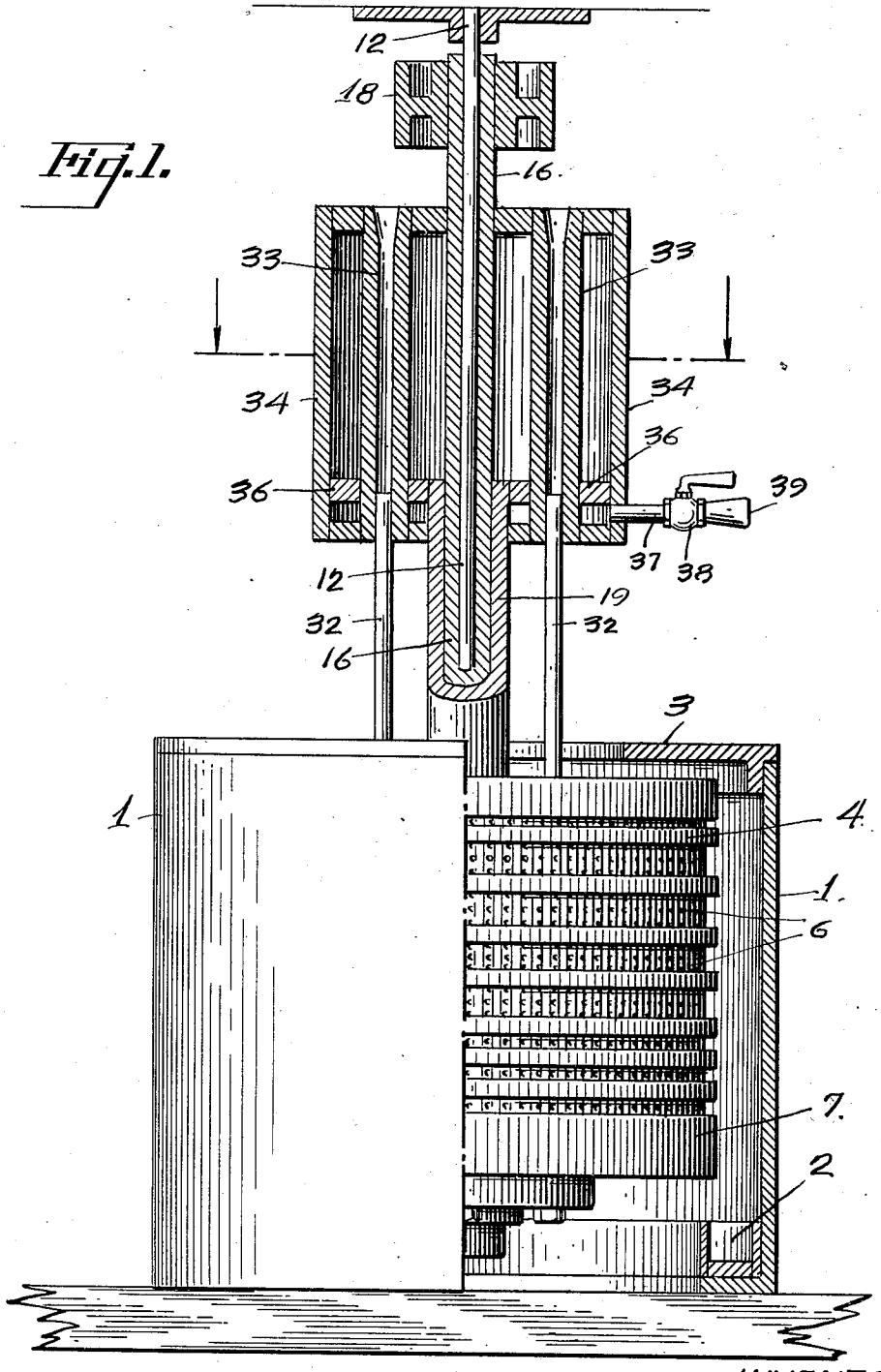
May 17, 1932. M. N. BONSIAKOS 1,858,574

CENTRIFUGAL SEPARATOR

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Fig. 1.



