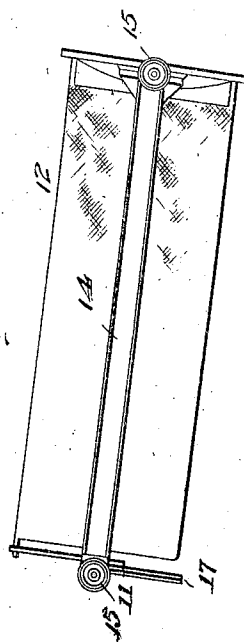
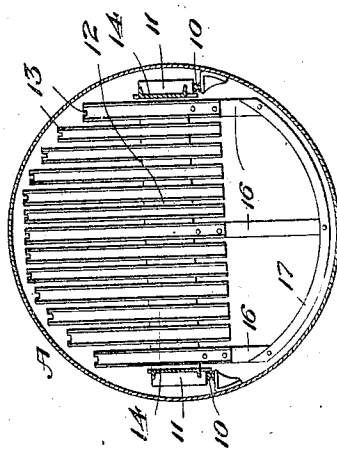
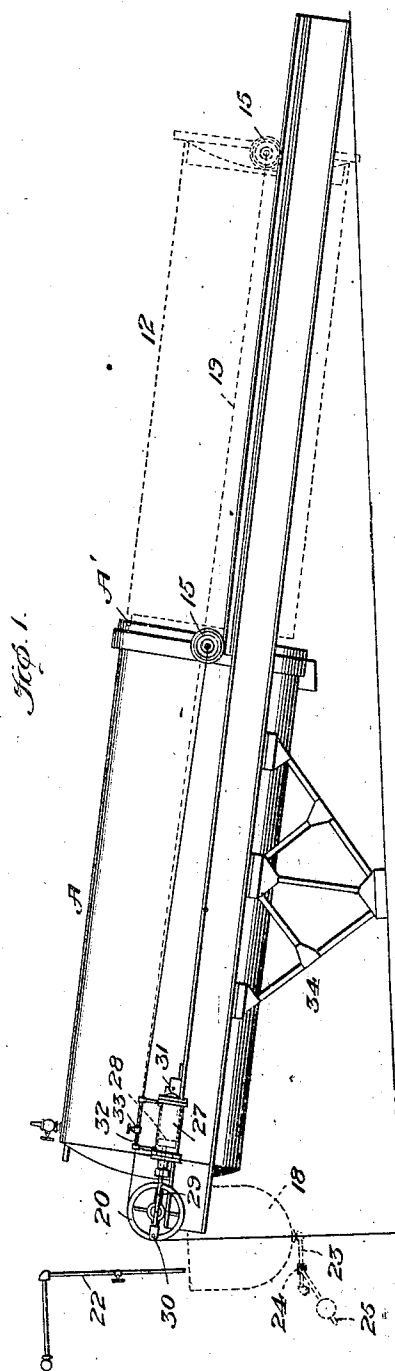


1,015,960.

D. J. KELLY.
SLIMES FILTERING APPARATUS.
APPLICATION FILED MAR. 3, 1911.

Patented Jan. 30, 1912.

