

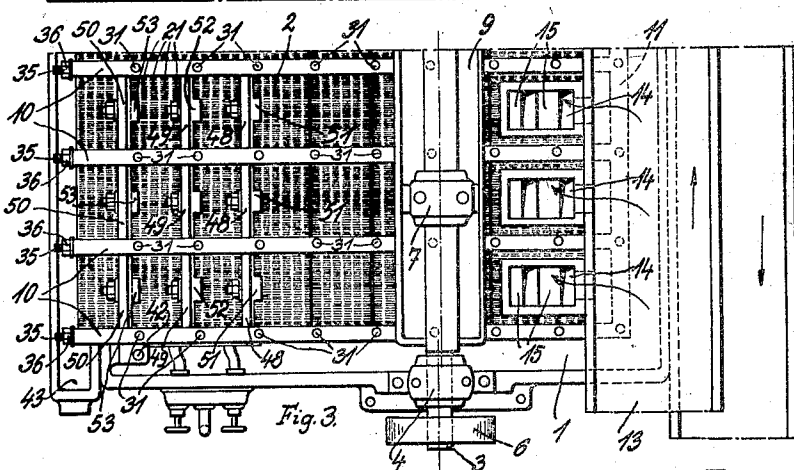
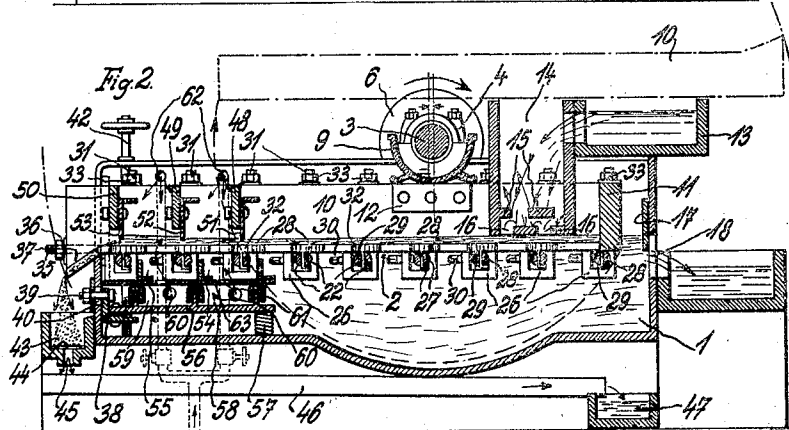
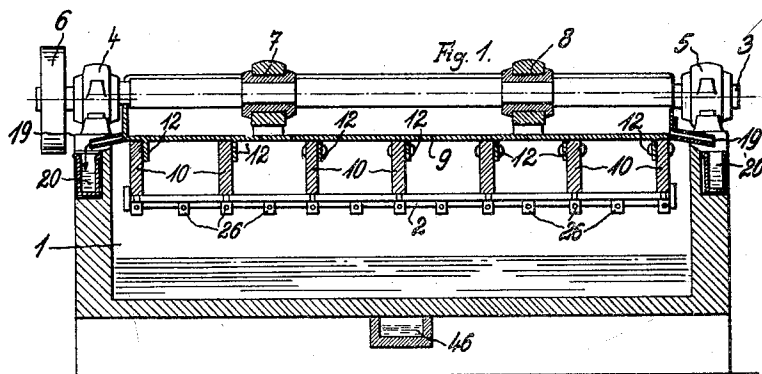
Dec. 30, 1924.

