F. DIECKMANN.

METHOD OF PRODUCING SHEET METAL ELBOWS.

APPLICATION FILED SEPT. 23, 1911.

1,197,271.

Patented Sept. 5, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

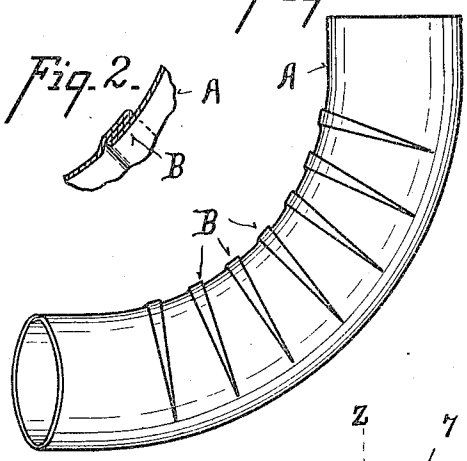


Fig. 2.

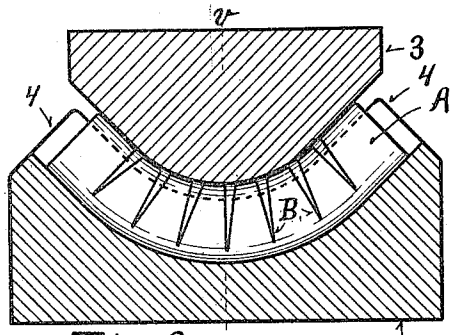


Fig. 3.

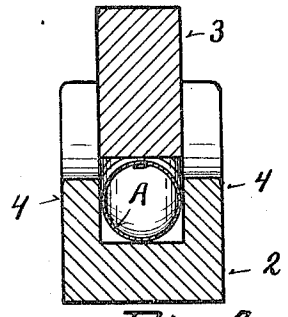


Fig. 4.

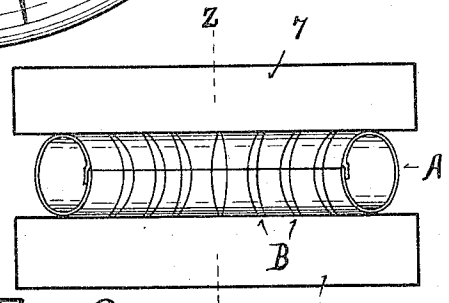


Fig. 6.

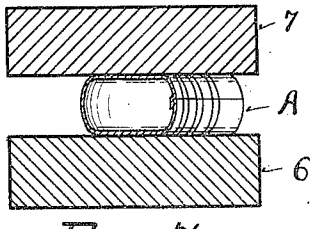


Fig. 7.

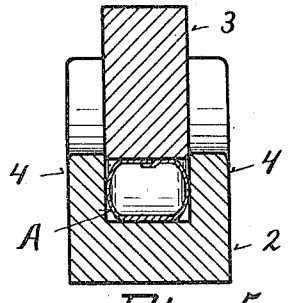


Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 8.

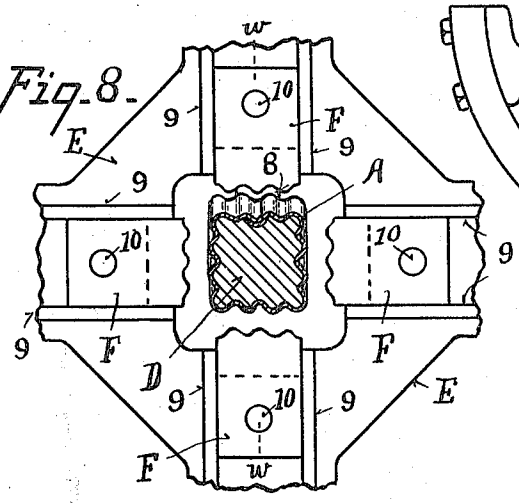


Fig. 9.

