

F. H. DANIELS.
 APPARATUS FOR ANNEALING FLATS AND OTHER SHAPES.
 APPLICATION FILED MAR. 6, 1909.

943,625.

Patented Dec. 14, 1909.
 2 SHEETS—SHEET 1.

Fig. 1.

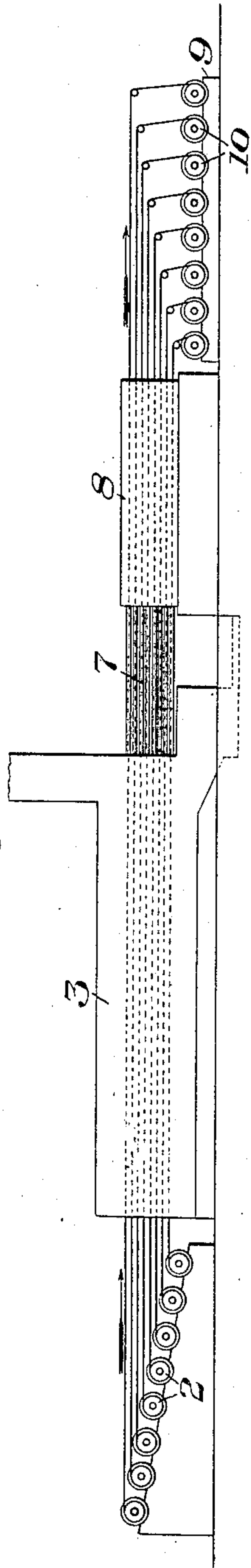
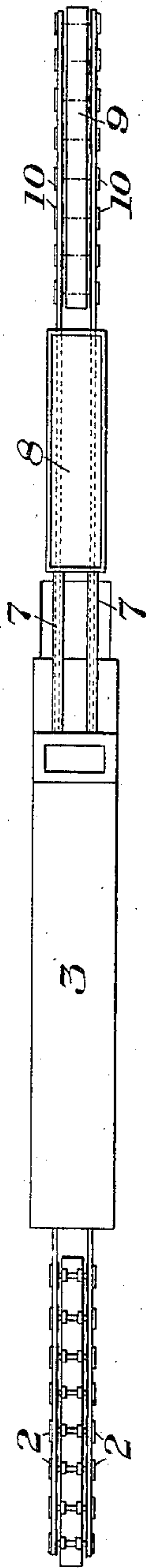


Fig. 2.



WITNESSES

R. A. Balderson
 J. L. Bunters

INVENTOR

F. H. Daniels,
 by Bakewell, Symes & Parnelle,
 his Attys

943,625.

F. H. DANIELS.
 APPARATUS FOR ANNEALING FLATS AND OTHER SHAPES.
 APPLICATION FILED MAR. 6, 1909.

Patented Dec. 14, 1909.

2 SHEETS—SHEET 2.

Fig. 3.

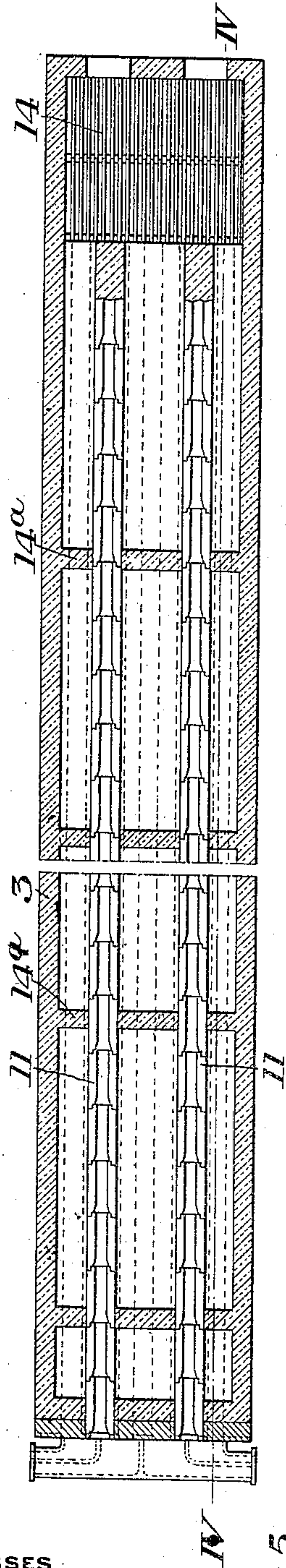


Fig. 4.

