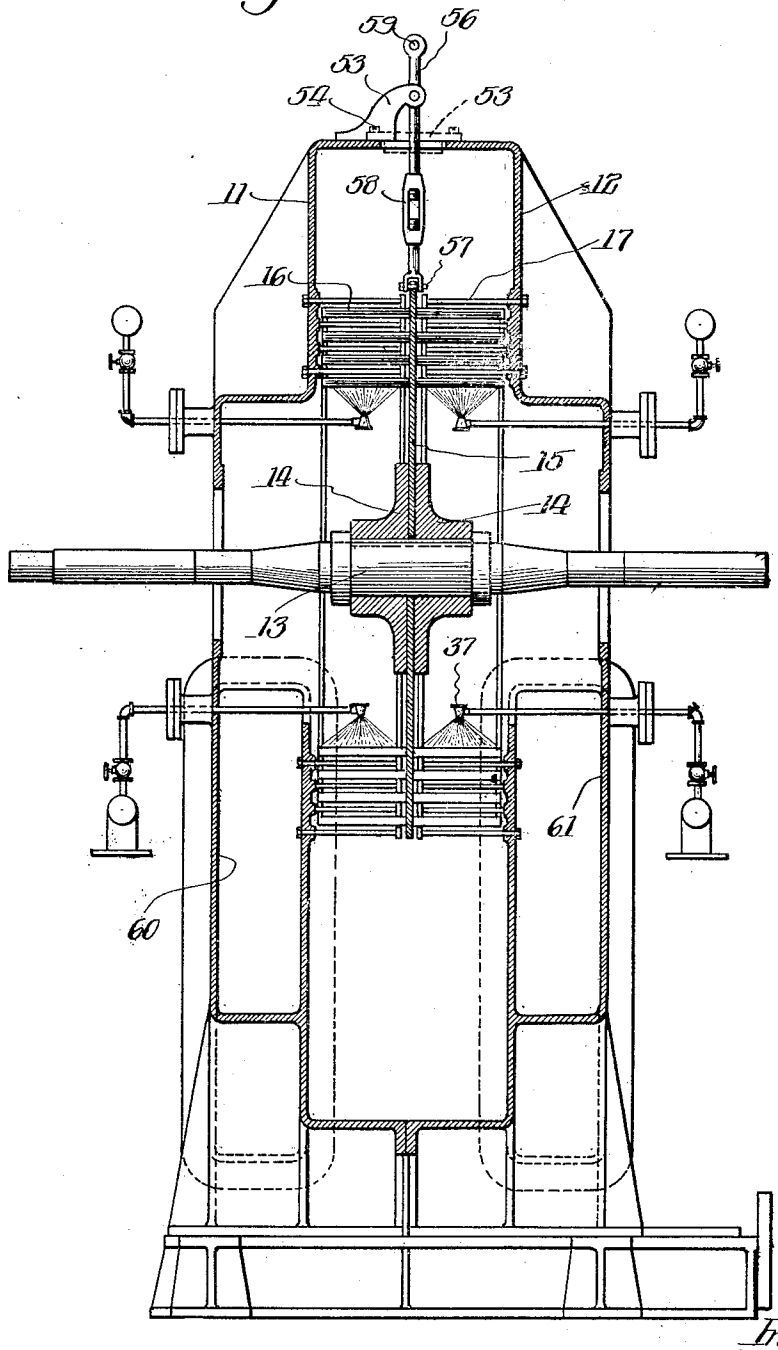
Jan. 12, 1932. H. A. BRASSERT ET AL 1,840,654

APPARATUS FOR WASHING GAS

Filed Jan. 21, 1929 3 Sheets-Sheet 1

Fig. 1.



