

April 24, 1934.

E. F. RUSS

1,956,401

HEATING FURNACE FOR BANDS AND WIRES

Filed June 18, 1932

2 Sheets-Sheet 1

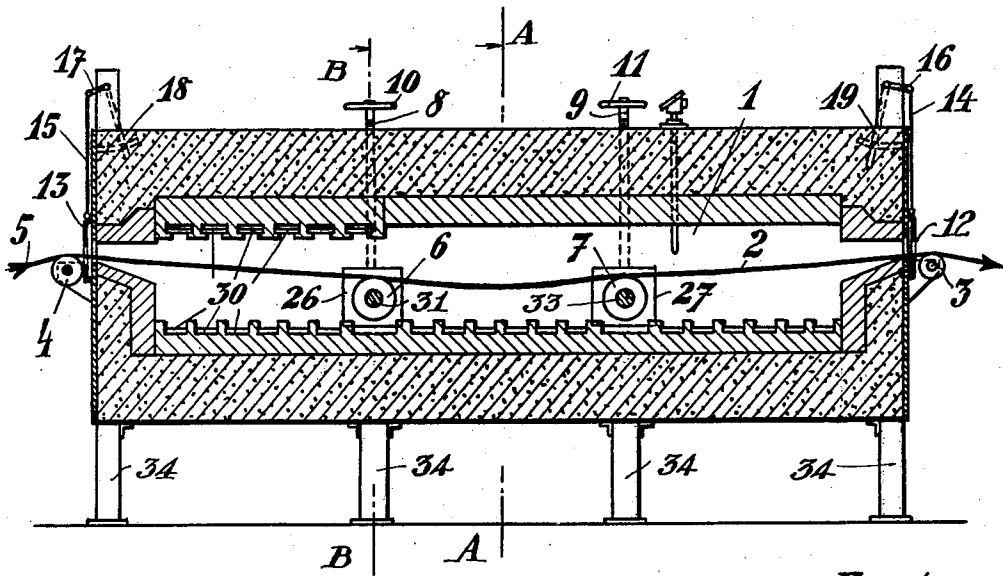


Fig. 1.

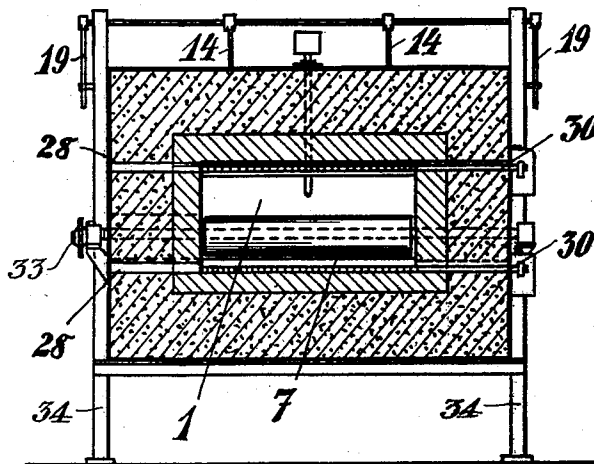


Fig. 2.

Section AA

Inventor:
Emil Friedrich Russ
By *[Signature]*
attorney

April 24, 1934.

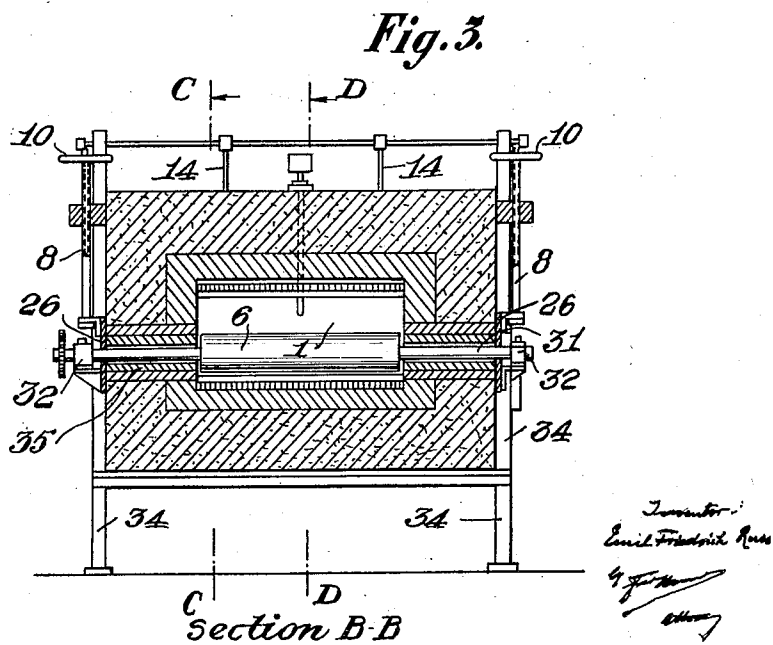
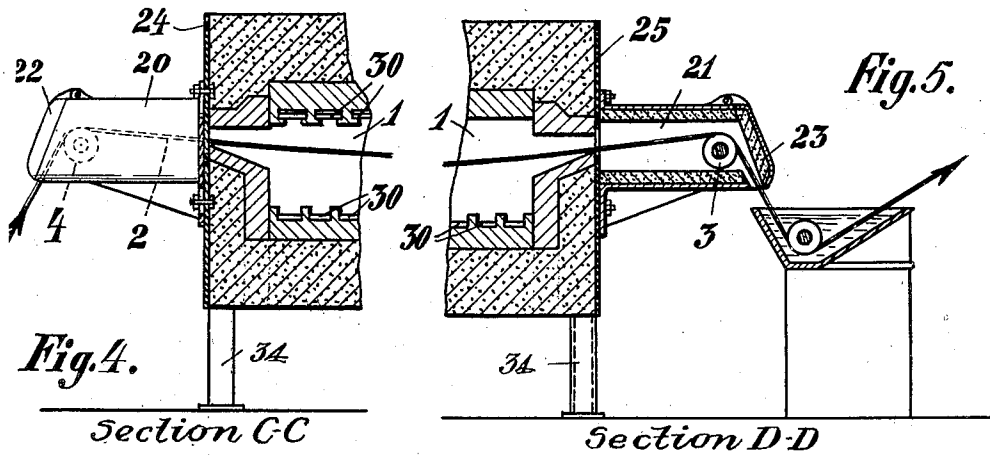
E. F. RUSS

