April 18, 1933. G. G. McARTHUR 1,904,066

BOOK STOCK WASHER

Filed May 25, 1931 4 Sheets-Sheet 1

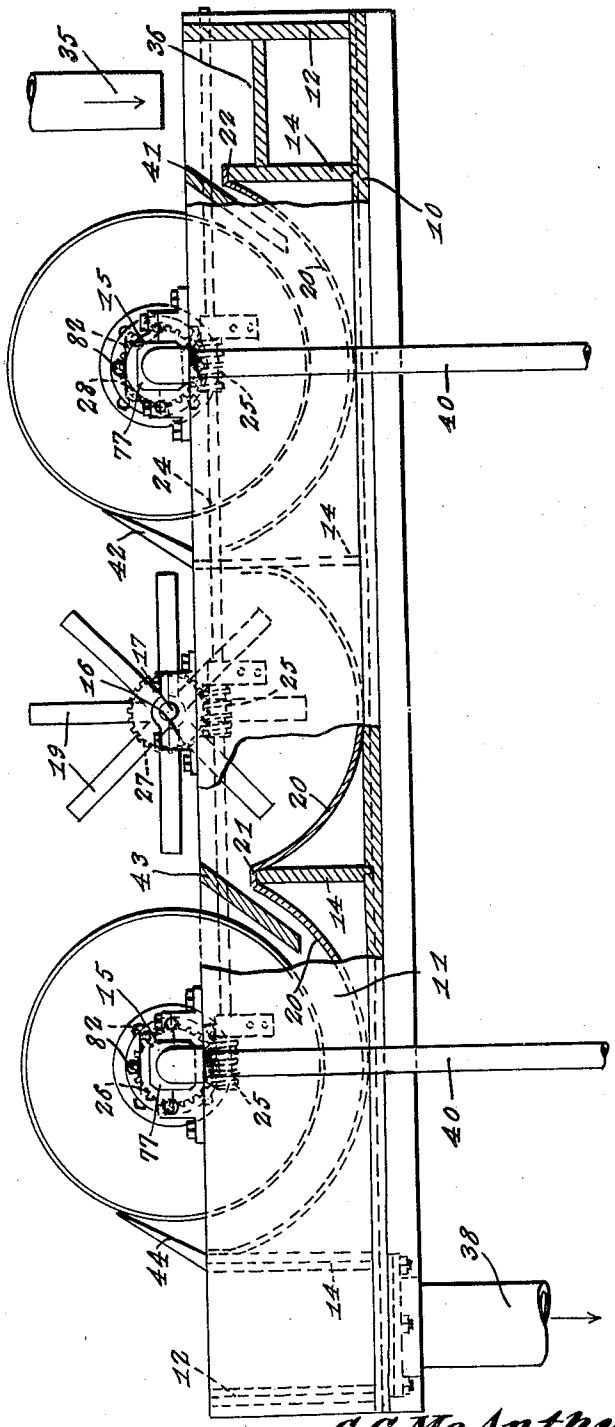


Fig. 1.