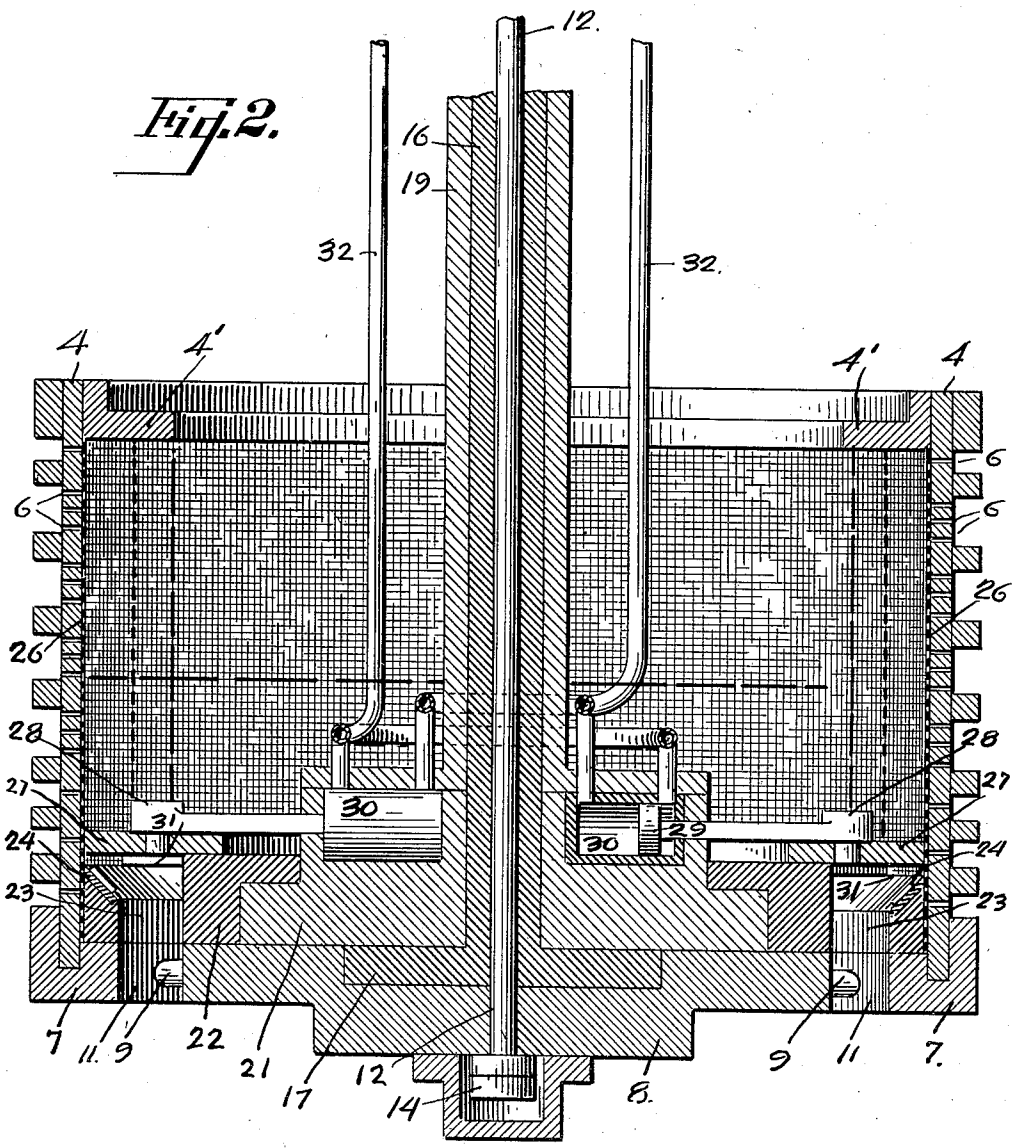
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Fig. 2.



