July 2, 1940. W. HOFFMAN 2,206,401

CENTRIFUGAL APPARATUS

Filed April 19, 1938 2 Sheets-Sheet 1

Fig. 1.

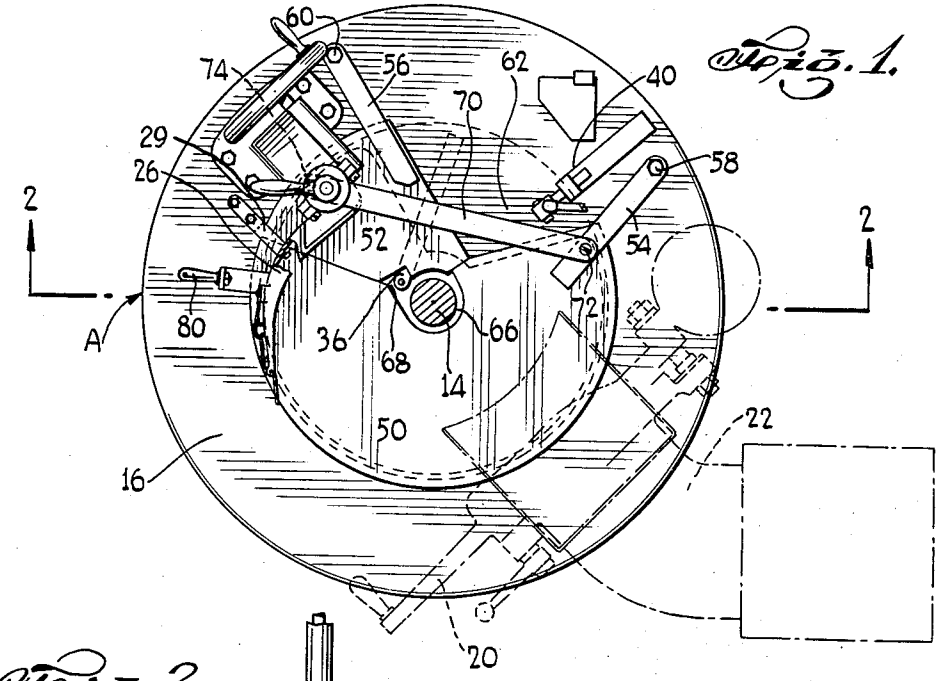
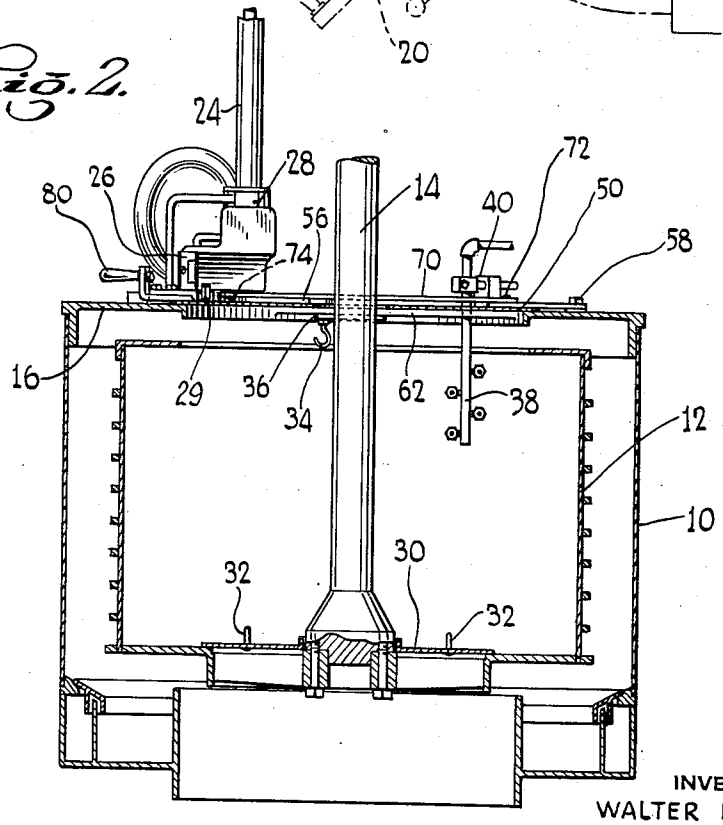


Fig. 2.



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Fig. 3.

