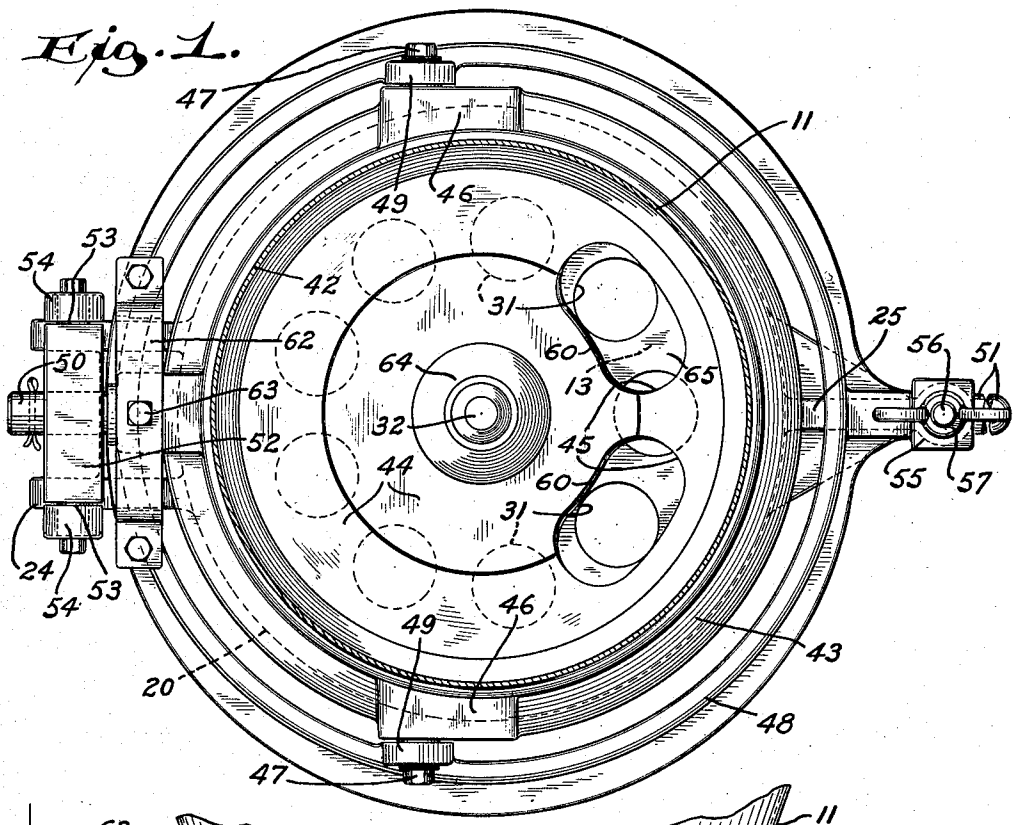
May 1, 1951 R. R. COLBURN 2,550,781

CONCRETE AGGREGATE FEEDER HAVING A MEASURING ROTOR AND AN ADJUSTABLE FEED HOPPER

Filed Dec. 9, 1946 3 Sheets-Sheet 1

Fig. 1.