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APPARATUS FOR WASHING GAS

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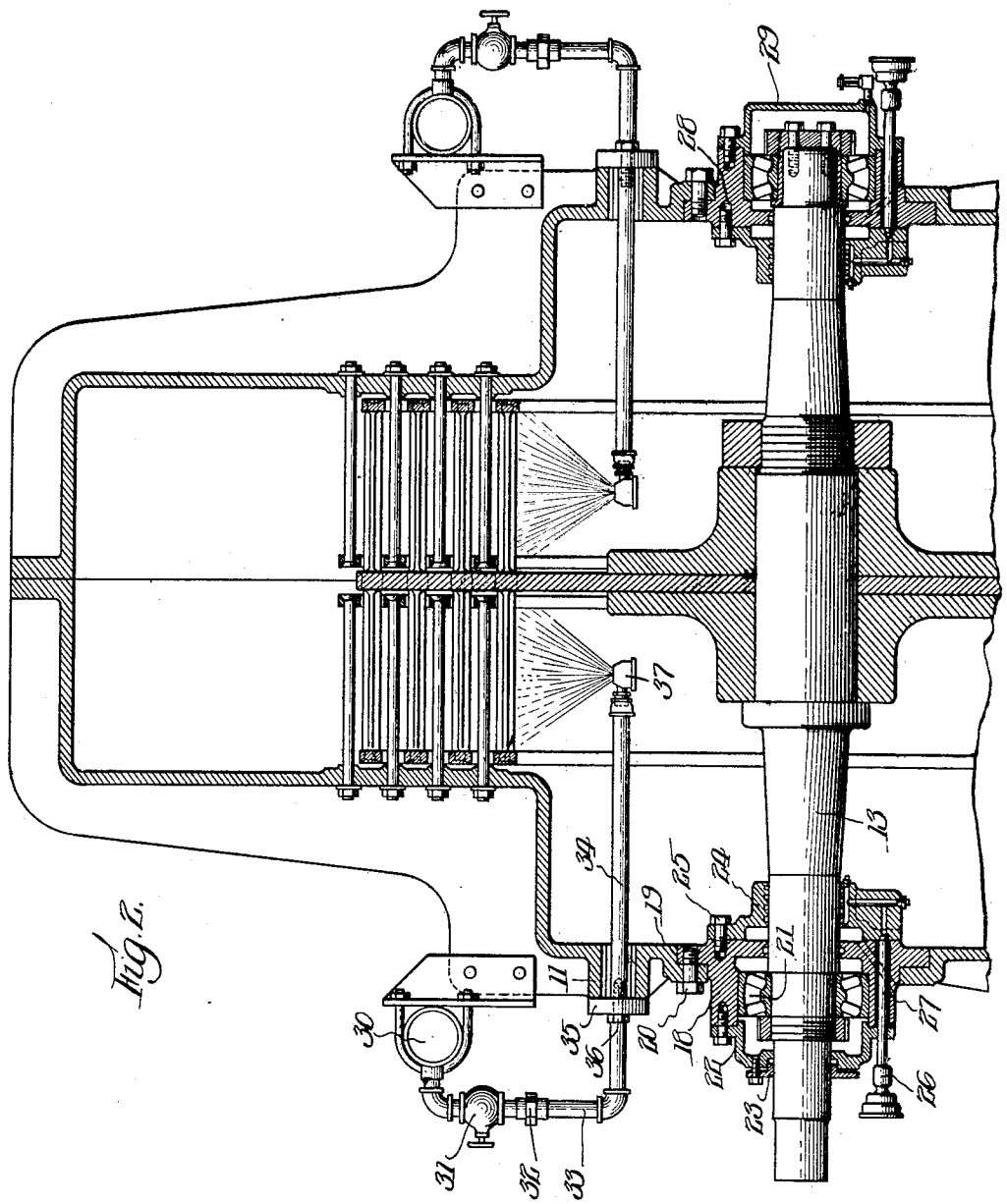


Fig. 2.

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APPARATUS FOR WASHING GAS

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Fig. 3.

