

July 7, 1931.

W. H. BACHELDOR

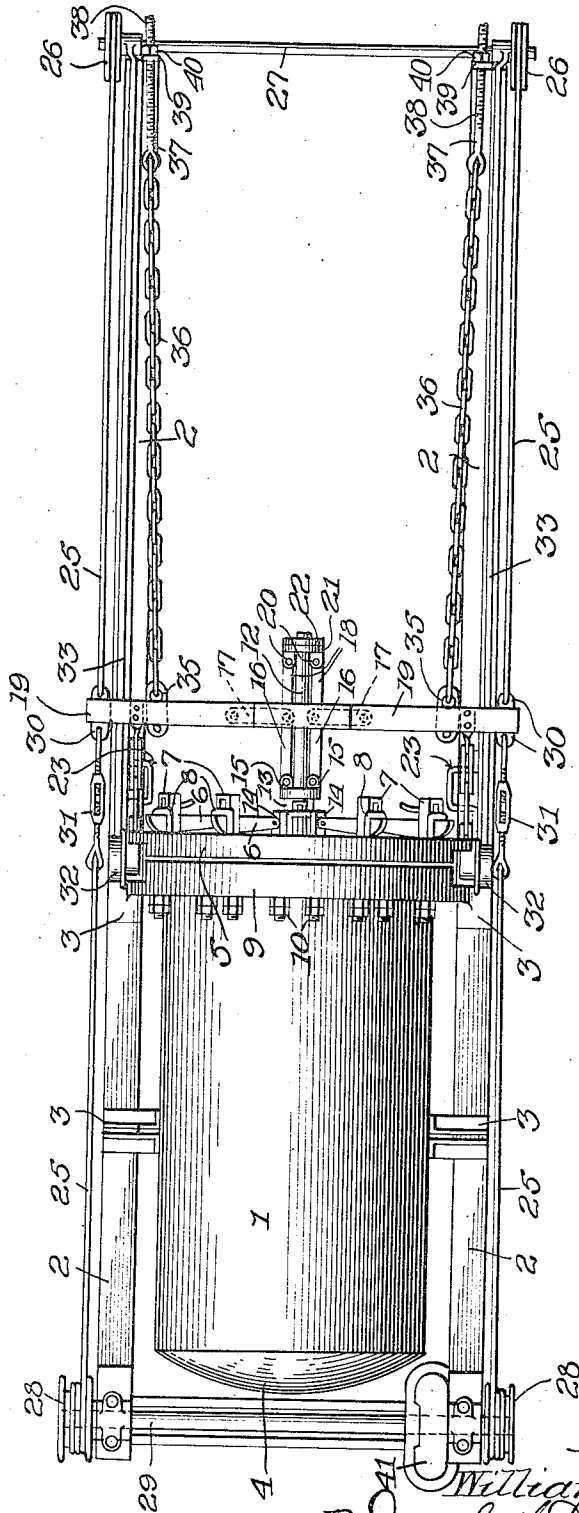
1,813,601

FILTER OPENING MEANS

Filed July 29, 1929

2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

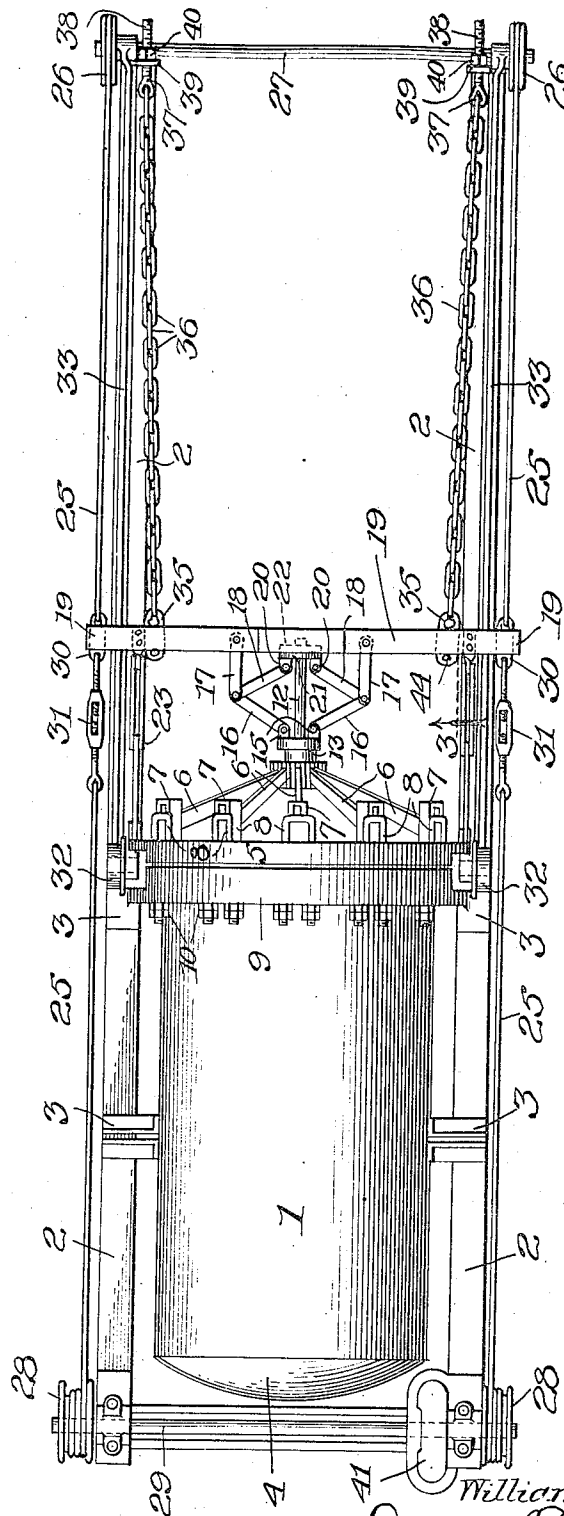


Fig. 3.

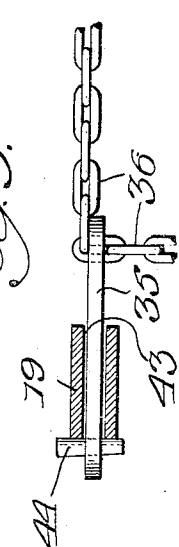
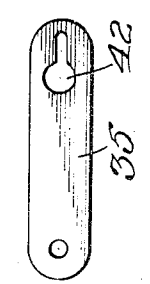


Fig. 4.



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FILTER OPENING MEANS

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This invention relates to certain new and useful improvements in industrial type pressure filtering apparatus employed for separating and filtering all kinds of solids from liquids.

In filtering apparatus of this type, the filtering receptacle comprises a tank provided with a removable head mounted upon a carrier. The head is provided with means for locking it in a leak-proof manner to the pressure tank. The head and the carrier therefor are adapted to be moved away from the tank, as it is necessary to periodically clean from the filtering elements within the tank, the solid matter filtered from the liquid, which solid matter tends to accumulate upon the filtering elements in the form of a cake.

This invention will be fully understood from the following description illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of a pressure type filtering device, embodying the invention; Fig. 2 is a view similar to Fig. 1, showing the relation of certain of the parts when the head-locking means is in unlocked position; Fig. 3 is an enlarged cross-sectional view on line 3 of Fig. 2, showing in detail the means for adjustably and removably connecting the chains to the cross-bar which operates the locking mechanism; and Fig. 4 is a plan view of the ear to which the chain is adjustably and removably connected.

In the embodiment illustrated, 1 designates a cylindrical pressure tank horizontally disposed and supported between a pair of horizontal frame members 2, being secured thereto by means of one or more suitable brackets 3. Each of the frame members 2 projects a substantial distance beyond the front end of the tank 1, and are supported by any suitable means.

The rear end of the tank 1 is closed by a wall 4, while the front end is closed by a removable head 5, which fits against the tank 1 in a leak-proof manner. The removable head 5 is secured or locked to the tank by means of a series of radially disposed levers 6, the outer ends of which extend through a series of guide brackets 7 secured

to the head 5 adjacent the periphery thereof. The inner surface of the outer ends of the levers 6 is curved or cam-shaped. The outer ends of the levers 6 are adapted to engage as a fulcrum a series of U-shaped bolts 8 which are carried in suitable apertures in an annular flange 9 on the pressure tank 1. The ends of the U-bolts 8 project through the flange 9 and receive one or more nuts 10, whereby they are adjustably secured to the flange 9.

The curved inner surface of the levers is adapted to bear against the head 5 when the inner ends of the levers 6 are moved toward the head 5, whereby the head is forced against the tank 1.

