Aug. 19, 1941. C. A. SCHNEIDER 2,253,098

ROTARY KILN OR DRIER

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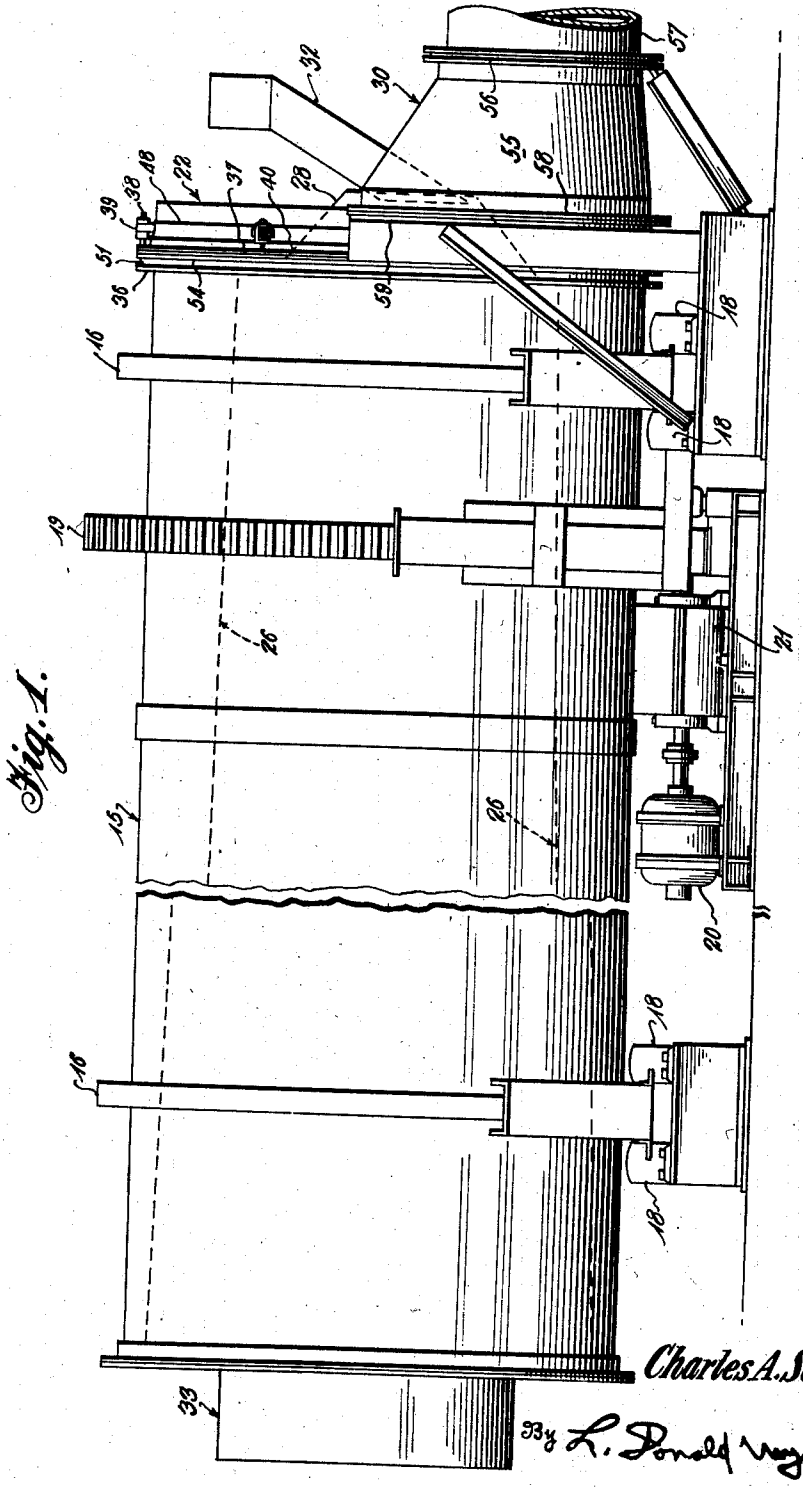


Fig. 1.

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Fig. 2.

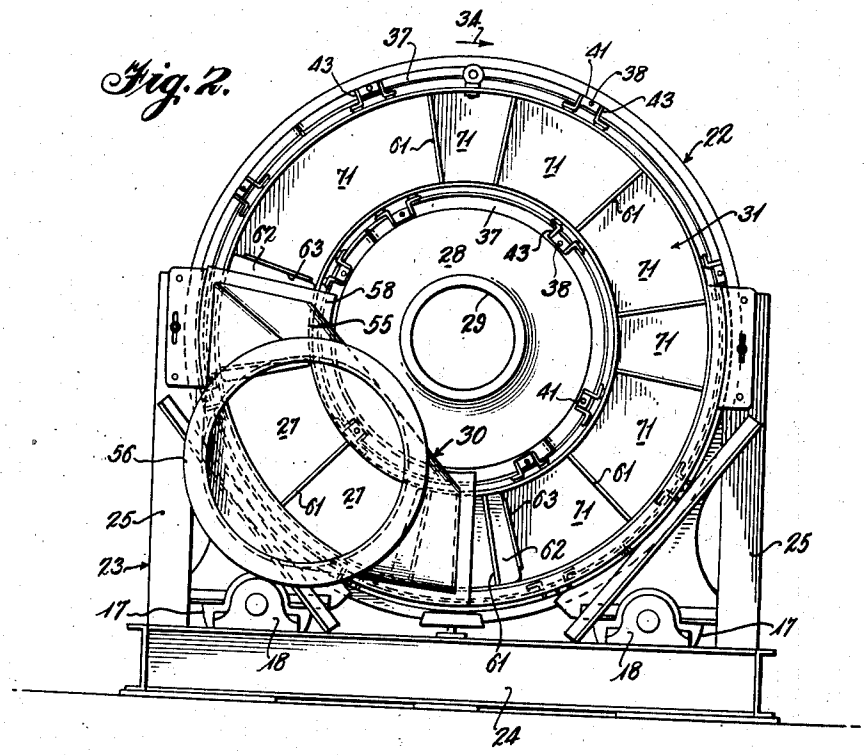
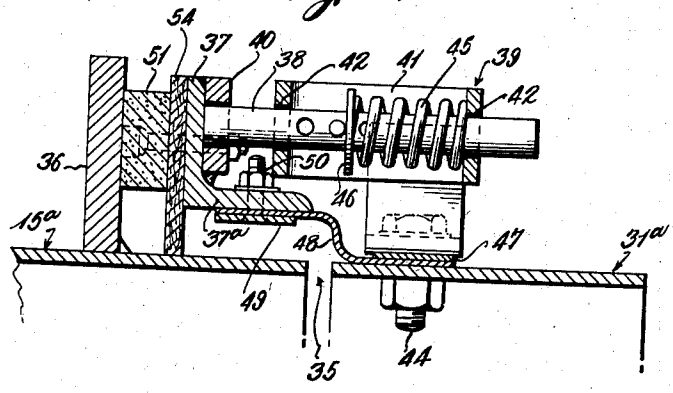


