

May 18, 1943

R. W. COOK

2,319,302

CONTACT STRIP ANNEALING FURNACE

Filed Aug. 17, 1942

Fig. 1

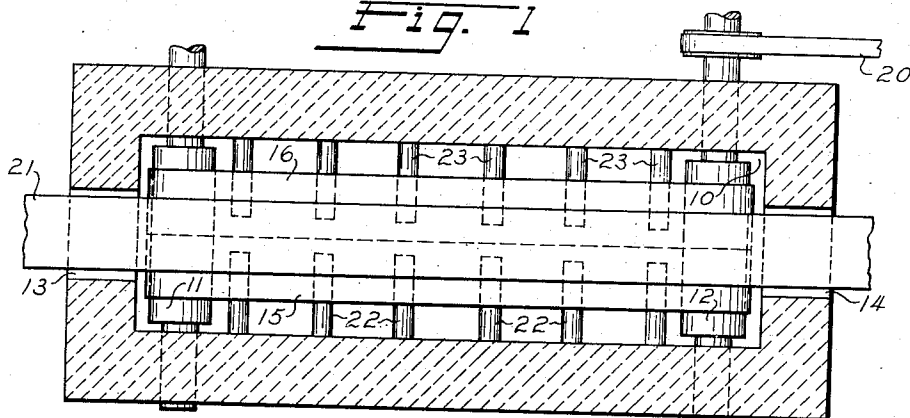


Fig. 2

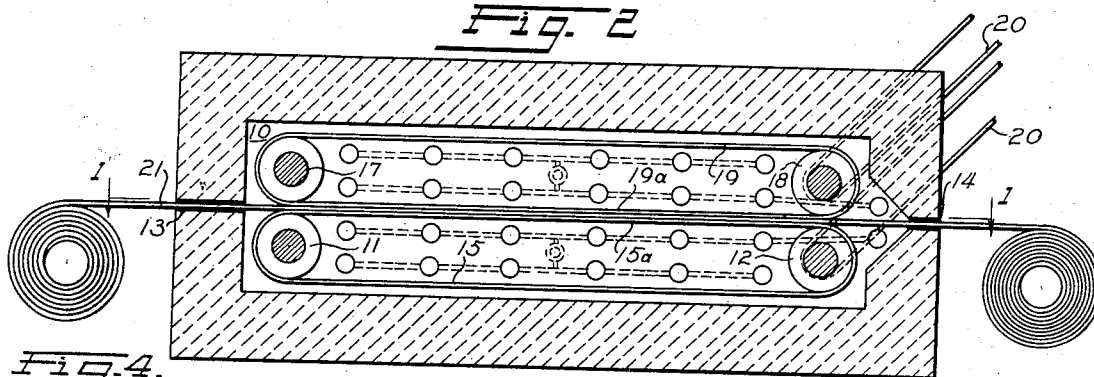


Fig. 4

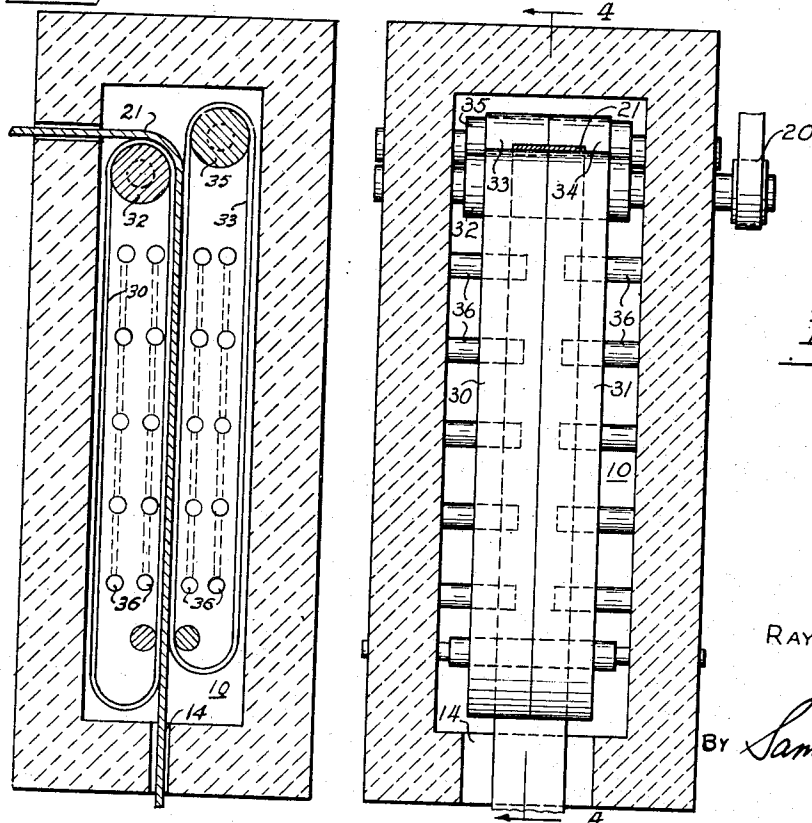


Fig. 3

Inventor
RAYMOND W. COOK

By *Samuel Kruever*
Attorney

UNITED STATES PATENT OFFICE

2,319,302

CONTACT STRIP ANNEALING FURNACE

Raymond W. Cook, Bristol, Conn., assignor to
Associated Spring Corporation, Bristol, Conn.,
a corporation of Delaware

Application August 17, 1942, Serial No. 455,104

3 Claims. (Cl. 266—3)

This application is a continuation in part of my co-pending application Serial No. 294,017, filed September 8, 1939, for Contact strip annealing furnace.

By the invention disclosed in this and the parent application I provide means for heating metal strip, in which two imperforate, endless metallic belts are mounted on pulleys so that parts thereof will be in opposed, face-to-face relation and will be spaced sufficiently to engage the opposite faces of a strip of metal therebetween, the belts and the strip being moved to cause the contacting parts thereof to travel together throughout a part of the total travel of the belts, and the belts being heated in order to transfer heat to the metal strip by conduction throughout the contacting length of the belts and strip.

It is the object of the invention particularly disclosed and claimed in this application to provide a strip heating apparatus of the type described which includes means for differentially heating the longitudinal sides or edges of the metal strip.

Other objects and features of novelty of the invention will be made apparent by the following description and the annexed drawing which, it will be understood, is merely illustrative of the invention, which is not limited in any way thereby or otherwise than by the appended claims.

Referring to the drawing, in which similar reference numerals refer to like parts,

Fig. 1 is a plan view of a heat treating apparatus according to the invention, taken on the line 1—1 of Fig. 2;

Fig. 2 is a vertical sectional view of a heat treating apparatus according to my invention, and

Fig. 3 is a view of a second form of a heat treating apparatus embodying my invention.

It is often necessary to heat metal strip in such a way that one longitudinal part thereof is at a temperature different from that of another longitudinal part. By this invention I provide heating means, in general accordance with the invention described and claimed in the parent case and generally outlined hereinbefore, which are particularly adapted and intended to effect such differential heating. One form which such means may take is disclosed in Figs. 1 and 2 and comprises a pair of horizontal pulleys 11, 12 which are rotatably mounted in a furnace chamber 10 and are positioned, respectively, adjacent the inlet and outlet ports 13 and 14 of such furnace. Mounted on these pulleys 11, 12 are two

