

No. 840,104.

PATENTED JAN. 1, 1907.

H. W. BLAISDELL.  
SCRAPING MACHINE FOR CLOSED FILTERS.

APPLICATION FILED NOV. 16, 1904.

4 SHEETS—SHEET 1.

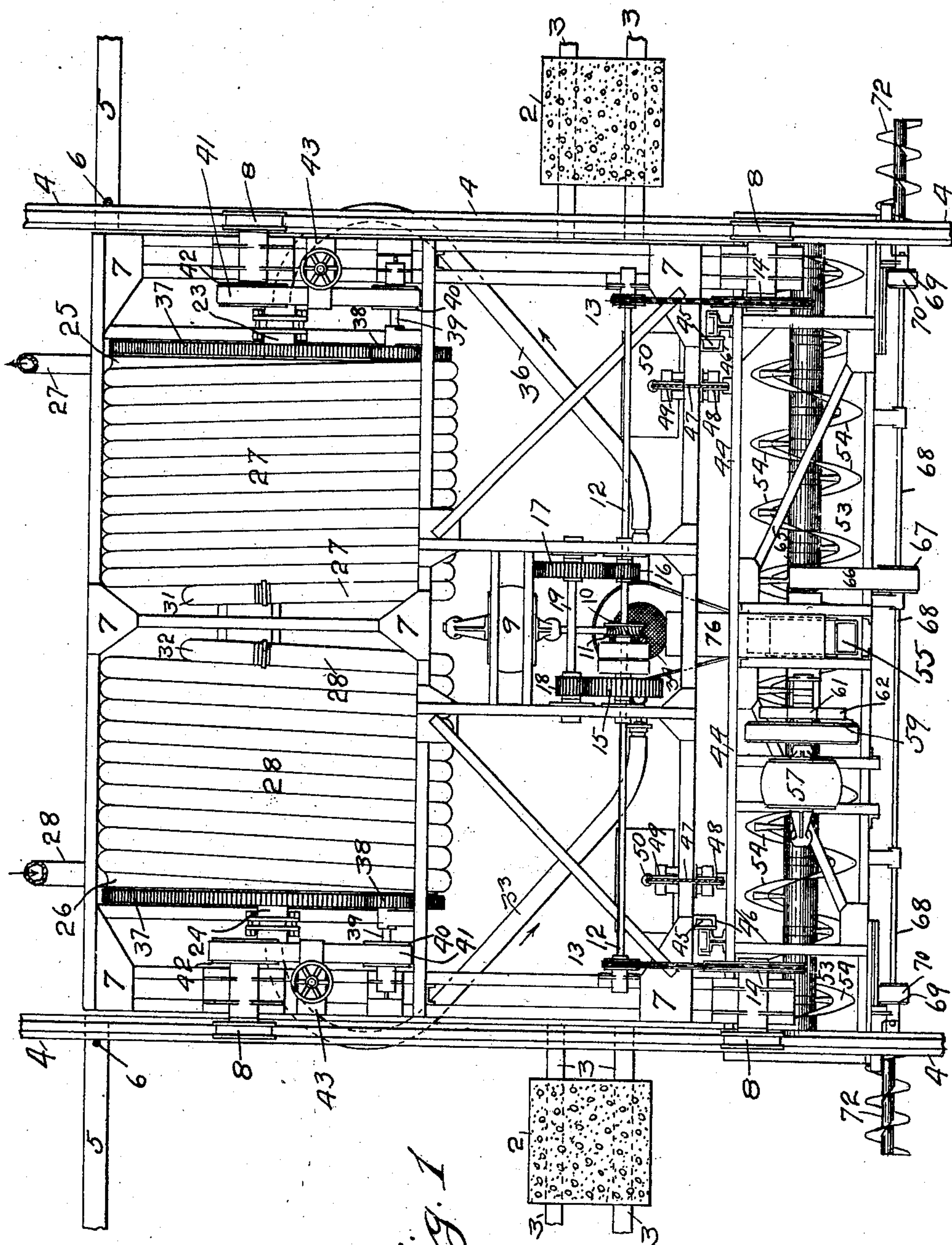


Fig. 1

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E. Freeman Gould.