Fig. 5.



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ROTARY KILN OR DRIER

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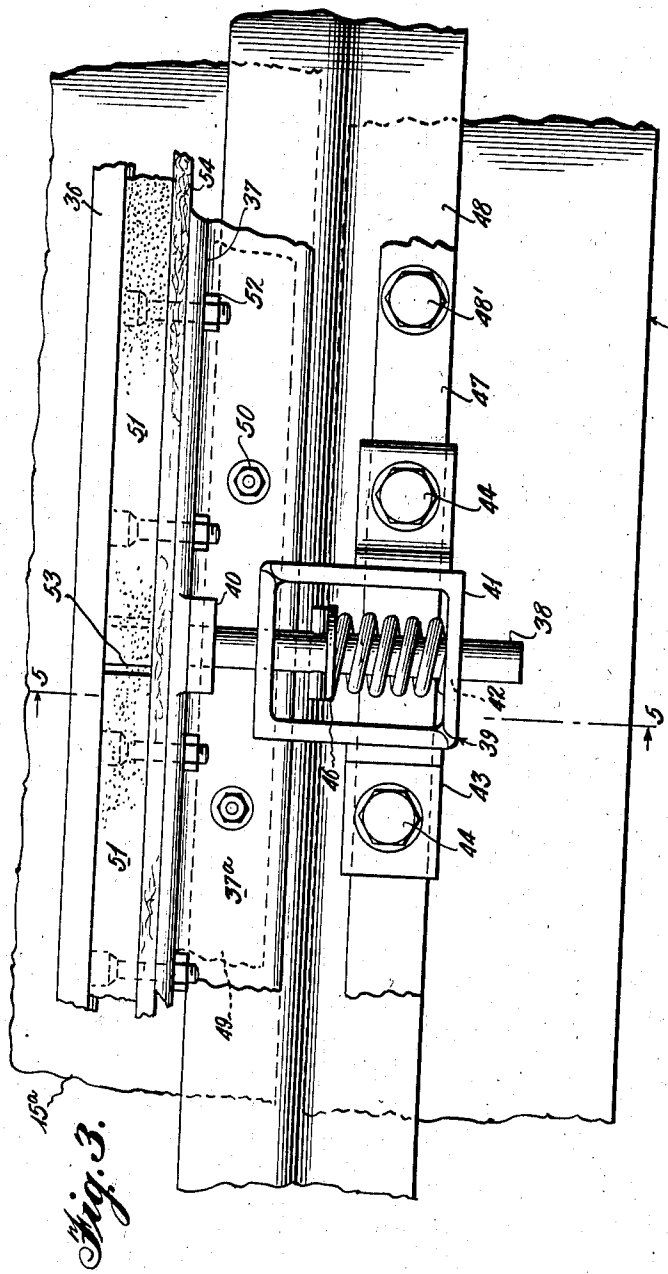


Fig. 3.

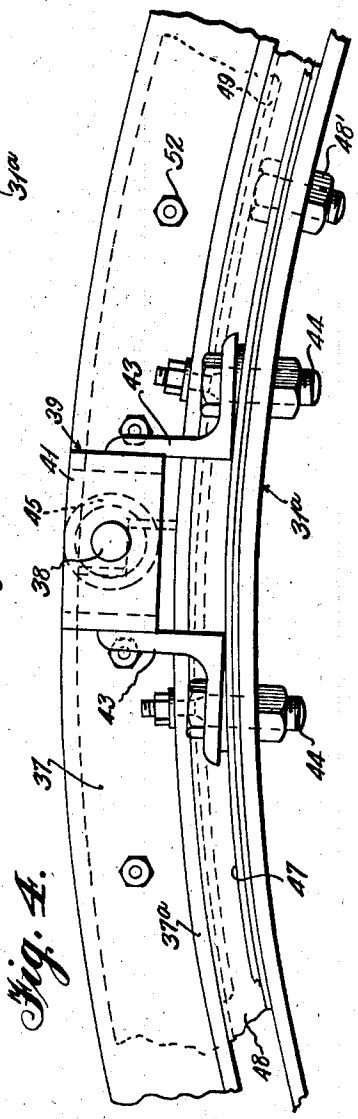


Fig. 4.

