April 7, 1925. 1,532,851

W. E. ZUCCARELLO

ELECTRICALLY OPERATED SAFETY LOCK FOR CENTRIFUGAL DISCHARGING MACHINES

Filed Jan. 8, 1924 2 Sheets-Sheet 1

Fig. 1.

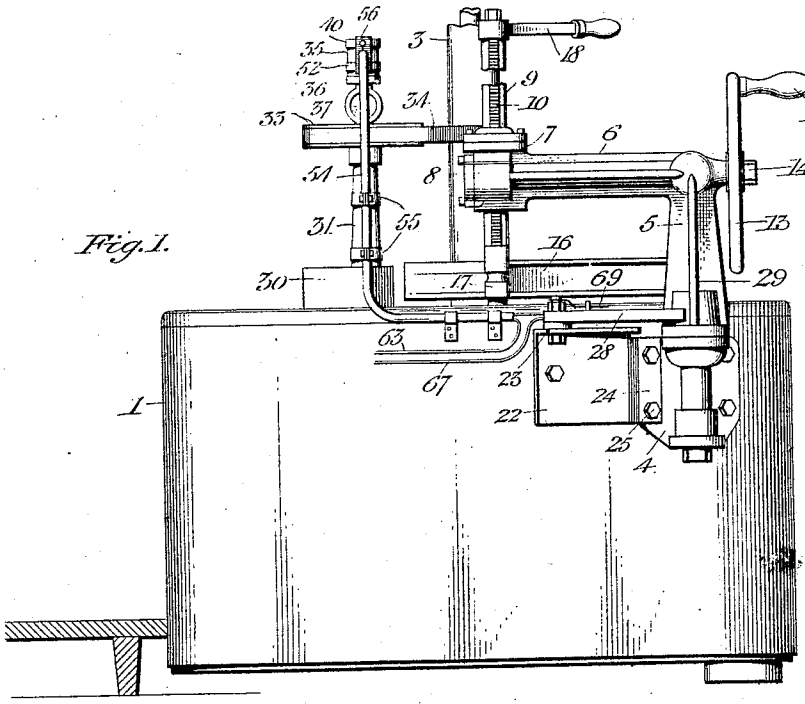
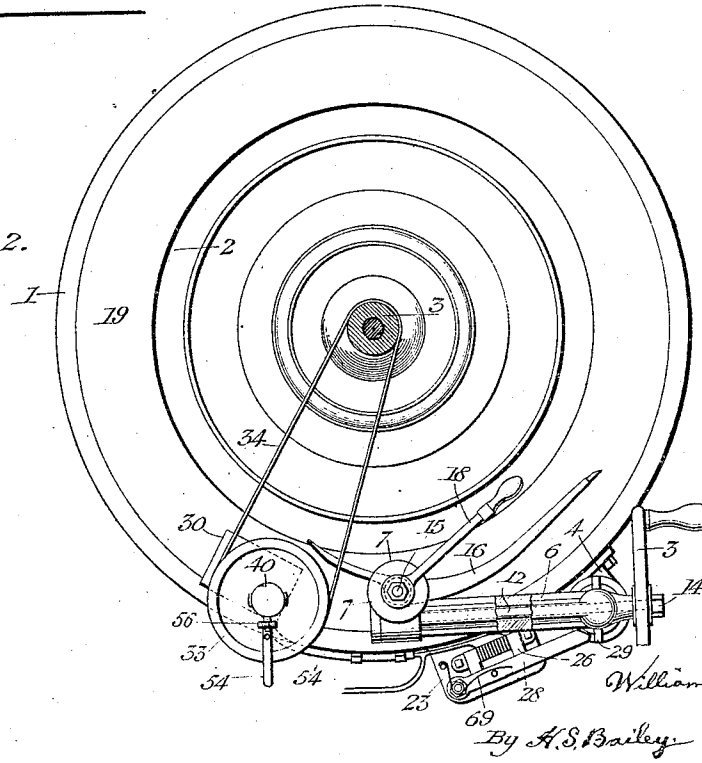


Fig. 2.



Inventor

William E. Zuccarello.

