Jan. 12, 1926. 1,569,778

E. S. MURPHY

CONTINUOUS AUTOMATIC SEPARATOR

Filed Sept. 7, 1921 2 Sheets-Sheet 1

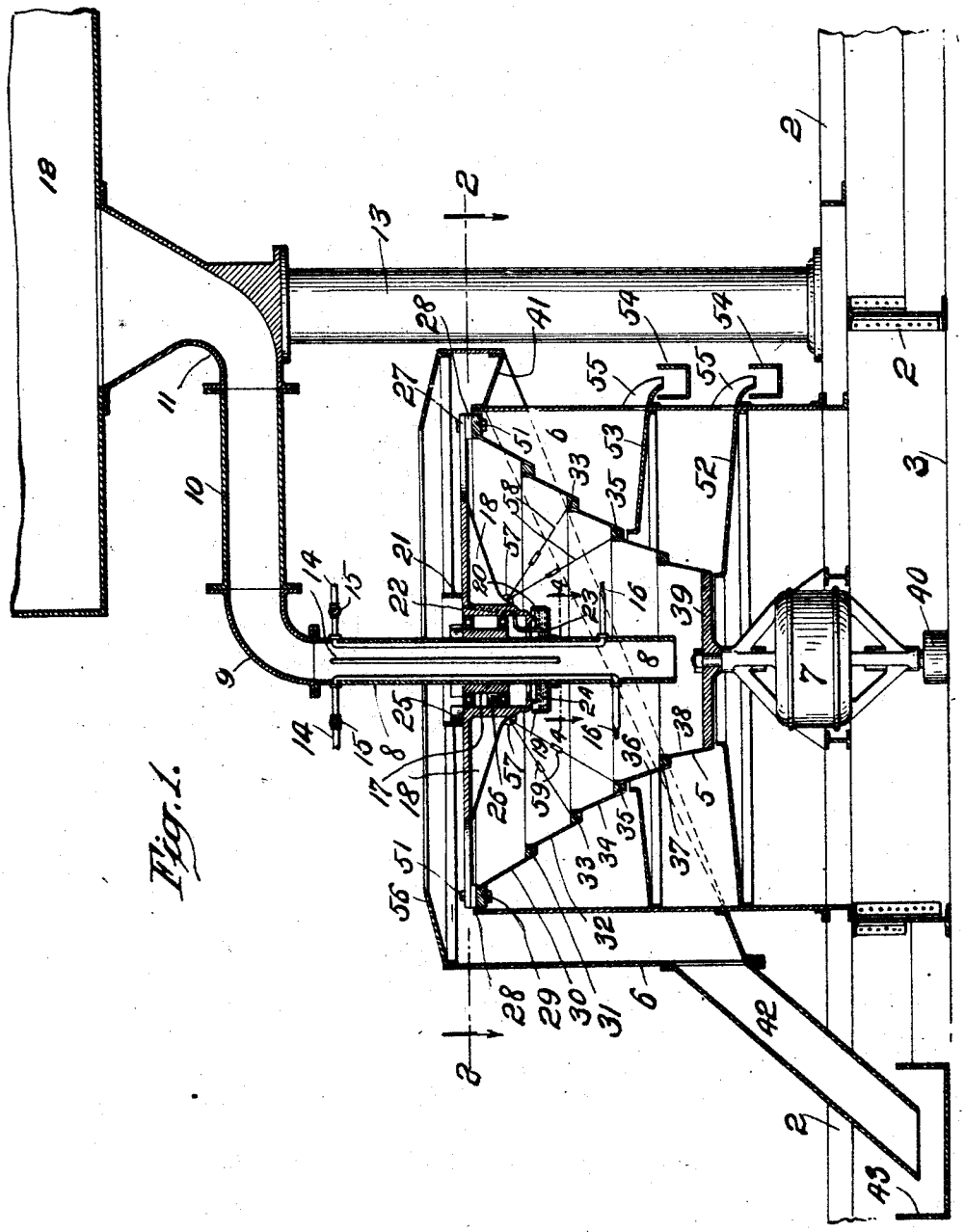

Fig. 1.

