July 22, 1930. C. E. BRONSON ET AL 1,771,028

METHOD OF CORRUGATING METAL BOILER SHEETS

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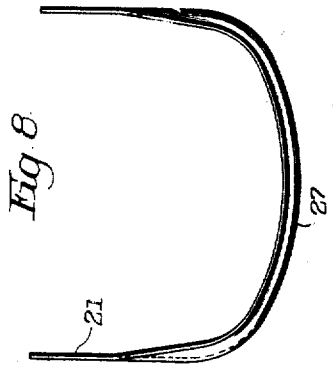


Fig. 8

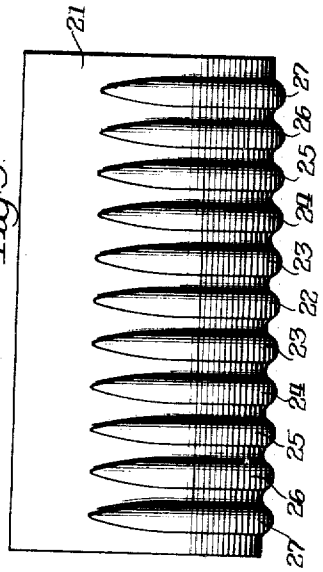


Fig. 9



Fig. 1



Fig. 2

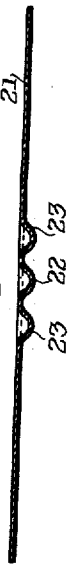


Fig. 3

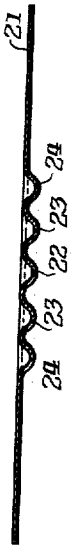


Fig. 4

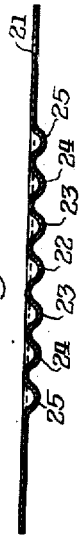


Fig. 5

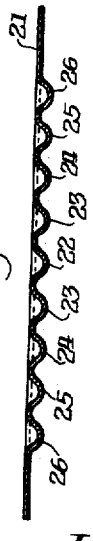


Fig. 6

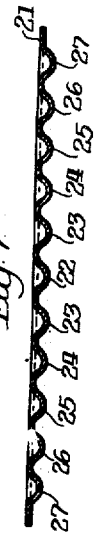


Fig. 7

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METHOD OF CORRUGATING METAL BOILER SHEETS

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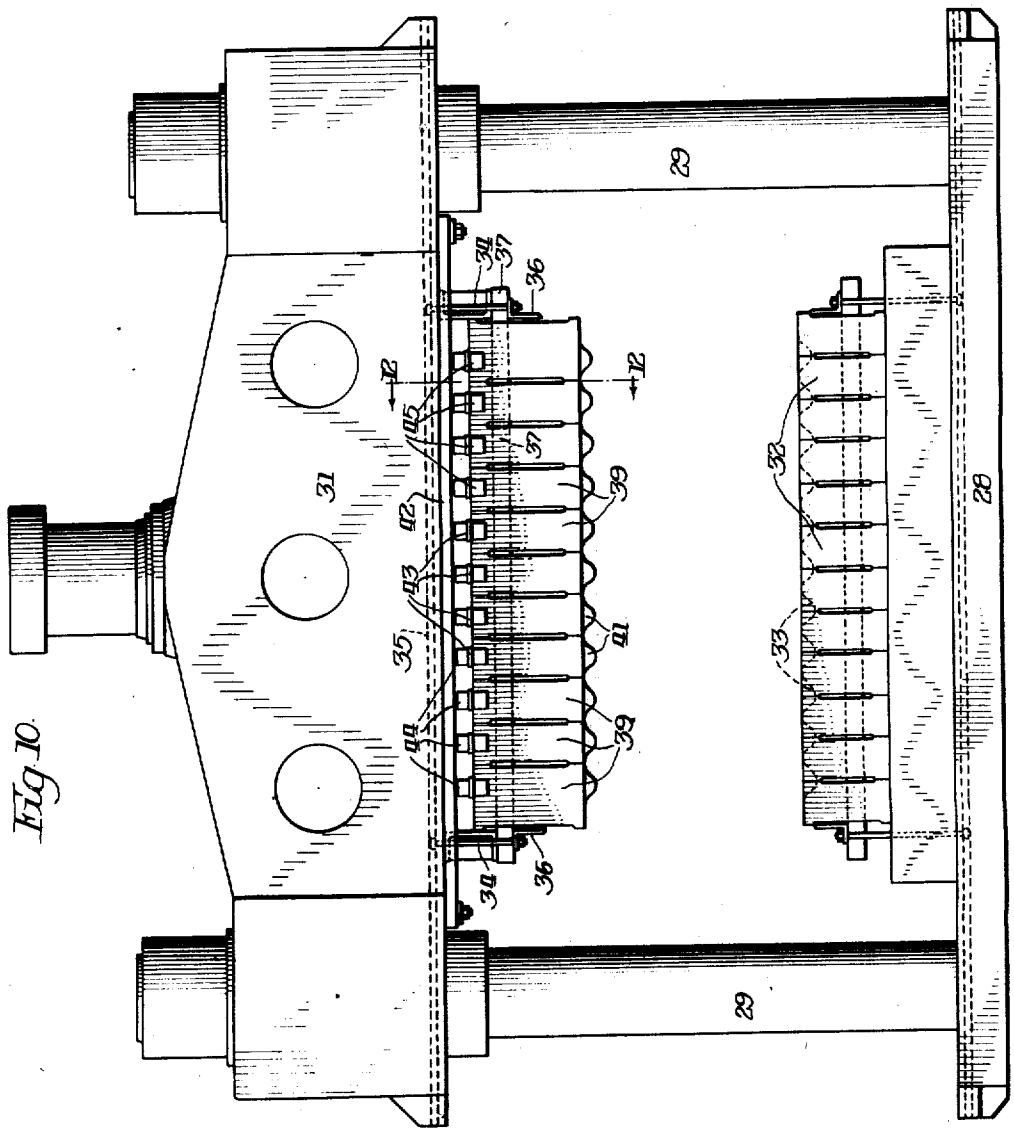