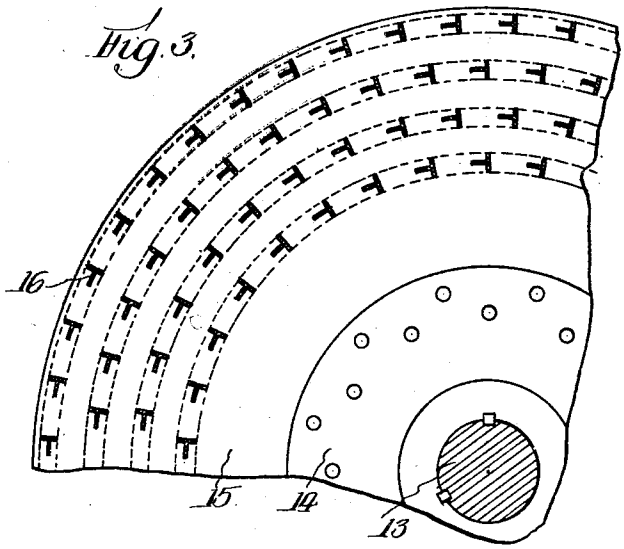


Fig. 4

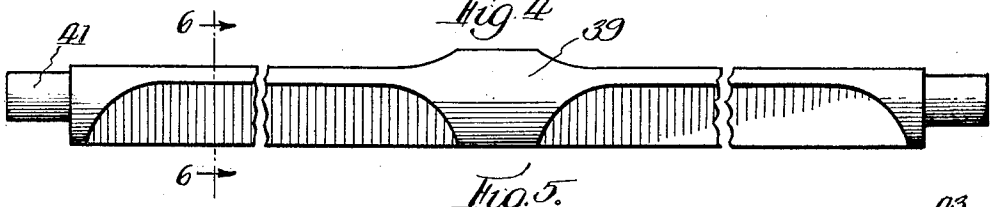


Fig. 5.

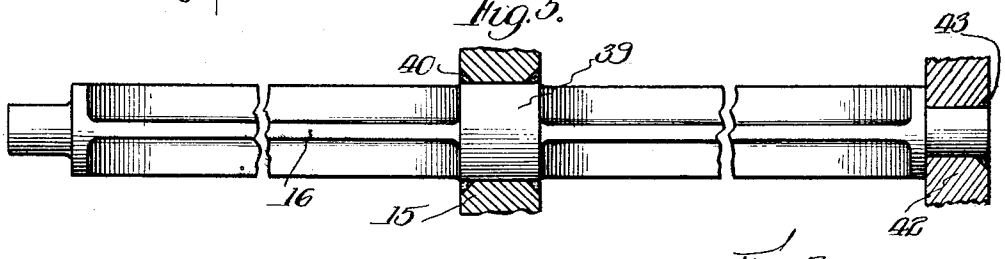


Fig. 6.

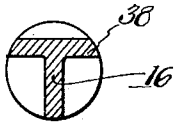
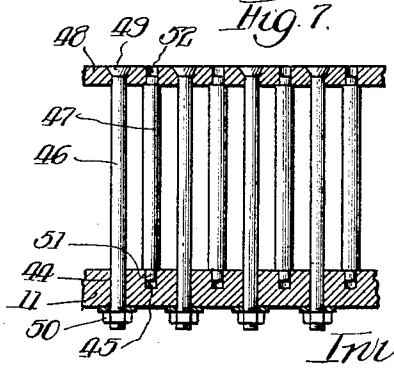


Fig. 7.



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UNITED STATES PATENT OFFICE

HERMAN A. BRASSERT AND CHARLES DOUGAN, OF CHICAGO, ILLINOIS, ASSIGNORS TO H. A. BRASSERT & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

APPARATUS FOR WASHING GAS

Application filed January 21, 1929. Serial No. 333,760.