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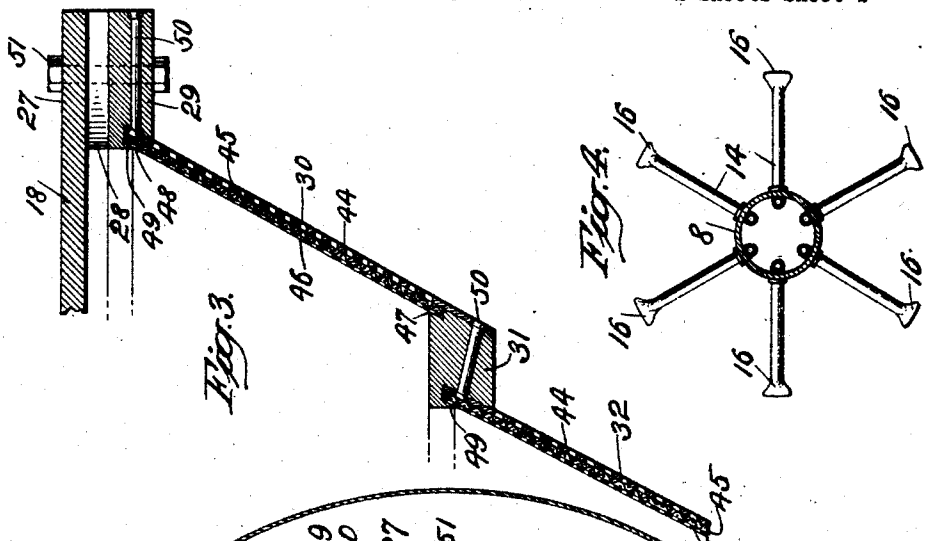

Fig. 3.

Fig. 4.

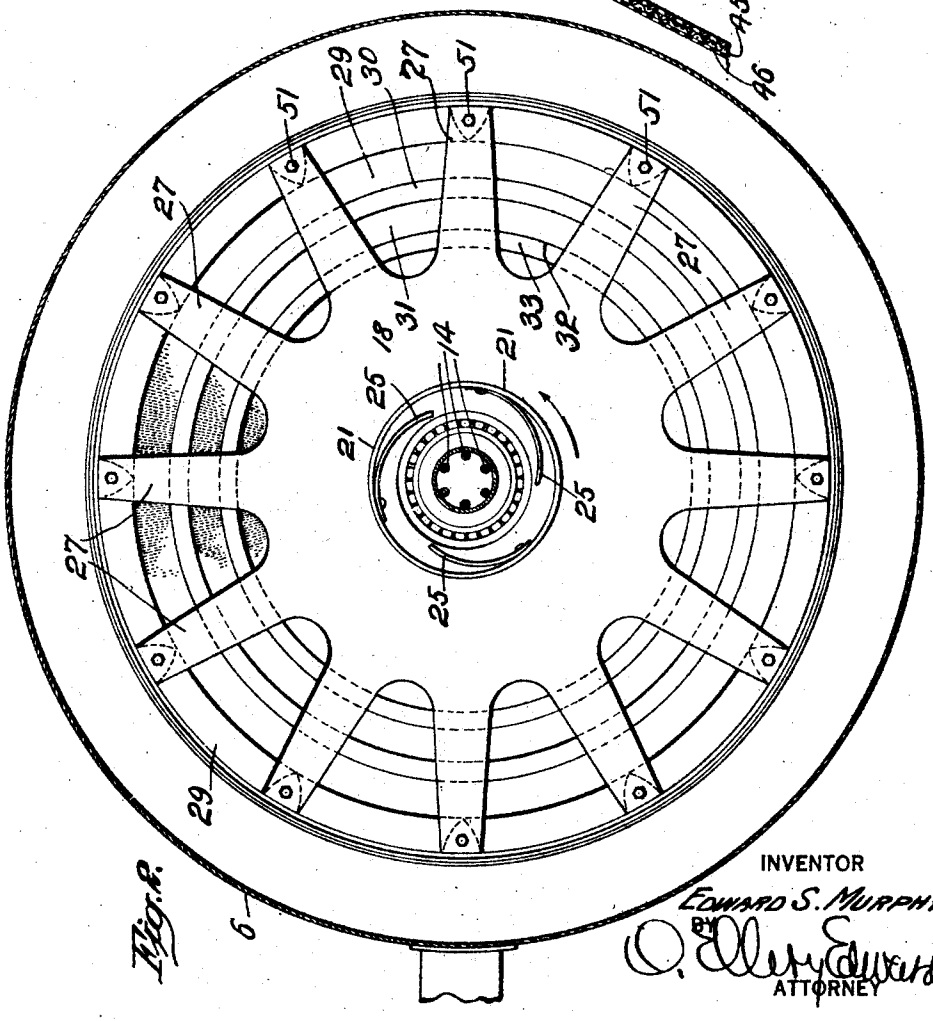

Fig. 2.

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Patented Jan. 12, 1926. 1,569,778

UNITED STATES PATENT OFFICE.

EDWARD S. MURPHY, OF CENTRAL MIRANDA, CUBA.

CONTINUOUS AUTOMATIC SEPARATOR.

Application filed September 7, 1921. Serial No. 499,082.

