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(54) **Method and device for feeding a cleaning solution with suspended abrasive substances, into work-piece finishing machine.**

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Description

This invention refers to a method and a device for feeding a cleaning solution with detergent and powdered abrasive substances, in suspension, from a recycling tank to the finishing tank of work-piece finishing machines, such as tumblers, centrifugal and vibratory finishing machines and the like, according to the preamble of claims 1 and 5.

As is well known, the finishing and cleaning of metal or non-metal pieces, is done with special finishing machines which include a finishing tank in which the pieces to be finished and the finishing materials are placed randomly; such device are commonly in use and are known for example by US-A- 3883410 and JP-A- 59192458.

The pieces to be treated and finishing materials undergo shaking and vibratory motions, in order to continuosly make the pieces to be finished and finishing materials rub against each other, in the presence of a cleaning solution. The cleaning solution can be enriched with a powdered abrasive substance in order to improve on the action of the finishing materials. The cleaning solution in the finishing tank of the machine is usually substituted with a fresh solution, while continuosly draining the dirty solution from the finishing tank, into a second tank, also known as recycling or decanting tank; from this tank the fresh solution is recycled in metered amounts into the finishing tank over the loose mass. The necessity of feeding into the finishing tank a fresh solution has been considered an essential requirement to the smooth running of the machine and the finishing of the pieces to be treated. Therefore in the recycling tank, where most of the dirt picked up by the cleaning solution drained from the machine was deposited, the tendency was to keep quiet conditions to avoid putting the deposited dirt back into circulation. For this reason the cleaning solution lost more and more of the abrasive substance, which was decanted to the bottom of the recycling tank, thus reducing the effectiveness of the solution and of the cleaning materials; the machine cycle was made longer and the desired finish on the pieces was not achieved.

Another problem with existing machines is the difficulty of dissolving the detergent in the cleaning solution and of dispersing the abrasive substance at the beginning of each machine cycle, due to the fact that these substances, upon contact with water, form lups which are hard to dissolve and can jam the recycling pump device.

It would therefore be convenient to keep the abrasive powder suspended for the duration of each machine cycle or part thereof, and to dissolve the detergent in the initial phase, with the aim of improving the effectiveness of the machine while shortening the machine cycle. Therefore, the scope of this invention is to provide a method and a device through which the powdered abrasive substances can be suspended and maintained in that state in the cleaning solution which is fed into the finishing tank, by structurally simple and inexpensive means, avoiding jamming of the apparatus.

A further scope of the invention is to provide a method and a device as specified above, which will further dissolve the detergent and the powdered abrasive substance in a short time, at the beginning of each machine cycle, allowing in addition for the substances to be drawn from special containers.

A further scope of the invention is to provide a device for feeding a cleaning solution containing a detergent and abrasive material, into the tank of a working machine, by which it is possible to create turbulence within the cleaning solution and alternatively to stop turbulence during a certain part of the finishing cycle, even if the solution is recycled or fed into the finishing tank, without negatively effecting on the finishing of the work-pieces, providing better results in terms of the effectiveness.

Yet another scope of the invention is to provide an apparatus or device which can put into action the method being claimed, which is able to operate totally independently, in a short amount of time, using one or more detergents, while keeping the structure and operation of the machine extremely simple.

All the above is made possible through the method and device of independent, claims 1 and 5. Further preferential embodiments are claimed in the dependent claims.

The invention will be described hereunder in further detail, with reference to the enclosed drawings of which:

Fig. 1 is a general scheme of a vibratory finishing machine with a device according to the invention.

Fig. 2 is an enlarged view of a possible embodiment for a detergent container.

Fig. 3 is a cross sectional view along the line 3-3 in figure 2.

In figure 1, 10 stands for a generic finishing machine having a finishing tank 11 in which are placed the pieces 12 to be treated together with the finishing materials 13 in a loose fashion and a cleaning solution 14 which can contain a certain amount of suspended powdered abrasive substance.

The machine finishing tank 11, near the bottom, is provided with a discharge opening 17 for solution drainage, which is fitted with a grate that keeps in the pieces 12 and the finishing materials 13, while allowing the liquid solution to flow out with the eventual suspended abrasive powder. The drainage opening 17 is in turn connected with a

recycling tank 19, by a conduit 18 to drain the cleaning solution from the finishing tank 11 to the recycling tank 19.

