F. C. JACOBY.

ROTARY CONVEYER.

APPLICATION FILED JAN. 29, 1919. RENEWED AUG. 22, 1921.

1,401,155.

Patented Dec. 27, 1921.

3 SHEETS—SHEET 1.

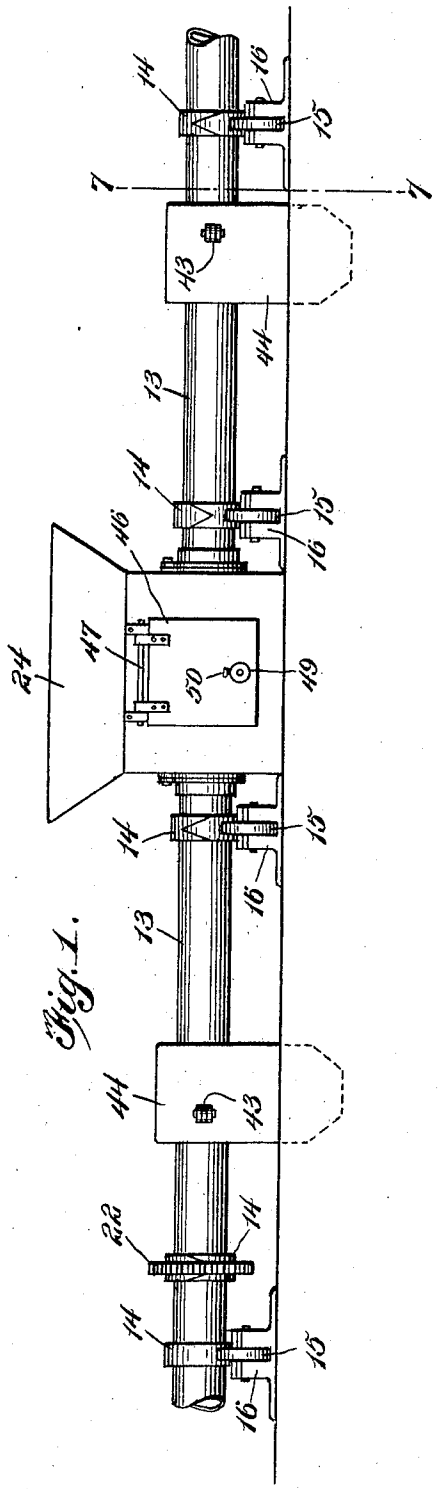


Fig. 1.

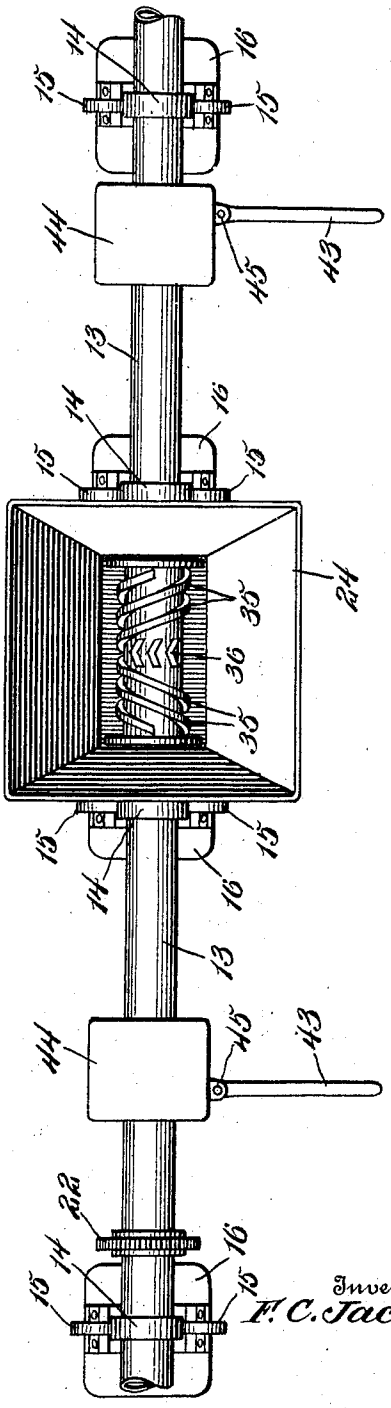


Fig. 2.