To all whom it may concern:

Be it known that I, EDWARD S. MURPHY, a citizen of the United States, and a resident of Central Miranda, Miranda, Oriente, Cuba, have invented a new and useful Continuous Automatic Separator, of which the following is a specification.

The object of my invention is to provide a separator which will continuously receive and automatically eject the material which passes through it, and while it may be adapted for many purposes, it is particularly useful in sugar cane mills when taking the molasses out of massecuite. This and other objects are accomplished by my invention, one embodiment of which is hereinafter more particularly set forth.

For a more detailed description of my invention, reference is to be had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a longitudinal section of a centrifugal separator embodying my invention.

Figure 2 is a sectional view, taken on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a longitudinal section of the side walls of the separator, and

Figure 4 is a sectional view, taken on the line 4—4 of Figure 1, looking in the direction of the arrows.

Throughout the various views of the drawings, similar reference characters designate similar parts.

My improved centrifugal separator 1 is mounted on any suitable support 2 which rests on any desired foundation 3 and it is provided with a rotary member 5 which is surrounded by a fixed casing 6 and the rotor is driven by a suitable motor 7 and guided by a fixed inflow pipe 8 which is fixed to an elbow 9 that is secured to a stud pipe 10 that runs to a T 11 which has its opened end supporting and connected to a tank 12 which contains massecuite or other material which is to be acted upon by the separator 1. The lower branch of the T 11 is closed and mounted on a column 13 which rests on the support 2 of the machine.

The main inflow pipe 8 is provided with a number of auxiliary water pipes 14 each of which has a valve 15 which is readily accessible and a horizontally disposed nozzle 16 at its lower end. These nozzles 16 are placed at different levels so that water may be added to the material which is being separated at different levels, should this be desired.

The inflow pipe 8 has a ball bearing 17 mounted thereon at any suitable level, and this bearing has its fixed part secured to the pipe 8 and its movable part secured to a spider 18 which is adapted to turn freely about the axis of the inflow pipe 8. The pipe 8 also carries below this bearing 17 and the spider 18 an oil receiving collar or cup 19 which is fixed on said pipe with a liquid tight joint. This cup 19 extends out beyond and around a bottom flange 20 which is the lowest extremity of the spider 18 and the upper surface of the spider is provided with an annular collar 21 which is concentric with the axis of the pipe 8 and separated from this pipe substantially as shown so as to form an oil receiving vessel. The upper vessel is connected to the cup 19 by means of an inclined passage 22 and a scoop 23 which enters the oil 24 in the cup 19 and when the spider rotates, as will be described below, oil is carried out of the cup 19 and into the chamber within the collar 21 and from thence it flows against blades 25 which carry this oil to the interior of the chamber so that it will flow through the ball bearing 17 with a ready flow. In the preferred embodiment of my invention, the ball bearing 17 has upper and lower races with upper and lower balls and between the two races and on the interior of the spider 18 are placed a second set of blades 26 which correspond to the blades 25 and perform the same identical function. In a machine of this character which runs at a high speed, say eight hundred revolutions in a minute with a hot material therein with a temperature therein say of 140° Fahrenheit which is necessary to have a free flow of good thin oil to keep the bearings running properly, and this is supplied by the device just above described.

The spider 18 is provided with a number of arms 27 and at their extremities these arms 27 are provided with pads 28 which engage an annular ring 29 which runs close to the top of the casing 6, but free of the same. The ring 29 is connected to a frustrum of a cone which is designated by the character 30 and this is connected at its lower edge to a second ring 31 and this ring 31 is the top ring over a second frustrum 32 which extends downwardly to a third ring

33, and this in turn is connected to the top of a frustrum 34 which is secured to a ring 35 at its lower edge, and this ring 35 is at the top of a frustrum 36 which at its lower edge is secured to a ring 37 and the ring 37 is at the top of a frustrum 38 which is secured to a bronze disc 39 at its lower edge and the bronze disc is so mounted that its axis coincides with the axis of the pipe 8 and it is supported by the upper end of the vertically disposed motor 7 and preferably by the armature of the motor, and the lower ends of this armature rests on a thrust ball bearing 40 which is placed on the foundation 3 and fixed true in any desired manner, it being understood that the axis of the motor 7 is also the axis of the pipe 8 so that the rotor 5 may run true when driven by the motor.