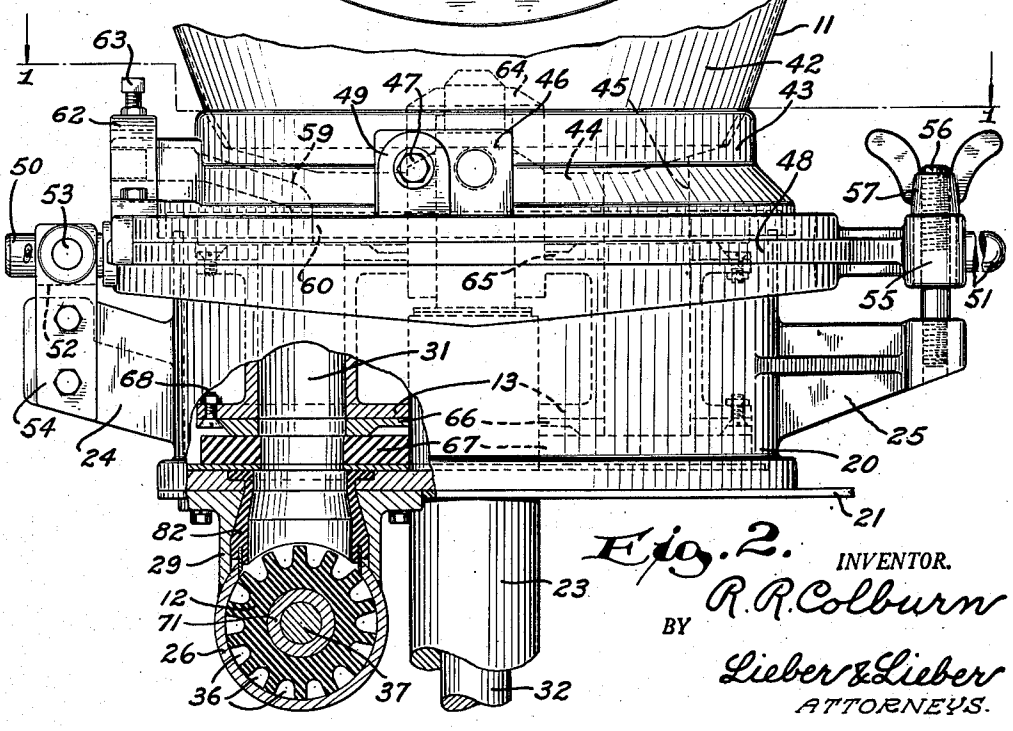


Fig. 2.

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Fig. 3.

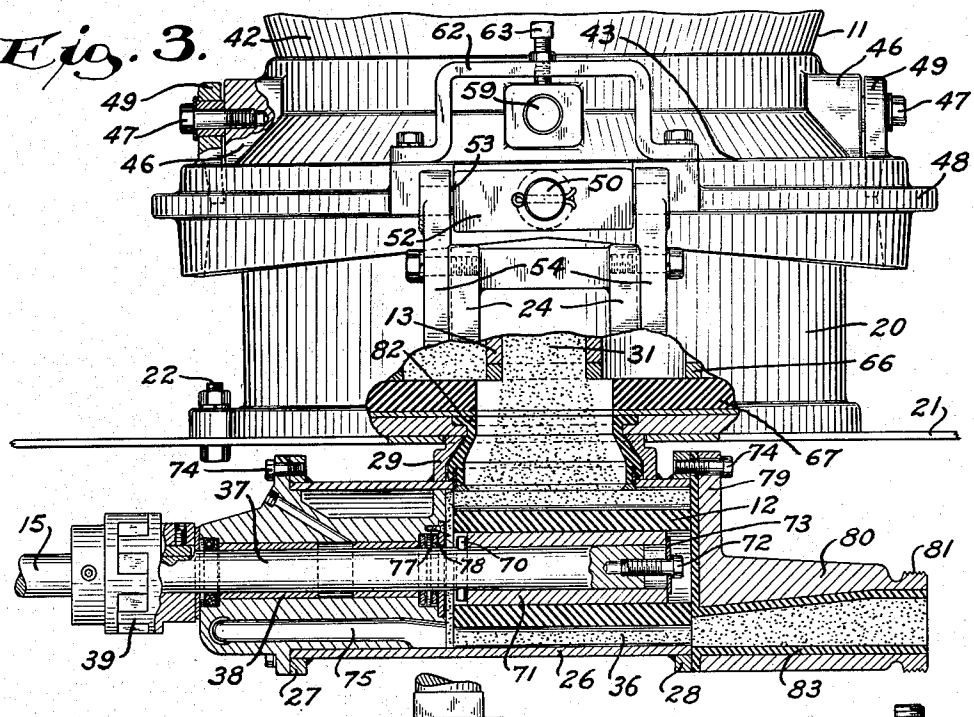
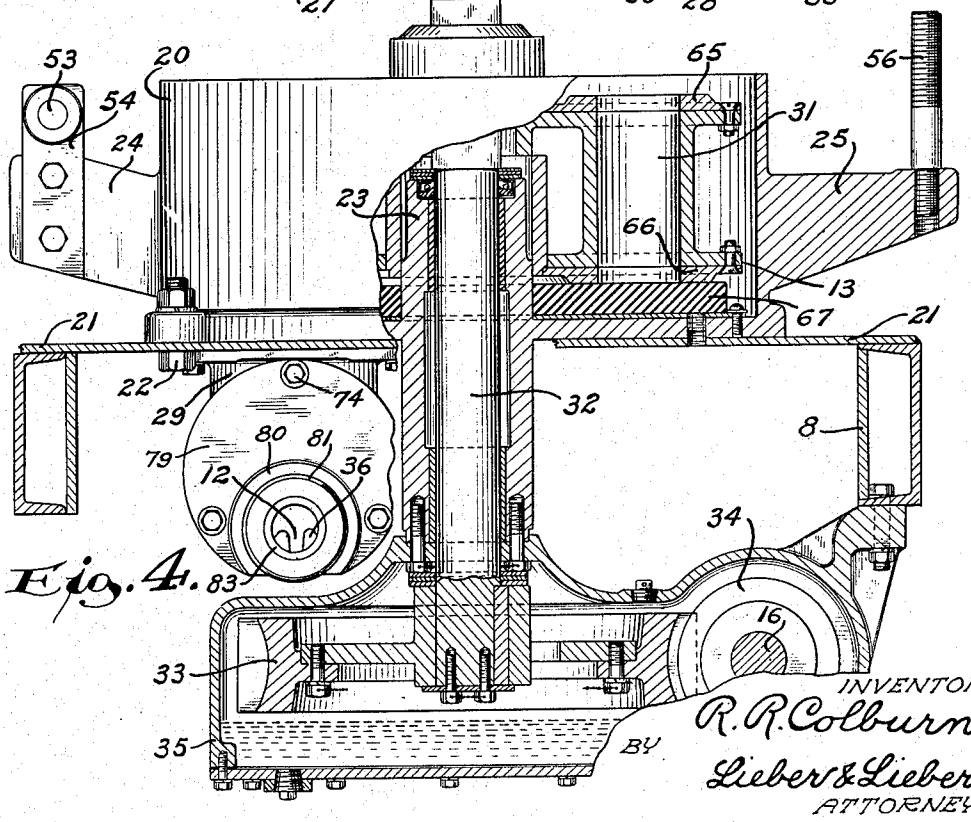


