

Feb. 26, 1929.

1,703,404

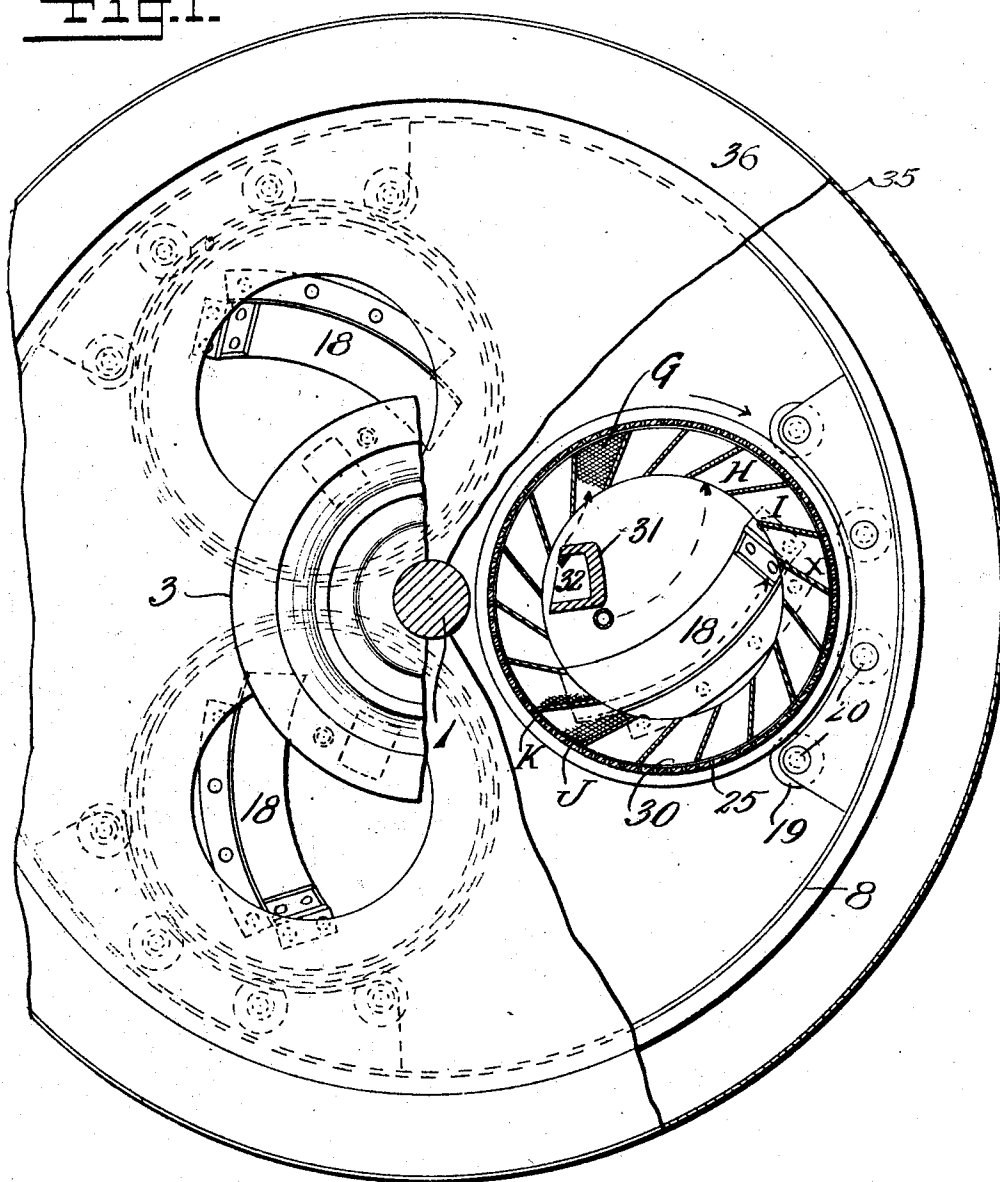
J. J. MUNSON

CENTRIFUGAL MACHINE

Filed June 23, 1926

3 Sheets-Sheet 1

Fig. 1.



