

Dec. 30, 1947.

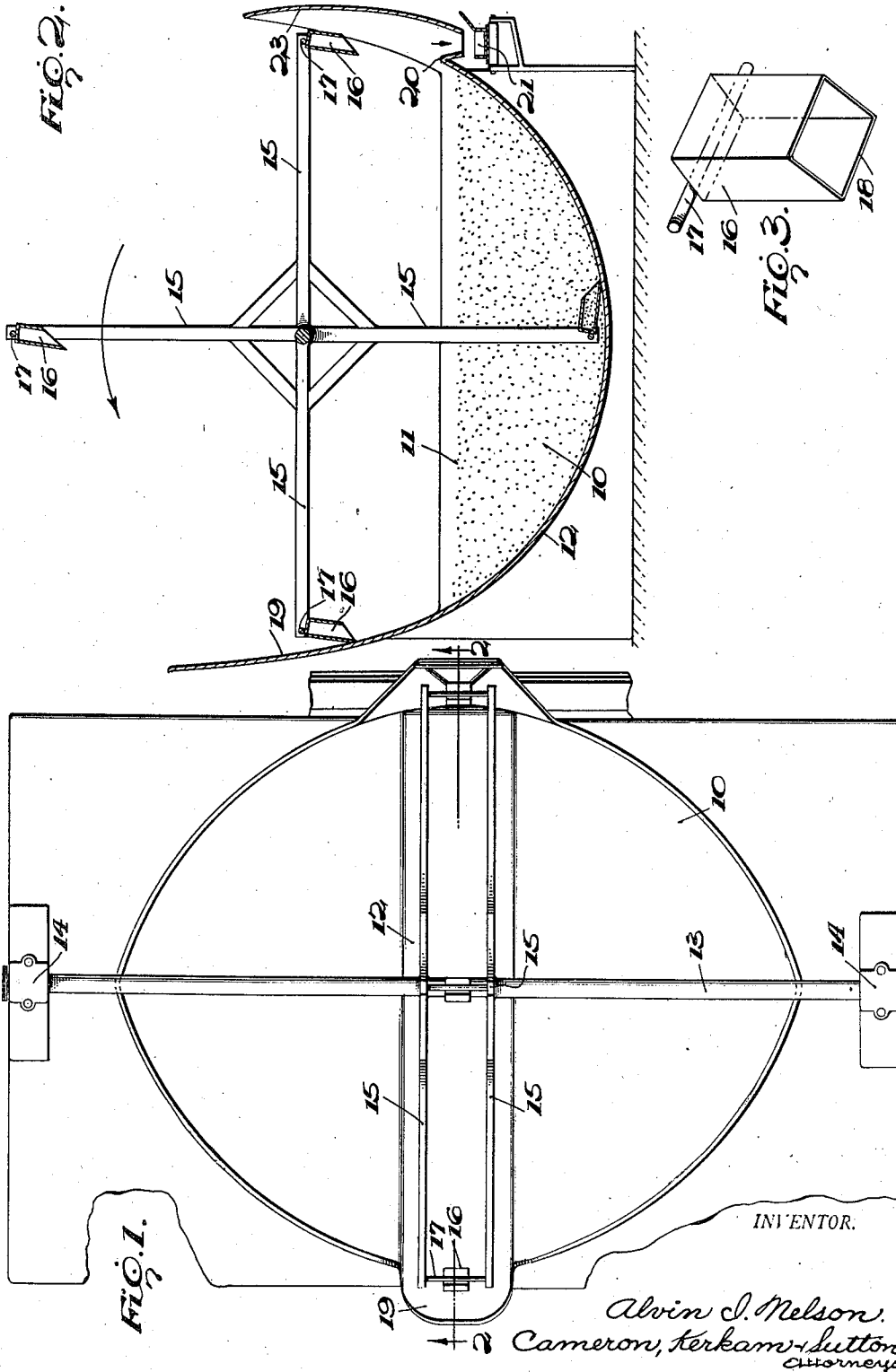
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2,433,478