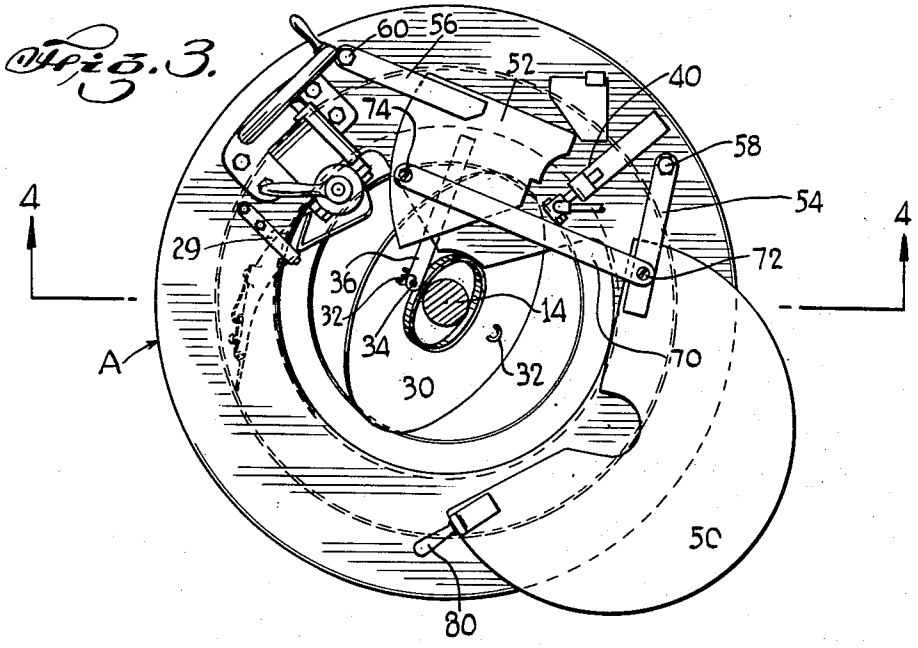
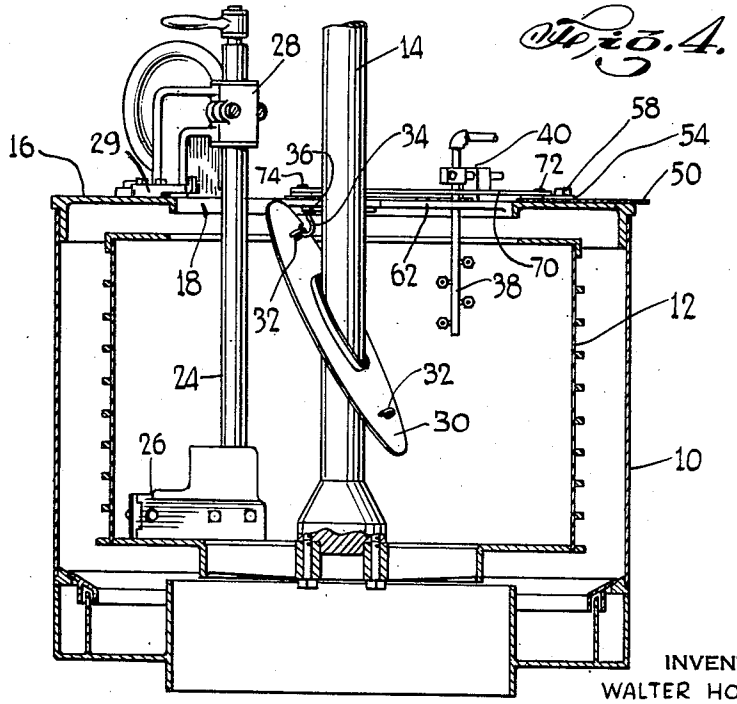


Fig. 4.



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UNITED STATES PATENT OFFICE

2,206,401

CENTRIFUGAL APPARATUS

Walter Hoffman, Hamilton, Ohio, assignor to The Western States Machine Company, New York, N. Y., a corporation of Utah

Application April 19, 1938, Serial No. 202,900

11 Claims. (Cl. 210—67)

This invention relates to centrifugal apparatus of the type employed in the recovery of grain sugar from mixtures of sugar crystals and syrup and for like purposes. It deals particularly with such apparatus embodying new and improved means for protecting the contents of the centrifugal basket against the objectionable cooling and drying effects of strong air currents and against contamination by foreign matter during centrifuging operations.

