Dec. 27, 1938. H. M. COX 2,141,518

ART OF ANNEALING SHEETS

Filed Jan. 2, 1937

Fig. 1

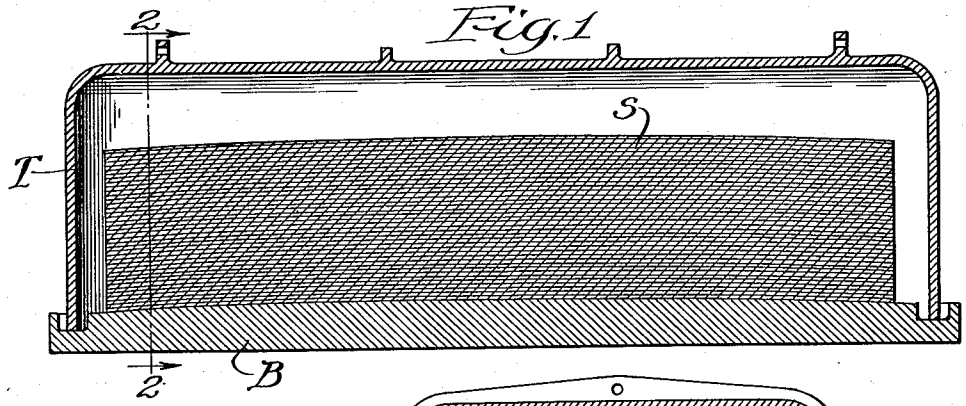


Fig. 2

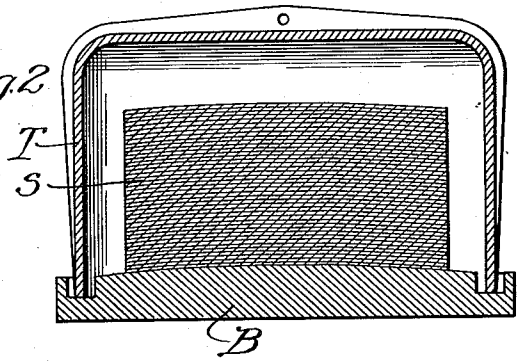


Fig. 3

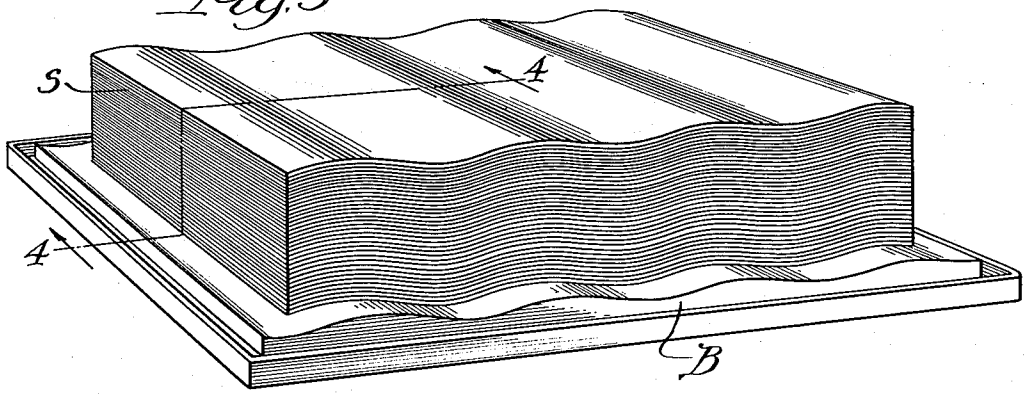
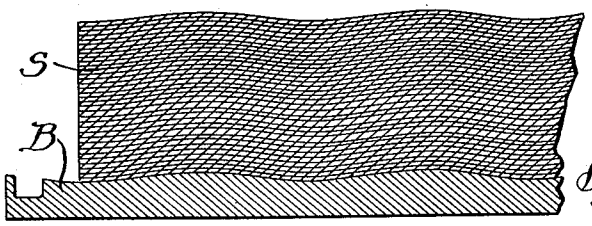


Fig. 4



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ART OF ANNEALING SHEETS

Herbert M. Cox, Kokomo, Ind.