2 SHEETS—SHEET 1.



Witnesses
G. Manning

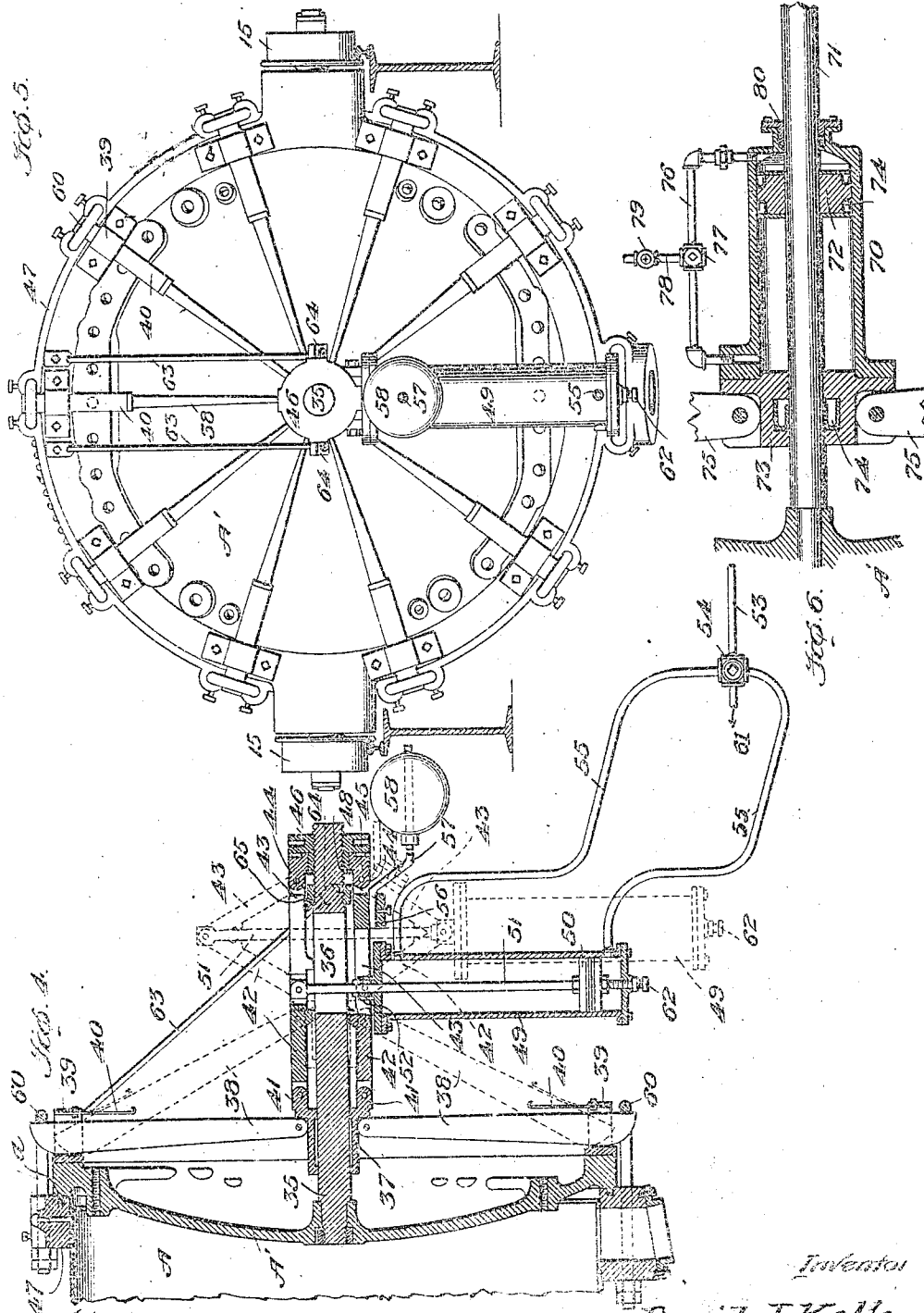
Inventor
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BY *J. Walter Fowler*
Attorney

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2 SHEETS—SHEET 2.

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Witnesses
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UNITED STATES PATENT OFFICE.

DAVID J. KELLY, OF SALT LAKE CITY, UTAH.

SLIMES-FILTERING APPARATUS.

1,015,960.

- Specification of Letters Patent.

Patented Jan. 30, 1912.

Application filed March 3, 1911. Serial No. 611,966.

To all whom it may concern:

Be it known that I, DAVID J. KELLY, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Slimes-Filtering Apparatus, of which the following is a specification.

My invention relates to certain new and useful improvements in apparatus designed to separate solid matter of whatever nature, from liquids, the apparatus being particularly useful in the art of separating slimes from which precious metals have been dissolved, and the liquid which holds the precious metals in solution, the present invention being improvements of my former Patents Nos. 815,021, dated Mar. 13/06; 864,308, dated Aug. 27/07; and 865,912, dated Sept. 10/07.

While I have primarily designed the invention as a means for separating slimes from which precious metals have been dissolved and the liquid which holds these precious metals in solution, the present improvements will also be found useful in the sugar-making industry for removing the precipitate of calcium carbonate resulting from the purification in carbonators of sugar juice; the improvements will also be useful in what is known as the "Steffans process" for filtering out the solid material, calcium saccharate.