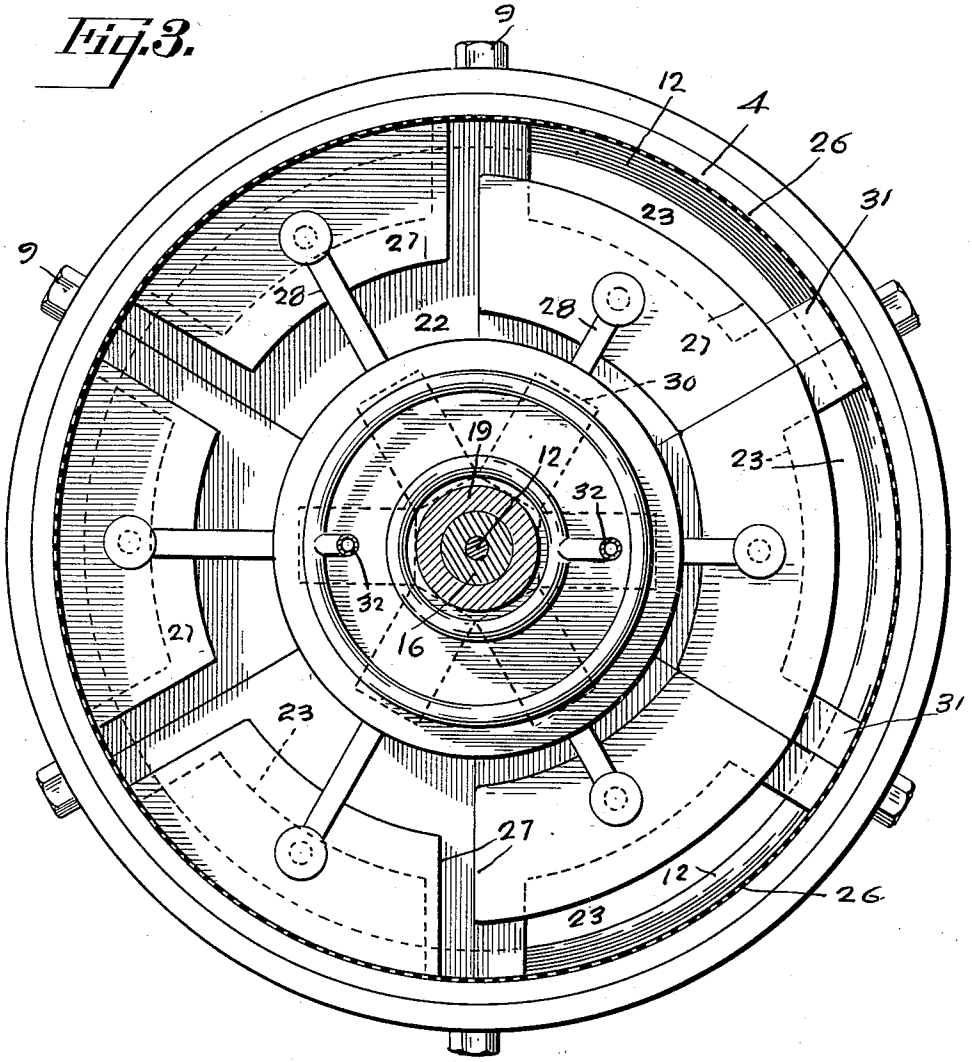
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Fig. 3.



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Fig. 4.

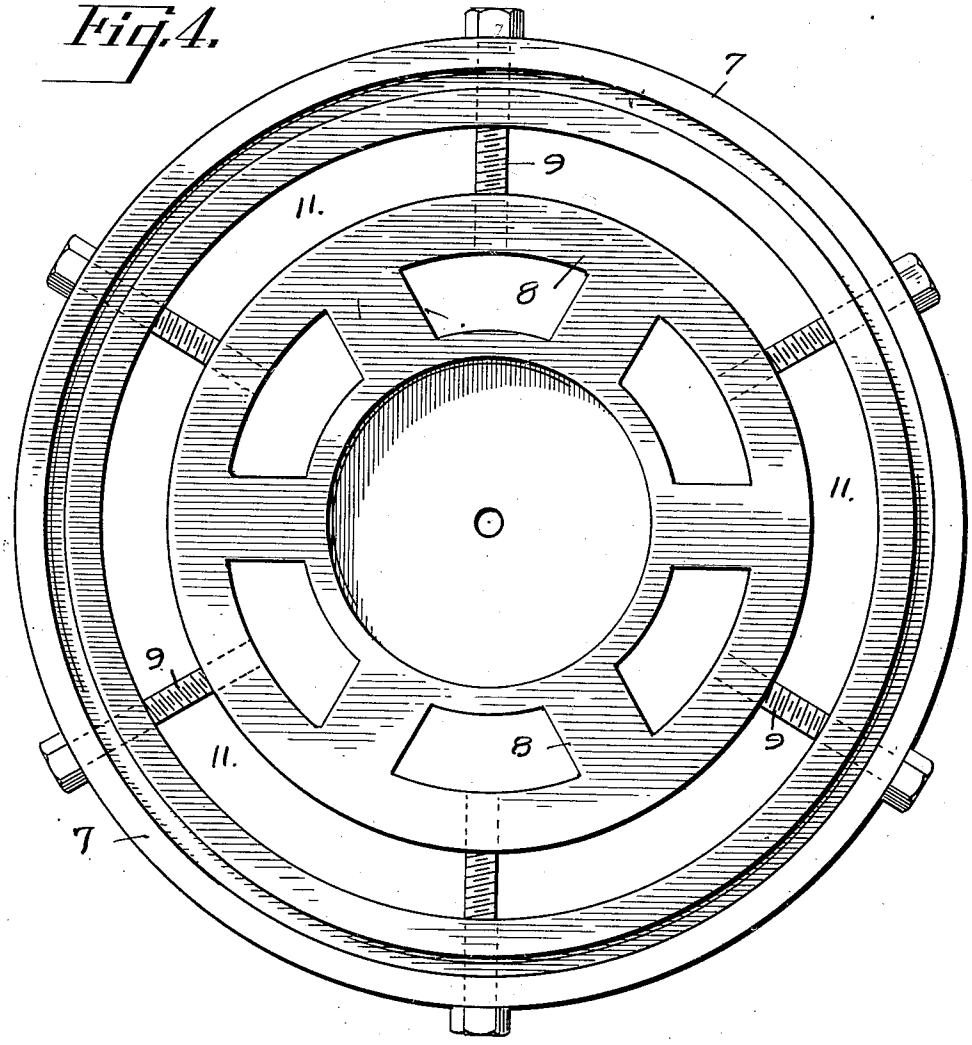
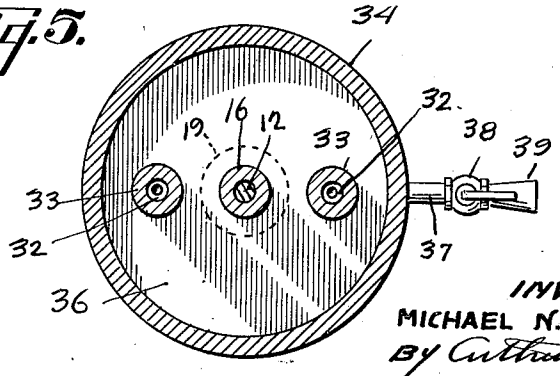


