Dec. 7, 1943. J. G. RUBENS ET AL 2,336,298

APPARATUS FOR SUGAR COATING ARTICLES

Filed Oct. 28, 1941 2 Sheets-Sheet 1

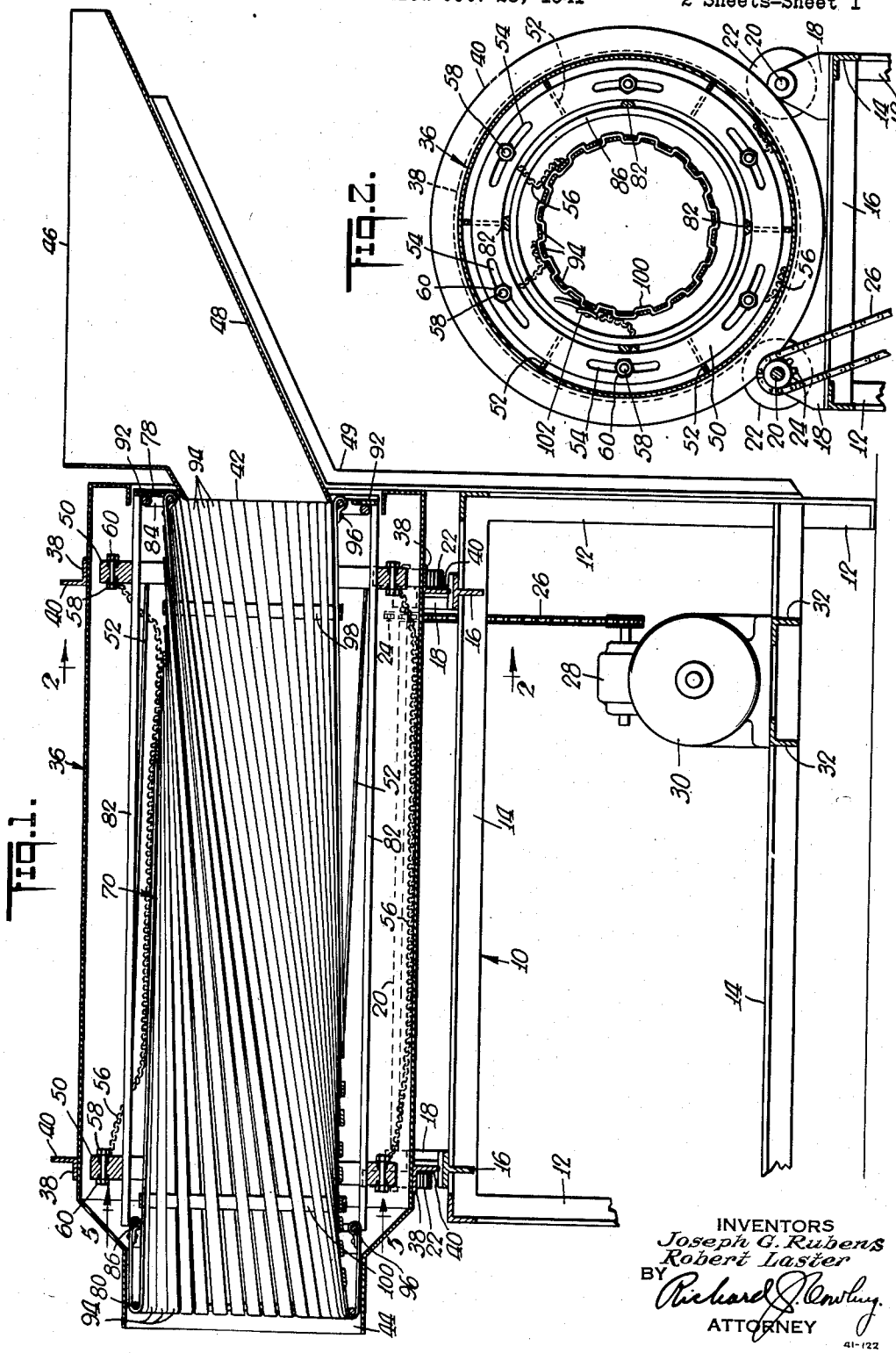


Fig. 1.