Fig. 4.



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Fig. 6.

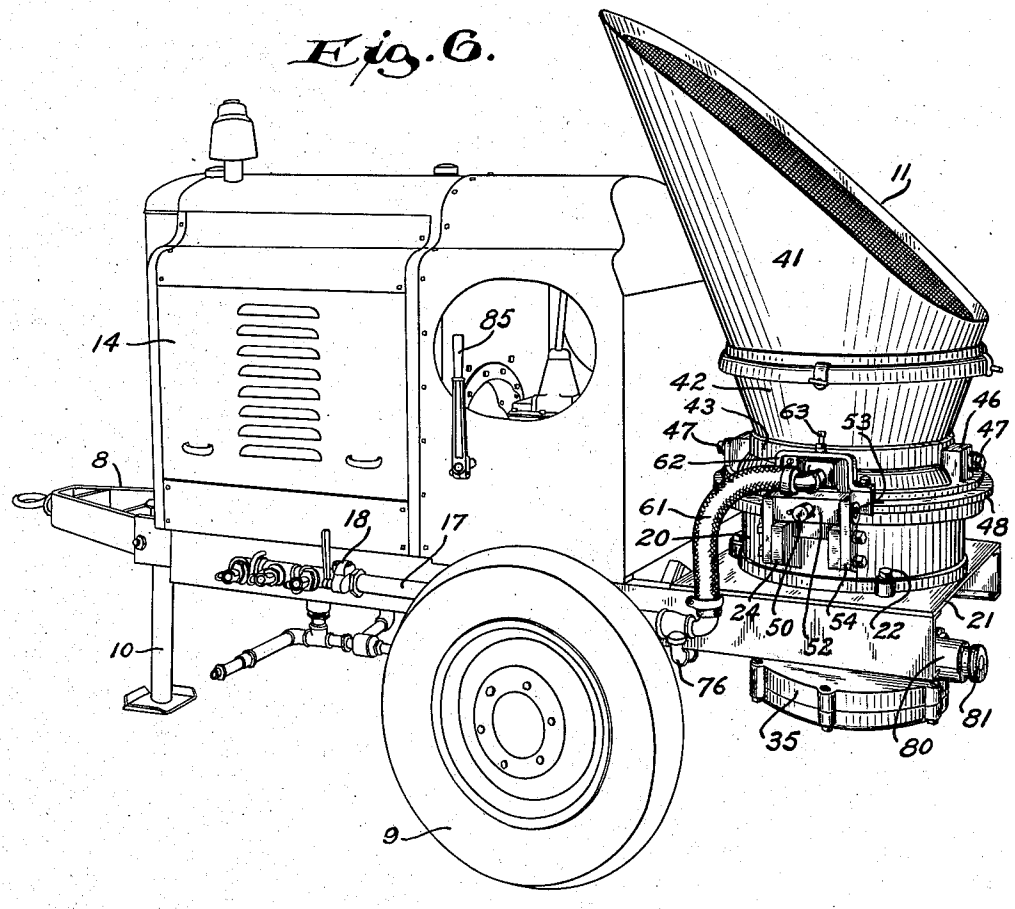
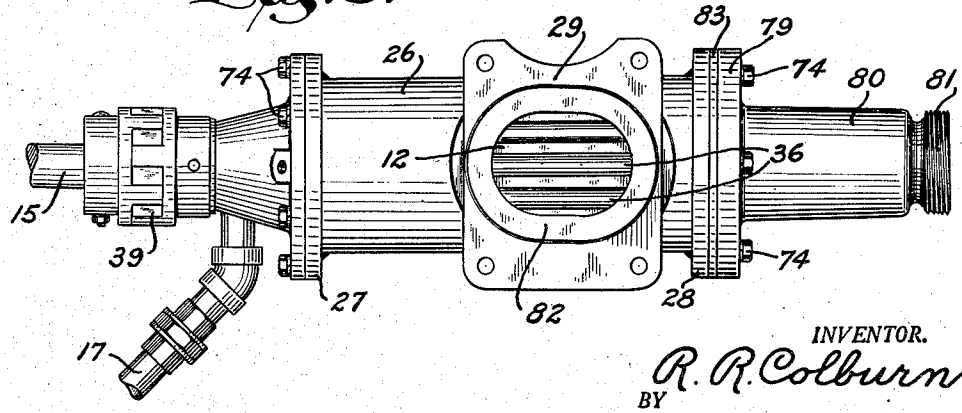


