June 13, 1950 L. G. HILKEMEIER 2,511,262

FEED MECHANISM FOR ROTATABLE DRUM AGITATING APPARATUS

Filed Aug. 5, 1948 3 Sheets-Sheet 1

Fig. 6.

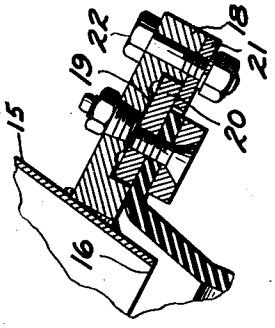
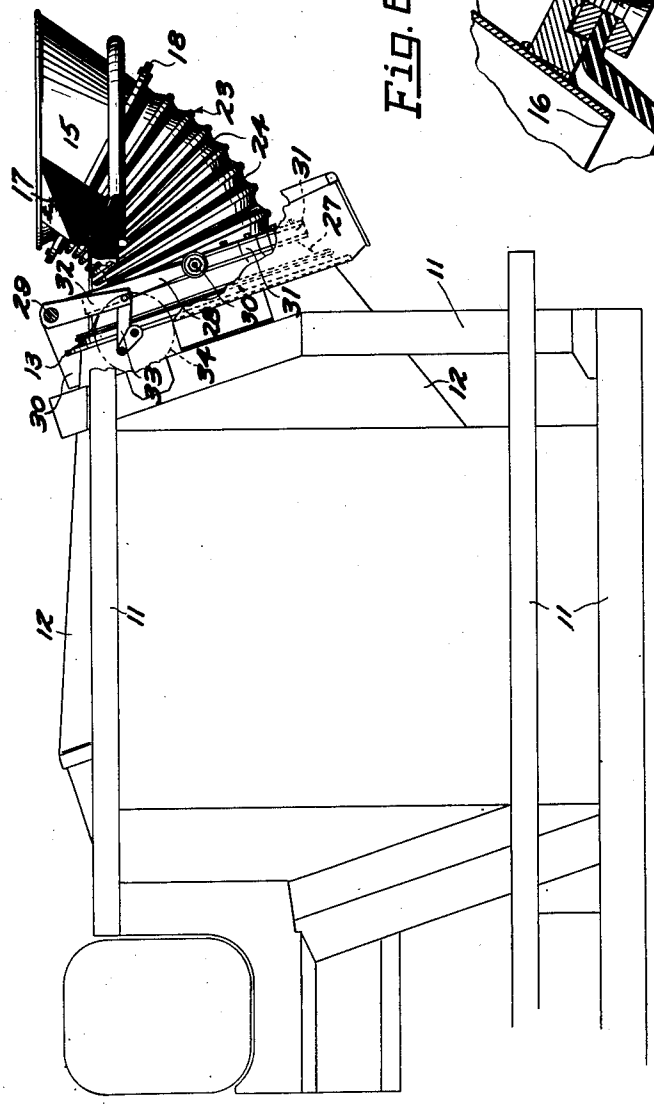


Fig. 1.



LOUIS G. HILKEMEIER
INVENTOR.

BY B. B. Collings
ATTORNEY

June 13, 1950 L. G. HILKEMEIER 2,511,262

FEED MECHANISM FOR ROTATABLE DRUM AGITATING APPARATUS

Filed Aug. 5, 1948 3 Sheets-Sheet 2

Fig. 3.