Fig. 5.



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UNITED STATES PATENT OFFICE

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CENTRIFUGAL SEPARATOR

Application filed September 2, 1931. Serial No. 560,691.

My invention relates to improvements in centrifugal separators, and particularly of that type of separator generally used for separating molasses from sugar, wherein an annular scraper operates in conjunction with a plurality of gates over an annular discharge opening, to remove accumulated sugar from the internal annular wall of said separator and into said discharge openings.

The primary object of the present invention is to provide a new and improved device for removing accumulated material from the internal annular wall of a centrifugal separator and discharging the same from said separator.

A further object of the present invention is to provide a new and improved device of the character described having improved and simplified means to facilitate removal of accumulated material from the internal wall of a centrifugal separator and discharging the same.

The invention consists of the improved device disclosed in the drawings forming a part of the present application wherein like characters of reference are used to designate similar parts throughout the specification and drawings, and in which—

Fig. 1 is an elevation, partly in vertical section, of a centrifugal separator, of the type used for separating molasses from sugar;

Fig. 2 is a vertical sectional view of the separator bowl;

Fig. 3 is a plan view of the bowl, the gates being shown closed on one side, and opened on the opposite side thereof;

Fig. 4 is a detailed plan view of the bottom plates of the separator bowl, disclosing the annular discharge opening; and

Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 1, in the direction indicated.

Referring to the drawings, the numeral 1 is used to designate an annular or cylindrical stationary housing or vat having an annular trough 2 arranged in the bottom thereof and provided with a flange 3 at the upper end, which is otherwise open.

Concentrically arranged within the housing 1 I have provided a centrifugal separator bowl 4 having the usual annular wall thereof perforated as shown at 6. The bottom plate of the bowl 4 comprises an outer annular member 7 held in spaced relation to an inner central plate 8 by means of suitable bolts 9 thereby providing an annular discharge opening 11 adjacent the outer edge or periphery of said bowl 4.

The bowl 4 is rotatably suspended by means of a fixed shaft 12 having a suitable supporting element 14 secured to the bottom of said shaft and supporting the said bowl 4. This fixed shaft 12 may be secured in any suitable manner to a supporting structure as disclosed at the upper end of Fig. 1 of the drawings.

A sleeve 16 is slidably mounted upon the shaft 12 and is provided at its lower end with a suitable flange 17 secured to the central plate 8 of the bottom of the bowl 4, the upper end of said sleeve being provided at its upper end with a suitable pulley 18 by means of which said sleeve 16 and the bowl 4 may be rapidly rotated in the usual manner.