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ROTARY KILN OR DRIER

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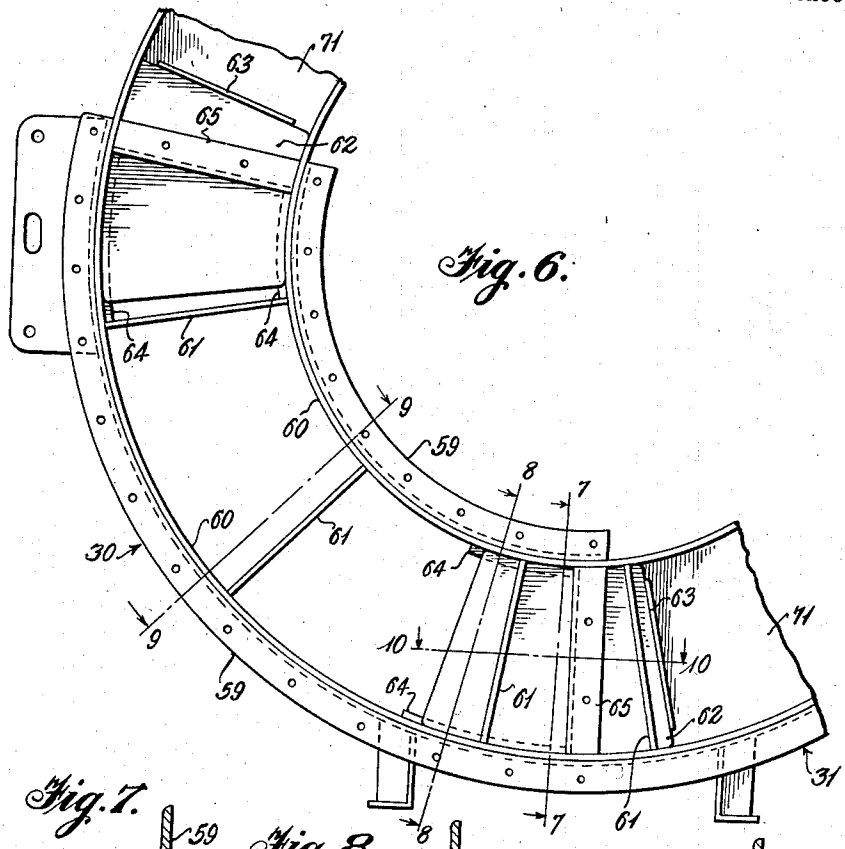


Fig. 6.

Fig. 7.

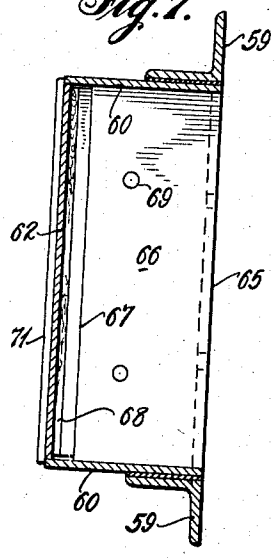


Fig. 8.

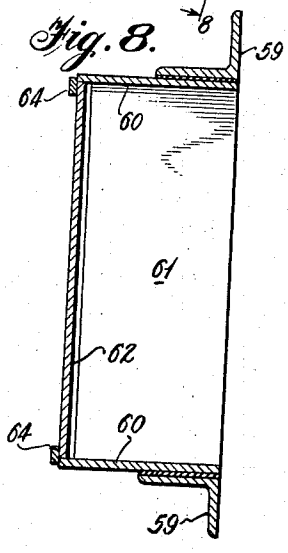
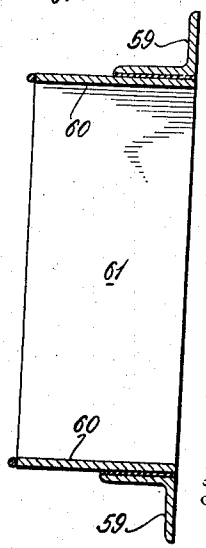


Fig. 9.



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ROTARY KILN OR DRIER

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Fig. 12.

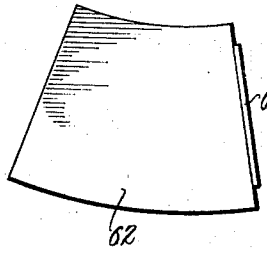


Fig. 10.

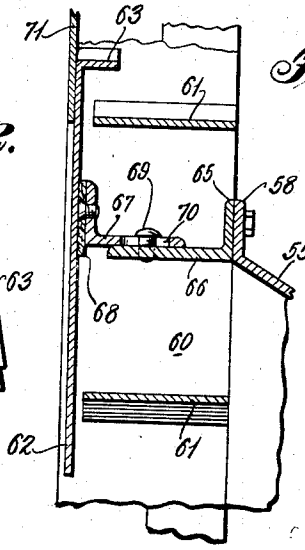


Fig. 11.

