No. 889,173. PATENTED MAY 26, 1908.

F. BRUNE.

PROCESS OF MAKING CORRUGATED SHEET METAL PIPE ELBOWS.

APPLICATION FILED FEB. 10, 1908.

Fig. 1.

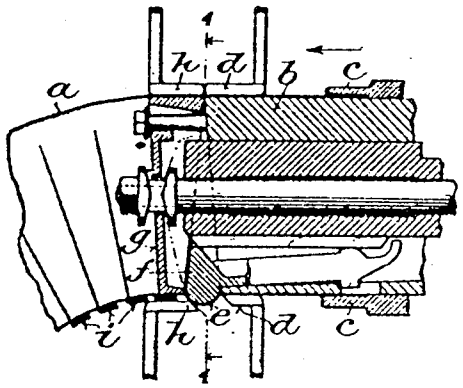


Fig. 2.

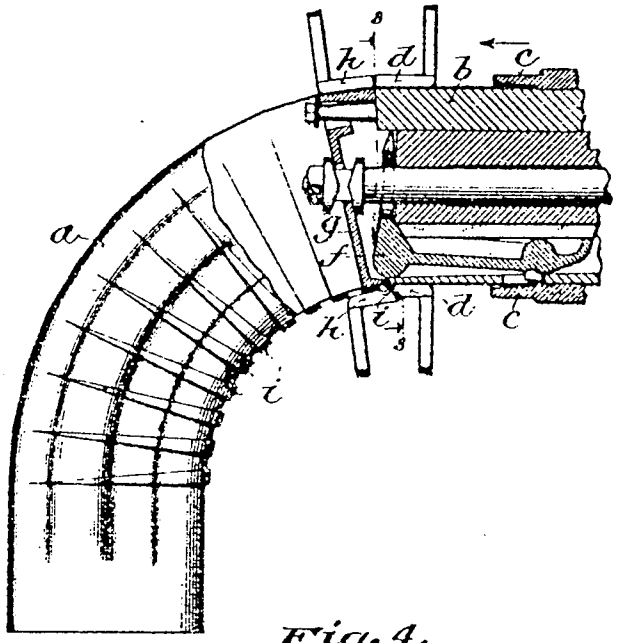


Fig. 3.

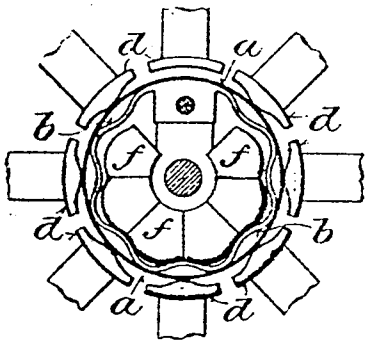


Fig. 4.

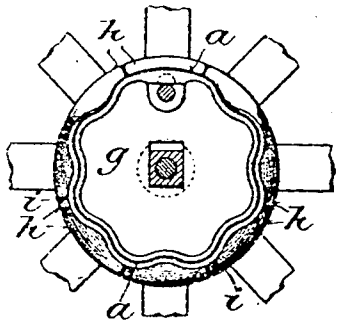


Fig. 5.

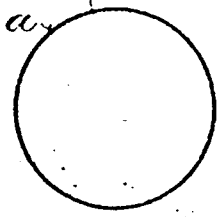


Fig. 6.

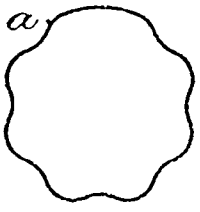


Fig. 7.

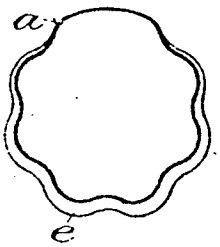
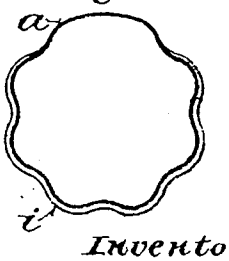


Fig. 8.



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889,173. PROCESS OF MAKING CORRUGATED SHEET-METAL PIPE-ELBOWS. FRIEDERICH BRUNE, Milwaukee, Wis., assignor to Milwaukee Corrugating Company, Milwaukee, Wis., a Corporation of Wisconsin. Original application filed Jan. 31, 1906, Serial No. 298,745. Divided and this application filed Feb. 10, 1908. Serial No. 415,101.

To all whom it may concern:

Be it known that I, FRIEDERICH BRUNE, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Processes of Making Corrugated Sheet-Metal Pipe-Elbows, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The object of this invention is to simplify, facilitate and cheapen the manufacture of corrugated sheet-metal pipe elbows.

It consists in the operations and mode of performing them as hereinafter particularly described and defined in the claims.

In the accompanying drawing, illustrating the various operations of the process in connection with suitable tools or dies for performing such operations, and a pipe section in the several stages of its formation to produce an elbow, like characters designate the same parts in the several figures.