MIXING AND FILLING APPARATUS

Filed Dec. 22, 1943

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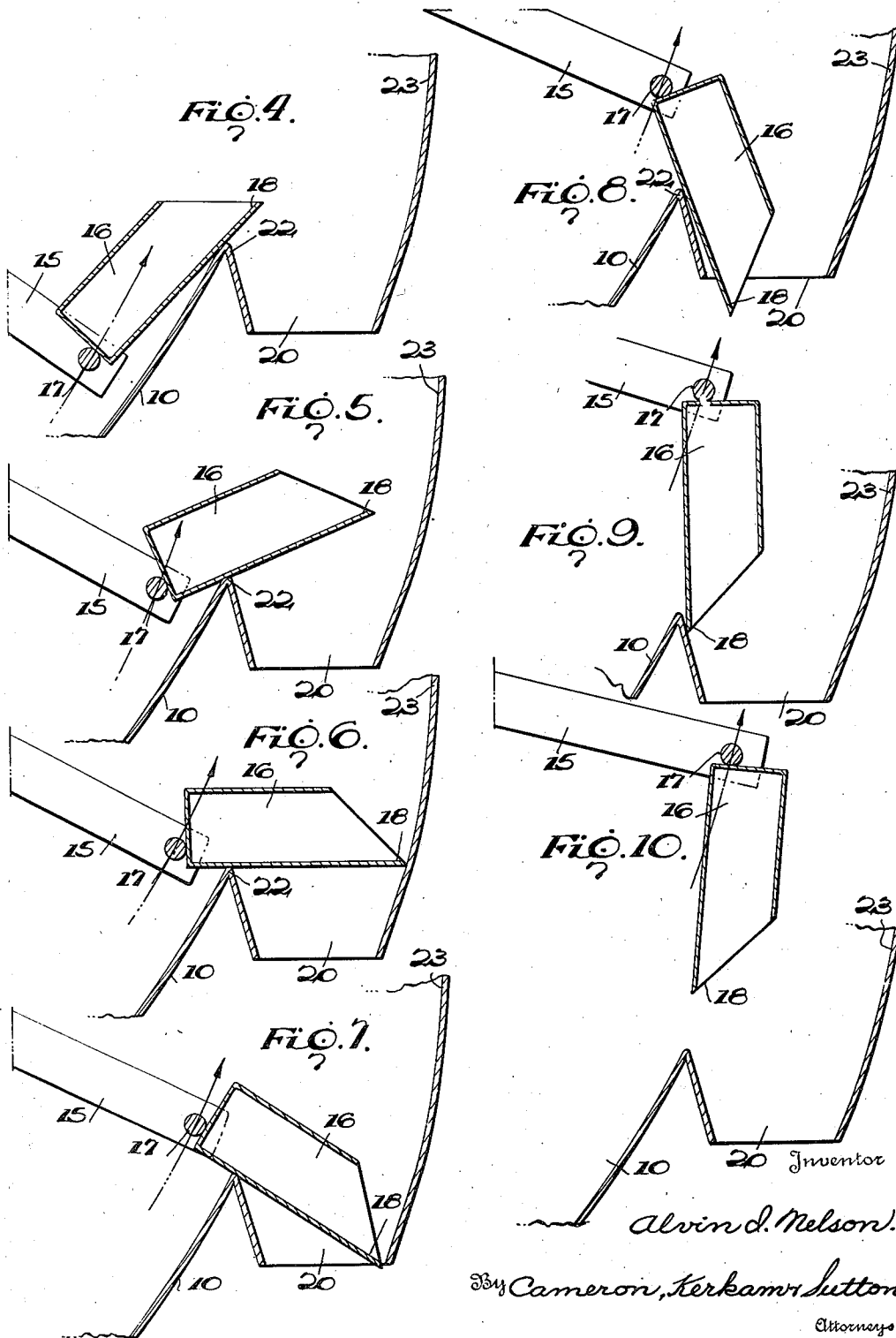
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FIG. 11.