By H. S. Bailey Attorney.

April 7, 1925. 1,532,851

W. E. ZUCCARELLO

ELECTRICALLY OPERATED SAFETY LOCK FOR CENTRIFUGAL DISCHARGING MACHINES

Filed Jan. 8, 1924 2 Sheets-Sheet 2

Fig. 3.

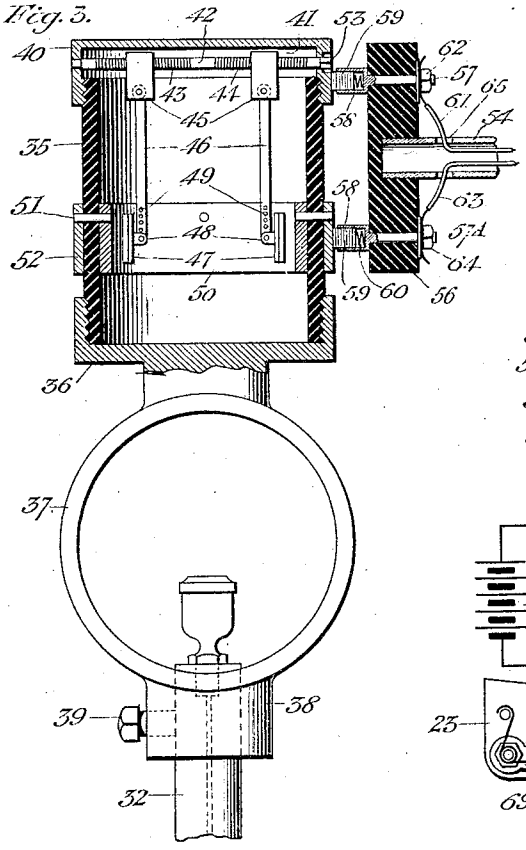
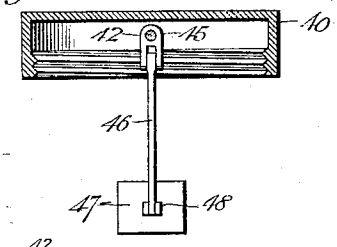


Fig. 4.



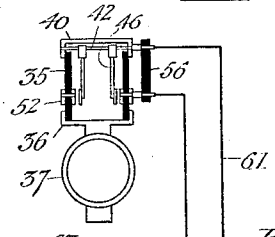


Fig. 5.

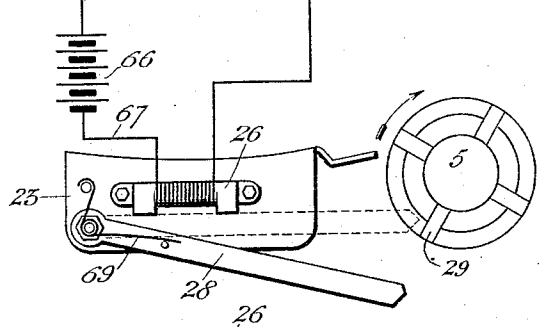
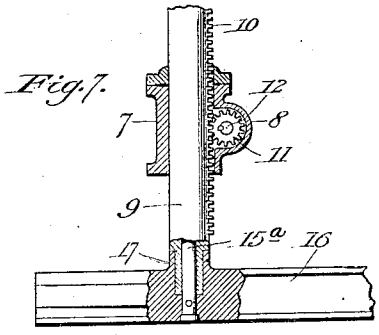


Fig. 7.



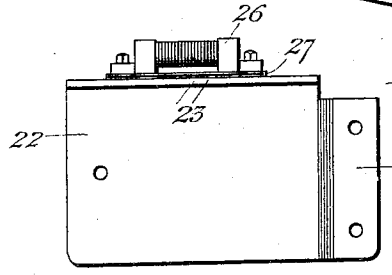


Fig. 6.

