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(54) **A METHOD AND APPARATUS FOR SEPARATION.**

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(73) Proprietor: **SPIRAC ENGINEERING AB**
Djäknegatan 16
S-211 35 Malmö (SE)

(72) Inventor: **JOHANSSON, Dag**
Vintergatan 2 D
S-386 00 Färjestaden (SE)

(74) Representative: **Magnusson, Gustav**
MAGNUPATENT Gustav Magnusson AB P.O.
Box 6207
S-200 11 Malmö 6 (SE)

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Description

The present invention relates to a method and an apparatus for separating, from a liquid flow, for example a flow of wastewater, solid pollutants and, more precisely, a method and an apparatus in which a screening grid traps pollutants from liquid passing through the grid and scraper devices clean the grid and remove pollutants trapped on the grid.

In many contexts, there is a need for so-called machine-cleaned grids which normally make up the first purification stage in, for example, purification plants for wastewater. Prior art mechanical separation devices for coarse solid pollutants consist of a screening grid comprising parallel bars between which there are formed gaps normally of a width of from 10 to 15 mm. The grid is disposed in a channel along which the polluted liquid flows, the location of the grid being such that the liquid is forced to flow through the gaps which the grid creates. Normally, the gaps are oriented substantially vertically and with the upper portion of the grid slightly offset in the direction of flow of the liquid.

It is further known in the art to remove, by means of a scraper (rake), the pollutants (screening) which are trapped by the grid bars, the scraper being moved, during the removal operation of the pollutants, upwardly along the grid bars and in abutment against them. As a rule, the scraper is fixed by means of arms to chain driven hoists which, in their upward movement, move the scraper from the lowermost edge of the grid to such a level above the surface of the liquid that the screenings may readily be taken care of, for example transferred to a receptacle or transported further by means of a conveyor. As a rule, the scraper is, at its highest position, at least approximately 1.5 m above the surface of the liquid and, in its lowermost position, approximately 1 metre above the bottom of the channel. Prior art embodiments of screening grids with straight grid bars from which the screenings are separated by means of scrapers suffer from the drawback that they require tall building heights and, consequently, tall ceiling height, because of the length of travel of the scraper. The total length is determined by the depth of the liquid and requisite lifting height for the screenings above the surface of the liquid. As a result, prior art grid constructions are unwieldy and expensive. This latter circumstance is further accentuated by the fact that the construction should preferably be of stainless steel.

The Patent Document DE—A—2 654 475 (Rimmele) discloses an apparatus having the features of the precharacterising parts of the present claims 1 and 7. Essentially, the construction of Rimmele relies on the use of a scraper which travels all the way from the bottom of the grid to the top of it in order to remove the screenings trapped by the grid bars and continues to travel towards the top of the apparatus in order to transfer the screenings to a receiving device.

As a consequence the construction suffers from the drawback of requiring tall building heights and tall ceiling heights because of the length of travel of the scraper.

The present invention, which relates to "machine-cleaned grids", substantially obviates the above-outlined drawbacks, since the total building height requirements of the installation may, in the great majority of cases, be reduced by approximately half in comparison with prior art equipment. This is effected by means of a reduction of the requisite movement space for the members which realise clean-scraping of screenings from the screen grid and movement of such screenings in a direction towards a receptacle facility. Moreover, it is possible, according to the present invention, to utilize more smoothly and evenly operating driving means than the previously-used electro-mechanical driving means which include an electric motor, gearing, one or more chain hoists and requisite juggling.

An apparatus for separating solid pollutants from liquids includes, according to the present invention, a grid of the fundamentally conventional type as described above, i.e. a straight grid made up of parallel bars with substantially vertical orientation and a scraper member known from prior art, substantially in abutment against the bars of the screen grid and under movement, at least along a portion of the screen grid entraining screenings gathered against the grid, thereby raising these screenings out of the liquid passing through the grid. According to the present invention the apparatus includes at least one additional scraper member which in sequence shifts the screenings further towards, for example receptacle means. The additional scraper members are located above the first scraper member and move their scraper blades substantially along a residual section of the grid and/or, where applicable, along an extension section connected to the grid for continued transport of the screenings, e.g. to the receptacle means.