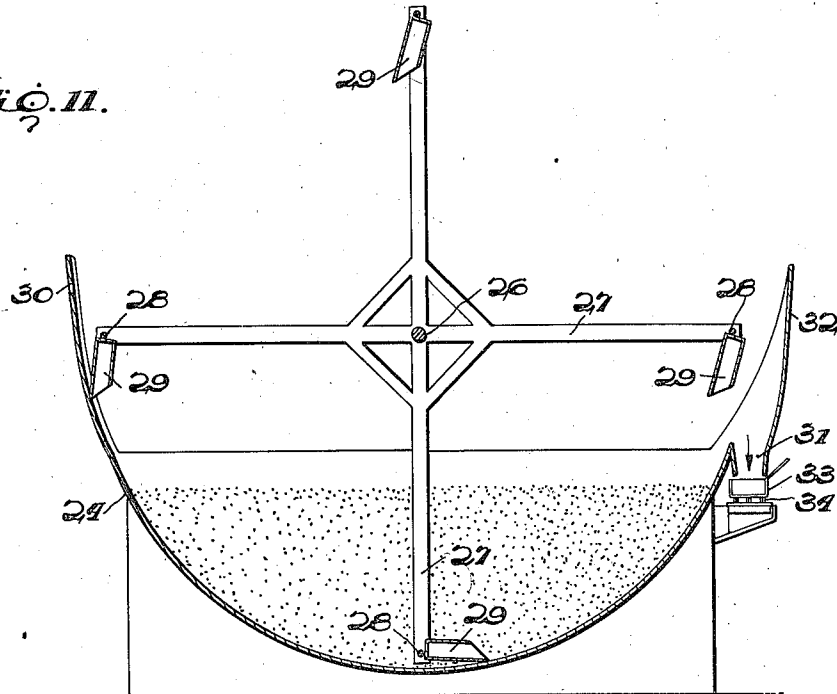
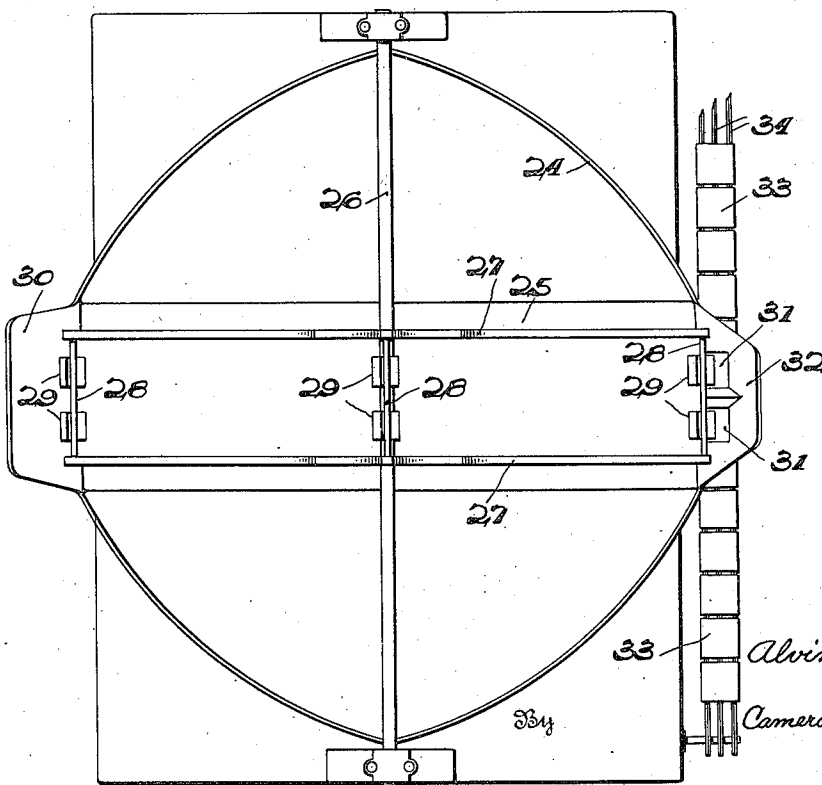


FIG. 12.



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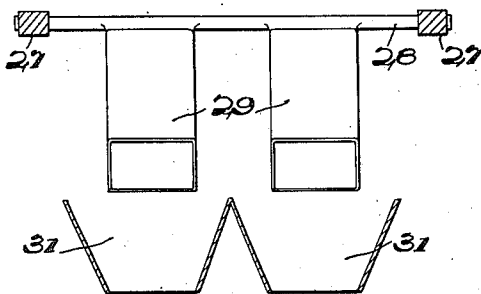


FIG. 13.