Fig. 2.

INVENTORS
Joseph G. Rubens
Robert Laster
BY
Richard J. Newling
ATTORNEY

41-122

Dec. 7, 1943. J. G. RUBENS ET AL 2,336,298

APPARATUS FOR SUGAR COATING ARTICLES

Filed Oct. 28, 1941 2 Sheets-Sheet 2

Fig. 3.

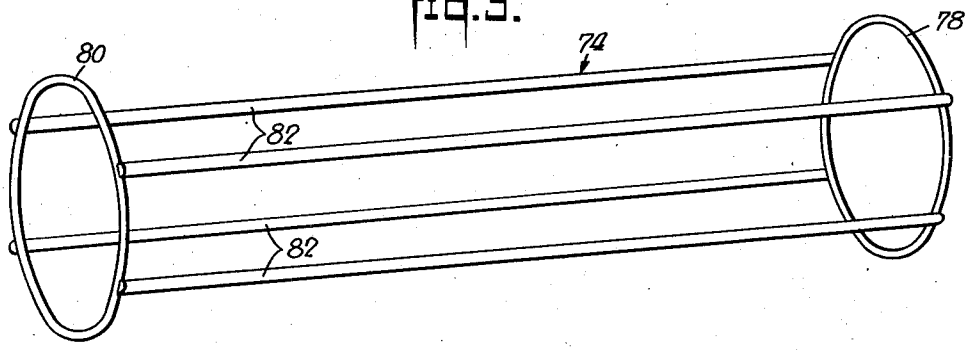


Fig. 4.

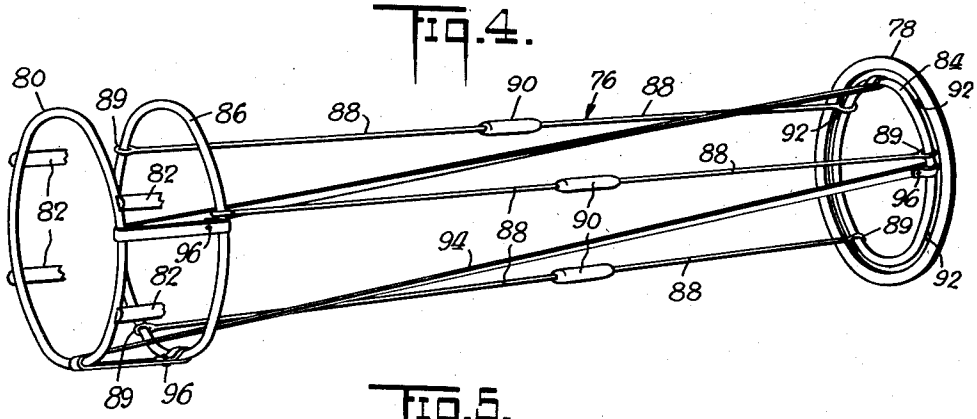
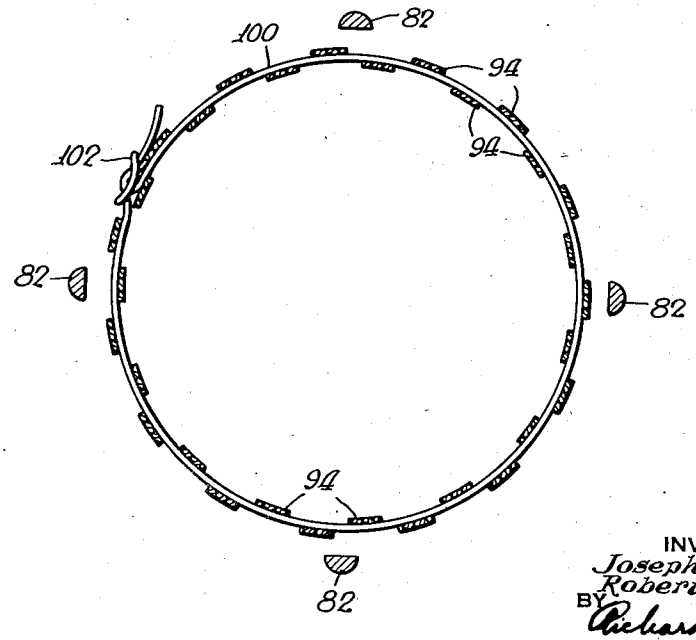