INVENTOR

Hiram W. Blaisdell

BY

Stephen Rogers  
his ATTORNEY

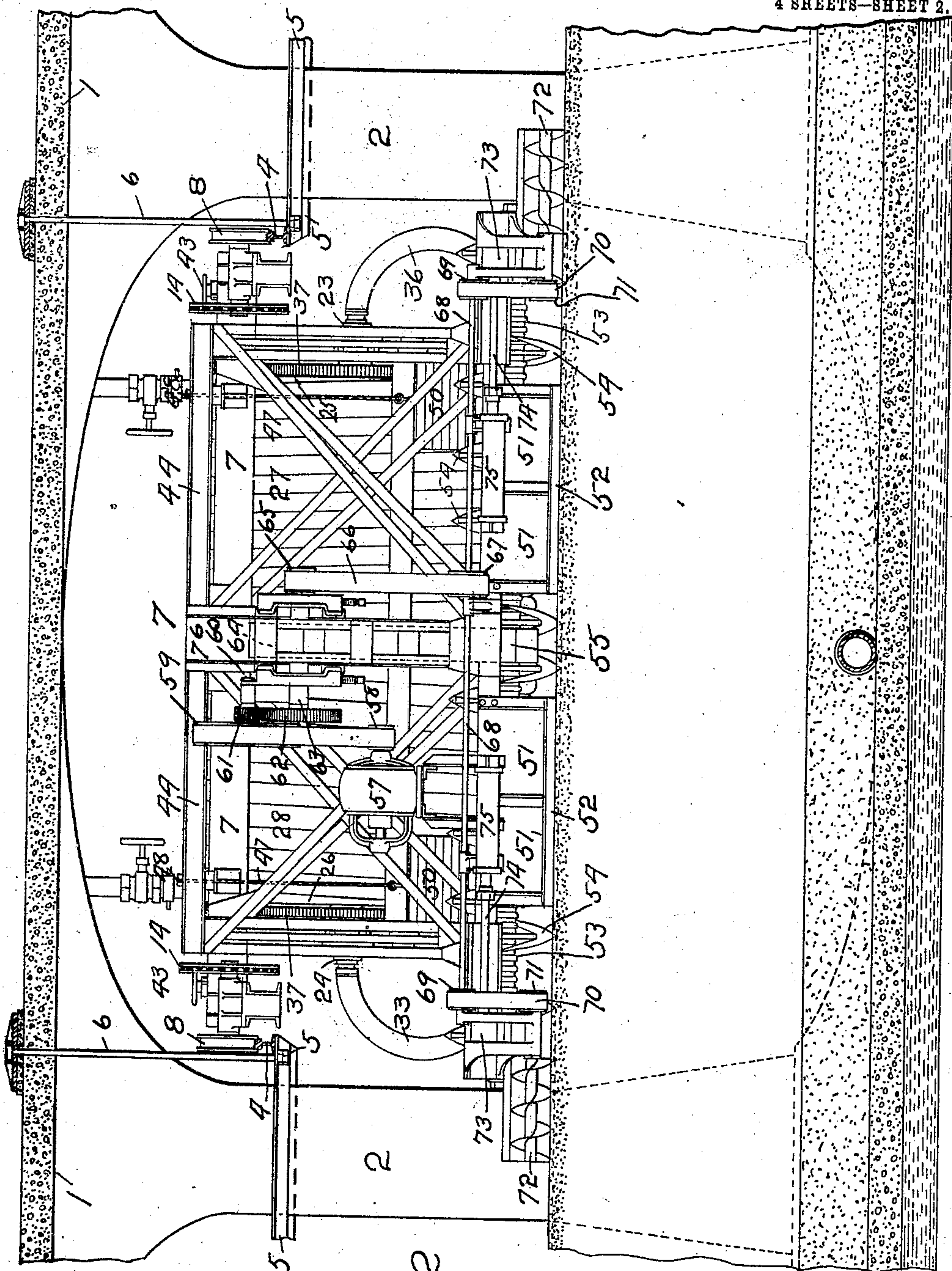
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4 SHEETS—SHEET 2.



WITNESSES:

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*Fig. 2*

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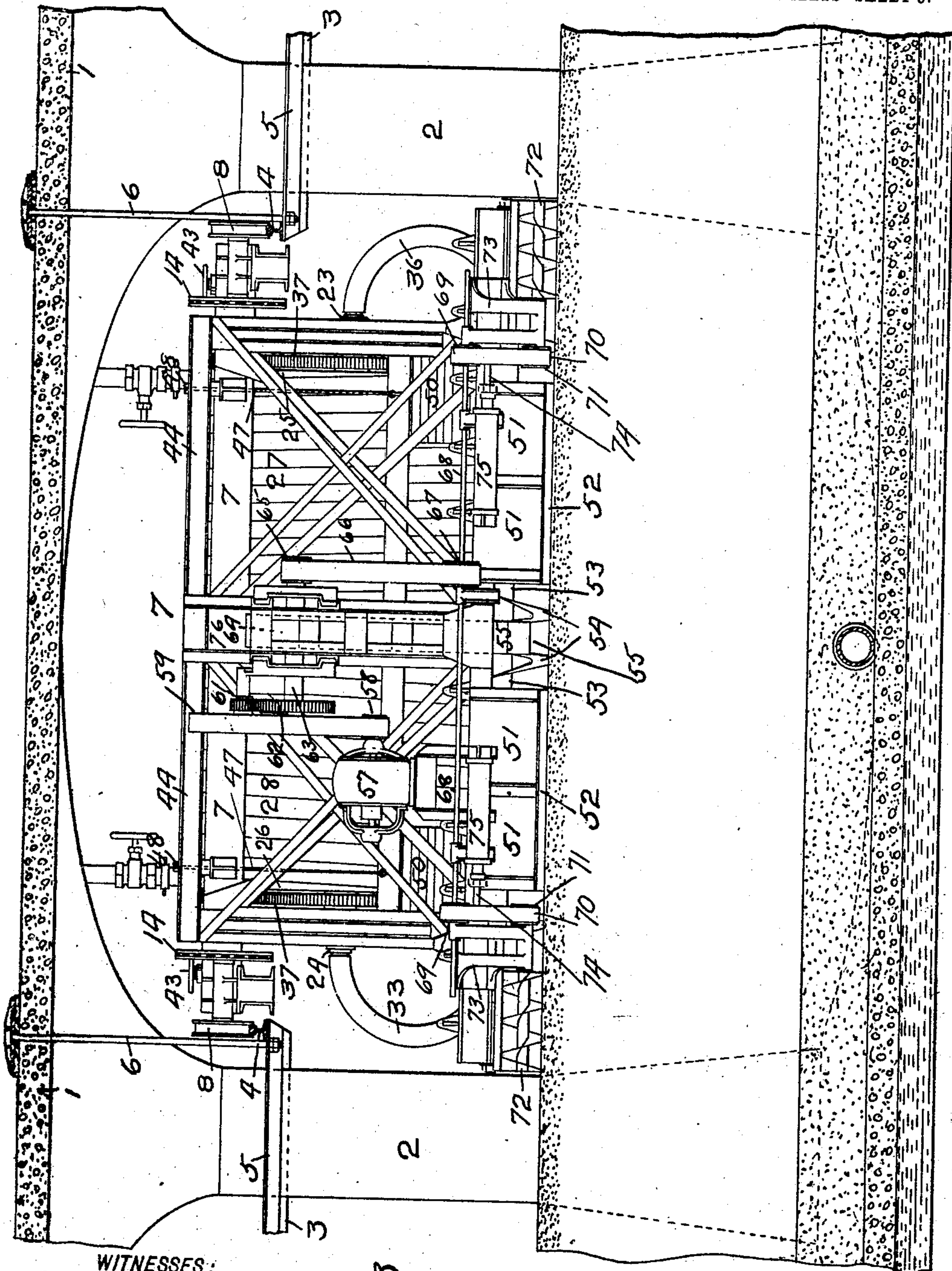
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4 SHEETS—SHEET 3.