A second sleeve 19 is slidably mounted upon the first sleeve 16 and is provided with a flanged portion 21 resting upon the bottom of the bowl 4. Secured to the flanged portion 21 are a plurality of what I term sector-plates 22, each provided with an arcuate discharge opening 23 arranged adjacent, but in spaced relation with, the internal wall of the bowl 4, said openings 23 connecting with each other and providing a continuous annular opening registering with the annular discharge opening 11 of the separator or bowl 4.

The plates 22 are provided in the form of sectors in order to facilitate the introduction of the same into an annular member whose outer diameter is greater than the diameter of the opening within the usual inwardly extending flange 4′ on the upper end of the bowl 4, as disclosed in Fig. 2 of the drawings.

Each plate 22 is provided with an arcuate inclined knife 24 arranged between the discharge opening 23 and the periphery thereof, said knives being also arranged continuously to provide an annular inclined

scraper whose outer edge is substantially in contact with the inner or internal surface of a screen 26 mounted upon the internal wall of the separator bowl 4. These arcuate knives 24 are preferably sunk below the upper surfaces of the plates 22.

Slidably mounted upon each plate 22 is what I term a gate 27 connected, by means of suitable connecting rods 28, to pistons 29 slidably mounted within cylinders 30 connected to the second mentioned sleeve 19, as disclosed in Figs. 2 and 3 of the drawings.

In order to provide a proper supporting surface for these sliding gates 27, each plate 22 is provided, at each end thereof, with bridge portions 31 which extend over the openings 23 of the plates 22 but do not interrupt the continuity of the annular discharge openings 23, hereinbefore described.

The cylinders 30 have suitable connections to supply pipes 32 which extend upwardly adjacent the second sleeve 19 and connect telescopically with tubular members 33 mounted within a cylinder 34 having its upper end rigidly secured to the first sleeve 16, the upper ends of said tubular members 33 being open, the purpose of which will hereinafter be more fully set forth.

A suitable piston 36 is slidably mounted within said cylinder 34 and is connected to the upper end of the second sleeve 19 which carries the sector-plates 22, gates 27 and cylinders 30, said piston 36 being suitably apertured to slidably engage the tubular members 33.

A connection 37 is provided in the lower end of the cylinder 34, and is provided with a suitable valve 38 and an intake nozzle 39, the purpose of which will hereinafter be more fully set forth.

In operation, in the present instance, the bowl 4 of the centrifugal separator is filled with raw sugar to the depth indicated by the heavy horizontal line in Fig. 2 of the drawings.

As the entire device is rotated at high speed upon the supporting shaft 12, the action of centrifugal force moves the entire mass to a vertical position indicated by the heavy vertical broken lines in Fig. 2 of the drawings, and the centrifugal force generated forces the liquid portions of the mass, or the molasses, thru the screen 26 and apertures 6 in the annular wall of the separator bowl 4, from whence it is thrown off against the internal wall of the housing 1 and drips into the annular trough 2, disclosed in Fig. 1 of the drawings, provided for its reception.

When the molasses and other liquid content has been removed by centrifugal force, the remaining or accumulated matter is piled vertically upon the internal wall of the screen, to a reduced depth, as indicated by the heavy dotted line in Fig. 2 of the drawings. This accumulated material usually represents the dry sugar and it is the prime purpose of the present invention to facilitate the removal of this accumulated sugar or other matter, which is accomplished as follows:

A suitable hose, leading to a source of compressed air, not shown, as they form no part of the present invention, is applied to the top of one of the tubular members 33 to introduce, thru the proper pipe 32, compressed air into the cylinders 30 to move the pistons 29 therein in a direction which will open the gates 27 slidably mounted upon top of the sector-plates 22 and normally closing the apertures or discharge openings 23 therein.

When the gates 27 have been fully opened, to the position disclosed in the right hand side of Fig. 3 of the drawings, the source of compressed air is applied to the nozzle 39 of the connection 37, the valve 38 being opened, and the pressure thus introduced into the cylinder 34 and under the piston 36 therein, raises said piston 36, second sleeve 19 to which it is attached, and the cylinder 30, gates 27, sector-plates 22 and also the scraper formed by the arcuate knives 24.

As the knives 24 move upwardly in contact with the internal wall of the bowl 4, or the screen 26 therein, the accumulated material is scraped or removed from said screen 26 and into the discharge openings 23 of the plate 22 and discharge opening 11 in the bottom of the centrifugal bowl 4, from whence it is dropped thru the open bottom of the housing 1, and inside of the annular trough 2 therein, and onto conveyors, not shown.