1,521,469

R. PAWLIKOWSKI
HORIZONTAL SIFTER FOR THE MANUFACTURE OF PAPER PULP AND CELLULOSE
WITH A SCREEN SUBMERGED IN THE AQUEOUS PAPER PULP

Filed April 20, 1923

2 Sheets-Sheet 1



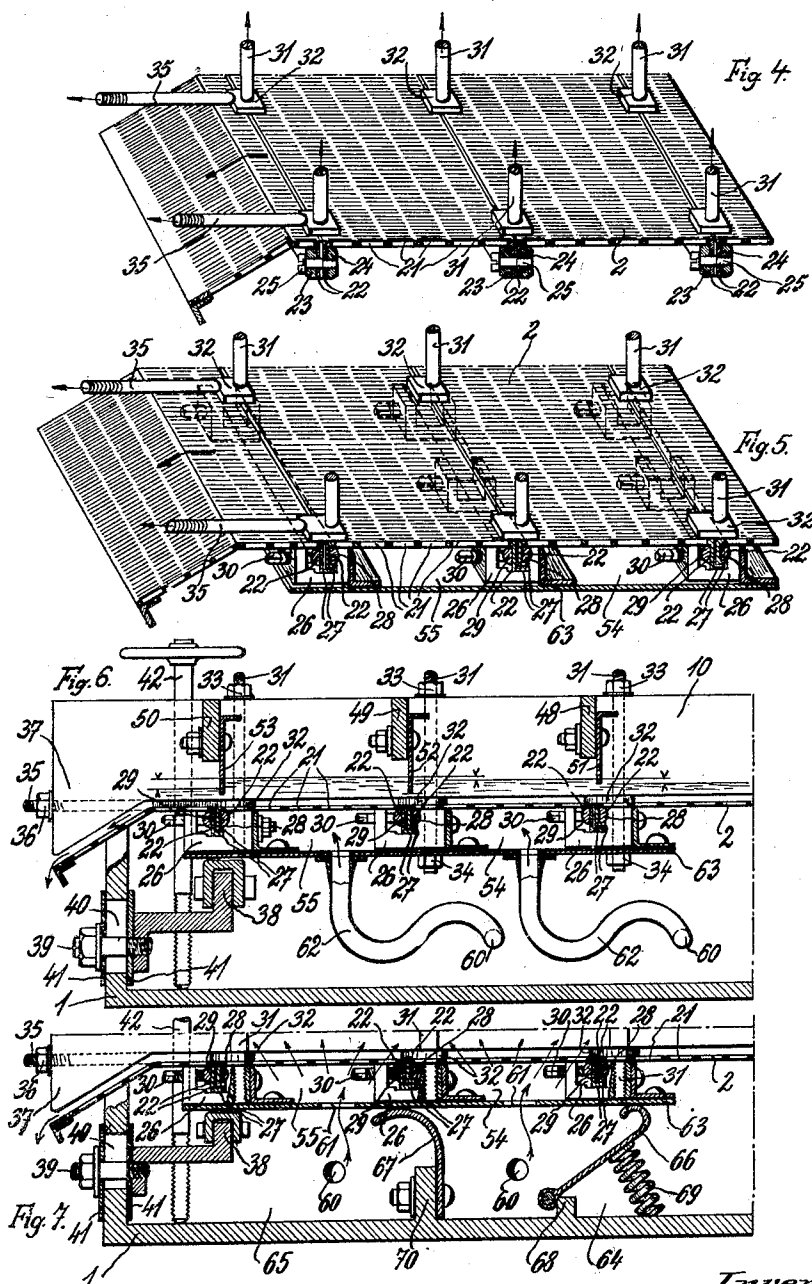
Inventor:
Rudolf Pawlikowski,

by Hastings W. Baker
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UNITED STATES PATENT OFFICE.

RUDOLF PAWLIKOWSKI, OF GORLITZ, GERMANY.

HORIZONTAL SIFTER FOR THE MANUFACTURE OF PAPER PULP AND CELLULOSE
WITH A SCREEN SUBMERGED IN THE AQUEOUS PAPER PULP.

Application filed April 20, 1923. Serial No. 633,497.

To all whom it may concern:

Be it known that I, RUDOLF PAWLIKOWSKI, a subject of Germany, and residing at Gorlitz, Germany, have invented certain new and useful improvements in a horizontal sifter for the manufacture of paper pulp and cellulose with a screen submerged in the aqueous paper pulp, of which the following is a specification.