G. G. McArthur, INVENTOR

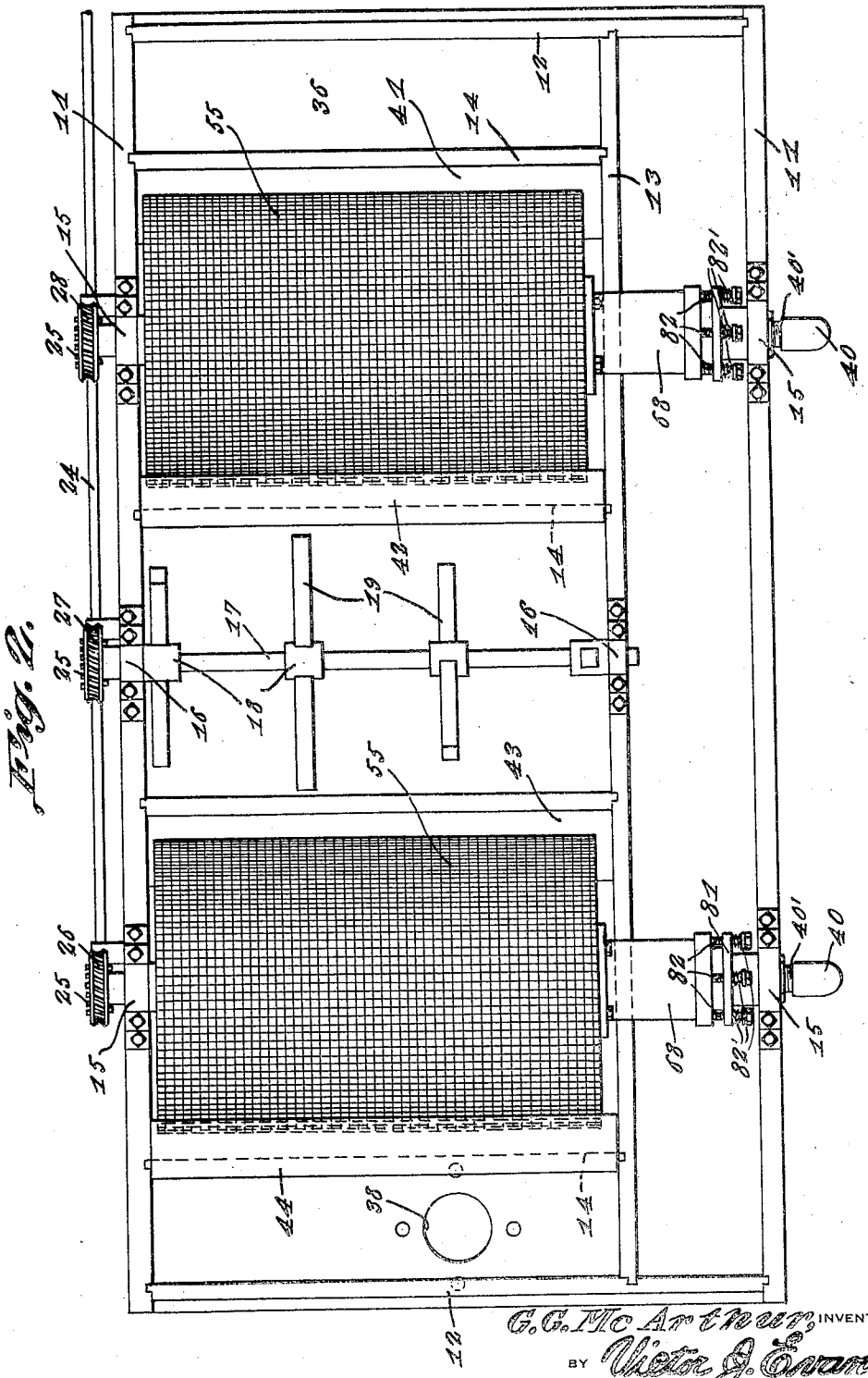