1,956,401

HEATING FURNACE FOR BANDS AND WIRES

Filed June 18, 1932

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

1,956,401

HEATING FURNACE FOR BANDS AND WIRES

Emil Friedrich Russ, Cologne-on-the-Rhine,
Germany

Application June 18, 1932, Serial No. 617,998

7 Claims. (Cl. 263—3)

This invention relates to heating furnaces for bands and wires, which are moved by means of transporting rollers through a tunnel-shaped furnace heated by electric heating elements. By this new construction, it is rendered possible satisfactorily to employ a furnace with straight central axis and plane surfaces instead of a tunnel furnace the central axis of which is bent in a catenary curve such as that of the sag of a rope.

An embodiment of the invention is illustrated by way of example in the accompanying drawings in which:—

Fig. 1 shows a furnace in longitudinal section.

Fig. 2 is a cross section of the furnace shown in Fig. 1, taken on line A—A.

Fig. 3 is a section taken on line B—B of Fig. 1.

Fig. 4 is a part section taken as if on lines C—C of Fig. 3 but showing the feed end of the latter furnace.

Fig. 5 is a part section on line D—D of Fig. 3 showing the discharge end of the latter furnace.

In the drawings 1, designates the straight tunnel-shaped channel, through which the wire 2 to be heated is moved in the direction of the arrow 5 by means of conveyor rollers 3 and 4. Instead of bending the furnace in a catenary curve, the furnace is provided near its centre with supporting rollers 6 and 7 covered with refractory material, which rollers lie in vertical direction considerably lower than the conveyor rollers 3 and 4. Owing to these supporting rollers 6 and 7 the wire or band 2 is compelled to deflect slightly from the curve which would exist in the event of free hanging. As the rope curve near the middle produces a very deep sag and consequently just this portion of the rope curve is the cause of the difficulty in the production of a curved furnace channel in the known furnaces, it is possible, owing to the two supporting rollers 6 and 7, to employ the cheaper and more reliable furnace with straight central axis. As the supporting rollers 6 and 7 can be easily covered with refractory material and bear only at a point against the material to be heated, scores and scratches on the band can easily be avoided, which always occur if the wires or bands are moved through the furnace space in bearing on a plane surface. These known furnaces, in which it is possible to produce a straight line furnace tunnel with the aid of numerous supporting rollers in the furnace, are open to the objection that the heat distribution on the band is not nearly as uniform as with a freely hanging band or wire.

A number of possibilities of adjustment are provided on the furnace in order to avoid the difficulties which result from the changing of the sag curve, if the wire or band to be heated is of different material or has other cross-section. The supporting rollers 6 and 7 are adjustable, as shown in Fig. 3, in connection with the supporting roller 7. The axle 31 of the supporting roller 7 is mounted outside the furnace. The bearings 32 are fixed on iron plates 26, 27 which are bolted on the sheet metal casing 34 of the furnace. A spindle 8 provided with a hand wheel 10 is connected to each of the iron plates. The two apertures in the masonry at the insertion points of the supporting rollers are filled with refractory bricks 35. The iron plates 26, 27 can be dismantled with the bearings 32, the bricks 35 and supporting rollers withdrawn or adjusted into the desired position, as the iron plates 26 are provided with slots and can therefore be screwed to any desired height. The spindles 8 are attached to the iron plates 26, 27 as diagrammatically suggested in Fig. 1, and serve for effecting accurate horizontal adjustment. Consequently, it is possible, for example with constant conveying pull 5, to adjust the sag in the furnace so that the band or wire to be heated is situated at the correct distance from the heating elements fixed on the walls of the furnace channel. In a similar manner the conveyor rollers, which are situated outside the furnace, and also the furnace doors 12 and 13 can be made so that they can be lifted and lowered, this being effected in the case of the doors by two pull ropes 14 and 15, which are oscillatable through two-armed levers 16 and 17 by handles 18 and 19, whereas the rollers are provided with adjustable bearings and clamping screws. By this adjusting device it is possible, in a favorable manner, to also lift the conveying rollers 3 and 4 so that the sag of the material to be treated in the furnace is favorable enough for a uniform heating of the material.