Fig. 5.



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CONCRETE AGGREGATE FEEDER HAVING A MEASURING ROTOR AND AN ADJUSTABLE FEED HOPPER

Richard R. Colburn, Waterloo, Iowa

Application December 9, 1946, Serial No. 715,045

8 Claims. (Cl. 222—370)

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The invention relates generally to improvements in the construction and operation of mechanism for continuously measuring successive batches of relatively dry and fine concrete aggregate, and for transporting the same in the form of a uniform stream to places of utilization, with the aid of compressed air or the like; and relates more specifically to various improvements in apparatus of the type disclosed in my prior patents No. 2,299,565, granted October 20, 1942, and No. 2,413,293, granted December 31, 1946.

As shown and described in said prior application and patent, I have heretofore proposed the production of a dry concrete aggregate feeder having a revolving material measuring rotor provided with an annular series of upright pockets successively communicable at their upper ends with a bulk aggregate supply hopper, and at their lower ends with another revolving rotor having increment batch receiving recesses, and means for injecting compressed air through the pockets and recesses so as to remove the aggregate material and to produce a uniform stream of material flowing to the source of utilization of the concrete. While the mechanisms revealed in these prior disclosures have proven highly practical and successful in actual commercial use, it has been found rather difficult and tedious in larger units, to remove the heavy material supply hoppers, and to properly replace the same so as to effectively seal the compressed air ducts and the measuring pockets of the main rotor. Then too, some difficulty has been encountered in the matter of preventing grit from entering the bearing of the auxiliary rotor driving shaft, and in gaining quick access to and avoiding excessive and undesirably rapid wear on other parts of the mechanism which are exposed to the advancing aggregate, but the principle of operation of the prior devices has proven highly satisfactory and advantageous over prior assemblages intended for analogous purposes.

It is therefore an important object of my present invention to provide various improvements in the construction and operation of such concrete aggregate feeders whereby all of the above mentioned objections and difficulties are eliminated.

Another object of this invention is to provide an improved cradle for supporting the material supply hopper of a concrete aggregate feed mechanism, which permits rapid and convenient removal and most effective replacement of the hopper.

A further object of the invention is to provide

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an aggregate feeder adapted to automatically deliver a continuous uniform stream of the material to places of utilization, and wherein all parts are well protected against rapid wear, while also being readily accessible for inspection and replacement.

Still another object of my invention is to provide an improved assemblage for constantly delivering concrete aggregate to a cement gun or the like with the aid of compressed air, wherein the various bearings are most effectively protected against entry of grit, and in which the air ducts are thoroughly sealed at all times.

An additional object of the present invention is to provide an improved portable concrete aggregate feed unit which is simple, compact and durable in construction, and which is also highly efficient in operation and flexible in its adaptations.

The above and other more specific objects and advantages of the invention will be apparent from the following detailed description.

A clear conception of the several features constituting my present improvement, and of the mode of constructing and of utilizing concrete aggregate feeders embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional top view of the improved aggregate feeding unit looking into the material supply hopper and showing a plan view of the improved hopper supporting cradle, a transverse section having been taken through the lower portion of the hopper wall along the line 1—1 of Fig. 2;

Fig. 2 is a fragmentary part sectional rear elevation of the improved assemblage, showing the auxiliary feed rotor and adjacent structure in section and the hopper cradle in elevation;

Fig. 3 is a fragmentary part sectional side elevation of the same mechanism, showing the auxiliary feed rotor and adjacent parts in section;

Fig. 4 is another fragmentary part sectional rear elevation of the assemblage, showing a part of the main measuring rotor and its driving mechanism in section, and having the hopper cradle ring omitted;

Fig. 5 is a top view of the improved auxiliary feed rotor housing showing a portion of the rotor confined therein; and

Fig. 6 is a perspective view of a typical concrete aggregate feeding unit completely assembled and ready for use.