After all of the accumulated material has been removed, the source of compressed air is disconnected from the nozzle 39, and the piston 36, to which the scraper or knives 24 are operatively connected, is lowered by gravity until the entire device is again lowered onto the bottom of the separator bowl 4. The valve 38 is provided to control the escape of compressed air from the cylinder 34 and thereby prevent a too abrupt lowering of the device.

After the device has been lowered to normal position upon the bottom of the bowl 4, a source of compressed air is connected to the opposite tubular member 33 of the cylinder 34, and thru the proper pipe 32 said compressed air is conducted to the opposite sides of the pistons 29 within their respective cylinders 30, and the gates 27 are again closed, with their outer edges moved into contact with the internal wall of the bowl 4 or the screen 26 therein.

As the device is rapidly rotated, the centrifugal force developed will cause said gates to normally remain in a closed position to prevent the passage of matter thru the discharge openings prematurely.

Having thus described my invention what

I claim as new and desire to secure by Letters Patent is—

1. The combination with a centrifugal separator having perforated walls and an annular discharge opening in the bottom thereof and adjacent to the internal wall of said separator, of an annular scraper movably mounted within said separator and in contact with the said internal wall; a plurality of gates mounted within said separator and above the scraper to close the annular, discharge opening of said separator; means for opening said gates; and means for moving the scraper over the internal wall of said separator to remove accumulated material therefrom.

2. The combination with a centrifugal separator having perforated walls and an annular discharge opening in the bottom thereof, of a screen mounted upon the internal annular wall of said separator; a plurality of sector plates mounted within said separator and having discharge openings registering with the discharge opening of the separator; a plurality of gates slidably mounted upon said sector-plates and normally closing the discharge openings therein; a plurality of arcuate knives mounted upon said plates between the gates thereon and the discharge openings of the separator, said knives being positioned to form a continuous annular scraper arranged in contact with the screen in said separator; means for opening said gates; and means for moving the annular scraper over the screen of said separator to remove accumulated material therefrom into the discharge openings of the sector-plates and of the separator.

3. The combination with a centrifugal separator having perforated walls and a discharge opening in the bottom thereof, of a screen mounted upon the internal annular wall of said separator; a fixed shaft rotatably suspending said separator; a sleeve rotatably mounted upon said shaft and connected to said separator for rotating the same upon said shaft; a second sleeve mounted upon the first sleeve; a plurality of sector-plates connected to the second sleeve and having discharge openings therein registering with the discharge opening of the separator; a plurality of arcuate knives mounted upon said sector-plates and forming an annular scraper in contact with the screen; a plurality of pistons mounted in connection with the second sleeve and connected to the gates whereby said gates may be opened to permit passage of material to the annular opening of the separator; and a second piston mounted in connection with the second sleeve to raise the sector-plates and the annular scraper to remove accumulated material from the screen and discharge the same into the registering discharge openings of the sector-plates and the separator.

4. The combination with a centrifugal separator having a perforated annular wall and an annular discharge opening in the bottom thereof, of a plurality of sector-plates mounted within said separator and having discharge openings registering with the discharge opening of said separator; an arcuate knife mounted upon each plate and adjacent to the discharge opening therein, said knives forming a continuous annular scraper in contact with the internal annular wall of the separator; a gate slidably mounted upon each sector and normally covering the knife thereon and the discharge opening therein; a cylinder for each plate; a piston mounted within each cylinder and connected to the gate on its respective plate; and means for conveying compressed air to all of the cylinders to actuate the pistons and open said gates whereby matter within said separator may pass therefrom thru the registering discharge openings of the plates and the separator.

5. The combination with a centrifugal separator having a perforated annular wall and an annular discharge opening in the bottom thereof, of a plurality of sector-plates mounted within said separator and having discharge openings registering with the discharge opening of said separator; an arcuate knife mounted upon each plate and adjacent to the discharge opening therein, said knives forming a continuous annular scraper in contact with the internal annular wall of the separator; a gate slidably mounted upon each sector and normally covering the knife thereon and the discharge opening therein; a cylinder for each plate; a piston mounted within each cylinder and connected to the gate on its respective plate; means for conveying compressed air to all of the cylinders to actuate the pistons and open said gates whereby matter within said separator may pass therefrom thru the registering discharge openings of the plates and the separator; and means for moving the scraper over the internal wall of said separator to remove accumulated matter therefrom and into said discharge openings.

In witness whereof, I hereunto set my signature.

MICHAEL N. BONSIAKOS.