Tank 19, as is shown, includes a slanted bottom 20, outer walls 21 and a partition 22 which extends downward, ending at a certain distance from the bottom 20 of the tank. The partition 22 is usually below the surface of the liquid in tank 19 and is mainly used to divide area 23 from area 24. Area 23 of tank 19 during certain phases of the machine cycle, and specifically at the beginning and during part of the cycle, is used to created turbulence within the solution towards the bottom 20 of tank 19 to suspend the abrasive powder dispersed in it, as will be explained later. The second area 24 of the tank is used for the suction of the solution to be recycled into the finishing tank 11 of the machine 20. Figure 1 shows that the bottom 20 of the recycling tank is slanted downward beginning at an area 23a, where the dirt is collected, towards the suction area 24, where a valve 25 allows for drainage into the sewers whenever the tank has to be emptied; 26 stands for an overflow conduit.

Corresponding to the stirring area 23, next to the partition 22, the tank 19 includes a stirring device of any kind, hydraluic or mechanical for istance, whose stirrer 28 is submerged completely in the liquid reaching almost to the bottom 20 of the tank so as to create a strong turbulence and a strong flow of liquid from the top towards the bottom 20 of the tank 19; a recycling pump 29 is used to feed the cleaning solution contained in the tank 19, into the finishing tank 11 through the conduit 31 respectively to feed the same solution along the recycling circuit 30 in order to pick up the cleaning solution, as explained later.

The recycling tank 19 is fed with water from the main supply 32 through the conduit 33 and a valve 34 which can be activated by a float which detects the level of the liquid in the tank 19. Alternatively the finishing tank 11 can be fed by the main water supply 32 through the float valve 34 and a conduit 36. In this way the level of the liquid can be kept constant in tanks 11 and 19 that means that tanks and pieces can be washed in separate phases. For this reason the valve 34 has one or more nozzles 39 near the slanted bottom 20, the nozzles being directed downward towards the bottom 20 in order to allow for the proper washing of the bottom and of the abrasive material or the dirt deposited on it.

As mentioned previously, an essential feature of the method and of the device according to this invention is the creation of strong turbulence in the liquid or in the cleaning solution contained in the recycling tank 19, for example near the bottom 20 of the tank; in this way a turbulent circulation of the liquid is achieved thus lifting and keeping suspended the abrasive powder which has been previously dispersed into the solution, which would otherwise tend to settle on the bottom of the tank itself, thus augmenting the effectiveness of the machine 10. The presence of the partition 22 also prevents the turbulent motion of the liquid from spreading in an uncontrolled mode to the area from which the pump 29 draws which could cause cavitation problems in the pump.

Turbulence of the cleaning solution in the tank 19 can be maintained for the time necessary for the treatment of the pieces 12 in the finishing tank; the fact that during this phase of the cycle the stirrer 28 prevents the decantation of solid particles of the cleaning solution, which drains out of the machine's finishing tank 11 and which are drained into the recyling tank 19, does not constitute a negative element, on the contrary, this turbulence is created on purpose and used to some advantage in lifting and keeping suspended the abrasive powder particles previously dispersed into the solution. The machine cycle time is thus greatly reduced due to the effectiveness of the solution 14 and of the finishing materials 13 upon the pieces 12 in the finishing tank 11. When the initial treatment phase is over, or rather when the machine's working cycle requires it to be, the stirrer 27, 28 in the recycling tank is stopped, while the pump 29 is kept running. In this way, since the turbulence in tank 19 subsides, the dirt and the abrasive substance drained out of the finishing tank 11 into the recycling tank 19, are decanted and settle at the bottom of it. Therefore only the fresh cleaning solution is kept in circulation for the final finishing or polishing phases of the work-pieces. At the end of the machine cycle the cleaning solution contained in tanks 11 and 19 is drained out by opening the drainage valve 25 and the float valve 34 at the same time thus conneting both the nozzles 39 and the conduit 36 with the main water supply 32 at the bottom 20 of the tank 19 and the mass of material 12, 13 in the finishing tank 11 are thus properly washed. By closing up the drainage valve 25 the level of the liquid in the recycling tank 19 is restored which causes the float valve 34 to shut, starting up a new machine cycle.

As mentioned previously, the stirrer 28 in the recycling tank 19 facilitates the dissolving of the detergent and the dispersion of the abrasive powder from the very beginning of the cycle, at which point a new amount of detergent or cleaning substance and abrasive powder is added to the water in the tank 19.

Having to take into account, however, the automatic use of several cleaning solutions, the problem arises of how to draw at the right time the amount of detergent needed to make the new

solution, and how to rapidly dissolve it.

Among the various available systems, water could be made to flow through containers, each containing a given amount of detergent, and then feed the resulting solution into the finishing tank 11 of the machine, according to a sequence or machine cycle of choice. However such a system has some significant limitations; the flow of liquid which is fed into the finishing tank 11 as a solution cannot be compatible with the requirements of the machine. In this way much of the detergent would not be picked up or dissolved in real time, or rather wouldn't dissolve at all since it would tend to lump or to form a thick residue which would remain in the containers for the detergent.

