Feb. 8, 1927. 1,617,069

W. J. McLAUGHLIN

CORRUGATING AND BENDING MACHINE

Filed July 13, 1925. 2 Sheets-Sheet 1

Fig. 1.

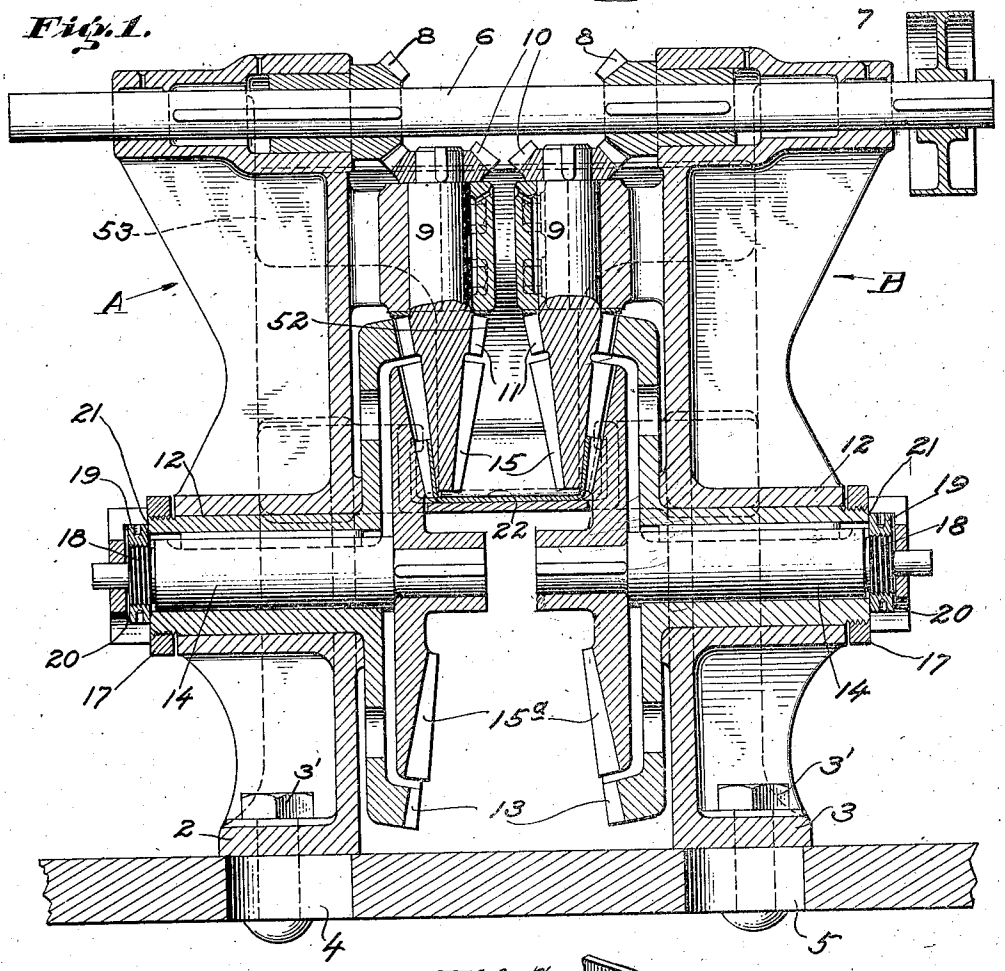


Fig. 4.