Fig. 5.



INVENTORS
Joseph J. Rubens
Robert Laster
BY
Richard J. Mowbray
ATTORNEY

Patented Dec. 7, 1943

2,336,298

UNITED STATES PATENT OFFICE

2,336,298

APPARATUS FOR SUGAR-COATING ARTICLES

Joseph G. Rubens and Robert Laster, Brooklyn, N. Y., assignors to Joe Lowe Corporation, New York, N. Y., a corporation of Delaware

Application October 28, 1941, Serial No. 416,844

16 Claims. (Cl. 91—7)

The present invention relates generally to apparatus for coating articles with pulverized or granular materials, and, while it is applicable to many other uses, it is more specifically concerned with the coating of bakery products, such as cakes, crullers, cookies, doughnuts and the like, with dry powdery sugar or materials having similar physical characteristics.

An object of the present invention is to provide a simple, inexpensive and economical apparatus for applying a uniform coating to articles of the character described in a rapid, efficient, economical and continuous manner without danger of damaging said articles, applying an incomplete or non-uniform coating thereto, or wasting said coating material.

A further object of the invention is the provision of simple, inexpensive and efficient apparatus which permits the safe and efficient handling of large numbers of such products simultaneously and continuously, and which is capable of adjustments for controlling the passage of said products through said apparatus and assuring the application of a uniform over-all coating thereto.

Another object of the invention is the provision of means for positively tumbling said articles in an efficient and non-injurious manner, and positively causing an application of said coating materials to all exterior surfaces of said products during each tumbling operation.

A further object of the invention is to provide suitable adjustable means for increasing or decreasing the spiral of said inner drum for regulating the gravitational flow of articles through said machine, thereby varying the capacity of said machine without changing its speed of rotation.

Another object of the invention is the provision of suitable adjustable means for increasing or decreasing the radial planes of said flexible strips of said inner drum for causing positive tumbling of articles passing therethrough, thereby assuring the application of a complete and uniform coating over all exterior surfaces of said products.

A further object of the invention is to provide means for adjusting the size of the discharge opening, thereby increasing or decreasing the amount of pitch or slope or said inner drum, which in turn regulates the gravitational flow of articles therethrough independently of the speed of rotation of the machine.

Various other and further objects and advantages of the invention, which result in simplicity, economy and efficiency, will be apparent from the following detailed description, wherein a preferred form of embodiment of the invention is shown, reference being had for illustrative purposes to the accompanying drawings, forming a part hereof, in which:

Fig. 1 is a longitudinal sectional view of an apparatus constructed in accordance with the invention, with the supporting platform and inner drum being shown in elevation;

Fig. 2 is a cross-sectional view of the apparatus shown in Fig. 1, the same being taken along the line 2—2 thereof, looking in the direction of the arrows;

Fig. 3 is a perspective view of the outer frame structure of the inner drum;

Fig. 4 is a perspective view of the inner frame structure of the inner drum, showing the manner in which it is mounted within the outer frame member of the inner drum, and illustrating the manner in which the flexible strips thereof are to be mounted thereover; and

Fig. 5 is a cross-sectional view of the inner drum of the apparatus shown in Fig. 1, the same being taken along the line 5—5 thereof, looking in the direction of the arrows.

