Nov. 4, 1969 D. L. ASHBAUGH 3,476,370

ANNEALING FURNACE SEAL

Filed Jan. 19, 1968

FIG. 2

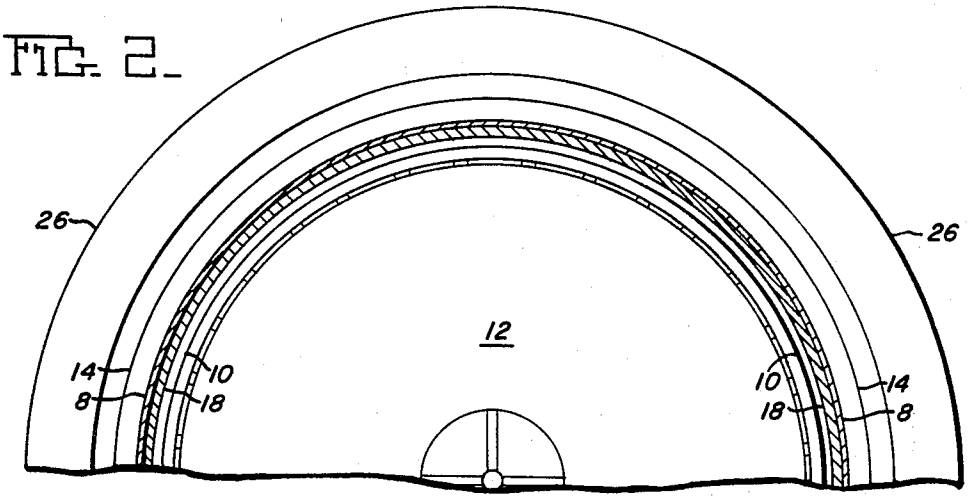
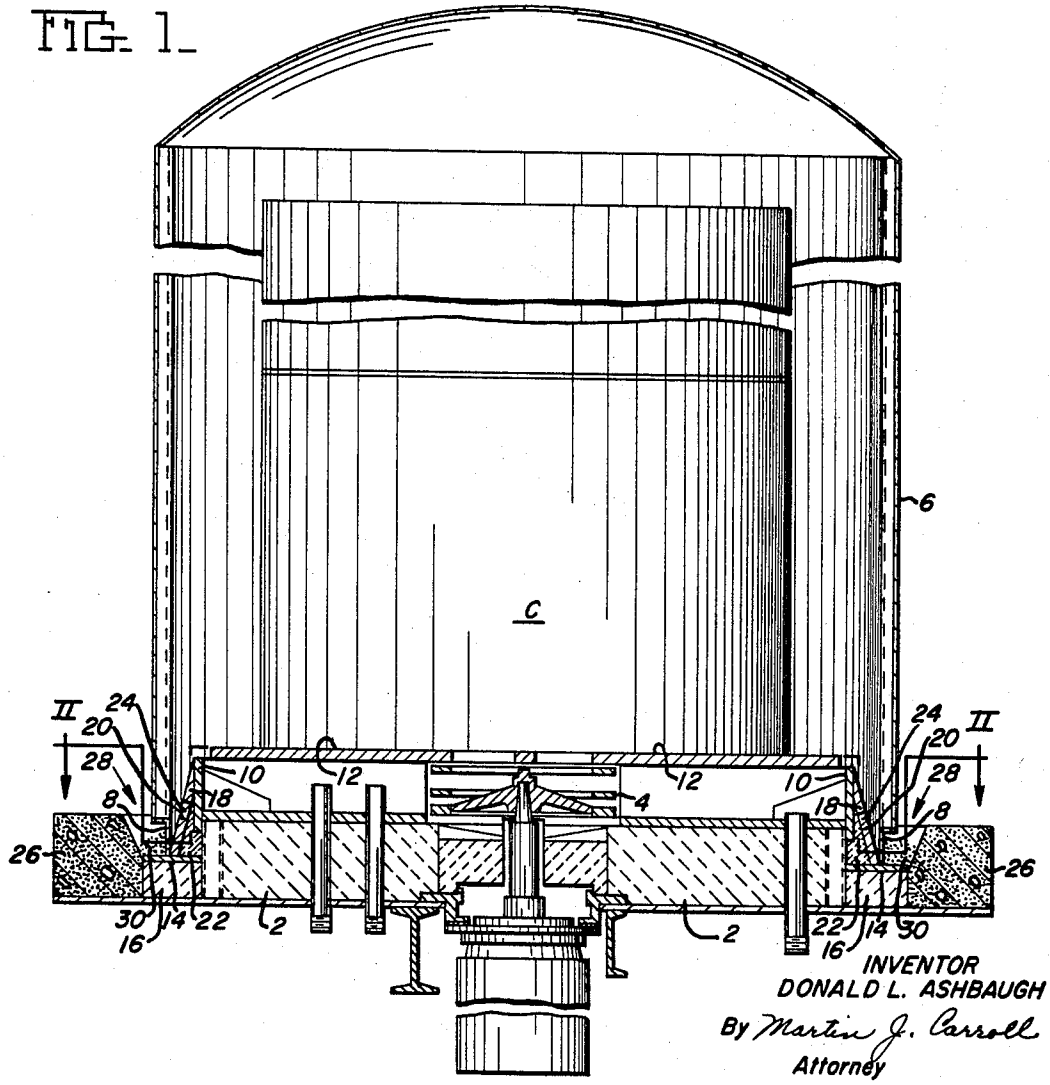


FIG. 1



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ANNEALING FURNACE SEAL

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ABSTRACT OF THE DISCLOSURE

A seal for eliminating or reducing air infiltration into an inner cover of a steel annealing furnace including a metal to metal seal between the cylindrical bottom ring of the inner cover and a horizontal plate at the bottom of the seal channel and also between the bottom ring and a frusto-conical ring extending from the plate upwardly and inwardly. Sand is provided in the channel only on the outside of the bottom cover ring.