The invention refers to horizontal sifters used in the manufacture of paper pulp and cellulose and the like, and which sifters have a screen submerged in the aqueous pulp, and reciprocating or undulating in a horizontal or approximately horizontal direction between its inflow and its outflow ends. This kind of horizontal sifters is well adapted to the sifting action, but the constructions which have been known up to the present time, suffer from the drawback of an extremely small capacity and output. The small capacity of the known sifters of this type is caused by their small size, necessitated by the very large and unfavorable stresses on the screen, thus allowing but a comparatively small sifting area. To this drawback is added the loss of time and the difficulty of repairing the screen, because a great number of sections of the screen have to be secured to their supports by a comparatively large number of screws, in order to obtain the necessary firmness and evenness of the whole screen. Besides that the screen is not immediately accessible for repairs, because first the inflow of the pulp has to be stopped and the support of its outflow end has to be disengaged or to be dismantled. My present invention does away with all these drawbacks. Furthermore the inclination of the screen may be altered in my machine while the same is operating, in case such alteration is necessitated by the nature of the material to be sifted or by the need for a better adaptation to some specific material. Another advantage of my invention consists in providing a specific sluicing arrangement at the outflow end fitted out with sluicing shutters whereby the fine high-grade fibres are prevented from being carried off under the sliding-valves or sluice-shutters and over the outflow end of the sieve, while at the same

time permitting the impurities and waste-parts to pass.

In the drawings I have shown a preferred embodiment of my invention, wherein—

Figure 1 is a vertical section of my new sifter-arrangement;

Fig. 2 is a vertical longitudinal section;

Fig. 3 is a plan-view of a part of the new sifter;

Figs. 4-7 represent details on an enlarged scale, namely Figs. 4 and 5 are perspective views of two varieties of the screen stiffening and fastening construction; Figs. 6 and 7 are two vertical longitudinal sections of different designs of the outflow end of the new sifter.

In the embodiment of my invention herein shown there is arranged within the trough of the sifter the horizontal screen, 2, which undulates or reciprocates in the usual manner in consequence of the action of the shaking shaft 3. The shaking shaft 3 is carried by eccentrics which are rotating in the bearings 4 and 5, and are driven by a belt-pulley 6 at the one end. From two rings 7 and 8, fitted on the eccentric shaft, there is suspended a support 9, having the form of a trough-shaped steel body. The screen-carrying frame consists of longitudinal hangers 10, united at the inflow-end by a cross tie or stiffening girder 11, closing the sieve box at this end, while the said box is open at the other end. The two longitudinal sidewalls of the sieve-box are formed by two longitudinal hangers 10. All of the longitudinal hangers 10 are fastened to and carried by the lugs 12, which are rigidly secured to the support 9, preferably equidistant from one another. The rotating shaking shaft 3 is arranged over the horizontal screen 2 at such a place between the inflow end and the outflow end of the sieve, which over its whole length is submerged into the pulpy liquid in the trough 1, that the buoyancy of that part of the screen, which is between the shaft 3 and the girder 11, counterbalances the buoyancy of the other part of the sieve between the shaft 3 and the outflow end of the screen. In consequence of this arrangement the outflow end of the screen may glide free on the discharge end of the trough or on some other bearing adjusted within the latter. No

stanchions are now needed, to keep the sieve down against the buoyancy. The stress on the longitudinal girders or hangers 10 is taken up in an extremely favorable way, so that the screen may have great length; and the high resistive power of the trough-shaped support 9 against flexion allows the use of a sieve of great breadth. This permits the use of sifters with a large output. Further the new adjustment of the shaking shaft 3 over the screen 2 permits the pulp-feeding box 13 to be installed over the inflow end of the screen; the outflow end of the screen resting free on the discharge end of the trough or on some other bearer, so that the whole screen, when repairs become necessary, can be swung freely round the shaking shaft 3 into the upper position indicated by the dash-dotted lines in Figure 2, without the necessity of dismounting the pulp-feeding arrangement, or to loosen the supports, stanchions or any other connections, as it was necessary in the constructions known heretofore.