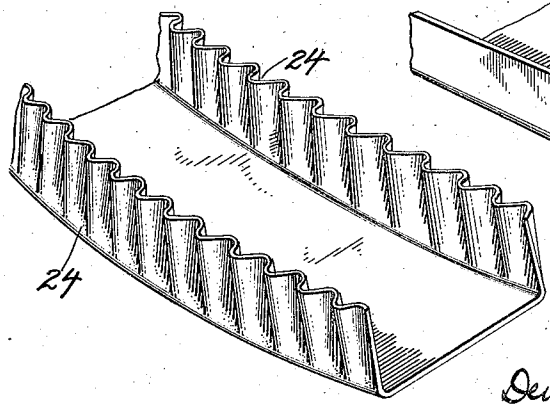
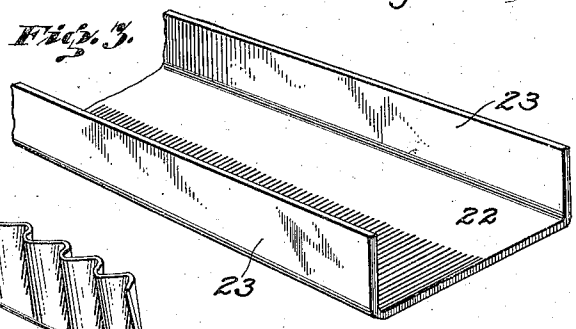


Fig. 3.



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Fig. 2.

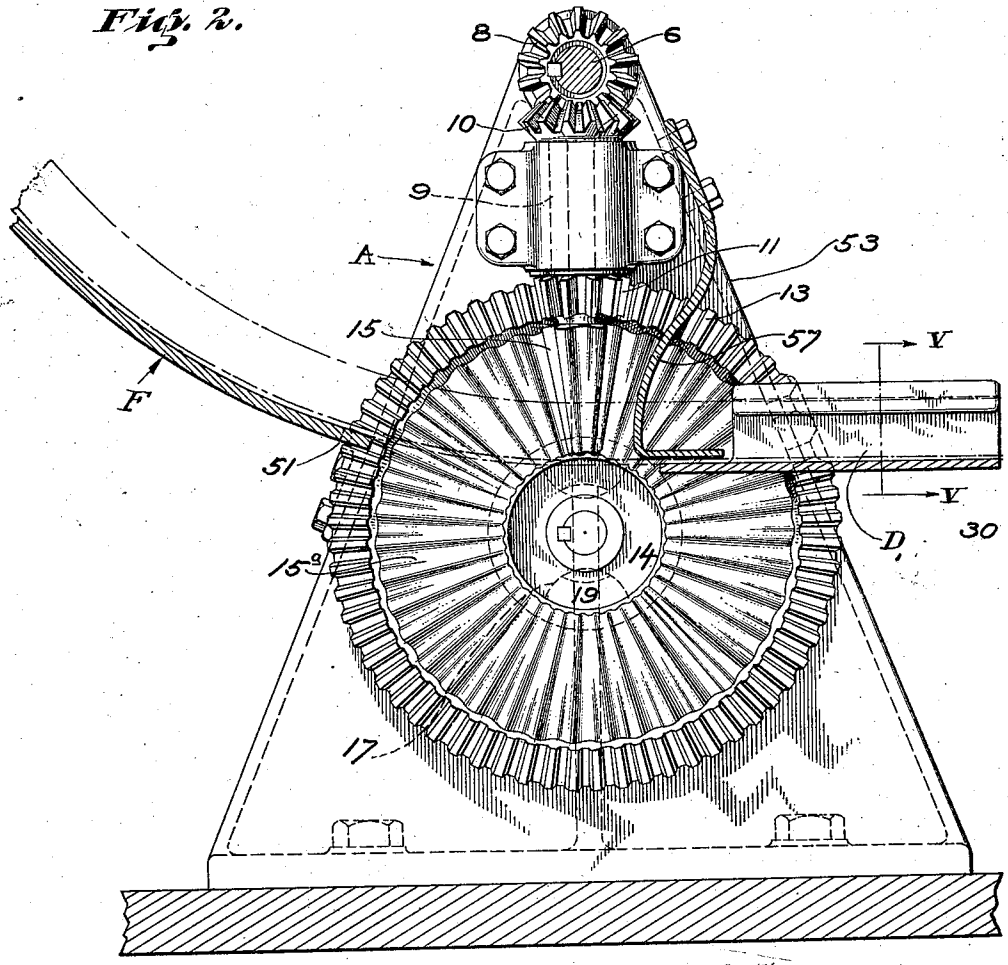


Fig. 6.