The inner ends of the levers 6 are moved toward or away from the head 5 by means of the following mechanism. The head 5 is provided with a rigid shaft 12 which extends outward from its center and axially in line with the tank 1. A sleeve 13 having a series of ears 14 is slidably mounted upon the shaft 12. The ears 14 are pivotally connected to the inner ends of the locking levers 6, whereby when the sleeve 13 is moved upon the shaft 12, in a direction toward the head 5, the upper ends of the levers 6 will project into the U-bolts 8 and fulcrum upon them to exert a multiplied force against the head 5, whereby the head will be firmly forced against the end of the tank 1 (as shown in Fig. 1). It will also be seen that when (as shown in Fig. 2) the sleeve 13 is moved upon the shaft 12 in a direction away from the head 5 the levers 6 will cease to exert any force against the head 5. When the inner ends of the levers 6 have been moved away from the head a predetermined distance, their outer ends will be sufficiently retracted so that they will not engage the U-bolts 8 when the head is being removed from, or applied to, the tank 1.

The sleeve 13 is provided with a pair of ears 15, which ears 15 have pivotally connected to them the rear ends of a pair of links 16. The forward end of each of the links 16 is pivoted to a pair of links 17 and 18. The front ends of the links 17 are pivotally connected to a transversely dis-

posed, movable cross-bar 19, while the front ends of the links 18 are pivoted to lugs 20 carried by a collar 21 mounted upon the outer portion of the shaft 12. The collar 21 is retained upon the shaft 12 by means of a nut 22 which has threaded engagement with the shaft 12.

From the foregoing description, it will be apparent that the links 16, 17 and 18 constitute a toggle-lever connection which is actuated by movement of the cross-bar 19 toward or away from the head 5. In Fig. 1, the toggle-levers are shown in their locked position, the sleeve 13 being forced toward the head 5 by the toggle levers whereby the levers 6 firmly lock the head 5 to the tank. In Fig. 2, the toggle-levers are shown in unlocked position, the sleeve 13 being moved away from the head 5 a sufficient distance to cause the levers 6 to be disengaged from the U-bolts 8.

The cross-bar 19 may be secured in a position where the levers 6 lock the head to the tank, by any suitable latching means, indicated as a whole at 23. Such latching means is well known in this art, and it is thought that it is not necessary to describe it in detail. The cross-bar 19 is moved toward or away from the head 5, when actuating the locking means, by any suitable mechanism. A well known type of structure for this purpose is shown, which structure comprises a cable 25 at each side of the tank, each of which cables 25 extends to a point in front of the head 5. The cables 25 pass over pulleys or drums 26 carried on a shaft 27 journaled on the front ends of the frame members 2, and pulleys or drums 28 carried on a shaft 29 journaled on the rear ends of the frame members 2. The drums 26 and 28 may be rotated by any suitable mechanism, such as an air-motor 40. The cables 25 are secured to ears 30 on the cross-bar 19, and may be adjusted to the desired tension by means of turnbuckles 31.

The head 5 is supported while it is removed from the tank 1 by a pair of flanged wheels 32 carried thereby, which wheels run upon a pair of rails 33 resting on the upper face of the main frame members 2. Thus, it will be apparent that the head 5, when the locking levers 6 have been retracted, may be moved away from the tank 1, the wheels 32 traveling along the rails 33.

Sometimes considerable difficulty is experienced in initially removing the head 5 from the tank 1 after the toggles and locking levers have been moved to unlocked position, as shown in Fig. 2. To provide a means for initially removing the head 5 from the tank 1, the following assembly is employed. The cross-bar 19 is provided with a pair of ears 35, each of which are secured to a log chain 36. The other end of each of the chains 36 is secured to an elon-

gated jack-screw 37, provided with an elongated threaded shank 38. Each of the shanks 38 projects through a bracket 39 carried by the supporting frame 2. A nut 40 is threaded on the protruding ends of the jack-screw shanks 38 so that when the nuts 40 are turned, they will draw the jack-screws 37 and the chains 36 in a direction away from the head 5.

Sometimes the tank 1 will contain such an amount of heavy filtered material as to offer sufficient resistance to the removal of the filter elements and their supporting frame to necessitate the use of the auxiliary head removing means to entirely remove the head, the filter elements and the supporting frame for the filter elements. So that the chains 36 and jack-screws 37 may be used in this manner, it is preferred to employ the type of ear 35, shown in detail by Figs. 3 and 4. The ear, as shown, is provided with a key-hole shaped slot 42, through the enlarged portion of which the chain may be moved to any position and then locked in the small narrow portion in the manner shown by Fig. 3. The ear 35 is carried in a slot 43 in the cross-bar 19, and is removably connected thereto by means of a tapered pin 44.

In the operation of the device, assuming that the head 5 is locked to the pressure tank 1 and it is desired to remove the head 5 therefrom: When the head is locked to the tank, the toggle and levers 6 are in the positions shown in Fig. 1. The latch 23 is first released so that the cross-bar 19 will be free to be moved away from the head 5. The cross-bar 19 is then moved away from the head 5.