The pulp-feeding parts consist in my new sifter in the inflow chambers 14, which fit in between the longitudinal girders or bearers 10, and which are attached to an inflow or feeding channel 13, arranged crosswise over the trough 1. Baffle-plates 15 inside the inflow-chambers 14 brake the impetus of the fed paper-pulp, so that it enters smoothly and is distributed without splashing over the whole breadth of the sieve 2 immediately beneath the exit-openings 16 of the inflow chambers. An overflow 18 of the trough 1, to be regulated by the shutters 17, serves to regulate the level of the fluid in the trough 1.

The trough-shaped support 9 keeps the lubricating oil of the eccentric bearings 7 and 8 away from the paper-pulp within the sieve respectively within the trough, all the oil droppings being caught up by the trough, from which the oil is conducted away during operations, by means of the lateral discharge pipolets 19 into stationary lateral receivers 20.

The screen 2 consists preferably of copper-, brass-, bronze-, sheets, in which sheets long narrow apertures 21 (see Figs. 3 and 4) are arranged lengthwise in parallel cross-rows. This arrangement of the apertures in the sieve is preferred, because the fibrous particles of the pulp in consequence of the current within the sieve turn lengthwise towards the longitudinal direction of the screen, and consequently they would find it more difficult, to pass through the apertures if the latter were arranged cross-wise.

In order to obtain the largest possible capacity and output of the sifter, it is necessary to utilize the full surface of the screen. This is obtained by fastening it to the longitudinal girders or hangers at some distance

from the latter. Further the fastening construction must be such, that the sieve or screen can not bulge out, nor can it be deflected by the stress put on it; a difficult demand, considering the great area of the sieve and the extremely narrow arrangement of the apertures in it. This difficulty is overcome according to my invention by the following construction of the sieve: The screen itself consists of a number of narrow cross-strips or sections, the width of which has been so selected, that the thin copper-sheet of each section, though weakened by the apertures 21, is still able to resist the deflections or bending stresses. Further these cross-strips or sections, are provided at their ends where they abut against one another, with angular bends 22, directed downwardly, as shown in Figs. 4-7 on a larger scale. According to Fig. 4 these bends are clamped in between pairs of clamping bars 23, 24, which latter are secured together by the screws 25; or according to the Figs. 2, 5-8 the downwardly bent ends 22 of the sieve-strips are connected to one another with adjustable clamps 26. In the latter construction the vertical flanges 22 are provided, at their bottom-ends, with horizontal bends 27, which overlap one another. One arm of the adjustable clamps contains a groove for the reception of a semi-round packing strip 28, which is fitted into the space between the lower side of the screen itself and the bent part 27 in such a way, that its flat side rests on the vertical flange 22 of that screen-section. Opposite to this first packing-strip there is provided a second packing strip 29, facing the vertical flange 22 of the other screen-section and being pressed against it by the clamping screw 30. This construction secures at the same time a complete union and a perfect evenness at the meeting lines of the different screen-sections.

The same construction may be employed for connecting the screen with the longitudinal hangers 10 and with the cross-ties at the one end. To this end the clamping bars 24 in Fig. 4 and the adjustable clamping arms opposite the clamping screws 30 in Fig. 5 are tapped by the fastening screw-bolts 31, which are provided, over the screen, with flanges or distancing plates 32 of ample area, on which plates rest the longitudinal hangers 10. The bolts 31 are threaded at either end, on which threads are screwed the nuts 33, 34, which press the screen from below and the longitudinal girders or bearers from above against the distancing plates 32, thus securing a firm and safe connection of these parts in the vertical direction. The distancing plates being all of equal thickness, the screen is kept at the right distance from the longitudinal hangers 10, so that the pulp may

flow beneath them, and therefore the sifting area under the hangers 10 is likewise fully utilized.

In my construction there is provided, moreover, a longitudinal stretching device, to secure complete horizontality of the screen along its whole length. For this purpose, as Figs. 5 and 6 clearly show, two straightening up bolts 35 with nuts 36 on their threaded ends are fixed on the flanges or distancing plates 32 of the last row of screw-bolts 31, nearest to the discharge end of the screen 2. These bolts 35 penetrate through the downwardly directed attachments 37 of the longitudinal girders or hangers 10. By screwing tight the nuts 36, the screen, which by its other end is attached to the cross tie or girder 11, may be drawn tight in the longitudinal direction. The troublesome, time-consuming, and difficult way of screwing together the different screen-sections and of connecting them to the cross bars at their junctions by means of numerous fastening screws has been avoided.