This invention relates to a new and improved apparatus for the washing of gas, and more particularly to an apparatus or machine of the disintegrating type in which the gas travels outwardly from the center and is required to pass between alternate rows of rotating or fixed and rotating bars or similar elements, while at the same time the gas is sprayed with water.

In machines of this character the thorough cleaning of the gas requires that every particle of dust contained in the gas shall come in intimate contact with the water and become entrained therein and thereby removed from the gas. In order to accomplish this result it is essential that the water be in as fine a state of division as possible and that the gas be thoroughly agitated so as to bring it in intimate contact with the finely divided water. The function of the stationary and rotating bars is to produce a thorough mixture of the gas and water through mechanical agitation. In order that the gas may be thoroughly and uniformly treated with the water, it is necessary that all parts of the stationary and rotating bars should be substantially uniformly wet by the incoming water.

In this type of apparatus the gas to be treated is introduced in a generally axial direction into the housing and passes out through the stationary and rotating bars or blades in an approximately radial direction. The gas, therefore, changes direction in the casing of the apparatus. With various types of disintegrators as heretofore used, the gas has come in contact with the water spray while moving in an axial direction, which has tended to deflect the spray and prevent the proper uniform wetting of the bars. In the present construction we have so located our sprays as to introduce the water at a point where the gas flow is generally radial rather than axial, and have so located and proportioned the sprays as to substantially uniformly wet the bars.

We have found that the design of the bars, particularly the rotating bars, is highly important both with regard to the efficiency of the cleaning and to the power required to operate the apparatus. We have developed a form of bar which is provided with a substantially flat radially extending forward surface which advances between the series of fixed bars with a comparatively small clearance. It has been found undesirable to have the rotating bars extend a material distance circumferentially adjacent the fixed bars or with small clearances between the rotating and fixed bars. A flat radially extending bar, however, is not of sufficient strength to withstand the stresses due to the rotation and pressure of the gas and water.

We have developed a T-shaped form of bar in which the cross of the T extends radially and the leg of the T extends circumferentially. In the preferred form of construction this T section is milled or otherwise formed from a bar which is circular in cross section so that the edges of the advancing face are rounded in a curve to the rear upon an arc of a circle. These bars are mounted upon a central disc carried by the rotating shaft and to facilitate assembly and form a rigid structure the bars are preferably left circular in cross section at the point where they pass through and are secured to the rotating disc. The outer ends of the bars are preferably fastened to circular bracing members which give rigidity to the structure.

While the preferred form of bar construction is in the shape of a T in cross section, the important feature of our design is that the minimum clearance between the rotating and stationary bars is substantially at the line of the advancing face and that the clearance increases at other points along the circumferential length of the rotating member. This clearance is preferably increased by decreasing the radial cross sectional dimensions symmetrically about the circumferential line passing through the center of the advancing face. We have found in the operation of our apparatus that by increasing the length or radial dimension of the advancing faces beyond that necessary for cleaning the gas, we can impart a pressure to the gas and pass it through the cleaning apparatus without the necessity for the use of separate fans such as

are required with other forms of mechanical gas washers.

It is necessary periodically to open up the casing of a gas washer of this type for the purpose of cleaning the interior and of making adjustments and repairs. Since the bars carried by the rotor are intermeshed with the fixed bars carried by the shell, it is necessary to move one-half of the shell laterally for a considerable distance so that the intermeshing parts may clear each other, and then to remove the rotor it must in turn be moved laterally from the fixed portion of the shell and its supported bars.

We have provided a construction in which means are provided for temporarily separating the rotor from the fixed shell portion so that the lateral movable shell portion may be moved laterally clear of the rotor without leaving the rotor supported merely by the bearing at the fixed end. We have also provided removable bearings which are secured in place upon the inner faces of the shell members and may be removed laterally from the shell members with the rotor.

In order to provide a more rigid construction of the bars, we have designed a method of securing the bars in place upon the supporting parts whereby certain of the bars are held in tension and other of the bars are held in compression by the tension of the first mentioned bars. This results in a much more rigid structure than is obtainable by merely individually securing the bars in place.