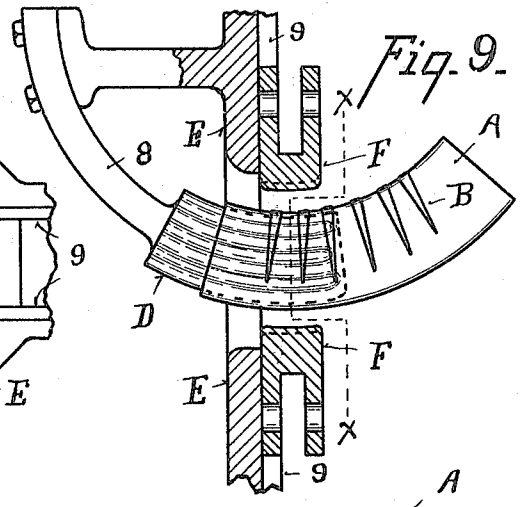
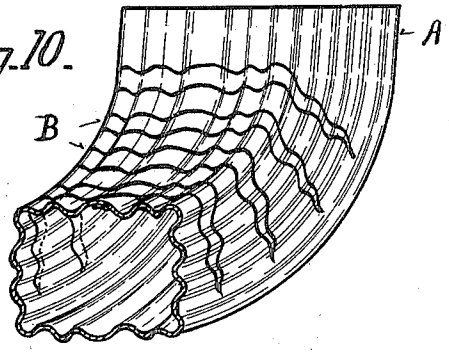


Fig. 10.



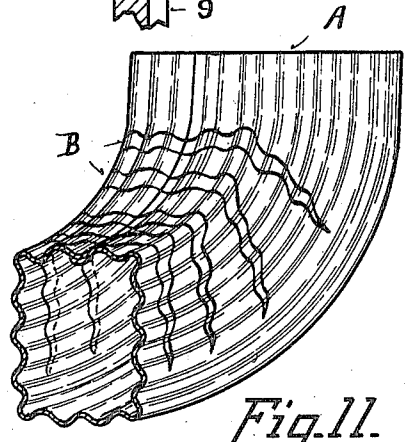
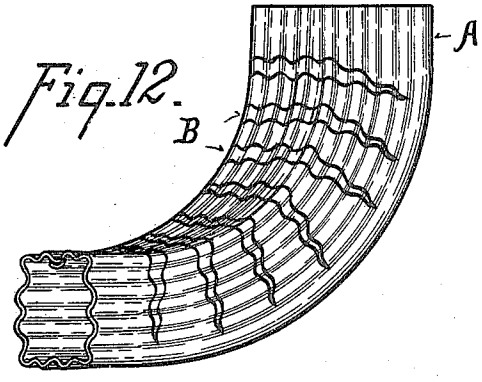


Fig. 11.

Fig. 12.



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METHOD OF PRODUCING SHEET-METAL ELBOWS.

1,197,271. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed September 23, 1911. Serial No. 650,954.

To all whom it may concern:

Be it known that I, FERDINAND DIECKMANN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Methods of Producing Sheet-Metal Elbows, of which the following is a specification.

My invention relates to improvements in the art of producing sheet metal elbows of rectangular cross sectional pattern, and also preferably of corrugated type or pattern.

One of its objects is to produce such elbows from elbows originally of plain cylindrical pattern.

Another object is to produce such elbows without fracturing or injuring the metal of which the elbow is composed.

Another object is to produce elbows of rectangular cross section possessing strength and a uniformity of outline which will permit the elbows to be used interchangeably one for another.

My invention further consists in certain details and order of procedure, all of which will be more fully set forth in the description of the accompanying drawings, in which;

Figure 1 is a perspective view of a cylindrical elbow from which to produce the elbows of polygonal cross-sectional pattern. Fig. 2 is a detail sectional view through a portion of the cylindrical elbow illustrating the nature of the crimps or circumferential folds. Fig. 3 is a central vertical section through a pair of dies adapted to act upon the cylindrical elbow, and illustrating a cylindrical elbow in position to be acted upon. Fig. 4 is a sectional view on line *v v* of Fig. 3, previous to the action of the dies upon the elbow. Fig. 5 is a view similar to Fig. 4, illustrating the position of the dies and elbow after the dies have acted. Fig. 6 is a side elevation of another pair of dies adapted to act upon a cylindrical elbow, and illustrating an elbow in position to be acted upon. Fig. 7 is a sectional view on line *z z* of Fig. 6 illustrating the position of the dies and elbow after the dies have acted thereon. Fig. 8 is a sectional view on line *x x* of Fig. 9 and illustrating a set of dies adapted to further act upon the elbows. Fig. 9 is a sectional view on line *w w* of Fig. 8. Figs. 10 and 11 are sectional views illustrating different styles or patterns of polygonal elbows adapted to be produced from duplicate cylindrical elbows. Fig. 12 is a perspective view of another pattern of polygonal elbow adapted to be produced from a similar cylindrical elbow.