Application January 2, 1937, Serial No. 118,784

1 Claim. (Cl. 148—12)

My invention which relates generally to the art of annealing sheets is concerned particularly with a method and apparatus used in connection with the box annealing of sheets of steel or iron. One difficulty which is common to the practices now employed is that the sheets, after annealing, tend to warp or twist, thereby acquiring a deflection from a flat plane. To overcome this tendency various expedients have been used, but all of them are unsatisfactory in some degree or other. It is a primary object of this invention to provide ways and means of performing an annealing operation on sheets of iron or steel so that the sheets, upon cooling, will lie in flat condition, and be free from any warp or twist such as is common at the present time.

In the accompanying drawing is shown an exemplification of apparatus suitable for carrying out my invention, Fig. 1 being a central longitudinal section through an annealing box and bottom upon which a pile of sheets is rested; Fig. 2, a transverse section taken on line 2—2 of Fig. 1; Fig. 3, a perspective view of a stack of sheets on an annealing bottom of modified construction; and Fig. 4, a fragmentary view in section on line 4—4 of Fig. 3.

In carrying out this invention, a plurality of sheets are arranged in a stack S upon the upper surface of a bottom B, over which is fitted an enclosing top T, commonly referred to as a box. While so stacked and enclosed within the box, the entire pile of sheets is subjected to an annealing temperature, following which the sheets are cooled, separated and removed.

The sheets to be annealed, according to my invention, need not have any fullness in the center. They may, if desired, be rolled dead flat—the most desirable condition if it can be maintained. Even so, it is difficult to prevent the sheet from twisting. In practice, sheets are commonly cold rolled in such a way as to acquire a slight convexity (or concavity, depending upon which face is viewed), in preparation for the succeeding step of roller leveling. This convex (or concave) pre-shaping may be dispensed with, as will now be explained.

The bottom on which the sheets are stacked for annealing is shaped with an upper surface which is ellipsoidal, as shown in Figs. 1 and 2, or which is provided with a plurality of convex curves, as shown in Figs. 3 and 4. According to Figs. 1 and 2, the upper surface of the bottom rises through a curve from its opposite ends and sides toward a point of highest elevation in the center, thus producing an ellipsoid. The sheets which are piled upon such a surface take on a corresponding curvature, inclining downwardly toward the opposite ends and sides, as shown. After annealing, followed by cooling, each sheet may be passed through a roller level, whereupon it is flattened and will remain so indefinitely.

With the bottom shaped as shown in Figs. 3 and 4, I provide a series of convex surfaces, arranged in succession. The stack of sheets which is placed upon such a surface takes on a corresponding form. In this condition they will remain throughout the annealing operation, but thereafter, upon cooling and separation, they will lie perfectly flat, once they are put through a roller level.

In the practice of this invention, I depend upon the utilization of certain forces which heretofore have been uncontrolled, whereby the resulting sheets are wavy or twisted. The improved condition of the sheets, i. e., their flat condition, may perhaps be due to greater freedom for contraction and expansion, particularly those sheets at the bottom of the pile. The employment of a convex surface, either single or multiple, seems to facilitate such movement with the consequent elimination of any strains which tend ultimately to produce a wave or twist in the sheets, when cooled. The sheets to be treated according to my invention are produced by the usual process, but it is unnecessary that there be any fullness in their center regions, as is commonly the case when cold rolling is employed.

I claim:

In the process of producing flat annealed sheets, the steps of supporting a plurality of stacked sheets between the margins thereof upon a rectangular supporting surface which is arched from a central portion toward each of the margins of the support while annealing so that portions of the sheets are caused to bulge out of a flat plane, thereafter removing and separating said sheets, and finally passing the sheets through a roller level while cool.

HERBERT M. COX.