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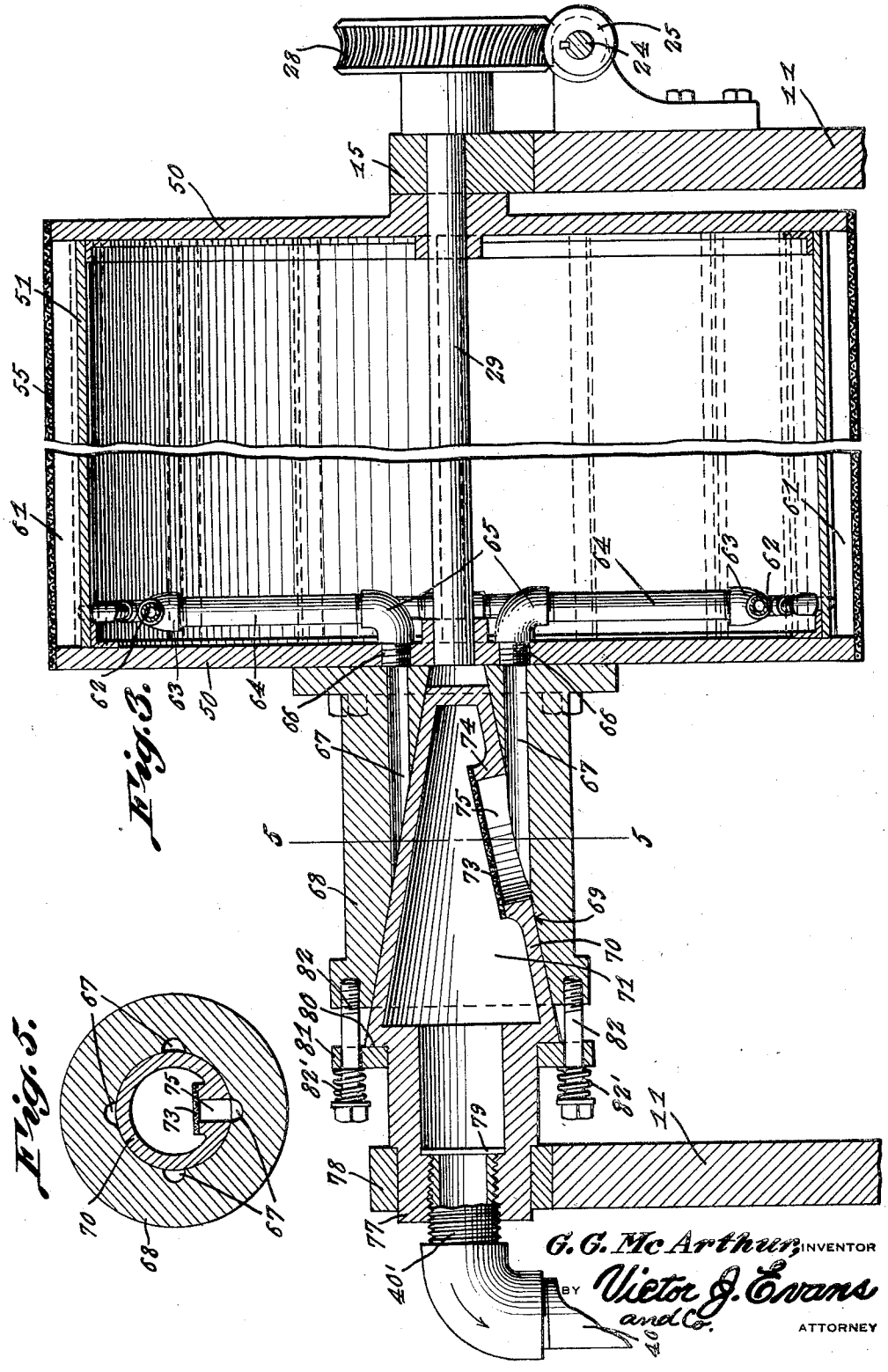