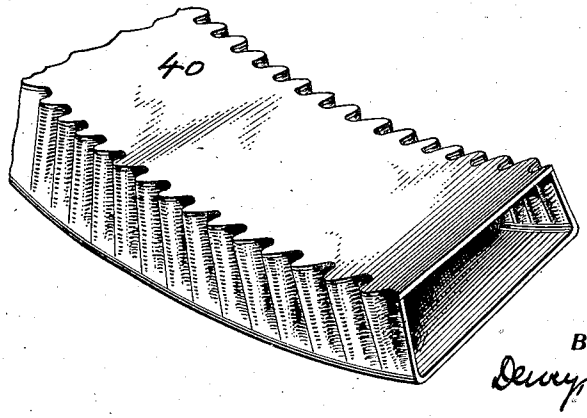
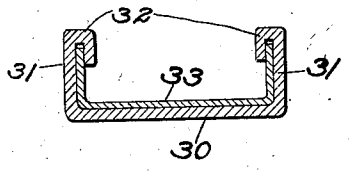


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CORRUGATING AND BENDING MACHINE.

Application filed July 13, 1925. Serial No. 43,107.

This invention relates to corrugating and bending machines, and especially to a type which is adapted to corrugate or crimp the side flanges of sheet metal channel sections and the like.

The object of the present invention is to generally improve and simplify the construction and operation of machines of the character described, to provide a machine in which crimping or corrugating rolls are positively driven, to provide adjustment of the crimping rolls to take care of metal of varying gauge or thickness, to provide adjustment of the crimping rolls to take care of channel sections of varying width and height, and further to provide means for positively guiding the channel sections or other material being crimped while passing through the crimping rolls.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Fig. 1 is a central vertical longitudinal section of the machine.

Fig. 2 is a central vertical cross section.

Fig. 3 is a perspective view of a sheet iron channel section ready to be corrugated or crimped.

Fig. 4 is a perspective view of the channel section after passing through the crimping rollers.

Fig. 5 is a cross section of the guide through which the channel section is fed into the crimping means.

Fig. 6 is a perspective view of a portion of a completed furnace section.

Referring to the drawings in detail and particularly Figs. 1 and 2, A and B indicate a pair of main frames. The lower portion of the frames is provided with foot members 2 and 3, and these are provided with bolt holes to receive securing bolts as shown. The frame members A and B are supported on a suitable base plate and this base is slotted as indicated at 4 and 5 to permit securing bolts to pass therethrough and to permit adjustment of the main frames with relation to each other; that is, to space the frames closer or further apart. Journalled in the upper end of the frames A and B is a driving shaft 6 which may be driven by a driving pulley indicated at 7. Keyed or splined on the shaft are a pair of bevel pinions 8. Journalled in the upper end of the frames A and B are a pair of vertically disposed shafts 9—9. These shafts are provided with bevel pinions 10 on their upper ends which intermesh with the bevel gears 8 and as such are driven and rotated thereby. Mounted on the lower ends of the shafts and keyed or otherwise secured thereto are bevel pinions 11 and corrugating rolls 15. Journalled in the lower portion of the frames A and B are tubular shafts 12—12 and secured on their inner ends are bevel gears 13—13 which intermesh with and are driven by the pinions 11. Carried by each tubular shaft 12 is a shaft 14 and keyed or otherwise secured on the inner end of shaft 14 are corrugating rolls 15^a. The shafts 12 and 14 are driven in unison through the gears 11 and 13; that is, a splined or keyway connection is formed between the shafts 12 and 14 as indicated at 16, and the shafts are thus driven in unison and so are the corrugating rolls 15 and 15^a. By referring to Fig. 1, it will be noted that a screw adjustment is provided on the outer end of the shafts 12 and 14. This is important as it permits longitudinal adjustment of the shafts 14 with relation to the shafts 12. Such longitudinal adjustment increases or decreases the spacing between the corrugating rolls 15 and 15^a and thus permits sheet metal of varying gauge or thickness to be passed through the corrugating rollers. The screw adjustment is obtained by placing thrust collars 17 on the outer ends of the shafts 12, threading the outer ends of the shafts 14 as at 18, and placing an adjusting nut 19 on each threaded end. The nuts 19 bear against the thrust collars at the point 20 and they also bear against the ends of the shafts 12 as at 21; hence, if turning movement is imparted to the nuts 19, shaft 14 will move either inwardly or outwardly as the case may be and the spacing between the teeth of the corrugating rolls will accordingly be increased or decreased.