According to one preferred embodiment, the apparatus includes one or more shoulder-like regions located in the transition between two mutually adjacent scraper members. The first of the scraper members moves the screenings to one such shoulder-like region, and the other moves the screenings from the shoulder-like region. In conjunction with each further shoulder-like region, a corresponding cooperation takes place between the scraper members. Depending upon the embodiment of the invention employed, the grid, the extension section of the transition between the grid and the extension section includes the shoulder-like regions.

In a further embodiment of the present invention, compression means are provided for compression of the screenings during their stay-time on each respective shoulder-like region, whereby the proportion of water in the screenings will be reduced.

In yet a further embodiment of the present invention, each respective scraper member is

disposed to be reversible, there being formed an abutment surface which is urged by the scraper member against screenings located on each respective shoulder-like region. As a rule, the scraper blades of the scraper members form the above-outlined compression means. In certain embodiments, each respective abutment surface is reversed prior to the movement of the scraper member for moving the screenings into an orientation which is substantially at right angles to the direction of movement of each respective scraper blade during movement of the screenings. The abutment surface will thereby constitute that surface which shifts the screenings to subsequent transitional regions between two mutually adjacent scraper members.

In still a further preferred embodiment of the present invention, the lower scraper member completes more than one reciprocal movement between each such movement in which the remaining scraper members move the screenings in a direction towards a receptacle.

In still a further preferred embodiment, the lower scraper member is disposed also on its downward movement to abut against the bars of the grid, at least along a restricted portion of this travel, this restricted travel being preferably located in a region at and slightly below the surface of the liquid. As a rule, the risk of blockage of the gaps of the grid is greatest in the previously mentioned region. However, as a result of the described embodiment of the present invention, it is generally possible to prevent blockage of the gaps in the region in question.

It will be apparent from the above description that the invention entails a number of considerable improvements compared with the prior art technology now currently employed. The construction with more than one scraper member entails that the total building height of the separation apparatus is reduced. Furthermore, the present invention makes it possible to provide each separate scraper member with a design which is particularly adapted to meet its purpose. This results in the realisation of an optimum function of each respective scraper member. The lower scraper member is designed with a view to transport by flowing liquid and to cleaning the gaps between the bars of the grid, while the scraper member or members operating above the surface of the liquid are designed in adaptation to meet, for example, the requirement of de-watering of the screenings and their further conveyance to receptacle means.

As a rule, the extension section disposed in association with the grid and preferably above the surface of the liquid is designed as a slip plane for cooperation with one or more scraper members. According to the present invention, each such scraper member is operated by a separate prime mover, for example a compressed air cylinder which controls the position

of the scraper blade in relation to the surface of the slip plane so that the scraper blade is located slightly above or, alternatively, abuts against the slip plane. Naturally, the corresponding circumstance applies for the scraper member of members cooperating with the grid.

The movement of the scraper members along the grid and, where applicable, along the extension section, is suitably realised by a joint prime mover, for instance a compressed air cylinder whose stroke length is adapted according to the longest individual scraping movement. Each one of the scraper members is preferably in cooperation with a sled-like device which is connected to the prime mover. In certain embodiments, a number of, or all of, the scraper members utilize one common such sled-like device, while, in other embodiments of the present invention, each scraper member is provided with its separate sled-like device.

The invention will be described in greater detail below with particular reference to the accompanying drawings, in which:

Fig. 1 is a section taken through one preferred embodiment of an apparatus according to the present invention; and

Fig. 2 is a front elevation of the apparatus.

The figures illustrate one embodiment of the invention in which the separation apparatus is composed of a lower portion which essentially comprises a grid 10, and an upper portion which essentially comprises an extension section 20. There is further disposed a first, lower scraper member 40, substantially for cooperation with the grid 10, and a second, upper scraper member 50, substantially for cooperation with the extension section 20. The grid 10 comprises a number of grid bars 11 forming gaps 12 therebetween. The distance between the grid bars is adapted to suit the size of the particles which are intended to be trapped by the grid bars on passage of the liquid through the grid.

