Jan. 1, 1929. 1,696,900

T. F. BAILY

CONTINUOUS SHEET HEATING FURNACE

Filed April 20, 1926 3 Sheets-Sheet 1

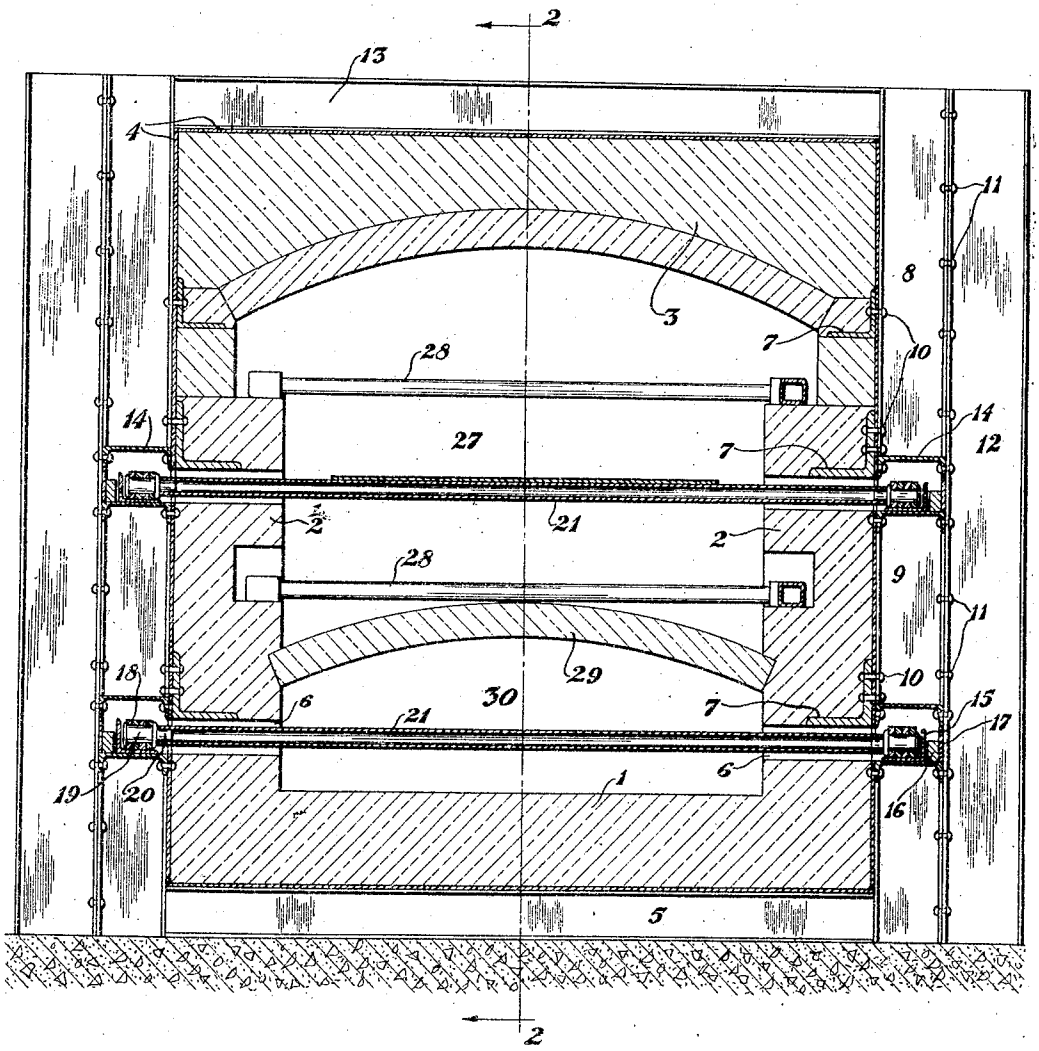


Fig. 1

Inventor

T. F. Baily

By Fraser and Bond

Attorneys

