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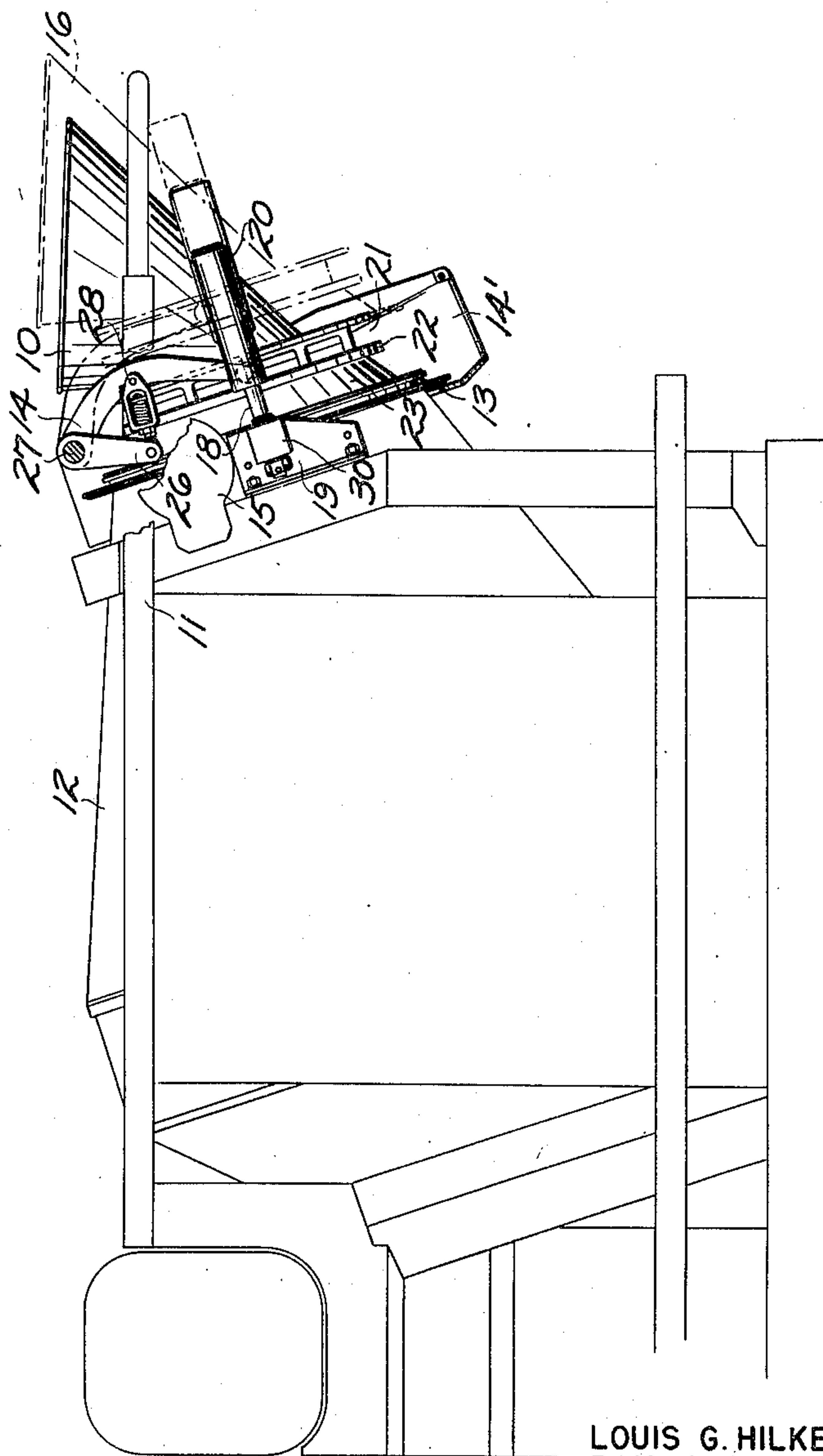
2,544,084

APPARATUS FOR CHARGING AND DISCHARGING CONCRETE MATERIALS

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3 Sheets-Sheet 1

Fig. 1.