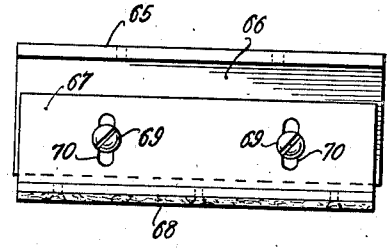
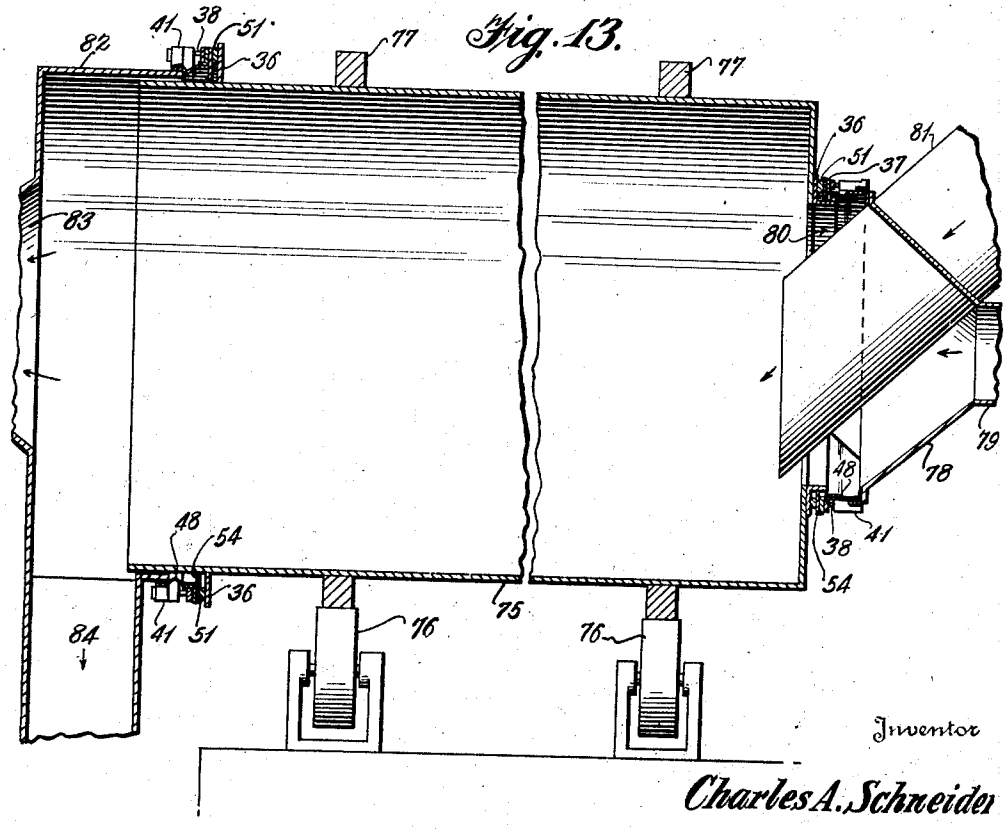


Fig. 13.



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Patented Aug. 19, 1941 2,253,098

UNITED STATES PATENT OFFICE

2,253,098

ROTARY KILN OR DRIER

Charles A. Schneider, Tinley Park, Ill., assignor to Link-Belt Company, a corporation of Illinois

Application August 3, 1940, Serial No. 351,011

12 Claims. (Cl. 263—32)

This invention relates to new and useful improvements in rotary kilns, driers, furnaces, cylinders, or the like, and deals more particularly with means for effecting proper delivery of the hot gases from stationary sources of supply to the desired portions or zones of the rotating shell portions of said devices without any leakage occurring between these relatively movable parts.

In all kilns, driers, furnaces, cylinders, or the like, where hot gases of one kind or another must be circulated through the rotating shells to effect the desired processing of the materials being treated, the problem of effecting delivery of the hot gases to the desired portions or zones of the rotating shells from the necessarily stationary sources of supply without leakage to the surrounding atmosphere and/or to other portions or zones of the shells always has been troublesome. This is particularly true where the rotating shells are of special design which are intended to provide very accurately controlled temperature conditions in different portions of the shells and with the temperatures in said portions falling within rather narrow ranges. Any loss of hot gases to the surrounding atmosphere or any leakage which causes improper circulation of the gases will materially lower the efficiency of the apparatus and will render difficult any attempts to maintain accurate control over operating temperature conditions.

It is a primary object of this invention to provide means for effecting accurate delivery of hot gases from stationary sources of supply to well defined portions or zones of rotating shells of kilns, driers, furnaces, cylinders, or the like, without any loss of the gases to the surrounding atmosphere and/or to undesired portions or zones of the shells.

A further important object of the invention is to provide extremely efficient sealing means for preventing the escape of hot gases through the joints between stationary heads and rotating shells of kilns, driers, furnaces, cylinders, or the like.

A still further important object of the invention is to provide an improved form of sealing means which will operate to prevent leakage between relatively rotating parts.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same—

Figure 1 is a side elevational view of a drier or kiln with the hot gas delivering and sealing means embodying this invention properly applied thereto,

Figure 2 is an end elevational view of the apparatus disclosed in Fig. 1,

Figure 3 is a fragmentary top plan view of the hot gas loss preventing or sealing means embodying this invention,

Figure 4 is a detail elevational view of the sealing means disclosed in Fig. 3,

Figure 5 is a transverse sectional view taken on line 5—5 of Fig. 3,

Figure 6 is a detail, enlarged view of the hot gas delivering ring by means of which hot air or other heating mediums may be delivered to well defined portions or zones of a rotating drier shell,

Figure 7 is a detail vertical sectional view taken on line 7—7 of Fig. 6,

Figure 8 is a detail vertical sectional view taken on line 8—8 of Fig. 6,

Figure 9 is a view similar to Figs. 7 and 8 but taken on line 9—9 of Fig. 6,

Figure 10 is a detail horizontal sectional view taken on line 10—10 of Fig. 6,

Figure 11 is a fragmentary side elevational view of the mechanism shown in Fig. 10,

Figure 12 is a detail elevational view showing a form of damper plate which is employed in the distributing ring mechanism of Fig. 6, and

Figure 13 is a side elevational view of a different type of kiln, drier, furnace, cylinder, or the like, from that shown in Fig. 1 and illustrates the sealing means embodying this invention applied to both the feed and discharge ends of the rotating shell.