The plain cylindrical elbow may be produced by various means, but I preferably produce the cylindrical elbow A from a single piece of sheet metal by rolling the sheet into a straight tube and then taking the surplus metal up upon one side to form the elbow curve by means of overlapping flat crimps or circumferential folds B by methods known in the art. A majority of sheet metal elbows to be used as conductor pipe elbows are required to be longitudinally corrugated in order to expand outwardly under the freezing action of water flowing through them, in order to avoid injury to the elbows, and further in order that the elbows may register with corrugated straight pipe sections. Rectangular elbows of both plain and corrugated patterns are in demand, and are adapted to be produced of uniform and accurate dimensions from cylindrical elbows by my improved method.

In Figs. 3, 4, and 5 I have illustrated a stationary die 2 and a movable die 3 which are adapted to receive and act upon the cylindrical elbows to flatten them upon the inner and outer faces of the curve so that the elbows will assume the cross-sectional pattern indicated in Fig. 5. The side lips 4 of the die 2 may be omitted if desired, but are preferably employed. The dies 2 and 3 are designed to be used, and the elbow flattened upon the inner and outer faces of the curve when the axis from the inside to the outside of the finished elbow is to be the minor axis of its cross-sectional pattern, as illustrated for instance in Fig. 10.

Where finished elbows of the general type indicated in Fig. 11, that is with the major axis of the rectangle extending from the inside to the outside of the curve, I preferably employ dies 6 and 7 between which the cylindrical elbows are placed and acted upon to give them substantially the cross sectional pattern indicated in Fig. 7, with flattened sections at opposite sides.

The elbows after treatment either by dies 2 and 3 or by dies 6 and 7, are in condition to receive the final rectangular or corrugated rectangular cross-sectional pattern. As illustrated in Figs. 8 and 9, D represents a curved mandrel of substantially the cross sectional pattern to be impressed upon the

elbow, which mandrel is rigidly secured by a shank 8 of reduced cross section to a frame E through an opening in which the mandrel D projects. F, F represent a series of dies mounted in guides 9 on the frame E and adapted to be connected by means of journal pins seated in the recesses 10 with mechanism adapted to reciprocate said dies F preferably in unison toward and from the mandrel D. The inner faces of the dies F are shaped to a counterpart of the adjacent or meeting face of the mandrel. Any well known mechanism may be employed to reciprocate the dies F.

The elbows with flattened faces as produced by the dies 2 and 3, or the dies 6 and 7, are now successively forced endwise over the mandrel D as indicated in Fig. 9 and between said mandrel and the dies F, whereupon the elbow due to the action of the dies F and mandrel D thereon assumes the desired rectangular or corrugated rectangular pattern with accuracy and without injury to or fracture of the metal.

In practice I preferably flatten or press inwardly the elbows the full length thereof, but for some forms or patterns the elbows may be flattened for only a portion of their length, and the action of the mandrel D and dies F will bring the unflattened portion of the elbow to the rectangular pattern. The elbows are fed progressively forward upon the mandrel D until the dies F have acted upon all portions of the elbow, when the elbow is fed in the reverse direction until it is clear of the mandrel, and may if desired be fed forward and backward under the action of the dies F until the pattern is satisfactorily impressed upon the elbow.

My invention as herein illustrated and described is capable of considerable modification without departing from the principle thereof.

Having described my invention, what I claim is;

1. The method of producing rectangular pipe elbows from cylindrical flat-crimp elbows, which comprises subjecting the cylindrical elbows to a preliminary compressing operation of two opposite sides to cause the elbows to partially conform to a rectangular outline, and then to a final operation between internal rectangular and exterior dies to produce therein a rectangular cross sectional elbow.

2. The method of producing longitudinally corrugated rectangular pipe elbows from cylindrical flat-crimp elbows, which comprises subjecting the cylindrical elbows to a preliminary compressing operation of two opposite sides to cause the elbows to partially conform to a rectangular outline, and then to a final operation between internal rectangular and exterior dies to produce therein a rectangular cross sectional pattern with longitudinal corrugations.

In testimony whereof I have affixed my signature in presence of two witnesses.

FERDINAND DIECKMANN.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."