Fig. 3.

Fig. 5.

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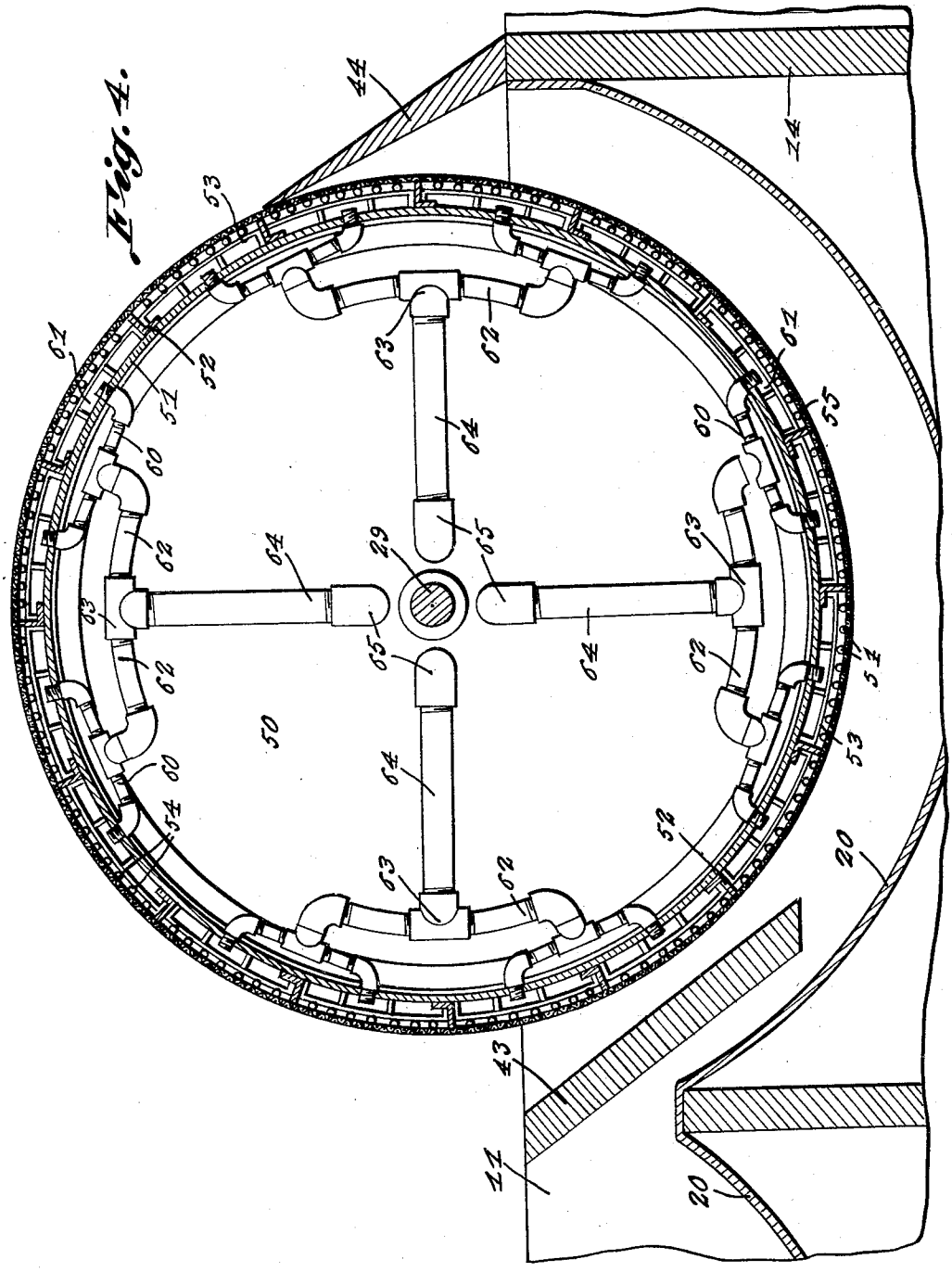
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BOOK STOCK WASHER

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Fig. 4.



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Patented Apr. 18, 1933 1,904,066

UNITED STATES PATENT OFFICE

GEORGE G. McARTHUR, OF NIAGARA FALLS, NEW YORK

BOOK STOCK WASHER

Application filed May 25, 1931. Serial No. 539,907.

The object of this invention is to provide means for removing printer's ink and dark water from paper stock obtained from discarded books and the like, after the stock has been cooked in accordance with the usual procedure in handling this class of material.

A further object is to provide an apparatus which shall include a main tank with water inlet and outlet connections, the tank mounting a plurality of rotatable cylinders and an intermediate agitating device, all of which elements are geared to a line shaft, said cylinders being of special construction and having special suction means incorporated therein.

A further object is to provide a particular form of valve controlling the suction through the cylinders, the valve including an outlet leading to a suction pump or to some other discharge element.