When purging sugar massecuites in the usual open top centrifugals, especially if the treatment must be prolonged in order to effect proper separation of the molasses, as in the case of highly viscous low grade massecuites, or if the centrifugals are operated at very high speeds, the air currents created by revolution of the basket materially reduce the temperature of the material and also cause appreciable drying of the unseparated molasses. A drop of a few degrees in the temperature of saturated molasses results in a great increase in its viscosity and often is attended by the formation of objectionable "false grain," or discrete sugar crystals, which interfere seriously with the efficiency of separation. Drying of the massecuite also is harmful, since it increases viscosity and thus reduces the quality of separation. In addition to these considerations, it is always important, particularly in the purging of refined sugar massecuites, carefully to exclude foreign matter from the contents of the centrifugal basket. The possibility of water, dust, grit or other matter entering the loaded basket and contaminating the sugar is generally present wherever centrifugal apparatus is used.

A further problem encountered in the operation of the usual type of centrifugal at very high speeds consists in the sweeping of strong air currents from the open top of the curb through and around the basket and through the bottom discharge outlet of the curb where these currents exert an objectionable blowing action and cause difficulties in the handling of sugar discharged from the centrifugal.

An object of my invention is to provide centrifugal apparatus embodying new and improved means for covering the top of the curb during a purging operation, so that the contents of the basket are protected against the harmful effects of strong air circulation and kept free of contamination by foreign matter during centrifuging operations, and so that the objectionable windage below the curb may be avoided. I have provided apparatus of this type which effectively eliminates these objectionable features of the usual open top centrifugal, and which in no way interferes with or requires modification of operations customarily carried out during the centrifuging cycle. My improved apparatus is further advantageous in that it is organized to permit easy manipulation by the attendant of the centrifugal without interference with his other duties.

Another object of my invention is to provide a new and improved centrifugal curb top cover which is constructed and arranged in combination with a centrifugal, a surrounding curb and the units of equipment normally associated therewith—such as discharger, sprayer, loading chute and basket valve support—so that the cover may be mounted permanently on the curb top yet moved easily to and from open position allowing full access to the basket for the loading and discharging operations without obstruction by any of said units.

Additional novel features and advantages of the invention and a desirable manner of applying it in practice will be apparent from the ensuing description when considered in connection with the illustrations on the accompanying drawings. It will be understood, of course, that the invention is not restricted to the details of construction and arrangement shown in the drawings, but extends also to other embodiments utilizing novel features of the invention as set forth in the claims appended hereto.

In the drawings,

Figure 1 is a plan view of a centrifugal curb top and associated units provided with an improved curb top cover in accordance with my invention, the cover being shown in closed position. The phantom lines in this figure indicate the position of the usual loading chute and control gate overlying the curb.

Figure 2 is a vertical section taken approximately along the lines 2—2 of Figure 1.

Figure 3 is a plan view similar to Figure 1, with the curb top cover in open position and other units of the apparatus in position for discharging material from the centrifugal basket, and

Figure 4 is a vertical section taken approximately along the lines 4—4 of Figure 3.

The drawings show a form of curb top cover provided in accordance with this invention in operative association with the curb top of a suspended centrifugal and other units of equipment employed in the operation of the centrifugal. The curb 10 surrounds a perforate centrifugal basket 12, which is suspended on a vertical spindle 14 and adapted to be revolved at high speed

to effect separation of liquid and solid materials introduced into the basket. The curb has a circular top wall 16, with a central opening 18 therein permitting access to the basket. The front of the apparatus and the approximate position normally occupied by the attendant operating the centrifugal is indicated by the character A in Figures 1 and 3. Considerably to the right of this position is located a control arm 20 of a gate normally lying across a loading chute 22, which chute overlies the curb top in position to direct material from the end of the chute through the opening 18 and into basket 12 when arm 20 is actuated to open the control gate and permit material to flow through the chute. A discharger unit is mounted on the curb top a few degrees to the left of the position A. This unit usually comprises a vertically movable spindle 24 carrying a discharger shoe 26 on its lower end and mounted in a bracket 28 which overhangs the curb opening 18 in a manner permitting the discharger shoe and spindle to be lowered into the basket through the opening. The discharger is provided with mechanism for swinging the spindle and shoe about the vertical axis of the spindle. When the discharger is not in use the shoe 26 rests on supporting means in the form of a bracket 29 having an end portion secured to the curb top and another end portion extending over the opening 18 and spaced above the plane of the curb top substantially as shown in Figures 1 and 2. When the discharger is to be used, it is swung horizontally to a position over the opening 18 and free of the bracket 29, lowered vertically into the basket and then moved clockwise about its axis and pressed into the wall of material inside the basket.