INVENTOR

Joseph Jones Munson

BY

Knight Bros

ATTORNEYS

Feb. 26, 1929.

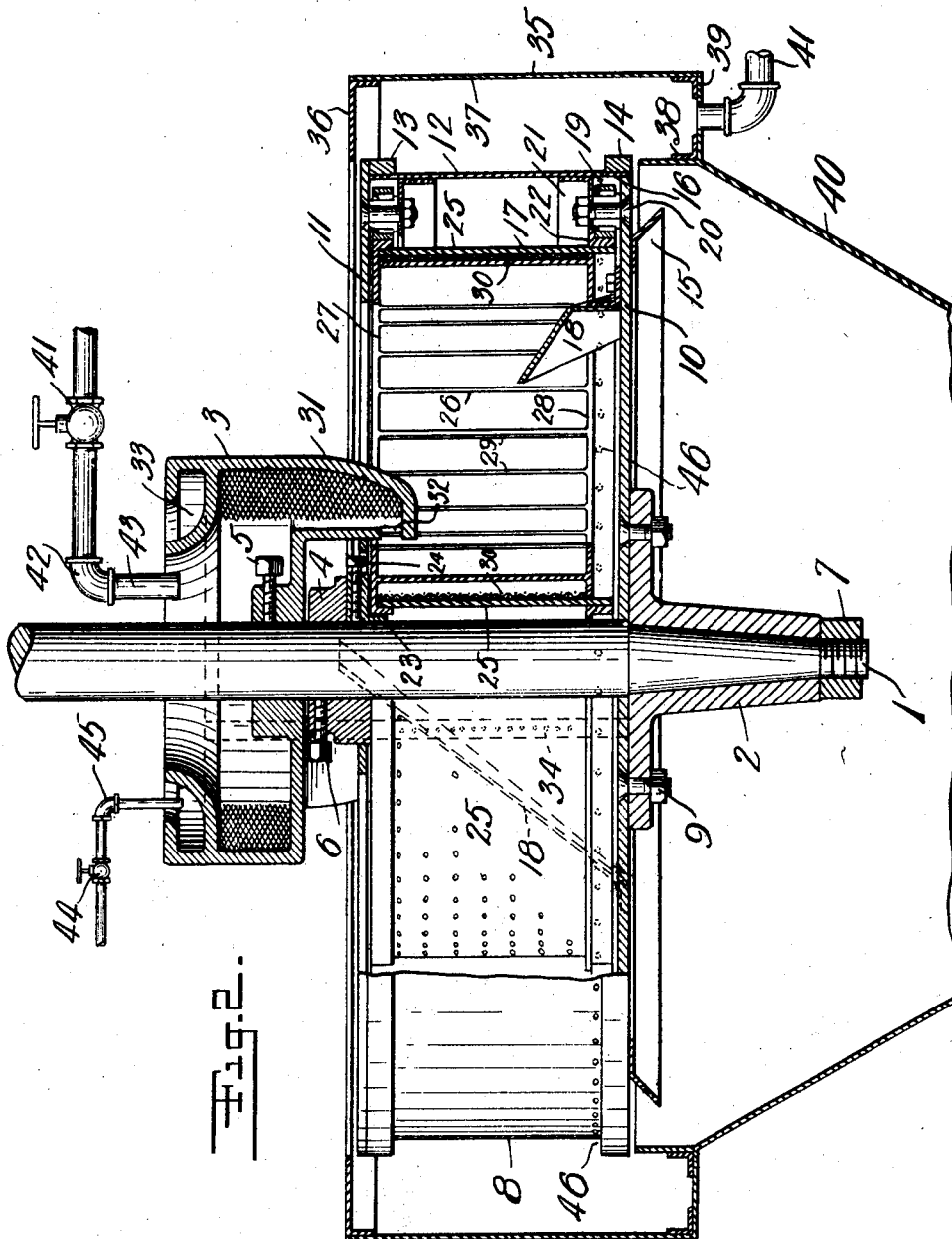
1,703,404

J. J. MUNSON

CENTRIFUGAL MACHINE

Filed June 23, 1926

3 Sheets-Sheet 2



INVENTOR

Joseph Jones Munson

BY

Knight & Co.