While the improvements have been shown and described herein as being advantageously applicable to a particular type of aggregate feeder especially adapted for use in connection with cement guns, it is not my intention to unnecessarily restrict the utility of the invention by virtue of this limited disclosure.

Referring to the drawings, the improved typical concrete aggregate feeder unit specifically shown therein, comprises a portable truck 8 having rear supporting wheels 9 and a front supporting prop 10; an aggregate feeder mounted upon the rear portion of the truck frame between the wheels 9 and having a material supply hopper 11 communicable with a lower increment feed rotor 12 through an intervening measuring rotor 13; an internal combustion engine 14 or the like, mounted upon the truck frame between the rear wheels 9 and front prop 10 and being drivingly connected to the rotors 12, 13 by means of clutch controlled shafts 15, 16 respectively; and a compressed air line 17 communicating with a suitable source of supply and being adapted to furnish air in regulated quantities to the feed mechanism past a manually controlled valve 18.

The main rotor 13 is housed within a sturdy annular upright casing 20 which is firmly secured to the upper deck 21 of the truck 8 by bolts 22, and which is also provided with an integral central bearing 23 and with diametrically opposite integral external lugs 24, 25; and the auxiliary feed rotor 12 is confined within a tubular horizontal casing 26 firmly secured to the bottom of the casing 20 and having opposite integral end flanges 27, 28 and an intermediate upwardly directed duct 29 communicating with the lower interior of the casing 20, see Figs. 2, 3, 4 and 5. The measuring rotor 13 is provided with an annular series of upright cylindrical measuring pockets 31 and is revolvable within the main casing 20 by means of a vertical central shaft 32 coacting with the bearing 23, and the lower extremity of this shaft 32 is drivingly connected to the main rotor drive shaft 16 by a worm wheel 33 and a worm 34 both of which are enclosed in a sealed housing 35, as shown in Fig. 4. The increment feeding rotor 12 is provided with an annular series of elongated peripheral recesses 36 and is revolvable within the auxiliary casing 26 by means of a horizontal shaft 37 journalled in a bearing 38 secured to the casing end flange 27, and the front end of this shaft 37 is drivingly connected to the auxiliary rotor drive shaft 15 by means of a flexible coupling 39 as shown in Fig. 3.

The material supply hopper 11 which is normally disposed above the measuring rotor 13 but which should also be conveniently removable in order to permit free access to the interior of the main casing 20, consists primarily of an upper screening section 41, an intermediate bin section 42 and a base section 43, the latter having a diaphragm 44 formed integral therewith and spanning the top of the rotor 13. This diaphragm 44 is provided with a pair of hopper discharge openings 45 which are registerable with the successive advancing measuring pockets 31 as they revolve about the axis of the shaft 32, and the periphery of the base section 43 is provided with a pair of diametrically opposite integral lugs 46 each of which has a pivot screw 47 associated therewith, as illustrated in Figs. 1, 2 and 3. A relatively resilient but sturdy cradle ring 48 loosely surrounds the hopper base section 43 and has integral ears 49 with which the pivot screws 47

coact; and the ring 48 is also provided with an integral outwardly projecting pivot 50 at one side and with an integral outwardly projecting manipulating handle 51 at its opposite side, both disposed at right angles to the common axis of the screws 47.

The side pivot 50 of the cradle ring 48 is journalled in the medial portion of a block 52 having integral pivot pins 53 at the opposite ends thereof, and these alined pins 53 are journalled for oscillation in plates 54 rigidly secured to the opposite sides of the main casing lug 24. These coacting elements provide a universal joint between the cradle ring 48 and the casing 20; and the manipulating handle 51 which is associated with the ring 48 remote from this universal joint, is provided with an enlarged hub portion 55 having a relatively large through opening adapted to loosely receive a stud 56 firmly secured to the fixedly casing lug 25, and to be confined upon the stud by a thumb nut 57, see Figs. 1 and 2. The improved hopper cradle thus provided, permits the hopper 11 to be either firmly held in normal active position as shown in Fig. 6, or swung away from and toward the tops of the casing 20 and main rotor 13 with the aid of the handle 51 when the clamping nut 57 is removed from the stud 56; and the pivots 47, 50, 53 together with the loose fit between the hub 55 and stud 56 will obviously permit the hopper base 43 to automatically properly aline itself and conform to the top of the main rotor 13 whenever the clamping nut 57 is reapplied to the fixed stud 56.