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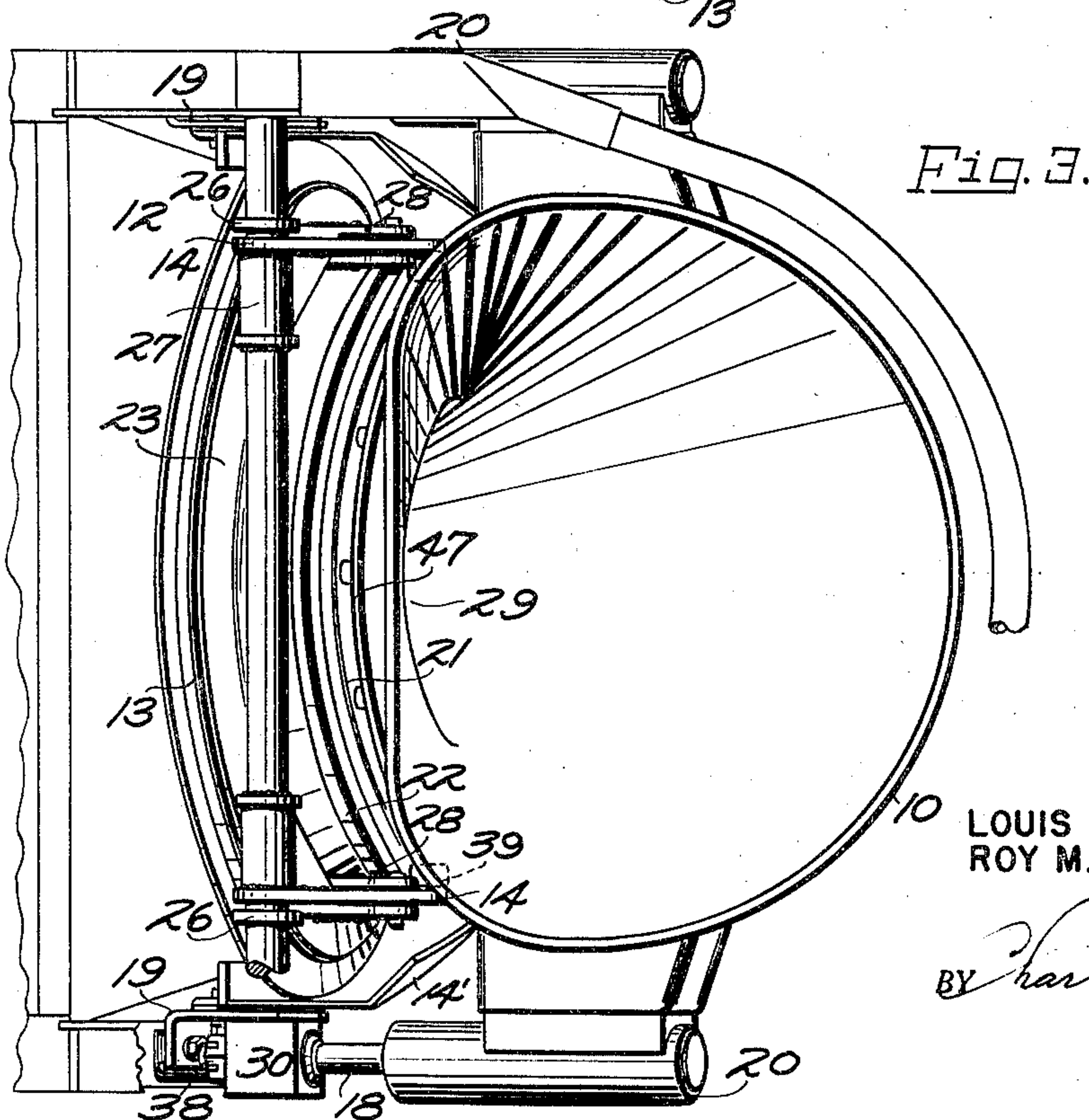