imperforate metallic belts 15, 16 arranged in side-by-side relation. Above the pulleys 11, 12 and parallel thereto are a second pair of pulleys 17, 18 which also have mounted thereon two imperforate metallic heating belts in side-by-side relation, only one belt 19 of this pair being shown. The belts and pulleys are so positioned that adjacent reaches, such as 15a, 19a, of the belts are in opposed, face-to-face parallel relation and are spaced apart sufficiently to permit a metal strip to be positioned therebetween with its opposite sides or faces in face-to-face contactual engagement with the spaced, opposed faces of the belts. The pulleys are driven by suitable means such as the belt driving means 20. The strip of metal 21 is pulled through the furnace by reason of the frictional engagement between the opposite faces of the strip and the outer faces of adjacent reaches of the belts. Banks of heating means 22, 23, diagrammatically illustrated in the drawing as a plurality of radiant tube heating elements, project from each side of the furnace into the chamber and are preferably so disposed within the chamber that all portions of the belts are heated. It should be clearly understood that the invention is not limited in any way to any particular form or type of heating means.

This invention may also be applied to a vertical or inclined type of furnace, as illustrated in Fig. 3 of the drawing. In this figure there is illustrated a vertically elongated furnace having disposed therein two heating belts 30, 31 which are arranged in side-by-side relation and which are trained over pulley 32, a strip of metal 21 being maintained in face-to-face contact with the belts in the manner hereinbefore described. A second pair of belts 33, 34, which are trained over and depend from a second pulley 35, may be disposed in contactual relationship to the opposite face of the metal strip, if desired. Suitable heating means 36 are disposed in the furnace chamber and are shown as separate radiant tube heaters for each belt.

In accordance with the invention disclosed herein the strip is introduced into the furnace through the inlet port and led through the chamber between the heated belts and out of the furnace through the outlet port therein, the strip being maintained in face-to-face contact with the belts at all times. In order to heat one longitudinal edge portion of the strip differently from the opposite longitudinal edge portion more heat may be applied to one set of the belts than is applied to the other set which, of course,

may be effected by differential operation of the radiant tube heaters. The strip may overlap the belts in any desired proportion in order to differentially heat different relative portions thereof.

While I have described and illustrated various forms which my invention may take, it will be apparent to those skilled in the art that other embodiments of the invention may be made and that improvements and changes may be made therein, all without departing in any way from the spirit or scope of the invention, for the limits of which reference must be had to the appended claims.

What is claimed is:

1. An apparatus for differentially heating longitudinal parts of a strip of metal, comprising two groups of endless imperforate metallic belts, the belts of each group being arranged in side-by-side relation and the belts of one group having parts thereof disposed in face-to-face relation to the corresponding parts of the belts of the second group and being spaced from such corresponding parts sufficiently to receive a metal strip therebetween with the opposite faces of the metal strip in face-to-face contactual engagement with the belts and in such a position laterally of the belts that different longitudinal parts of the strip are in face-to-face contactual engagement with different belts of each group, and means for differentially heating said belts to thereby differentially heat the strip.

2. An apparatus for differentially heating longitudinal parts of a strip of metal, comprising two groups of horizontally disposed, endless, im-

perforate metallic belts, the belts of each group being arranged in side-by-side relation and the belts of one group having parts thereof disposed in face-to-face relation to the corresponding

5 parts of the belts of the second group and being spaced from such corresponding parts sufficiently to receive a metal strip therebetween with the opposite faces of the metal strip in face-to-face contactual engagement with the belts and in
10 such a position laterally of the belts that different longitudinal parts of the strip are in face-to-face contactual engagement with different belts of each group, and means for differentially heating said belts to thereby differentially heat the
15 strip.

3. An apparatus for differentially heating longitudinal parts of a strip of metal, comprising two groups of vertically disposed endless, imperforate metallic belts, the belts of each group being arranged in side-by-side relation and the
20 belts of one group having parts thereof disposed in face-to-face relation to the corresponding parts of the belts of the second group and being spaced from such corresponding parts sufficiently to receive a metal strip therebetween with the
25 opposite faces of the metal strip in face-to-face contactual engagement with the belts and in such a position laterally of the belts that different longitudinal parts of the strip are in face-to-face contactual engagement with different
30 belts of each group, and means for differentially heating said belts to thereby differentially heat the strip.

RAYMOND W. COOK.