H. B. ROSE AND W. B. ENCK.

ANNEALING BOX.

APPLICATION FILED JUNE 30, 1919.

1,340,675.

Patented May 18, 1920.

3 SHEETS—SHEET 1.

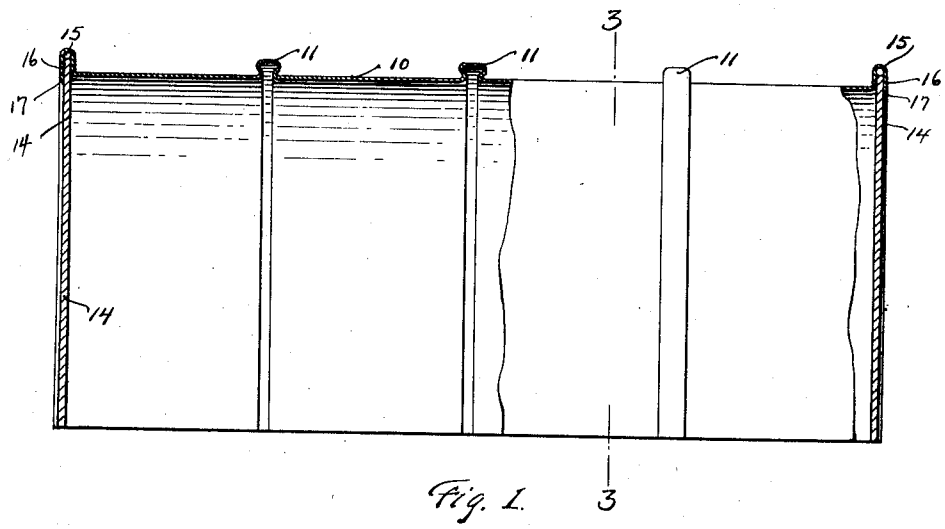


Fig. 1.

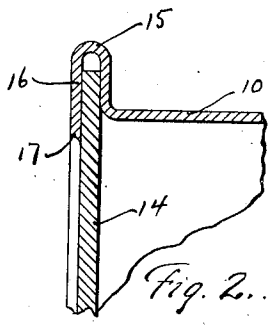


Fig. 2.

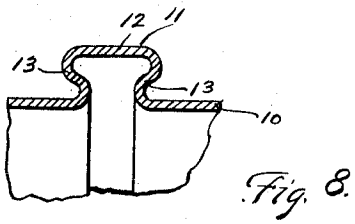


Fig. 8.

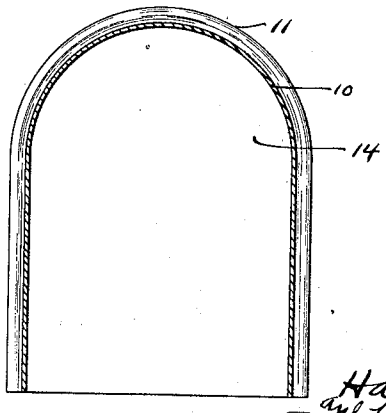


Fig. 3.

INVENTORS
Harry B. Rose
and Walter B. Enck
By J. W. McEllis
ATTORNEY

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3 SHEETS—SHEET 2.