Jan. 1, 1929. 1,696,900

T. F. BAILY

CONTINUOUS SHEET HEATING FURNACE

Filed April 20, 1926 3 Sheets-Sheet 2

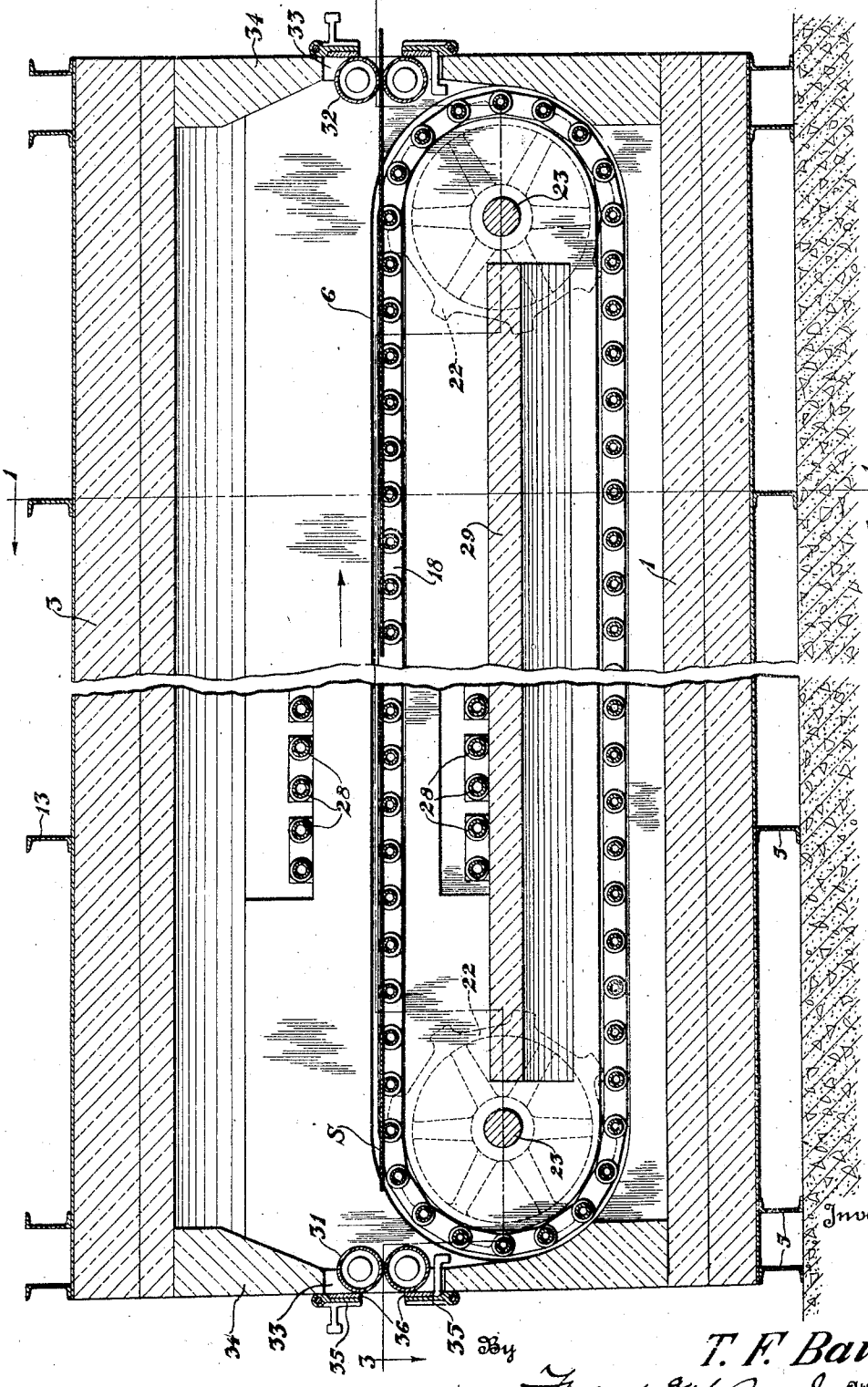


Fig. 2

Inventor

By T. F. Baily

Attorneys

Jan. 1, 1929.