It is an object of the present invention to provide a new and improved gas washer and more particularly a washer of the disintegrator type.

It is also an object to provide a construction in which the rotating bars provide a minimum clearance with the fixed bars substantially in the plane of their advancing faces, the clearance increasing rearwardly from the advancing faces.

It is also an object to provide a disintegrator which may be operated without the necessity for additional blowers or other gas moving means.

It is also an object to provide a gas washer which is so designed as to facilitate assembly and removal of parts for repair or adjustment.

Other and further objects will appear as the description proceeds.

We have illustrated certain preferred embodiments of our invention in the accompanying drawings, in which—

Figure 1 is a vertical section taken on an axial plane of our improved gas washer, with certain parts left out for the sake of clearness;

Figure 2 is a fragmentary view on an enlarged scale of a construction generally similar to that shown in Figure 1;

Figure 3 is a fragmentary section of the rotor construction taken upon a plane perpendicular to the plane of Figures 1 and 2;

Figure 4 is a plan view on an enlarged scale of one of the rotor bars;

Figure 5 is a view similar to Figure 4 but showing the bar as seen from the rear and indicating the method of assembling the bar in the rotor;

Figure 6 is a transverse section of the bar of Figure 4 taken on line 6—6; and

Figure 7 is a fragmentary section showing a method of assembling the stationary bars.

Referring first to the forms of construction shown in Figures 1 and 2, the disintegrator shell or casing is formed of a pair of members 11 and 12, of which, for the purpose of the present discussion, section 11 will be considered the stationary section and section 12 the movable section. The rotor consists of the shaft 13, the flanges 14 and the central disc 15 which supports the bars 16. The fixed bars 17 are secured to the casing members in a manner shown in detail in Figure 7, which will be discussed hereafter.

Referring now particularly to Figure 2, the main bearing member 18 is fitted in a shoulder 19 in the member 11 and is held in place by a plurality of bolts 20. This member 18 carries a roller bearing 21 and an outer closure member 22 having a cover 23. The inner side of the member 18 is additionally closed by a gland 24 held in place by bolts 25. An oil cup 26 and oil passages 27 are provided for lubricating the bearing.

It will be apparent from the relation of the main bearing member 18 to the shoulder 19 in the shell member 11, that by removing the bolts 20 the entire bearing assembly may be moved inwardly of the shell with the rotor and rotor shaft. The left end of the shaft 13, as shown in Figure 2, may be supplied with power through any desired means. The right end of the shaft 13 is provided with a bearing assembly 28 which is generally similar to that just described, with the exception that the shaft does not pass through the bearing which is closed with an imperforate cover 29.

The header 30 is provided for the supply of water to the several nozzles in the disintegrator. This water passes through a valve 31 controlling each individual nozzle. The valve is connected through coupling 32 to the pipe section 33 which in turn is connected to the spray pipe section 34 which projects into the disintegrator parallel to the axis of the shaft 13. Each of these pipes 34 is carried upon an individual supporting closure member 35 held in place by bolts 36. The nozzles 37 are carried upon the inner ends of the pipes 34. With the form of construction shown, by closing the control valve 31 and disconnecting the coupling 32 to any individual spray nozzle, that nozzle may be removed with its closure 35 by removing the

bolts 36. The nozzles may thus be removed individually for adjustment or repair without affecting other parts of the installation.

Referring now to Figure 3 it will be apparent that the rotating bars 16 are generally T-shaped in cross section and that they are so placed that the cross or top of the T is arranged substantially radially of the supporting disc 15. These bars are shown in detail in Figures 4, 5 and 6, and it will be apparent from Figure 6 that the bar 16 is formed in the shape of a T inscribed within a circle so that the ends 38 of the T's are rounded upon the arc of a circle. These bars 16 are preferably formed by milling or similar operation, from bars which are circular in cross section.