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*Fig. 3*

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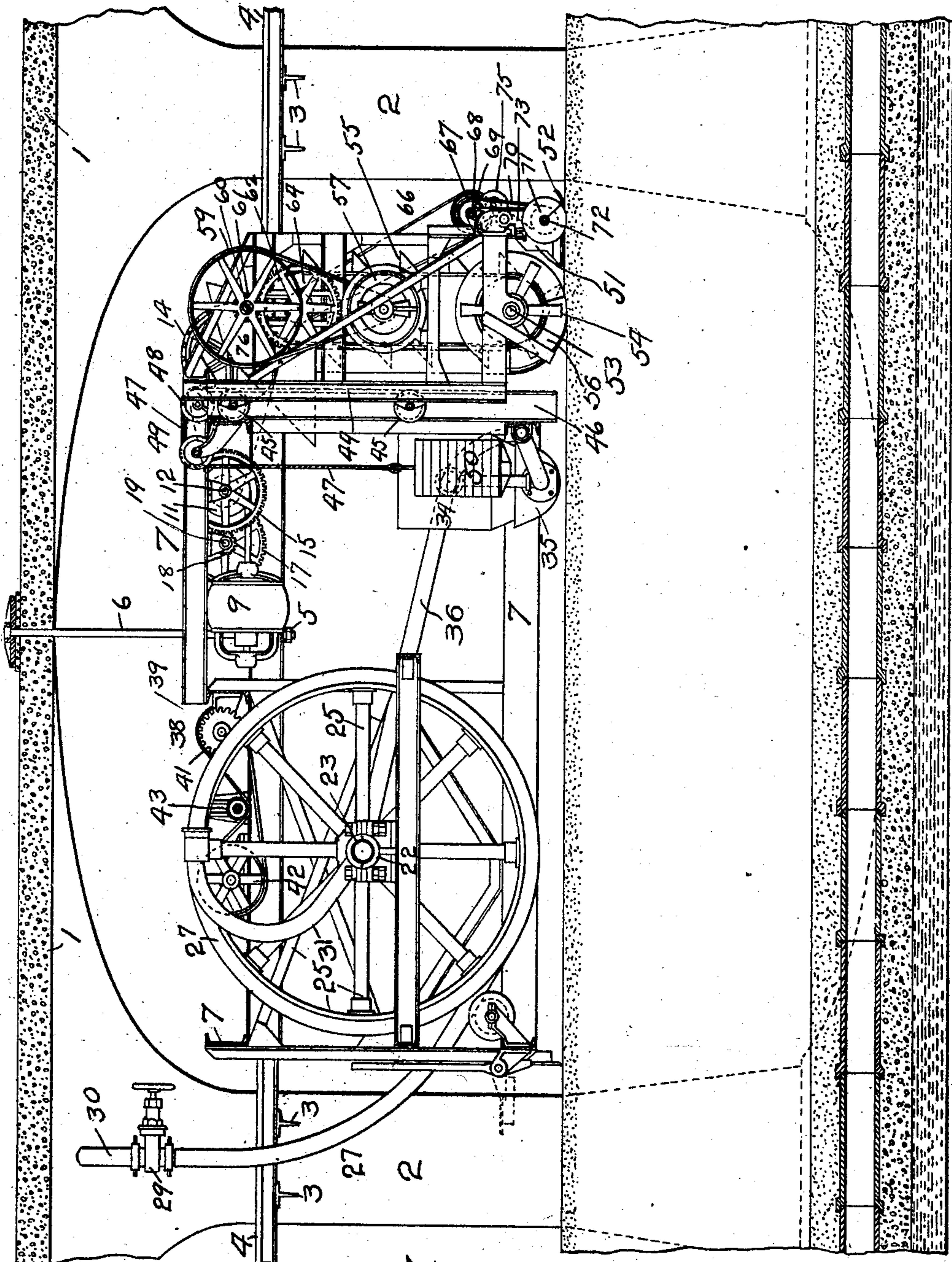
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4 SHEETS—SHEET 4.



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Fig. 4

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# UNITED STATES PATENT OFFICE.

HIRAM W. BLAISDELL, OF LOS ANGELES, CALIFORNIA.

## SCRAPING-MACHINE FOR CLOSED FILTERS.

No. 840,104.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed November 16, 1904. Serial No. 233,004.

*To all whom it may concern:*

Be it known that I, HIRAM W. BLAISDELL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Scraping-Machines for Closed Filters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines constructed to operate upon covered or obstructed filter-beds or filtration-works, and particularly to machines for removing a portion of the surface of slow sand filters; and some of the objects of the invention are to provide a machine of this character which will be simple and cheap in construction and efficient for the purpose intended.

Another object of the invention is to provide a machine constructed to travel beneath the covering or roof of covered or obstructed filter-beds and to be capable of movement over the entire area of the filter-beds.

A further object of the invention is to provide a machine constructed to operate upon covered filter-beds without exerting injurious or damaging pressure thereon and one wherein the amount of such pressure can be regulated.

It is also an object of the invention to provide a machine for covered or obstructed filter-beds constructed to remove a portion of the filtering material and transfer the same to any desired place of deposit.

Still another object of the invention is to provide a machine for removing material from partially or entirely covered filter-beds wherein fluid is supplied to the machine during the operation thereof to facilitate such removal.

Another object of the invention is to provide a machine for removing material from covered filter-beds constructed to operate between or around the supports for the covering of the filter-bed or other obstructions, so that the entire area or filtering-surface of the filter-bed can be operated upon.

With these and other objects in view the invention consists, essentially, in the construction, combination, and arrangement of parts substantially as more fully described in the following specification, and as illustrated

in the accompanying drawings, forming part of this application, in which—

Figure 1 is a top plan view of the scraping-machine in operative position, showing the covering of the filter-bed removed. Fig. 2 is a front elevational view of the same, illustrating the parts extended. Fig. 3 is a view similar to Fig. 2, showing the parts retracted; and Fig. 4 is a longitudinal central sectional view thereof.