Referring now to the drawings, wherein like numbers indicate like parts, there is shown in Fig. 1 a welded box-like supporting structure 10 having four angle-iron uprights or legs 12 suitably connected at their tops and braced intermediate their ends by horizontal angle-iron cross-bars 14. A pair of transversely extending T-shaped cross-bars 16 are welded adjacent each end of the top of the supporting structure 10. Supporting brackets 18 are welded on top of the T-shaped cross-bars 16 adjacent each of the ends thereof. Each bracket has suitably journaled therein a stub shaft 20, upon which are mounted rollers 22. One of the rollers 22 has a sprocket wheel 24 fixedly mounted thereon, which is connected by a drive chain 26 to a conventional reduction gear box 28, which in turn is suitably connected to an electric motor 30 mounted upon angle-iron supports 32 welded to the intermediate cross-bars 14.

An imperforate outer drum 36 of cylindrical shape, having a pair of spaced circumferentially extending angle-iron exterior trackways 38 with inwardly projecting radial flanges 40, is positioned freely on the rollers 22 in such a manner that each end pair of rollers 22 engages one of the trackways 38, as best shown in Figs. 1 and 2. The outer drum 36, which is rotatably positioned on the rollers 22 and driven frictionally thereby, is provided with an inlet opening

42 at one end and a discharge opening 44 at its opposite end. The inlet opening 42 is provided with a receiving hopper 46, having an inclined bottom 48 which acts as a feeding trough for discharging the articles delivered to the hopper 46 into the machine. The hopper 46 is suitably supported by a pair of spaced brackets 49 welded to the supporting structure 10. A pair of axially spaced annular rings 50 are mounted concentrically within the outer drum 36. A plurality of spiral vanes 52 are mounted axially between the rings 50, and extend radially outwardly from the interior surface of the drum 36. These vanes 52 serve to distribute the coating material during rotation of the drum 36. Each of the rings 50 has a series of arcuately shaped slots 54, extending therethrough between the vanes 52. The slots 54 serve as means for mounting axially extending drag chains 56, which are suitably attached to the inward ends of bolts 58, that project outwardly, and are fastened therein by nuts 60. The drag chains 56 assist in the distribution of the coating material, and serve to break up any lump formations that may occur therein.

An inner drum 70, which is preferably of conical shape, is concentrically fitted at its opposite ends within the inlet opening 42 and the discharge opening 44 of the imperforate outer drum 36. The diameter of the inner drum 70 is of such dimensions as to leave a concentric interspace between the two drums, which interspace serves as a reservoir for the coating material. The inner drum 70 consists of an outer cylindrical supporting frame 74 and an inner cylindrical supporting frame 76. The outer cylindrical frame 74 is made up of spaced end rings 78 and 80 suitably connected by a series of circumferentially spaced axially extending rods 82 suitably welded thereto. The end rings 78 and 80 are of a size adapted to be fitted frictionally into the inlet and discharge openings of the outer drum 36. The inner cylindrical frame 76 consists of spaced end rings 84 and 86 of smaller diameter than the corresponding rings 78 and 80 of the outer cylindrical frame 74, and have projecting inwardly therefrom a series of axially extending rods 88. The rods 88 are slidably mounted on their respective end rings 84 and 86, as indicated at 89. The inward ends of the rods 88 projecting from the end rings 84 and 86 are connected together by a turnbuckle 90, which permits limited adjustments axially for tensioning purposes to be hereinafter described. It will be noted that the inner frame 76 is substantially shorter than the corresponding outer frame 74. The end ring 84 of the inner frame 76 is fixedly secured concentrically within the end ring 78 of the outer frame 74 by a series of spacing lugs 92, and its opposite end ring 86 is freely positioned adjacent the end ring 80 of the outer frame 74 at the ends of the rods 88. The surface covering for the inner drum consists of a plurality of relatively narrow strips 94 of flexible material, which may be fabric, cloth, rubber, rubber and fabric, woven wire, etc. These strips 94 are securely fastened, as indicated at 96, around the ring member 84, as best shown in Fig. 4, passed axially inwardly through the opposite ring members 86 and axially inwardly through ring member 80, being then brought back around the outside thereof and fastened securely to the ring member 86. The strips 94 are circumferentially positioned contiguously around the ring 84, and because the ring 80 has a greater circumference, there will be a slight circumferential spacing of the strips 94 as they pass around that ring 80. A pair of axially spaced circumferentially extending bands 98 and 100 are alternately interwoven over and under adjacent strips 94 of the drum 70. The band 100 is provided with a conventional belt buckle 102, as best shown in Fig. 5, which permits loosening or tightening of the same for adjusting the radial position of certain of the strips for increasing or decreasing the size of the discharge opening of the inner drum 70.