Inventor
F. C. Jacoby

By C. C. Hines,
Attorney

F. C. JACOBY.

ROTARY CONVEYER.

APPLICATION FILED JAN. 29, 1919. RENEWED AUG. 22, 1921.

1,401,155. Patented Dec. 27, 1921.

3 SHEETS—SHEET 2.

Fig. 3.

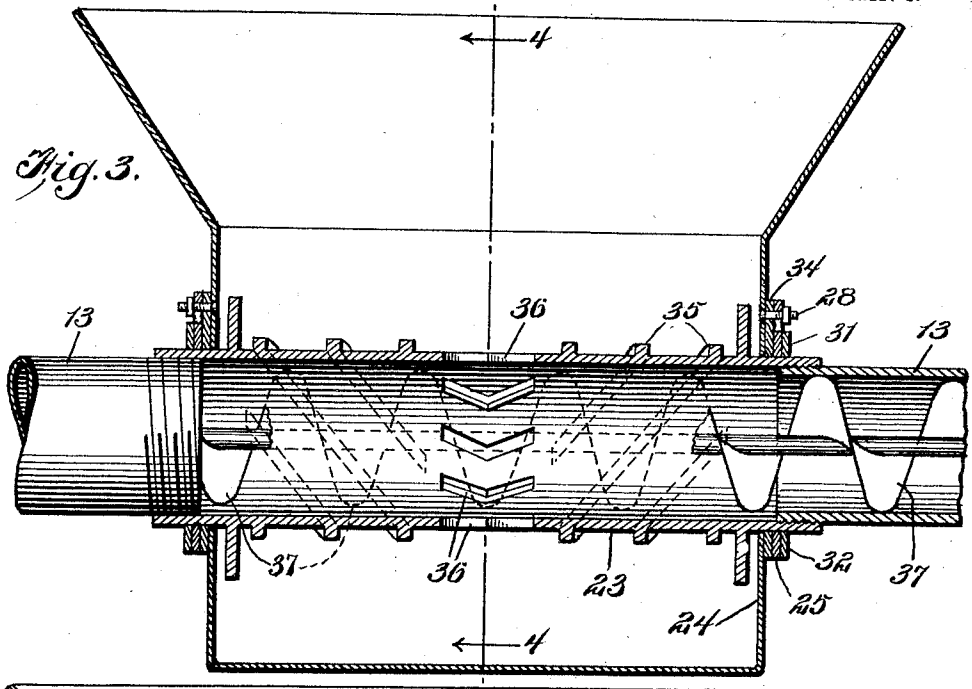


Fig. 4.

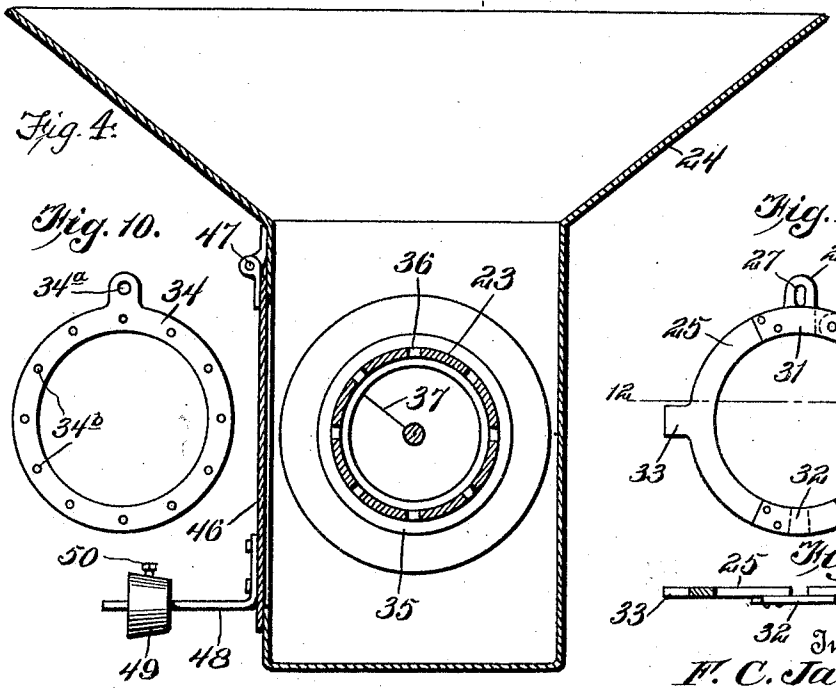


Fig. 10.