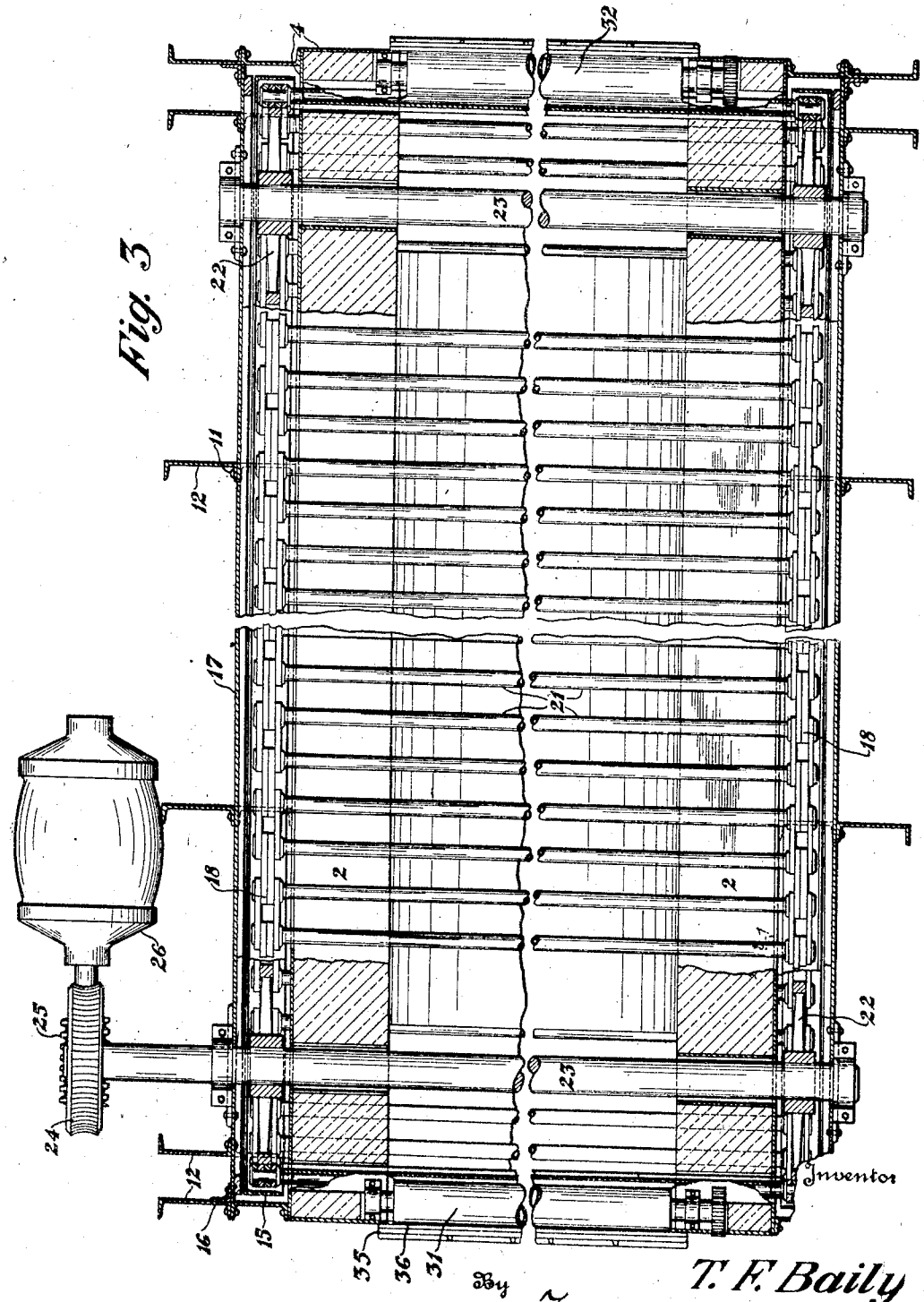
1,696,900

T. F. BAILY

CONTINUOUS SHEET HEATING FURNACE

Filed April 20, 1926 3 Sheets-Sheet 3

Fig. 3



Inventor

By T. F. Baily

Fraser and Bond

Attorneys

Patented Jan. 1, 1929. 1,696,900

UNITED STATES PATENT OFFICE.

