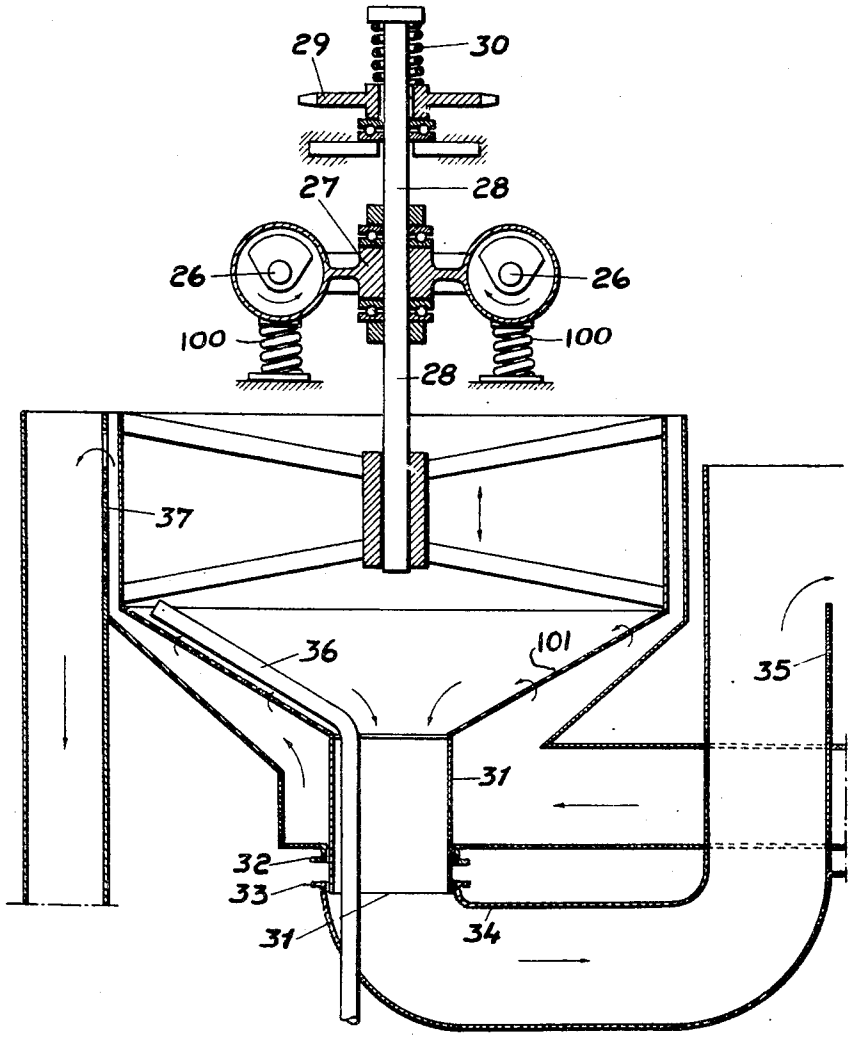
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APPARATUS FOR SCREENING FIBROUS SUSPENSIONS

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Fig. 1.



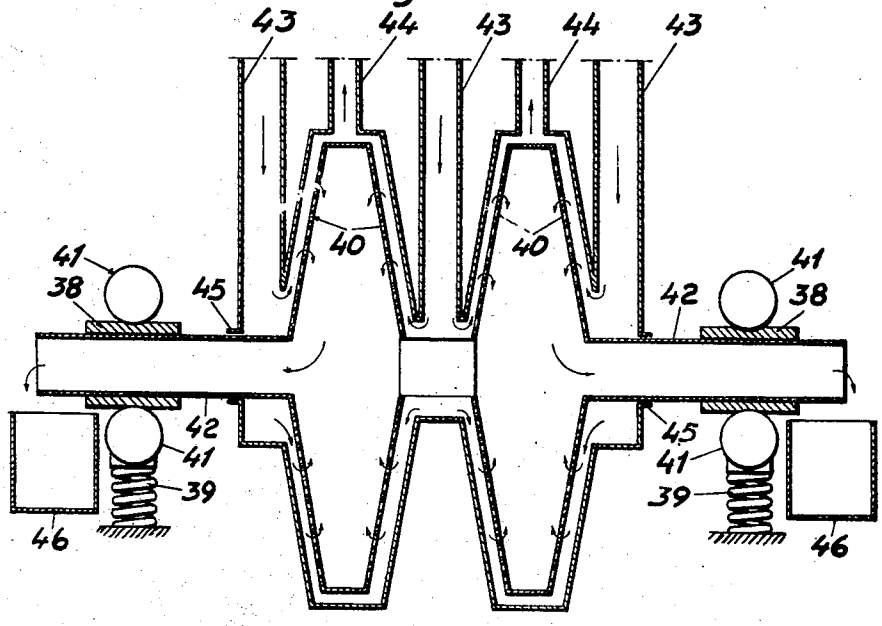
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APPARATUS FOR SCREENING FIBROUS SUSPENSIONS

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Fig. 2.