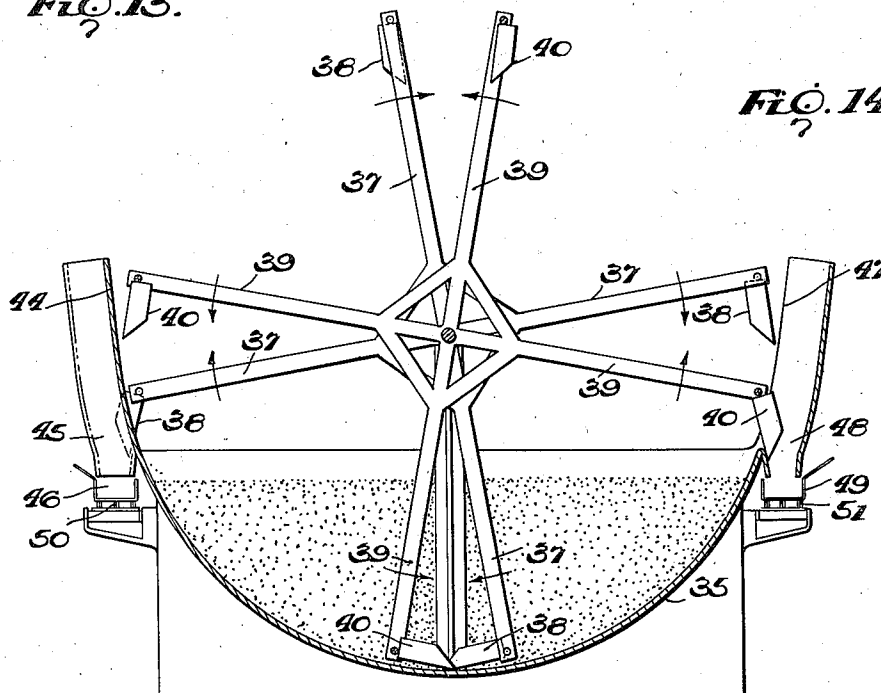


FIG. 14.

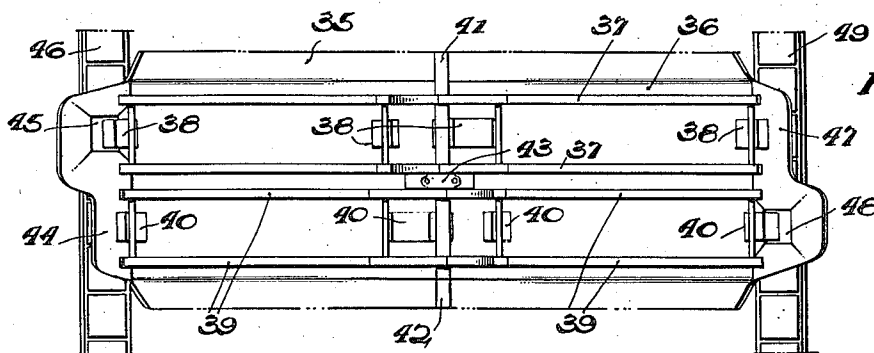


FIG. 15.

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MIXING AND FILLING APPARATUS

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4 Claims. (Cl. 222—357)

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This invention relates to apparatus for mixing and stirring materials and for withdrawing therefrom measured quantities of a mixture of uniform consistency for packaging or like purposes.

Apparatus embodying the invention is particularly adapted for handling a more or less soupy mixture of liquid and solid materials, although it will be understood that the invention is not restricted to this use. For purposes of explanation, the following description refers to an apparatus for mixing and packaging baked beans in a soupy condition, i. e., mixed with juice in which the beans have been cooked. When such a mixture is handled in large quantities in conjunction with a machine packaging operation, the beans tend to settle and the problem arises of dipping out or otherwise withdrawing successive package charges which are of the desired uniform proportions and consistency.

One of the objects of the invention is to provide a novel apparatus for accomplishing the above ends which is simple and inexpensive, but at the same time thoroughly reliable and effective in operation.

Other objects are to provide novel means for mixing and stirring the mixture to maintain a substantially uniform consistency and avoid settling, for dipping out measured quantities of the mixture, and for automatically dumping such measured quantities into packages in a simple, effective manner.