The base section 43 of the supply hopper 11 is also provided with a compressed air duct 59 located remote from the aggregate delivery openings 45 and directed toward and into the upper ends of the successive advancing measuring pockets 31 through an upper sealing disc 60 formed of rubber and which is fixedly secured to the bottom of the diaphragm 44, and compressed air from the supply line 17 may be admitted to this duct 59 through a flexible tube 61 detachably secured to the base 43 by means of a yoke 62 and clamping screw 63, as depicted in Figs. 1, 2, 3 and 6. The hopper base diaphragm 44 is moreover provided with a central socket 64 which is adapted to coact with the upper extremity of the rotor shaft 32 above the rotor hub when the hopper 11 is in normal position, and the sealing disc 60 which is attached to the diaphragm 44 has openings therein corresponding to the feed openings 45. The top of the main measuring rotor 13 is provided with a wear plate 65 forming an annular sealing ridge adapted to snugly engage the upper disc 60, and the bottom of this rotor 13 is also provided with a similar wear plate 66 forming an annular ridge likewise adapted to snugly engage a lower rubber sealing disc 67 which is fixedly secured to the bottom of the main casing 20 and has an opening therein communicating with the auxiliary rotor casing duct 29, see Figs. 1 to 4 inclusive. The wear plates 65, 66 are identical in structure and are firmly but detachably secured to the rotor 13 by means of screws 68, and they are also replaceable without necessitating renewal of the entire rotor.

The main rotor 13 is slip fitted upon a polygonal upper portion of the upright shaft 32 and is freely upwardly removable from within the cup-shaped main casing 20 when the hopper 11 and disc 60 have been removed, and the auxiliary rotor 12 is likewise detachably secured to its driving shaft 37 by means of a pin 70 piercing this shaft and coacting with notches in one end

of the auxiliary rotor core 71, and a retaining screw 72 coacting with the end of the shaft 37 and with the opposite end of the core 71 through a clamping disc 73, as shown in Fig. 3. The bearing 38 for the horizontal shaft 37 is snugly but removably confined within one end of the tubular auxiliary casing 26 by cap screws 74 and is provided with an air duct or passage 75 in its lower portion one end of which communicates with the air supply line 17 through a pipe 76, and the opposite delivery end of which is communicable with the forward ends of the successive lowermost advancing recesses 36 of the revolving feed rotor 12. The bore of the bearing 38 is effectively sealed from the auxiliary rotor chamber by an improved packing 77 having two solid rings snugly embracing the shaft 37 on opposite sides of a flexible packing disc, each of the solid rings having a lateral annular groove adjacent to the shaft periphery and facing the rotor 12, and this packing 77 is protected and held in place by a disc 78. The opposite end of the tubular auxiliary casing 26 is provided with a closure fitting 79 having a discharge passage for the aggregate stream formed in an integral projection 80 thereof, and the outer end of this projection is provided with screw threads 81 for effecting attachment of a hose leading to the final cement gun or other source of utilization.

The casings 20, 26, bearing 38, main rotor 13, auxiliary rotor core 71, and fitting 80 are formed primarily of durable metal, and in order to protect the duct 29, rotor 12, and the fitting 80 against excessive abrasion and wear due to the constant travel of the abrasive aggregate therethrough, these parts are preferably provided with rubber liners or surfaces. The auxiliary rotor 12 is formed as a rubber bushing which is stretched over the core 71, thus providing the feeding recesses 36 with wear resistant surfaces, and the casing duct 29 is provided with a rubber liner 82, while the fitting 80 is also provided with a rubber liner 83. These liners 82, 83 cooperate with the sealing discs 60, 67 and with the auxiliary rotor to provide wear resistant surfaces wherever exposed to high velocity flow of the abrasive material, thus materially prolonging the life of the unit to a maximum, and the discharge passage formed in the fitting 79 is preferably disposed in horizontal alinement with the air supply passage 75 so that the successive revolving material filled recesses 36 will be placed in alinment with these passages as the rotor 12 is rotated, see Figs. 3, 4 and 5.

During normal use of the improved concrete aggregate measuring and feeding device, the portable unit, after having been properly constructed, assembled and provided with abundant lubrication wherever necessary, may be readily transported from place to place and actuated to accurately measure and to deliver a constant uniform stream of aggregate through the discharge conduit of the fitting 79 to the final zone or places of utilization, such as a spray gun or the like attached by means of a hose to the screw threads 81. Such normal operation may be effected by merely operating the engine 14, throwing in the clutch mechanism with the aid of the lever 85 shown in Fig. 6, opening the compressed air supply valve 18, and maintaining an abundant supply of aggregate material within the hopper 11. When the measuring rotor 13 is constantly rotated by its driving shaft 16, 32 through the worm gearing 33, 34, the successive pockets 31 will be brought into open communication with

the supply hopper 11 through the arcuate openings 45 formed in the diaphragm 44 and in the upper sealing disc 60, and the pockets are then filled by gravity with equal batches of material. As the successive pockets 31 are carried beyond the openings 45, they are momentarily tightly sealed at both ends by the upper and lower rubber discs 60, 67, before being exposed to the compressed air admission duct 59.