Similar characters of reference designate corresponding parts throughout the several views.

This invention is particularly designed and constructed for use upon filtration-works or filter-beds which are partially or entirely covered or roofed over or which are constructed with obstructions in the form of columns, buttresses, or otherwise, by reason of which machinery capable of use upon open filter-beds cannot be employed and the transporting or treating of the filtering material is required to be done by hand or manual labor.

Whenever the yield of filtration-works or filter-beds is diminished to such a point or degree that enough water cannot be obtained therefrom, it is evident that the surface thereof has become clogged, and it then becomes necessary to "scrape" the filter-bed or remove the upper portion of the same, which is done by laborers, using shovels of extra width and long handles, who remove the surface portion of the filter-beds, varying from one-half to one inch in thickness, the filtering material removed being thrown into piles a convenient distance apart, whereupon boards are placed upon the scraped area or surface of the filter-beds, and the filtering material so piled up is shoveled into wheelbarrows and wheeled away to the place where the foul or contaminated material is to be treated or washed, thus requiring the expenditure of a great amount of time and money to scrape a filter-bed, besides injuring the same by reason of the weight or pressure exerted thereon during the foregoing lengthy and tedious operation.

Although this invention relates particularly to use upon covered or obstructed filtration-works or filter-beds and is so shown and described herein, yet it is in no manner confined or limited thereto, and the applica-



tion of this invention herein shown and described is only typical of one of the many uses of which the same is capable.

Referring to the drawings, and particularly to the construction illustrated in Figs. 2 to 4 thereof, the reference character 1 designates the covering or roof of a filtration-works or slow sand filter-bed, which covering is preferably of the groined-arch type, supported by columns or piers 2, provided with brackets or supports 3 to receive tracks or ways 4, and the latter may be provided with intermediate supports 5, suspended from the roof 1 by rods or hangers 6, substantially as shown in said figures. A traveling structure or frame 7 of any suitable construction is preferably provided with supporting-wheels 8, adapted to travel upon the tracks 4, which may extend longitudinally of each bay or gallery of the filtration-works or filter-beds, as will be understood by those skilled in the art to which this invention appertains.

An electric motor 9, Figs. 1 and 4, may be suitably mounted upon the traveling structure 7 and may be provided with suitable connections with a source of electrical supply, and the drive-shaft of this motor or other driving apparatus may be provided with a worm 10, engaging a worm-wheel 11 on a propelling-shaft 12, desirably provided with sprocket-wheels 13, chained to sprocket-wheels 14 upon the other end of the short shafts carrying the forward supporting-wheels 8, substantially as shown.

It may be found desirable to advance the machine at a slow rate of speed and retreat the same at a fast rate of speed. Therefore a set of differential gears may be employed for this purpose, a large and a small gear 15 and 16, respectively, being secured upon the propelling-shaft 12 and a large and a small gear 17 and 18, respectively, being mounted upon a counter-shaft 19.

In the rear portion of the traveling structure or frame 7 may be revolubly mounted in suitable bearings 22, Fig. 4, hollow shafts 23 and 24, whereon are secured reels or drums 25 and 26, respectively, carrying hose or flexible tubing 27 and 28, and the hose 27 is preferably provided with a valved coupling 29, constructed to be removably connected with a fixed outlet pipe or conduit 30, shown as located in the covering 1 of the filter-bed and terminating at the place desired for the discharge of the foul fluid, and the other end of the hose 27 is desirably provided with a connection 31, movably attached to one end of the hollow shaft 23, while the hose 28 is provided with a connection 32 with the hollow shaft 24, as will be readily understood. The other end of the hose 28 is connected with the source of fluid-supply, preferably under pressure, so that fluid is thus delivered to the machine through the hose 28, connec-

tion 32, hollow shaft 24, and pipe 33, movably connected thereto and to the receiver 34, Figs. 1 and 4, or preferably with a hydraulic sand-ejector 35 of the usual construction, by means of which the foul material is forced from the receiver 34, through the pipe 36, connected with the outlet thereof and with the end of the hollow shaft 23, through the latter, the connection 31, and hose 27 to the outlet-pipe 30, to the place of deposit.