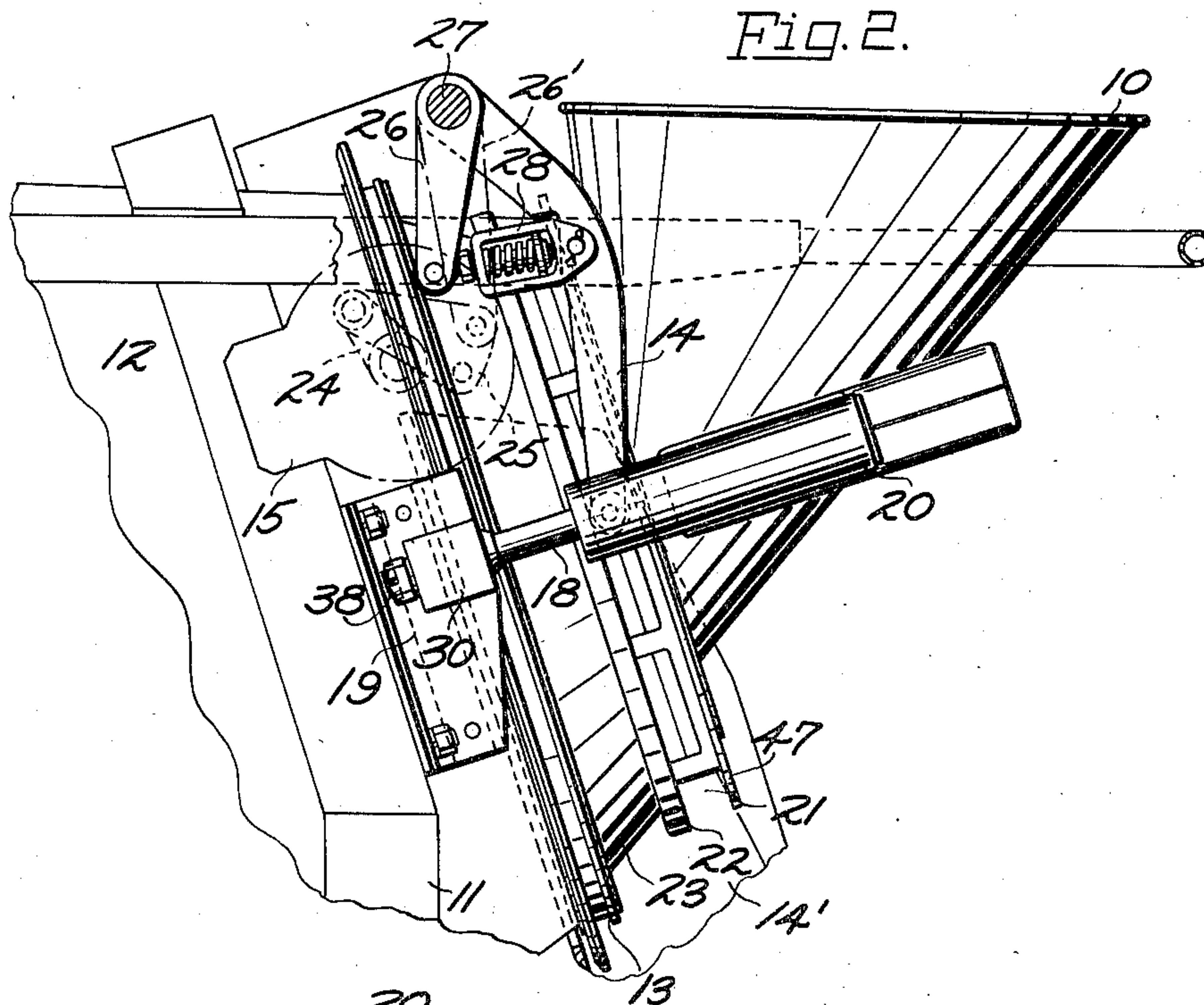
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