliding of said mobile part (23) of the device (30, 300).
10. Unit according to claim 1, **characterised in that** said filter (400) is rotatable and said tubular duct (500) is provided with holes (501) that are normally closed by the filter (402) in said first position (C).
11. Unit according to claim 10, **characterised in that** in said second position (D) said holes (404) located on one end (403) of said filter (402) correspond to said holes (501) of said tubular duct (500).
12. Unit according to claim 11, **characterised in that** said device (407) for moving the filter (402) is a handle external the to the filter container (400) but integral with the filter (402).
13. Unit according to claim 1, **characterised in that** said end (19; 403) of the filter (15, 402) is coaxial to said end of the tubular duct (5; 500).

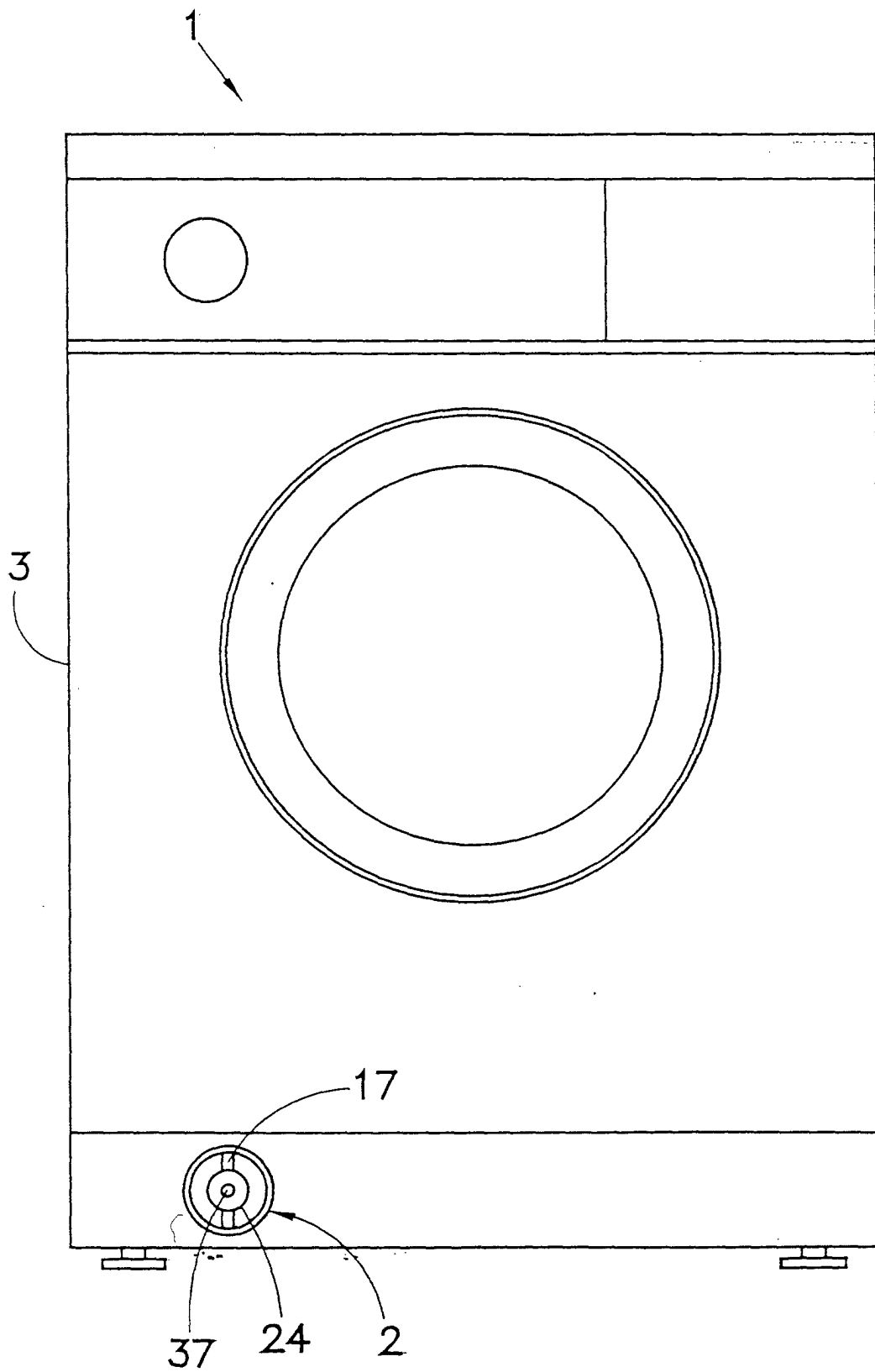
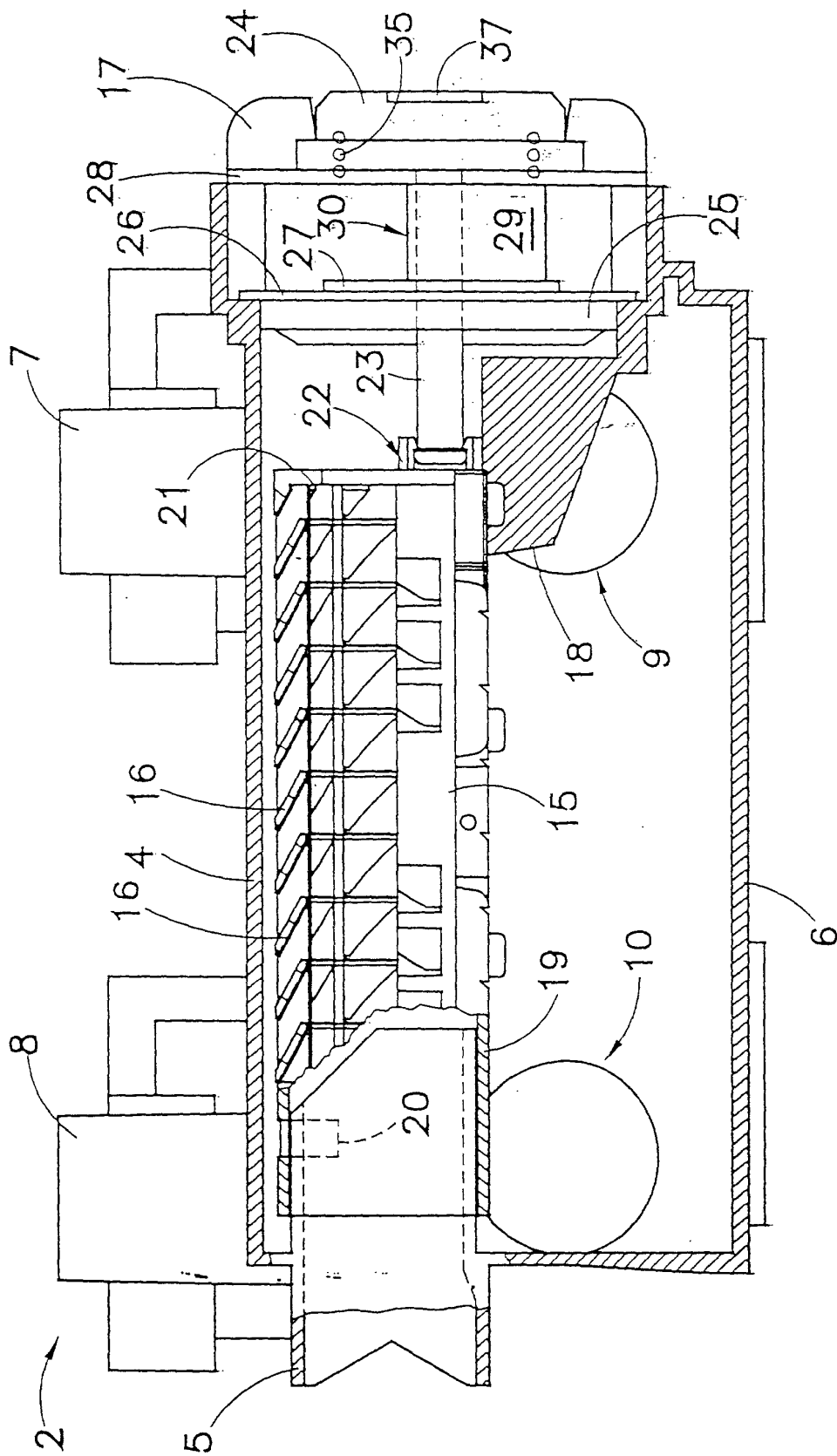


FIG. 1



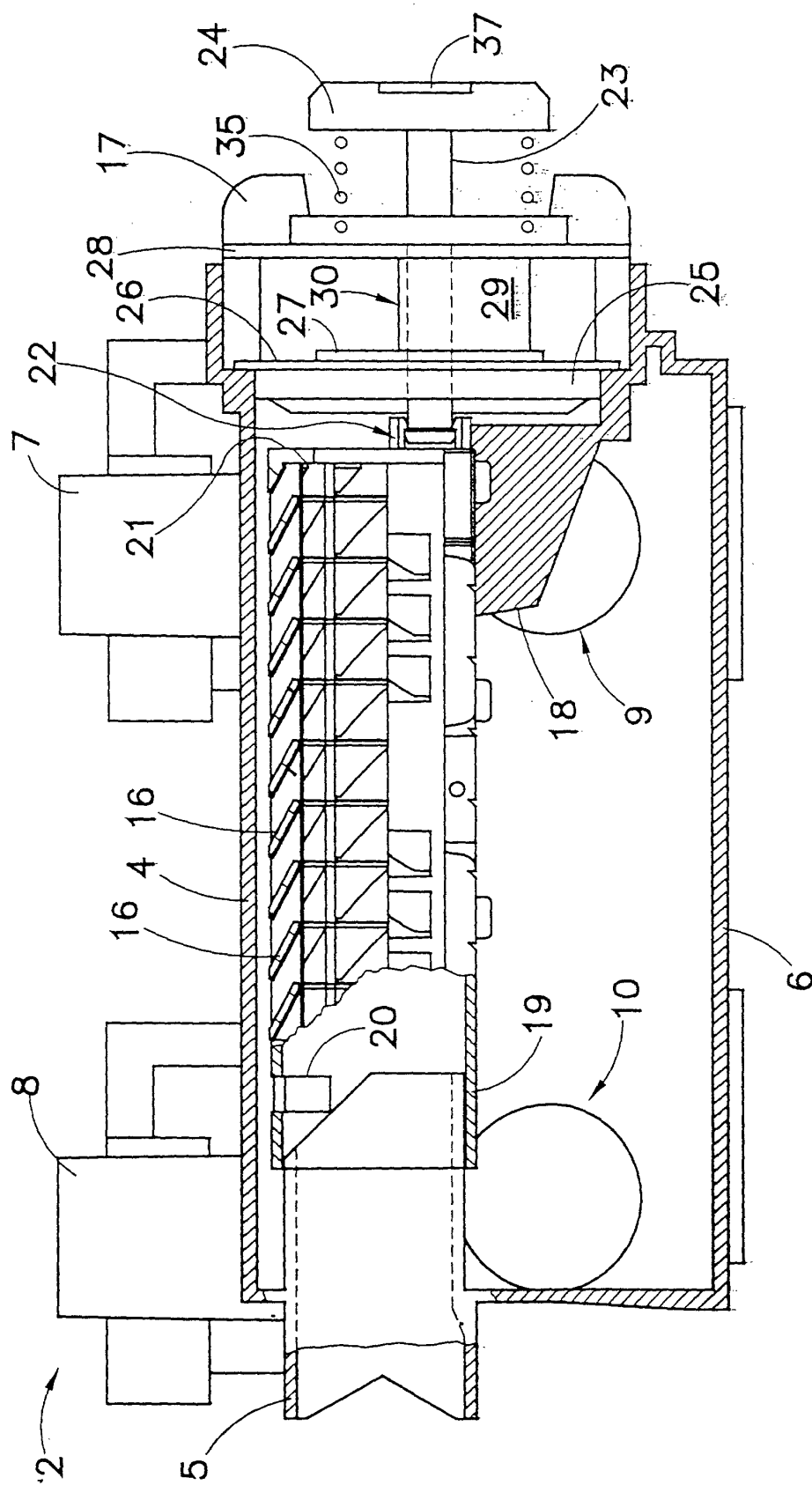


FIG. 3