The discharge or exit end of the screen 2 rests on a vertically adjustable cross tie 38, mounted in the trough 1. This cross tie can be fixed at any required altitude, with the aid of the adjusting screws 39, which are slidable in vertical adjusting slots 40, of the wall of the trough 1. Tightening plates 41 of appropriate size cover the inside and the outside of the adjusting slots. If the elevation of the discharge end has to be altered, then, after loosening the adjusting screws 39, on both sides of the screen the adjusting spindles 42 are actuated, which spindles with their lower ends, rest on the bottom of the trough 1 and pass with their threaded upper parts through the cross tie 38. By this construction and its operation the elevation of the outflow end of the screen and at the same time its inclination may be altered, in order to adjust it to the speed of the advancing pulp and in accordance with various kinds of pulp to be treated within the same sifter. The impurities, which are sifted off by the screen, are discharged according to Fig. 2 over the slope of the outflow end of the screen into a receiver 43, extending over the whole width of the screen and possessing a perforated bottom 44 for keeping back the impurities, while the liquid of the pulp passes through an outlet 45 into a longitudinally arranged pipe 46 and into the drain 47.

The efficiency of my improved sifter is further augmented by preventing the high-grade pulp-fibres from being conveyed along with the so-called twig-pieces and other impurities, which are retained on the screen, and which at the extreme end of the screen are carried over the discharge incline into the waste conduits. In order to obtain this

result according to Fig. 2 several divisions or sluice-chambers 48, 49 are arranged one behind the other between the longitudinal hangers 10 before the end of the screen. These divisions are fitted with vertically adjustable shutters 51, 52, 53, the distances of which from the screen may be regulated. Into two chambers, for example, formed by three such sluice-boards or shutters over the screen, water may be run; either from above, or preferably from below through the screen, so as to keep the water-level over the screen in the sluice-chambers permanently higher than on the screen, before the sluice-chambers; the level of the fluid over the screen advantageously rising towards the end of the screen. The pressure of the pent-up fluid and of the countercurrent from below keep the high-grade fine pulp particles back before the sliding shutters, those particles remaining in suspension higher up, while the heavier wastes float at the bottom end and pass through under the slides or shutters in immediate contact with the screen. The countercurrent inflow takes place through the chambers 54 and 55, which fit tightly against the lower side of the screen. Both lower chambers have their bottom 63 in common and slidable on a support 56, Fig. 2, which forms the partition between the two chambers 58, 59, which latter communicate with the room below the screen. The bottom 56 of the lower chambers is supported at its one end by the cross tie 38, so as to be able to undulate, but at its other end it is supported by a spring 57, in such a manner, that this end, by its elastic support, is permanently pressed close to the bottom of the chambers 54, 55, and that the two-chambered support is able to respond to the undulations and elevational changes of the screen. The pent-up fluid enters into the chambers 58, 59 in regulated quantities by the inlets 60, and it passes through the apertures 61 in the bottom of the chambers 54, 55, through these chambers and through the screen into the sluice-chambers 48, 49.

The part of the screen, which is under the last sluice-chamber, may be left without apertures 21, if in the manner indicated in Figure 2 by dotted lines, the water is entered for example by the way of the spraying pipes 62 from above. But if with the upper arrangement of the spraying pipes the part of the screen under the sluice-chambers is perforated like the rest of the screen, the advantage is obtained, that all the fine high grade pulp particles, that may have been carried into these chambers, are passed back through the screen so that not a single particle thereof flows away into the drain and is wasted. In that case naturally the water hose pipes 62 (Fig. 6) may be dispensed with.