In the drawings, wherein for the purpose of illustration are shown the preferred embodiments of this invention, it first will be noted that for the purpose of illustrating the wide range or field of usefulness of the structure embodying this invention, two radically different types of kilns, driers, furnaces, or the like, have been illustrated with the hot gas delivering and sealing means applied thereto. Figs. 1 to 12, inclusive, disclose the invention as applied to a rotary furnace or drier of the type covered by the patent to Gustav Bojner et al., 1,709,456, issued April 16, 1929. With this type of furnace or drier, the loss of hot gases to the surrounding atmosphere or the dissipation of hot gases to undesired portions of the shell materially

lowers the efficiency of the device. In Fig. 13 there is disclosed a more common form of kiln or drier with the invention applied thereto. With this type of apparatus, prevention of the loss of hot gases to the surrounding atmosphere at both the feed and discharge ends of the shell is essential. It will be noted at this point, also, that while the apparatus embodying this invention so far has been and throughout the remainder of the description will be referred to in connection with the delivery and control of hot gases, the apparatus is just as applicable to the delivery and control of low temperature gases when it is desired to perform a cooling operation on the material being treated.

In the aforementioned patent to Bojner et al., there is disclosed the rotating shell of a furnace or drier which is of cylindrical formation and is adapted to rotate about a substantially horizontal axis, or one which is inclined to the horizontal slightly to assist in axial movement of the materials being treated. Arranged around the inner surface of the shell is a circular series of hot air chambers which extend longitudinally of the shell. In the commercial embodiment of this invention, these hot air chambers are longitudinally tapered from the feed end to the discharge end of the shell with the larger ends of the chambers arranged at the feed end. The chambers are formed by radially inwardly directed louvres to the inner, longitudinal edge portions of which are attached tangentially arranged louvres. These tangentially arranged louvres extend circumferentially of the interior of the shell in the direction opposite to the direction of rotation of the shell. The various sets of radial and tangential louvres are maintained out of contact with each other to provide air discharge slots or openings which extend longitudinally of the shell and through which the hot air or other gases are permitted to escape so as to permeate up through the bed of material being treated within the shell. The hot gases are delivered to the larger ends of the chambers, at the feed end of the kiln or furnace, and the delivery of hot gases must be so controlled that it will only enter the receiving ends of the chambers which have their discharge slots or openings underlying the bed of material. It is important that these hot gases be delivered only to the chambers underlying the bed of material and that the hot gases not be permitted to enter any of the chambers which do not underlie the bed of material. Such improper delivery of hot gases will short circuit the intended circulation of the heating medium. These improperly delivered, or short circuited gases would find their way directly to the point of discharge for the exhaust gases without permeating up through the bed of material with the result that the apparatus would operate inefficiently and the desired temperature control would be destroyed.

Referring first to Figs. 1 and 2, the reference character **15** designates in its entirety the rotating shell of this form of kiln or furnace. This shell is supported for rotation by the tires or rings **16** which are adapted to engage suitable supporting rolls **17**, see Fig. 2, carried by appropriate anti-friction bearings **18**. A suitable driving gear **19** extends around the shell **15** and meshes with a drive pinion, not shown, which is driven by the motor **20** through the speed reducer unit **21** in the conventional manner.

At the right of Fig. 1 and in Fig. 2 there is disclosed a stationary head which is designated in its entirety by the reference character **22**. This stationary head is vertically adjustably supported by a suitable frame **23** which includes the base portion **24** and the upstanding side supports **25**.

In Fig. 1, the location of the longitudinally tapered chambers for the hot gases is illustrated. These chambers are arranged between the louvres, which are represented by the dash lines **26**, and the internal surface of the shell **15**. Fig. 2 discloses two of the ports or receiving ends **27** of these these chambers. Ports of this character extend entirely around the interior of the shell. Radially inwardly of these ports **27**, the feed end of the shell, that is, the large central chamber portion of the shell which receives the material to be treated, is closed by the disc **28** that is provided with a material inlet opening **29**.

A hot gas inlet manifold **30** is suitably bolted to the face flanges of a distributing ring **31** which is best illustrated in Figs. 2 and 6.

The material to be treated is delivered through a suitable feed hopper or chute **32** into the opening **29** formed in the feed disc **28**, see Fig. 2. After the material has been properly treated, it is discharged through the end portion **33** of the device. The exhaust gases, after being circulated through appropriate hot gas chambers and up through the bed of material, are withdrawn from the material receiving bore of the kiln or drier through a suitable exhaust duct which may be arranged at either end of the shell, as desired.

As the shell rotates in the direction of the arrow line **34** in Fig. 2, the material being treated is carried part way up one side of the bore of the shell and to properly deliver the hot gases to the chambers which underlie the material, it is necessary to locate the hot gas manifold **30** over the lower left-hand sector of the distributing ring **31**. To prevent these hot gases from escaping to the atmosphere and from being short circuited into other hot gas receiving chambers of the shell, which are not located beneath the bed of the material, it is necessary to seal the joints between the feed end of the shell and the inner and outer peripheries of the distributing ring **31** and, additionally, to seal between the ends or radially extending limits of the hot gas inlet manifold **30** and the distributing ring **31**. These leak preventing or sealing structures are shown in detail in Figs. 2 to 6, inclusive, 10, and 11.

Figs. 2 to 5, inclusive, first will be referred to, as these figures disclose the means employed for sealing between the inner and outer edges of the distributing ring **31** and the feed end of the shell. In Figs. 3 and 5, the peripheral wall **15a** of the shell **15** is illustrated as being aligned with a peripheral wall **31a** of the distributing ring **31**. A gap **35** naturally will exist between the edges of these two wall members, and it is necessary to seal this gap to prevent leakage of the hot gases. The peripheral shell wall **15a** has secured thereto an upstanding ring **36** which may be divided into two or more sections to facilitate its application to the shell. This ring may be welded or otherwise secured to the exterior surface of the shell at a suitable distance from its adjacent edge.