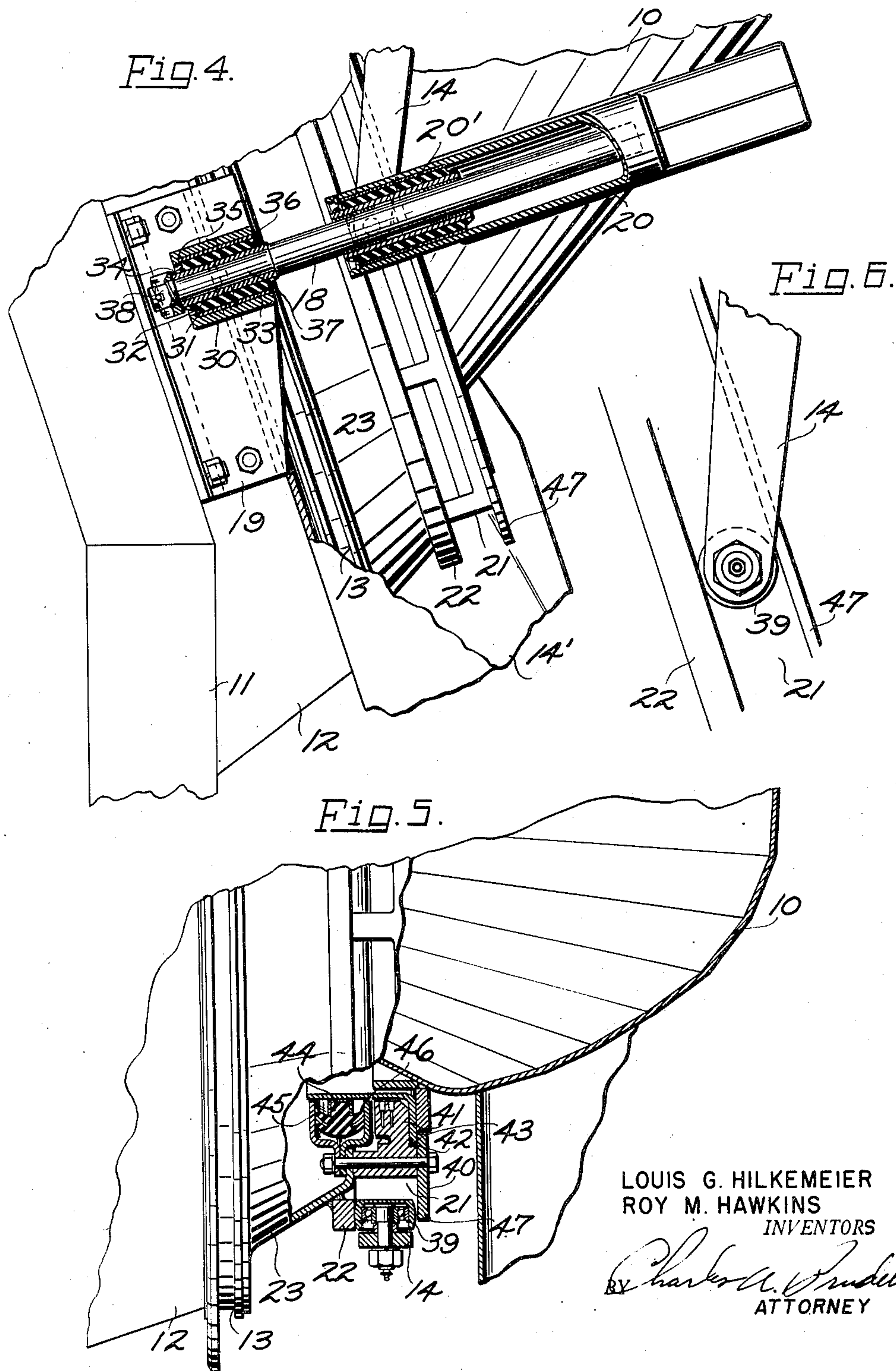
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UNITED STATES PATENT OFFICE