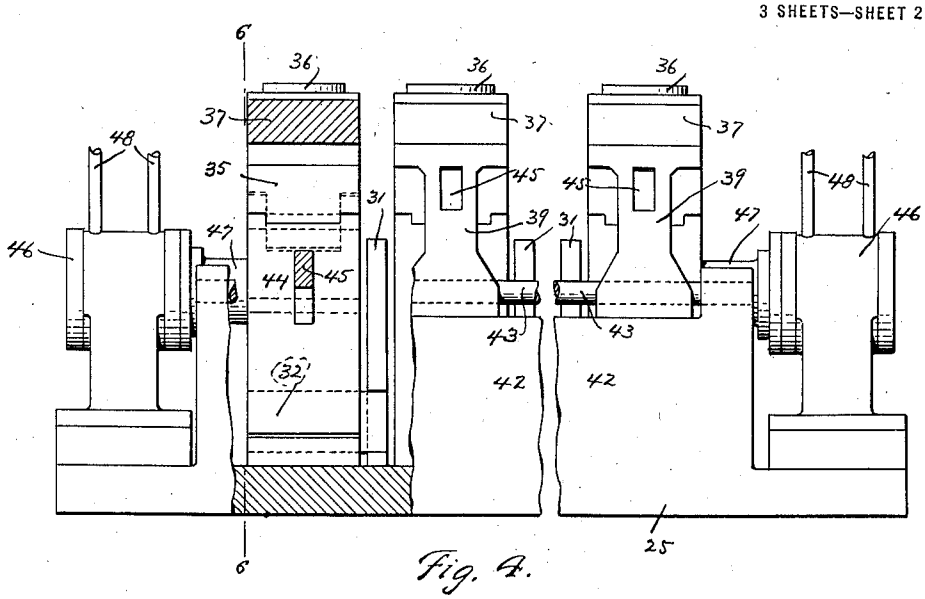


Fig. 4.

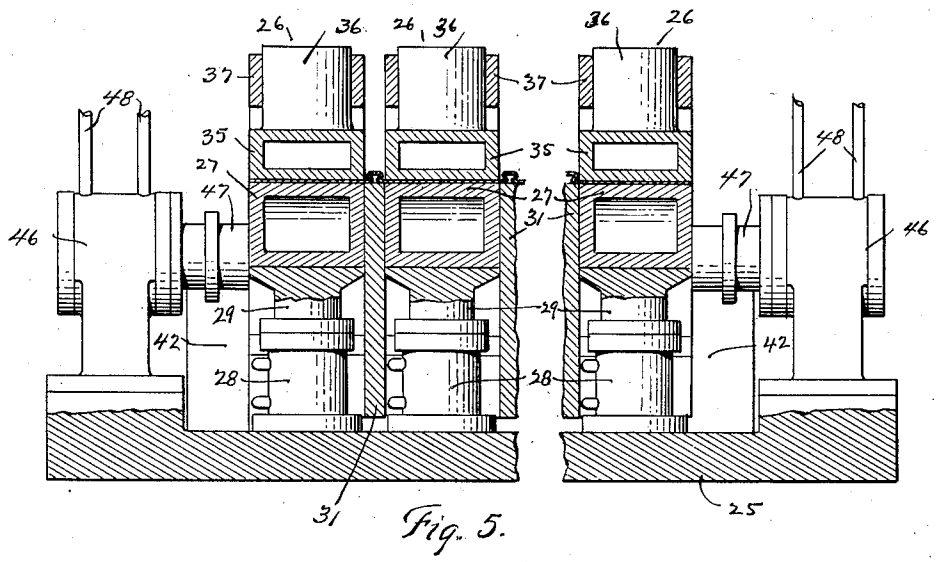


Fig. 5.

INVENTORS
Harry B. Rose
and Walter B. Enck
BY
ATTORNEY

H. B. ROSE AND W. B. ENCK.

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3 SHEETS—SHEET 3.