Fig. 11.

Fig. 12.

Inventor

F. C. Jacoby

By C. A. Hines,

Attorney

F. C. JACOBY.

ROTARY CONVEYER.

APPLICATION FILED JAN. 29, 1919. RENEWED AUG. 22, 1921.

1,401,155. Patented Dec. 27, 1921.

3 SHEETS—SHEET 3.

Fig. 5.

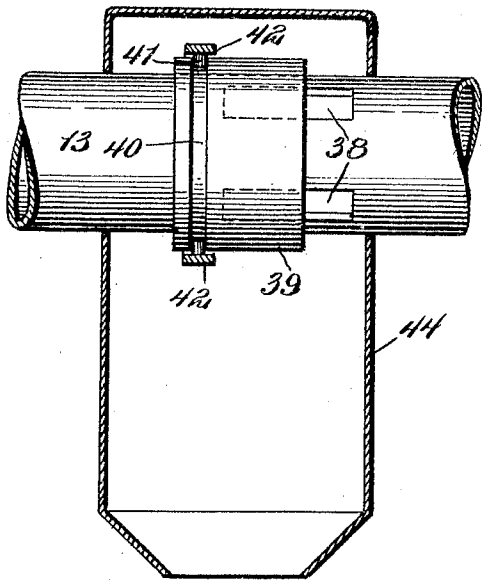


Fig. 6.

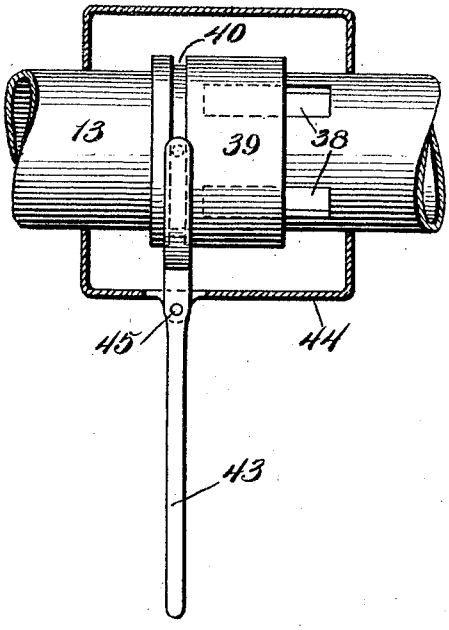


Fig. 7.

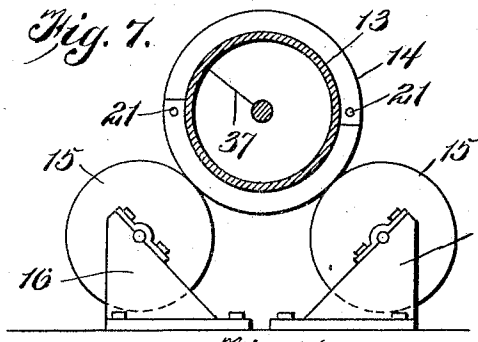


Fig. 8.

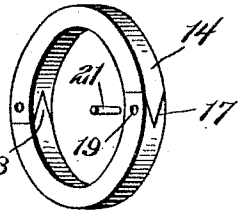


Fig. 9.

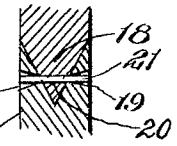


Fig. 13.

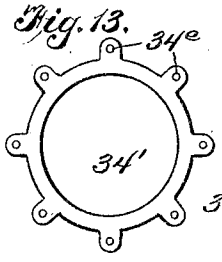
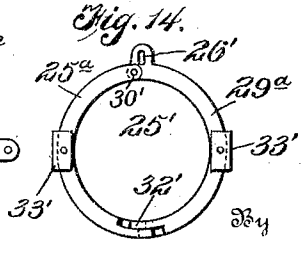


Fig. 14.



Inventor

F. C. Jacoby

By C. C. Hines,

Attorney

UNITED STATES PATENT OFFICE.

FRANK C. JACOBY, OF NEWPORT, ARKANSAS.