At its upper region, the grid merges into the extension section 20 which is shown on the drawings as including a slip plate 21 which forms a substantially downwardly directed supporting surface in a through-like part of the extension section 20. In its lower region, the slip plate forms a shoulder-like portion 22 which connects with the grid 10.

In its lower portion, the first, lower scraper member 40 is provided with a scraper blade 41 for cooperation with the grid 10 in certain embodiments, the blade is fitted with prong-like members which, when the blade abuts against the grid bars, penetrate into the space between the bars. An operating device 42 is fixedly retained in relation to a sled 30 and is connected to the first scraper member for adjustment of its distance, and thereby the distance of the scraper blade 41, to the grid bars 11. The second, upper scraper member 50 is, similarly, provided in its lower region with a scraper blade 51 for cooperation with the slip plate 21. An

operating device 52 is fixedly retained in relation to the sled 30 and is connected to the second scraper member for adjustment of its distance, and thereby the distance of the scraper blade 51, to the supporting surface of the slip plate 21.

In a certain embodiment of the invention switching means (not shown in the figures) are provided for adjustment of an abutment surface on each respective scraper member to an orientation adapted to the orientation of the path in the area of each respective shoulder-like portion 22.

In some embodiments the shoulder-like portion 22 is formed by the screen grid 10, by the screen grid 10 and the extension section 20 together or formed by the extension.

A path 35 is provided for the sled 30 which, in its turn, is connected to driving means 31 which reciprocate the sled along the path 35.

Fig 1 also shows that the grid 10 is immersed in a liquid 60 which flows in the direction indicated by the arrows A. Reference numeral 61 refers to the surface of the liquid. Figure 1 further intimates the presence of an outer casing 80 which covers the extension section 20. Finally, figure 1 also shows a receptacle 70 placed on a substrate, for example a floor 62, the receptacle receiving the screenings which are shifted by the second, upper scraper member 50 past the upper edge 23 of the extension section.

For describing the function of the apparatus according to the present invention, it will be assumed that the operating device 42 and the operating device 52 have been activated for moving the scraper members, and thereby the scraper blades 41, 51, to the positions illustrated in Fig. 1, i.e. to positions where the scraper blades abut against the grid bars 11 and against the slip plate 21, respectively. It is further assumed that the sled 30 and, thereby, the scraper members 40, 50, are in the positions illustrated in Fig. 1. The driving means 31 thereafter initiates the movement of the sled 30 upwardly in the drawings. During this movement, the operating device 42 and the operating device 52 maintain the abutment of each respective scraper blade against the grid bars 11 and the slip plate 21, respectively, whereby both the screenings gathered against the grid bars and the screenings located on the shoulder-like portion 22 will be shifted in a direction towards the receptacle 70. The driving means 31 subsequently reciprocates the sled 30 to its starting position. During the return of the sled to its starting position, the scraper blades are, as a rule, raised from the grid bars and the slip plate 21, respectively, for a pre-determined and pre-set length of the movement.

The length of the extension section 20 and the grid 10 are mutually adapted and adapted to the stroke length of the driving means 31 of the sled so that, during the final phase of the movement of the sled, screenings from the grid 10 will be deposited on the shoulder-like portion 22, at the same time as the screenings which the second, upper scraper 50 just previously removed from the shoulder-like portion will be reliably and safely deposited — or

will have already been deposited — in the receptacle 70.

During that part of the return movement when the lower scraper blade abuts against the grid bars, the scraper blade cleans the gaps between the grid bars in that the prong-like members of the scraper blade are passed in the spaces between the bars.

In certain examples of physical application, more than one sled is employed for movement of the scraper members, while in certain physical applications, each sled is combined with a separate prime mover for transport of the sled. For example, it is thereby possible to cause the lower scraper member to execute more than one upward movement for shifting of screenings to the shoulder-like portion before the screenings are conveyed to the receptacle.

It is, furthermore, possible to provide more than one shoulder-like portion so as thereby more efficiently to de-water the screenings before they are conveyed to the receptacle. The above-described cooperation of interaction between two or more scraper members makes for a highly flexible construction of an apparatus according to the present invention and adaptation of this apparatus so as to meet varying working duties.