The present improvements have in view, first, the employment of a means by which a filter-press or a battery or series of filter-presses may be operated from a central station, by fluid pressure as distinguished from the hand-operation of single presses, as disclosed in my former patents, thereby facilitating the operation and increasing the capacity of the filter presses and at the same time decreasing manual labor; second, in furnishing an improved means for controlling the travel of the filter-carrier and employing a hydraulic brake in lieu of the band brake of my former patent; third, the employment of a counterweight-tank in lieu of the solid counterweight of the former patent.

With the above and other objects in view, my present invention consists of the constructions, arrangements and combinations of parts which I will hereinafter describe and claim.

In the accompanying drawings forming

part of this specification, and in which similar reference characters indicate like parts throughout the several views, Figure 1 is a side elevation of a slime filtering apparatus, embodying my invention, showing by dotted lines the position of the filter carrier when removed from the tank. Fig. 2 is a somewhat diagrammatic view of the filter-carrier removed and showing particularly the improved means for scraping the tank during the outward travel of the said carrier. Fig. 3 is a cross section of the filter tank and an end view of the filter carrier. Fig. 4 is an enlarged sectional view of the locking-head end of the filter-carrier. Fig. 5 is an end view of the apparatus showing the locking-head construction in elevation and showing in section the track rails upon which the carrier travels. Fig. 6 is a sectional view of a modified construction for operating the head by fluid-pressure means.

In the cyanid process for example, when gold or silver bearing slimes are mixed or brought into contact with a cyanid solution, the precious metals are dissolved and carried in the liquid in a state of solution. To effect a separation of the metal-bearing solution from the solid matter or slimes tailings by an improved filtering apparatus which greatly facilitates the operation, is a leading characteristic of the present improvements.

In carrying out my invention I employ a filter which I have found particularly useful for metallurgical work, but to this particular use the filter is not limited since it may be successfully employed in other fields and substantially wherever the separation of solids from fluid matter is desired. The filter includes a stationary tank, A, set, preferably, at an incline and having a general cylindrical form, although it may have any other desired suitable cross-sectional shape. This cylinder has one of its ends, preferably the higher one, permanently closed while the opposite or lower end, A', is capable of being opened and closed for the purpose of introducing, and removing the filter frames and the contained matter which has been collected or caked thereon during the filtering operation, and which operation is substantially the same as that disclosed in my aforesaid patents. Extending along the inner sides of the tank are appropriate track rails, 10, upon which travel the wheels, 11, of a carrier, 12, which may have the general

form of the corresponding carrier shown in my former patents and which carrier is connected with or made a part of the lower or movable head, A', of the tank and is designed to support and carry appropriate filter frames, 13, which latter, the wheeled carrier and the removable head of the tank constitute substantially a unitary structure, since these several parts are so related that they may be positioned and moved together with relation to the tank; the filter frames, however, are in practice so connected to the carrier that they may be removed when desired and an additional frame or frames substituted.

I may employ for my present purposes any well known form of filter-frame and filtering material, including the filter-bags and frame construction of my aforesaid patents, or I may use any construction which I may find useful in the filtration of slimes or other matter under pressure.

The carrier is shown as comprising longitudinal channel iron or other bars, or beams, 14, at the ends of which are mounted appropriate rollers, 15, adapted to travel on track rails, suitably supported along the inner sides of the tank, whereby the carriage may be run in and out of the tank when desired. To the sides of the carrier are bolted or otherwise secured brackets or irons, 16, and to these are fastened the scraper blade, 17, which has a curvature substantially conforming to that of the inner wall of the tank.

In some cases in operating the filter-presses the free travel of the carrier may be hindered by the premature sloughing of cakes or by an accumulation of sand, or other solid material on the bottom of the tank, and to clear the bottom of the tank of any fragments of cake or of settlings, as before pointed out, I employ the scraper, 17, and which scraper is automatic in its action, as it is attached to the back end of the carrier and is in fact, a part of said carrier; as the carrier travels out of the tank after the locking-head has been released, the scraper operates against the inner wall of the bottom of the tank and pushes any solid matter before it, and discharges the same from the open end of the tank, thereby cleaning the tank and insuring the unhindered return of the carrier into the tank. If a scraper operating as just described, should cause much friction, the counterweights of my earlier Patents 815,021 and 864,308, are liable to prevent the free travel of the carrier. On this account I prefer to have a counterweight mechanism, the weight of which can be varied at will and to accomplish this object I have designed the mechanism shown in Fig. 1 and which comprises a fluid-containing tank, 18, which when the carrier is in the tank, A, may be emptied sufficiently

of its fluid contents, or load, so that the carrier has a strong and positive pull when the outer or locking-head is unlocked from the tank; when the carrier is run out, water, or other liquid or other material, may be delivered into the counterweight-tank until a sufficient weight is accumulated therein, to overcome the weight of the carrier and pull the same back into the tank A.