Referring particularly to Figures 4 and 5, the central portions 39 of the bars are left in their full circular cross section so as to fit in circular holes drilled through the central disc 15. As shown in Figure 5 at 40, these bars may be secured in the disc 15 by welding. The ends of the bars are reduced at 41 to fit into the bracing rings 42, as shown in Figure 5, and here again the welding has been indicated at 43. It will be understood that the rings 42 are in the form of comparatively narrow circular rings which pass around the ends of a series of bars and are located between adjacent series of stationary bars.

The stationary bars may be secured in place as shown in detail in Figure 7. The shell 11 is provided with alternate holes 44 and recesses 45 to receive long bars 46 and short bars 47. The long bars 46 are placed through the bracing rings 48 and may be welded thereto or merely held in place by an enlarged head 49. These bars 46 pass through the openings 44 and have nuts 50 upon their outer ends to secure them in place in the casing. The shorter bars 47 are provided with reduced ends 51 fitting in the recesses 45, and similar reduced ends upon their opposite ends fitting in the perforations 52 in the ring 48. It will be apparent from a consideration of this assembly as shown in Figure 7, that the bars 46 will be put under tension by tightening up the nuts 50 and that this tension will impart a compressive stress to the bars 47 so that the whole assembly will be held rigidly in place. It will be understood that it is not essential that alternate bars be in compression and tension and more or less of either type of bars may be inserted as desired.

Referring now to Figure 1, the casings 11 and 12 are provided with a hand hole 53 which extends across the line of junction of the two shell members and is secured in place by bolts 54. Adjacent this hand hole is located the bracket 55 which is adapted to support the link 56 which in turn is connected by pin 57 to the rotor disc 15. The rotor disc may be provided with a plurality of holes in its periphery for the reception of the pin 57. These holes will be spaced uniformly about the periphery of the disc so as to maintain it in balance. Link 56 is provided with a turnbuckle 58 for adjustment, so that the pin may be properly fitted in the opening.

It will be understood that this pin and link are only inserted when it is desired to disassemble the disintegrator by lateral removal of the shell member 12. By means of this link the rotor will be supported so that the shell member 12 may have the bearing assembly 28, as shown in Figure 2, disconnected from the shell and the shell may be removed laterally without throwing the whole weight of the rotor upon the left hand bearing. The upper end of the link 56 is provided with a pin hole 59 by means of which it may be connected to a hoist or crane, in which event the link may be disconnected from the bracket 55 and the rotor moved laterally to clear the fixed shell portion 11 and the rotor may then be moved as desired.

In the operation of our improved disintegrator, it will be understood that the gas to be treated will be introduced through the intake passages 60 and 61 formed in the lower portions of the shell members 11 and 12, as shown in Figure 1. The gases then pass in substantially parallel to the axis of the rotor shaft 13 and then are passed outwardly approximately radially through the intermeshing bars 16 and 17. It will be apparent that at the point of location of the spray nozzles 37, the gas will have turned and be passing in a substantially radial direction. The gas flow will therefore not tend to materially deflect the cones of spray from the nozzles 37. The size of the cones of spray and the locations of the nozzles are so related that the cones overlap in such manner that substantially the entire extent of the bars, both circumferentially and axially, are constantly subjected to a spray of water.

The rotating bars 16, by their design and construction act in the nature of a fan and serve to drive the gas through the intermeshed bars and to force it outwardly from the series of bars. Due to the small clearance between the advancing faces of the moving bars and the fixed bars, the gas is thoroughly agitated and the water finely divided so that the gas is brought intimately in contact with the water. This results in a very thorough cleaning.

Our construction is relatively simple in design and is adapted for ready removal and repair of any parts thereof. The nozzles may be removed and repaired independently and without interfering with the operation of the apparatus. Means are provided where the entire assembly may be dismantled efficiently and without undue delay when such an action is required.