The Figs. 6 and 7 show other arrange-

ments for feeding the water from underneath the screen. In both cases the screen 2 is fastened to and reciprocates with the bottom 63 of the chambers 54, 55, both parts together gliding on the vertically adjustable support, in this particular instance on the cross-tie 38. In Figure 6 the admission of the pent-up water to the lower chambers 54, 55 is effected by the flexible tubes 62, attached to the inlet mains, which lead up to the wall of the trough. But in Figure 7 there are arranged, under the bottom of the lower chambers 54, 55, corresponding chambers or cells 64, 65, which are formed in the trough itself by the flexible cross partition-walls 66, 67, pressed against the bottom 63. Figure 7 shows two styles of such partitions; the one partition-wall 66 being yieldably pressed by means of the coil springs 69 against the bottom or bottom-rib of the trough, so as to allow swinging movements against the bottom 63 by means of the coiled springs 69. The other partition-wall 67 consists of flexible material, and it is fixed to a bottom rib 70 of the trough, and is bent against the bottom 63 in such a way, that it is permanently pressed against the bottom, not only by its own elasticity, but also by the superpressure in the chambers 64, 65, which are sealed by it hermetically. The pent-up fluid in its turn flows into the chambers 64, 65 in a regulated manner by the way of the inlets 60.

I claim:

1. A horizontal sifter for the manufacture of paper-pulp and the like, containing in combination, a sifting trough, a supporting means, a sieve depending from and supported by said supporting means and connected therewith at such points of the sieve so that the part of the sieve between the supporting means and the feeding end is counterbalanced when submerged by the part of the sieve between the supporting means and the discharge end.

2. A sifter for the manufacture of paper-pulp and the like comprising a sifting trough, a supporting means, a sieve depending from said supporting means and connected therewith at such points of the sieve so that the part of the sieve between said points and one end thereof is counterbalanced by the part between said points and the other end thereof and means whereby said sieve is given a to and fro motion.

3. A horizontal sifter for the manufacture of paper-pulp, cellulose and the like, containing in combination: a sifting trough, having a bulged bottom, so as to allow the passage of the downwardly swung part of the sieve, when the sieve is swung round its supporting axis; a sieve within the trough; and means for moving and for supporting the sieve at such points, as to allow the sieve to be swung round a transverse axis some-

where above a medium part between the feeding end and the discharging end of the sieve.

4. In a horizontal sifter, containing a sieve-trough, a sieve within the trough; means for supporting and moving the sieve, arranged somewhere above a medium part of the sieve between its feeding end and its discharging end, and comprising in combination: a rotating shaft; eccentric rings on said shaft; a support carried by the said eccentric rings; longitudinal hangers for the sieve, which are fastened to the said support and means for fastening the sieve to the longitudinal hangers.

5. In a horizontal sifter, containing a sieve-trough; a sieve within the trough; means for feeding the pulp into the sieve; means for bringing out the sifted-out fine fibrous particles; means for discharging the impurities and other wastes; means for supporting and moving the sieve, arranged somewhere crosswise above a medium part of the sieve between its feeding end and its discharging end, and comprising in combination: a rotating shaft; eccentric rings actuated by the said shaft; a trough-shaped support surrounding the lower side of the shaft and being supported by the said eccentric rings, the said trough-shaped bearer collecting the lubricating oil, dripping from the shaft and from the eccentric rings; longitudinal hangers fastened to the trough-shaped support; and means for fastening the sieve to the longitudinal bearers.

6. A horizontal sifter, containing: a sieve-trough; a sieve within the trough; means for supporting and moving the sieve, arranged crosswise somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; comprising in combination: a pulp-feeding channel arranged crosswise above the back-end of the sieve; vertical inflow-chambers extending from the pulp-feeding channel on to the bottom of the sieve between the sieve-supporting means and the endwall of the sieve; baffle plates in the vertical chambers; means for carrying away the sifted out fine fibrous particles; and means for discharging the impurities and other wastes.

7. A horizontal sifter, containing: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged crosswise somewhere above a medium part of the sieve; means for supporting the front end of the sieve, comprising in combination: supporting brackets fastened vertically adjustably to the front-wall of the sieve-trough; means for fastening the brackets to the trough-wall; and means for effecting the vertical adjustment of the brackets.