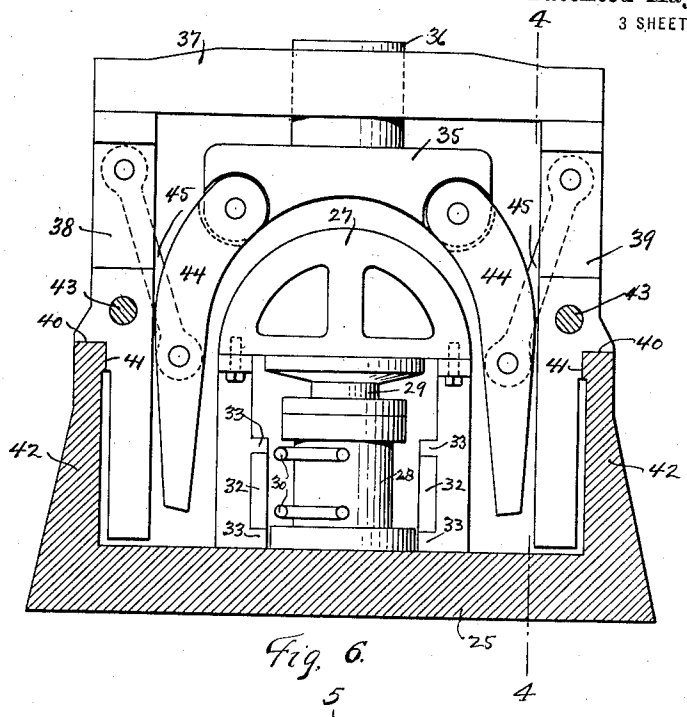


Fig. 6.

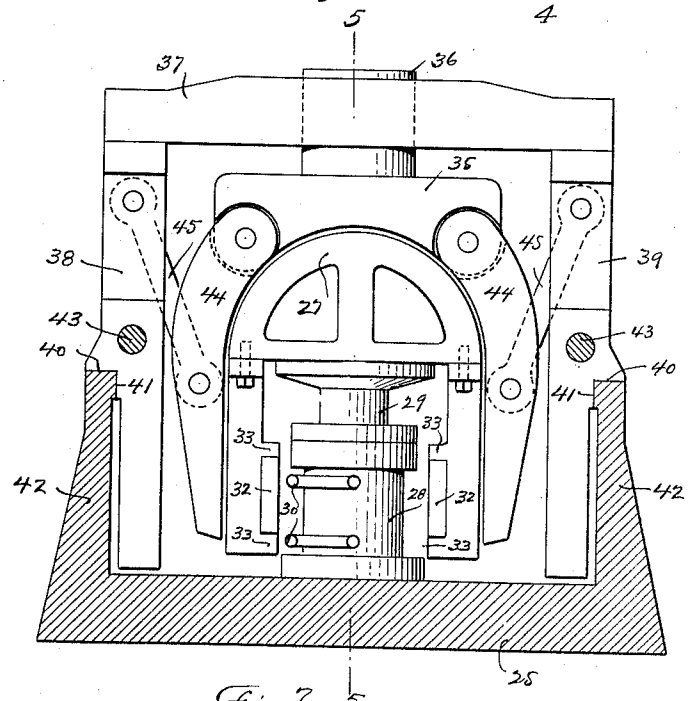


Fig. 7.

INVENTORS
Harry B. Rose
and Walter B. Enck
BY
J. W. Ellis
ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY B. ROSE AND WALTER B. ENCK, OF BUFFALO, NEW YORK.

ANNEALING-BOX.

1,340,675. Specification of Letters Patent. Patented May 18, 1920.

Application filed June 30, 1919. Serial No. 307,772.

To all whom it may concern:

Be it known that we, HARRY B. ROSE and WALTER B. ENCK, citizens of the United States of America, and residents of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Annealing-Boxes, of which the following is a full, clear, and exact description.

It is well known to those skilled in the art that large annealing boxes, if not stiffened by some means, collapse very readily when in the presence of the intense heat to which they are subjected. In boxes made of steel plate this stiffening is usually accomplished by riveting or otherwise fastening angle-iron or other structural steel braces to the exterior or interior of the boxes. The objection to this built-up form of construction is that the rivets become loose or burn off and admit air into the box. Other boxes have been made of cast steel with a series of ribs cast integral, but such structures are not only heavy, requiring a long time for the heat to penetrate the thick walls, but the walls thereof become fire-cracked, thereby rendering the box useless.

The general object of our invention has been to provide an annealing box in which all the objections above noted shall be obviated, and a box produced of steel plate having integral corrugations or ridges.

Another object has been to produce a box which is very durable, and one which can be repaired if it becomes distorted by continual use.

Moreover, our annealing box is very rigid and strong; yet it is of such construction that it is free to expand and contract, and is one which will remain air-tight.