Operatively associated with this shell ring **36** is a second ring **37** which is of angle iron shape in section, see particularly Fig. 5. This angle iron ring **37**, also, may be divided into two or more sections to facilitate its application. This angle ring **37** is supported at suitably spaced intervals around the distributing ring **31** by pins **38** which are axially adjustably supported by brackets **39**

which are attached to the wall 31a of the distributing ring 31. The ring end of each pin 38 is connected to the ring by the attachment member 40. The bracket is clearly illustrated in Figs. 3 to 5, inclusive, as including a box portion 41 having pin receiving openings 42 formed in its opposite walls. This box 41 is provided with mounting lugs 43, the base branches of which are secured to the distributor ring wall 31a by means of nuts and bolts 44. It is desirable to have the angle ring 37 spring pressed toward the shell ring 36 and for this reason each pin 38 has threaded thereon a spring 45 which bears at one end against a wall of the box 41 and at its other end against a washer 46 which is suitably attached to the pin 38 to prevent its movement axially of this pin.

Extending circumferentially around the distributor ring wall 31a, in radial alignment with all of the mounting brackets 43 of the several spring pressed pins is a metallic band 47. This band is held in place by the bolts and nuts 44 of the several pairs of mounting brackets 43 and by any suitable number of additional bolts and nuts 48'. Interposed between the outer surface of the ring wall 31a and the inner surface of this band 47 is a gas-tight, flexible sealing band 48. This sealing band extends entirely around the distributing ring wall 31a but, for convenience in handling, it may be made in two or more sections. This sealing band may be made of any desired material but fibreglass is recommended. The width of this sealing band should be sufficient to enable its free edge portion to be attached to the base flange 37a of the angle ring 37 by means of the metallic band 49 and a suitable number of securing devices 50. It will be appreciated that this flexible sealing band 48 will effectively seal the base flange 37a of the angle ring 37 to the distributing ring wall 31a.

To complete the sealing of the gap 35, it now is necessary to effect a seal between the two rings 36 and 37. This type of seal is obtained by two different means. One of these means consists of a ring formed of graphite blocks 51 which are mounted on the angle ring 37 by means of bolts and nuts 52. Figs. 3 and 4 disclose the adjacent ends of these graphite blocks 51 as having half-together joints 53 formed therein. These lapped joints will prevent leakage of gas between the ends of the blocks. As these graphite blocks are rather fragile and easily broken, an asbestos liner ring 54 is interposed between the ring formed by the graphite blocks 51 and the adjacent face of the angle ring 37. This asbestos liner ring 54 may be made of two or more sections to facilitate its application. Fig. 5 discloses the inner edge of this asbestos liner ring 54 as engaging the peripheral surface of the shell wall 15a. When this asbestos liner ring is made of proper dimensions to cause this type of engagement, an additional seal is obtained between the angle ring 37 and the shell wall 15a. In other words, this asbestos ring sealing action supplements the sealing accomplished by the graphite blocks 51. Of course, if the blocks 51 are made of less fragile material than graphite, they may be mounted directly on the angle ring 37 without any interposed asbestos ring 54 and in such a case this asbestos ring will be omitted.

The sealing means described in detail in connection with Figs. 3 to 5, inclusive, happens to be the means employed for sealing between the outer wall of the distributing ring 31 and the outer wall of the shell 15. Fig. 2 discloses a duplicate of this sealing means for effecting sealing between the inner edge portion of the distributing ring 31 and the opposed face of the disc 28 which closes the feed end of the material receiving chamber with the exception of the material admitting opening 29. This inner sealing means need not be described in detail as the same reference characters will be applied to the same parts. For this inner seal, a ring-like flange will be carried by the disc 28 to take the place of the sealing ring 36 shown in Fig. 5 as being attached to the periphery of the shell wall 15a.

The hot gas inlet manifold and its connection with the distributing ring now will be described with the aid of Figs. 1, 2, and 6 to 12, inclusive. This inlet manifold is formed of two main parts. The outer part is best illustrated in Figs. 1 and 2 and consists of a main, flared, hollow body portion 55 which is flanged at its smaller end 56 for connection with a hot gas duct 57. Its larger end is flanged at 58 for connection with the outer flange 59 of the inner manifold part. This inner manifold part is best illustrated in Figs. 5 to 10, inclusive. As is clearly illustrated in Figs. 7 to 9, inclusive, the two inner and outer, circumferentially extending flange portions 59 are suitably attached to inner and outer, arcuately shaped walls 60. These walls are braced at suitable intervals by radial plates 61, see Figs. 6, 8, and 9. These radial plates are spaced circumferentially approximately the same distance as the radial louvres which partly form the hot gas chambers of the shell 15. The arcuate walls 60 are continuations of the inner and outer distributing ring walls 31a on which are mounted the brackets 39 that support the spring loaded pins 38 of the angle ring 37. The sealing means has not been included in Figs. 6 to 9, inclusive, to avoid confusion.

For the purpose of varying the active, circumferential length of the inlet manifold 30, circumferentially adjustable damper plates 62 are provided. One of these dampers is shown in elevation in Fig. 12 as including a manipulating flange 63 at its outer, radially extending edge. These damper plates are provided with arcuate inner and outer edges so that they will slidably fit between the inner and outer arcuate walls 60 of the inner manifold part. One of these damper plates is illustrated positioned between the plates 60 in Figs. 6 to 8, inclusive. In Figs. 8 and 10, two of the radial plates 61 are illustrated as being cut away at their inner edges to accommodate this adjustable type of damper 62. In Fig. 8, guides 64 are illustrated as being attached to the manifold walls 60 to help support the damper plate 62. It will be appreciated that some form of seal must be provided between this inner part of the inlet manifold and the adjustable damper plates 62 to prevent the hot gases from escaping between the ends of the manifold parts and the distributing ring 31. Suitable sealing means to accomplish this purpose is shown in detail in Figs. 6, 7, 10, and 11. At the extreme ends of the inner part of the inlet manifold, radially extending flanges 65 are provided. These flanges lie in the vertical plane of the inner and outer flanges 59 previously referred to. These flanges are disclosed as forming one branch of an angle plate which is provided with a second branch 66. This branch 66 extends radially in parallelism with radial plates 61 and is shown in Fig. 10 as lying between the two radial plates 61 which are