ROTARY CONVEYER.

1,401,155. Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed January 29, 1919, Serial No. 273,369. Renewed August 22, 1921. Serial No. 494,373.

To all whom it may concern:

Be it known that I, FRANK C. JACOBY, a citizen of the United States, residing at Newport, in the county of Jackson and State of Arkansas, have invented new and useful Improvements in Rotary Conveyers, of which the following is a specification.

This invention relates to rotary conveyers for causing the movement of calcine, crushed ore, sand, gravel, cement, sugar or other such masses, and may be particularly associated with calcine treatment.

The primary object of the invention is to provide conveying means of a simple and improved nature capable of moving hot or cold masses, and in which the expansion or contraction of the conveying apparatus, due to heat or cold, is compensated for.

A still further object of the invention is to provide a rotary conveyer having associated therewith improved means for feeding the mass to the conveyer and for preventing the introduction to the conveyer of substances or materials too coarse for proper treatment, and to exclude from the conveyer bulky materials or foreign objects not designed for treatment.

A still further object of the invention is to provide an apparatus of the character stated which is capable of readily carrying out the conveying operation with a minimum amount of physical labor.

Still further objects reside in providing conveying means of the character stated which is equipped with improved mechanism for causing the discharge of the material from the conveyer, which embodies means for preventing dust or dirt passing from the feeding or conveying apparatus or gaining access thereto, means of an improved nature for compensating for the expansion or contraction of the conveyer casing due to variations in temperature, means for supporting a rotatable conveyer casing with a minimum amount of friction, and which will prove highly practical and efficient in use.

With these objects in view, together with others which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts, all as will be described more fully hereinafter, illustrated in the drawings, and particularly pointed out in the claims.

In the drawings:—

Figure 1 is a side elevation of a conveying apparatus constructed in accordance with the invention,

Fig. 2 is a top plan view of the improved apparatus,

Fig. 3 is a vertical sectional view on an enlarged scale taken through the feed hopper and a part of the casing,

Fig. 4 is a sectional view taken substantially upon line 4—4 of Fig. 3,

Fig. 5 is a sectional view taken vertically through the discharge apparatus,

Fig. 6 is a horizontal sectional view taken through the discharge apparatus,

Fig. 7 is a sectional view on a slightly enlarged scale taken upon line 7—7 of Fig. 1,

Fig. 8 is a detail perspective view of one of the supporting rings for the casing,

Fig. 9 is a detail fragmentary sectional view taken through the adjoining ends of the sections of the supporting rings,

Fig. 10 is an elevation of one of the rings for use in connection with the dust band,

Fig. 11 is an elevation of the adjustable dust band, and

Fig. 12 is a sectional view taken upon line 12—12 of Fig. 11.

Figs. 13 and 14 are views similar to Figs. 10 and 11, showing a modified form of car and dust ring, respectively.

The conveying apparatus consists essentially in a rotatable drum or casing of either circular, square or polygonal configuration in cross section, and into which the material to be conveyed is introduced. This conveyer may contain either hot or cold masses, or the conveyer may be subjected to hot or cold treatments as the mass passes therethrough. Improved apparatus is employed for screening or refining the mass before its entry to the conveyer, and this feeding means is so constructed as to prevent bulky materials or foreign articles gaining access to the conveyer. The conveyer may be constructed in such manner as to direct the mass fed thereto from the feed hopper in one direction or in opposite directions in the conveyer casing. In the present instance the conveyer is shown as constituting a spiral or worm, but it will be understood that plates, blades or fins may equally as well be employed within the rotating casing to cause the material therein to travel as the casing rotates.

The casing may be of any desired length, and is provided with one or more series of delivery openings remote from the hopper, whereby the material within the conveyer may be discharged from the casing at a number of different points. The delivery openings are controlled by the operation of a sleeve inclosing the casing, and this sleeve may be readily operated by manipulation of the hand lever associated therewith.

The casing is supported in such manner as to reduce friction to a minimum, and anti-friction rollers are arranged in pairs beneath the casing and engage and support expansible bearing rings inclosing and snugly fitting the casing. Any improved means may be employed for imparting rotary movement to the casing.