The counterweight tank is connected with a chain or rope, 19, which passes over a sheave, 20, to the front of the carrier; if desired a rope may be substituted by a chain and the sheave, 20, over which it passes, will be of the character commonly used with a chain, which construction would prevent the slipping of the rope relatively to the sheave. When the tank is raised into the dotted position shown in Fig. 1 and which position occurs when the carrier is run out of the tank, the counterweight-tank is in position to receive water from a supply pipe, 22, whereby the tank may be filled until the weight thereof overcomes that of the filter-carrier, when said carrier will be moved rearwardly into the containing-tank.

The counterweight tank has a discharge pipe, 23, in its lower portion and this pipe has a controlling valve, 24, to the stem of which is connected a weighted arm or lever, 25, which is designed to contact with an automatic tripper, 26, fixed at some appropriate point in the path or descent of said lever, whereby the lever is moved to open the valve and allow the water in the tank, 18, to be discharged, thus lightening the counterweight so that it may be returned to the dotted position, Fig. 1, during the outward travel of the carrier.

In connection with the counterweight-tank I employ, in the present instance, a hydraulic brake to take care of the rate of travel, inward and outward of the carrier, this hydraulic brake being shown in Fig. 1 and comprising a cylinder, 27, suitably mounted exterior to the tank, A, having an operating piston, 28, with a piston rod, 29, connecting with a crank pin, 30, on the sheave over which the chain or rope from the counterweight-tank passes. The cylinder, 27, may have a pivot-bearing, 31, to allow it to have a rocking action to compensate for any irregularity in the movement of the piston and piston rod, or other parts.

The cylinder, 27, is provided with a bypass, 32, which consists of a pipe connecting with opposite ends of the cylinder, said bypass having a valve, 33, which may be manipulated to increase or decrease the size of the fluid passage between the opposite ends of the cylinder and the extent of which opening determines the speed or travel of the carrier. Thus, in lieu of the band-brake of my former patents, I employ a hydraulic brake which consists of a plunger, a cylin-

der, and a by-pass at one or both sides of the brake, A.

The sheave, 20, is at the back of the press and actuates the piston, while the by-pass is regulated by the valve in the line to permit slow or rapid flow of fluid from one end of the cylinder to the other. In this manner the travel of the carrier is regulated at will, and from a distant point if necessary, and an operator is not required to be near the press as is necessary when a hand-brake or other hand-operated mechanism is employed for controlling the travel in and out of the carrier.

In Fig. 1, I show the tank A, as mounted upon a trussed-frame, 34, and it will be understood that the mounting of this frame may follow more or less closely the mounting of similar parts of my aforesaid Patent No. 864,308, or any other method of mounting the tank so that its inclination may be varied when desired, may be employed in connection with the present improvements.

Another important feature of my present invention is the improved locking head connection between the containing tank and the end head which closes the open end thereof and which head is fixed to and is carried by the filter-carrier, 12, the prime purpose of the connection being to obtain a liquid-tight joint between the open end of the tank and the movable head therefor when the latter is in position in the tank and the filtering process is under operation. In the said former Patent No. 865,912, is disclosed one arrangement of locking-head connection between the tank and carrier, but I have found in practice that in operating a battery or series of filter presses, it is highly desirable, from a standpoint of economy, at least, to be able to lock and unlock presses from a central station. This is one of the principal objects of the present invention, and this object is attained by the use of suitable mechanism operated by fluid-pressure and one satisfactory type of which mechanism I will now describe, having particular reference to Fig. 4. The locking-head, A', is provided with a rigid shaft, 35, which extends outwardly from its center and axially in line with the tank, said shaft being longitudinally slotted at 36, and having a screw-threaded outer end. On the shaft is slidably mounted a sleeve, 37, having ears or lugs to which are pivoted the inner ends of the radially disposed levers, 38. The outer ends of these levers are curved or cam-shaped and they slidably operate between the lugs or ears, 39, projecting from the front face near the periphery of the head, suitable springs, 40, being also preferably employed and against which the outer edges of the levers substantially bear whereby the springs assist in maintaining the levers against the lugs. In the foregoing respects the levers and their