When the machine is progressed in a forward direction, it will be understood that the hose 27 and 28 will be unwound or paid out until the machine shall have reached the end of the bay or gallery wherein it is operating, whereupon the travel of the machine will be reversed and the hose 27 and 28 will preferably be rewound upon the reels 25 and 26 by means of large gear-wheels 37, formed on or connected with the reels 25 and 26, meshing with suitable idlers (not shown) driven by pinions 38 on shafts 39, carrying pulleys 40, connected by belts 41 with pulleys 42 on the shafts of the rear supporting-wheels 8, and take-up or tensionizing devices 43 are preferably provided for the belts 41, so that they may be slacked up or loosened when the machine is traveling in a forward direction to permit the reels 25 and 26 to unwind by the pull on the hose 27 and 28; but the take-up devices 43 are used to tighten the belts 41 to effect the rotation of the reels 25 and 26 when the machine is traveling in a rearward direction, thereby rewinding the hose 27 and 28 thereon.

In or upon the forward portion of the machine is preferably movably mounted a frame or support 44 of suitable construction and material, desirably provided with small wheels or rollers 45, adapted to travel in or upon channel irons or ways 46 in the forward portion of the traveling structure or frame 7, and ropes or chains 47 are preferably attached to the movable frame 44 and pass up over sheaves 48 and 49 and are connected with counterweights 50, whereby the pressure exerted by the movable frame 44 upon the filter-bed can be regulated. On the forward part of frame 44 is fastened a box 51 or other suitable means, adapted to bear upon the filter-bed and provided with a curved shoe 52, adapted to slide over the surface of the filter-bed.

In bearings connected with the lower portion of the movable frame 44 is preferably revolubly mounted a horizontal shaft 53, desirably provided with helical vanes or flights 54, constructed to remove the upper or surface portion of the filter-bed or other area and progress the removed material toward the middle of the machine, where it is preferably taken up by a bucket elevator 55 or other device, desirably passing around and driving a pulley or drum 56, secured upon the flight-shaft 53, substantially as shown.



An electric motor 57, having suitable connection with a source of electrical supply, may be mounted in or upon the movable frame 44, and the drive-shaft of the motor may carry a pulley 58, belted to a band-wheel 59 on a shaft 60, carrying a pinion 61, meshing with a gear-wheel 62 on a shaft 63, preferably carrying the drive-pulley 64 of the elevator 55, and also a pulley 65, connected by a belt 66 with a pulley 67 on a horizontal shaft 68, as will be readily understood.

Upon the shaft 68 are feathered pulleys 69, connected by a belt 70 with pulleys 71 on the wing or auxiliary conveyer 72, revolvably mounted in sliding bearings 73, preferably connected with the piston-rods 74 of hydraulic cylinders 75, having suitable fluid connections whereby the auxiliary conveyers may be extended, as shown in Figs. 1 and 2, or retracted, as illustrated in Fig. 3 of the drawings, in order that the surface between or in line with the piers 2 may be scraped simultaneously with the surface in the bay or gallery wherein the machine is operated.

If found desirable in practice, a chute or guideway 76 may be suitably mounted in the movable frame, constructed to receive the material raised by the elevator and discharge the same into the receiver 34, and a folding platform may likewise be provided at the rear of the machine for the operator thereof.

The operation of the invention will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following explanation thereof. The machine is placed in operating position, preferably at one end of a bay or gallery of a covered slow sand filter-bed, and the outlet and inlet hose 27 and 28, respectively, are connected with the outlet-pipe 30 and the source of fluid-supply, whereupon the propelling-motor 9 is started, thereby rotating the worm 10, which drives the worm-wheel 11 on the propelling-shaft 12, carrying the sprocket-wheels 13, chained to the sprocket-wheels 14 upon the shafts of the forward supporting-wheels 8 of the machine, thereby imparting motion thereto at a slow rate of speed. The actuating-motor 57 is likewise started, thereby actuating the driving-pinion 58 on the drive-shaft thereof, which pinion is belted to the band-wheel 59 on the shaft 60, also carrying the pinion 61, driving the large gear-wheel 62 on the shaft 63 of the driving-pulley 64 of the elevator 55, the tail-pulley whereof is preferably keyed to the main conveyer-shaft 53, whereby the latter is revolved by the travel of the elevator, as will be readily understood. The shaft 63 of the driving-pulley of the elevator carries a belt-pulley 65, connected by a belt 66 with a belt-pulley 67 on a horizontal actuating-shaft 68, provided with pulleys 69, belted to pulleys 71 on the shafts 72 of the wing-conveyers to effect

the rotation of the latter, and the wing-conveyers are extended, as shown in Figs. 1 and 2, and retracted, as illustrated in Fig. 3, by means of the piston-rods 74 of the hydraulic cylinders 75, which are provided with suitable operating connections.