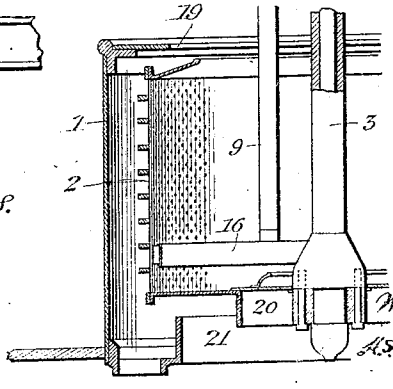


Fig. 8.

Inventor

William E. Zuccarello

A. S. Bailey Attorney.

Patented Apr. 7, 1925. 1,532,851

UNITED STATES PATENT OFFICE.

WILLIAM E. ZUCCARELLO, OF LONGMONT, COLORADO, ASSIGNOR OF ONE-FOURTH TO LARS P. PILKAER, OF DENVER, COLORADO.

ELECTRICALLY-OPERATED SAFETY LOCK FOR CENTRIFUGAL DISCHARGING MACHINES.

Application filed January 8, 1924. Serial No. 685,070.

To all whom it may concern:

Be it known that I, WILLIAM E. ZUCCARELLO, a citizen of the United States of America, residing at Longmont, county of Boulder, and State of Colorado, have invented a new and useful Electrically-Operated Safety Lock for Centrifugal Discharging Machines, of which the following is a specification.

This invention relates to improvements in safety lock for the discharge plows of centrifugal sugar manufacturing machines.

The primary object of the invention is to provide means whereby the plow is automatically locked against accidental or unintentional swinging of the same into a position where it can be lowered or dropped into the basket, when the same is rotating at a high rate of speed, thereby avoiding accident.

Further, to provide an electrically operated lock for the plow, which is controlled by a centrifugal switch, said switch being driven from the basket operating shaft or spindle of the machine, whereby, when said basket is operating at a high rate of speed, said switch acts automatically to close a circuit through a magnet which throws said lock to prevent the swinging of the plow into a position to be lowered or dropped into the basket.

Further, to provide in connection with a centrifugal sugar discharging machine, a centrifugally operated electric circuit closing switch which is driven from the power shaft of the said machine, and which is adapted to close said circuit at any desired speed of said machine, said circuit including a magnet which is adapted to draw a lock bar into position to prevent the swinging movement of a plow mounted on said machine, into position where it can be accidentally or unintentionally lowered into said machine when the same is rotating at a high rate of speed.

These objects are accomplished by the mechanism illustrated in the accompanying drawings, in which:

Fig. 1 is a side view of a sugar discharging machine equipped with the improved mechanism for locking the discharge plow in an inoperative position;

Fig. 2 is a plan view of the same;

Fig. 3 is a vertical sectional view through the improved circuit closing switch;

Fig. 4 is a sectional view of the cap of the switch and one of the centrifugally operated circuit closers supported thereby;

Fig. 5 is a plan view of the electrically operated lock, and showing a diagram of the circuit wires and switch in connection therewith;

Fig. 6 is a front view of the supporting bracket for the lock, showing the magnet thereon, but omitting the locking arm;

Fig. 7 is a sectional view through the guide for the plow supporting spindle; and

Fig. 8 is a sectional view through the sugar washer.

In the manufacture of beet sugar, when the product reaches the stage when it comprises a mixture of sugar and molasses, this mixture is run into a centrifugal machine, comprising an outer stationary cylindrical vessel or "curb," and an inner revolvable screen or "basket," which is suspended to rotate axially within the curb, and at a high rate of speed. The mixture is run into this basket, and under centrifugal action, the molasses is thrown against and forced through the screen wall of the basket and into the curb, while the sugar, which is in crystal formation, adheres to and accumulates upon the wall of the basket. Water is sprayed upon the crystal formation to wash out all the molasses, and the crystallized sugar is cut from the wall of the basket by a plow or discharger, which is mounted on the curb. The plow is secured to the lower end of a vertically adjustable shaft or spindle, which is mounted in an arm which forms part of a standard which is rotatably mounted on the curb. During the separation of the molasses from the sugar, the plow is withdrawn from the basket and is swung outwardly far enough to rest upon a ring shaped member which is secured to the curb

and closes the space between the curb and the basket, as shown in Figure 8; and in machines of this character, as at present supplied to the trade, no means are employed for preventing the accidental or unintentional swinging of the plow into a position where it may either drop by gravity into the basket or be lowered therein by an attendant, when the basket is running at a high rate of speed. Serious injury, both to the machine and to the attendants in charge, have resulted from lowering the plow into the basket when the same was rotating at high speed, and suddenly bringing the plow into cutting engagement with the crystal coating on the wall of the basket.