2,544,084

APPARATUS FOR CHARGING AND DIS-
CHARGING CONCRETE MATERIALS

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4 Claims. (Cl. 259—161)

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This invention relates to concrete mixers and in particular to apparatus for charging and discharging the same; this application contains matter disclosed and claimed in the co-pending application of Roy M. Hawkins, S. N. 794,150, filed December 27, 1947, entitled "Apparatus for Charging and Discharging Concrete Mixers"; also matter disclosed and claimed in the co-pending application of Louis G. Hilkemeier, S. N. 515,834, filed on December 27, 1943, entitled "Transit Concrete Mixer," (now Patent 2,439,250 dated April 6, 1948).

In high discharge truck mixers, a generic example of which is shown and disclosed in Letters Patent 2,045,532 issued to J. C. Merwin et al. on June 23, 1936; it is now conventional practice to load the mixer through a nonrotatable hopper as shown in the Letters Patent 2,267,801 issued to H. C. Peters et al. on December 20, 1941. Such apparatus as is there shown and claimed has obvious advantages in that hatch loading is dispensed with, and the open hopper further permits the coursing of mixing aggregates from one end of the drum to the other producing a completed mechanical mixture which has been popularly termed "a live mix"; this is in accordance with the teachings found in the Letters Patent issued to C. F. Ball 2,303,902 issued on December 1, 1942. The aforesaid patent to Peters et al. (2,267,801) while contributing to the art has intrinsic failings which render such a device expensive to maintain during field operations, i. e., in most embodiments of the device the force used to urge the rotatable closure ring onto the drum opening of the mixer is exerted on the non-rotatable hopper with consequent wear on the sealing and thrust devices necessarily used therewith. This problem is not peculiar to the aforesaid mentioned device but is found in practically all transit concrete mixers of the aforesaid type which are used in the industry today.

Further problems have arisen in relation to the manner in which the hopper and its rotatable closure ring should be supported as respects to the drum itself. An example of such device is shown in the Letters Patent issued to C. F. Ball (2,265,751) issued on December 9, 1941, wherein a device is shown in which the hopper is mounted on a shaft along the axis of the mixing drum, the shaft being supported by a spider positioned in the mouth of the drum opening. Various forms of this device have met with wide acceptance in the industry, however such an arrangement necessarily obstructs the flow of material into the mixing drum as the spider and shaft arrange-

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ment induces arching of the materials directed through said opening with consequent slow charging time. In the field operation of such apparatus it is important to secure the minimum charging time. Hence it can be realized that the art of record for many years has not solved these the basic problems in regard to hopper device for charging and discharging transit concrete mixers.

It is the object of this invention to provide apparatus for charging and discharging concrete mixers which will permit optimum charging time.

Another object of this invention is to provide hopper charging apparatus for transit concrete mixers in which seal and thrust assemblies are relieved of bearing loads while permitting fast charging time through said hopper.

Another object of this invention is to provide apparatus which will accommodate the erratic movement of drum in respect to the hopper loading device.

These are necessarily the broad objects of this invention however in the reading of the following description and claims other objects will appear to those skilled in the art.

In the drawings Fig. 1 represents a side elevation of the hopper mounted on a conventional transit concrete mixer.

Fig. 2 represents an enlarged view of the charging device shown in Fig. 1.

Fig. 3 shows a plan elevation of Fig. 2.

Fig. 4 represents an enlarged side elevation of the device partly in section, with parts broken away, showing the outside hopper support.

Fig. 5 is a plan view of the device shown in Fig. 2 partly in section, with parts broken away, showing the arrangement of the thrust and seal assemblies and the location of the means for urging rotatable closure ring into engagement with the mouth of the drum opening.

Fig. 6 is an enlarged detailed view of the apparatus for urging the rotatable closure ring into engagement with the mouth of the drum opening.

Referring to the drawings in greater detail Fig. 1 shows the hopper 10 mounted onto the frame 11 of a conventional transit concrete mixer having the desired characteristic of a high point of discharge. The drum 12 is rotatably mounted on said frame by well known means which have been described at divers times in the patent art. As is shown in Fig. 1 the hopper 10 is in a closed position being urged into engagement with the mouth of the mixing drum 13 by means of levers 14 which are operated by a conventional hand-wheel, screw and gear mechanism 15. The por-

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tion in dotted lines 16 shows the hopper in an open position. When in this position it is apparent that aggregates may leave the mouth of the drum opening 13, be caught and directed by the chuting devices 14' and be directed to the site of application by other means now well known in the art. The hopper itself is supported on parallel shafts or guide members 18 resiliently mounted to the frame 11 of the mixer by means of brackets 19 and resilient members which are not shown in this view. The guide members cooperate with resiliently mounted bushings (also not shown in this view) mounted in the housing 20 which is affixed to the hopper 10. In this embodiment the guide members and the receiving means are arranged so that the hopper may move axially of the drum. It will be observed that the lever mechanism 14 ultimately engages a groove 21 and track 22; the track is mounted on the rotatable closure ring 23 which abuts the mouth of the mixing drum 13.

