

[72] Inventor **Calvin C. Blackman**
24272 W. Lake Road, Bay Village, Ohio
44140

[21] Appl. No. **725,043**

[22] Filed **Apr. 29, 1968**

[45] Patented **Feb. 16, 1971**

Continuation-in-part of application Ser. No. 575,577, Aug. 29, 1966, now Patent No. 3,411,763.

[50] Field of Search..... 263/40, 41;
34/242; 266/5B

References Cited			
UNITED STATES PATENTS			
2,411,763	11/1968	Blackman et al.	263/40
3,438,617	4/1969	Gordon et al.	263/40
3,471,137	10/1969	Kitchel	263/40

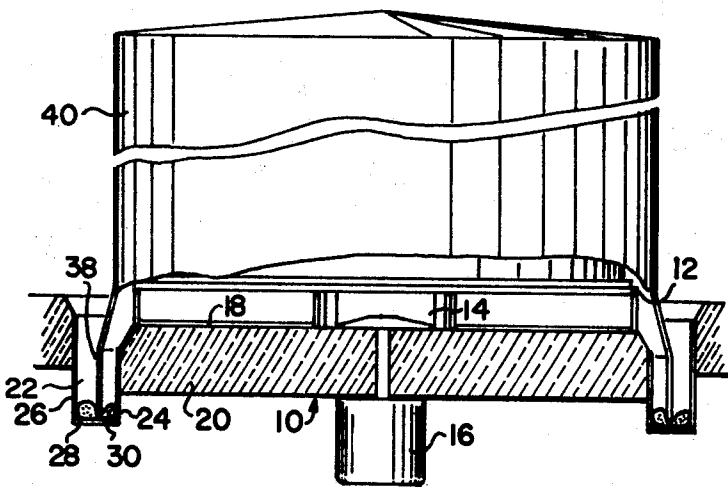
Primary Examiner—John J. Camby
Attorney—William N. Hagg

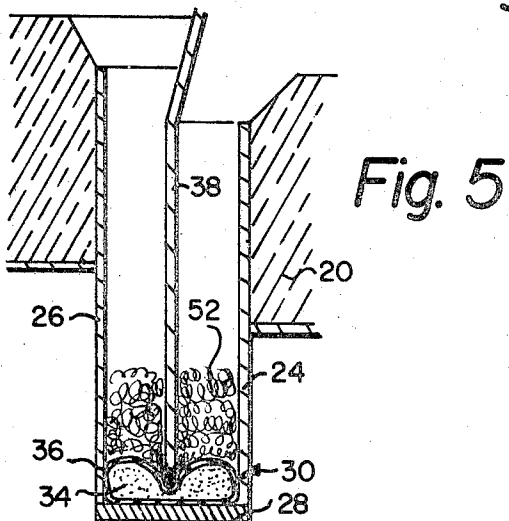
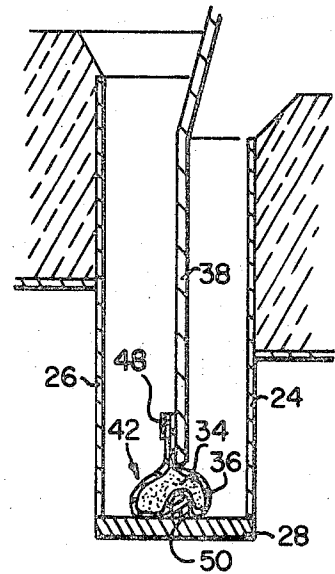
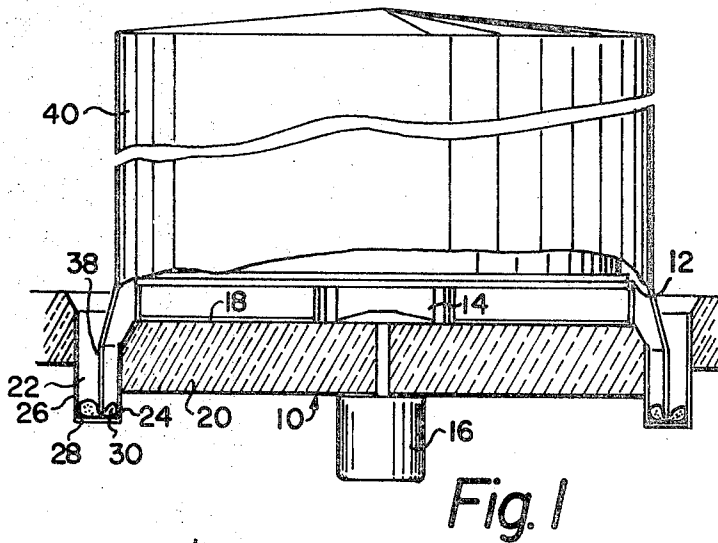
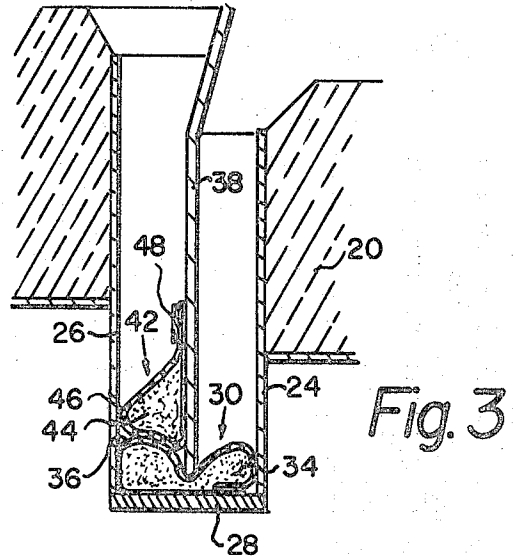
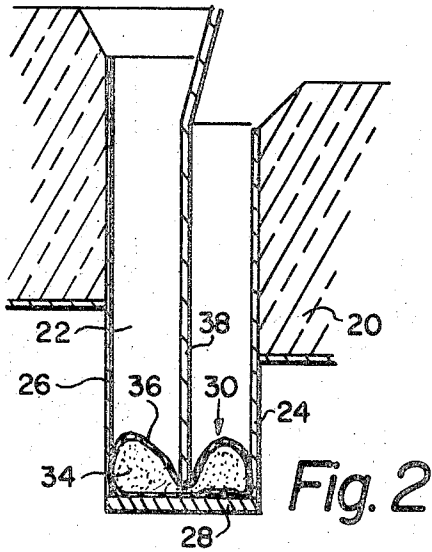
[54] **SEALING DEVICE**
15 Claims, 5 Drawing Figs.