The sheet metal to be crimped or corrugated is usually passed through a brake or similar machine so as to form a bottom section 22 (see Fig. 3) and side flanges 23—23. A channel section thus formed is passed between the crimping rolls as shown in Fig. 1 and these rolls form corrugations such as shown at 24 (see Fig. 4). The side flanges are thus not only crimped but the bottom section 22 is bent to form an arc. If the channel section is sufficiently long, a ring may be formed and the ends joined by weld-

ing or otherwise securing the same. Channel sections such as shown in Fig. 3 often vary in width and it is therefore important to provide an adjustment to take care thereof. This is accomplished by slotting the base plate as indicated at 4 and 5 and releasing the nuts 3'. The frames A and B may thus be moved together or spread apart as the case may be and practically any width channel section may then be taken care of. It will also be noted that gears 8 are splined to the shaft 6. A driving engagement is thus maintained between the gears 8 and pinions 10.

For the purpose of properly guiding a channel section when feeding the same between the crimping rolls, a guide chute generally indicated at D is employed (see Fig. 5). This chute consists of a bottom section 30 and side flanges 31. The upper ends of the side flanges are turned inwardly and downwardly as at 32, and a guide-way is thus formed for the channel sections shown at 33 which rigidly supports the channel section as it is being fed inwardly between the corrugating rolls. These rolls, by the way, are nothing more nor less than ordinary bevel gears the teeth of which have been rounded to form corrugations as shown at 24. The length of the teeth on the corrugating rolls is fairly great and varying heights of channel sections will thus be taken care of.

The machine is particularly designed for the purpose of forming ring shaped hollow ducts through which hot air or gases are passed, for instance, in the construction of heating furnaces and the like. After the channel sections have been passed through the crimping rolls and crimped as shown in Fig. 4 an inner section is applied as indicated at 40 (see Fig. 6), this being welded or otherwise secured thereto, thus forming a ring shaped hollow duct which is substantial in construction and which provides a large heating area, this heating area being materially increased by the corrugated crimped side flanges.

The machine may, of course, be used for other purposes, for instance, crimping angle sections and the like, and it may handle material with practically any gauge or thickness by merely designing the machine to take care of the work or load imposed thereon.

Important features of the invention are the adjusting of the corrugating rolls to take care of metal of varying gauge or thickness, to provide an adjustment which permits channel sections of varying width and height to be taken care of, to provide means whereby the metal to be corrugated is securely held and guided while passing through the corrugating rolls, and further to provide means whereby the curve or radius of the bent channel section may be increased if desired. This latter feature is accomplished as follows: Secured on the main frame sections A and B opposite the guide member D is a curved plate F. A number of these plates may be employed and they are merely bolted to the side flanges 50 of the frames A and B. The crimp of the side flanges or the corrugating rolls draws the side flanges together and thereby naturally bend the bottom section of the channel. If it is desired to increase the bend, a curved plate is applied as indicated at F. This receives the forward end of the channel as it comes through the gripping rolls and as its curvature is greater than the natural curvature imparted by the crimping rolls, the crimped flanges will be slightly compressed and the curve or radius thereof will be increased. If it is desired to still further decrease the curve, another plate such as shown at F may be applied. It is important that the material should be securely held and supported when fed into the corrugating rolls. For this reason, the bottom section of the member D is extended to a point as close to the corrugating rolls as possible, for instance, as shown at 51 in Fig. 2. A second guide plate engaging the top side of the channel section is also employed as indicated at 52, this being bolted to the side flanges 53 of the main frames A and B. It was previously stated that channel sections of greater or less width might be handled by the machine and that this was taken care of by separating the main frames A and B. It is therefore necessary to employ guide members D of varying width and the guide members D are therefore detachable with relation to the main frames A and B so that they may be readily removed and replaced when the width of the channel section is increased or decreased.