The present invention is designed to prevent such accidents by providing an electrically controlled lock which engages the plow supporting standard, said lock being thrown to position by a magnet in a circuit, which is closed by a centrifugal switch, operated by the shaft of the basket, as will now be fully described.

Referring to the accompanying drawings:

The numeral 1 indicates the curb or outer stationary cylindrical housing of a centrifugal sugar discharging machine, and 2 the cylindrical screen or basket, which is secured to a rotatable spindle 3, which is suspended from a hanger—not shown—which is supported above and in line with the axis of the curb. A bracket 4 is bolted to the outer side of the curb and a standard 5 is rotatably mounted in the bracket and is formed with a horizontal hollow arm 6, having a vertical spindle guide 7 on its outer end and on one side of the axis of the arm, and a pinion housing 8 on the opposite side of the axis of the arm, which opens into the spindle guide, as clearly shown in Figure 7.

A vertical hollow spindle 9 is slidably mounted in the guide 7 and is provided on one side with rack teeth 10, which are engaged by a pinion 11 on the end of a shaft 12, which is mounted in the hollow horizontal arm 6. The shaft 12 projects far enough beyond the inner end of the arm 6 to receive a hand wheel 13, which is secured thereon by a nut 14. The hand wheel is provided with an operating handle 15, and by turning the said wheel, the spindle 9 is raised or lowered by the engagement of the pinion 11 with the rack teeth 10. A rod 15A passes through the spindle 9, and a plow or discharger 16 is rigidly secured to the lower end of this rod, and is provided with a hub portion 17, which is pivotally mounted upon the lower end of the spindle 9. The upper end of the rod 15A has rigidly secured thereon a hand lever 18, and by turning this hand lever in either direction, the plow is turned in a corresponding manner. The parts thus far described constitute a type of sugar discharging machine in common use and, therefore, are not a part of the present invention. When the plow is not in use, it is withdrawn from the basket and is swung out far enough to rest upon a flat, ring shaped support 19, which rests upon the rim of the curb and which covers the space between the curb and the basket, as clearly shown by Figure 8.

While the plow is thus supported in a position of disuse, the basket is being rotated at a high speed, to effect the separation of the molases from the sugar by centrifugal action in the manner above described, leaving an accumulation of crystallized sugar on the wall of the basket, or on a circular screen which may be placed in the basket, and this sugar must be removed by the plow or discharger 16 and discharged through an opening 20 in the bottom of the basket, and through an opening 21 in the bottom of the curb.

To lower the plow into the basket and swing the same into position to remove the sugar, while the basket is rotating at a high speed, would result in wrecking the machine, and in serious, if not fatal, injury to the attendant. Machines in present use are not provided with any means of preventing such an accident, and such a contingency is dependent wholly upon the attendant in charge of the machine. The present invention, however, eliminates the possibility of the plow being swung into operative position while the basket is rotating at high speed, as will now be fully set forth:

Upon the wall of the curb 1 is bolted a bracket 22 in the form of a flat plate, the upper end of which terminates in a ledge or shelf 23. This plate has an offset extension 24 which overlaps the adjacent side of the bearing bracket 4, and is secured to said bracket by the same bolts 25 which secure the bracket to the wall of the curb, as shown in Figure 1.

Upon the shelf 23 is bolted a magnet 26, which is insulated from the shelf by a non-conducting strip 27; and in front of the magnet, an arm 28 is pivoted to the plate at one end so as to be attracted by the magnet. The free end of this arm is adapted to engage a rib 29 on the standard 5, when the arm is attracted by the magnet, and thus prevent the standard from being turned in one direction, or so as to allow the plow to be lowered into the basket. Upon the support 19 at the top of the curb, is mounted a casing or housing 30, from which extends a hollow standard 31, in which is mounted a shaft 32. The housing contains mechanism—not shown—which operates an oscillating spraying nozzle—also not shown—for spraying the sugar to wash the molasses therefrom. The shaft 32 op-

erates the said mechanism and is driven by a wheel 33, which is connected by a belt 34 with the basket operating spindle 3. This spraying mechanism is in common use, and, therefore, by itself forms no part of the present invention, and further description of the same is deemed unnecessary.