means of attachment do not depart materially from the substantially similar parts found in the aforesaid Patent No. 865,912. The sliding sleeve or collar, 37, is formed with other lugs or ears, 41, and to these are pivoted the rear ends of the links, 42, whose forward ends are in turn pivoted to the rear ends of similar links, 43; the front ends of the second-named links are pivoted to the lugs, 44, of a suitable collar, 45, against the outer face of which bears a nut, 46, which is threaded on the outer end of the shaft, 35, and is designed to adjust the tension of the head, as when the nut is rotated it causes the lever-spacing collar, 37, to move forward or backward and in this manner the tension of the head, A', against the gasket, a, in a groove in the ring casting, 47, of the tank can be regulated at will. The tension-adjusting nut, 46, also bears against a ring, 48, which seats against a shoulder on the outer sleeve or collar, 45. The aforesaid links constitute a toggle-lever connection from which is suspended or otherwise relatively positioned a fluid-cylinder, whose upper portion is connected to the lower links, 42, 43 of the toggle joint, said cylinder, 49, having a piston, 50, whose rod, 51, extends through a suitable stuffing-box, 52, and through the slot in the shaft and has its outer end pivotally connected to the pivoted meeting ends of the upper pair of the links, as shown in Fig. 4. The cylinder is designed to be supplied with fluid-pressure from a pipe, 53, in a suitable fluid-pressure line, said pipe being provided with a four-way valve, 54, of the usual or well known form, which connects with a hose or flexible connection, 55, leading to the opposite ends of the cylinder. One of the lower links of the toggle connection is provided with a boss or thickened portion, 56, which is bored horizontally to receive the stem, 57, of a weight, 58, which is employed to counterbalance the weight of the cylinder carried by the upper links of the toggle. From this description it will be apparent that when the head is closed and the filter carrier is locked in the tank, the levers and the fluid pressure actuating devices appear as in the full-line position of Fig. 4; but when it is desired to unlock the head to permit the carrier with its filter frames to be run out of the tank, as shown in dotted lines in Fig. 1, the four-way valve, 54, is turned to open communication between the fluid pressure line and that portion of the flexible connection, 55, leading to the lower end of the cylinder and beneath the piston, whereby the fluid-pressure operates to separate the piston from the corresponding end of the cylinder. In doing this the piston rod and the cylinder move in opposite direction and first act to move the adjacent ends of the links of both the upper and lower series so that the pivotal centers of

these ends will be forced out of a straight line with the centers of the pivots at the outer ends of the links, and the pressure being continued the links are made to assume the dotted position of Fig. 4, the piston rod being elevated and the cylinder lowered. The sliding sleeve or collar, 37, is at the same time pulled along the shaft, 35, thereby causing the levers, 38, to slidably fulcrum on the lugs or bearings, 59, and loosen on the U-bolts, 60, and unlock the head so that it and the cylinder and other parts of the fluid-pressure mechanism may be moved outwardly with the carriage. When it is desired to again lock the head after the carrier is returned to the tank, the valve, 54, is turned to admit the fluid pressure above the piston when the parts are moved until they again assume the full-line position shown in Fig. 4. During the movement of the piston, exhaust from the cylinder takes place through the flexible connection, 55, the valve, 54, and an exhaust pipe, 61, leading therefrom; the travel of the piston in the head-closing action is limited by a set-screw or stop, 62, so that the piston cannot cover the port through which the fluid pressure is admitted to the cylinder for the purpose of unlocking the head.

If desired, the head, A', may be braced by the rods, 63, extending downwardly and forwardly from the head and fixed in lugs, 64, of a follower or nut, 65, as shown in Figs. 4 and 5.