Furthermore, our annealing box is provided with a plurality of reinforcing corrugations, so formed in the body of the box that the material at the corrugations remains substantially the same thickness as that of the body.

The above objects and advantages, as well as others which will be apparent to those skilled in the art, have been accomplished by the device shown in the accompanying drawings and by the process hereinafter described. In the drawings:

Figure 1 shows a side elevation of our annealing box, partly in section.

Fig. 2 shows an enlarged, fragmentary, sectional view showing one of the end corrugations and one of the end heads pressed therein.

Fig. 3 is a transverse, sectional view of the annealing box taken on line 3—3 of Fig. 1.

Fig. 4 is a side elevation of one form of apparatus for making our annealing box, one unit thereof being shown in section, and taken on line 4—4 of Fig. 6.

Fig. 5 is a fragmentary, longitudinal, sectional view of the apparatus, taken on line 5—5 of Fig. 7.

Fig. 6 is a transverse, sectional view of the apparatus and is taken on line 6—6 of Fig. 1, showing the parts in their open positions.

Fig. 7 is a similar view, showing the parts in their closed positions.

Fig. 8 is an enlarged view of one of the corrugations.

Referring to Figs. 1 to 3 and 8 of the drawings, it will be seen, that the body 10 of our box is made from a single sheet of steel plate, having a substantially inverted U-shape cross-section and provided throughout its length with a number of lateral corrugations 11. These corrugations have preferably a substantially flat, or slightly curved top 12 and sides 13 which are substantially S-shaped, so that the top of each corrugation is wider than at the point where it joins the body, whereby maximum longitudinal expansion and contraction is provided for.

The end heads 14 of our box are preferably made also of steel plate and are secured within the end corrugations 15. After the head is in place, the outer overhanging portion 16 thereof is welded to the head 14 along the edge 17. The end corrugations 15 are formed preferably from the regular corrugations 11. The regular corrugation is formed at each end of the box body, and, after the end head 14 has been placed within the same the end corrugation is flattened, by any suitable means, down upon the portion of the end head lying between the sides of the corrugation, whereby an end corrugation 15, shown in Fig. 2, is formed.

Referring to Figs. 4 and 7, where we show one form of apparatus by which our annealing box may be made, 25 is the bed plate which supports all the parts of the device. The bending and forming of the

corrugations is produced by a series of units 26, one greater in number than the number of corrugations to be formed. Each unit comprises an inner core 27, of substantially the general interior shape of the box. This core may be made up of sections as shown or may be one integral part. It is preferably provided with a jacket so that it may be cooled by the circulation of water. Suitable and well known means (not shown) are provided for conducting water to and from the core. A hydraulic cylinder 28 is arranged beneath each unit core 27 and the plunger 29 thereof is engageable with the core to elevate the same. Suitable pipes 30 are connected with the cylinder, whereby hydraulic pressure may be applied to the plunger.

Between each unit core 27 is provided an auxiliary core 31. These cores are preferably of the same size and shape as the unit core, but may if desired be slightly larger and curved on their exposed edges. Each of these auxiliary cores is provided with two lateral arms 32, which are arranged to slide within suitable ways 33 provided in the unit core 27, whereby the auxiliary core will be held in proper alinement and have axial movement with the unit cores.

Arranged above each unit core 27 is a unit die 35. Each of these dies is provided with an upwardly extending stem 36, which is slidably mounted within a yoke 37. The yoke is carried by two vertical side members 38 and 39, each of which is provided with bearing faces 40 and 41. These bearing faces are in slidable contact with a vertical bearing abutment 42 arranged in each side of the bed plate 25, whereby the members 38 and 39 and yoke will be slidably supported. Each of the members 38 and 39 is provided with an aperture through which a rod 43 passes. One of these rods is arranged at each side of the bed plate and each is supported at its ends by one of the abutments 42. By this construction the members 38 and 39 will take the vertical thrust of the unit cores 27.