This invention relates to a seal and more particularly to a seal for preventing infiltration of air into the inner cover of a batch type annealing furnace. Such furnaces, sometimes called bell annealing furnaces, include a base upon which coils of steel strip are stacked within a removable inner cover. One or more such bases are arranged beneath a removable outer cover carrying heating means thereon. An annealing atmosphere is circulated by means of a fan within each inner cover and it is necessary to provide a seal to prevent infiltration of air into the inner cover and escape of atmosphere from the inner cover. A sand seal is most commonly used for this purpose. This includes a channel for the sand in which the inner cover rests. Such a seal is shown in Dailey Patent No. 2,489,012 dated Nov. 22, 1949. Sand seals have various disadvantages, the most important one being that a portion of the sand sometimes contacts the strip being annealed and causes "sand pits" which results in a loss of production. Special seals including metal to metal seals have been proposed as shown in Cone Patent No. 2,854,226 dated Sept. 30, 1958; Field Patent No. 2,556,962 dated June 12, 1951; Cramer et al. Patent No. 2,998,236 dated Aug. 29, 1961; and Hazen et al. Patent No. 3,211,590 dated Oct. 12, 1965. However, these special seals all have various disadvantages. Some require special construction of inner covers including flared skirts which increase the cost considerably and require considerable change in the base construction. Also, since metal to metal seals may not prevent all leakage it is desirable to have an additional seal which is sometimes not provided. If additional seals are provided the construction may be expensive or part of the seal material may be provided within the inner cover and will contaminate the steel.

It is therefore an object of my invention to provide a relatively inexpensive internal metal to metal seal in combination with an outer sand seal so that sand is eliminated within the inner cover.

Another object is to provide such a seal which can be used with a standard inner cover.

These and other objects will be more apparent after referring to the following specification and attached drawing, in which:

FIGURE 1 is a sectional view of an inner annealing cover and supporting structure with my seal incorporated therein; and

FIGURE 2 is a view taken on line II—II of FIGURE 1, but showing only one half of the furnace.

Referring more particularly to the drawing, reference numeral 2 indicates the base of an annealing furnace for supporting coils C of steel strip. A fan 4 is used to circulate atmosphere through and around the coils C beneath a corrugated inner cover 6 which is preferably made of stainless steel. A vertical cylindrical ring 8 is provided at the lower end of the cover 6. The base 2 includes a circumferential vertical steel plate or ring 10 which extends to a short distance below horizontal flat surface 12 of the base. According to my invention I provide an annular steel ring 14 which is mounted on refractory 16 which surrounds the base 2. A frusto-conical steel ring 18 is welded to the rings 10 and 14. The maximum diameter of frusto-conical ring 18 is substantially equal to the inside diameter of ring 8. It is preferred to have openings 20 in the ring 18 through which a castable insulating refractory 22 is pumped into the space between plates 10 and 18. After the refractory 22 sets, the openings 20 are closed by plugs 24. An annular refractory member 26 extends upwardly from the outer portion of annular ring 14 so as to form a channel 28 between it and frusto-conical ring 18.

In operation, coils C are placed on the upper surface 12 of the base 2. The inner cover 6 is lowered into place over the coils C and come to rest on the plate 14 with the bottom of ring 8 contacting the bottom of frusto-conical ring 18. This provides a metal to metal seal between ring 8 and plate 14 and also between ring 8 and frusto-conical ring 18. An external seal is then made in the conventional manner by heaping sand 30 into the channel 28 as shown. After annealing the cover 6 and coils C are removed. All of the sand 30 is then removed from the channel 28 before the operation is repeated. Thus, all sand is kept out of the space beneath the inner cover. If desired, the annular member 26 may be omitted and the sand heaped against the ring 8 without any outer confining member. This will generally be done on multi-base furnaces.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made.

I claim:

1. In heat treating apparatus including a base having a top horizontal surface for supporting a metal charge to be treated, a metal cover surrounding said base and charge and extending below the top of said horizontal surface, said metal cover having a cylindrical ring at its lower end, and a seal for preventing leakage of atmosphere from said cover around the bottom of said cylindrical ring; the improvement in said seal comprising an annular metal ring having a generally horizontal top surface below the base horizontal surface and having an inner diameter at least as small as the inner diameter of said cylindrical ring and an outer diameter substantially greater than the outer diameter of said cylindrical ring, a frusto-conical metal ring attached to and extending between said annular metal ring and said base, said frusto-conical ring having a bottom diameter substantially equal to the inner diameter of said cover ring so as to make contact therewith and a smaller upper diameter greater than that of said horizontal base surface, and sealing

material surrounding said cover bottom ring only on the outside thereof.

2. The heat treating apparatus of claim 1 including a vertical metal ring on said base extending to a point adjacent the top base surface, said frusto-conical ring being welded to said vertical ring and said horizontal top surface of said annular ring.

3. The heat treating apparatus of claim 2 including an insulating filling between said frusto-conical ring and said vertical metal ring on said base.

References Cited

UNITED STATES PATENTS

2,600,094	6/1952	Cone	263—40
2,998,236	8/1961	Cramer et al.	263—40

JOHN J. CAMBY, Primary Examiner

U.S. Cl. X.R.

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