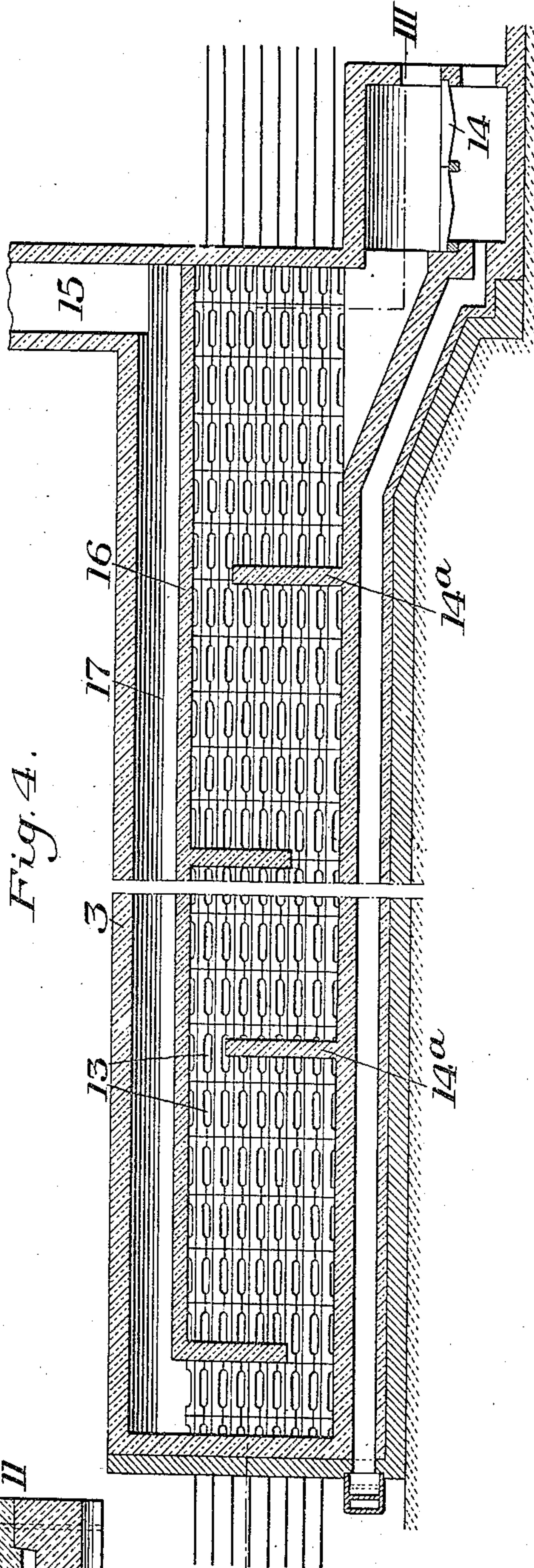
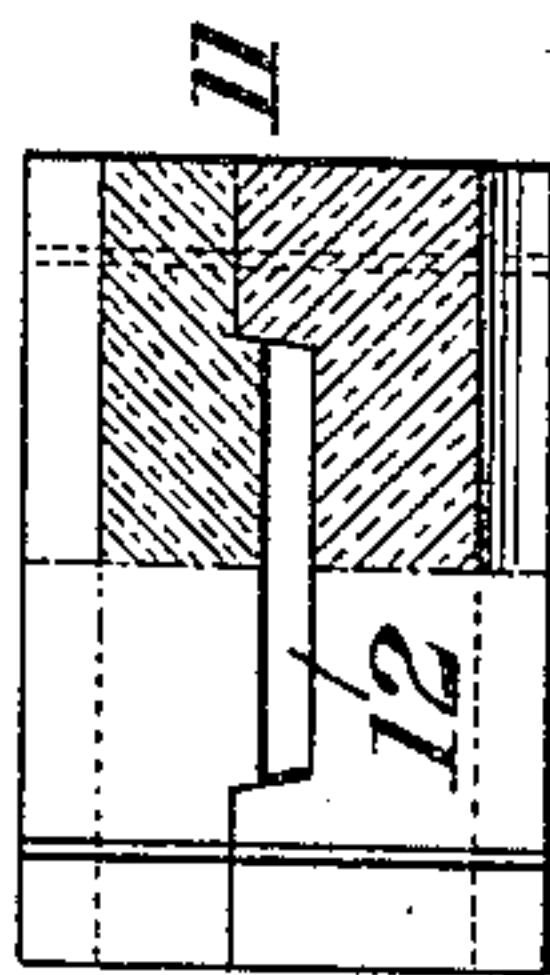


Fig. 5.



WITNESSES

R. A. Balderson,
 G. L. Brunters

INVENTOR

F. H. Daniels,
 by Baker, Dymers & Parnell,
 His Attys

UNITED STATES PATENT OFFICE.

FRED H. DANIELS, OF WORCESTER, MASSACHUSETTS.

APPARATUS FOR ANNEALING FLATS AND OTHER SHAPES.

943,625.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Original application filed December 8, 1908, Serial No. 466,471. Divided and this application filed March 6, 1909. Serial No. 481,593.