In addition to the loading chute and discharger, the illustrated apparatus includes a sprayer 38 for directing a spray into the material inside the basket during a centrifuging cycle. It also includes means 34 for supporting a bottom valve or closure 30 for the basket in a raised position permitting free passage of the spray into the wall of material in the basket and free manipulation of the discharger and discharge of material from the basket. The bottom closure 30 is provided with loops or eyes 32 for engagement with the support 34, which is shown in the form of a hook suspended from the end of a stationary bar 36 and located adjacent the spindle 14 between the latter and the discharger. Hook 34 is positioned below the curb top in such relation to the discharger that the bottom closure 30 may be raised and engaged on the hook by means of an eye 32 without obstructing the path of movement of the discharger shoe as the latter is lowered into the basket and manipulated therein.

The sprayer 38 is mounted on the curb top in a position between the loading chute and discharger and toward the back side of the curb, means such as indicated at 40 serving for this purpose. The sprayer extends below the curb top in position to direct a spray across unobstructed space between the peripheral wall of the basket and spindle 14 and into material carried in the basket. Among the above-mentioned units of apparatus, the curb, basket, basket valve, discharger and sprayer, may be of any suitable known construction. As individual units of equipment they do not constitute novel features of the present invention.

In accordance with this invention, I have provided a new and improved curb top cover in combination with the curb top 16 and the other units of apparatus associated therewith. This cover comprises a plurality of cooperating sections which are movable from a position substantially closing the opening 18 and preventing objectionable air currents and foreign matter from entering the curb to an open position exposing the opening 18 and permitting free access to the basket 12 so that a charge may be introduced into the basket and treated material discharged therefrom in the usual manner. The curb top cover is constructed and arranged with reference to the other units of apparatus associated with the curb so that its sections are unobstructed in moving back and forth from closed to open position in the normal operation of the centrifugal. In addition, it is arranged in a manner permitting the attendant of the centrifugal to cover or expose the opening 18 by a single simple manipulation which may be performed easily and without complicating or prolonging the attention normally required by the centrifugal apparatus during each complete cycle of operation.

In a preferred form of my invention, as illustrated in the drawings, the curb top cover comprises two relatively movable sections 50 and 52 which are of a size and shape adapted to fit together in closed position and substantially cover the opening 18 in the curb top and to move freely to open position exposing the opening without interference by the sprayer, discharger or loading chute.

Sections 50 and 52 closely overlie the curb top 16 as indicated in Figures 2 and 4. Each section is mounted for swinging movement in a horizontal plane about a fixed axis lying beyond the margin of opening 18 and on normally unused portions of the curb top. Suitable mounting means include bars 54 and 56, which are rigidly secured to the respective sections and swiveled at their ends to the curb top by pivots 58 and 60, respectively. In the illustrated embodiment, the curb top 16 is provided with an integral portion 62 extending inwardly toward the spindle 14 from the back side of the curb between the discharger and load-chute. The edges of this inwardly extending portion 62 define side margins of opening 18, which otherwise would be circular. The sprayer 38 is mounted to extend over portion 62 and downwardly through an opening therein into position below the curb top for directing a spray into the contents of the basket. To the bottom of portion 62 is secured the mounting bar 36 for the hook support 34, as indicated in Figures 1 and 3.

The cooperating cover sections 50 and 52 are preferably of sector-like configuration, one covering an arc of at least 180° and the other an arc of less than 180° and the two together in closed position having margins which overlie the margins of opening 18, including the edges of portion 62, and substantially cover the entire opening. Sections 50 and 52 have central recessed portions which, when the sections lie in closed position, provide central apertures 66 and 68, the first permitting requisite swinging movement of the basket spindle 14 and the second permitting inspection of the hook support 34 to determine whether the basket closure 30 is supported by the hook or lowered into closed position in the bottom of the basket. Aperture 68 also would permit the hook 34 to be suspended on means extending from above to the indicated position below the curb top.