I utilize the shaft 32 to mount thereon my improved circuit closing switch, but the said switch may also be mounted independently of the shaft 32 if desired, but operated by the spindle 3.

The improved centrifugal switch is constructed and arranged in the following manner:

I employ a housing 35, which is made of suitable non-conducting material, as fibre, which is open at both ends. The lower end of this housing is closed by a threaded cap 36, which is formed on a ring-shaped base member 37, having a hub 38 on its lower side, which is secured upon the upper end of the shaft 32 by a set screw 39. The upper end of the housing 35 is also closed by a threaded cap 40, there being a space 41 between the upper end of the housing 35 and the head end of the cap 40, as shown in Figure 3. A transverse rod 42 is rotatably mounted in the cylindrical wall of the cap 40, and so as to lie in the said space 41, and this rod is provided with right and left threads 43 and 44 respectively. Upon the threaded portions of this rod are mounted blocks 45, the lower ends of which are bifurcated, as shown in Figure 4, and in the bifurcated portions of these blocks are pivotally mounted the upper ends of depending rods 46; and to the lower ends of these rods are connected plates 47, having ears 48, to which the lower ends of the said rods 46 are pivotally secured, the said rods each having a series of pivot-receiving holes 49, which permit of an adjustable connection of the plates 47 with the said arms 46. The plates 47 serve as contact plates and are adapted to be swung into contact with a metal band 50, which is secured by metal pins 51 to the inner face of the fibre housing 35. The pins 51 pass through the wall of the housing 35 and also secure a second metal band 52 to the outside face of the housing, and the pins act as electric current conductors between the two bands. When the housing 35 is rotated, through the connection of the wheel 33 with the spindle 3 by means of the belt 34, the arms 46 are swung outwardly by centrifugal force, so that the contact plates 47 engage the metal band 50 for a purpose which will later appear. The threaded rod 42 has a squared end 53 to receive a suitable turning wrench; and by turning the rod to either the right or left, the blocks 45 thereon are moved toward or away from each other, and the space between the contact plates 47 and the metal band 50 is correspondingly increased or diminished. When the space between the said band 50 and contact plates 47 is small, a relatively low rotary speed of the housing 35 will suffice to throw the said plates into contact with the said band by centrifugal force; but as the space between the band and the contact plates is increased, a correspondingly increasing rotary speed of the housing 35 is necessary to cause the plates to swing out into contact with the band. Thus the plates may be adjusted to contact with the band 50 at any predetermined rotary speed of the housing 35.

A metal pipe or conduit 54 is secured to the standard 31 of the spraying mechanism by clamp plates 55, and the upper portion of the pipe is bent outward so as to extend up over the belt wheel 33, and the end of this pipe is bent to lie on a horizontal plane and terminates a short distance from the fibre housing 35. A fibre block 56 is rigidly secured upon this end of the pipe so as to parallel the face of the housing, and bolts 57 and 57A are passed through the end portions of the block, the said bolts having socketed projections 58 on their inner ends, in which are slidably mounted suitable metal brushes 59, which are arranged to bear respectively against the metal band 52 and the cap 40, the brushes being held in contact with the said band and cap by coil springs 60, which are interposed between the bottoms of the sockets and the adjacent ends of the brushes. A circuit wire 61 is connected to the bolt 57 by a binding nut 62, and a circuit wire 63 is connected to the bolt 57A by a binding nut 64, and these wires are passed into the conduit 54 through holes 65 in the same.