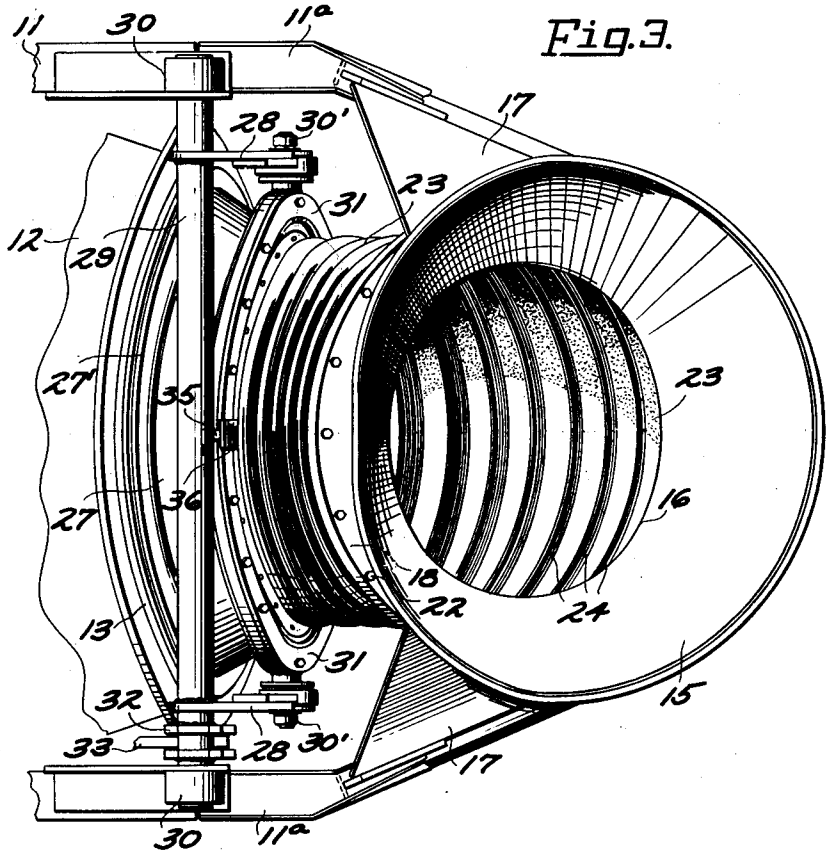
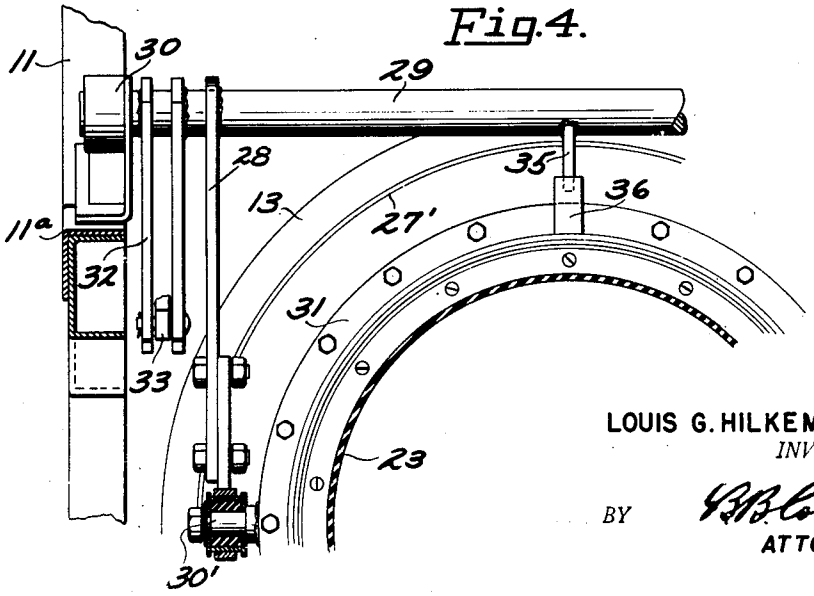


Fig. 4.



LOUIS G. HILKEMEIER
INVENTOR.