As an upward flow of the material which passes through and issues from the bottom of the pipe 8 is essential to the proper functioning of the apparatus, provision has to be made for forcing upwardly the viscous mass. Furthermore, this mass becomes increasingly viscous as its moisture is progressively ejected and so provision must be made for increasing the upward forcing tendency. This provision is had as follows. The bottom frustrum is inclined to its base at a large angle say 85°, the next frustrum 36 is inclined to its base by a smaller angle, say 80°, the next 34 has a corresponding inclination of 75°, the next one 32 an inclination of 70°, and the frustrum 30 an inclination of 65°. By this inclination, progressively increasing as the mass gets more viscous and rises, it is possible to get an upward thrust which will overcome the influence of gravitation until finally the mass will flow on each side of the spacing blocks 28 and over the ring 29 and into an inclined trough 41 which runs about the outer periphery of the shell 6 and diagonally, as shown, to a chute 42 down which this material passes and it may be caught in any desired way as in a receptacle 43 below the end of the chute.

If the mass is too viscous to function properly, water or other fluid may be turned on through the pipes 14 and nozzle 16, as above set forth, so as to facilitate the flow.

The frustra 30, 32, 34, 36 and 38 are all built up in identically the same way so that a description of one will answer for all. The outer wall is composed of a perforated metal shell 44 which is made of any suitable material, as bronze or brass or copper, and next to this is placed a wire gauze 45 and inside the wire gauze is placed a second conical screen 46 with vertically disposed slits. The screen 46 and the wire gauze screen 45 are removable and are held in place by suitable grooves, the bottom groove 47 being at the lower end and the upper groove 48 is at the upper end and the upper groove is provided with a downwardly disposed overhanging edge 49 which tends to hold the removable screens in place. The outer screens 44 are secured to the upper and lower rings by means of suitable rivets 50, or any other suitable means, which rivets have counter-sunk heads so that their ends are flush with the outer surfaces of the screens 44.

The arms 27 of the spider 18, support the parts 28 and the ring 29, and these parts are secured together by any suitable means as bolts 51 which pass through all these parts.

The interior of the casing 6 is provided with any desired number of fixed partitions 52 and 53 which are substantially horizontally disposed and somewhat inclined which partitions catch the expressed water, or other moisture, which is thrown through the screens 44 and this water is caught in suitable vessels 54 which are placed below spouts 55 which are connected with the spaces just above these respective partitions so that all this liquid together with its contained sugar or salts or other desirable elements, is caught and not wasted and is available for further treatment. The top of the casing 6 is provided with an annular flange 56 which is upwardly and inwardly disposed so as to cover the trough 41 and the greater part of the ring 29.

As the rotor 5 will carry the large mass of heavy material at a high speed, it may be that the screens 44 will be too weak for the load unless reinforcement be provided. To properly reinforce and strengthen this rotor without unduly increasing its bulk and weight, or in any way interfering with its action, I provide the spider 18 with perforated ears 57 which are connected to wires 58 which run to the rings 33 and 35 where their ends are secured. Each of these wires 58 is provided with a turn-buckle 59 by means of which it may be put at a proper tension.

In view of the foregoing, the operation of my improved separator will be readily understood. Assuming that massecuite or other material flows in a regular stream through the pipe 8 and from the tank 12, as above stated, and that the rotor 5 is rotating at the proper speed, this material is at once distributed over the disc 39 and thrown to the periphery of the conical sleeve 38 where some of the moisture is expressed through the openings, whereby the material is rendered a little more viscous than formerly. The centrifugal force acting on this material will cause it to climb upwardly on the interior of the cone while giving up some of its excess moisture and increasing in viscosity until it passes the upper edge

of the ring 37 and then it will come against the cone 36 where more moisture is extracted and the viscosity of the liquid is increased and so is its ability to climb because of the greater inclination of this sieve as compared with the one below. This process is continued with increasing viscosity and a corresponding increase in ease of climbing because of the increased slope until the dried mass, which has parted with all or nearly all of its moisture, emerges from the rotor and passes over the ring 29 and is projected into the trough 41 from whence it falls, as above described, into the chute 42 and passes off. If the mass is too viscous to act properly, as above described, water may be added in any desired proportion to facilitate the proper action of the apparatus, and this water may be placed at any desired level, as above set forth. The process of extracting moisture may be continued, as above described, as a continuous process as long as desired.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but that it is broad enough to cover all structures that come within the scope of the annexed claims.

Having thus described my invention, what I claim is:

1. A rotor for centrifugal machines provided with a disc, side walls composed of frustra of increasing slope from the bottom up, whereby the ejecting force of the rotor when in use is progressively increased, a top ring about the upper edge of the uppermost frustra and a spider secured to the top ring.

2. A rotor for centrifugal machines provided with a disc, side walls composed of frustra of increasing slope from the bottom up, whereby the ejecting force of the rotor when in use is progressively increased, a top ring about the upper edge of the uppermost frustra, a spider secured to the top ring and wires connecting the interior of the frustra with the spider, whereby the strength of the side walls of the rotor is increased.

In testimony whereof, I have hereunto set my hand and seal this 26th day of August, 1921.

EDWARD S. MURPHY.