The lower end of the conduit 54 terminates near the magnet 26, and this portion of the said conduit is rigidly secured to the curb 1. The wires 61 and 63 are insulated and extend through the conduit and beyond its lower end. The wire 61 connects with one terminal of the winding of the magnet 26, and the wire 63 extends to one terminal of a battery 66, or other source of electric power, and a wire 67 connects the other terminal of the battery with the remaining terminal of the magnet winding.

In practice, when the molasses is being separated from the sugar, the plow 16 is out of commission and is supported on the flat ring-shaped member 19 on the top of the curb. During this operation the basket is rotating at a high rate of speed, and, therefore, the circuit closing plates 47 of the switch are thrown outwardly by centrifugal force against the metal band 50, whereby a circuit is closed through the magnet 26, the current passing from the battery through wire 63 to the lower brush 59 and outer band 52, whence it is conducted by the pins 51 to the inner band 50, whence it passes

through the plates 47, arms 46 and rod 42 to the cap 40, and through the upper brush 59 to wire 61, thence through the magnet 26 and wire 67 to the battery, thus completing the circuit. The magnet is thus energized and the arm or lock 28 is drawn to the magnet, so that the outer end of the said arm lies in the path of a rib 29 on the rotatable standard 5 of the plow supporting arm 6, and prevents rotation of the standard in the direction of the arrow in Figure 5, or so as to prevent the plow from being swung to a position where it can be lowered in the basket by hand or accidentally dropped therein by gravity, thus preventing the plow from being placed in sugar discharging position while the basket is rotating at a high rate of speed, with the consequent damage to the machine and injury to the attendant. As soon as the basket slows down, the circuit through the magnet is broken, and the arm or lock 28 is thrown out of the path of the rib 29, by a spring 69, and the plow may then be swung into position to be lowered into the basket.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a machine of the character described having a rotatable shaft, the combination with a rotatable standard on said machine, a lock arm for engaging said standard to prevent rotation of the same, a magnet in circuit with an electric power source for actuating said lock arm, and means operated by said shaft when the same is rotating at high speed, to close the circuit through said magnet.

2. The combination with a machine having a rotatable member and a rotatable standard on said machine; of a lock arm for engaging said standard to prevent rotation of the same, a magnet in circuit with an electric power source, for actuating said lock arm, and a centrifugally actuated means operated by said rotatable member when the same is running at high speed, for closing said circuit.

3. The combination with a machine having a rotatable member and a rotatable tool supporting standard on said machine; of a lock arm for engaging said standard to prevent rotation of the same in one direction; a magnet in circuit with an electric power source, for actuating said lock arm, a rotatable switch in said circuit operated by said rotatable member, and centrifugally actuated elements in said switch for closing the circuit through said magnet when the rotatable member is running at high speed.

4. The combination with a machine having a power driven rotating member and a rotatable tool supporting arm on said machine; of a lock arm to engage said tool supporting arm and prevent rotation of the same in one direction, a magnet in circuit with a battery for drawing said lock arm into position to engage said tool supporting arm, a rotatable switch in said circuit and means operated by the rotating member to rotate said switch, and centrifugally actuated circuit-closers in said switch which close the circuit through said magnet when the rotating member is running at high speed.

5. The combination with a machine having a power driven rotating member, and a tool supporting arm on said machine adapted to be rotated; of a lock arm for engaging said tool supporting arm to prevent rotation of the same in one direction, and a spring for holding said arm in non-locking position; a magnet in circuit with a battery for drawing said arm into locking position, a shaft and means connecting with the rotating member for rotating said shaft; a switch in said circuit and mounted on said shaft to turn therewith, and centrifugally actuated circuit-closers in said switch which close the circuit through said magnet when the rotating member is running at high speed, thereby to throw the lock arm to prevent the turning of the tool holding arm in one direction.

6. The combination with a machine comprising an outer stationary cylindrical receptacle, a cylindrical receptacle rotatable in said outer receptacle, a standard rotatably mounted on the outer receptacle and having an arm, and a vertically movable tool supporting spindle mounted in said arm and adapted to be lowered into said inner receptacle when said arm is swung inward; of a lock arm, power means for swinging said lock arm to prevent the inward swinging of the arm having the tool holding spindle, and means operated by the rotatable receptacle when the same is running at high speed, whereby power is transmitted to the lock-arm-swinging means.