Claims

1. A method of separating from a liquid flow (60) solid particles entrained therein, preferably coarse particles, there being disposed in the liquid flow a screen grid (10) with bars (11) arranged in spaced-apart relationship for trapping said particles and forming so-called screenings when the bars are awash by the liquid flow, and a scraper member (40), substantially in abutment against the bars of the screen grid and under movement, at least along a portion of the screen grid, entraining screenings gathered against the grid thereby raising these screenings out of the liquid flow, characterised in that one or more further scraper members (50) in sequence shift the screenings further towards, for example, receptacle means (70) and that the further scraper means are located above the first scraper member (40).

2. A method as claimed in claim 1, characterised in that the screenings from the first (40) of the two scraper members are, in the transitional region between two mutually adjacent scraper members (40, 50), moved to a shoulder-like portion (22) whence they are thereafter conveyed by the second (50) of the two scraper members.

3. The method as claimed in claim 2, characterised in that during the stay-time of the screenings on each respective shoulder-like portion (22), compression means compress the screenings so as to reduce the aqueous content therein.

4. The method as claimed in claim 3, characterised in that each respective scraper member is reversible so as, by means of an abutment surface, to abut under pressure against screenings located on each respective shoulder-like portion (22) and thereby form the compression means.

5. The method as claimed in claim 4, characterised in that each respective scraper member (40, 50) is provided with at least one scraper blade (41) which, prior to the movement of the scraper member for shifting the screenings, is switched so as to assume an orientation substantially at right angles to the direction of movement of each respective scraper blade during shifting of the screenings.

6. The method as claimed in claim 1, characterised in that the lower scraper member completes more than one reciprocal movement between each movement in which the remaining scraper members shift the screenings in a direction towards the receptacle means (70).

7. An apparatus for separating from a liquid flow (60) particles entrained therein, preferably coarse particles, the apparatus including a screen grid (10) with bars (11) in spaced-apart relationship from one another for trapping particles whereas between these bars gaps (12) are formed, through which the liquid passes, and including a scraper member (40) having a range of reciprocal movement which at least covers a portion of the screen grid, which portion is intended to be passed by the liquid flow, or has a range of reciprocal movement substantially covering the entire grid screen, the scraper member (40) being moved by driving means in compliance with a plan of movement in which the scraper member moves the screenings up out of the liquid flow and towards receptacle means (70); and the scraper member being disposed, in abutment against the bars, to shift the screenings up out of the liquid flow, characterised by one or more further scraper members (50) which, in sequence, driven by driving means shift the screenings further towards a receptacle means and by said further scraping members being located above the first scraper member (40).

8. The apparatus as claimed in claim 7, characterised in that an extension section (20), preferably located above the surface of the liquid, is disposed in conjunction with the screen grid (10); in that the remaining scraper members (50) or at least one thereof, has a range of movement which covers the extension section, or alternatively a portion thereof; and in that said remaining scraper members (50) move the screenings in a direction towards said receptacle means (70), preferably under abutment against said extension (20).

9. The apparatus as claimed in claim 7 or 8, characterised in that the grid (10) and, where applicable, the extension section (20), form a path for movement of the screenings; and in that the path is provided with at least one shoulder-like portion (22) for temporary storage of the screenings so as to make possible the location of a sequentially subsequent scraper member (50) in a position where the scraper member, on its continued movement, entrains the screenings.

10. The apparatus as claimed in claim 9, characterised in that the shoulder-like portion (22) of the path is formed by the screen grid, by the exten-

sion section (20) or by the screen grid (10) and the extension section (20) together; and/or in that switching means are provided for adjustment of an abutment surface on each respective scraper member to an orientation adapted to the orientation of the path in the area of each respective shoulder-like portion (22).