The use of mechanical dispersing devices to dissolve the detergent in a separate container would not be a valid and economical solution to the problem since it would imply a complex and expensive structure for the machine which would be difficult to build and use due to the lack of available space and to the additional consumption of energy. According to a further feature of the invention, then, a method and a device have been provided, as described above, in which a strong flow of water or liquid, is drawn by the recycling pump 29 from the recycling tank 19, and most all of the flow is fed through a detergent container 41 so as to constantly flush against the detergent in said container, which is thus picked up in a short time, together with eventual abrasive powder, and carried to the recycling tank 19 where the turbulence caused by the stirrer 28 completely dissolves and disperses it. Only a small or metered quantity of the main flow used to dissolve the detergent is drawn form the conduit 30 and fed, through conduit 31, into the finishing tank 11 from which it will then go back to the recycling tank 19, as previously explained. In the case when the device must feed several cleaning solutions during different phases of the same machine cycle, advantageously each detergent container 41 has its own recycling conduit 31 to the tank 19 with a respective pump 29 for the flow of the liquid into the detergent container 41, as previously explained. All of the above is achieved through a simple device set-up which is resistent to malfuncions that could arise from solid suspended particles in the cleaning solution which is recycled.

Therefore, as mentioned, the device includes for each detergent to be dissolved, two distinct recycling circuits or paths, one of which draws the cleaning solution suspended in it, form the respective containers while the other recycles the cleaning solution, with the suspended abrasive powder, into the machine's finishing tank 11. The first path 30 or main path is made up of an closed circuit and includes the solution suction area 24 of the tank 19, the pump 29 with the respective conduit 40, a container 41 for the detergent to be dissolved, and a discharge tube 42 which discharges the detergent in the container 41 directly into the tank 19 within the stirring area 23 which is defined by the partition 22 and a protection netting 43 which separates the stirring area proper, where the powdered abrasive substance is lifted up, and the area 23a where the eventual dirt floating on the solution is trapped. The flow of solution pouring out of the conduit 42, preferably does not go directly into the tank 19, but rather over a flow quieting member 44 placed under the conduit, as shown.

The main circuit 30 is used to lift and dissolve the detergent in the container 41. This circuit must therefore be sized to carry a large flow and in any case a volume of liquid greater than that necessary for the finishing tank 11 of the machine; in this way the drawing of the detergent from the respective container 41 and dissolving it are facilitated. On the other hand, the conduit 31 used to recycle the liquid into the finishing tank 11 can be sized for the volume of flow needed solely by the machine 10 to work under the best conditions. In this way the detergent can be completely removed from the container 41 quickly and in a controlled mode, as a function of the speed and volume of the flow of liquid which is poured by the pump 29 into the container 41.

The quick removal and dissolving of the detergent can be improved by making the container in a particular way, as shown in figures 2 and 3 of the enclosed drawings. As can be seen, the container 41 for each main circuit 30 includes outer walls 45 and a bottom wall with a forward horizontal part 46 and a rear slanted part 47 over which opens the tube 40 feeding the liquid for dissoving the detergent, which conduit is part of the main recycling circuit. As can be seen in figure 2, the flow of water which is constantly recycled by the tube 40 is towards the slanted wall 47 at the bottom of the container, so as to cause the liquid to flow over the detergent 48 in the container 41 both on the top, the sides and the bottom. The detergent 48 is held by a perforated plate, or restraining grate 49, slanted in the opposite direction of the bottom wall 47. In order to insure that the flow of liquid flushes over the powdered detergent 48 over the largest possible surface, without allowing lobsided flow or insufficient dissolving of the detergent, the grate 49 is provided with resting pacers 50 which separate it from the bottom 46 and is narrower that the container 41 in order to create a gap 51 for the solution to flow between the edges of the grate, the bottom and the side walls of the container 41. In this way the liquid flow tends to dig into the detergent both under and on the side of the lump of detergent, facilitating its dissolving and removal. A spacer 52 separates the upper edge of the grate

49 from the lateral wall of the container, so as to create a sort of overflow which, due to the presence of appropriate holes in the plate, adjusts itself to the level of detergent which is left in the container. The configuration of the detergent container or vat 41 and of the restraining grate 49, allows the detergent to dissolve rapidly due not only to the action of the liquid flow fed with augmented volume by the pump 29, but also to the creation of a surface flow which constantly flushes over the detergent 48 in the container.

In the case shown in figure 1 only one container is shown, linked to a corresponding main recycling circuit 30 and a secondary recycling circuit 31; however it is evident that if several cleaning substances are used, the device can be equipped with several recycling and detergent drawing circuits with their respective pumps, similar to the one shown.

