Oct. 18, 1949. T. W. MUNFORD 2,485,453

FURNACE WITH REMOVABLE COIL STAND

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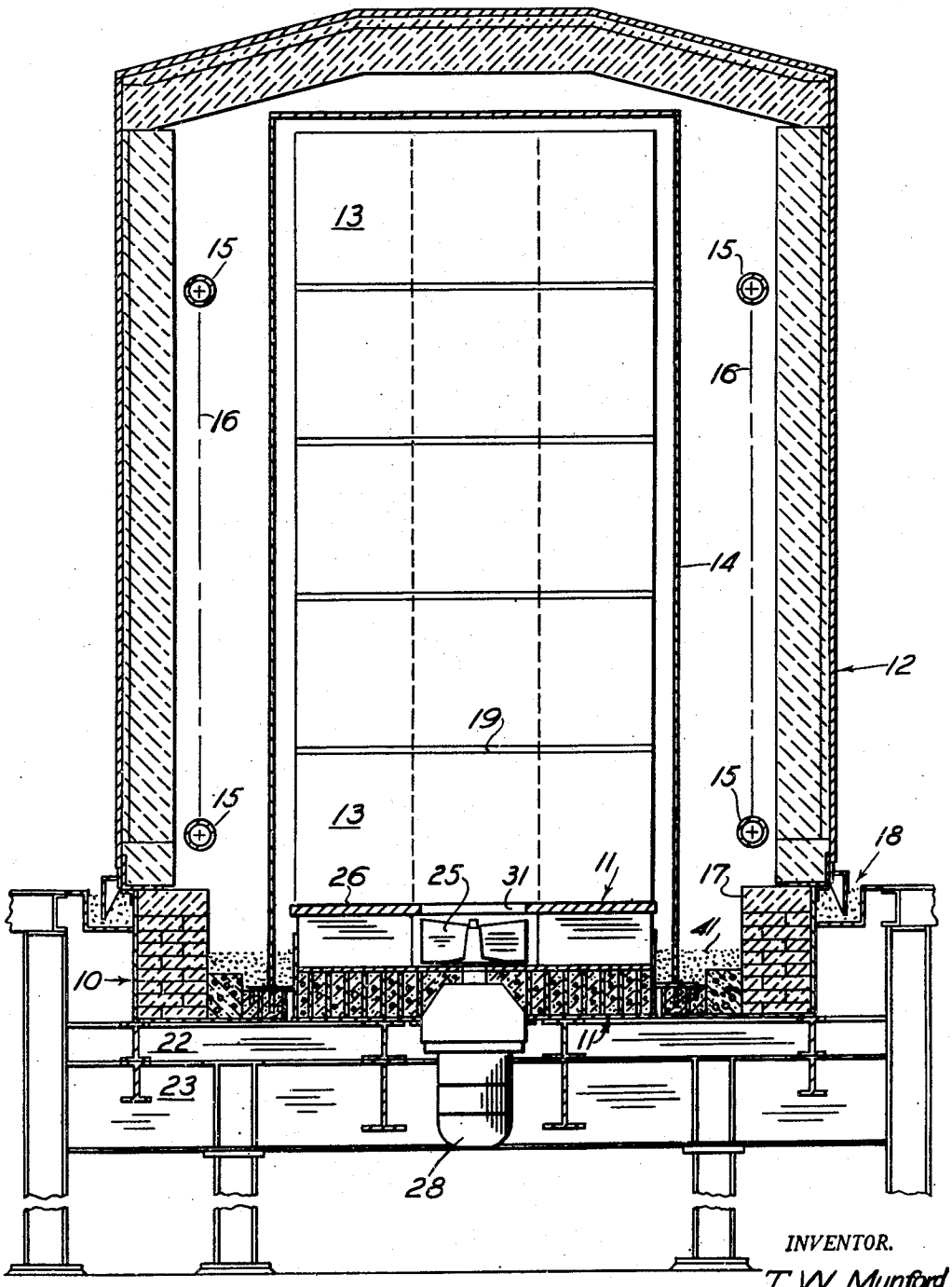