Patentansprüche

1. Verfahren zum Trennen von festen Partikeln, insbesondere groben Partikeln, aus einer Flüssigkeitsströmung (60), in der sie mitgeführt werden, bei dem in der Flüssigkeitsströmung ein Rechen (10) Stangen (11), die zum Auffangen der Partikel und zum Bilden sogenannter Siebrückstände, wenn sie durch die Flüssigkeitsströmung überflutet werden, in Abständen voneinander angeordnet sind, und bei dem ein Schaberelement (40) vorgesehen ist, das im wesentlichen an den Stangen des Rechens anliegt und bei seiner Bewegung, wenigstens entlang eines Teils des Rechens, Siebrückstände, die sich auf dem Rechen angesammelt haben, mitnimmt und dabei diese Siebrückstände aus der Flüssigkeitsströmung heraushebt, dadurch gekennzeichnet, daß ein weiteres Schaberelement (50) oder mehrere solcher Elemente aufeinanderfolgend die Siebrückstände zum Beispiel zu Behältermitteln (70) weiterschieben und daß die weiteren Schabermittel oberhalb des ersten Schaberelementes (40) angeordnet sind.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Siebrückstände vom ersten (40) der beiden Schaberelemente im Übergangsbereich zwischen zwei aneinander angrenzenden Schaberelementen (40, 50) zu einem schulterförmigen Bereich (22) bewegt werden, von wo sie danach durch das zweite (50) der beiden Schaberelemente gefördert werden.

3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, daß während der Aufenthaltszeit der Siebrückstände auf jedem schulterförmigen Bereich (22) Druckmittel die Siebrückstände komprimieren, um den Wassergehalt in denselben zu verringern.

4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, daß jedes Schaberelement umsteuerbar ist, so daß es mit Hilfe einer Anlagefläche unter Druck gegen Siebrückstände anliegt, die auf jedem schulterförmigen Bereich (22) angeordnet sind, und dabei die Druckmittel bildet.

5. Verfahren nach Anspruch 4, dadurch gekennzeichnet, daß jedes Schaberelement (40, 50) mit wenigstens einem Schaberblatt (41) versehen ist, das vor der Bewegung des Schaberelementes zum Verschieben der Siebrückstände so umgestellt wird, daß es im wesentlichen eine Orientierung im rechten Winkel zu der Bewegungsrichtung jedes Schaberblattes während des Verschiebens der Siebrückstände einnimmt.

6. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß das untere Schaberelement mehr als eine hin- und hergehende Bewegung zwischen jeweils zwei Bewegungen durchführt, in

denen die übrigen Schaberelemente die Siebrückstände in einer Richtung zu den Behältermitteln (70) bewegen.

7. Vorrichtung zum Trennen von festen Partikeln, insbesondere groben Partikeln aus einer Flüssigkeitsströmung (60), in der sie mitgeführt werden, die einen Rechen (10) mit Stangen (11), die in Abständen voneinander angeordnet sind, um Partikel aufzufangen, während zwischen diesen Stangen Zwischenräume (12) gebildet sind, durch die Flüssigkeit hindurchströmt, und die ein Schaberelement (40) aufweist, das in einem Bereich eine Hin- und Herbewegung durchführen kann, die wenigstens einen Teil des Rechens überdeckt, durch den die Flüssigkeitsströmung hindurchfließen soll, oder das eine Hin- und Herbewegung durchführen kann, die im wesentlichen den gesamten Rechen überdeckt, wobei das Schaberelement (40) durch Antriebsmittel in Übereinstimmung mit einem Bewegungsablauf bewegt wird, in dem das Schaberelement die Siebrückstände aus der Flüssigkeitsströmung nach oben heraus und zu Behältermitteln (70) bewegt und wobei das Schaberelement so angeordnet ist, daß es gegen die Stangen anliegt, um die Siebrückstände aus dem Flüssigkeitsstrom heraus nach oben zu bewegen, gekennzeichnet durch ein weiteres Schaberelement (50) oder mehrere Schaberelemente, die nacheinander und angetrieben durch antriebsmittel die Siebrückstände weiter zu Behältermitteln verschieben, wobei die weiteren Schaberelemente oberhalb des ersten Schaberelements (40) angeordnet sind.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß ein Verlängerungsabschnitt (20), der sich vorzugsweise oberhalb der Flüssigkeitsoberfläche befindet, in Verbindung mit dem Rechen (10) angeordnet ist, daß die übrigen Schaberelemente (50) oder zumindest eines derselben einen Bewegungsbereich hat, der den Verlängerungsabschnitt oder einen Teil desselben abdeckt, und daß die übrigen Schaberelemente (50) die Siebrückstände in einer Richtung zu den Behältermitteln (70) bewegen, wobei sie vorzugsweise gegen den Verlängerungsabschnitt (20) anliegen.