Fig 10.

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METHOD OF CORRUGATING METAL BOILER SHEETS

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Fig. 12

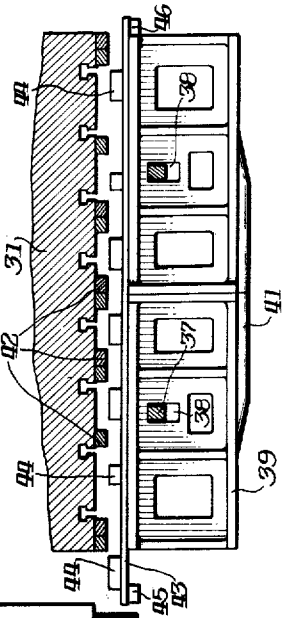
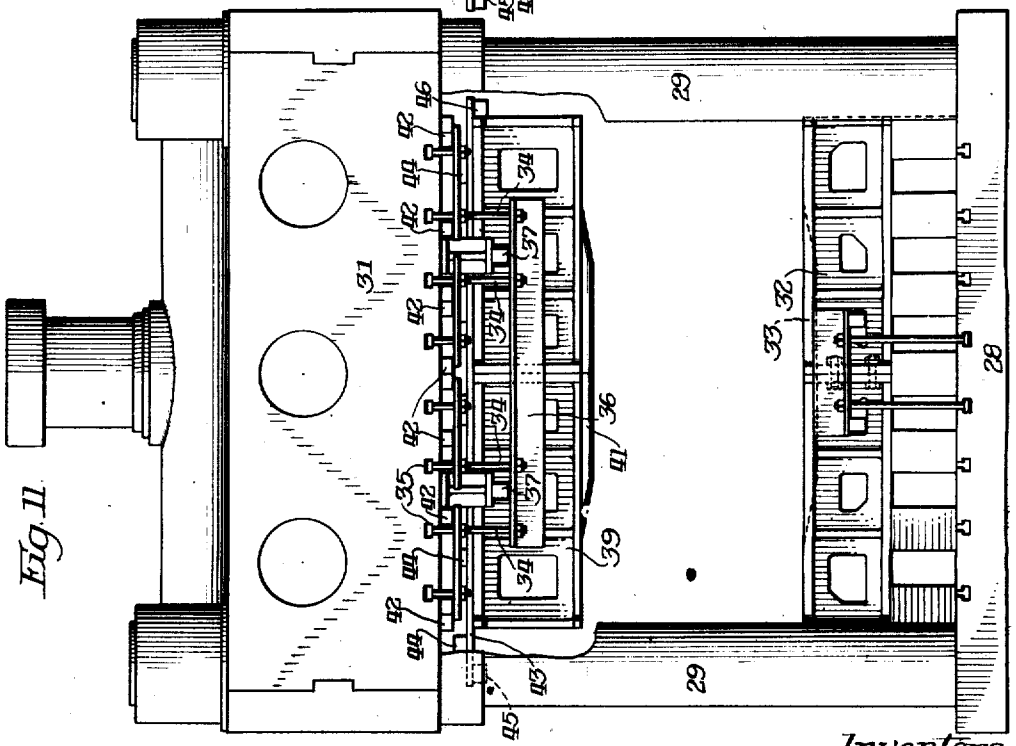