The operation of the device described up to this point can be briefly explained as follows; initially a certain amount of water is fed into the recycling tank 19 until it reaches a set level and at the same time the various containers 41 are loaded with an amount of detergent which can be mixed with a powdered abrasive substance. The finishing machine 10 is then started; which also starts the stirrer 28 and the recycling pump 29. The pump 29 initially creates a strong flow of water through the main circuit 30, thus drawing up the detergent contained in the container 41 together with the abrasive powder. At the same time, part of the water or of the cleaning solution being formed, is deviated into the conduit 31 and fed in an appropriate quantity into the finishing tank 11 of the machine 10 from which the liquid is drained back into the tank 19. Together with the solution and the dirt, the powdered abrasive substance which would otherwise settle on the bottom of the tank 19 is entrained into circulation, since the turbulence, caused by the stirrer 28, keeps the abrasive substance suspended in the cleaning solution, which then circulates throughtout with it. The stirrer 28 can be actuated constantly, or it can be intermittently or off when the abrasive substance needs to be decanted, during a final or intermediate phase of the treatment cycle, in order to run a finishing or polishing phase with only the cleaning solution.

When the treatment cycle is over, the cleaning solution and the dirt removed, can be discharged; the pieces treated in the tank 11 can be washed with water alone, and at the same time the recycling tank 19 can be washed by the stream of water coming out of the float valve 34, which whashes off the bottom of the tank removing all the deposits.

Claims

1. A method for feeding a cleaning solution containing a detergent and/or powdered abrasive materials in which the cleaning solution is circulated between a recycling tank (19) and a finishing tank (11) of a work-pieces finishing machine (10) and in which the detergent and/or the abrasive materials are dissolved and kept in suspension by a stirring action in said recycling tank (19), characterized by recirculating a strong flow of cleaning solution along a recycling circuit (30) between said recycling tank (19) and a discharging point (42) above the level of the cleaning solution within the same recycling tank (19) said recycling circuit (30) comprising a container (41) for fresh detergent and/or abrasive materials;flushing the fresh detergent and/or the abrasive materials from said container (41) by circulating the cleaning solution along said recycling circuit, and feeding said cleaning solution containing said fresh detergent and/or abrasive materials,from said recycling circuit (30) to said finishing tank (11).

2. Method, as claimed in claim 1, characterized by creating turbulence in the cleaning solution at least in a limited area (23) of the recycling tank (19) producing a turbulent flow towards the bottom (20) of the recycling tank (19).

3. Method, as claimed in claim 1, characterized by the fact that said flow of cleaning solution is derived from said recycling circuit (30) in a position between a recycling pump (29) and the detergent container (41).

4. Method, as claimed in claim 1 or claim 5, characterized by stopping the stirring of the cleaning solution in the recycling tank (19) allowing said abrasive material to be settled, and by feeding the cleaning solution without the abrasive powder into the finishing tank (11) of the machine (10).

5. A device for feeding a cleaning solution comprising a detergent and/or an abrasive material into the finishing tank (11) of a work-pieces finishing machine (10), said device comprising a recycling tank (19) containing the cleaning solution, a recycling pump (29) and a feeding conduit (31) for circulating said cleaning solution from the recycling tank (19) to the finishing tank (11) of the machine (10), a drainage conduit (18) between said finishing and recycling tanks (11, 19) and stirring means (27, 28) to mix the cleaning solution within said recycling tank (19), characterized in that said

recycling tank (19) comprises a recycling circuit (30) between said recycling pump (29) and a discharging point (42) above the level of the cleaning solution to recirculate said solution into the same recycling tank (19) and a flow quieting member (44) between said discharging point (42) and said recycling tank (19) and in that the feeding conduit (31) for circulating the cleaning solution to the tank (11) of the finishing machine (10) is branched off from said recycling circuit (30) of the recycling tank (19).

6. Device, as claimed in claim 5 characterized by including a detergent container (41), in said recycling circuit (30) and conduits means (40, 42) for circulating the cleaning solution from the recycling pump (29) in the recycling tank (19) and said container (41) respectively from said detergent container (41) to said recycling tank (19).

7. Device, as claimed in claims 5 and 6 characterized in that said feeding circuit (31) is branched from the recycling circuit (30) between the recycling pump (29) and the detergent container (41).

8. Device, as claimed in claim 6, characterized in that the detergent container (41) has a slanted bottom wall (47) and a detergent restraining grate (49) positioned between said bottom wall (47) and a discharge tube (42) of the detergent container (41) and in that a gap (51) for the flow of the liquid is provided between the side (41) and bottom (47) walls of the container and the edges of said grate (49).