[52] U.S. Cl..... 263/40,
34/242, 266/5

[51] Int. Cl..... F27b 5/00

ABSTRACT: A sealing device for a bell-type furnace which includes a quantity of loose, temperature resisting material such as sand encased within flexible temperature resisting material such as asbestos cloth.





INVENTOR.
Calvin C. Blackman

BY

J. C. Douglas
His atty

SEALING DEVICE

This application is a continuation-in-part of application Ser. No. 575,577, filed Aug. 29, 1966, now U.S. Pat. No. 3,411,763.

This invention relates generally to sealing devices, and more particularly to improved sealing devices for bell-type annealing furnaces which sealing devices utilize loose sealing material contained within flexible encasement means.

In bell-type annealing furnaces, it is necessary to provide some sort of seal between the inner cover and the base member to prevent the gaseous atmosphere used in the furnace from leaking out to the ambient atmosphere. There have been many prior art proposals for such seals, all of which have certain serious drawbacks and limitations.

One of the most common prior art seals in the so-called sand seal. This takes the form of a ring of sand around the furnace base into which the edge of the inner cover is set. Although the sand seal does provide a relatively good seal at low pressures when properly used, care must be taken to have the sand properly distributed within the annular space provided in the base in order to assure a complete continuous seal thereof. Also, the sand can scatter and may foul the operation of some of the mechanical devices used in conjunction with the furnace, or in being scattered it may collect on the charge within the furnace presenting certain serious problems in subsequent operations such as strip rolling. Hence, loose sand does not prove to be an entirely satisfactory sealing medium.

There have also been some recent prior art proposals for so-called solid seals wherein a solid mass of elastomer material is used. These also have not proved entirely satisfactory due to excessive war and deterioration due to high heat.

It is therefore a principle object of this invention to provide an improved seal for a bell-type furnace.

A more particular object of this invention is to provide an improved seal which incorporates the benefits of the sand-type seal but eliminates the drawback of loose sand being scattered around.

Still a further more particular object of this invention is the provision of a sand-type seal wherein the sand or other loose sealing material is at least partially encased within a flexible encasement material to prevent it from being scattered, but to allow it to perform a sealing function.