Several embodiments of the invention have been illustrated in the accompanying drawings, but it is to be expressly understood that said drawings are for purposes of illustration only and are not to be construed as a definition of the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings,

Fig. 1 is a plan view of an apparatus embodying the invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a detail view of a bucket or dipper;

Figs. 4 to 10 inclusive illustrate successive positions of the apparatus in the dumping operation;

Fig. 11 is a side view of another embodiment of the invention;

Fig. 12 is a plan view of Fig. 11;

Fig. 13 is a detail of the buckets or dippers of Figs. 11 and 12;

Fig. 14 is a side view of a further embodiment of the invention; and

Fig. 15 is a partial plan view of Fig. 14.

In the form shown in Figs. 1-3, the mixture

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of beans and juice is supplied in any suitable manner to a container or vessel 10 in which the level 11 may be maintained more or less constant. The container may have any desired size and shape, being here shown as a shallow generally oval basin. Part of the bottom of the container, however, comprises a diametrical strip 12 with a substantially cylindrical inner surface as shown in cross-section in Fig. 2.

Mounted over the container is a horizontal shaft 13 which is rotated by any suitable means in bearings 14, the shaft being concentric or substantially so with the cylindrical strip 12. A suitable number of stirring or mixing arms 15 are carried by the shaft 13 and rotated thereby through the mixture in the container, the ends of said arms preferably traveling in a path close to the cylindrical surface 12 and carrying pivoted buckets or dippers 16 which scrape along said cylindrical surface as the shaft rotates. For this purpose the arms 15 may conveniently be arranged in pairs, one of the buckets 16 being pivoted between the extremities of each pair.

The buckets 16 are mounted so that their pivot axes are beneath their centers of gravity, whether filled or empty, whereby said buckets tend to hang between the ends of the arms 15 with their open ends downward as shown in Figs. 2 and 10. This may readily be accomplished, for example, by securing pivot pins 17 to the bottoms of the buckets and mounting the ends of the pivot pins loosely in openings in the extremities of the arms 15. Hence the open ends of the buckets are caused by gravity to slide or scrape along the cylindrical surface 12, as shown in Fig. 2. If desired, one of the sides of the buckets may be made longer than the other side to provide extending lips 18 which contact the cylindrical surface.

Preferably the pivot pins 17 are secured to the buckets somewhat to one side of their centers of gravity, as shown in Fig. 3, so that the buckets normally hang in the inclined position shown in Figs. 2 and 10. This arrangement insures that the lips 18 engage the cylindrical surface 12 as soon as they enter the container 10 (i. e., on the left as seen in Fig. 2). To prevent the lips 18 from overhanging and striking the edge of the container, a deflector plate 19 may be provided above the rim of the container as an extension of the strip 12.

As the buckets 16 pass through the bottom of the container and slide up its side (i. e., to the right as seen in Fig. 2), they approach a discharge chute depending from the edge of the container

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and beneath which individual packages 21 are placed in succession in any suitable manner. The dumping action whereby the buckets are emptied into these packages is illustrated in Figs. 4-10. The buckets approach the chute 20 in the position shown in Fig. 4 wherein the lips 18 have just passed the edge 22 of the chute. As the arms 15 continue to rotate and the bottom of the bucket is elevated to the position of Fig. 5, the weight of the bucket and its contents causes it to rest on the edge 22 of the container adjacent the chute, the bucket turning on its pivot pin 17. In Fig. 6, the bucket has been turned to the horizontal position and also preferably slid laterally until the lip 18 projects a substantial distance over said edge 22. It will be observed that this horizontal position of the bucket, which may be considered to mark the beginning of dumping, occurs when the arm 15 is considerably below its horizontal position due to the location of the dumping edge 22 substantially below the horizontal plane of the shaft 13.

Hence on further rotation of the arms 15 the edge 22 acts as a fulcrum about which the bucket is turned to inverted position as shown in Figs. 7 and 8, its open mouth extending down into the chute to empty its contents into the waiting package. On still further rotation of the arms 15 the bucket is withdrawn from the chute and swings back to its free hanging position as shown in Figs. 9 and 10. During this rotation of the arm 15 up to its horizontal position, the bucket axis 17 is moving outwardly as well as upwardly. The bucket axis rotates in an arc close to the cylindrical surface 12 as stated above; in other words, the radial distance between bucket axis 17 and shaft 13 is such that the bucket axis swings outwardly to a position vertically above the dumping edge as shown in Fig. 9 and even outside of the dumping edge as shown in Fig. 10. Hence although the bucket hangs free as shown in Fig. 10, the drip from the bucket is nevertheless directed against the inner wall of the chute. The outer wall of the chute may be extended upwardly at 23 to form a splash guard if desired.