Patentansprüche

1. Verfahren zum Zuführen einer Reinigungslösung mit einem Reinigungsmittel und/oder pulverförmigen Schleifmaterialien, bei welchem die Reinigungslösung zwischen einem Rückführungstank (19) und einem Endbearbeitungstank (11) einer Werkstück-Endbearbeitungsmaschine (10) zirkuliert und bei dem die Reinigungs- und/oder Schleifmaterialien aufgelöst sind und in der Schwebe gehalten werden durch einen Rühreffekt im besagten Rückführungstank (19), gekennzeichnet durch den Umstand, daß ein starker Fluß von Reinigungslösung rezirkuliert in einem Rückführkreislauf (30) zwischen dem besagten Rückführungstank (19) und einem Ablaßpunkt (42) überhalb des Reinigungslösungsstands in dem besagten Rückführungstank (19), wobei der besagte Rückführkreislauf (30) einen Behälter (41) für frisches Reinigungsmittel und/oder frische Schleifmaterialien umfaßt, wobei das frische Reinigungsmittel und/oder die frischen Schleifmaterialien von besagtem Behälter (41) abgelassen werden durch das Zirkulieren der Reinigungslösung in besagtem Rückführkreislauf, und die besagte, frisches Reinigungsmittel und/oder frische Schleifmaterialien enthaltende Reinigungslösung durch den besagten Rückführkreislauf (30) dem besagten Endbearbeitungstank (11) zugeführt wird.

2. Ein Verfahren wie unter Patentanspruch 1 beschrieben, gekennzeichnet durch den Umstand, daß zumindest in einem begrenzten Bereich (23) des Rückführungstanks (19) Turbulenzen in der Reinigungslösung erzeugt werden, die einen turbulenten Fluß zum Boden des Rückführtanks (19) hin bewirken.

3. Ein Verfahren wie unter Patentanspruch 1 beschrieben, gekennzeichnet durch den Umstand, daß der besagte Reinigungslösungsfluß abgeleitet wird vom besagten Rückführungskreislauf (30) an einer Stelle, die sich zwischen einer Rückführpumpe (29) und dem Reinigungsmittel-Behälter (41) befindet.

4. Ein Verfahren wie unter Patentanspruch 1 oder Patentanspruch 5 beschrieben, gekennzeichnet durch den Umstand, daß der Reinigungslösungs-Rührvorgang im Rückführtank (19) unterbrochen wird, wodurch das besagte Schleifmaterial herabsinken kann, und dadurch, daß die Reinigungslösung ohne das Schleifpulver dem Endbearbeitungstank (11) der Maschine (10) zugeführt wird.

5. Eine Vorrichtung zum Zuführen einer Reinigungslösung mit einem Reinigungsmittel und/oder einem Schleifmaterial in den Endbearbeitungstank (11) einer Werkstück-Endbearbeitungsmaschine (10), wobei besagte Vorrichtung einen Rückführtank (19) aufweist, der die Reinigungslösung enthält, eine Rückführpumpe (29) und eine Zufuhrleitung (31) für das Zirkulieren der besagten Reinigungslösung vom Rückführtank (19) zum Endbearbeitungstank (11), eine Abflußleitung (18) zwischen dem besagten Endbearbeitungs- und Rückführtank (11, 19) sowie Rührvorrichtungen (27, 28) zum Mischen der Reinigungslösung im besagten Rückführtank (19), gekennzeichnet durch den Umstand, daß der besagte Rückführtank (19) einen Rückführungskreislauf (30) zwischen der besagten Rückführpumpe (29) und einem Ablaßpunkt (42) überhalb des Reinigungslösungsstands aufweist, um die besagte

Lösung in selbigen Rückführtank (19) rezirkulieren zu lassen, und durch den Umstand, daß die Zufuhrleitung (31) für das Zirkulieren der Reinigungslösung zum Tank (11) der Endbearbeitungsmaschine (10) abgezweigt wird vom besagten Rückführungskreislauf (30) des Rückführtanks (19).

6. Eine Vorrichtung wie unter Patentanspruch 5 beschrieben, gekennzeichnet durch den Umstand, daß sie einen Behälter (41) im besagten Rückführungskreislauf (30) umfaßt wie auch Leitvorrichtungen (40, 42) für das Zirkulieren der Reinigungslösung von der Rückführpumpe (29) in den Rückführtank (19) und den besagten Behälter (41) beziehungsweise vom besagten Reinigungsmittelbehälter (41) zum besagten Rückführtank (19).