While certain features of the present invention are more or less specifically illustrated, I wish it understood that various changes in form and proportion may be resorted to within the scope of the appended claims. I similarly wish it understood that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate or various uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A machine of the character described, comprising a frame, two pairs of corrugating rolls journalled in the frame, the rolls in each pair being disposed at right angles to each other, and means for positively driving all the rolls in unison.

2. A machine of the character described, comprising a frame, two pairs of corrugating rolls journalled in the frame, the rolls

in each pair being disposed at right angles to each other, means for positively driving all the rolls in unison, and means whereby the spacing between each pair of rolls may be increased or decreased.

3. A machine of the character described, comprising a frame, two pairs of corrugating rolls journalled in the frame, the rolls in each pair being disposed at right angles to each other, means for positively driving all the rolls in unison, means whereby the spacing between each pair of rolls may be increased or decreased, and means whereby the spacing between the rolls in each pair may be increased or decreased.

4. A machine for corrugating the side flanges of metal channel sections and the like comprising a frame, a guide member through which the channel section is fed, two pairs of corrugating rolls, one pair on each side of the guide and adapted to receive the side flanges of the channel section, and means for positively driving each pair of rolls in unison.

5. A machine for corrugating the side flanges of metal channel sections and the like comprising a frame, a guide member through which the channel section is fed, two pairs of corrugating rolls, one pair on each side of the guide and adapted to receive the side flanges of the channel section, means for positively driving each pair of rolls in unison, and means whereby the spacing between the rolls in each pair may be increased or decreased to handle channel sections of varying gauge or thickness.

6. A machine for corrugating the side flanges of metal channel sections and the like comprising a frame, a guide member through which the channel section is fed, two pairs of corrugating rolls, one pair on each side of the guide and adapted to receive the side flanges of the channel section, means for positively driving each pair of rolls in unison, means whereby the spacing between the rolls in each pair may be increased or decreased to handle channel sections of varying gauge or thickness, and means whereby the spacing between each pair of rolls may be increased or decreased to permit channel sections of varying width to feed through the rolls.

7. A machine of the character described, comprising a frame, two pairs of corrugating rolls journaled in the frame adapted to receive and corrugate the side walls of a channel-shaped section of iron, and a bending plate disposed on the discharge side of the corrugating rolls, said plate adapted to bend the bottom of the channel iron section and further compress the corrugations in the side walls of the channel iron.

8. A machine for corrugating the side flanges of metal channel sections and the like, comprising a base member, a pair of vertically disposed frame members supported by the base, means for adjusting said frame members to and away from each other, a corrugating roller journaled in each frame member, a second corrugating member journaled in each frame member, the corrugating members in each frame comprising pairs of cooperating corrugating rolls, and means for adjusting the corrugating rolls in each pair with relation to each other to take care of metal of varying thickness or gauge.

9. A machine of the character described comprising a frame, two pairs of corrugating rolls journalled in the frame, said rolls having teeth on their peripheral surface which intermesh, and means for positively driving each corrugating roll in each pair, in unison.

10. In a machine of the character described, a frame, a pair of corrugating rolls journalled in the frame, said rolls having teeth on their peripheral surfaces which are adapted to intermesh, and means whereby the rolls are positively driven, in unison with each other.

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