The arrangements described above materially extend the period during which material from the bucket falls down the chute to the waiting package instead of back into the vessel 10. Moreover, they do so in spite of the fact that the bucket does not hang vertically because of its offset axis. The direction of inclination of the bucket is such as to cause its edge to engage the vessel as it enters (see left-hand side of Fig. 2), in order to obtain the desired scraping and mixing effects and also so that the bucket reaches its horizontal and subsequent dumping positions sooner with respect to the position of the arm 15 (see Fig. 6 et seq.). When inclined in this direction, however, the tendency would be for the bucket to swing back over the dumping edge as it passed from the position of Fig. 9 to that of Fig. 10 and to dump or drip back into the vessel, were it not for the position of the bucket axis 17 relative to the dumping edge 22 as shown in the latter figure.

The movement of the arms 15 through the mixture in the container 10 mixes and stirs the mass and minimizes the tendency of the beans to settle. Moreover, the accumulation of settled masses of beans on the bottom of the container is prevented by the scraping action of the buckets 16, at least in the region from which the mixture is withdrawn for packaging. On the other hand, the buckets are filled by first moving them down

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through the upper layers of the mass, then through the bottom, and finally up through the upper layers again. It has been found in practice that the combination of these features results in filling the packages with charges of uniform consistency over long periods of operation of the apparatus, the supply in the container being gradually withdrawn and replenished from time to time without any substantial variation in the relative proportions of the mixture.

Furthermore the mixing, filling and dumping operations, while automatic and continuous, are accomplished by very simple and inexpensive means, with only one driven member, and without parts requiring adjustment or service whereby maintenance problems are reduced to a minimum.

It will be apparent that should it be desired to fill a number of packages simultaneously, a corresponding number of sets of arms 15 and buckets 16 may be mounted side by side. On the other hand, it may be preferable in such cases to employ apparatus of the type shown in Figs. 11-13. Here the mixture of beans and juice is contained in a vessel or basin 24 corresponding to the basin 10 of Figs. 1-3 except that its bottom strip 25 is wider than the strip 12. A shaft 26 above the basin 24 carries a plurality of pairs of arms 27 similar to the arms 15 of Figs. 1-3 but spaced farther apart. Pivot pins or rods 28 are rotatably mounted in the ends of each pair of arms 27, the distance between the arms being sufficient for each pin or rod to carry a plurality of buckets or dippers 29 here shown as two in number.

The buckets 29 are preferably similar to the buckets 16 of Figs. 1-3 and are secured to the rods 28 in a similar manner, each pair of buckets dumping simultaneously. The deflector plate 30 corresponds to the deflector plate 19 mentioned above, but is wider to accommodate the two buckets. The discharge means comprises two similar chutes 31 side by side, one for each bucket, a common splash guard 32 being provided above the chutes if desired. Packages to be filled are placed below the mouths of the chutes 31 in any suitable manner. As shown in Figs. 11 and 12, a line of packages 33 is conveyed under the chutes by a suitable conveyor 34, the empty packages being filled two at a time and the filled packages being carried away by the conveyor.

Figs. 14 and 15 illustrate another embodiment of the invention in which a plurality of packages are filled simultaneously while at the same time an improved mixing and stirring action is obtained by arranging a plurality of units such as shown in Figs. 1-3 with the adjacent units rotating in opposite directions. Any suitable number of such units can be employed, two being shown in the drawings for purposes of illustration.

Referring to Figs. 14 and 15, a basin 35 such as described above is provided with a bottom strip 36 wide enough to accommodate the two units one of which comprises pairs of arms 37 and pivoted buckets 38 and the other pairs of arms 39 and pivoted buckets 40 similar to those described above. As shown, these units are rotated in opposite directions by shafts 41 and 42 the inner ends of which are mounted in a common center bearing 43, the unit 37, 38 rotating clockwise and the unit 39, 40 counterclockwise as indicated by the arrows. The strip 36 extends beyond the rim of the basin at the left-hand side of these figures to provide a deflector plate 44 for the unit 39, 40 and a chute 45 for the unit 37, 38 which

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leads to the packages 46 to be filled. At the right-hand side of these figures, a deflector plate 47 and a chute 48 are similarly provided for the units 37, 38 and 39, 40 respectively, the chute 47 leading to the packages 49 to be filled. It will be understood from the foregoing description that the packages 46 and 49 may be carried on suitable conveyors 50 and 51 if desired and that the conveyors may each move in either direction as may be convenient.