It is not at all essential that the fluid pressure cylinder and toggle-lever should be arranged to operate as before described, nor do I limit my invention thereto for said invention is of broader scope than any mere arrangement of parts and it comprehends and includes any mechanism in combination with a head and traveling carrier and operated by fluid pressure for automatically unlocking and locking the head, say from a more or less distant point, as distinguished from the manipulation of a lever, hand-wheel or like part proximate to the head and requiring the pressure of an operator stationed at the machine, or at each machine if a battery or series of machines is employed. Accordingly in Fig. 6, I show another and more simple form of mechanism for the purposes stated. In this modified construction, the cylinder, 70, is mounted on and is concentric with the shaft, 71, projecting from the head, the said shaft serving as a piston rod and carrying the piston, 72. The sliding sleeve or collar, 73, is, in Fig. 6, fixed to the cylinder and said sleeve and the piston are supplied with appropriate cup-washers, 74, to prevent leakage of fluid pressure around the shaft and piston. The sleeve or collar has the inner ends of the levers, 75, pivoted to it, and the cylinder has a by-pass, 76, between its opposite ends

controlled by a four-way valve, 77, of any well known type, to which is connected the fluid supply pipe, 78, having a check-valve at 79. The outer end of the cylinder is provided with a stuffing-box, 80, through which the central shaft operates. In operation, when the fluid pressure is admitted to the outer end of the cylinder said cylinder is forced outwardly along the shaft thereby moving the sleeve or collar and rocking the levers to cause them to unlock the head. Fluid-pressure admitted to the other end of the lever returns the cylinder and resets the parts in locked position. In either movement of the cylinder the exhaust from the cylinder will be through the opposite end of the by-pass and the four-way valve to the open air, or to an appropriate receiver, not shown. Other and different arrangements may also be used without departing from the scope of the invention, provided the same are capable of use with a fluid-pressure supply.

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

1. In apparatus of the character described, the combination with a tank having an open end, a filter-carrier movable in and out of the tank, and provided with a head adapted to close the open end of the tank, locking mechanism between the head and tank, and a fluid-pressure mechanism for actuating the locking mechanism.

2. In apparatus of the character described, the combination with a tank having an open end, a filter-carrier movable in and out of the tank, and provided with a head adapted to close the open end of the tank, locking mechanism between the head and tank, and a fluid-pressure mechanism for actuating the locking mechanism, said fluid-pressure mechanism including a fluid-pressure cylinder, a piston and a toggle-lever connection between the piston and the locking mechanism.

3. In apparatus of the character described, the combination with a tank having an open end and a filter-carrier operable in and out of the tank and having a head at one end adapted to close the open end of the tank, locking devices between the head and tank and comprising radially disposed levers movable with the head, a fluid-pressure cylinder and a piston operable therein, said cylinder being movable with the head, and a toggle-lever connection actuated by fluid pressure applied to the cylinder and piston and adapted to move the radial levers to lock and unlock the head.

4. In apparatus of the character described, the combination with a tank having an open end, a filter-carrier operable in said tank having a head at one end adapted to form a closure for an open end of the tank,

a shaft projecting centrally from the head, a sleeve slidably mounted on the shaft, radially-disposed levers having inner ends pivoted to the sleeve and having outer ends adapted to engage a fixed part of the tank, an intermediate portion of said levers fulcruming against the head, a second sleeve or collar concentric with said shaft and separated from the first-named sleeve, a double series of toggle levers between the two sleeves, a fluid-pressure cylinder carried by one series of toggle levers, said cylinder having a piston whose rod is connected to the other series of toggle levers, and means for admitting fluid pressure to either end of said cylinder.

5. In apparatus of the character described, the combination with a tank having an open end, a filter-carrier operable in said tank having a head at one end adapted to form a closure for the open end of the tank, a shaft projecting centrally from the head, a sleeve slidably mounted on the shaft, radially-disposed levers having inner ends pivoted to the sleeve and having outer ends adapted to engage a fixed part of the tank, an intermediate portion of said levers fulcruming against the head, a second sleeve or collar concentric with said shaft and separated from the first-named sleeve, a double series of toggle levers between the two sleeves, a tension-adjusting nut on the outer end of the shaft bearing against the second-named sleeve, a fluid-pressure cylinder carried by one series of toggle levers, said cylinder having a piston whose rod is connected to the other series of toggle levers, and means for admitting fluid-pressure to either end of said cylinder.