Fig. 1

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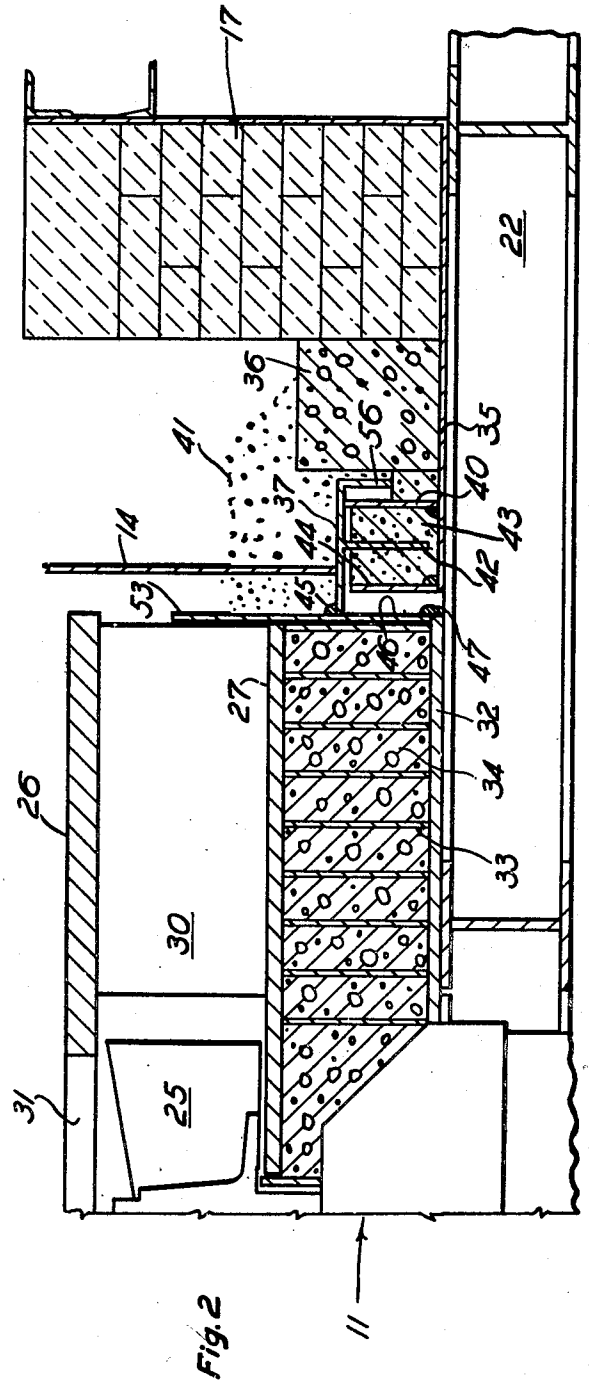

Fig. 2

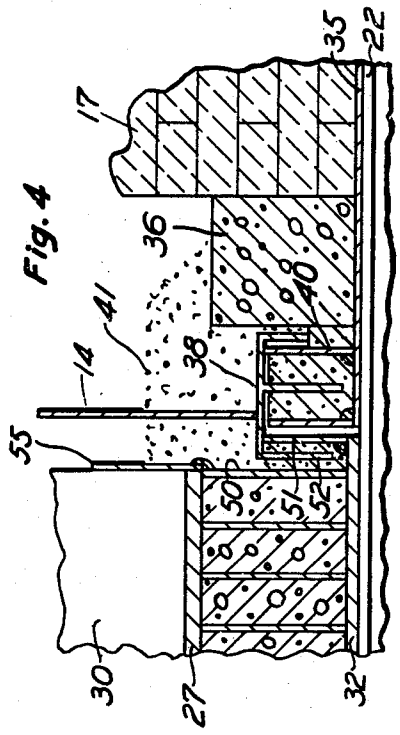

Fig. 4

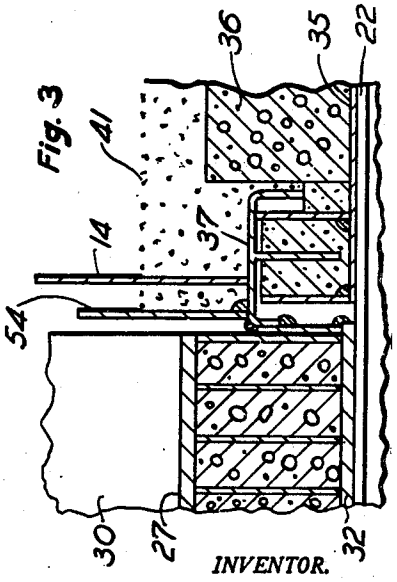

Fig. 3

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UNITED STATES PATENT OFFICE

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FURNACE WITH REMOVABLE COIL STAND

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Application December 9, 1947, Serial No. 790,589

3 Claims. (Cl. 263—40)

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This invention relates to improvements in furnaces of the cover type which are now widely used for the annealing of coiled strip steel, the coils being arranged in a vertical column on a coil stand and the stack enveloped by a muffle for excluding the outside atmosphere and to permit a specially prepared atmosphere to be circulated through and around the stack of coils. A portable heating hood surrounds the muffle for heating the coils.