To all whom it may concern:

Be it known that I, FRED H. DANIELS, of Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Annealing Flats and other Shapes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view showing diagrammatically one form of apparatus embodying my invention; Fig. 2 is a plan view of the same; Fig. 3 is a horizontal section of one form of furnace; Fig. 4 is a vertical section of the same; Fig. 5 is a detail view showing one of the sectional bricks.

My invention has relation to apparatus for annealing flats and other metal shapes and is especially applicable to shapes of long length and of various widths, and is designed to provide a continuous process, together with apparatus for carrying out the same which will insure a uniform grade of material both physically and chemically. For round wire or narrow flats common muffle or pot annealing is more or less satisfactory in its results, as the heat penetrates comparatively quickly through the coils. The wider, however, the section is the longer it will take for the heat to penetrate the closely wound bundle, and when it cools off, the outer portions will cool much more quickly than the inner portions; all these conditions prevent obtaining uniform grade of product.

This application forms a divisional part of my copending application. Serial Number 466,471, filed Dec. 8, 1908, for method for annealing flats and other shapes.

My invention is designed to provide means by which the flats or other sections may be subjected to a uniform heating and cooling action throughout, thereby insuring a uniform texture and hardness.

In accordance with my invention, the flats when rolled in a rolling mill are reeled up into close bundles. These bundles are afterward placed on an unreeling apparatus, such as indicated at 2 in Figs. 1 and 2, and the unreeling flats are led therefrom through an annealing furnace, such as shown at 3 in Figs. 1, 2, 3 and 4. After passing out of the annealing furnace, the flats are gradually cooled without coming into contact with

the outer air. For this purpose, they are first passed through protecting pipes or tubes 7, and then through a receptacle 8, containing a mass or packing consisting of coal, coke or other carbonaceous material, which in contact with the hot metal forms a non-oxidizing gas. Any other material which will form such a gas in contact with the metal and which is in other respects non-injurious, may also be employed. This gas also excludes the air, and for these reasons the metal is completely protected against oxidation. The flats are then wound up on a suitable take-up frame 9, having reeling or coiling drums 10, upon which they are wound.

In the particular arrangement of apparatus shown in the drawings, provision is made for simultaneously annealing sixteen different flats, there being two sets of the unreeling rollers, 2, arranged side by side, and each set containing eight rollers in successively lower planes, as shown in Fig. 1. The take-up frame 9 is provided with a similar number of the coiling or take-up rollers 10.

The furnace 3 is shown as having two parallel series of bricks 11, each of which is made in two sections, as shown in Fig. 5, with a space 12 between the sections for the flat to pass through. The bricks are also thicker at their ends than at their intermediate portions, as shown in Fig. 4, so as to provide the lateral spaces or openings 13. Any desired number of these openings may be filled up with brick or other material, so as to properly distribute the heat where it is wanted or they may be all left open. The furnace is provided with a fire grate 14, at one end, the fire being led from the grate around the rows of bricks and baffle walls 14^a, and then back up over the rows of bricks to the chimney or stack 15, a suitable longitudinal baffle 16 being provided to form the upper flue 17, leading to the stack.

The furnace shown and described is heated by coal or coke, but an equal result could be obtained by a furnace heated with gas, oil or any other manner known to the arts.

The advantages of my invention result from the uniform heating and cooling of the flats, whereby uniformity in the texture and hardness of the steel is obtained. Also from the simplicity of the apparatus which

enables the process to be carried out continuously and with rapidity, it being possible to anneal a large number of flats or other sections simultaneously, thereby making possible a low manufacturing cost. It will be understood that any desired number of flats or other sections can be simultaneously annealed.

It will be noticed that several wires, strips or flats, instead of, as commonly is the case, being run side by side in a horizontal plane, are placed one above the other in vertical planes. By this arrangement, the workmen have easy access to all the wires which would not be the case if many wires were placed horizontally.

It will also be understood that any annealing furnace can be substituted for the furnace shown in the drawings. An annealing furnace such as shown in my application Serial No. 481,594 filed March 6, 1908 can be readily substituted therefor.

I claim:

1. Apparatus for annealing flats and other metal sections, comprising an annealing furnace, unreeling apparatus at one end of the furnace, a mass of carbonaceous material beyond the furnace, means to exclude the air from the flats during their passage from the furnace to and through the carbonaceous material, and re-reeling or take-up apparatus beyond the carbonaceous material; substantially as described.

2. Apparatus for annealing flats and other metal sections comprising an annealing furnace, unreeling apparatus at one end of the furnace, an inclosed cooling chamber containing carbonaceous material at the opposite end of the furnace, and re-reeling or take-up mechanism beyond the cooling chamber, and means to exclude the air from contact with the flats during their passage through the apparatus; substantially as described.