The casing in its preferred form comprises an elongated drum 13, formed of suitable metal and being circular in cross section, and this casing has arranged at intervals thereon the bearing rings 14. These rings snugly fit the casing, and are engaged and supported by the rollers 15 rotatably mounted in the bearing blocks 16. It will be observed that a pair of rollers is provided for each of the rings 14, and it will be further observed, particularly with reference to Fig. 7 of the drawings, that the rollers are so arranged as to equally divide between them the burden of the casing. Each of the bearing rings 14 comprises a pair of semi-circular sections, each having one end recessed as at 17 and its opposite end provided with a V-shaped tongue 18 to fit in the recess 17 of the next adjacent section end. The shape of the recesses correspond to the shape of the tongues so that the section ends may snugly interfit, and openings 19 extending through the lateral walls of the recessed portions aline with openings 20 in the tongues 18. It will be observed that the openings 19 are flared outwardly, and the spring pins 21 which are employed to connect the ends of the ring sections are thus permitted to move or bend slightly within the said openings. The spring pins normally hold the ring sections so that the ends thereof are in tight engagement with each other, but by reason of the flexible connection of the ring section ends, the wear rings are permitted to expand slightly. This expansion may be created by heating the drum or casing.

The drum may be equipped with a gear 22, the latter being fitted upon one of the expansible rings 14. This gear may be connected with any suitable mechanism (not shown) for imparting rotary movement to the drum.

The casing 13 may be formed in sections, and any number of these sections may be connected together, whereby the casing may be extended or contracted. The casing sections in the present instance are connected by the tubular member 23, to the ends of which the casing sections may be threaded or in any other preferred manner secured. The section 23 is inclosed by a hopper 24, and extends at its ends through suitable openings in the end walls of the hopper. To prevent dust entering the hopper and intermingling with the materials to be fed to the conveying apparatus, or to prevent dust passing out of the hopper or casing, dust rings such as those shown in Figs. 11 and 12 of the drawings are employed. These dust rings are formed of suitable material and are formed in arcuate sections as shown. One section, 25, is provided at one end with an ear 26 having an elongated opening 27 therein, through which a bolt 28 secured to the hopper above the casing extends. The section 29 of the dust ring is pivoted as at 30 to a plate 31 secured to the upper end of section 25, and is prevented from moving laterally of the section 25 at its lower end by the guide 32. Each of the sections 25—29 is provided with a weight 33, and by reason of the fact that the ring sections are suspended at their upper ends, these weights will cause the lower ends of said sections to normally engage each other. It is evident, therefore, that the ring sections will at all times snugly engage with the ends of the tubular members 23 which protrude beyond the hopper 24, and dust will be precluded entrance to the hopper or escape therefrom. Variations in the diameter of the member 23, due to wear or changes in temperature, will be compensated for by the expansible dust band. A collar 34 is interposed between the wall of the hopper and the expansible dust band and formed with an apertured lug 34^a for passage of the bolt 28 and at intervals with openings 34^b for passage of rivets or bolts to secure it to the hopper.

The exterior surface of the member 23 is provided with feeding or conveying ribs or blades 35, and these ribs are spirally arranged upon the surface of the said member. A rib of this character is provided near each end of the tubular member 23, and the ribs are so disposed that rotation of the tubular member in one direction will cause material within the hopper to be moved inwardly from the end walls thereof and toward the center of the said tubular member. The central portion of the tubular member is provided with an annular series of openings or slots 36 of substantially V-shape, and through which the material in the hopper is fed to the conveyer. It is obvious that as the member 23 rotates, materials fed to the hopper will be moved toward the center of the said member, and such of the material as is of sufficient fineness will pass through the openings 36 to the conveyer. The spiral ribs and V-shaped openings also, to some degree, answer the purpose of grinding or chopping

mechanism, as lumps or crusts which are formed in the casing or are delivered thereto are engaged by the said ribs and the edges of the openings and acted upon to cause disintegration. By restricting the size of the openings 36, it is obvious that materials fed to the conveyer will not be of sufficient size or bulk to choke or clog the conveyer.

Each of the casing sections is provided upon its interior with a conveyer 37. The conveyers in the present instance are in the form of spirals or worms, and are affixed to the said casings so as to rotate therewith. The inner ends of the conveyers terminate with the ends of the adjacent casing sections, and the conveyers may be so disposed within their casings as to direct material in the same general direction or in opposite directions, as preferred. If desired, short arcuate blades or fins arranged progressively and at angles within the casing sections may be employed instead of the worms, or any suitable arrangement or combination of conveyer blades may be used.