7. Eine Vorrichtung wie unter Patentansprüchen 5 und 6 beschrieben, gekennzeichnet durch den Umstand, daß der besagte Zufuhrkreislauf (31) abgezweigt wird vom Rückführungskreislauf (30) zwischen der Rückführpumpe (29) und dem Reinigungsmittelbehälter (41).

8. Eine Vorrichtung wie unter Patentanspruch 6 beschrieben, gekennzeichnet durch den Umstand, daß der Reinigungsmittelbehälter (41) eine abgeschrägte Bodenwand (47) aufweist sowie ein Reinigungsmittel-Rückhaltgitterrost (49), das sich zwischen der besagten Bodenwand (47) und einem Ablaßrohr (42) des Reinigungsmittelbehälters (41) befindet, und durch den Umstand, daß eine Lücke (51) für den Durchfluß der Flüssigkeit zwischen der Seiten- (41) und der Bodenwand (47) des Behälters und den Rändern des besagten Gitterrosts (49) vorgesehen ist.

Revendications

1. Une méthode pour alimenter une solution de nettoyage contenant un détergent et/ou des substances abrasive en poudre par laquelle la solution de nettoyage est faite circuler entre un réservoir de recyclage (19) et un réservoir de finition (11) d'une machine de finition (10) de pièces usinées et dans laquelle le détergent et/ou les substances abrasives sont dissoutes et maintenues en suspension par une action de mixage dans le dit réservoir de recyclage (19), caractérisé par le fait de faire recirculer un flot abondant de solution de nettoyage dans un circuit de recyclage (30) entre le dit réservoir de recyclage et un point de décharge (42) au-dessus du niveau de la solution de nettoyage dans le même réservoir de recyclage (19) le dit circuit de recyclage (30) comprenant un récipient (41) pour le détergent frais et/ou les substances abrasives; chassant le détergent frais et/ou les substances abrasives du dit récipient (41) en faisant circuler la solution de nettoyage dans le dit circuit de recyclage, et en alimentant la dite solution de nettoyage contenant le détergent frais et/ou les substances abrasives, du dit circuit de recyclage (30) au dit réservoir de finition (11).

2. Méthode, selon la revendication 1, caractérisée par la création de turbulence dans la solution de nettoyage au moins dans une zone limitée (23) du réservoir de recyclage (19) produisant un courant vers le fond (20) du réservoir de recyclage (19).

3. Méthode, selon la revendication 1, caractérisée par le fait que le dit flux de solution de nettoyage est dérivé du dit circuit de recyclage (20) à un endroit entre une pompe de recyclage (29) et le récipient de détergent (41).

4. Méthode, selon la revendication 1 ou 5 caractérisée par l'arrêt de la turbulence de la solution de nettoyage dans le réservoir de recyclage (19) permettant à la dite substance abrasive de se déposer, et par l'alimentation de la solution de nettoyage sans la poudre abrasive dans le réservoir de finition (11) de la machine (10).

5. Un dispositif pour alimenter une solution de nettoyage comprenant un détergent et/ou une substance abrasive dans le réservoir de finition (11) de la machine de finition de pièces usinées (10, le dit dispositif comprenant un réservoir de recyclage (19) contenant la solution de nettoyage, une pompe de recyclage (29) et un conduit d'alimentation (31) pour faire circuler la dite solution de nettoyage du réservoir de recyclage (19) au réservoir de finition (11) de la machine (10), un conduit de drainage (18) entre les dits réservoirs de finition et de recyclage (11, 19) et des moyens de mixage (27, 28) pour mélanger la solution de nettoyage dans le dit réservoir de recyclage (19), caractérisé par le fait que le dit réservoir de recyclage (19) comprend un circuit de recyclage (30) entre la dite pompe de recyclage (29) et un point de décharge (42) au-dessus du niveau de la solution de nettoyage pour faire recirculer la dite solution dans le même réservoir de recyclage (19) et un appendice d'arrêt du flux (44) entre le dit point de décharge (42) et le dit réservoir de recyclage (19) et par le fait que le conduit d'alimentation (31) pour la circulation de la

solution de nettoyage vers le réservoir (11) de la machine à finir (10) est une ramification du dit circuit de recyclage (30) du réservoir de recyclage (19).

6. Dispositif, selon la revendication 5 caractérisé par l'inclusion d'un récipient de détergent (41), dans le dit circuit de recyclage (30) et conduits (40, 42) pour faire circuler la solution de nettoyage de la pompe de recyclage (29) vers le réservoir de recyclage (19) et le dit récipient (41), et du dit récipient de détergent (41) vers le dit réservoir de recyclage (19).

7. Dispositif, selon les revendications 5 et 6 caractérisé par le fait que le dit circuit d'alimentation (31) est une ramification du circuit de recyclage (30) entre la pompe de recyclage (29) et le récipient de détergent (41).