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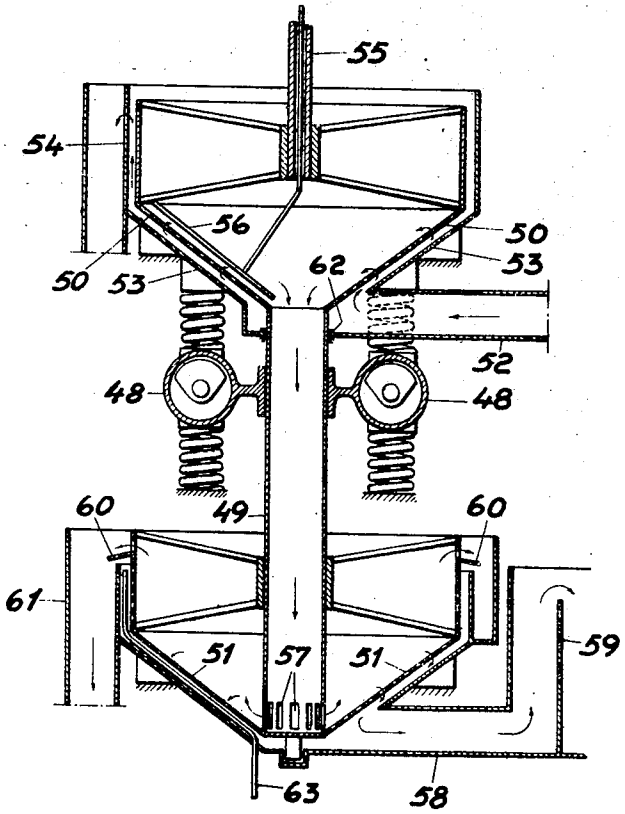
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Fig. 3.



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APPARATUS FOR SCREENING FIBROUS SUSPENSIONS

Nils Walfrid Jönsson, Lidingo, Sweden

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In Sweden August 18, 1944

2 Claims. (Cl. 92—34)

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This invention refers to the screening of suspensions of solid particles, and particularly fibrous suspensions.

For this purpose, vibrating screens were heretofore used, which are advantageous in many cases. But for screening suspensions of fine fibres, they are less suitable, because in such case the screen tends to become clogged and obturated, so that it is necessary to cleanse the screening plates by water or steam flushing. It is, however, difficult to carry out such flushing automatically in the screening apparatus heretofore used, because the screens and the troughs containing the suspension are stationary.

The chief purpose of my invention is to effect the screening operation in such manner that a high screening capacity is obtained, while the risks of obturation and clogging are eliminated.

Another purpose of this invention is to rotate the screen, thus subjecting the fibres of the suspension to a centrifugal action, while simultaneously the suspension is moved centripetally, that is from the outside inwards. Thus, clogging of the screen plates is avoided and a high screening efficiency is obtained.

It is well known that efforts have been made to attain the screening effect here aimed at, by means of horizontal vibratory screening mechanisms rotated around a horizontal axis. In this case the vibratory motions proceed in planes perpendicular to the axis of rotation. The difference in velocity between the suspension and the slots or screening openings, however, is relatively small. In accordance with my experience, however, a great difference in velocity can be attained by arranging the vibratory motions to be accomplished in planes parallel to the axis of rotation. For certain purposes it has proved advantageous to use reciprocating linear vibrations instead of circular or elliptic ones, and to make the vibrations proceed in planes being parallel to the axis of rotation.

The present invention is essentially characterised in that the suspension is caused to pass between and in contact with two organs, one of which is a screening plate, through which one portion of the stock passes to a discharge, and at least one of which is rotary. One of said organs is resiliently suspended, and this suspended organ, during the passage of the suspension between said organ and said screening plate, is set in vibratory motions in planes parallel to the axis of rotation, in order to facilitate the screening operation.

On the assumption that the two organs between which the suspension is passed are formed by a screening plate and a vat containing the suspension the motion of the organs can be arranged in any of the following different ways: The screening plate can be rotary and set in vibratory motions, while the vat is kept stationary. The screening plate can be set in vibratory motions but for the rest be kept stationary, while the vat is rotary. The screening plate can be rotated, while the vat is set in vibratory motions but for the rest being kept stationary. At last the screening plate can be kept stationary, while the vat is being rotated and is set in vibratory motions.

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I attain these objects by the means set forth in the detailed description which follows, and as illustrated by the accompanying drawings, in which—

Figure 1 shows a screening device in accordance with my invention. Fig. 2 illustrates another embodiment with a horizontal shaft. Fig. 3 illustrates still another embodiment with a vertical shaft.

In Fig. 1 the shafts 26 are unbalanced (that is: carry eccentrics) and rotate synchronously in opposite directions and are carried by the yoke-bearing 27 which is resiliently suspended on springs 100 as shown. The vertical shaft 28 is rotated via the sprocket wheel 29 from a suitable motor and is resiliently carried by the coil spring 30. The screening is effected radially towards the centre, the screened pulp being discharged via tube 34 and settable overflow 35. The spraying spout 36 is stationary and serves for washing or flushing the slots or screening openings. The waste and the coarse refuse escape over the settable overflow 37.