ATTORNEYS

Feb. 26, 1929.

J. J. MUNSON
CENTRIFUGAL MACHINE

Filed June 23, 1926

3 Sheets-Sheet 3

1,703,404

Fig. 3.

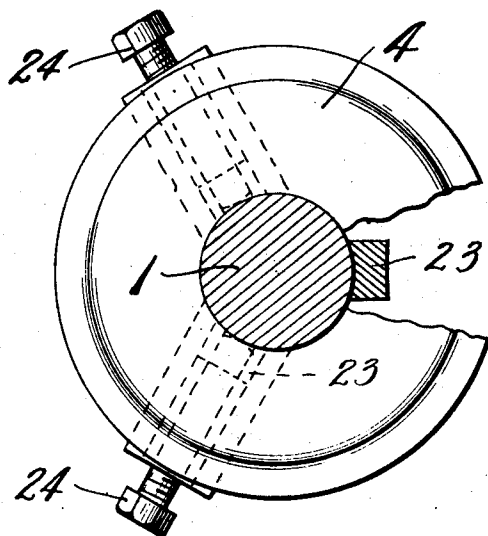
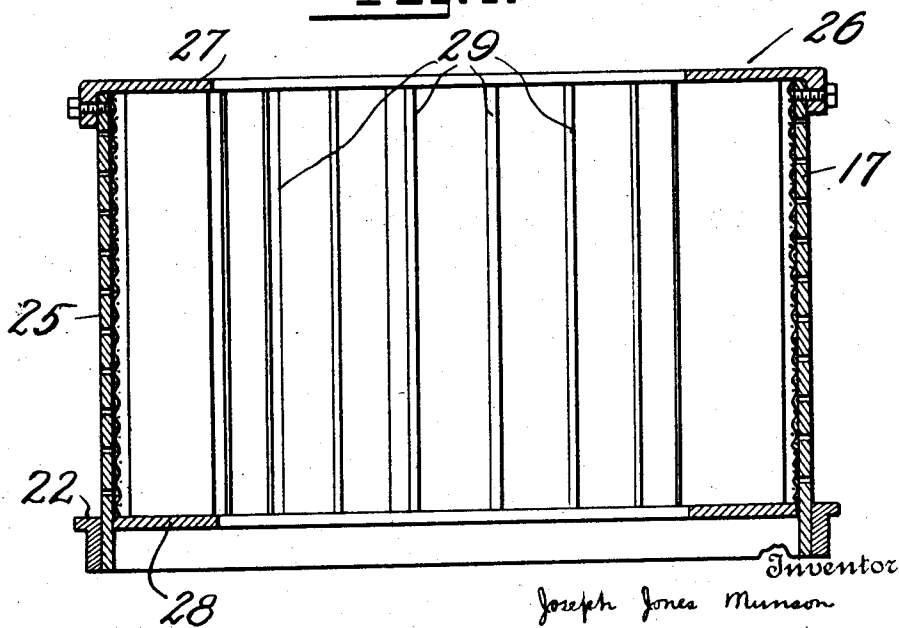


Fig. 4.



Inventor
Joseph Jones Munson
By his Attorneys Knight Bros

UNITED STATES PATENT OFFICE.

JOSEPH JONES MUNSON, OF BATON ROUGE, LOUISIANA.

CENTRIFUGAL MACHINE.

Application filed June 23, 1926. Serial No. 118,131.

My invention relates to centrifugal ex-
tractors of the continuous type and has for
its object the simplification of the mech-
anism and the attainment of more uniform
and regular separation of the solids and
liquids. Such machines are used for in-
stance in the separation of molasses from
the sugar in massecuite. The subject mat-
ter of my present invention includes the
subject matter of an earlier abandoned
application which was filed by me under
date of January 3, 1923, and Serial No.
610,467.