These and other objects together with a fuller understanding of the invention may be had from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevational view partially in section with parts broken away for clarity of a bell-type furnace incorporating a sealing device of this invention;

FIG. 2 is an enlarged detailed sectional view showing the sealing relationship of the sealing ring and lower leg of the cover member of the device shown in FIG. 1;

FIG. 3 is a view similar to FIG. 2 showing another embodiment of the sealing device of this invention;

FIG. 4 is a view similar to FIG. 2 showing still another embodiment of the sealing device of this invention; and

FIG. 5 is a view similar to FIG. 2 showing yet another embodiment of the sealing device of this invention.

Referring now to the drawings and for the present to FIGS. 1 and 2, a bell-type furnace is shown having a base generally designated as 10. The base 10 is conventional and includes a charge support plate 12, an impeller 14 driven by a motor 16, a base plate 18, and insulating material 20. An annular recess or channel 22 surrounds the insulating material 20 and is defined by an inner plate 24, an outer plate 26, and a bottom plate 28. The annular channel 22 is where the sealing takes place. The bottom of the channel 22 is depressed substantially below the top of the insulation 20 and preferably below the bottom of this insulation as shown in the drawing. It is desirable that the bottom of the channel be so disposed so that the sealing member will be removed and shielded as much as possible from the heated area to protect the sealing medium from heat damage.

An annular sealing ring 30 is disposed within the channel 22 and rests on the bottom plate 28. The sealing ring 30 is comprised of a quantity of temperature resisting loose sealing material 34 enclosed within a flexible temperature resistant encasement material 36. The encasement material is preferably asbestos cloth, or fiber glass cloth, or the like. The temperature resisting loose sealing material may be particulate material such as silica sand or zirconia sand, or it may be fibrous material such as asbestos fibers or glass wool or the like. Silica sand is preferred since it is readily available at a reasonable price and is an effective sealant; but the term temperature resisting loose material is intended to include any material which is loose and which unless confined will not retain its shape as opposed to solid shape holding materials such as rubber and elastomers which have previously been used for sealing.

The ring 30 normally is left in place in the channel 22, and will seal against the lower rim 38 of a charge cover 40. When the furnace has been charged the cover 40 is put in place with the lower rim 38 resting on the sealing ring 30 within the channel 22. As can best be seen in FIG. 2, the lower rim 38 embeds itself within the sealing ring 30, the encasement material 32 flexing to allow the sand 34 therein to flow to the shape of the lower rim 38. This will provide a reasonably tight seal to prevent the gases from leaking around the bottom of the rim 38 to the ambient atmosphere.

As can best be seen in FIG. 2, the sealing ring 30 preferably extends completely between the inner plate 24 and the outer plate 26. These plates will provide retaining surfaces against which the ring 30 can push, thereby enhancing the ability of the ring to conform to or squeeze tightly around the rim 38.

It will be noted that as shown in FIGS. 1 and 2, the cloth 36 completely surrounds the sand 34, thereby providing a complete encasement thereof. With this type of construction the entire sealing ring 30 can be easily removed and replaced in the channel 22. However, if desired, the sand 34 can be placed directly on the bottom plate 28 of the channel 22 and the cloth 36 loosely extended between the plate 24 and the plate 26 or secured to the bottom plate 28, and thereby only partially surround the sand 34. This provides a permanent type sealing ring but has disadvantages in that it cannot be easily replaced if there is any wear on the cloth or if for other reasons it is desired to replace the ring. It will function adequately, however, but because of these limitations it is preferred that the cloth completely enclose the sand 34 for facile removal for replacement and/or repair.

Referring now to FIG. 3, another embodiment of the sealing device of this invention is shown. In this embodiment a sealing ring 30, identical to that shown in FIGS. 1 and 2, is provided in the channel 22. However, an additional or second sealing ring 42 is provided which ring also includes a quantity of loose temperature resisting material 44 enclosed within flexible encasement cloth 46. This additional sealing ring 42 is bonded by means of a strap 48 to the lower rim 38 of the cover 40 near the bottom thereof. As can be seen, when the cover is in place, the sealing rings 30 and 42 abut each other in sealing engagement in addition to the rim 38 embedding in the ring 30. This provides an additional amount of sealing capability between the cover and the base and is useful where a better seal is desired than can be obtained through the use of the seals shown in FIGS. 1 and 2.