BY *B. B. Collings*
ATTORNEY

June 13, 1950 L. G. HILKEMEIER 2,511,262

FEED MECHANISM FOR ROTATABLE DRUM AGITATING APPARATUS

Filed Aug. 5, 1948 3 Sheets-Sheet 3

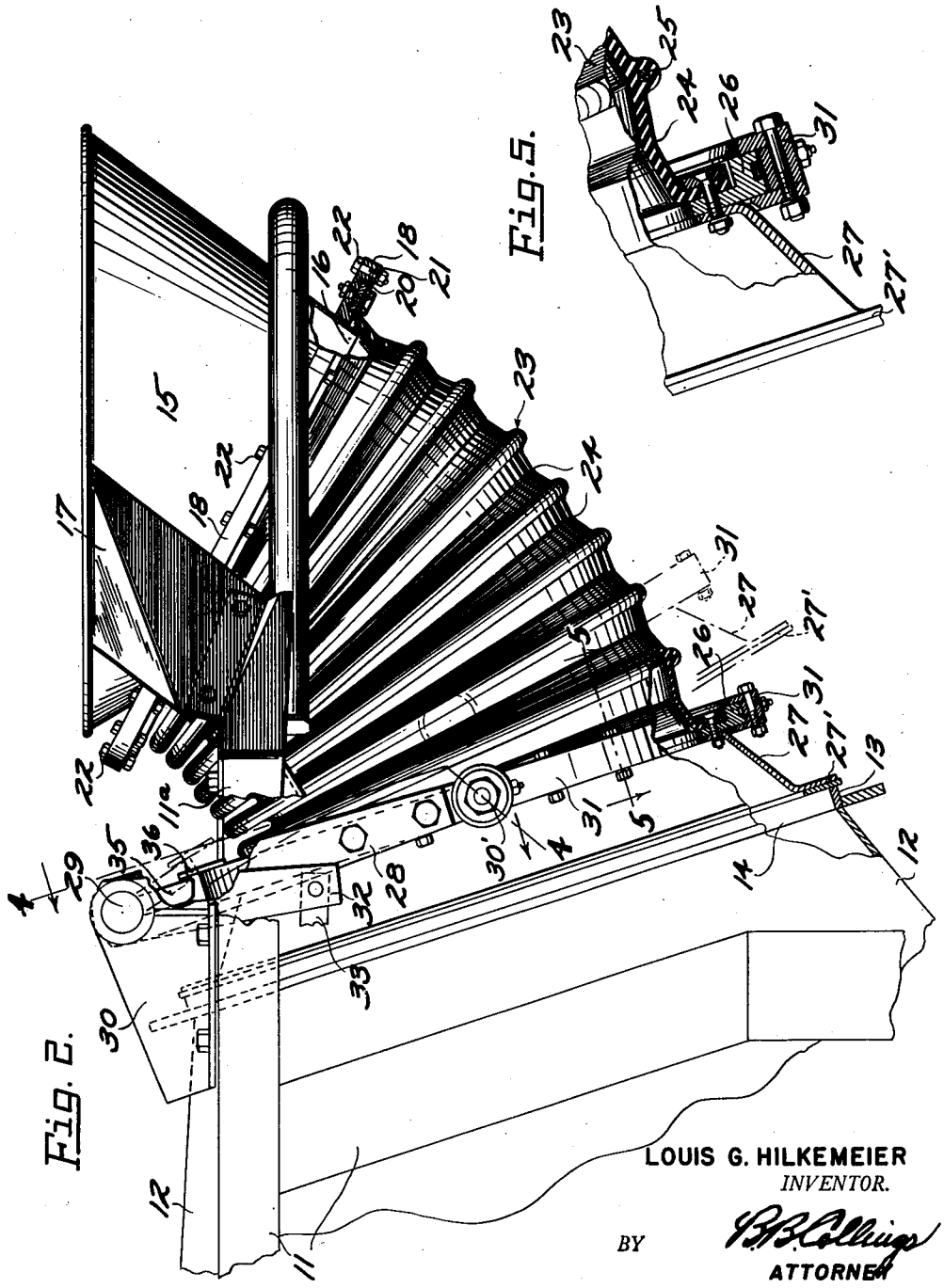


Fig. 2.