In carrying out my invention I provide
two or more perforated sieves or baskets of
cylindrical form which I mount in a sym-
metrical manner around the center of a
rotating carrier, the cylinders or baskets
being free to rotate planetarily on their
vertical axes while revolving around the
common center. When running empty
these cylinders do not rotate relatively to
their carrier, but upon the introduction of
the material to be treated they become
loaded eccentrically by such material which
thereupon causes them to rotate, the veloc-
ity of rotation depending upon the rapidity
with which the material is supplied.

As a further means of regulating the
operation I provide a retarding device in
the form of an adjustable brake, whereby
the baskets are held in check until they are
sufficiently loaded, whereupon they are au-
tomatically released from the breaking
effect.

Referring to the accompanying draw-
ings:—

Figure 1 is a plan view partly in section
of my centrifugal machine;

Figure 2 is a vertical section thru the
center of the machine;

Figure 3 is an enlarged axial section of
the brake;

Figure 4 is an axial section of the divid-
ing element.

The spindle 1, Figure 2, is supported in
a vertical position and is free to revolve at
high speed. Upon the spindle 1 is carried
the hub 2, the distributor bowl 3, the brake
head 4. The distributor bowl 3 is secured
to the spindle 1 by means of the set screw
5. The brake head is fastened to the spin-
dle 1 by means of set screw 6. The hub 2,
which is held to the spindle 1 by means of
nut 7 carries the revolving casing 8. This
revolving casing is held to hub 2 by means

of bolts 9. The revolving casing 8 is made
up of bottom plate 10, top plate 11, vertical
cylinder 12, top hoop 13, bottom hoop 14,
and guide baffle 15, all securely fastened to-
gether by means of rivets and bolts, and by
welding at 16. Upon the revolving casing
are carried three perforated drying baskets
17, and three discharge baffles 18. The
three drying baskets are supported radially
by means of the roller bearings 19. These
roller bearings are journalled on bolts 20
mounted at opposite ends in bottom plate
10 and arcuate basket supports 21. Each
of said perforated drying baskets 17 is pro-
vided with a circular rail 22 of angular
cross-section which has rolling contact with
and is supported by the roller bearings 19.
An inward tilting of the perforated drying
baskets is prevented by means of brake-
shoes 23 which are adjustable radially by
means of bolts 24 which abut at their inner
ends on spindle 1. Each perforated dry-
ing basket is provided with a perforated
wall 25 and a dividing element 26. Said
dividing element 26 comprises a top shroud
27, bottom shroud 28 and slats 29 welded to
these shrouds. The dividing element 26 is
designed to slip inside of the perforated
basket casing and a fine mesh screen 30 is
interposed between the outside edges of the
slats 29 of the dividing element and the
inner side of perforated wall 25. Said
screen extends completely around and
within the perforated wall 25, and entirely
covers the same.

As shown in Figures 1 and 2, the baffles
18 project a short distance above the top
plate 11 so that as the cylinder 12 revolves,
a strong current of air is deflected down-
wardly along the under surfaces of said
baffles. By an inspection of Figure 1, it
will be seen that the sugar which becomes
dislodged from the compartments in the
drying baskets at points K and J, will be
deflected downwardly thru the openings in
the bottom plate 10 of the revolving casing.

The distributor bowl 3 has depending
legs or spouts 31 extending into the basket
17, one for each basket and at the inner face
of the lower extremity each spout has an
opening 32 facing inwardly toward the side
of the basket farthest removed from its out-
most swing. The distributor bowl is made
with an annular compartment 33 around its
upper circumference and leading down-
wardly therefrom is a perforated pipe 34,

Figure 2, the bottom end of which pipe is supported on the bottom plate 10 of the revolving casing. There are three of these pipes, one for each drying basket.

5 From the above it is clear that the distributor bowl 3, the brake head 4, the perforated drying baskets and the discharge baffles 18, the hub 2 and the revolving casing 8 all revolve at the same speed about the
10 axis of the vertical spindle 1.