It is to be observed that the rotary motion of the screening plates 101 secured to the shaft 28 imparts a centrifugal tendency to the fibres. The combined action of the centrifugal tendency and of the vibratory motion loosen all fibres that may clog to the screening plates, and thus obturation is prevented.

Fig. 2 illustrates an embodiment wherein the screening member or vessel is constituted of two chambers 40 mounted on a common horizontal shaft 42. The screening chambers are formed as hollow bodies of rotation. The vats are developed corresponding to the shape of the screening chambers and surround them.

The vibrator, as shown diagrammatically, corresponds to that described with regard to Fig. 1 or that of Fig. 3. It comprises a yoke or sleeve 32 mounted on shaft 42 and a pair of unbalanced

shafts 41 crossing the main shaft 42. The system, vibrator 38, 41, main shaft 42, and screening chambers 40, is carried by springs 39. Shafts 41 are rotated in synchronism by any convenient or conventional means, not shown on the drawing. Vibratory impulses are thus imparted to shaft 42 and the screening chambers 40 and thus, owing to the elastical support of the system, free elastic oscillations of the system will be induced.

The two shafts 41 of the pair may be coupled by any convenient or conventional means, not shown in the diagrammatic showing of the drawing, so that they rotate either in the same direction or in opposite directions, and, correspondingly, the vibratory motions produced are either circular or elliptic; or, with proper arrangement of the unbalances of the two shafts with relation to each other, they are horizontally reciprocating.

Shaft 42 may be provided with any convenient or conventional means for rotating the shaft, such as with a sprocket wheel, as shown in Fig. 1 at 29, but not shown in Fig. 2 in order not to crowd the showing with known details.

The suspension enters at the centre through feed-pipes 43 and passes along the screening plates as indicated by the arrows. The waste and the coarse refuse are removed via discharge pipes 44, which can be provided with settable overflows. Packings 45 prevent leakage. The portion of the suspension which passes through the slots or screening openings in the plates 40 is conducted away through the tubular shaft 42 which empties into conveying troughs 46. In this constructional form two vibration mechanisms are provided, one of which, however, can be omitted, the other is then replaced by a spring-supported bearing.

Figure 3 shows a modification with a vertical shaft and designed for double-screening. By this contrivance the screening in the upper part of the contrivance proceeds radially towards the centre, whereas in the lower part the screening proceeds radially towards the circumference as indicated by the arrows. The vibration mechanism 48 is mounted on the tubular shaft 49 between the upper screening plates 50 and the lower screening plates 51. The stock is fed through tube 52 and passes between the screening plates 50 and the inner surface of the vat or trough 53. The waste and the coarse refuse are removed via overflow 54. The shaft 55 may be provided with rotary driving means for rotating the system. This shaft is shown to be tubular in order to allow passage of the inlet pipe for the spraying spout 56. That portion of the suspension which passes through the slots or openings of the screening plates 50 is conveyed through the interconnecting tube 49 into the lower part of the contrivance, passes through openings 57 and along the screening plates 51. That portion of the stock, which has passed through the slots or openings of the screening plates is removed through discharge tube 58 to a settable overflow 59. The portion of the suspension which has been screened in the lower part of the contrivance is conveyed over the overflow 60 into discharge tube 61. Packings 62 around the upper part of the interconnecting tube 49 prevent leakage. Spraying spout 63 washes the slots 51 clean of clogged particles.

The means described can be modified in various respects. Thus the surface formed by the screening plates, which is shown as a tapered surface can also be plane and circular, spherical or polyhedrical, and so on. The resilient suspension of the contrivances can also be effectuated otherwise than by means of coil springs. The rotary driving can also be performed otherwise than by means of chain and sprocket wheel.

The invention is not, of course, limited to comprise the constructional forms exemplified above, but includes any form of means for realizing the method in accordance with aforenamed characteristics.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for screening fibrous suspensions, comprising a trough, a screening vessel placed coaxially in said trough, an inlet for said suspension to said trough, an outlet for the screened stock, the screen of said screening vessel being so arranged between said inlet and said outlet that the suspension is moved towards the centre of said screening vessel, said screening vessel having a rotary shaft, means for rotating said rotary shaft, discharge means for leading off impurities and coarse particles of said suspension; a yoke mounted on said rotary shaft, a pair of unbalanced shafts journaled at said yoke and crossing said rotary shaft; and elastic supporting means for said yoke and said rotary shaft.

2. An apparatus for screening fibrous suspensions, comprising in combination two upright screening mechanisms, each having a trough and a screening hopper disposed in said trough, feeding means for said suspension and discharging means for the screened stock; the screen of each of said screening hoppers disposed between said feeding means and said discharging means; said screening hoppers having a common vertical central shaft adapted to be rotated and to carry, mounted thereon, said screening hopper; said shaft constituting a feed and discharge pipe, the whole arrangement being such that said central discharge pipe for the screened stock from one of said mechanisms forms the central feed-pipe of the hopper of the consecutive mechanism, said consecutive mechanism being situated vertically below the other mechanism; elastic means for supporting said shaft freely elastically oscillatable, and a vibrator operatively connected with said rotary shaft and having its direction of vibration parallel with said shaft.

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