7. In a sugar discharging machine, the combination with a curb, an axial power-driven shaft in said curb a screen basket mounted on said shaft, a standard rotatably mounted on the curb and having a horizontal arm, a spindle vertically movable in the outer end of said arm, and a sugar discharging plow on the lower end of said spindle, said plow being adapted to rest upon the top of said curb when not in operation; of means for preventing the swinging of said arm to permit the lowering of said plow into said basket when the same is running at high speed, comprising a lock arm, a magnet in circuit with a battery, for drawing said lock arm into position to engage said standard and prevent inward swinging of the spindle supporting arm, and means op-

erated by said power-driven shaft to close a circuit through said magnet, when said basket is running at high speed.

8. In a sugar discharging machine the combination with a curb, a power operated spindle-supported basket therein, a rotatable standard on said curb having a horizontal arm, a vertically movable support mounted in the end of said arm and a sugar-discharging plow on the lower end of said support, said plow being adapted to rest upon the top of said curb when not in operation; of means for preventing the swinging of said arm to permit the lowering of said plow into said basket when the same is running at high speed; comprising a bracket on said curb, a lock arm pivotally mounted on said bracket, a magnet on said bracket in circuit with an electric power source for drawing said arm into position to engage said rotatable standard and prevent inward swinging of the plow support, a shaft on the curb, and a belt connecting the same with the basket-operating spindle, a switch in said circuit and mounted on said shaft to rotate therewith, and centrifugally operated circuit-closers in said switch which close the circuit through said magnet when the basket is running at high speed.

9. In a sugar discharging machine, the combination with the curb, a power driven spindle, a screen basket in said curb and secured to said spindle, a rotatable support, and a sugar discharging plow adapted to have a vertical movement in said support and adapted to rest upon said curb when not in operation; of means for preventing the turning of said support to permit the plow to be lowered into said basket when the same is running at high speed, comprising a hollow cylindrical switch rotatably mounted on said curb and means connecting said switch with said power operated spindle to rotate said switch, centrifugally operated circuit-closers in said switch; a lock arm mounted on the curb, a magnet to draw said lock arm into position to engage said rotatable plow support and prevent inward swinging of the same; a conduit mounted on said curb, a non-conducting block on one end of said conduit, brushes carried by said block and engaging said rotatable switch, and wires connected to said brushes and extending through said conduit and connecting said magnet in circuit with an electric power source, said centrifugally operated circuit-closers being adapted to close a circuit through said magnet when said basket is running at high speed, thereby to draw said lock arm into locking position.

10. In a mechanism of the character described the combination with a power driven rotatable element and a pivotally mounted element; of means for preventing the turning in one direction of said pivotally mounted element when the rotatable element is running at any predetermined high speed, comprising a lock arm, a magnet in circuit with a battery for drawing said lock arm into position to engage said pivotal element, a rotatable hollow switch in said circuit and means driven by the rotatable element for rotating said switch, and adjustable centrifugally operated circuit-closers in said switch for closing a circuit through said magnet.

11. In a mechanism of the character described, the combination with a power driven rotary element and a swinging element; of means for preventing movement of the swinging element in one direction, when the rotary element is running at high speed, comprising a rotatable hollow, non-conducting switch, a metal conducting band on the interior wall of said switch, a similar band on the outside of said switch, and conductor pins connecting said bands; a metal cap on the upper end of the switch, a transverse rod pivotally mounted in said cap and provided with right and left threads, threaded blocks on said rod, depending arms hinged to said blocks having pivoted contact plates on their lower ends, brushes in contact respectively with the said cap and said outer metal band; a lock arm, a magnet to draw said lock arm in position to prevent turning of the swinging element, and circuit wires extending from said brushes and connecting said magnet in circuit with an electric power source, whereby, when said depending arms in said switch are thrown outward by centrifugal force, said contact plates engage said inner metal band, thereby closing a circuit through said magnet.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM E. ZUCCARELLO.

Witnesses:
G. SARGENT ELLIOTT,
ELIZABETH SMITH.