When the inner drum 70 is assembled, and is being fitted into position within the outer drum 36, a spiral can be given to said strips 94 by merely manually moving the ring 86 circumferentially with respect to the fixed ring 84 in either direction desired. In Fig. 1, the movement has been to the left or counterclockwise. After the inner drum 70 has been properly mounted within the outer drum 36, and the desired spiral has been given to the strips 94, the tension on said strips 94 may be adjusted by manually turning the turnbuckles 90. No difficulty will be encountered in gaining access to the turnbuckles because of the flexible nature of the strips 94, and also because of their circumferential spacing. The buckle 102 in the band 100 may be adjusted in like manner.

In operation of the apparatus it will be apparent that through slow constant rotation of the outer drum 36, the coating material which has been placed between the vanes 52 in the interspace between the outer drum 36 and inner drum 70, will be continuously lifted and showered from above on the strips 94, passing therebetween due to the fact that they have been spaced circumferentially. In a short space of time a considerable quantity of the coating material will gather on the inside surface of the strips 94, which in turn forms a bed for the products being received from the hopper 46. The bed of coating material is showered down on the top side of said products as the drum revolves. The difference in the radial planes of the strips 94 causes the products to be positively and gently turned over and over, each time falling back in the bed of the coating material covering the strip, and each time being showered by the coating material carried up by other strips. In this arrangement the products are gently turned over and over in their own coating material, and not permitted to fall against a hard screen surface, as in the case of conventional machines. Such a screen surface has many disadvantages in that it not only permits all excess coating material to pass therethrough, but also scrapes off some of the coating that has already been applied. With gravitational progression of the articles passing through the machine regulated by the amount of spiral on the strips 94, and the tumbling regulated by the difference in the radial planes of certain of the strips, it follows that we are able to effect a uniform and complete over-all coating of the articles in a rapid, continuous and sanitary manner, without injury to the articles and without waste of the coating material. In the latter case any excessive coating material deposited on the strips 94 will pass therebetween and back into the interspace between the drums where the vanes 52 and drag chains 56 operate to break up the lumps and redistribute the material over new articles entering the machine.

Although we have only described in detail one form of the invention, it will be readily ap-

parent to those skilled in the art that the invention is not so limited, but that various modifications may be made therein without departing from the spirit thereof or from the scope of the appended claims.

What we claim is:

1. In a machine of the character described, comprising a rotatable outer drum having inlet and discharge openings at opposite ends, an inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted in spaced relation to said outer drum, and means for rotating said outer drum.

2. In a machine of the character described, comprising a rotatable outer drum having inlet and discharge openings at opposite ends, an inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted in spaced relation to said outer drum, means for adjusting the tension on said strips, and means for rotating said outer drum.

3. In a machine of the character described, comprising a rotatable outer drum having inlet and discharge openings at opposite ends, an inner drum formed of spaced spiral strips of flexible material fitted at its opposite ends within said openings and mounted in spaced relation to said outer drum, means for adjusting the spiral of said strips, and means for rotating said outer drum.

4. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted in spaced relation to said outer drum, means for radially adjusting the position of said strips to increase or decrease the size of said discharge opening, and means for rotating said outer drum.

5. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted substantially concentrically in spaced relation to said outer drum, and means for rotating said outer drum.

6. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced spiral strips of flexible material fitted at its opposite ends within said openings and mounted substantially concentrically in spaced relation to said outer drum, means for adjusting the spiral of said strips, and means for rotating said outer drum.

7. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced spiral strips of flexible material fitted at its opposite ends within said openings and mounted substantially concentrically in spaced relation to said outer drum, means for adjusting the tension on said spiral strips, and means for rotating said outer drum.

8. In a machine of the character described, comprising a rotatable cylindrical outer drum of imperforate material having inlet and discharge openings at opposite ends, a conical inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted in interspaced relation to said outer drum, said strips being arranged in different radial planes to provide means for insuring tumbling of said articles to be treated during rotation of said drum, and means for rotating said outer drum.

9. In a machine of the character described, comprising a rotatable cylindrical outer drum of imperforate material having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted in interspaced relation to said outer drum, said strips being arranged in different radial planes to provide means for insuring tumbling of said articles to be treated during rotation of said drum, means for radially changing the plane of said strips, and means for rotating said outer drum.

10. In a machine of the character described, comprising a rotatable cylindrical outer drum of imperforate material having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced spiral strips of fabric fitted at its opposite ends within said openings and mounted concentrically within said outer drum, said strips being alternately arranged in different radial planes to provide means for insuring tumbling of said articles to be treated during rotation of said drum, means for adjusting the spacing between said groups of alternate strips, and means for rotating said outer drum.

11. In a machine of the character described, comprising a rotatable cylindrical outer drum of imperforate material having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spaced spiral strips of fabric fitted at its opposite ends within said openings and mounted concentrically within said outer drum, said strips being alternately arranged in different radial planes to provide means for insuring tumbling of said articles to be treated during rotation of said drum, means for adjusting the spacing getween said groups of alternate strips, means for adjusting the tension of said strips, and means for rotating said outer drum.

12. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical inner drum formed of spaced strips of flexible material fitted at its opposite ends within said openings and mounted concentrically within said outer drum in spaced relation thereto, said strips being alternately arranged in different radial planes to provide means for insuring tumbling of said articles to be treated during rotation of said drum, means for adjusting the radial spacing between said alternate strips, means for adjusting the tension on said strips, and means for rotating said outer drum.

13. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conically shaped inner drum formed of spaced strips extending longitudinally and spirally from the inlet opening to the discharge opening, said inner drum being spaced concentrically from said outer drum and having its larger end positioned adjacent the discharge

opening, and means for rotating said outer drum.

14. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spiral strips of flexible material mounted at opposite ends within said openings, means for adjusting the spiral of said strips, means for adjusting the tension of said strips, and means for rotating said outer drum.

15. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spiral strips of flexible material mounted at opposite ends within said openings, means for adjusting the tension of said strips, means for adjusting the spiral of said strips, means for adjusting the radial plane of certain of said strips, means within the space between said drums for elevating coating material contained therein, and means for rotating said outer drum.

16. In a machine of the character described, comprising a rotatable cylindrical outer drum having inlet and discharge openings at opposite ends, a conical shaped inner drum formed of spiral strips of flexible material mounted at opposite ends within said openings, means for adjusting the tension of said strips, means for adjusting the spiral of said strips, means for adjusting the radial plane of the alternate strips, axial means extending within the space between said drums for elevating sugar contained therein, means extending axially of said space between said drums for agitating and distributing the coating material when the drum is rotated, and means for rotating the outer drum.

JOSEPH G. RUBENS.
ROBERT LASTER.