Referring now to FIG. 4, still another embodiment of the device of this invention is shown. In this embodiment a sealing ring 42 (of the same type as shown in FIG. 3) is provided secured by the strap 48 to the outer surface of the lower rim 38 of the cover 40. However, the positioning of the sealing ring 42 is such that it extends substantially below the lower edge of the outer rim 40. The channel 22 is provided with a raised solid sealing projection 50 mounted on the lower plate 28. The sealing projection 50 is disposed to be in alignment with the sealing ring 42 and when the cover 40 is lowered into the channel 22 the sealing ring 42 will engage the projection 50 and conform thereto. In this embodiment the raised projec-

tion 50 provides a good device against which a seal may be obtained. However, it is possible to obtain a seal directly against the lower plate 28 without the use of any raised projection device merely by lowering the ring 42 into contact therewith. However, this does not provide as good a seal as is obtained by the use of the raised sealing projection 50.

Turning now to FIG. 5, still another embodiment of this invention is shown. This embodiment includes a sealing ring 30 similar to that shown in FIGS. 1 and 2. On top of the sealing ring 30 is placed a quantity of foraminous heat resistant material 52 such as asbestos fiber, or glass wool or other ceramic wool fibre or the like. This particular construction is desirable if the sealing ring is likely to reach extremely high temperatures which would impair the efficiency thereof or damage or destroy it. The heat resisting fibrous material is provided as a heat barrier which serves to lower the temperature in the sealing region. By virtue of this material being resilient and springy, it will allow the cover to embed therein and push down against the sealing ring 30 so that while providing good heat insulation it will not substantially impair the sealing ability of the sealing ring 30. As shown in FIG. 5, the material 52 is shown overlying a sealing ring of the type having loose material surrounded by an encasement material. It is contemplated, however, that the fibrous material itself could be placed directly over loose material, thus obviating the need of a separate encasement material 36. Thus, the material 52 acts as the encasement material for the particulate material 34. It is also contemplated that fibrous ceramic wool material such as Fiberfrax (a ceramic wool material sold by The Carborundum Company) could be used in the channel as the sole sealing medium when the bottom of the channel is disposed below the insulation 20 of the base. It is preferred, however, to use it in conjunction with a particulate material.

While several embodiments of this invention have been shown and described, various adaptations and modifications thereof may be made without departing from the scope of the appended claims.

I claim:

1. In a bell-type furnace including a base member for supporting a charge and a cover member for covering the charge, said base member having insulation on the bottom thereof, an improved gas seal comprising, said base member having an annular recess extending below the insulation, a quantity of loose temperature resisting material, temperature resisting flexible encasement means at least partially enclosing said loose material and defining therewith a continuous conformable annular sealing ring, said sealing ring being carried by one of said members, the other of said members including annular means disposed to sealingly engage said sealing ring within said recess when said cover is in place, whereby to provide a

gas seal.

2. The seal of claim 1 wherein a layer of heat resistant fibrous material is provided to overlie said ring.

3. The seal of claim 1 wherein said cover member also includes a second conformable sealing ring of temperature resisting material contained within temperature resisting flexible encasement means and disposed to abut said first sealing ring.

4. The seal of claim 1 wherein said cover member carries said sealing ring.

5. The seal of claim 4 wherein said annular means to engage said ring includes upwardly projecting means carried by said base member within said recess.

6. The seal of claim 1 wherein said loose material is particulate material.

7. The seal of claim 6 wherein the particulate material is silica sand.

8. The seal of claim 1 wherein the encasement means includes heat resisting cloth.

9. In a bell-type furnace including a base member for supporting a charge and a cover member for covering the charge, and wherein said base includes insulation on the bottom thereof, an improved gas seal comprising, an annular recess formed in said base member and extending below said insulation, sealing material disposed in said recess and disposed to support the lower edge of the cover member, a quantity of ceramic wool fiber extending across said recess above said sealing material to form a heat barrier.

10. The seal of claim 9 wherein particulate heat resisting material is disposed below said ceramic wool material.

11. The seal of claim 10 wherein said particulate material includes encasement means between said particulate material and said ceramic wool material.

12. In a bell-type furnace including a base member for supporting a charge and a cover member for covering the charge, said base member having insulation on the bottom thereof, an improved gas seal comprising, a quantity of particulate temperature resisting material, temperature resisting flexible encasement means at least partially enclosing said particulate material and defining therewith a continuous conformable annular sealing ring, said sealing ring being carried by one of said members, the other of said members including annular means disposed to sealingly engage said sealing ring when said cover is in place, whereby to provide a gas seal.

13. The invention as defined in claim 12 wherein the particulate material constitutes a major portion of the material encased by said encasement means.

14. The seal of claim 12 wherein the particulate material is silica sand.

15. The seal of claim 12 wherein a layer of heat resistant fibrous material is provided to overlie said ring.

55

60

65

70

75