The whole revolving element is surrounded by a stationary casing 35, which may be supported in any convenient manner, and comprises a top annular plate 36, a vertical
15 cylindrical plate 37, a bottom annular plate 39, and a conical hopper 40, to the upper edge of which the annular plate 39 is connected by means of a peripheral strap angle 38. A molasses discharge pipe 41 leads from
20 the annular chamber formed between the vertical cylindrical plate 37 and the upper cylindrical portion of hopper 40.

The operation of the machine is as follows:

25 The machine is first made to revolve by applying power to the spindle 1. Masseccuite or other material is then introduced into the rapidly revolving distributor bowl 3 from any convenient storage tank, through
30 valve 41 from where it passes to elbow 42 and then into distributor bowl 3, thru nipple 43. As the distributor bowl is rapidly revolving, the masseccuite is thrown out against the inside of the outer wall, and
35 gradually builds up a layer against this wall as shown by the shading, Figure 2. The surface of this layer of masseccuite toward the axis of spindle 1, is a paraboloid, and this surface will be almost vertical, under
40 the high velocity.

After the masseccuite has reached a point as at 32, at the bottom of the spouts of the distributor bowl, it begins to spill out of each one of the three spouts into the three
45 perforated drying baskets, and travels in a direction as shown by the dotted line, Figure 1. Thus the masseccuite is loaded into the perforated drying basket near the top and behind the slats 29 which form sections
50 in this basket. The first loaded section is shown by the shading in Figure 1 at "G". The remaining two drying baskets are loaded in exactly the same manner. The drying baskets are thus thrown out of equilibrium,
55 due to the centrifugal force acting on the loaded section of masseccuite at "G", and they tend to rotate on the roller bearings 19, in a direction shown by the arrow. By properly adjusting the brake 21, the drying
60 basket is prevented from turning until the section at "G" is completely filled with masseccuite, after which the loaded section will revolve around to some such point as at "H". If the drying basket was absolutely
65 free to turn, the loaded section would re-

volve from "G" to a point maximum distance from the center of the spindle 1, as at "X", however, the drying basket being under the brake 21, the loaded section "G" moves to some such point as "H" until the
70 turning moments on the drying baskets are sufficiently reduced to stop the same. As the masseccuite continues to be supplied from the spouts of the distributor bowl to the drying baskets, a second section is loaded (partly)
75 at "G", but as the basket is practically in equilibrium, the second section is only partly filled, which causes the first section loaded to move to a new position "I". This light loading of the sections continues until
80 the first heavy loaded one reaches the point "X", when further revolving of the basket caused by loading more masseccuite at "G", causes the first heavy loaded section to travel back toward the center of the spindle 1.
85 This induces a turning moment on the drying basket in the opposite direction from that which is caused by the masseccuite from "G" to "X", and this in turn causes heavier loading at "G" in order to keep the basket
90 revolving. As the loading is continued at "G", the first loaded section moves on around to "J" and then to "K". The first loaded section has thus completed its course, and from the time that it was first loaded
95 at "G", the freeing of the grains of sugar from the molasses takes place, the molasses passing thru the perforated wall 25 of the drying basket, while the grains of sugar are held back by the fine mesh screen 30, and
100 after the masseccuite has passed from "G" to "J" and "K", it has been completely freed from the molasses and is dry sugar ready to be discharged from the machine. Following the first heavily loaded section, is the
105 lighter loaded ones, which after reaching the point "X" cause still heavier loading at "G", and thus all of the sections of the drying baskets are finally filled with molasses and grains of sugar which vary in proportions from a maximum quantity of molasses
110 at "G", to a minimum at "J" and "K". Under the conditions which now prevail, the tendency for the drying basket to be thrown outward from the spindle 1, has been greatly
115 increased due to the masseccuite which has been added, and due to the natural spring of the framing which supports these baskets, or any convenient arrangement of adjustable springs under the bearings of rollers
120 19 they are allowed to move a very smaller fraction of an inch away from the brake 23 which leaves the baskets free to turn. Thus when the baskets are completely loaded with masseccuite, there are no brakes to retard
125 their rotation about their axes. It is thus clear that after the baskets have been completely loaded, they are always out of balance, and tend to rotate about their axes as masseccuite is supplied at "G", for while the
130