Hence the apparatus of Figs. 13 and 14 not only provides for filling a plurality of packages simultaneously, but also increases the stirring and mixing action obtained with apparatus as shown in Figs. 1-3 and 10-12 due to the fact that the arms rotate past one another in opposite directions through the mass.

While only three embodiments of the invention have been described and illustrated in the drawings, it will be understood that the invention is capable of a variety of mechanical expressions and that various changes may be made in the form, details of construction, and arrangement of the parts without departing from its spirit. Reference should therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. Apparatus of the class described comprising a container having a substantially cylindrical inner surface, a stirring arm continuously rotatable through said container about a horizontal axis substantially concentric with said cylindrical surface, and a bucket pivotally connected to the extremity of said arm on an axis extending substantially parallel to said first axis and beneath the center of gravity of said bucket, said bucket entering the container at one side, moving through the container with its forward end resting by gravity on said cylindrical surface, and dumping by gravity over the edge of said container at its opposite side as it moves out of the container, said dumping edge being substantially below a horizontal plane through the axis of said arm and the radius of said bucket axis from the axis of said arm being great enough so that said bucket axis moves outwardly above the dumping edge at least far enough to be substantially vertically above said dumping edge.

2. Apparatus of the class described comprising a container having a substantially cylindrical inner surface, a stirring arm continuously rotatable about a horizontal axis substantially concentric with said surface, and a bucket pivotally connected to said arm about an axis extending substantially parallel to said first axis and beneath the center of gravity of the bucket, said bucket entering the container with its forward end resting by gravity on said cylindrical surface, and dumping by gravity over the edge of the container at its opposite side as it moves out of said container, said dumping edge being substantially below a horizontal plane through the axis of said arm, the pivot axis of said bucket being also located at one side of its center of gravity whereby the bucket in its free hanging position is inverted and inclined toward that side of the container on which it enters the container for engagement with said cylindrical surface, and the

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radius of the bucket axis from the axis of the arm being great enough that said bucket axis moves outwardly above the dumping edge at least far enough to be substantially vertically above said edge whereby said bucket is fully inverted to dump its contents over said edge.

3. Apparatus of the class described comprising a container having a substantially cylindrical inner surface, a plurality of stirring arms continuously rotatable through said container in opposite directions about a horizontal axis substantially concentric with said cylindrical surface, and a bucket pivotally connected to the extremity of each arm with a substantially horizontal pivot axis beneath its center of gravity, each bucket entering the container at one side, moving through the container with its forward end resting by gravity on said cylindrical surface, and dumping by gravity over the edge of the container at its opposite side as it moves out of said container, whereby buckets are dumped over opposite edges of the container, said dumping edges being substantially below the horizontal plane through the axis of said arms, and the radii of the bucket axes from the axis of said arms being great enough that said bucket axes move outwardly above their respective dumping edges at least far enough to be substantially vertically above said dumping edges.

4. Apparatus of the class described comprising a container having a substantially cylindrical inner surface, a plurality of stirring arms continuously rotatable through said container in opposite directions about a horizontal axis substantially concentric with said cylindrical surface, and a bucket pivotally connected to the extremity of each arm with a substantially horizontal pivot axis beneath its center of gravity, each bucket entering the container at one side, moving through the container with its forward end resting by gravity on said cylindrical surface, and dumping by gravity over the edge of the container at its opposite side as it moves out of said container, whereby buckets are dumped over opposite edges of the container, said dumping edges being substantially below the horizontal plane through the axis of said arms, the pivot axes of said buckets being also located at one side of their centers of gravity whereby each bucket in free hanging position is inverted and inclined toward that side of the container on which it enters the container for engagement with said cylindrical surface, and the radii of the bucket axes from the axis of said arms being great enough that said bucket axes move outwardly above their respective dumping edges at least far enough to be substantially vertically above said dumping edges.

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