9. Vorrichtung nach Anspruch 7 oder 8, dadurch gekennzeichnet, daß der Rechen (10) und gegebenenfalls der Verlängerungsabschnitt (20) eine Bewegungsbahn für die Siebrückstände bilden, und daß die Bewegungsbahn mit wenigstens einem schulterförmigen Bereich (20) zum zeitweiligen Lagern der Siebrückstände versehen ist, so daß es möglich ist, das nachfolgende Schaberelement (50) an einer Stelle anzuordnen, bei der das Schaberelement bei seiner weiteren Bewegung die Siebrückstände mitnimmt.

10. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß der schulterförmige Bereich (22) der Bewegungsbahn durch den Rechen, durch den Verlängerungsabschnitt (20) oder zusammen durch den Rechen (10) und den Verlängerungsabschnitt (20) gebildet ist, und/oder daß Schaltmittel vorgesehen sind, um eine zum

Anliegen bestimmte Oberfläche an jedem Schaberelement in eine Stellung einzustellen, die der Orientierung der Bewegungsbahn im Bereich jedes schulterförmigen Bereichs (22) angepaßt ist.

Revendications

1. Procédé pour séparer d'avec un courant de liquide (60) des particules solides qui y sont entraînées, de préférence grosses particules, avec disposition dans le courant de liquide d'une grille-tamis (10) à barres (11) espacées les unes des autres pour capter lesdites particules et former des "refus de tamisage" quand les barres sont inondées par le courant de liquide, et une racle (40), sensiblement en butée contre les barres de la grille-tamis et en mouvement, le long d'une partie au moins de la grille-tamis, entraînant les refus de tamisage rassemblés contre la grille en les soulevant ainsi hors du courant de liquide, caractérisé en ce qu'une ou plusieurs autres racles (50) déplacent encore successivement les refus de tamisage, par exemple vers un réceptacle (70) et que les autres racles sont situées au-dessus de la première racle (40).

2. Procédé selon la revendication 1, caractérisé en ce que les refus de tamisage provenant de la première (40) des deux racles sont déplacés, dans la région de transition située entre deux racles voisines l'une de l'autre (40, 50), jusqu'à une partie formant épaulement (22) d'où ils sont ensuite transportés par la seconde (50) des deux racles.

3. Procédé selon la revendication 2, caractérisé en ce que pendant le temps de séjour des refus de tamisage sur chaque partie formant épaulement respective (22), des moyens de compression compriment les refus de tamisage afin d'en réduire la teneur aqueuse.

4. Procédé selon la revendication 3, caractérisé en ce que chaque racle respective est réversible afin de buter sous pression, par une surface de butée, contre des refus de tamisage situés sur chaque partie formant épaulement (22) respective et de constituer par là les moyens de compression.

5. Procédé selon la revendication 4, caractérisé en ce que chaque racle (40, 50) respective présente au moins une lame de racle (41) qui, avant le mouvement décrit par la racle pour déplacer les refus de tamisage, est mise par commutation dans une orientation sensiblement perpendiculaire à la direction du mouvement décrit par chaque racle respective pendant le déplacement des refus de tamisage.

6. Procédé selon la revendication 1, caractérisé en ce que la racle inférieure décrit plus d'un mouvement à va-et-vient entre chaque mouvement au cours duquel les autres racles déplacent les refus de tamisage en direction du réceptacle (70).