Referring to Fig. 2 which is an enlarged view of Fig. 1 the relationship of the parts mentioned aforesaid can be readily comprehended. The cranking mechanism 15 is further expanded to show a crank 24 (shown in dotted lines) to which is attached a lever 25 which in turn is pivotally attached to another lever 26' which is keyed to the shaft 27. The lever 14 is not keyed to shaft 27 and is free to rock about said shaft. A resilient device 28 is attached to lever 14 and to the lever 26 which is keyed to shaft 27 so that when the crank 24 is rocked lever 14 moves accordingly. The spring device 28 is inserted to compensate for variances in manufacture and also to accommodate the erratic movement of the drum 12 in respect of the hopper 10. When the drum 12 is loaded the shape of the drum is distorted so as to be in somewhat an elliptical shape.

Fig. 3 shows the unobstructed opening 29 in the hopper extending into the drum 12 afforded by the apparatus of this invention.

The resiliently mounted guide members 18 and guide receiving means 20 are shown in greater detail in Fig. 4. Mounted on the bracket 19 which is mounted on the frame of the mixer 11 is a rectangular bracket 30. Inserted in said bracket is a bushing member 31 which comprises a central rubber portion 32, a peripheral metal portion 33 and a metal bore portion 34. These elements are bonded together by known processes so that the only movement of the 3 parts with respect to each other is produced by the flexure of the intermediate rubber portion 32. No attempt will be made to discuss the characteristics of such movement as it is known in the art. The external peripheral portion of said mounting engages the bore of the bracket 30 in somewhat of a pressed fit and one of the lateral faces 35 engages the counterbore in bracket 30. The other lateral face 36 of said bushing is restrained from longitudinal movement by means of a set screw and washer, which expedient is well known. The shaft 18 has a portion turned down to a smaller diameter 37 which is fitted into the bore of said bushing member. The end of said shaft is threaded and a nut 38 is shown as engaging the lateral face of the sleeve 34 so as to lock it against further longitudinal movement. In the guide member 20 a similar bushing 20' is shown. The bushing is arranged so that the bore of the same is in sliding relationship to the shaft 18 and the bushing is further held in said guide member in an obvious manner. It is understood of course that the shaft 18 and said bushing assemblies

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have duplicating parts oppositely arranged, substantially on the diameter of the drum opening.

The means for urging the rotatable closure ring 23 toward the drum opening 13 are shown in greater detail in Fig. 5. Also there shown is the sealing assembly for the device which is more fully described in the aforesaid application of Louis G. Hilckemeier, S. N. 515,834. As has been explained in the foregoing, pressure for urging said rotatable closure ring onto the drum opening is provided by the lever arm 14. Attached to said lever arm is a ball bearing mounted roller 39 which rides on the track 22 in the groove 21, provided by the positioning of the guide and track member 40 so as to form the groove 21. Both elements 40 and 41 are attached to the rotatable closure ring 23 as is evident in the drawing. The hopper 10 is supported by the shaft 18 and guide members 20 and the thrust ring 41 abuts the thrust face 42 when the rotatable closure ring is urged into sealing engagement with the mouth of the drum opening. However, the force required to urge the rotatable closure ring 23 against the revolving drum opening 13 is not exerted through this face, for only the weight of the hopper itself causes thrust face 42 to abut the rotating thrust ring 41. Of course when the hopper 10 is moved so as to remove the rotatable closure ring 23 from the opening of the drum to discharge the contents therefrom the thrust ring 41 abuts the thrust face 42. These instances are very few in the operation of truck mixers as most of the time the rotatable closure ring is in engagement with the mouth of the drum opening. In order to have the necessary control of the hopper in respect to the rotatable closure ring when it is closed a small wearing surface is provided as at 43. Further in conventional truck mixers when applying all of the force necessary to seal the drum opening, terrific amounts of pressure were required on the order of 500 to 600 p. s. i. on a side. This caused great wear between the thrust faces with the consequent distortion of the seal 44 so that the hopper 10 was displaced axially toward the drum hence the lateral limits 45 of the seal 44 were worn and a gap appeared at the opposite lateral limits of said seal 46. This gave grout an opportunity to seep through openings between the hopper and the seal 44 and of course the grout was free to infiltrate into the thrust assembly thus causing serious abrasion and other deleterious effects which in very short order required replacement of the sealing and thrust assemblies with consequent expense and loss of time. These problems are not peculiar to any single type of mixer that is manufactured and offered to the industry today.