In Figs. 3 and 4 the conveyor rollers 3 and 4 are mounted in the fore-chambers 20 and 21 and these chambers have flap doors 22 and 23 which only leave a very small gap for the introduction of the wire 2 to be heated and considerably facilitate the threading of the material. The whole chambers 20 and 21 are preferably shiftable in vertical direction for the purpose of adjustment. For this purpose it is advantageous to provide the flanges of the fore-chambers 20 and 21 with slots so that the fore-chambers can be shifted as desired relative to the end plates

24 and 25 after loosening the bolts 28. As the supporting rollers 6 and 7 in the furnace 1 must wear considerably in spite of a refractory covering of asbestos or the like, it is preferable to provide lateral apertures as shown in the region of the bearing blocks 26 and 27 in the furnace body, which are closed by insulating plates to be screwed thereover in order to enable these supporting rollers 6 and 7 to be easily and rapidly exchanged.

As these supporting rollers 6 and 7 are further only loaded by a very slight pressure from the wires 2, it being however difficult to make these supporting rollers 6 and 7 easily rotatable, it is advisable to mechanically drive these supporting rollers 6 and 7 at the same speed as that at which the material 2 is conveyed linearly in the direction of movement 5, in order to prevent slipping between the supporting rollers 6 and 7 and the material 2. This mechanical drive of the supporting rollers 6 and 7 may be effected in various manners, as can be imagined. The axles of the supporting rollers 6 and 7 may extend transversely through the furnace and be rotated directly or indirectly by a motor or by a gearing derived therefrom. It is also possible to interconnect the axles of the supporting rollers 6 and 7, for example by means of a chain, so that only one supporting roller must be driven.

The arrangement and distribution of the heating elements in the channel of the furnace requires special care. If the construction of the channel and the distribution of the heating elements is not carried out correctly, this is shown by the appearance of the bands heated in the furnace as soon as they leave the furnace. In this case they are bent or warped. The latter phenomenon is particularly apparent when the heating elements are arranged in the longitudinal direction of the furnace channel. In the furnace according to the invention the heating elements are therefore arranged transversely to the axis of the furnace. Further a larger number of heating elements are arranged on the admission side of the furnace, firstly in order to utilize the greater heat drop at the admission point of the furnace and secondly in order to make it possible to distribute the heat uniformly over the material over its entire width and length when it is moving towards the discharge end of the furnace.

In order to enable a defective heating element

to be exchanged, if necessary whilst the furnace is in use, these elements can be so arranged that they can be removed from the furnace in lateral direction. The apertures for introducing and removing the heating elements 30 are evidently made as narrow as possible in order to prevent loss of heat.

I claim:—

1. In heating furnaces with rectilineal central axis and conveyor rollers for the bands and wires situated outside the furnace, supporting rollers near the middle of the furnace, covered with refractory material and situated considerably lower in vertical direction than the conveyor rollers serving for conveying the material to be heated.

2. In heating furnaces with straight line longitudinal axis and low-lying supporting rollers in the middle of the furnace, carriers for the supporting rollers provided with means for a vertical adjustment of the rollers.

3. In heating furnaces with supporting rollers covered with refractory material in a generally central region of the furnace, furnace walls having lateral apertures within the range of movement of the supporting rollers to allow the easy exchanging of the rollers.

4. In heating furnaces with supporting rollers situated in a generally central region of the furnace, mechanical drive for the supporting rollers to reliably prevent a slipping between the material to be heated and the supporting rollers.

5. In heating furnaces with rectilineal longitudinal axis and conveyor rolls for conveying through the furnace material to be heated in otherwise freely hanging state, supports for the shafts of said rollers, and means connected therewith for a vertical shifting of the conveyor rollers.

6. In heating furnaces with vertically adjustable conveyor rollers, the combination of adjustable conveyor roller carriers with the furnace doors to permit of said doors being adjusted with said carriers.

7. In heating furnaces with rectilineal longitudinal axis and external conveyor rollers and furnace doors adjustable in vertical direction, insulated extension chambers carrying the conveyor rollers and the furnace doors as inclined flaps, and means for securing the same selectively at different heights relative to the furnace body.

EMIL FRIEDRICH RUSS.