7. Appareil pour séparer d'avec un courant de liquide (60) des particules qui y sont entraînées, de préférence grosses particules, l'appareil com-

portant une grille-tamis (10) à barres (11) espacées les unes des autres pour capter des particules tandis qu'entre ces barres sont ménagées des brèches (12), que le liquide traverse, et comportant une racle (40) présentant une plage de mouvement à va-et-vient qui couvre au moins une partie de la grille-tamis, laquelle partie est destinée à être franchie par le courant de liquide, ou a une plage de mouvement à va-et-vient couvrant toute la grille-tamis, la racle (40) étant déplacée par des moyens d'entraînement suivant un plan de mouvement dans lequel la racle extrait par déplacement vers le haut les refus de tamisage du courant de liquide et les amène vers le réceptacle (70); et la racle étant disposée, en butée contre les barres, en sorte d'extraire par déplacement vers le haut les refus de tamisage du courant de liquide, caractérisé par une ou plusieurs autres racles (50) qui, entraînées successivement par des moyens d'entraînement rapprochent encore les refus de tamisage d'un réceptacle et par le fait que lesdites autres racles sont situées au-dessus de la première racle (40).

8. Appareil selon la revendication 7, caractérisé en ce qu'une section de prolongement (20), de préférence située au-dessus de la surface du liquide, est disposée conjointement avec la grille-tamis (10); en ce que chacune des autres racles (50) ou au moins l'une d'entre elles, a une plage

de mouvement qui couvre la section de prolongement, ou en variante une partie de celle-ci; et en ce que lesdites autres racles (50) déplacent les refus de tamisage en direction dudit réceptacle (70), de préférence en butée contre ladite section de prolongement (20).

9. Appareil selon la revendication 7 ou 8, caractérisé en ce que la grille (10) et, lorsqu'elle existe, la section de prolongement (20) constituent un trajet de mouvement des refus de tamisage; et en ce que le trajet présente au moins une partie formant épaulement (22) assurant l'emménagement temporaire des refus de tamisage de façon à permettre de placer une racle (50) ultérieure dans un emplacement où la racle, en poursuivant son mouvement, entraîne les refus de tamisage.

10. Appareil selon la revendication 9, caractérisé en ce que partie formant épaulement (22) du trajet est formée par la grille-tamis, par la section de prolongement (20) ou conjointement par la grille-tamis (10) et par la section de prolongement (20); et/ou en ce que des moyens de commutation sont prévus pour conférer par réglage à une surface de butée de chaque racle respective une orientation adaptée à l'orientation présentée par le trajet dans la zone de chaque partie formant épaulement (22) respective.

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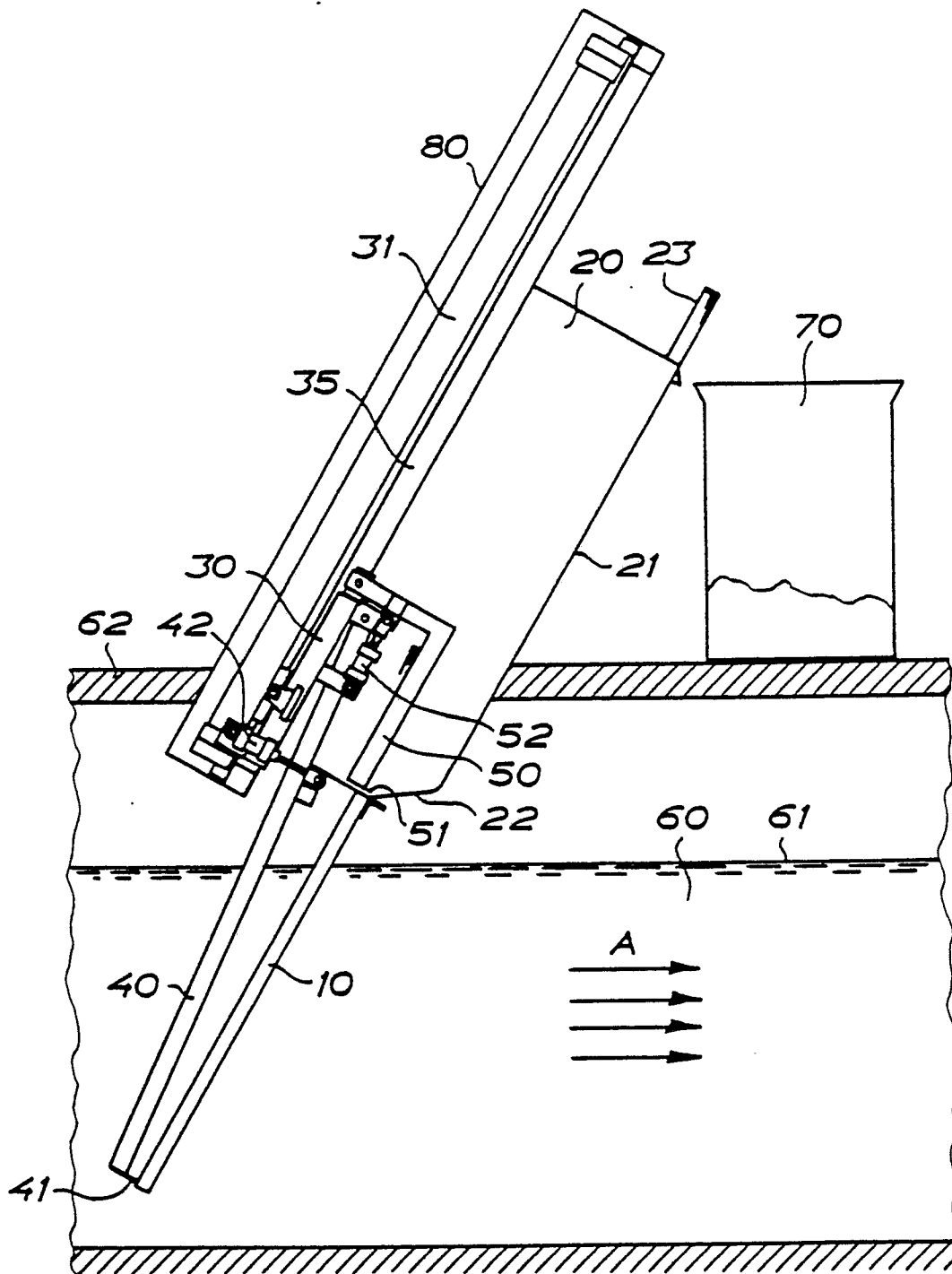