As soon as each of the previously filled pockets 31 is brought into communication with the compressed air duct 59 the measured batch of material is ejected downwardly therefrom by compressed air, and after passing through the rubber lined duct 29, increments of the measured batches of the material are removed from the descending charges and partially fill the relatively small and more rapidly revolving upper recesses 36 of the feed rotor 12. The successive emptied pockets 31 are subsequently transported between the sealing discs 60, 67 toward the hopper openings 45 for refilling, and while the material laden recesses 36 of the auxiliary rotor 12 are being carried toward their lowermost positions within the casing 26, the compressed air delivered from the passage 75 through the space between the forward end of the feed rotor 12 and into the recesses 36, constantly tends to urge the increments of material toward the rear ends of these recesses. When the successive material laden recesses 36 are brought into axial alinement with the air supply passage 75 and with the discharge passage formed in the fitting 79, the increments of material are quickly ejected longitudinally from the rotor recesses 36 and into the discharge passage, and the mixture of air and aggregate material is thereafter discharged in the form of a constant and uniform stream of mixture to the zone of utilization.

This normal operation of the mechanism obviously continues as long as the compressed air valve 18 remains open, and if it becomes desirable to gain access to the internal mechanisms, the clutch lever 85 should first be operated to stop the moving parts. The hopper 11 may then be readily removed so as to gain access to the main rotor 13, by merely removing the single thumb nut 57 and by thereafter swinging the cradle 48 about the pivots 53 of the block 52, upwardly and laterally away from the measuring rotor. The sealing disc 60 and the upper portion of the rotor will then be thoroughly accessible, and the rotor 13 may thereafter be freely upwardly removed from within the main casing 20. In order to gain access to the auxiliary rotor 12, it is only necessary to remove the fitting 79 by withdrawing the adjacent cap screw 74, and the bearing 38 may likewise be readily removed from the opposite end of the auxiliary casing 26. The wear plates 65, 66 may also be readily removed from the main body of the rotor 13, thus making it possible to gain rapid and convenient access to all essential parts of the mechanism.

The improved cradle structure for the hopper 11, also permits rapid and effective replacement of the hopper 11 to its normal position, and enables most efficient sealing of the air duct 59 and of the joints between the rotor 13 and the adjacent sealing discs 60, 67. Such sealing of the parts may be effected by merely manipulating the thumb nut 57 until the desired sealing pressure is obtained, and the improved packing 77 for the shaft 37 and bearing 38 has proven highly effective for the purpose of preventing grit from entering the bearing surfaces of the shaft 37.

The hose 61 may also be readily connected to and disconnected from the air supply duct 59, with the aid of the clamping screw 63, thus providing a highly efficient unit in which all parts are conveniently removable and protected against rapid wear.

From the foregoing detailed description it will be apparent that my invention provides an improved concrete aggregate measuring and feeding unit which functions to automatically produce a constant uniform stream of the aggregate and which is extremely durable in structure. The assemblage while being relatively compact has enormous capacity and performs its intended function with minimum attention and with utmost reliability. The cradle support for the aggregate supply hopper 11, besides permitting rapid access to the measuring pocket structure, also enables most efficient sealing of the measuring pockets and of the air ducts, and the improved construction of the auxiliary rotor casing 26 also facilitates access to the rotor 12 and removal thereof. The provision of the renewable wear plates at the opposite ends of the main rotor 13 not only facilitates initial machining and prolongs the life of this rotor; but the annular sealing ridges of these plates are also adapted to sink into the adjacent rubber sealing discs 66, 67 when pressure is applied with the aid of the thumb nut 57, thus insuring effective sealing of the rotor 13 at all times and making it possible to readily compensate for wear. The improved packing 77 effectively protects the shaft bearing 38 against undesirable entry of grit, and the liners 82, 83 cooperate with the rubber rotor 12 to eliminate excessive wear. The tubular formation of the auxiliary rotor casing 26 with rigid flanges at its opposite ends and with the fitting 79 coacting with one of these flanges closely adjacent to the rotor 12, also makes it possible to quickly inspect this rotor and to remove the same. The improved unit has gone into highly satisfactory and successful commercial use, and has eliminated many of the slight difficulties encountered with similar mechanisms; and the assemblage may be manufactured and sold at moderate cost.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use, herein shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art; and it is also intended that specific descriptive terms used herein be given the broadest possible interpretation consistent with the rest of the invention.