8. A horizontal sifter, containing in combination: a sieve-trough, a sieve within the

trough; sieve-supporting and moving means, arranged crosswise somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles; means for discharging the impurities and other wastes; sluicing-chambers above the discharging end of the sieve; and means for feeding a washing-fluid into the sluicing-chambers.

9. A horizontal sifter, containing in combination: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles; means for discharging the impurities and other wastes; sluicing-chambers above the discharging end of the sieve; the said sluicing-chambers being formed by transverse walls fixed between the longitudinal bearers of the sieve, and vertically adjustable sluicing-shutters arranged at the transverse walls; and means for feeding washing-liquid into the said sluicing chambers.

10. A horizontal sifter, containing in combination: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged crosswise somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles; means for discharging the impurities and other wastes; sluicing-chambers above the discharging end of the sieve; chambers opposite to the sluicing-chambers, arranged at the lower side of the sieve; and means for feeding washing liquid into the last-mentioned lower chambers.

11. A horizontal sifter, containing in combination: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged crosswise somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the fine fibrous particles; means for discharging the impurities and other wastes; sluicing-chambers above the discharging end of the sieve; liquid-distributing chambers opposite to the sluicing chambers, arranged at the lower side of the sieve; liquid-feeding chambers below the said liquid-distributing chambers, and communicating with them; and means for introducing a washing-liquid into the liquid-feeding chambers.

12. In a horizontal sifter, containing in combination: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged crosswise somewhere above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles;

means for discharging the impurities and other wastes; the construction of the afore-said sieve consisting in: a plurality of sieve-sections, having the form of comparatively small perforated sheets, extending over the full breadth of the sieve; means for fastening the sieve-sections to one another; means for fastening the sieve-sections to longitudinal sieve-bearers; and means for stretching the sieve longitudinally.

13. In a horizontal sifter, containing in combination: a sieve-trough; a sieve within the trough; sieve-supporting and moving means, arranged somewhere crosswise above a medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted-out fine fibrous particles; means for discharging the impurities and other wastes; the construction of the afore-said sieve consisting in: a plurality of comparatively small perforated sheets, extending transversely over the full breadth of the sieve; downwardly bent brims at the transversal sides of the sheets; clamping devices for fastening the adjoining brims to one another; means for fastening the sieve-sections or sheets to longitudinal sieve-bearers; and means for stretching the sieve longitudinally.

14. In a horizontal sifter, containing in combination: a sieve-trough; an approximately horizontal sieve within the trough; sieve-supporting and moving means, arranged crosswise somewhere above the medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles; means for discharging the impurities and other wastes; sieve-supporting members, subdividing the whole area of the sieve into smaller sections and supporting the bottom of the sieve at different places; means for fastening the bottom of the sieve to the supporting bearers, consisting in: sieve-plate supporting means arranged below the bottom of the sieve.

15. In a horizontal sifter, containing in combination: a sieve-trough; an approximately horizontal sieve within the trough; sieve supporting and moving means, arranged crosswise somewhere above the medium part of the sieve; means for feeding the pulp into the sieve; means for bringing out the sifted out fine fibrous particles; means for discharging the impurities and other wastes; means for stretching the sifting bottom of the sieve, consisting in bolts fastened at suitable places of the sieve-bottom, extending to the front-end of the sieve and fastened at the front-end of the sieve.

16. A sifter for the manufacture of paper pulp and the like including a sifting trough, a supporting means and a sieve suspended from the supporting means and adapted to

be rotated about the supporting means to an inverted position.

17. A sifter for the manufacture of paper pulp and the like including a sifting trough, a supporting and agitating means, a sieve
5 supported thereby and adapted to be rotated on the supporting means to an inverted position, said supporting means also serving

as a means to conduct drip oil from the agitating means. 10

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

RUDOLF PAWLIKOWSKI.

Witnesses:

K. HEENIG,
MARTA BRUSBERG.