8. Dispositif, selon la revendication 6 caractérisé par le fait que le récipient de détergent (41) a un fond avec une paroi inclinée (47) et une grille de retenue du détergent (49) disposée entre le dit fond (47) et un tuyau de décharge (42) du récipient de détergent (41) et par le fait qu'une ouverture (51) pour le flux du liquide est pourvue entre le côté (41) et les parois du fond (47) du récipient et les bords de la dite grille de retenue (49).

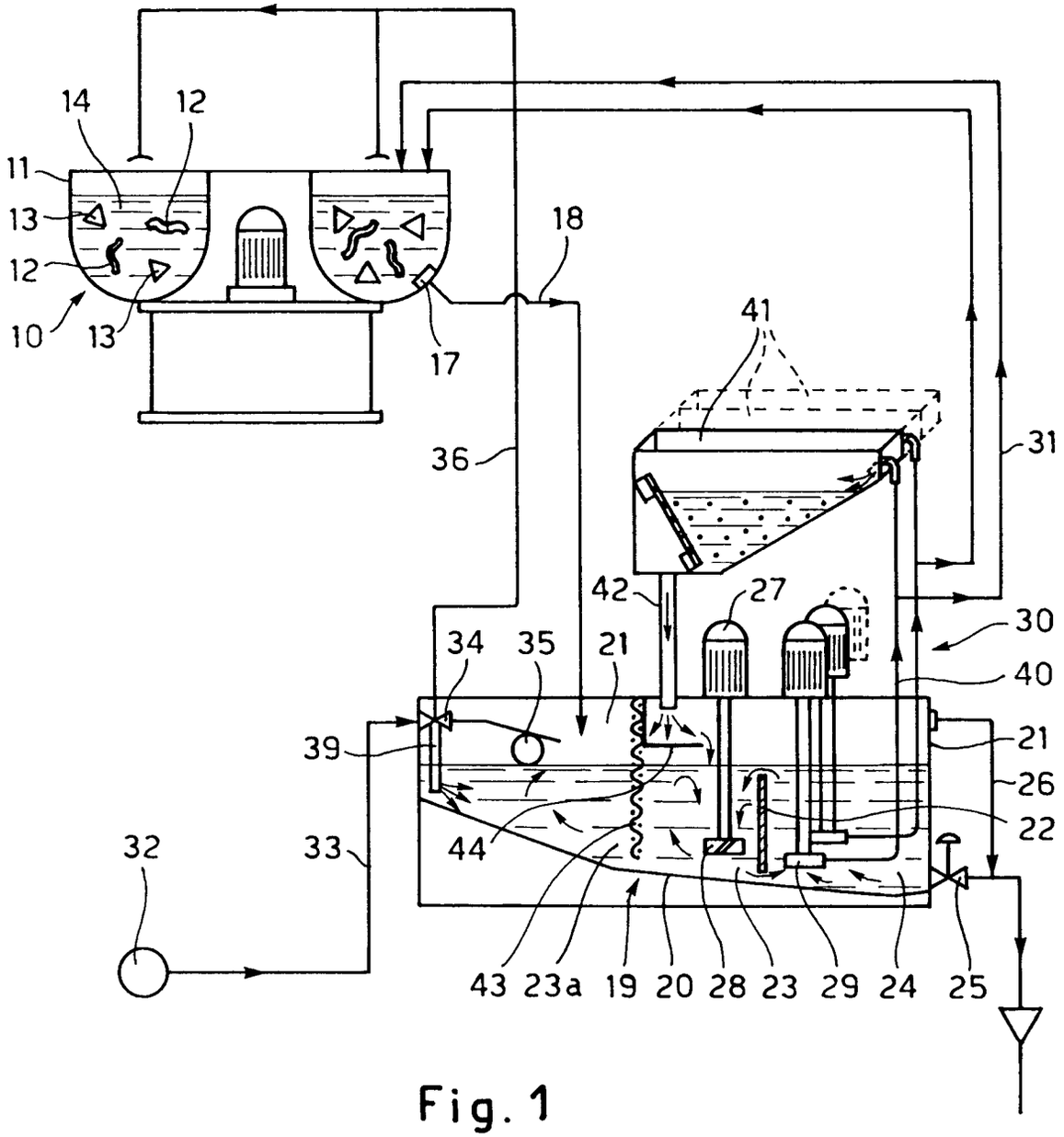
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Fig. 1