cut away at their inner edges to accommodate the adjustable damper 62. Adjustably carried by the inner edge portion of this radial branch 66 is an angle 67 which carries an asbestos lining 68 that bears against the outer face of the adjustable damper plate 62. The angle member 67 and the branch 66 are adjustably connected by means of the screws 69 received in slots 70 of the angle member 67. By adjusting the angle 67 with respect to the flange branch 66 so that the asbestos lining member 68 will bear with a proper degree of pressure against the associated damper plate 62, no leakage of hot gas can occur at the ends of the inner manifold parts.

As is clearly shown in Figs. 2 and 6, the parts of the distributing ring 31 which are not covered by the hot gas inlet manifold 30 are closed by suitable plates or face members 71. The idea of employing radially extending plates 61 between the inner and outer walls of the distributing ring 31 is carried out throughout this remainder of the said distributing ring.

Coming now to Fig. 13, there is disclosed a type of kiln, drier, furnace, cylinder, or the like, which is more commonly used. This apparatus includes a rotatable shell 75 which is supported on the rolls 76 by means of the tires 77. Any suitable means may be employed for rotating this cylinder. At the feed end of the cylinder there is disclosed a hot gas inlet manifold 78 which is supplied by the duct 79. The opening 80 in the feed end of the shell 70 is sealed with respect to the hot gas inlet manifold 78 by the sealing means disclosed in detail in Figs. 1 to 5, inclusive. The same reference characters will be applied to like elements of this sealing means. A material feeding chute 81 is properly associated with the inlet manifold 78 so that the material will be passed into the shell 75 through the same feed opening 80 and the sealing means for the manifold 78 will also seal around the material chute 81.

At the discharge end of the shell 75, a stationary head 82 is provided. An exhaust gas outlet 83 is formed in the outer vertical wall of this head. A material discharging outlet 84 is provided in the bottom of this discharge head. The form of sealing means illustrated in detail in Figs. 3 to 5, inclusive, is employed for sealing between the stationary head 82 and the peripheral wall of the shell 75. The same reference characters will be applied to this sealing means.

This Fig. 13 clearly illustrates the adaptability of the sealing means of Figs. 3 to 5, inclusive, to prevent leakage between stationary parts and the rotating shell of a kiln, drier, etc. at both the feeding and discharging ends of the shell. With this type of apparatus, the hot gases are merely fed into the single chamber formed by the rotating shell and are permitted to contact the exposed surface of the bed of material which is being turned over by the rotation of the shell.

It is to be understood that the forms of this invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. In a kiln, drier, furnace, or the like, a rotating shell, a circular series of longitudinally slotted gas chambers arranged around the wall of the shell with the chambers having their inlet ports at the feed end of the shell, a stationary distributing ring covering the inlet ports of the gas chambers, means for delivering gas to the portion of the distributing ring which covers the inlet ports of the gas chambers that underlie the bed of material in the shell, separate means for sealing between the inner and outer edges of the distributing ring and the inner and outer edges of the circular series of gas chambers, each of said sealing means including a ring, having a radial face, extending circumferentially of the shell and rigidly attached thereto, a second ring arranged to bear against said face of the first ring, means for mounting the second ring on the stationary distributing ring and resiliently forcing it against said first ring, and a flexible band arranged to seal between the second ring and the stationary distributing ring.

2. In a kiln, drier, furnace, or the like, a rotating shell, a circular series of longitudinally slotted gas chambers arranged around the wall of the shell with the chambers having their inlet ports at the feed end of the shell, a stationary distributing ring covering the inlet ports of the gas chambers and having a flanged opening registering with the inlet ports for the gas chambers that underlie the bed of material in the shell, a gas inlet manifold having a mounting flange attached to the flanged opening of the distributing ring, an adjustable damper plate slidable under each flanged end of the opening in the distributing ring to vary the length of said opening, means adjustably carried by each flanged end of the distributing ring opening for sealing between the same and said adjustable dampers, separate means for sealing between the inner and outer edges of the distributing ring and the inner and outer edgs of the circular series of gas chambers, each of the separate sealing means for the edges of the ring and the series of gas chambers including a sealing ring, having a radial face, extending circumferentially of the shell and rigidly attached thereto, a second ring arranged to bear against said face of the first ring, means for mounting the second ring on the stationary distributing ring and resiliently forcing it against said first ring, and a flexible band arranged to seal between the second ring and the stationary distributing ring.

3. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising an annular sealing surface rigid with respect to one of the wall portions to be sealed, a sealing ring arranged to bear against the said annular sealing surface, means for resiliently supporting the sealing ring on the other of said wall portions including an annular backing member to which the sealing ring is attached, a series of mounting brackets attached to said other wall portion, and spring pressed pins guided for axial movement by said brackets and rigidly attached to the annular backing member to move therewith, and flexible means for sealing between the resiliently supported sealing ring and the wall portion on which it is mounted.

4. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising a ring, having a radial face, rigidly attached to one of the wall portions to be sealed, a second ring arranged to bear against the radial face of the first ring, said

second ring consisting of a plurality of blocks overlapped at their adjacent ends and formed of self-lubricating material, means for resiliently supporting the second ring on the other of said wall portions including an annular backing member to which the second ring is attached, a series of mounting brackets attached to said other wall portion, and spring pressed pins supported by said brackets for axial sliding movement and attached to the annular backing member for movement therewith, and flexible means for sealing between the annular backing member and the wall portion on which it is mounted, said flexible means being attached to the wall portion by the attaching means for the series of mounting brackets.

5. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising a ring, having a radial face, rigidly attached to one of the wall portions to be sealed, a second ring arranged to bear against the radial face of the first ring and consisting of a plurality of blocks overlapped at their adjacent ends and formed of self-lubricating material, a shock absorbing backing for said blocks, means for resiliently supporting the second ring and said backing on the other of said wall portions, and a gas-tight flexible band for sealing between the resiliently supported second ring and the wall portion on which it is mounted.

6. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising a ring, having a radial face, rigidly attached to one of the wall portions to be sealed, a second ring arranged to bear against the radial face of the first ring, said second ring consisting of a plurality of blocks overlapped at their adjacent ends and formed of self-lubricating material, means for resiliently supporting the second ring on the other of said wall portions including an annular backing member to which the second ring is attached, a series of mounting brackets attached to said other wall portion, and spring pressed pins supported for axial movement only by said brackets and attached to the annular backing member, and a gas-tight flexible band for sealing between the resiliently supported second ring and the wall portion on which it is mounted.

7. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising a ring, having a radial face, rigidly attached to one of the wall portions to be sealed, a second ring arranged to bear against the radial face of the first ring, said second ring consisting of a plurality of graphite blocks having overlapping joints at their adjacent ends, means for resiliently supporting the second ring on the other of said wall portions including an annular backing member to which the second ring is attached, a lining interposed between the second ring and its annular backing member to cushion shocks received by the graphite blocks forming said second ring, a series of mounting brackets attached to said other wall portion, and spring pressed pins supported by said brackets and attached to the annular backing member, and flexible means for sealing between the resiliently supported second ring and the wall portion on which it is mounted.

8. In a kiln, drier, furnace, or the like, a rotating shell, a stationary head at one end of the shell, means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, said sealing means comprising a ring, having a radial face, rigidly attached to one of the wall portions to be sealed, a second ring arranged to bear against the radial face of the first ring, said second ring consisting of a plurality of graphite blocks having overlapping joints at their adjacent ends, means for resiliently supporting the second ring on the other of said wall portions including an annular backing member to which the second ring is attached, a lining interposed between the second ring and its annular backing member to cushion shocks received by the graphite blocks, said lining extending to and bearing against the surface of the wall portion on which the first ring is attached, a series of mounting brackets attached to said other wall portion, and spring pressed pins supported by said brackets and attached to the annular backing member, and flexible means for sealing between the resiliently supported second ring and the wall portion on which it is mounted.

9. In a kiln, drier, furnace, or the like, a rotatable shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, comprising an annular sealing surface rigid with one of said wall portions, a series of mounting brackets attached to the other wall portion, a mounting ring, spring means movably carried by the mounting brackets for yieldably urging the mounting ring toward the said annular sealing surface, means carried by the mounting ring for sealing between it and the said annular sealing surface, means carried by the mounting ring for sealing between it and the wall portion having said annular sealing surface, and means for sealing between the mounting ring and the wall portion to which the mounting brackets are attached.

10. In a kiln, drier, furnace, or the like, a rotatable shell, a stationary head at one end of the shell, and means for sealing between associated wall portions of the rotating shell and the stationary head to prevent loss of gases, comprising an annular sealing surface rigid with one of said wall portions, a series of mounting brackets attached to the other wall portion, a mounting ring, spring pressed means movably carried by the mounting brackets for yieldably urging the mounting ring toward the said annular sealing surface, a ring formed of self-lubricating material carried by the mounting ring and bearing against the said annular sealing surface, a shock absorbing lining interposed between the self-lubricating ring and the mounting ring and having sealing engagement with the wall portion having said annular sealing surface, and means for sealing between the mounting ring and the wall portion to which the mounting brackets are attached.

11. In a kiln, drier, furnace, or the like, a rotating shell, a circular series of longitudinally slotted gas chambers arranged around the wall of the shell with the chambers having their inlet ports at the feed end of the shell, a disc attached to the shell at its feed end to overlie the end of the central material receiving chamber formed

by the series of gas chambers, a stationary distributing ring covering the inlet ports of the gas chambers, means for delivering gas to the portion of the distributing ring which covers the inlet ports of the gas chambers that underlie the bed of material in the shell, and separate means for sealing between the outer edge of the distributing ring and the shell and the inner edge of the distributing ring and the said shell disc inwardly of the circular series of gas chambers, each of said sealing means including a pair of rings extending circumferentially of the shell and distributing ring and having sealing faces flatly engaging each other, one ring of the pair being rigidly attached to one of the parts to be sealed, means for movably mounting the other ring of the pair on the other of said parts to be sealed and resiliently forcing it against said first ring, and means for sealing between the movable ring and the part on which it is mounted.

12. In a kiln, drier, furnace, or the like, a rotating shell member, a circular series of longitudinally slotted gas chambers arranged around the wall of the shell member with the chambers having their inlet ports at the feed end of the shell member, a stationary distributing member covering the inlet ports of the gas chambers, means for delivering gas to the portion of the distributing member which covers the inlet ports of the gas chambers that underlie the bed of material in the shell member, and separate means for sealing between the shell member and the distributing member radially inwardly and outwardly of the circular series of gas chambers, each of the sealing means including a circumferentially extending annular sealing surface rigid with respect to one of the members to be sealed, a sealing ring arranged to bear against said sealing surface, means for mounting the sealing ring on the other of the members to be sealed and for resiliently forcing it against said surface, and means for sealing between the sealing ring and the member on which it is mounted.

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