Fig. 11



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METHOD OF CORRUGATING METAL BOILER SHEETS

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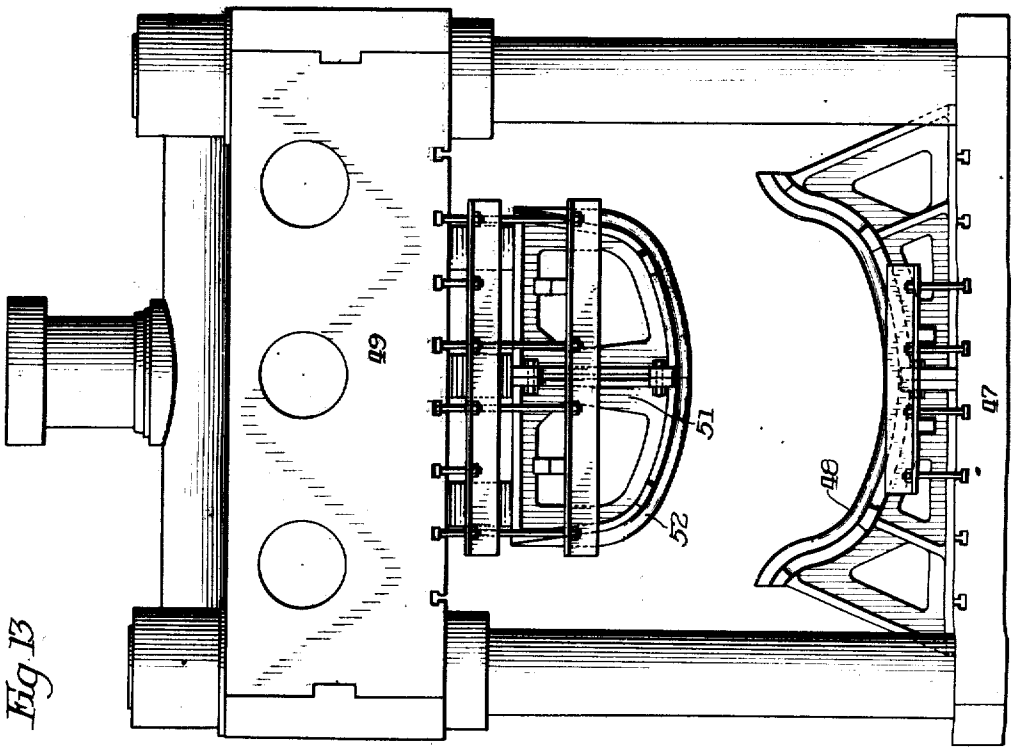


Fig 13

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UNITED STATES PATENT OFFICE

CARLOS E. BRONSON, OF KEWANEE, AND JOSEPH F. DICKSON, OF GALVA, ILLINOIS, ASSIGNORS TO KEWANEE BOILER CORPORATION, OF KEWANEE, ILLINOIS, A CORPORATION OF DELAWARE

METHOD OF CORRUGATING METAL BOILER SHEETS

Application filed December 31, 1928. Serial No. 329,582.

This invention relates to the corrugating or forming of sheet-metal plates and concerns more particularly the production of such members for the crown-sheets of furnaces.

The invention involves the formation of the corrugations, which stop short of the margins of the flat sheets and whose ends are tapered, progressively in the plane sheets by means of suitable dies, in order that the metal of the sheets may not be unduly stretched, strained, or ruptured, and, thereafter, the corrugated sheets are bent to proper form.

To enable those skilled in this art to fully understand the invention, the same has been illustrated in detail in the accompanying drawings throughout the several views of which like reference characters have been employed to designate the same parts.

Figures 1 to 7 inclusive illustrate the progressive or step-by-step application of the corrugations to the metal sheet;

Figures 8 and 9 illustrate the corrugated sheet in end and side elevations respectively after it has been bent to form;

Figures 10, 11, and 12 show the machine for forming the corrugations, Figure 10 being a front elevation of the appliance, Figure 11 an end view of the same, and Figure 12 a section on line 12—12 of Figure 10, the parts being viewed in the direction indicated by the arrows; and

Figure 13 is an elevation of the appliance for bending the corrugated sheet to the desired conformation.

Referring to these drawings, it will be noted that the flat metal-sheet 21 is first provided with a central corrugation 22, as indicated in Figure 2; whereupon, corrugations 23, 23, are simultaneously made in the sheet on opposite sides of such original hollow rib 22, as portrayed in Figure 3; and, in like manner, pairs of corrugations 24, 24, 25, 25, 26, 26 and 27, 27 are simultaneously added step by step as presented in Figures 4 to 7 inclusive; it being clear that the ends of all of such hollow ribs or corrugations are tapered as shown in Figure 9, thus preventing any abrupt metal deformations with incident risk of metal rupture.