Fig. 5.

LOUIS G. HILKEMEIER
INVENTOR.

BY B. B. Collings
ATTORNEY

Patented June 13, 1950 2,511,262

UNITED STATES PATENT OFFICE

2,511,262

FEED MECHANISM FOR ROTATABLE DRUM AGITATING APPARATUS

Louis G. Hilkemeier, Milwaukee, Wis., assignor to Chain Belt Company, Milwaukee, Wis., a corporation of Wisconsin

Application August 5, 1948, Serial No. 42,686

12 Claims. (Cl. 259—161)

1

The invention relates to agitating apparatus of the rotatable drum type, of which a concrete mixer may be cited as a typical example, and it has for its principal object the provision of improved mechanism for effecting introduction of materials into a rotatable drum, one end of which is provided with a charging opening concentric with the axis of rotation. The said mechanism also permits of the materials being subsequently discharged from the drum through said opening, as will appear more fully below.

In many well known examples of concrete mixer of the rotatable drum type the drum is mounted for rotation about a horizontal axis. In other forms however, and more especially where the mixing unit is mounted on a motor vehicle chassis for rapid highway movement, the drum is mounted for rotation about an axis inclined to the horizontal, whereby to secure a higher point of discharge. While the present mechanism may be employed with machines of either of these types, in the accompanying drawings forming a part of this specification it has been illustrated in conjunction with an inclined-axis truck mounted mixer.

In the said drawings, in which like reference characters designate like parts in all the views:

Figure 1 is a side elevational view, partly broken away, of a well known commercial example of inclined axis concrete mixer, equipped with one form of charging and discharging mechanism constructed and arranged in accordance with the invention;

Fig. 2 is an enlarged side elevational view, partly broken away and in section, of the rear portion of the mixer and the charging apparatus shown in Fig. 1;

Fig. 3 is a top plan view of the parts shown in Fig. 2;

Fig. 4 is a fragmentary cross sectional view, on approximately the plane indicated by the line 4—4 of Fig. 2, looking in the direction of the arrows;

Fig. 5 is an enlarged detail sectional view, on approximately the plane indicated by the line 5—5 of Fig. 2; and

Fig. 6 is an enlarged detail sectional view of the rotary joint between the fixed hopper and the rotatable flexible conduit of the charging apparatus.

The concrete mixer shown in Fig. 1 is a unit which may be mounted upon a motor truck chassis (not shown) and comprises a framework 11 in which a frusto-conical mixing drum 12 is journalled for rotation about an axis which inclines upwardly from left to right, as viewed in said figure, at an angle of about 15° to the horizontal. The smaller higher end of the drum at the rear of the machine is headless and is provided with a drip-ring structure 13 defining a transfer opening 14 through which the concrete-making materials may be charged into the drum and the mixed concrete subsequently discharged therefrom by means of spirally arranged blades within the drum, as is well known in the art.

2

The present mechanism for feeding materials into the drum and controlling the discharge of the mixture therefrom, comprises an open-topped, frusto-conical hopper 15 having a bottom discharge port 16, which hopper is fixedly mounted in rearwardly spaced relation to the drum 12 by brackets 17 secured to rearward extensions 11a of the top horizontal frame members 11. As here shown in Figs. 1 and 2, the discharge port 16 of the hopper is disposed in a plane which makes an angle of approximately 30° with the horizontal, so that the said port is angularly displaced from the drum opening 14 by about 45°, and is spaced rearwardly and upwardly therefrom.