3. Apparatus for annealing flats and other metal sections, comprising an annealing furnace, unreeling apparatus at one end of the furnace, re-reeling or take-up apparatus at the other end of the furnace, a cooling chamber containing a mass of carbonaceous material intermediate of the re-reeling or take-up apparatus and the adjacent end of the furnace, and closed guides for guiding the flats or other sections from the furnace into the cooling chamber; substantially as described.

4. In apparatus for annealing flats and other metal sections, an annealing furnace having a longitudinally extending series of sectional bricks therein, said bricks having longitudinal openings therethrough formed between the sections of said bricks to provide passages for the articles to be annealed, and also having transverse openings between adjacent bricks; substantially as described.

5. In apparatus for annealing flats and

other metal sections having therein a longitudinally extending series of sectional bricks having longitudinal openings between the sections of said bricks placed one upon another and forming therein a plurality of longitudinally extending passages one above the other for the articles to be annealed, said bricks also having transverse openings between adjacent bricks for conducting heat over and under said passages; substantially as described.

6. Apparatus for annealing flats and the like, comprising an annealing furnace having a vertical wall extending throughout the length of said furnace, a plurality of guides or passages for the flats extending through the wall, the sides of said wall being exposed to the heat of the furnace, and circulating openings through said wall above and below the passages, a plurality of unreeling devices at one end of the furnace, and a plurality of re-reeling devices at the opposite end of the furnace; substantially as described.

7. In apparatus for annealing flats and the like, an annealing furnace having a longitudinal wall therein, a plurality of separate annealing passages therein in the same vertical plane, the sides of said wall being exposed to the heat of the furnace, and transverse openings through the wall above and below the passages to circulate the heat around said passages; substantially as described.

8. Apparatus for annealing flats and other metal sections, comprising an annealing furnace, a receptacle containing carbonaceous material, and means to pass the flats through the furnace and then through the receptacle containing the carbonaceous material, and means to exclude the air from contact with the flats during their passage through the apparatus; substantially as described.

9. Apparatus for annealing flats and other metal sections, comprising an annealing furnace, a receptacle containing a mass of carbonaceous material, unreeling apparatus at one end of the furnace, re-reeling or take-up apparatus at the other end of the furnace, and an inclosed guide for each flat to guide and exclude the air from the flats or other sections, in their passage from the furnace to the receptacle containing carbonaceous material; substantially as described.

10. Apparatus for annealing flats and other metal sections, comprising an annealing furnace, unreeling apparatus at one end of the furnace, re-reeling or take-up apparatus at the other end of the furnace, a cooling chamber containing carbonaceous material intermediate of the re-reeling or take-up apparatus and the adjacent end of the furnace, and closed guides in a vertical plane for guiding and preventing the air from contacting with the flats or other sections

in their passage from the furnace into the cooling chamber; substantially as described.

11. In apparatus for annealing flats and other metal sections, an annealing furnace 5 having a longitudinally extending wall composed of a series of sectional bricks in a vertical plane, said bricks having longitudinal openings therethrough formed between the sections of said bricks to provide passages 10 for the articles to be annealed; substantially as described.

12. In apparatus for annealing flats or other metal sections, an annealing furnace having a longitudinally extending series of 15 sectional bricks in a vertical plane, said bricks having longitudinal openings therethrough formed between the sections of said bricks to provide passages for the articles to be annealed, and also having lateral pas- 20 sages intersecting said openings; substantially as described.

13. Apparatus for annealing flats and the like, comprising an annealing furnace hav- 25 ing a plurality of guides or passages in a vertical plane for the flats, a plurality of unreeling devices at one end of the furnace, a mass of carbonaceous material beyond the furnace, a plurality of re-reeling devices be- 30 yond the carbonaceous material, and means to prevent the flats from contacting with the air during their entire passage through the furnace; substantially as described.

14. In apparatus for annealing flats and

the like, an annealing furnace having a plurality of separate annealing passages in 35 a vertical plane to receive the flats, and a receptacle beyond the furnace containing carbonaceous material; substantially as described.

15. In apparatus for treating flats and 40 the like, an annealing furnace having inclosed passage extending therethrough from which air and steam are excluded, a cooling chamber beyond said furnace and connected to the passage in which the flat is gradually 45 cooled in a non-oxidizing atmosphere, and means to continuously draw the flat through the passage in the furnace into and through the cooling chamber; substantially as de- 50 scribed.

16. In apparatus for treating flats and the like, an annealing furnace having a plurality of inclosed passages extending therethrough, a cooling chamber containing a carbonaceous 55 atmosphere beyond the furnace and connected to the passages, and means to continuously draw the flats through the passages in the furnace and the cooling chamber; sub- 60 stantially as described.

In testimony whereof, I have hereunto set my hand.

FRED H. DANIELS.

Witnesses:

A. F. BACKLIN,
GEO. SIEURM.