THADDEUS F. BAILY, OF ALLIANCE, OHIO.

CONTINUOUS SHEET-HEATING FURNACE.

Application filed April 20, 1926. Serial No. 103,280.

The invention relates to furnaces for continuously heating or heat treating sheets, plates and the like and is especially adapted for continuous annealing of sheets.

The object of the improvement is to provide a furnace having an endless conveyer for continuously passing sheets and the like, through the heating chamber, the conveyer being in the form of chains located outside of the refractory walls of the furnace and driven by means of sprockets also located outside of the refractory walls, the chains being connected together at close intervals by bars or tubes of heat resisting material extended through endless slots in the side walls of the furnace, and located entirely across the heating chamber to support the sheets and convey them continuously through the heating chamber. In carrying out the invention the side walls of the furnace, as well as the roof, are carried upon supports entirely outside of the furnace, and the chains are boxed in gas tight housings, provided with rails on which the chains travel; feed and discharge rolls being located at the ends of the furnace, operating at the same peripheral speed as the conveyer and forming a substantially gas tight entrance and exit to the heating chamber; means being provided for readily removing the sheet supporting bars which couple the conveyer chains together.

An embodiment of the invention is illustrated in the accompanying drawings, in which

Figure 1 is a transverse sectional view through the improved furnace, taken substantially on the line 1—1, Fig. 2;

Fig. 2, a vertical longitudinal section through the furnace taken substantially on the line 2—2, Fig. 1, and

Fig. 3, a plan sectional view of the furnace taken substantially on the line 3—3, Fig. 2.

Similar numerals refer to similar parts through the drawings.

The furnace may be built of any suitable refractory material comprising the bottom 1, side walls 2 and roof 3, preferably arched, all of which may be enclosed, in the usual manner, in a steel casing 4.

The bottom portion 1 of the furnace may rest upon a suitable base support such as the channels 5, and an elongate-ovate slot 6 is formed in each side wall, making it necessary to support the side walls, as well as the roof, independently of the bottom portion of the furnace.

To accomplish this, angle members 7, carried in the side walls and roof, are connected to the vertical sections 8 and 9, of channels or similar structural members as by rivets 10, these sections of channels being connected, as by the rivets 11, to upright structural supports, such as the channels 12 which are spaced upon each side of the furnace.

The channel uprights are held in spaced position and tied together at their upper ends as by the horizontally disposed channels 13. Thus the entire side walls and roof are supported independently of each other and of the bottom of the furnace upon the upright channel supports permitting the slots 6 to be unobstructed throughout their entire lengths.

A boxing or housing 14 of the same shape, and registering with each of the slots 6, is mounted between each side wall and the adjacent upright supports 12, each of these housings being formed of channels or the like and being entirely enclosed from the outside atmosphere, and open to the furnace atmosphere only through the slots 6.

A track, preferably in the form of an angle 15, is mounted in each housing, and normally held against lateral movement therein as by the filler blocks 16, removable plates 17 being provided in the side walls of the housing to provide access thereto as will be later described.

For the purpose of continuously conveying material such as sheets, plates and the like, through the furnace, an endless conveyer is provided consisting of an endless chain 18 located in each housing 14 and arranged to ride upon the angle track 15 therein. The pins 19, which connect the links of each chain together are preferably fixed with relation to one link and pivoted with relation to the adjacent link. Each of these pins is provided with a pintle 20, upon the side toward the furnace, supporting bars, preferably in the form of the tubes 21, being con-

BEST AVAILABLE COPY BEST AVAILABLE COPY

nected at opposite ends to these pintles and extending transversely through the furnace and through the slots 6. For the purpose of driving this conveyer, each chain passes over a sprocket wheel 22, located in each end of the corresponding housing 14, the sprocket wheels being thus located out of the furnace atmosphere and at the same time cut off from the outside atmosphere, so that if desired, a reducing or non-oxidizing atmosphere may be maintained within the furnace chamber.

Each pair of these sprockets is mounted upon a shaft 23, these shafts being the only portion of the driving apparatus which extends through the furnace chamber. A worm gear 24 may be fixed upon the forward or driving shaft 23 meshing with a worm 25 upon the shaft of the motor 26, all of which driving mechanism is located outside of the furnace, and thus not subjected to the furnace temperature.