In the illustrated organization, section 50 is

the larger of the two cover sections, and section 52 the smaller. The pivot 58 forming the axis for section 50 is located on the curb top adjacent but in clockwise displacement from the sprayer mounting 40, so that in swinging to open position about pivot 58 section 50 moves in a direction away from the discharger and in a path extending beneath the loading chute 22 overlying the curb top. The pivot 60 for section 52 is fixed on the curb top between the discharger and sprayer mounting so that section 52 swings away from opening 18 in a path lying between the discharger and sprayer. Thus the paths of the sections in moving to or from open position and their location when in open position occupy otherwise unused portions of the curb top and do not interfere with normal operation of the apparatus.

In addition to the features mentioned above, my improved curb top cover construction provides a plurality of relatively movable sections together with means responsive to the movement of one of the sections to or from closed position to move the other to and from closed position. For example, means such as a link 70 extends between the two sections and is connected to each by swivels or pivots 72 and 74, respectively. These pivots both lie to one side of the pivots 58 and 60 and are arranged so that the movement of section 50 around its pivot 58 exerts a force upon section 52 through link 70 causing section 52 to swing about its pivot 60. By this means the operation of closing or opening the curb top may be carried out by a single, simple manipulation. To facilitate this manipulation, a handle 80 is mounted on section 50 adjacent the front of the curb.

In the normal cycle of operation of the described apparatus, assuming the centrifugal basket to be empty, the discharger shoe resting on the supporting means 29, and the curb top cover in closed position, the attendant of the machine first moves handle 80 in a counterclockwise direction and thus shifts the cover sections to open position fully exposing the opening 18. He then grasps a handle on the gate control lever 20 and actuates the same to introduce a charge of material into the basket, which, during this stage of operation, is revolved at a relatively low speed. After dropping the gate to close the loading chute, the attendant again grasps handle 80 and shifts the cover sections to closed position, whereupon the centrifugal is ready for the purging operation. With the cover in closed position revolution of the basket at high speed takes place without difficulties due to air currents entering the curb through the curb top or to the inadvertent introduction of foreign matter into the basket. During the spinning operations a washing agent may be directed into the basket from sprayer 38 in the usual manner. After the charge has been treated to the desired extent, the centrifugal is decelerated, and is then in condition for discharging. Thereupon the attendant again shifts the curb top cover to open position, raises the bottom closure 30 and supports it on member 34, and then swings the discharger shoe 26 from its position on bracket 29 to a free position over opening 18 and lowers the discharger into the basket. The discharging operation is carried out in the usual manner. The bottom closure 30 is then disengaged from support 34, placed back in normal position, and the machine again loaded with another charge of material from loading chute 22.

While I have illustrated a preferred embodiment of my invention in combination with centrifugal apparatus of the suspended type having numerous accessory units associated therewith, it is to be understood that the invention is not restricted to this particular arrangement or to the illustrated details of construction. I intend that the invention be given a scope commensurate with its novel contributions as limited only by fair interpretation of the claims.

I claim:

1. A centrifugal curb top cover comprising two relatively movable sections adapted in closed position to cover the opening in a centrifugal curb top, means mounting said sections for swinging movement about spaced vertical axes lying outside the margins of said opening and means connecting said sections together and responsive to movement of one of said sections in a counterclockwise direction about its axis to move the other section in a counterclockwise direction about its axis and thus to expose said opening.

2. A centrifugal curb top cover comprising two relatively movable sector-like sections overlying the centrifugal curb top and adapted in closed position to cover the opening in a centrifugal curb top, means mounting said sections for swinging movement about spaced vertical axes lying outside the margins of said opening and link means connecting said sections together and responsive to movement of one of said sections in a counterclockwise direction about its axis to move the other section in a counterclockwise direction about its axis and thus to expose the opening.

3. A centrifugal curb top cover comprising a plurality of relatively movable sections including two dissimilar movable sections adapted in closed position to cover the opening in a centrifugal curb top, means mounting said movable sections for horizontal movement away from said opening to positions overlying said curb top, and link means connecting said movable sections together and responsive to movement of one of said movable sections away from closed position to move the other and expose said opening.

4. In combination with a centrifugal and a surrounding curb having an opening in its top wall permitting access to the centrifugal basket, a curb top cover comprising two dissimilar cooperating movable sections adapted in closed position to cover said opening, means mounting said sections for movement about fixed vertical axes to and from closed position, link means connecting said sections and responsive to movement of one of them to or from closed position to move the other to or from closed position, and a handle on said one section for moving the same to and from closed position.