The sections 13 of the casing are provided with delivery stations, whereby the material operated upon within the said sections may be delivered therefrom. Openings 38 of suitable size are provided in the casing at the desired place, and a suitable sleeve 39 incloses the casing and may be slid over or away from the said openings. This sleeve is provided with an annular groove 40 receiving the pins 41 at the end of the operating yoke 42, the opposite end of the yoke constituting a lever handle 43 protruding beyond the chute 44. The yoke is pivoted to the chute at 45, and it is obvious that the rocking movement of the lever will cause the sleeve to be moved over or away from the openings 38 according to the direction of movement of the said lever. The material delivered to the chute 44 through the openings 38 may be collected in suitable receptacles placed beneath the chute.

Associated with the hopper 24 is improved means for ejecting therefrom bulky substances too coarse to be introduced to the casing 13 or operated upon by the crushing mechanism within the said hopper. One side of the hopper is provided with an opening which is normally closed by the door or gate 46 pivoted at its upper end to the said hopper as at 47. The lower end of this door is provided with an outwardly extending arm 48, upon which is slidably mounted the weight 49. This weight may be held in various positions of adjustment longitudinally of the arm by the set screws 50. Any large or bulky objects delivered to the grinding apparatus through the hopper which will not readily crush by operation of the latter will be forced against the door 46, whereupon the latter will swing outwardly upon its hinges, permitting the said lumps to pass from the hopper. The weight 49 at the lower end of the door will immediately cause the gate to swing to closed position. By adjusting the weight upon the said arm the door can be caused to open only upon the application of a predetermined weight or pressure thereto.

In operation, the material to be conveyed is deposited in hopper 24 and the casing 13 is caused to rotate. The oppositely wound ribs 35 operate upon the material and cause the same to move toward the center of section 23. Such of the material as is of sufficient fineness to enter the openings 36 will pass to the interior of the said sections and will be moved by the conveyer. The conveyers cause the material to be moved toward the delivery openings in the casing sections, and the speed of movement of the material will depend entirely upon the speed of rotation of the casing. The material passes through the discharge openings 38 in sections 13 and will pass downwardly through the chutes 44. This discharge operation is controlled by actuation of the sleeves 39, as will be understood. In the present illustration only one feed hopper is shown, but it will be understood that any number of said hoppers may be employed if required. These hoppers may be arranged at intervals along the line of the conveyer 13, and, similarly, the number of discharge chutes 44 may also be varied.

In Figs. 13 and 14 I have respectively shown a modified form of collar 34′ and dust ring 25′. As shown in Fig. 13 the collar 34′ is provided with an annular series of apertured lugs 34^c to receive the bolt 28 and the fastening bolts or rivets whereby it is secured to the hopper. As shown in Fig. 14 the two sections 25^a—29^a of the dust ring are provided with interfitting upper ends directly pivoted as at 30′, and the apertured lug 26′ is formed on one of the sections, as the section 29^a. Weights 33′ are detachably secured to the sections 25^a—29^a, whereby interchangeable weights may be employed. In this form of dust ring the plate 32 is dispensed with and the lower ends of the ring sections are circumferentially and transversely split to provide lapping elements 32′ forming a dust-proof joint and slidably connecting the ring ends to maintain them in alinement.

From the foregoing it is obvious that I have provided a conveyer apparatus of extremely simple construction and which will prove highly efficient in practice. By mounting the rotatable drum or casing upon the rollers in the manner stated, the friction due to the operation of the device is greatly reduced. When heat is employed either internally or externally of the casing, the wear rings 14 automatically adjust them-

selves, as do the dust rings constituting the sections 25—29.

While the above is a description of the preferred embodiment of the invention, it is to be understood that the invention is not necessarily restricted thereto, as variations in the construction and combination of the parts may be resorted to without departing from the invention as defined by the claims.

I claim:—

1. In a device of the class described, a revoluble casing, means for feeding material to the interior of the casing, spiral conveyers in said casing disposed in opposite directions therein from said feeding means, and discharge means in said casing remote from said feeding means.