The heating chamber 27 of the furnace may be maintained at the desired temperature by any suitable heating means such as the electrical resistors 28 and the heating chamber may be divided from the remainder of the interior of the furnace as by an arch 29, the conveyer bars 21 passing through the heating chamber in one direction and back through the chamber 30 in the opposite direction.

This arch 29 not only divides the chamber 30 from the heating chamber but also acts as an interior support for the refractory side walls 2 and may be used, as shown in Figure 1, to support one of the electric resistors 28.

For the purpose of feeding the sheets or the like, indicated at S to the furnace and onto the endless conveyer, and then out at the other end of the furnace feed-in and discharge rolls 31 and 32 are provided, the pinch of these rolls being substantially in the same horizontal plane as the tops of the supporting bars 21. Each pair of these rolls is located in an opening 33, in the adjacent end wall 34, and this opening is substantially sealed as by the pivoted counterweighted plates 35 which may be provided with a lining 36 of asbestos or the like, engaging the peripheries of the rolls, this lining preventing abrasion of the surfaces of the rolls.

In operating the furnace the sheets are passed, one at a time, into the feed-in rolls 31 which feed the sheet onto the conveyer as shown in Fig. 2, the sheet resting upon the rounded surfaces of the supporting bars 21 as they are carried through the heating chamber, these rounded bars conveying the sheet through the furnace without scratching or abrading the surface thereof. As each sheet passes from the endless conveyer it is received by the discharge rolls 32 which convey the sheet out of the furnace.

From the above it will be obvious that the chains of the conveyer are located outside of the refractory furnace walls and within the housings which close the same off from the outside atmosphere, and as the entrance and exit of the furnace are substantially sealed by the feed-in and feed-out rollers and hinged plates a reducing or non-oxidizing atmosphere may be maintained within the furnace chamber.

In the event it is desired to remove or replace any of the sheet supporting bars 21, one of the plates 17 is removed and the corresponding filler block 16 is taken out of the housing permitting the track 15 to be moved laterally a sufficient distance to allow the desired bar or bars to be removed from the chains.

I claim:

1. In a continuous annealing furnace having refractory walls, a plurality of chains located outside of the refractory walls upon opposite sides of the furnace and fastened together at close intervals with heat resisting members extending into the furnace and adapted to support the material to be treated, the chains operating in housings enclosed from the outside atmosphere.

2. In a continuous annealing furnace having refractory walls, a plurality of chains located outside of the refractory walls upon opposite sides of the furnace and fastened together at close intervals with heat resisting members extending into the furnace and adapted to support the material to be treated, the sheet supporting members being rounded on the surface touching the sheets.

3. In a continuous annealing furnace having refractory walls, a plurality of chains located outside of the refractory walls upon opposite sides of the furnace and fastened together at close intervals with heat resisting bars extending into the furnace and adapted to support the material to be treated, the sheet supporting bars being fixed against movement with relation to the chains.

4. In a furnace having refractory walls, chains located beyond the refractory walls on opposite sides of the furnace and connected together through the furnace with heat resisting supporting members passing through two slots at each side of the furnace, the wall of the furnace between the slots, and the roof, being carried independently of the remainder of the walls.

5. In a furnace having refractory walls, conveyer chains located outside the refractory walls of the furnace and tied together by heat resisting supporting bars traversing substantially the entire inner length of the furnace and pairs of feed and discharge rolls substantially in line with the upper sides of the supporting bars.

6. A furnace having endless slots in opposite refractory side walls, means for supporting the portion of the refractory wall between the slots independently of the remainder of

the side wall and a refractory arch engaging the inner sides of the portions of the refractory walls between the slots.

7. In a furnace of the character described, pairs of sheet feeding rolls at the entrance and discharge ends and a conveyer chain located entirely inside the furnace chamber for conveying the sheets through the furnace chamber, said entrance and discharge rolls operating at the same peripheral speed as the speed of the chain.

In testimony that I claim the above, I have hereunto subscribed my name.

THADDEUS F. BAILY