5. In combination with a suspended centrifugal and a surrounding curb having an opening in its top wall providing space for access to the basket between the basket spindle and said wall, a curb top cover comprising two dissimilar cooperating sector-like sections movable from closed position covering said opening to open position exposing the same, one of said sections covering an arc greater than the other and the two in closed position forming a substantially circular closure having outside margins which overlap the margin of said opening and inside margins which embrace said spindle and provide a small space around the spindle permitting swaying of the same, means mounting each of said sections for horizontal movement to and from closed position about a fixed axis lying outside the margin of

said opening, and means responsive to movement of one of said sections about its fixed axis to move the other about its fixed axis.

6. In combination with a suspended centrifugal and a surrounding curb having a circular top wall with a central opening therein surrounding the spindle and permitting access to the basket, a curb top cover comprising two cooperating sector-like sections movable from closed position across said opening to open position exposing the same, one of said sections covering an arc of at least 180°, the other an arc of less than 180° and the two in closed position forming an incomplete circle having a central aperture accommodating the spindle, said top wall having a stationary portion extending toward the spindle to a position underlying free edges of said sections, and means mounting each of said sections for swinging movement away from said opening.

7. In combination with a centrifugal and a surrounding curb having an opening in its top wall permitting access to the centrifugal basket, a curb top cover comprising a plurality of movable cooperating sections, an arm fixed to each of said sections and extending over said curb top, swivel means connecting said arms to the curb top at spaced points permitting said sections to swing together about the points of connection to closed positions covering said opening and to swing apart to positions exposing the same, and link means connecting said sections together and swiveled to each section and responsive to movement of one section to or from closed position to move the other to or from closed position.

8. In combination, a circular curb top for a suspended gyratory centrifugal, said top having a portion extending inwardly toward its center and an otherwise substantially circular opening adapted to surround the spindle of a centrifugal and to permit the introduction of material into and the operation of a discharger inside the basket, and a curb top cover comprising two cooperating sector-like sections movable from closed position substantially covering said opening to open position exposing the same, one of said sections covering at least 180° and the other substantially less than 180°, means mounting said one section for swinging movement about a pivot on said top in a path extending away from said portion and means mounting said other section for swinging movement about another pivot on said top and in a path lying between its pivot and said one section.

9. In combination, a circular curb top for a suspended gyratory centrifugal, said top having a portion extending inwardly toward its center and an otherwise substantially circular opening adapted to surround the spindle of a centrifugal and to permit the introduction of material into and the operation of a discharger inside the basket, and a curb top cover comprising two cooperating sector-like sections movable from closed position substantially covering said opening to open position exposing the same, one of said sections covering at least 180° and the other substantially less than 180°, means mounting said one section for swinging movement about a pivot on said top in a path extending away from said portion, means mounting said other section for swinging movement about another pivot on said top and in a path lying between its pivot and said one section, a link extending between said sections and swiveled to each at points located to one side of said pivots, and a handle on said one section.

10. In combination, a suspended centrifugal, a surrounding curb having an opening in its top wall surrounding the spindle and permitting access to the basket, a discharger mounted on said top wall and adapted to be supported on said top wall outside of said opening when not in use and to be lowered into the basket through said opening for use, a sprayer mounted on said top wall away from said discharger and extending below the wall to a position within the basket, a curb top cover comprising a plurality of cooperating sections movable from closed position embracing said spindle and covering said opening to open position overlying said top wall and exposing said opening, and means mounting said sections for horizontal movement to open position in paths free of said discharger and sprayer.

11. In combination, a suspended centrifugal, a surrounding curb having an opening in its top wall surrounding the spindle and permitting access to the basket, a discharger mounted on said top wall and adapted to be supported on said top wall outside of said opening when not in use and to be lowered into the basket through said opening for use, said wall having a stationary portion extending inwardly toward the spindle, a sprayer mounted on said wall away from said discharger and extending downwardly through said portion to a position within the basket, a support upon which to suspend the bottom closure of the basket, means extending from said wall portion to hold said support adjacent the spindle and between the same and the discharger, a curb top cover comprising a plurality of cooperating sections movable from closed position covering said opening to open position overlying said top wall and exposing said opening, said sections in closed position providing apertures permitting swaying of the spindle and inspection of said support, means mounting said sections for swinging movement to open position in substantially horizontal paths free of said discharger and sprayer, and means connecting said sections for simultaneous movement to and from open position.

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