By means of the construction just described the main conveyer 53, with its oppositely-inclined flights 54, is made to scrape or remove the upper surface of the filter-bed toward the middle of the machine, where it is delivered to the buckets of the elevator and raised thereby into the chute 76, to be thereby directed into the receiver 34, from which the material is discharged in the following manner.

Fluid is conveyed to the machine under pressure from a source of fluid-supply through the inlet-hose 28, the hollow shaft 24, the connection 33 to the receiver 34 or hydraulic sand-ejector, and the liquid thus conveyed passes out of said receiver or ejector under sufficient pressure to carry with it the foul filtering material and impregnated or contaminated fluid which has been discharged into the receiver, as will be readily understood by those skilled in the art to which this invention appertains. From the receiver or the ejector the foul material and contaminated fluid passes through the outlet connection 36, the hollow shaft 23, and the outlet-hose 27 to the outlet-pipe 30, which conveys the same to the desired place of discharge or deposit.

It is to be understood that this invention is not limited to the specific manner of propelling the traveling structure or operating the elevator or driving the main and auxiliary conveyers from the elevator, or extending or retracting the auxiliary conveyers, and the mechanism illustrated and described therefor is only typical, being capable of modification and change without departing from the character of the invention, and all such other changes in and modifications of the invention may be made in practice as come within the spirit and scope of the invention.

I claim—

1. A covered filter provided with supporting means beneath the cover, a machine constructed to travel thereon, means carried by said machine for removing a portion of the filtering material and mechanism for operating the parts.

2. A covered filter provided with suspending means beneath the cover, a traveling structure constructed to move in engagement with said means, mechanism supported by said structure for removing a portion of the filtering material and instrumentalities for operating the parts.

3. A covered filter provided with supporting means beneath the cover, a traveling structure suspended therefrom, mechanism



movably connected with said structure for removing a portion of the filtering material and instrumentalities for operating the parts.

4. A covered filter provided with supporting means beneath the cover a structure suspended from said means above the surface of said filter, mechanism partially supported by said structure constructed to contact with said filter-surface to remove the filtering material and instrumentalities for operating the parts.

5. A filter provided with a covering supported by piers, supporting means beneath the covering, a machine constructed to travel on said supporting means beneath said covering and between said piers and to remove the filtering material and mechanism for operating the parts.

6. A machine constructed to travel on fixed supports within closed filters provided with means for removing the filtering material from the filter, devices for effecting the discharge of the material so removed and mechanism for operating the parts.

7. A machine constructed to operate upon fixed supports within covered filters provided with devices for scraping a predetermined portion of the filtering material from the filter and means for operating the parts.

8. A machine constructed to operate from fixed supports within covered filters provided with means for scraping the surface of the filter mechanism for removing the scraped filtering material and instrumentalities for operating the parts.

9. A covered filter provided with suspending means beneath the cover, mechanism supported therefrom constructed to scrape the surface of the filter and instrumentalities for operating the parts.

10. A covered filter provided with supports beneath the cover, means constructed to travel on said supports within the covering of the filter and adapted to scrape the filter and instrumentalities for operating the parts.

11. A machine constructed to operate from fixed supports within the covering of closed filters provided with means for removing a predetermined portion of the filtering material, a device constructed to contact with the surface of the filter to regulate the depth of the material removed and mechanism for operating the parts.

12. A machine constructed to operate from fixed supports within covered filters provided with means for scraping the filter, a shoe carried by said means constructed to slide over the filter-surface to regulate the cut thereof and mechanism to operate the parts.

13. A machine constructed to operate from fixed supports within covered filters provided with means for scraping the filter, an adjustable shoe carried by said means

constructed to slide over the filter-surface to regulate the cut thereof and mechanism to operate the parts.

14. A covered filter provided with supports beneath the cover, scraping means constructed to engage said supports, a device carried by said means to regulate the depth of the cut and mechanism for operating the parts.

15. A covered filter provided with supports beneath the cover, scraping means constructed to engage said supports, an adjustable shoe carried by said means to regulate the depth of the cut and mechanism for operating the parts.

16. A machine for operating from fixed supports within covered filters provided with means for removing a portion of the filtering material, apparatus for effecting the discharge of the material and mechanism for operating the parts.

17. A machine for operating from fixed supports within covered filters provided with means for effecting the removal of a portion of the filtering material during the travel of the machine over the surface of the filter, apparatus for effecting during said travel the discharge of the material so removed and mechanism for operating the parts.