The arrangement of the lever arms with respect to the groove and tracks are shown in considerable detail in Fig. 6. As the lever arm 14 is rocked about shaft 27 the roller 39 is free to roll down track 22 and conversely when the hopper is open the roller 39 is free to roll up track 47. Also since there are erratic movements of the rotating drum in relation to the rotatable closure ring 23 and hopper 10, which cannot be controlled due to the loading of the machine, and subsequent travel over rough terrain, always found where truck mixers are used, such movement is accommodated by this facile arrangement.

While it is clear that various embodiments of invention differing somewhat in structure may be formed they are well within the spirit of the

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invention hence, it is to be limited only by the clear import of the following claims.

We claim:

1. In combination with a rotatable mixing drum mounted on a frame and having an opening in the end thereof, supporting members disposed substantially on a diameter of said drum opening and projecting outwardly from said frame, a hopper for directing materials into said drum, a rotatable closure member on said hopper, receiving means mounted on said hopper for cooperatively registering with said supporting members, actuating means to move said hopper away from said drum, said actuating means comprising spaced parallel annular members on the closure ring, a lever having projections arranged to slideably fit between said spaced members, and means to actuate said lever whereby the hopper and closure ring may be uniformly displaced axially of said drum.

2. A charging hopper construction for transit concrete mixers of the type wherein the mixer has an open end providing a port through which the drum is charged and discharged, a charging hopper having an open discharge end, a rotatable drum closure on said discharge end of the hopper adapted for engagement with the port of the drum to revolve therewith, resilient means for mounting said hopper comprising stationary guide members substantially parallel to the axis of said drum, resilient guide receiving means on said hopper arranged to permit axial movement of the hopper toward and away from said port while supporting the hopper, whereby misalignment and erratic movement of said drum with respect to said closure is accommodated, and actuating means for so moving the hopper.

3. In a concrete mixer, means for mounting a nonrotatable charging hopper upon a rotatable mixing drum for axial movement toward and away from a material transfer opening in one end of said drum the hopper having a discharge port cooperatively registerable with said drum opening for the transfer of materials from the hopper into the drum, a rotatable collar structure secured to said hopper around said port; said hopper mounting comprising stationary guide members mounted to the frame of said mixer parallel to the axis of the drum, cooperating

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members on said hopper for slideably fitting said guide members to support the hopper, actuating means to move said hopper away from said drum said actuating means comprising spaced parallel members mounted on said rotatable collar structure, rolling contact lever means for cooperating with said parallel members to move the hopper toward and away from said material transfer opening in the drum.

4. In combination with a rotatable mixing drum having an opening in the end thereof, stationary supporting members disposed substantially on the diameter of said drum and projecting outwardly of said opening, said supporting members being arranged in nonrotatable relationship with said drum, the supporting members further being resiliently mounted, a hopper for directing materials into said drum, a rotatable closure member on said hopper, resiliently mounted receiving means on said hopper for cooperatively registering with said supporting members whereby misalignment and erratic movements of the drum in respect to said hopper are accommodated, actuating means to move said hopper away from said drum, said actuating means comprising spaced parallel members on the hopper, rolling contact lever means arranged to interfit between said spaced members, and means to actuate said levers whereby the hopper may be uniformly displaced axially of said drum.

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ROY M. HAWKINS.

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