In furnaces of said type, in order to reduce to a minimum the time a furnace need be kept out of service because of a damaged coil supporting stand, it is desirable that the stand be readily removable from the furnace base for replacement purposes, but this presents the problem of how to provide a gas-tight seal between the steel deck at the underside of the furnace base and the coil stand where it is surrounded by said deck. There is also the problem of how to support the muffle. The present invention aims to solve these problems in a relatively simple and practical way, and from one point of view the invention may be said to be an improvement over the furnace disclosed in Patent No. 2,414,130.

For a consideration of what I consider to be novel and my invention, attention is directed to the following specification and the claims appended thereto.

In the accompanying drawings forming part of this specification,

Fig. 1 is a vertical section of a furnace embodying the present invention.

Fig. 2 is an enlarged fragmentary sectional view of parts embodied in Fig. 1.

Fig. 3 is a view similar to Fig. 2 but showing a slightly different arrangement of parts.

Fig. 4 shows a modified form of the invention.

Referring to the drawings, the furnace comprises a furnace base 10 for supporting one or more coil-supporting stands 11 (only one stand being shown), a portable heating hood 12 common to all of said stands, and a bell-type muffle 14 individual to each stand for enveloping the coils 13 thereon whereby to exclude the outside atmosphere therefrom and to permit a specially prepared atmosphere to be circulated about the coils during the annealing operation. The heating hood embodies radiant tubes 15 for heating

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the muffle. In the drawings, only the top and bottom tubes are shown but as indicated by the connecting line 16 there will be a series of such tubes therebetween. The heating hood seats on an upright peripheral wall 17 on the furnace base, and the seating joint is surrounded by a conventional sand seal 18. The coils 13 are separated from each other by conventional spacers 19.

The furnace base 10 comprises underlying floor beams 22 supported on an elevated structure 23 whereby the underside of the base is openly exposed to atmospheric air and whereby access may be had to a fan motor 24 which is secured to the underside of the coil stand 11 for driving a circulating fan 25 coaxial with a control opening 31 in the top plate 26 of the coil stand, the fan being interposed between the said top plate and a lower plate 27, the function of the fan being to circulate the atmosphere within the muffle 14 through and around the pile of coils 13 on the stand. The two plates 26 and 27 are maintained in spaced relation by a plurality of radially extending wall plates 30 in circumferentially spaced relation whereby to provide radial gas passages between the fan 25 and the muffle 14. The special atmosphere is supplied to the muffle by a supply pipe not shown but entering through the bottom of the coil stand.

The coil stand has a bottom base plate 32 which seats directly on the floor beams 22 on the base; hence, the underside of the plate is openingly exposed to atmospheric air. The intermediate plate 27 of the coil stand and the base plate 32 are separated from each other by a concentric series of wall-type spacer rings 33 and by a filling 34 of heat insulating concrete between said rings, the primary function of the rings being to absorb a shock of impact of dropping a coil on the top plate 26 of the stand; however, this arrangement is optional insofar as the present invention is concerned. Except where the coil stand is positioned, the floor beams 22 of the furnace base are covered with a gas-tight sheet-metal deck 35, it being understood that it is on this deck that the peripheral brick wall 17 is seated and that the otherwise exposed top-side of the deck is covered with a cast layer of heat-insulating material 36.

To prevent leakage of gas out of the furnace,

it is necessary to provide a gas-tight connection between the coil stand and the surrounding steel deck 35, and it is also necessary to provide a suitable support for the foot of the muffle 14. In the present invention, these requirements are met in a relatively simple and practical manner as will now be explained.

In the present invention, the seal between the coil stand and the surrounding deck 35 comprises a horizontally disposed annular plate 37 coaxial with said stand. This plate (hereinafter sometimes called a bridge plate) is supported in part by said stand in a manner presently explained and in part by an annular pedestal 40 which is welded gas-tight to the steel deck 35 and which is coaxial with said stand. The muffle 14 is removably seated on this bridge plate 37 and objectional leakage of gas out of the muffle under its foot is prevented by a layer of sand 41 disposed around the lower portion of the muffle.

To prevent leakage of gas out of the furnace by way of the seat between the pedestal 40 and the bridge plate 37, the latter is provided with a depending endless blade 42 coaxial with the pedestal and the space between the blade and pedestal is filled with a plastic sealing material 43. This material must necessarily be in place before the bridge plate 37 is seated on the pedestal and, therefore, there is mounted on the steel deck 35 coaxial with said blade an upstanding endless wall 44 to form an endless channel or trough wherein the plastic sealing material may be initially placed for penetration by the blade 42 as will now be readily understood.