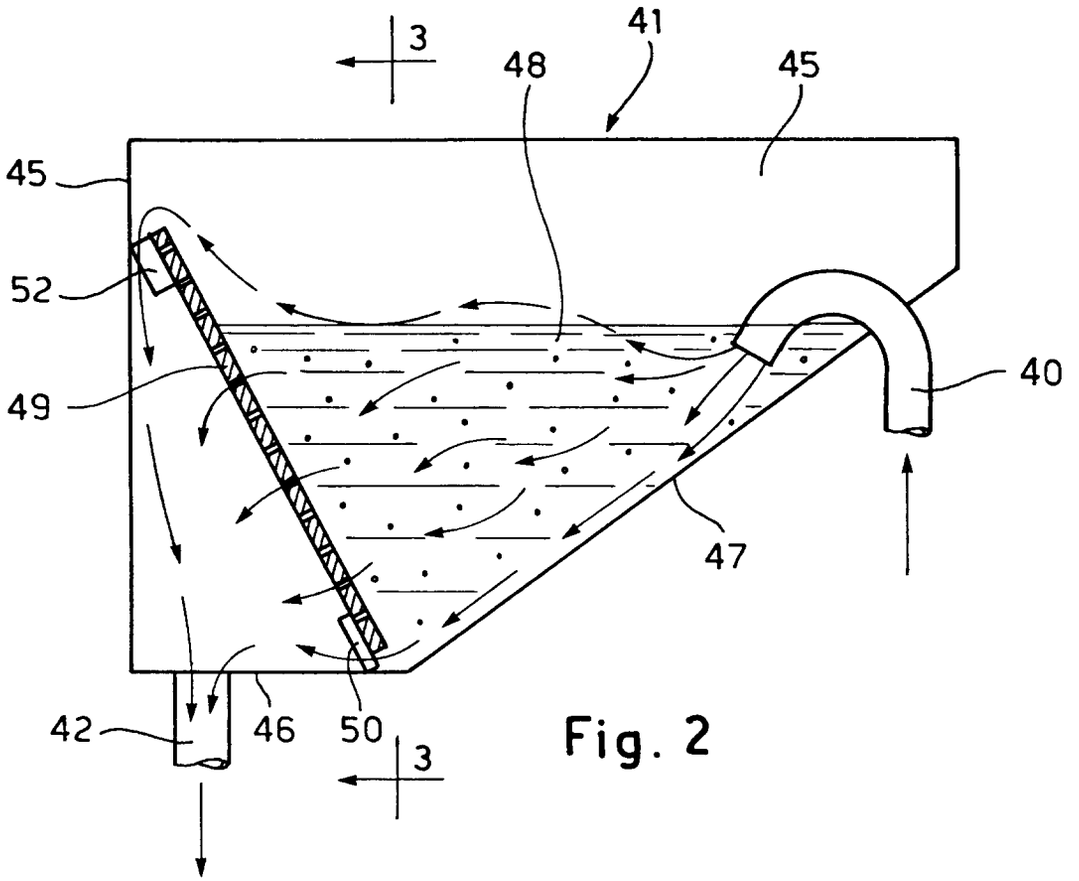

Fig. 2

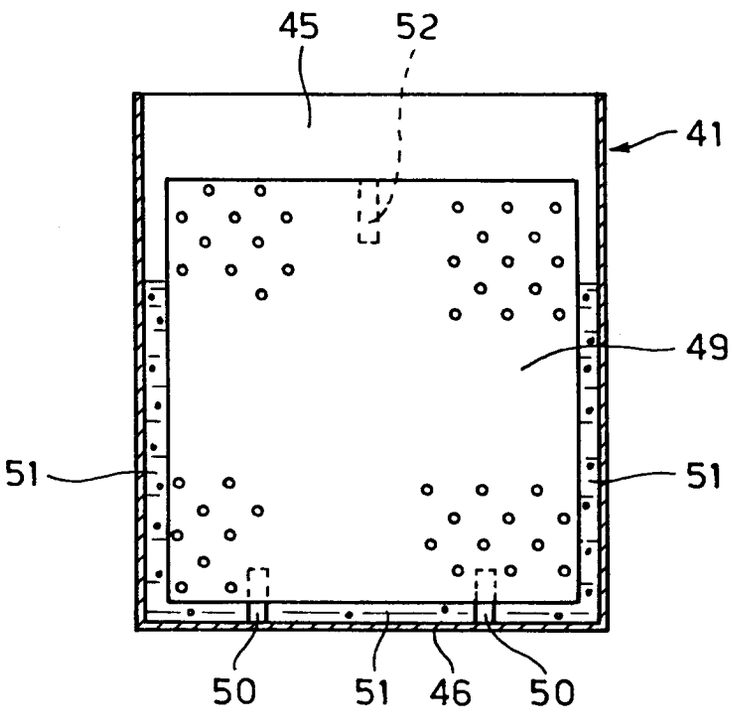

Fig. 3