With the foregoing and other objects in view, the invention consists in the novel features of construction and in the novel arrangement of the elements herein disclosed, it being understood that modifications, alterations or changes may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming part of this application:—

Figure 1 is a view in longitudinal section and elevation, showing the principal elements of the construction, some of these elements appearing diagrammatically or conventionally.

Figure 2 is a top plan view of the apparatus.

Figure 3 is a view in vertical section through one of the suction cylinders, the view being in a plane with the axis of rotation, and the valve, valve casing and connections being shown.

Figure 4 is a section through one of the cylinders in a direction transversely of the axis of rotation, the view also showing a portion of the structure below the cylinder.

Figure 5 is a section through the valve and its casing, the section being on line 5—5 of Figure 3.

A main tank or receptacle includes a bottom 10, side walls 11, and end walls 12. A longitudinal member 13 extends between the end walls 12 and transverse members 14 are positioned between the element 13 and the wall 11 located on the remote side of the tank.

Bearings, such as 15, are provided on the walls 11, for mounting cylinders appearing at the right and left of Figure 2. Other bearings 16 serve to support the shaft 17 mounting the agitating device at the center of Figure 2, and including the hub portion 18 and the radial arms 19.

A plurality of concave elements, such as those shown at 20, are provided beneath the cylinders and beneath the central agitating device, these concaves being supported on the transverse elements at points 21, 22 and the like.

In order to drive all of these rotary elements, I provide a line shaft 24 carrying the worms 25, and the latter meshing respectively with worm wheels 26, 27, 28. The cylinders are each provided with a shaft 29, and shaft 17 of the agitating device serves the corresponding purpose, the two cylinders and the agitating device being geared to the line shaft as disclosed in Figure 2.

Each cylinder is provided with suction means, but it should be stated that the washing fluid is admitted from inlet pipe 35, a transversely extending trough is shown at 36, and the fluid passes through the concave elements 20 and through outlet pipe 38.

Each cylinder is provided with pipes connected with an outlet valve casing, and the latter is in communication with pipe 40 leading to a suction pump, or to some other point of discharge. Boards 41, 42, 43, 44 are positioned as shown, and elements 42 and 44 extend upwardly and are in direct contact with the surface of the cylinders, for removing any material tending to adhere thereto. The elements 41 and 43 guide or deflect the fluid in proper direction with reference to the concave elements 20 and the surface portions of the rotatable cylinders.

Each cylinder includes head or end members 50, and an enclosing wall 51, and on the latter a plurality of angular bars or the like designated 52 are adapted to support

plates 53 of sheet metal. Wires 54 are welded electrically to the sheet metal plate and directly support the wire mesh 55 of the cylinders. The mesh provides a peripheral wall, and the material being treated is drawn against this wall by suction through low pressure pipes 60, and is loosened from the wire mesh by engagement with boards 42, 44, as indicated.

Chambers are produced between the walls 51 and the metallic plates 53, in view of the angle bar construction, and suction pipes 60 are in communication with these chambers, the latter being designated 61, said pipes having a plurality of entrance ports if desired, or open ends. These pipes are in communication with pipes 62 connected with T elements 63. The connections just referred to constitute a portion of the suction system, and are in communication with radial pipes 64, and the latter are connected with elbows 65 mounted at 66 in the heads 50 of each cylinder. Suction is established through these connections and their channels 67 in the casing 68 extending horizontally with reference to the axis of each cylinder and concentric with reference to the axis of shaft 29.

The valve casing or housing 68 is provided with a tapered bore 69, and a tapered valve 70 enters this chamber or bore, and is itself provided with a bore 71 through which circulation toward the left is established through the channels 67, and thence through strainer 73 carried by the portion 74 adjacent to port 75 in the valve under consideration. The valve is stationary in each instance, and the cylinders formed with heads 50 rotate with reference to the respective valves, each valve casing 68 being also rotatable with the cylinder with which it is associated, because of direct connection with one of the heads 50 of the cylinder.