As indicated at 45 in Fig. 2, the inner rim of the bridge plate 37 is welded gas-tight to an upright supporting wall 46 which surrounds the coil stand, this wall being welded gas-tight at its lower edge, as indicated at 47, to the base plate 32 of the coil stand. It will, therefore, be understood that according to Fig. 2 the bridge plate 37 is integral with the coil stand and that the means for making a gas-tight connection between said plate and said stand comprises the wall 46 and the welds 45 and 47. However, as shown in Fig. 4, the gas-tight connection may be otherwise made, the bridge plate in this view being indicated by reference numeral 38.

In Fig. 4 the base plate 32 of the stand is extended outwardly somewhat farther than in Fig. 2 whereby to provide between the outer peripheral wall 50 of the stand and an upstanding wall 51 welded gas-tight to the outer portion of said base plate an annular trough or channel around the stand for plastic sealing material of the same character as the sealing material 43. The bridge plate 38 is adapted to overlie and rest on the wall 51; hence, this wall may be considered as a pedestal on the stand for supporting the bridge plate in conjunction with the other pedestal 40 on the metal deck 35. At its inner edge the plate 37 is provided with a depending blade 52 coaxial with the coil stand for penetration into the initially plastic sealing material in the underlying trough whereby to form a gas-tight seal between said plate and the coil stand as will now be readily understood.

In Fig. 2 sand from around the foot of the muffle 14 is prevented from entering the space between the upper and intermediate plate 26 and 27 of the coil stand by an upward extension 53 of the lower encircling wall 46; in Fig. 3 the sand barrier is formed by an upstanding wall 54 mounted on the bridge plate 37 itself, and in Fig. 4 the barrier is formed by an upstanding wall 55

welded to the rim of the intermediate plate 27 of the coil stand. It will be understood that the sand barriers are not so high as to substantially restrict the outward flow of gas from the fan 25.

At its outer rim, the bridge plate will ordinarily be provided with a depending flange 56 primarily to prevent sand from the pile 41 thereabove from working under said plate at the pedestal 40.

It will be readily appreciated that the arrangement of parts in Fig. 3 is to all intents and purposes the same as in Fig. 2 and, therefore, need not be further described.

In the present invention it serves no useful purpose to extend the steel deck 35 of the furnace base under the coil stand; hence, said deck is terminated short of said stand, it being observed that there is an air gap between said stand and said deck. One practical advantage of not extending the deck beneath the coil stand is that it affords no seat for lodgement of foreign matter that might interfere with a proper seating of the coil stand at its station on the furnace base.

As previously stated, the protective gas or atmosphere for the coils 13 is supplied to the muffle 14 by a supply pipe not shown but extending through the bottom of the coil stand. There is no outlet pipe for said atmosphere; hence, a slight positive pressure tends to prevail in said muffle. Some leakage of gas out of the muffle by way of the sand seal 41 around the foot thereof is not objectional but instead is desirable as it insures the presence of a relatively fresh atmosphere in the muffle at all times. The sand seal 18 around the foot of the heating hood 12 prevents infiltration of air into the hood and permits a plenum of the gas from the muffle to prevail in said hood, and as will now be readily understood the seal between the coil stand and the metal deck of the furnace base serves the same purpose.

What I claim is:

1. A furnace comprising, in combination, a stand for a charge of material to be heat treated, a furnace base having underlying floor beams and a station on said beams where said stand is removably seated, a sheet metal deck on said floor beams except at said station and surrounding the stand in spaced relation to provide a clearance gap therebetween, a horizontally disposed annular plate encircling said stand and overlying said gap, an annular support mounted on said stand in gas-tight connection therewith for supporting the inner edge portion of said annular plate, and another annular support mounted on the deck in gas tight connection therewith for supporting the outer edge portion of said plate.

2. A furnace comprising, in combination, a stand for a charge to be heat treated, a furnace base having underlying floor beams and a station on said beams where said stand is removably seated, a sheet metal deck on said floor beams except at said station and surrounding the stand in spaced relation to provide a clearance gap therebetween, a horizontally disposed annular plate encircling said stand and overlying said gap, an annular support mounted on said stand in gas tight connection therewith for supporting the inner edge portion of said plate, and another annular support mounted on the deck in gas tight connection therewith for supporting the outer edge portion of said plate, the annular support on the stand being laterally spaced from the side wall of the latter to form therewith a trough for sealing material, and said annular plate having a depending blade for extending into said trough for envelopment by the sealing material therein.

3. A furnace comprising, in combination, a stand for a charge of material to be heat treated, a furnace base having underlying floor beams and a station on said beams where said stand is removably seated and the stand comprising a base plate which rests on said beams, a sheet metal deck on said floor beams except at said station and surrounding said base plate in spaced relation to provide a clearance gap therebetween, a horizontally disposed annular plate encircling said stand and overlying said gap, and means comprising said annular plate for forming a gas tight seal between said base plate and said deck.

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The following references are of record in the file of this patent:

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