Pivotally carried at each end of the unit die 35 is a lateral die 44. The inner faces of these lateral dies are so shaped that when the parts are in the position shown in Fig. 7 they, together with the unit die 35, will conform substantially to the shape of the unit core 27. A link 45 connects each lateral die 44, at a point substantially below its middle portion, with the side members 38 and 39. The upper ends of the links 45 are pivotally united to the side members near the upper ends thereof, so that when the unit die is moved vertically, a downward and inward thrust on the lateral dies 44 will be produced by these links 45. The vertical die 35 and the lateral dies 44 are each water jacketed and provided with the usual means for conducting cooling fluid to and from them.

Arranged at each end of the bed plate 25 is a hydraulic cylinder 46, each having a plunger 47 and suitable pipe connections 48 by which hydraulic pressure may be applied to the plunger. The ends of the plunger are engageable with the end unit cores 27 and the entire series of unit cores and auxiliary cores, together with their co-acting dies, may be moved toward each other.

In producing our annealing box by the apparatus herein shown and described, the steel plate for the body is, preferably, first bent laterally in substantially a **U**-shaped form. It is then placed within the machine above described with the parts thereof in the positions shown in Figs. 4 and 6. The plate is, of course, first heated before being placed in the machine. It will be noted that in Fig. 4 the parts are slightly separated to permit a longitudinal movement when the corrugations are being formed. The hydraulic plungers 29 are now operated, which will force the unit cores 27 up against the unit dies 35, and a further vertical movement of these parts will cause the lateral dies 44 to be forced inwardly and press the plate firmly against the sides of the unit cores. The plate will thus be firmly gripped at a number of places throughout its length and, as these cores and die parts are water cooled, the portions of the body gripped by them will be chilled. The portions which lie between the units will, however, retain their heat, and, while these portions of the body are in a heated condition, the hydraulic plungers 47 are operated, which will move the units toward each other and in contact with the auxiliary cores 31. This will cause the heated portions of the body, lying between the units 26, to be buckled or bent in the form of ridges. The auxiliary cores 31 will prevent this buckling from occurring inwardly so that the ridges will thus be formed on the exterior of the box. Due to the chilling of certain portions of the body of the plate, a corrugation of the form shown in the drawings will be produced. The auxiliary dies may also be water cooled, thus also chilling the middle portions of the material forming the corrugations. This will leave only the side portions, which form the **S**-shaped sides of the corrugation, pliable and bendable, whereby the finished corrugations will have substantially flat tops. After the box body has been formed, the end heads are put in position and fastened as hereinbefore described.

Having thus described our invention, what we claim is:

1. As an article of manufacture, an annealing box having a body formed of one piece of sheet steel, and having open ends, a

plurality of reinforcing corrugations formed in the body, and heads secured in the open ends of the body.

2. As an article of manufacture, an annealing box having a body formed of rolled material, and having open ends, a plurality of reinforcing corrugations formed in the body, and heads secured in the open ends of the body.

3. As an article of manufacture, an annealing box having a body formed of one piece of rolled material, and having open ends and a plurality of reinforcing corrugations formed in the body, each corrugation having a top wider than the part where it joins the body, and heads secured in the open ends of the body.

4. As an article of manufacture, an annealing box having its body formed of one piece of imperforate rolled material, and having open ends and a plurality of reinforcing corrugations formed in the body, and imperforate heads secured, by welding, in the open ends of the body.

5. As an article of manufacture, an annealing box, having a body formed of one piece of material and having open ends, a plurality of laterally arranged corrugations formed in the body, and heads secured in the open ends of said body.

6. As an article of manufacture, an annealing box, having a body formed of one piece of material and having open ends, a plurality of laterally arranged corrugations formed in the body, each of the corrugations having a top wider than the point where it joins the body, and heads secured in the open ends of the body.

7. As an article of manufacture, an annealing box, having a body formed of one piece of material and having open ends, a plurality of laterally arranged corrugations formed in the body, and heads secured in the open ends of said body and fitting into the end corrugations.

In testimony whereof, we have hereunto signed our names.

HARRY B. ROSE.
WALTER B. ENCK.