dry sugar is discharged at approximately the same distance from the center of the spindle 1, as the massecuite is loaded on the opposite side, the massecuite is heavier than the dry sugar by an amount equal to the weight of the molasses which is thrown off. That is to say, that the weight of the massecuite from "G" to "X" will always be heavier than that from "X", to "J" and "K", which will keep the drying baskets in slow rotation which will vary in an exact proportion to the rate at which massecuite is introduced into the baskets, and this rate of rotation of the baskets will control the rate of discharge of the dry sugar, thus all three of the drying baskets will always be filled to the same extent with sugar and massecuite which will prevent the machine from becoming unbalanced about the spindle 1.

The discharging of the sugar is as follows:

The first loaded section which has reached "J" is partly unloaded by the sugar being thrown out of same by the action of centrifugal force, and by the time "K" is reached, the unloading has been completed. The dry sugar on leaving one of the sections of a drying basket at "J" and "K" passes in the direction of the dotted arrow, Fig. 1, into the path of a strong current of air which is directed downwardly by the baffle 18. The dry sugar is thus swept downwardly and out thru openings in the bottom plate 10 of the revolving casing, from where it is thrown against the guide baffle 15, and then to the stationary conical hopper 40 and finally to a storage bin or bags.

Where it is necessary to wash the sugar, water is introduced into the distributor bowl 3 from any convenient storage tank, thru the valve 44 from where it passes to the elbow 45 and then downward to the compartment 33 of the distributor bowl. From this compartment, the water is led downward thru the perforated pipes 34 where it is sprayed out thru the holes shown in these pipes and then follows the dotted arrow and is thus projected against the wall of massecuite, passing thru the same and out with molasses thus diluted.

After the dry sugar has been discharged at "J" and "K", the fine mesh screen is cleaned by centrifugal force as the emptied sections pass from "K" to "G", as in traversing this distance, the sections are completely empty, and the centrifugal force acts in a direction opposite to that in which the molasses travelled in passing thru the screen. The fine mesh screen may also be washed at this point if desired. Thus the massecuite is always loaded in the drying baskets upon a clean screen, which insures the free passage of the molasses which is thrown out by centrifugal force.

The molasses and water (when the water is used) is thrown out thru the fine mesh screen 30 and the perforated wall 25 of the drying basket, from where it is thrown outward against the vertical cylindrical wall 12 of the revolving case 8. It then passes thru the small holes 46 near the bottom hoop of the revolving casing. The molasses is then collected in the annular space of the stationary casing 35 from where it is conducted to any convenient storage tanks thru pipe 41.

According to the preferred embodiment of my invention shown on the drawings, it will be seen from Fig. 1 that the main driving spindle 1 is suspended from above (the suspension head for said spindle not being shown). It will appear from the following discussion that the construction and relative arrangement of the several parts described above, tends to maintain a proper balance during the operation of the machine and in the event of the machine becoming temporarily unbalanced, automatically reestablishes a proper balance therein.

When sugar is introduced from above into distributor bowl 3, it builds up against the outside wall of said distributor bowl and gradually forms a paraboloid, the surface of which extends toward the center of spindle as the loading continues. The sugar being in a fluid condition in the distributor bowl 3, the surface of the paraboloid must be uniform about the axis of rotation of said distributor bowl. That is to say that the inside wall of the sugar in the bowl will form a true circle on a plane passed perpendicular to the axis on which it rotates. As the loading operation continues, the inside wall of sugar eventually reaches a surface which is tangent to the edge of nozzle 32 where the spilling over takes place. When the loading is carried still further, the inside surface of the sugar extends further inward so that the sugar will then be spilled over in a layer with a thickness which increases as the rate of flow of sugar to the distributor bowl increases. The thickness of this layer will come to equilibrium under a uniform rate of flow to the bowl.