The hopper 15 is provided with an outwardly extending flange 18 surrounding the discharge port 16, which flange has an annular groove 19 in its under face in which is seated a bearing ring 20, which is held in place by a retaining ring 21 secured to the flange by bolts 22. The bearing ring 20 is rigidly carried by the outwardly flanged end of a flexible tubular conduit 23. As here shown, this conduit comprises a rubber or similar resilient tube, the wall of which is formed with a plurality of circumferential accordion pleats 24, whereby the conduit may be longitudinally extended and contracted, as will be readily understood, and may assume an arcuate form between the hopper port 16 and the drum opening 14, as shown in Figs. 1 and 2. The conduit may be and preferably is provided with circumferential metallic reinforcing rings 25 (Fig. 5) embedded in the walls to preserve the cross sectional contour.

The joint provided by the hopper flange 18, bearing ring 20 and retaining ring 21 rotatably connects the rearward end of conduit 23 to the hopper in register with the hopper port 16, so that materials introduced into the hopper may flow through the said port into and through the conduit; and the other end of the latter is provided with means engageable with the drip ring 13 surrounding the drum transfer opening 14, whereby rotation of the drum may be transmitted

to the conduit to turn it relative to the hopper.

As best shown in Figs. 2 and 5, the forward end of the conduit wall is flanged outwardly and has rigidly secured to it a shifting ring 26 and a driving ring 27, the latter being here shown as comprising a short frusto-conical annulus, the larger end of which is provided with an outwardly extending flange 27' which is adapted to be pressed against the drip-ring 13, as clearly shown in Fig. 2. The driving annulus 27 and the forward end of the conduit 23 are supported in co-axial relation to the drum by a pair of arms 28 depending from a rock-shaft 29 journalled in bearings 30 carried by the top horizontal frame members 11, the lower ends of said arms being connected by trunnions 30' to a circular collar structure 31 of substantially U-shaped cross section, which surrounds and journals the bearing ring 26 carried by the forward end of the conduit. The rock-shaft 29 may be shifted back and forth in any suitable manner, as for example by means of a rigidly carried arm 32 connected by a link 33 to a manually operable worm gear mechanism diagrammatically indicated at 34, which may be of the type disclosed in prior U. S. Patent No. 2,265,751 granted December 9, 1941, on an application filed by Charles F. Ball.

With the conduit 23 extending in an arc between the hopper port 16 and the drum end, and with the collar structure 31 pivotally connected to the supporting arms 28 by the trunnions 30', the expansive tendency of the more collapsed upper segment of the conduit will tend to prevent the disengagement of the upper sector of the flange 27' of driving ring 27 from the drip-ring 13 when the rock-shaft 29 is moved counterclockwise to contract the conduit for discharge purposes. To insure complete circumferential disengagement of the driving ring flange 27' from the drip-ring, a finger 35 is rigidly secured to the mid portion of rock-shaft 29, for engagement with an ear 36 carried by the upper sector of the collar 31, whereby when the said shaft is moved to cause contraction of the conduit to enable discharge of concrete from the drum opening 14, the engagement of the said finger with the ear will prevent pivotal movement of the collar 31 about trunnions 30' and cause the driving annulus 27 to be fully disengaged from the drip-ring.

When the parts are in the positions shown in full lines in Fig. 2, with the flange 27' of driving ring 27 in pressural engagement with the drip-ring 13 of drum 12, the flexible conduit 23 and driving ring 27 will conduct any materials introduced into hopper 15 to the opening 14, and thus into the drum. Since the latter is usually rotated in the mixing direction during charging, the engagement between the drip-ring 13 and drive ring 27 will impart rotation to the conduit relative to the fixed hopper, and while the accordion pleats in the conduit wall are circumferential rather than helical, nevertheless their expansion and contraction as a result of such rotation will materially hasten the transfer of the materials, and will also tend to prevent the adherence thereof to the surface of the conduit wall.

