

85 slidably mounts a piston 86, the function of which will be hereinafter described.

The operation of the filter shown in FIG. 3 is similar in many respects to the operation of the filters shown in FIGS. 1 and 2. Thus, the unfiltered fluid is forced through port 49 to drive the hydraulic motor 46 and then discharges through conduit 52 into the lower end of the filter unit where it undergoes a first filtration through the screen 53. The partially filtered fluid then flows through the main portion of the housing 1 into the filter elements 12 to be discharged through the open ports 16 thereof into the chamber 23 and then out of the discharge port 26. By reason of the motor 46, the shaft 72 is rotated in an intermittent manner through the Geneva drive plate 61 to effect step by step movement of both of the arms 27 and 71 so that their respective openings 35, 78 move step by step into alignment with the openings 17, 16 respectively.

When the openings 35 and 78 of the arms 27 and 71 are at rest, aligned with one of the filter elements, for example, the filter element 12' shown in FIG. 3, a portion of the unfiltered fluid will pass through the aligned openings 84 and 75 in disc 82 and plate 11 to enter into the portion of cylinder 85 below the piston 86 thereof. This will cause the piston 86 to move upwardly in the cylinder to react against the filtered fluid contained in the upper portion of the cylinder which was charged therein when the openings 81 and 76 in disc 74 and plate 8 were aligned during the movement of arm 71 from one rest position to the next adjacent rest position. Since the associated openings 81 and 76 are closed when the arm 71 is at rest position over one of the filter elements 12 and the associated openings 79 and 76 are aligned, the filtered fluid in the upper part of the cylinder 85 will be forced by the upward movement of the piston 86 through such aligned openings 79 and 76 and through passageway 77 and opening 78 into the bore of the stacked washers of filter element 12' to flow in reverse direction through the grooves in such washers to dislodge the particles that have obstructed or clogged the inlet to each of the grooves on the outer periphery of the stack of washers. Such particles will then flow downwardly through the jacket into the opening 35 of arm 27 and pass through passageway 34 thereof to be discharged through conduit 39 and discharge port 41.

While this occurs, the partially filtered fluid will of course flow through the other filter elements 12 in manner described with respect to the embodiments shown in FIG. 1 to be filtered and discharged into chamber 23 and through discharge port 26.

When the motor 46 causes the ganged arms 27 and 71 again to rotate to the next position through the Geneva drive plate 61, during the course of such movement the openings 35 and 78 of arms 27 and 71 will be closed by the plates 11 and 8 and the ports 76 and 75 in plates 8 and 11 associated with openings 79 and 84 will be closed. At this time also, the upper portion of cylinder 85 above the piston 86 will be in communication with the chamber 23 through the associated aligned openings 81, 76 and the portion of the cylinder 85 below piston 86 will be in communication with the passageway 34 of arm 27 through the associated aligned openings 75 and 83.

As a result, it is apparent that as the arms 27 and 71 move from alignment with one of the filter elements into alignment with the next adjacent filter element, the fluid under pressure in chamber 23 which enters the upper portion of cylinder 85 will force the piston 86 downwardly, discharging the fluid beneath the piston through aligned openings 75 and 83 and through the vertical passageway in hub 28, thence through conduit 39 for discharge through port 41 into a collecting tank.

The embodiment shown in FIG. 8 is similar to the embodiment shown in FIG. 3 except that the single piston 86 of the embodiment of FIG. 3 is replaced by a differential piston assembly comprising pistons 86a and 86b, the former being of larger diameter than the latter. The cylin-

der 85 associated with pistons 86a, 86b has two axially aligned portions 85a, 85b, the former being of larger diameter than the latter to accommodate the associated pistons 86a, 86b. The larger diameter portion of the cylinder 85 defines an annular shoulder which has a port 91 connected by conduit 92 to discharge port 93 leading out of the housing 1, said conduit 92 defining an air vent between the pistons 86a, 86b.

The operation of the equipment shown in FIG. 8 is identical to that of the embodiment shown in FIG. 3 except that by reason of the larger diameter piston 86a, the pressure provided against the filtered fluid contained in the upper portion of cylinder 85 above piston 86b will be greater and provide for more effective cleaning of the filter elements.

With the equipments above described, it is apparent that continuous filtering action will be provided during the operation of the unit while at the same time there will be step by step cleaning of one of the filter elements at a time and the same fluid that is being filtered is used to effect such automatic cleaning operation.

As many changes could be made in the above equipments, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Equipment for filtering particles from fluids, comprising a container having a chamber at its upper end, having a floor defined by a plate extending transversely across the container spaced from the top wall thereof, said plate having a plurality of circumferentially spaced openings therethrough, said chamber having a discharge port for filtered fluid, a plurality of filter elements positioned in said container between said chamber and the lower end of said container and arranged in a circle circumferentially spaced from each other, each of said filter elements comprising a cylindrical jacket extending parallel to the longitudinal axis of said container, a filter column in each of said jackets, each filter column having a central bore in communication at its upper end with said plurality of circumferentially spaced openings, the lower end of said central bore being closed, said jacket having a closed upper end through which the bore extends and an open lower end, defining the inlet to the filter column therein, a second plate positioned in said container longitudinally spaced from the first plate and parallel thereto, said second plate having a plurality of circumferentially spaced openings aligned respectively with the openings in said first plate, the lower end of each of said jackets being in communication respectively with each of the openings in said second plate, said filter column permitting flow of fluid therethrough from the outer surface thereof into said bore but restraining passage of such particles, means to provide flow of unfiltered fluid into said container, a discharge port for said filter elements, an arm rotatable on an axis longitudinally aligned with the axis of said container and the axis of said circumferentially spaced filter elements, said arm having a passageway therethrough, the free end of said arm being movable in a circle aligned with said circumferentially spaced openings in said second plate and being retained against the undersurface of said second plate to define a sliding seal with respect thereto, the free end of said arm having an opening in communication with one end of the passageway therein and movable into alignment with each of the openings in said second plate as said arm is rotated, the other end of said passageway having a port and a conduit leading from said filter column discharge port to the port at the other end of said passageway and in constant communication therewith, whereby the filtered fluid under pressure in said