While we have shown certain preferred embodiments of our invention, these are to be

understood to be illustrative only, as we contemplate such changes and modifications to meet varying conditions as may come within the spirit and scope of the appended claims.

We claim:

1. In a disintegrator or the like, spaced fixed bars, movable bars adapted to pass between the fixed bars, said movable bars being so designed as to have a minimum clearance from the fixed bars between which they pass substantially in the plane of the advancing face of the movable bars, said clearance being greater from both sets of fixed bars in planes in the rear of said face.

2. In a disintegrator or the like, spaced fixed bars, movable bars adapted to pass between the fixed bars, said movable bars being so designed as to have a minimum clearance from the fixed bars substantially in the plane of the advancing face of the movable bars, the radial dimension of the movable bars being decreased substantially symmetrically of a plane passing midway between the top and bottom edges of the advancing face of the bars.

3. In a disintegrator or the like, spaced fixed bars, movable bars adapted to pass between the fixed bars, the movable bars being T-shaped in cross section.

4. In a disintegrator or the like, spaced fixed bars, movable bars adapted to pass between the fixed bars, the movable bars being T-shaped in cross section, the top of the T constituting the advancing face of the movable bars.

5. In a disintegrator or the like, spaced fixed bars in arcuate formation, movable bars carried by a rotor and adapted to pass between the series of fixed bars, said movable bars being T-shaped in cross section, the cross of the T extending substantially radially and constituting the advancing face of the movable bars.

6. In a disintegrator or the like, spaced fixed bars and movable bars adapted to pass between series of fixed bars, said movable bars having the cross section of a T inscribed within a circle, the edges of the cross of the T being formed upon circular arcs.

7. A rotor for a disintegrator or the like comprising a central circular diaphragm, circumferential series of bars extending through the diaphragm, said bars being circular in cross section at their portions in engagement with the diaphragm and T-shaped in cross section at points spaced from the diaphragm.

8. A rotor for a disintegrator or the like comprising a central circular diaphragm, circumferential series of bars extending through the diaphragm, said bars being circular in cross section at their portions in engagement with the diaphragm and T-shaped in cross section at points spaced from the diaphragm, the T-shaped portions being located with the crosses of the T extending substantially radially.

9. A rotor for a disintegrator or the like comprising a central circular diaphragm, circumferential series of bars extending through the diaphragm, said bars being circular in cross section at their portions in engagement with the diaphragm and T-shaped in cross section at points spaced from the diaphragm, and continuous rings joining the outer ends of the series of bars.

10. A rotor for a disintegrator or the like comprising a central circular diaphragm, circumferential series of bars extending through the diaphragm, said bars being circular in cross section at their portions in engagement with the diaphragm and T-shaped in cross section at points spaced from the diaphragm, and continuous rings joining the outer ends of the series of bars, the ends of the bars being reduced and extending into the rings.

11. In a disintegrator or the like, a casing, a circular series of fixed bars extending inward of the casing, a ring joining the inner ends of the bars, certain of the bars having bearings in the casing and having reduced portions fitting into the ring, and other of the bars having enlargements bearing upon the inner portion of the ring and the outer portion of the casing.

12. In a disintegrator or the like, a casing, a circular series of fixed bars extending inward of the casing, a ring joining the inner ends of the bars, certain of the bars having bearings in the casing and having reduced portions fitting into the ring, and other bars having enlarged portions bearing on the inner face of the ring and extending through the casing and having nuts threaded on their outer ends.

13. In a disintegrator or the like, a casing, a circular series of fixed bars extending inward of the casing, a ring joining the inner ends of the bars, certain of the bars having bearings in the casing and having reduced portions fitting into the ring, and other bars having enlarged ends countersunk in the inner face of the ring and extending through the casing and having nuts threaded on their outer ends and bearing against the outer face of the casing.

Signed at Chicago, Illinois, this 19th day of January, 1929.

HERMAN A. BRASSERT.
CHARLES DOUGAN.