Each valve includes the portion 77 which may be angular in cross section, having flattened outer portions, and in order that the valve may be held stationary when desired, an enclosing member 78 is mounted on the adjacent tank wall, or other stationary element. The end portion 77 of the valve is provided with a bore for accommodating the threaded pipe connection 40′ of the outlet duct 40. A strainer is shown at 79, serving an obvious purpose at that point.

Valve 70 is further provided with an annular shoulder 80 engaged by a retaining member 81 through which adjusting bolts 82 pass, these bolts entering the end of the casing 68, and the shank portion of the bolts being surrounded by coiled springs 82′ between elements 81 and the heads of the bolts, whereby a resilient mounting with reference to longitudinal movement is afforded, the tapered valve being held to seat in an obvious manner.

For cut-off purposes, the valve may be rotated to a position in which the port 75 will be out of registration with one of the channels 67, partial cut-off may be similarly effected, and the degree of rotation is in accordance with the results desired.

In operation, the material to be treated or washed is carried from trough 36 by the current of water or washing fluid admitted through pipe 35, and is directed between the cylinder at the right of Fig. 1 and the concave element 20. Low air pressure or suction in pipe 40 produces low pressure in the outer chambers of the cylinder, within wire mesh 55, and the stock being washed adheres to the mesh until removed by board 42, from which it discharges to the space between the arms 19 of the agitating device and the concave element 20 below the arms.

The washing fluid then passes below board 43 and below the left cylinder, where stock or material carried along by the current adheres to the surface of the cylinder until removed by inclined board 44, and the reclaimed or washed material being suitably disposed of.

One of the cylinders in which low air pressure is employed for causing the material to adhere to the surface thereof, is shown in detail in Fig. 3. The suction pipes are positioned as in Fig. 4, and the air passes through ducts 67, Fig. 3, chambered valve 71 and pipe 40, assumed to lead to a vacuum pump or low pressure chamber.

What I claim is:

1. In a machine of the class described, a plurality of cylinders having heads and each including a perforated peripheral wall connecting the heads and an annular chamber within said wall, means for rotatably mounting the cylinders, means including low pressure pipes opening into the chambers for producing suction within said chambers, a valve casing rotatable with each cylinder, a non-rotatable valve member positioned within each casing and including a port, said casings each having ducts in communication respectively with the low pressure pipes and successively in communication with the port of the valve during the rotation of each valve casing and cylinder.

2. A structure comprising the elements of claim 1, and means for resiliently retaining the non-rotatable valve member in its casing and causing longitudinal thrust on the valve member without unduly retarding the movement of the cylinder.

3. A rotatable cylinder for apparatus employed in cleansing paper stock, said cylinder comprising heads connected by an inner cylindrical wall and an outer covering of openwork material, means for mounting said covering and spacing it from the cylindrical wall, a plurality of radial partitions connecting the perforated wall and inner cylin-

drical wall, providing fluid chambers, exhaust ducts connected with the fluid chambers, a housing rigidly connected with one of the heads of each cylinder and having a main tapered bore and elongated channels for communication with the bore and with the ducts, a chambered and ported valve within the housing, and discharge means in communication with the chambered portion of the valve and with the channels through the valve port.

4. A structure comprising the elements of claim 3, in which the chambered and ported valve is non-rotatable and the walls of the valve adjacent to the ported portion thereof act as a cut-off device in association with the longitudinal channels of the rotatable housing, and means for resiliently retaining the valve member in the tapered bore of the housing without unduly retarding the rotation of the cylinder.

5. A device of the class described, comprising a tank, fluid inlet and outlet means therefor, a series of concave elements between the inlet and outlet means, spaced rotatable cylinders each mounted above a concave element, the cylinders each including an outer arcuate openwork structure, low pressure exhaust connections extending through the cylinders and including ducts having intake portions within said openwork structure causing material being treated to adhere to the cylinders by reducing fluid pressure in said cylinders, agitating members located between the cylinders, and devices for directing the material being treated from a cylinder to an adjacent agitating member and from the latter to the next succeeding cylinder.

In testimony whereof I affix my signature.

GEORGE G. McARTHUR.