In operating mixers of this type it is customary to rotate the drum in one direction for mixing and in the opposite direction for discharge, in which latter case the helical mixing blades in the drum work the mixed concrete rearwardly toward and through the transfer opening 14. When it is desired to discharge concrete from a drum equipped with the present charging mechanism, if the worm gear mechanism 34 be actuated to move shaft 29 counterclockwise, the arms 28 carried thereby, acting through trunnions 30', collar 31 and bearing ring 26, will withdraw the drive ring 27 from engagement with drip-ring 13, collapsing the pleats of conduit 23 and moving the parts to the positions indicated in broken lines in Fig. 2. Thus, concrete moved rearwardly in the drum to opening 14 may be discharged through the space between the drip-ring 13 and the now separated conduit drive ring 27.

It will be noted that the hopper 15 is so constructed and positioned on the frame 11 that its discharge port 16 is at all times substantially above the plane to which concrete will rise if the drum be rotated in discharge direction while the feed conduit 23 is extended and its drive ring 27 engaged with the drum drip-ring 13. Since the only joint between rotating and non-rotating members of the present mechanism is in the plane of the hopper port, concrete finding its way into the conduit under the above mentioned conditions will not reach the said joint, and therefore it is unnecessary to provide it with any special seal construction, as has been heretofore necessary in apparatus of this general character. The present mechanism therefore is especially suitable for use in the uni-directional mode of operating these inclined axis mixers described in the prior Ball Patent No. 2,303,902; and it likewise may be advantageously employed with horizintal-axis mixers where it is usual to charge the drum to or above the axis of rotation.

While for purposes of disclosure one form of the invention has been illustrated and described, it will be obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the appended claims.

What is claimed is:

1. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced relation to the drum opening; a longitudinally extensible and contractible tubular conduit having one of its ends rotatably engaging the hopper in register with the hopper port, and its other end drivably engaging said drum end in register with its opening, whereby the drum may rotate the conduit relative to the hopper; and means connected to the conduit for extending and contracting the same, whereby to move its last named end into and out of engagement with the drum end.

2. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced relation to the drum opening; a tubular conduit having accordion-pleated longitudinally extensible and contractible walls, disposed between the hopper and drum; means rotatably connecting one end of said conduit to the hopper in register with its port; a driving ring carried by the other end of the conduit concentric with the drum opening; and reciprocable means connected to the conduit for extending and contracting the same to move said ring into and out of frictional engage-

ment with the drum end, whereby the drum may rotate the conduit relative to the hopper during said engagement, and material may be discharged from the drum through the opening during disengagement.

3. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means mounting the hopper with said port in fixedly spaced relation to the drum opening; a tubular conduit having resilient longitudinally extensible and contractible walls, disposed between the hopper and drum for conducting material from said port to said opening; means rotatably supporting one end of the conduit on the hopper in register with said port; a journal member rotatably mounting the other end of the conduit adjacent the drum opening; and supporting means for said journal member mounting it for reciprocation toward and from said opening, whereby to move said last named end of the conduit into and out of driving engagement with the drum end.

4. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced relation to the drum opening; a tubular conduit having accordion-pleated longitudinally extensible and contractible walls, disposed between the hopper and drum for conducting material from said port to said opening; means rotatably securing one end of the conduit to the hopper in register with its port; a driving ring rigidly secured to the other end of the conduit; a journal member rotatably mounting said ring and other end of the conduit adjacent the drum opening; and movable arms supporting said journal member for movements axially of the drum, whereby to extend and contract the conduit and to shift said driving ring into and out of frictional engagement with the drum end.

5. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced angular relation to said drum opening; a tubular conduit having longitudinally flexible walls, disposed between the hopper and drum with one end rotatably engaging the hopper in register with its port; and means drivably connecting the other end of the conduit to the drum in register with its opening, whereby the drum may rotate the conduit relative to the hopper.

6. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced angular relation to said drum opening; a tubular conduit having accordion-pleated longitudinally extensible and contractible walls, extending in an arc between said hopper port and drum opening; means rotatably connecting the outer end of said conduit to the hopper in register with its port; and extending and contracting means connected to the inner end portion of the conduit for moving such end into and out of opening-registering engagement with the drum end.

7. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced angular relation to and substantially above said drum opening; a flexible tubular conduit having longitudinally extensible and contractible walls, extending arcuately between said hopper port and drum opening; means providing a rotational joint between the hopper and the complemental end of said conduit; a drive ring rigidly carried by the other end of the conduit; and means journalling said other end of the conduit in concentric relation to said drum opening, with said ring in driving engagement with the drum end.

8. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced angular relation to and substantially above said drum opening; a tubular conduit having accordion-pleated longitudinally extensible and contractible walls, extending arcuately between said hopper port and drum opening; means providing a rotational joint between the hopper and the complemental end of the conduit; a drive ring rigidly carried by the other end of the conduit; a member journalling said other end of the conduit in concentric relation to the drum opening; and means mounting said journal member for movement axially of the drum, whereby the conduit may be extended and contracted and said drive ring moved into and out of driving engagement with the drum end.

9. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port and a flange extending around said port; means fixedly mounting the hopper with said port and flange in spaced angular relation to and substantially above said drum opening; a tubular conduit having resilient accordion-pleated walls, extending arcuately between said hopper port and drum opening; a bearing ring carried by the outer end of the conduit and seating against said hopper flange to provide a rotary joint between the conduit and hopper; a drive ring rigidly carried by the inner end of the conduit; a collar rotatably mounting said inner end of the conduit in concentric relation to the drum opening; and oscillatory arms supporting said collar for movements axially of the drum, whereby the conduit may be longitudinally extended and contracted and said drive ring moved into and out of driving engagement with the drum end.

10. Feeding apparatus for charging material into a rotatable drum having a charging opening in one of its ends, said apparatus comprising a hopper having a discharge port disposable in fixed spaced relation to the drum opening; a flexible tubular conduit having longitudinally extensible and contractible walls; rotatable joint connections between one end of the conduit and the hopper maintaining said end in register with said hopper port; and means connected to the conduit for extending and contracting the same, whereby to move its other end into and out of opening-registering engagement with the drum.

11. Feeding apparatus for charging material into a rotatable drum having an end charging opening concentric with its axis of rotation, said apparatus comprising a hopper having a discharge port disposable in fixed spaced angular relation to the drum opening; a resilient tubular conduit having circumferentially accordion-pleated walls; a rotatable joint connecting one

end of the conduit to the hopper in register with said port; and means connected to the conduit for longitudinally extending and contracting the same, whereby its other end may be moved into and out of opening-registering engagement with the drum and the conduit rotated by the drum during passage of material through the conduit.

12. In agitating apparatus, the combination of a rotatable drum, one end of which is provided with a material-transfer opening; a feed hopper having a discharge port; means fixedly mounting the hopper with said port in spaced angular relation to said drum opening; a tubular conduit having accordion-pleated longitudinally extensible and contractible walls, extending arcuately between said hopper port and drum opening; means providing a rotary joint between the hopper and the complemental end of the conduit; a drive ring rigidly carried by the other end of the conduit; a collar rotatably mounting the last mentioned end of the conduit in concentric relation to the drum opening; oscillatably mounted arms pivotally connected to and supporting said collar for movements axially of the drum; means

for oscillating said arms to longitudinally extend and contract the conduit, whereby to move said drive ring into and out of driving engagement with the drum end; and a member movable with said arms and engageable with the collar during conduit-contracting movements thereof to limit swinging of the collar on the arm pivots, whereby to insure complete disengagement of the drive ring from the drum end.

LOUIS G. HILKEMEIER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
716,087	Nicolay	Dec. 16, 1902
968,275	Smith	Aug. 23, 1910
1,692,374	Jaeger	Nov. 20, 1928
1,827,713	Eggert	Oct. 13, 1931
1,898,416	Wiseman	Feb. 21, 1933
2,202,652	Glidden	May 28, 1940
2,264,039	Hoyd	Nov. 25, 1941