6. In apparatus of the character described, the combination with a tank having an open end, of a locking head mechanism for said tank, said mechanism including a head adapted to close the open end of the tank, radial levers adapted to fulcrum on the head and having a portion to engage a fixed part of the tank, a sleeve slidably on the shaft and to which the inner ends of the levers are pivoted, and fluid-pressure means including a cylinder and piston, one movable relative to the other for operating the sliding sleeve and radial levers and locking and unlocking the head.

7. In apparatus of the character described, the combination with a tank having an open end and a locking head therefor, of a fluid-pressure mechanism for locking and unlocking the head, said mechanism comprising a fluid-pressure cylinder and a piston operable therein having a piston rod, and a double set of toggle-levers, said piston being connected to one set of toggle-levers and the cylinder being carried by the other set of toggle-levers, and means for admitting fluid-pressure to the cylinder, whereby

the piston and cylinder and the two sets of toggle-levers are simultaneously moved in opposite directions, and locking levers connected to and actuated by the movement of said toggle-levers, and means engaged by the outer ends of the locking levers for detachably locking the head to the tank.

8. In apparatus of the character described, the combination with a tank having an open end and a locking head therefor, of a fluid-pressure mechanism for locking and unlocking the head, said mechanism comprising a fluid-pressure cylinder and a piston operable therein having a piston rod, and a double set of toggle-levers, said piston being connected to one set of toggle-levers, and the cylinder being carried by the other set of toggle levers, and means for admitting fluid-pressure to the cylinder, whereby the piston and cylinder and the two sets of toggle-levers are simultaneously moved in opposite directions, and locking levers connected to and actuated by the movement of said toggle-levers, and means engaged by the outer ends of the locking levers for detachably locking the head to the tank, and a weight for counterbalancing the weight of said cylinder.

9. In apparatus of the character described, the combination with a tank having an open end, and a filter-carrier operable in and out of the tank and having a head adapted to form a closure for the open end thereof, of a hydraulic brake for regulating the travel of the filter-carrier and its connected parts.

10. In apparatus of the character described, the combination with a tank having an open end, and a filter-carrier operable in and out of the tank and having a head adapted to form a closure for the open end thereof, of a hydraulic brake for regulating the travel of the filter-carrier and its connected parts, said brake comprising a cylinder, a piston operating therein having a projecting rod, a sheave to which the rod is eccentrically mounted, and a valve-controlled by-pass connecting with opposite ends of said cylinder.

11. In apparatus of the character described, the combination of a tank having an open end, of a filter-carrier movable in and out of said tank having a head adapted to form a closure for the open end thereof, and a counterweight mechanism connected with the carrier, said mechanism comprising a tank adapted to contain a liquid having a valve-controlled outlet, a sheave and a flexible connection from the counterweight tank extending over said sheave having its opposite end connected to the filter-carrier whereby the counterweight tank is lifted when the carrier is run out of its tank, means for supplying liquid to the counterweight tank to cause it to overbal-

ance the filter-carrier, and withdraw the same into its tank, and an automatic tripper by which the discharge valve of the counterweight tank is opened to discharge the contents of said tank.

12. In apparatus of the character described, the combination of a tank having an open end, a filter-carrier movable in and out of said tank having a head adapted to form a closure for the open end thereof, and a counterweight mechanism connected with the carrier, said mechanism comprising a tank adapted to contain a liquid having a valve-controlled outlet, a sheave and a flexible connection from the counterweight tank extending over said sheave having its opposite end connected to the filter-carrier whereby the counterweight tank is lifted when the carrier is run out of its tank, means for supplying liquid to the counterweight tank to cause it to overbalance the filter-carrier, and withdraw the same into

its tank, and an automatic tripper by which the discharge valve of the counterweight tank is opened to discharge the contents of said tank, and means for regulating the in and out travel of the filter-carrier.

13. In apparatus of the character described, the combination of a tank having an open end, a filter-carrier operable in and out of the tank having a head adapted to form a closure for the open end thereof, and a scraper blade secured to the filter carrier and fashioned to substantially conform to the inner wall of the tank, and adapted to scrape collected matter on the bottom of the tank and to advance the same through the open end of said tank.

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

DAVID J. KELLY.

Witnesses:

C. B. FELT,
GEO. F. FELT.