I claim:

1. In a measuring and feeding device, a casing having an upright bore, a material measuring rotor revolvable within said bore, a material supply hopper for directing material toward said rotor, a resilient seal clamped between said hopper and said rotor, a cradle ring surrounding said seal externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper to permit tilting of the hopper in one direction, a block member swingably connected to said casing remote from said alined pivots to also permit tilting of said ring in said direction, and a pivot connecting said member and said ring for permitting tilting of the ring and hopper in a transverse direction.

2. In a measuring and feeding device, a casing having an upright bore, a material measuring rotor revolvable within said bore, a material supply hopper for directing material toward said rotor, a resilient seal clamped between said hopper and said rotor, a cradle ring surrounding said seal externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper to permit tilting of the hopper in one direction, a block member swingably connected to said casing remote from said alined pivots to also permit tilting of said ring in said direction, a pivot connecting said member and said ring for permitting tilting of the ring and hopper in a transverse direction, and means for varying the position of said ring to alter the clamping pressure between said hopper and said ring.

3. In a measuring and feeding device, a casing having an upright bore, a material feeding rotor revolvable within said bore, a material supply hopper for directing material toward said rotor, a resilient sealing disc clamped between the bottom of said hopper and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper to permit tilting of the hopper toward and away from the bore axis in one direction, a hinge connection between said casing and said ring remote from said alined pivots for also permitting tilting of said ring in said direction, and a pivot connecting said ring and said hinge connection for permitting tilting of the ring and hopper in a transverse direction relative to said axis.

4. In a measuring and feeding device, a casing having an upright bore, a material feeding rotor revolvable within said bore, a material supply hopper for directing material toward said rotor, a resilient sealing disc clamped between the bottom of said hopper and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper to permit tilting of the hopper toward and away from the bore axis in one direction, a hinge connection between said casing and said ring remote from said alined pivots for also permitting tilting of said ring in said direction, a pivot connecting said ring and said hinge connection for permitting tilting of the ring and hopper in a transverse direction relative to said axis, and means for swinging said ring about said connecting pivot to vary the clamping pressure between said hopper and said rotor.

5. In a measuring and feeding device, a casing having an upright bore, a material feeding rotor revolvable within said bore, a material supply hopper having a bottom provided with an opening for directing material toward said rotor, a resilient sealing disc clamped between said hopper bottom and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper bottom to permit tilting of the hopper relative to the ring in one direction, a hinge connection between said casing and said ring remote from and mid-way between said pivots for also permitting tilting of said ring in said directon, and a pivot pin connecting said ring and said hinge connection for permitting tilting of the ring and hopper in a direction at right angles to said alined pivots.

6. In a measuring and feeding device, a casing having an upright bore, a material feeding rotor revolvable within said bore, a material supply hopper having a bottom provided with an opening

for directing material toward said rotor, a resilient sealing disc clamped between said hopper bottom and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, alined pivots connecting opposite sides of said ring with said hopper bottom to permit tilting of the hopper relative to the ring in one direction, a hinge connection between said casing and said ring remote from and mid-way between said pivots for also permitting tilting of said ring in said direction, a pivot pin connecting said ring and said hinge connection for permitting tilting of the ring and hopper in a direction at right angles to said alined pivots, and adjustable means cooperating with said ring remote from said hinge connection for varying the clamping pressure acting upon said disc.

7. In a measuring and feeding device, a casing having an upright bore, a material measuring and feeding rotor revolvable within said bore, a material supply hopper having a bottom provided with an opening for directing material toward said rotor, a resilient seal clamped between said hopper bottom and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, pivots connecting the opposite sides of said ring with said hopper to permit tilting of the hopper relative to the ring in one direction, a block having a hinge connection with said casing for also permitting tilting of the block in said direction, and a pivot pin connecting said block to said ring remote from and mid-way between said pivots for permitting tilting of said ring in a direction at right angles to said pivots.

8. In a measuring and feeding device, a casing

having an upright bore, a material measuring and feeding rotor revolvable within said bore, a material supply hopper having a bottom provided with an opening for directing material toward said rotor, a resilient seal clamped between said hopper bottom and the top of said rotor, a cradle ring surrounding said disc externally of said hopper, pivots connecting the opposite sides of said ring with said hopper to permit tilting of the hopper relative to the ring in one direction, a block having a hinge connection with said casing for also permitting tilting of the block in said direction, a pivot pin connecting said block to said ring remote from and mid-way between said pivots for permitting tilting of said ring in a direction at right angles to said pivots, and adjustable means coacting with said ring and said casing remote from said block for varying the clamping pressure on said seal.

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