When all three of the baskets are perfectly balanced, the center of rotation of the whole machine will be about the axis of the spindle, so that a plane passed thru the end of the nozzle 32 where the sugar spills over and perpendicular to the axis of spindle 1 will cut the inside wall of sugar in the distributor bowl in a perfect circle. If, now, one of the baskets should happen to receive more sugar than the other two, the result would be to move the axis of rotation of the entire mass toward the heavily loaded basket. The spindle would therefore gyrate about the new axis while the paraboloid represented by the inner wall of sugar in the bowl 3, would also form about the new or

displaced axis since the sugar is always in a fluid state in said bowl. The result of this displacement in the axis of revolution will be to move the nozzle 32 of the heavily loaded basket inwardly and away from the inner wall from which the sugar spills so that the flow of sugar into said heavily loaded basket from its nozzle 32 ceases whereas the flow of sugar into the other baskets increases in such a way as to quickly restore the machine to a rotation about its normal axis.

I claim:—

1. In a continuously acting centrifugal machine, the combination of a carrier rotating about a variable axis, a plurality of cylindrical drying baskets mounted thereon so as to be free to rotate planetarily, a distributor bowl surmounting said rotating carrier, spouts depending therefrom into said drying baskets respectively, said spouts being provided with discharge nozzles adjacent to said axis.

2. In a continuous acting centrifugal machine, the combination of a carrier rotating about a variable axis, a plurality of cylindrical drying baskets mounted thereon so as to be free to rotate planetarily, a distributor bowl surmounting said rotating carrier, and spouts depending therefrom into said drying baskets respectively, said spouts being provided with discharge nozzles displaced inwardly with respect to the main bodies of said spouts.

3. In a centrifugal machine, the combination with a rotary carrier, of a drying basket journaled upon an axis eccentric to the rotary axis of said carrier, a loading bowl mounted on said carrier and discharging into said drying basket, and a baffle mounted on said carrier and extending upwardly thru said drying basket to a point above the top of said drying basket, said baffle being adapted to deliver a downwardly deflected current of air thru said basket.

4. In a continuously acting centrifugal machine, the combination of a rotating carrier, a plurality of cylindrical drying baskets mounted thereon so as to be free to rotate planetarily and means for introducing material to the interior of the baskets at a point removed from their outermost swing whereby the eccentric loading of the material will cause the baskets to rotate, discharge baffles mounted on the carrier within the baskets to intercept the path of the material as it is freed from the cylinder wall by centrifugal force.

5. In a continuous acting centrifugal machine, the combination of a plurality of planetarily revoluble cylindrical drying baskets, a rotating carrier for the same on which the baskets freely rotate, anti-friction rolls supporting the outer periphery of the baskets and means for introducing material to the interior of the baskets at a point removed from their outermost swing so that the consequent eccentric accumulation of the material will cause the baskets to rotate.

6. In a centrifugal machine, the combination with a rotary carrier, of a drying basket rotatable thereon about an axis eccentric to the rotary axis of said carrier, means for introducing material to the interior of said drying basket, said drying basket being adapted to discharge the dried product at a predetermined point in its rotation with respect to the rotary axis of said carrier, and a baffle mounted on said carrier and projecting thru said drying basket to intercept the dried material as it is freed from said basket, said baffle being extended upwardly above the top of said drying basket to deflect a current of air downwardly thru said drying basket.

7. In a continuous acting centrifugal machine, the combination of a rotating carrier, a plurality of planetarily revolving perforated drying baskets mounted on the carrier, the said baskets being free to rotate independently and a loading bowl having spouts depending into said baskets, and discharge openings at the bottom of said spouts opening towards the center of the machine.

8. In a continuously acting centrifugal machine, the combination of a rotating carrier, a plurality of planetarily revolving perforated drying baskets mounted on the carrier, the said baskets being free to rotate independently and a loading bowl having spouts depending into said baskets, the said bowl having an auxiliary chamber for the reception of water with perforated pipes leading therefrom to the interior of the baskets.

9. In a continuous centrifugal machine, the combination of a rotating carrier, a plurality of perforated baskets carried thereby and free to rotate planetarily thereon, loading spouts extending into said baskets and a removable dividing element within each basket having pockets for catching the material to be treated and screens interposed between the dividing elements and the walls of the baskets.

JOSEPH JONES MUNSON.