FIG. 1

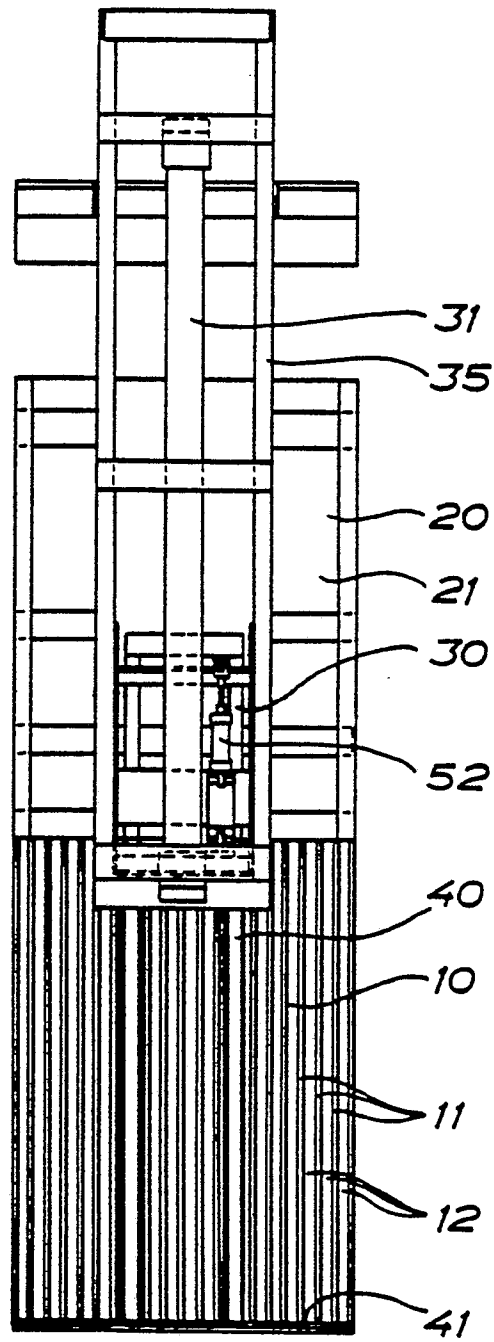


FIG. 2