In the present embodiment, the cross-bar 19 is moved by means of the cables 25, the air motor 41 being employed to rotate the drums 28. When the bar 19 and the toggles 16, 17 and 18 assume the position shown in Fig. 2, the levers 6 are moved to unlocked position and the bar 19 is restrained by the toggle levers 16, 17 and 18 from moving away further from the head 5. Thus any further movement of the bar 19 in a direction away from the head 5 will cause the head 5 to be moved along with the bar. In the event the head 5 tends to adhere to the tank 1, the nuts 40 may be screwed up on the jack-screws 37 until sufficient force is exerted upon the bar 19 to cause the head 5 to become disengaged from the tank 1. If it is necessary to employ the jack-screws 37 to entirely remove the head, the nut 40 on the jack-screw is screwed up to the end of the threads on the shank 38. Then the nut 40 is unscrewed and the slack in the chains 36 is taken up by pulling them through the enlarged portion of the key-hole slots 42 in the ears 35. The nut 40 is then screwed up again. This operation is repeated until the

head has been moved to the desired position. Both of the chains 36, together with the ears 35 and jack-screws 37, may be removed from the filter and applied to it only when difficulty is experienced in removing the head and filter assembly from the tank 1.

While the chains 36 have been shown connected to the cross-bar 19, it is to be understood that the invention contemplates connecting the chains 36 directly to the head, or to any accessory connected to it.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

I claim:

1. In a pressure type filter, the combination of a closed, horizontally disposed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, means for actuating said locking means and for exerting a predetermined force on said head to move the head on said support in a direction away from said tank, means for supporting said head while it is removed from said tank, and means for exerting an additional force upon said head to cause the same to be initially moved from said tank, comprising a flexible elongated member having one end connected to said head and the other end provided with a jack-screw means connected to a stationary member spaced in front of said head.

2. In a pressure type filter, the combination of a closed, horizontally disposed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, means for supporting said head while it is removed from said tank, means for actuating said locking means and for exerting a predetermined force on said head to move the head on said support in a direction away from said tank and means for exerting an additional force upon said head to cause the same to be initially moved from said tank, comprising a flexible elongated member having one end connected to said head and the other end provided with a jack-screw means connected at a point substantially spaced in front of said head.

3. In a pressure type filter, the combination of a closed, horizontally disposed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, means for supporting said head while it is removed from said tank comprising a pair of spaced elongated frame members extending from the front end of said tank to a point substantially removed from said end, means for actuating said locking means and

for exerting a force on said head sufficient to move it along said support means when it is removed from said tank, and means for initially moving said head away from said tank, comprising, a flexible elongated member having one end connected to said head and the other end provided with a jack-screw means connected to said head supporting means at a point substantially spaced from said head.

4. In a pressure type filter, the combination of a closed, horizontally disposed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, a pair of wheels carried by said head, a pair of spaced elongated frame members extending from the front end of said tank to a point substantially removed from said end and adapted to engage said wheels, whereby said head is supported while it is removed from said tank, means for actuating said locking means and for exerting a force on said head sufficient to move it along said frame members when it is removed from said tank, and means for initially moving said head away from said tank, comprising, a pair of flexible elongated members having their inner ends connected to said head and their outer ends provided with jack-screw means, each of said jack-screw means being connected to one of said frame members at a point substantially spaced from said head.

5. In a pressure leaf filter, the combination of a closed, horizontally disposed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, an elongated frame member extending from the front end of said tank to a point substantially removed from said end and adapted to support said head while it is removed from said tank, means for actuating said locking means and for exerting a force upon said head sufficient to move it along said frame when it is removed from said tank, a bracket provided with an aperture and mounted on said frame member at a point removed from said head, a chain having one end connected to said head and its other end provided with a threaded jack-screw passing through the aperture in said bracket, and a nut engaging said jack-screw for moving said jack-screw relative to said bracket, whereby said head may be initially withdrawn from said tank.

6. In a pressure type filter, the combination of a closed tank adapted to contain filter elements, a removable head for the front end of said tank, means for locking said head to said tank, means for supporting said head while it is removed from said tank, means for actuating said locking means and for exerting a predetermined force on said head to move the head on said support

in a direction away from said tank, and means for exerting a force on said head to cause the same to be initially moved from said tank, comprising a flexible elongated member having one end connected to said head and the other end connected at a point substantially spaced in front of said head, and a jack-screw adapted to cooperate with said flexible member and exert a tension thereon.

In testimony whereof, I have hereunto set my hand this 29th day of June, 1929.

WILLIAM H. BACHELDOR.