Figure 1 is a central vertical longitudinal section of a partly formed elbow and the tools or dies for forming the same; Fig. 2 is a similar section showing the elbow at a different stage in its formation and illustrating other operations in the process; Fig. 3 is a vertical cross section on the line 3 3, Fig. 2; Fig. 4 is a similar section on the line 4 4, Fig. 1; and Figs. 5 to 8 inclusive are cross sections showing various stages in the formation of an elbow from a plain cylindrical pipe to the finished product.

In carrying out this process a straight cylindrical sheet-metal pipe section *a*, like that shown in cross section in Fig. 5, is placed on a corrugated die or mandrel *b* of the desired size and form, and is thrust intermittently, as by a ring or follower *c* in the direction indicated by arrows on Figs. 1 and 2, between the mandrel *b* and corrugating dies *d*, which are shaped as shown in Fig. 3 to conform with the external shape of the corrugated mandrel *b*. In passing between the mandrel *b* and dies *d*, the blank or pipe section is corrugated or given the desired cross sectional shape, as shown in Fig. 6. Instead of forcing the blank or pipe section between the corrugated mandrel *b* and the dies *d* while the latter are closed upon said mandrel, as shown in Figs. 1 and 2, the dies *d* may be opened or withdrawn as shown in Fig. 3, while the blank is advanced between them, and then closed to give the pipe the desired corrugated or other cross sectional shape. After a certain length of the blank has been thus corrugated, as shown in Fig. 6, an outward bulge *e* is formed in one side thereof, as shown in Figs. 1 and 7. This may be accomplished by means of dies *f*, as shown in Fig. 1, while the blank or pipe section is firmly held on opposite sides of and adjacent to the dies *f* by the mandrel *b* and dies *d* on the one hand, and by a swinging wedge-shaped die *g* and clamping dies *h* on the other hand, the periphery of the die *g* corresponding with that of the mandrel *b*, and the dies *h* corresponding in shape with the dies *d*, as shown in Fig. 4. After each bulge has been formed as above stated, it is pressed together or closed, forming a crimp or plait *i*, which projects outwardly from the blank or pipe section, as shown in Fig. 2. This may be accomplished by forming the dies *d* and *h* with beveled ends and swinging the die *g* with the dies *h* closed thereon, towards the mandrel *b* and dies *d* while the

latter are closed on said mandrel, the bulging dies having been withdrawn, as shown in Fig. 2. This operation leaves the closed crimp projecting obliquely from the blank or pipe section against which it is then pressed or flattened, as shown in Fig. 8, and at the left in Figs. 1 and 2. This flattening of the crimp against the body of the blank or pipe section may be effected by means of the dies *g* and *h*, as shown in Figs. 1 and 2.

By repeating the foregoing operations, which may be performed with any suitable tools operated by hand or other power, or partly by hand and partly by other power, a plain straight blank or pipe section is progressively and successively or simultaneously corrugated lengthwise and crimped crosswise at intervals on one side, thereby gradually bringing it to the desired elbow-shape or curve.

Some of the operations of the process, as the formation of the corrugations and the flattening of the crimps, may be simultaneously performed.

The transverse bulges and crimps gradually diminish in depth and width from their center along the throat or shorter curve of the elbow towards their ends along or adjacent to the outer side or longer curve of the elbow, as shown in Figs. 2, 7 and 8.

The elbows may be formed with longitudinal corrugations of any desired shape and number, and by the term "corrugation" or "corrugated" as herein employed, it is intended to include pipe or elbows of any fluted or polygonal shape in cross section.

By the process herein described and claimed, the corrugations and crimps being progressively and successively or simultaneously formed, the extra handling involved in corrugating previously crimped elbows or in forming corrugated crimped elbows according to the methods heretofore practiced, is avoided, and the labor and cost of manufacture of elbows of this kind are correspondingly reduced.

This application is a division of application Serial No. 298,745, filed January 31, 1906.

I claim:

1. The process of making corrugated elbows from plain straight sheet metal pipe sections which consists in first corrugating a pipe section lengthwise and then crimping the same transversely on one side, thereby giving the desired curve to the elbow, substantially as described.

2. The process of making corrugated sheet metal elbows which consists in progressively and successively corrugating a plain straight pipe section lengthwise and crimping the same transversely on one side, thereby producing the curvature of the elbow, substantially as described.

3. The process of making corrugated sheet metal elbows which consists in progressively and successively corrugating a plain straight pipe section lengthwise, bulging the same outwardly and crosswise at intervals on one side, closing the inwardly opening transverse bulges thus formed and folding them against the outside of the pipe section, substantially as described.

In witness whereof I hereto affix my signature in presence of two witnesses.

FRIEDERICH BRUNE.

Witnesses:

CHAS. L. GOSS,

ALICE E. GOSS.