2. In a device of the class described, a revoluble casing having an inlet, a feeding hopper for said casing located inwardly from the ends thereof, feeding means within the hopper on opposite sides of said inlet for feeding the material from opposite sides of the hopper toward said inlet, means within the casing upon each side of the hopper for conveying materials away from the said hopper and toward the ends of the casing, and discharge stations for the casing remote from said hopper.

3. In a device of the class described, a casing, a rotatable member communicating with said casing and having filling openings therein, a hopper inclosing said member, and conveyer elements secured to the exterior of said rotatable member upon each side of said openings and between the same and the sides of the hopper and disposed progressively toward said filling openings.

4. In a device of the class described, a casing having an inlet, a hopper for delivering material to said casing, conveyers in said casing for causing the said materials to move in opposite directions from said hopper, and conveyers in said hopper to move said material from opposite directions toward said inlet.

5. In a device of the class described, a rotary casing, a conveyer in said casing, the said casing having an annular series of delivery openings therein, a chute surrounding and entirely inclosing that portion of the casing having the openings, a sleeve surrounding and slidably mounted on said casing and capable of opening or closing the said openings, and a lever pivoted on said chute and adapted to control the movements of said sleeve.

6. In a device of the class described, a rotary casing having an inlet, conveyers arranged longitudinally within said casing and spaced apart at their adjacent ends on oposite sides of said inlet, a hopper inclosing said casing at said adjacent conveyer ends, and conveying means in said hopper for feeding the material from opposite sides of the hopper to the said casing.

7. In a device of the class described, a rotatable casing, expansible annular bands inclosing said casing and arranged in spaced relation thereon, rollers arranged in pairs and the rollers of each pair engaging and supporting one of said bands, and means for rotating said casing.

8. In a device of the class described, a rotatable casing, bearing blocks arranged in pairs beneath said casing, rollers supported in said blocks, expansible annular bands arranged in spaced relation upon said casing and resting upon the said rollers, and means for rotating said casing.

9. In a device of the class described, a rotatable casing, anti-friction rollers arranged in pairs and adapted to support said casing, annular bands inclosing said casing and arranged in spaced relation thereon and resting upon said rollers, each band being formed of arcuate sections having interfitting ends, and pins connecting said ends.

10. In a device of the class described, a rotatable casing, rollers to support said casing, annular bands inclosing said casing and arranged in spaced relation thereon and resting upon said rollers, each band formed of arcuate sections, tongue portions on one end of each section, the adjacent ends of the next section having recesses to receive said tongues, the said recessed and tongued ends of said sections having tapered openings therein to register with each other, and spring pins for engagement in said openings.

11. In a device of the class described, a rotatable casing, a hopper receiving said casing, a sectional ring inclosing said casing, one end of each of said sections being pivoted at their upper ends, one of said sections being secured at its upper end to said hopper above said casing, a plate adjustably connecting the opposite ends of said ring sections, and means normally forcing the lower ends of said sections toward each other.

12. In a device of the class described, a rotatable casing, a hopper inclosing a part of said casing, dust excluding bands inclosing said casing at its entry to said hopper, each band comprising a pair of arcuate sections pivoted together above said casing, one of said sections being pivoted to said hopper, a plate adjustably connecting the lower ends of said sections, weights intermediate the ends of said sections, and a collar inclosing said casing adjacent each of said rings and fitting close to the latter.

13. In a device of the character described, a casing, a rotatable member communicating with said casing and having an annular series of substantially V-shaped filling openings therein, a hopper inclosing said member, and conveyer elements secured to the

exterior of said member between said V-shaped filling openings and sides of the hopper for feeding the material in the hopper from opposite sides thereof toward said V-shaped filling openings.

14. In a device of the class described, a rotatable drum, rollers supporting said drum, a hopper inclosing a part of said drum, the said inclosed part of the drum having filling openings therein, conveying mechanism in said hopper on opposite sides of said filling openings and between such openings and the sides of the hopper for moving material inwardly from opposite directions toward said filling openings, conveyers arranged in said drum and adapted to move material delivered through said openings in opposite directions to said drum, the said drum having openings therein remote from said hopper, and means for covering or uncovering said openings.

In testimony whereof I affix my signature.

FRANK C. JACOBY.