18. A machine for operating from fixed supports within covered filters provided with means for removing a portion of the filtering material, means for discharging the removed material, a fluid-vehicle to cooperate with said last-named means, connections between said means and the source of fluid-supply and place of deposit of the removed material and mechanism for operating the parts.

19. A machine for operating from fixed supports within covered filters provided with means for removing a portion of the filtering material, a fluid-vehicle to cooperate with said means, connections between the source of fluid-supply and place of deposit adapted to effect the continuous discharge of the removed material throughout the travel of said means and mechanism for operating the parts.

20. A machine for operating from fixed supports within covered filters provided with means for removing a portion of the filtering material, discharging apparatus fixed in relation to the filter and connections carried by said means constructed to permit the travel of said means while effecting the continuous discharge of the removed material.

21. A machine for operating upon covered filters provided with means for removing a portion of the filtering material, a fluid-vehicle to cooperate with said means, flexible connections between said means and the source of fluid-supply and between said means and the place of discharge of the removed material and mechanism for operating the parts.



22. A machine for operating upon covered filters provided with means for removing a portion of the filtering material, a discharging device, a fluid-vehicle to coöperate with said device, flexible connections between said device and both the source of fluid-supply and place of discharge of the removed material, apparatus for supporting said connections and mechanism for operating the parts.

23. A machine for operating upon filter-beds provided with means for removing a portion of the filtering material, a discharging device, a fluid-vehicle to coöperate with said device, reels, induction and eduction hose on said reels respectively connected with said device and the source of fluid-supply and place of deposit of said removed material and mechanism for operating the parts.

24. A machine for operating upon filter-beds provided with means for removing a portion of the filtering material, a discharging device, reels, hose thereon connected with said device, apparatus to operate said reels to wind or unwind said hose during the travel of the machine and mechanism for operating the parts.

25. A machine for operating upon filter-beds provided with devices for removing the filtering material having a compound motion in the same plane and mechanism for operating the parts.

26. A machine for operating upon filter-beds provided with conveyers for removing the surface of the filter-bed, said conveyers having a double movement in the same plane in relation to the machine and mechanism for operating the parts.

27. A machine of the character described provided with conveyers, means for imparting a rotary and a reciprocating motion thereto in the same plane whereby the efficiency of the machine is increased and mechanism for operating the parts.

28. A machine of the character described provided with a main conveyer, auxiliary conveyers and mechanism for operating the parts.

29. A machine of the character described provided with a main device for removing material, extensible and retractable auxiliary devices and mechanism for operating the parts.

30. A machine of the character described provided with a main conveyer, extensible and retractable conveyers, means for effecting such extension and retraction and mechanism for operating the parts.

31. A machine of the character described provided with a main scraper, auxiliary scrap-

ers, means for regulating the cut of the scrapers and mechanism for operating the parts.

32. A machine of the character described provided with a main scraper, auxiliary scrapers, adjustable means for automatically regulating the cut of said scrapers and mechanism for operating the parts.

33. A machine of the character described provided with a main scraper, auxiliary scrapers, an elevator taking the material therefrom, apparatus to discharge the elevated material and mechanism for operating the parts.

34. A machine of the character described provided with a main conveyer, auxiliary conveyers, an elevator driving said conveyers, means for discharging the elevated material and mechanism for operating the parts.

35. A machine of the character described provided with a main scraper, auxiliary scrapers, an elevator, a receiver for the material raised by the elevator, apparatus for discharging the material from said receiver and mechanism for operating the parts.

36. A machine of the character described provided with a main scraper, auxiliary scrapers, devices for extending or retracting the latter, an elevator driving said scrapers shoes to regulate the cut of said scrapers, apparatus for discharging the material reels for supporting part of said apparatus operated by the travel of the machine and mechanism for propelling the machine and for operating the elevator.

37. A covered filter provided with supporting means beneath the cover, mechanism supported thereby, an ejector carried by said mechanism and instrumentalities for operating the parts.

38. A filter provided with a covering supported by piers, means carried by said piers beneath said covering to receive a machine, a machine constructed to engage said means to effect the removal of material and mechanism for operating the parts.

39. A filter provided with a covering having suitable supports, tracks connected with said supports beneath said covering, a scraping-machine constructed to travel on said tracks and mechanism for operating the parts.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles, State of California, this 2d day of November, 1904.

HIRAM W. BLAISDELL.

Witnesses:

H. T. MORROW,  
MIGNON FORD.