Such flat, corrugated sheet is then bent, as depicted in Figure 8, into substantial U-shape to provide a member to form the arched crown-sheet and substantially-parallel sides or portions of the sides of a combustion chamber, the corrugations, extending across the crown-sheet, being prolonged partway down such sides as is clearly shown.

The means for successively performing the corrugating operations is presented in Figures 10 to 12 inclusive, the press comprising a suitable base or bed 28, posts or columns 29, and a power-operated member 31 slidable on such columns.

The bed fixedly supports a number of female die members 32 unitedly providing a correct number of die-cavities 33 on their upper surfaces; and the movable member 31 of the press, by means of bolts 34 having their heads accommodated in undercut slots or cavities 35 therein, support a pair of angle-bars 36, 36 cooperating with which are a pair of bars 37, 37 adapted to rest thereon and extended through vertical slots 38, 38 in a plurality of male die-members 39, 39 arranged side by side and having ribs 41, 41 on their under sides in register with the die recesses 33.

From the construction so far described, owing to the vertically sliding mounting of the die members 39, the latter would perform no metal corrugating function because the elements 39 would slide up relatively to their support 31.

It is accordingly necessary to provide means to allow such dies to become selectively active to perform the progressive corrugating operation.

To this end, the under surface of the part 31 has fixed thereto a plurality of spaced bars or strips 42, 42 constituting separated abutments, and each die-member on its top surface slidingly carries a longitudinally-disposed "gagger" bar 43 equipped on its upper face with a plurality of blocks 44, 44 so spaced apart that when the element 43 is in its "out" position the parts 42 and 44 will be out of register and the die member will be free to shift vertically relatively to its support 31 and will therefore be inoperative to

perform its corrugating function, but, when such bar is pushed in, the parts 44 will be positioned directly below the stops or abutments 42, thus precluding substantial movement of the die member in relation to its support 31, hence causing the rib 41 in cooperation with the companion or associated die member or members to form the corrugation or hollow rib in the interposed metal sheet.

The stroke of the bar 43 is limited as to its extent by its end stops 45, 46 which may contact or cooperate with the opposite ends of the die member.

Obviously, by properly manipulating the required "gagger" bars 43 between the strokes or reciprocations of the element 31 and its die members, the latter may be brought into action in the desired order to accomplish the result hereinbefore specified.

If preferred, the dies may come into action singly instead of in pairs, and, of course, it is not necessary to begin at the middle of the metal-sheet.

In the usual practice, after a die member has been rendered active by manipulation of its corresponding "gagger" or controlling bar, it remains thus locked during the application of other corrugations to assure that the hollow rib which it has produced in the plate shall not be deformed by the subsequent corrugating actions.

The flat or plane metal-sheet having been thus supplied with its corrugations, it is then necessary to bend the plate or sheet to required shape and this is accomplished in a press like that presented in Figure 13, the base 47 of which is fitted with a concave, stationary, female die 48 of the required contour and having cavities to receive the corrugations, the vertically slidable member 49 having a correlated male die 51 with spaced companion ribs 52 to fit in the hollow interiors of the corrugations.

Thus, when the press is operated with the previously-corrugated metal-sheet between its associated dies, the plate will be bent to the desired form without undue strain on any of its sections.

The resulting product will be like that depicted in Figures 8 and 9.

Those acquainted with this art will readily understand that the invention herein presented is not necessarily limited to the precise and exact details set forth, and that these may be modified within comparatively wide limits without departure from the heart and essence of the invention and without the sacrifice of any of its material or substantial benefits or advantages.

We claim:

1. The method of forming a sheet-metal boiler-plate, consisting in supplying a flat metal plate with corrugations in sequence at the same time preserving the previously formed corrugations of the series from deformation, and subsequently bending the sheet to the desired form through said corrugations.

2. The method of forming a sheet-metal boiler-plate, consisting in supplying a flat metal plate in sequence with corrugations having tapered ends terminating short of the margins of the plate at the same time preserving the previously formed corrugations of the series from deformation and subsequently bending the plate transversely of and through such corrugations to the desired form.

3. The method of forming a sheet-metal boiler-plate, consisting in pressing corrugations in a flat metal plate in sequence with the ends of the corrugations tapered and terminating short of the margins of the plate at the same time preserving the previously formed corrugations of the series from deformation, and subsequently bending the plate transversely of and through its corrugations to provide a central arched corrugated section and substantially-parallel side sections, the corrugations extending part way down such side sections.

In witness whereof we have hereunto set our hands.

CARLOS E. BRONSON.
JOSEPH F. DICKSON.