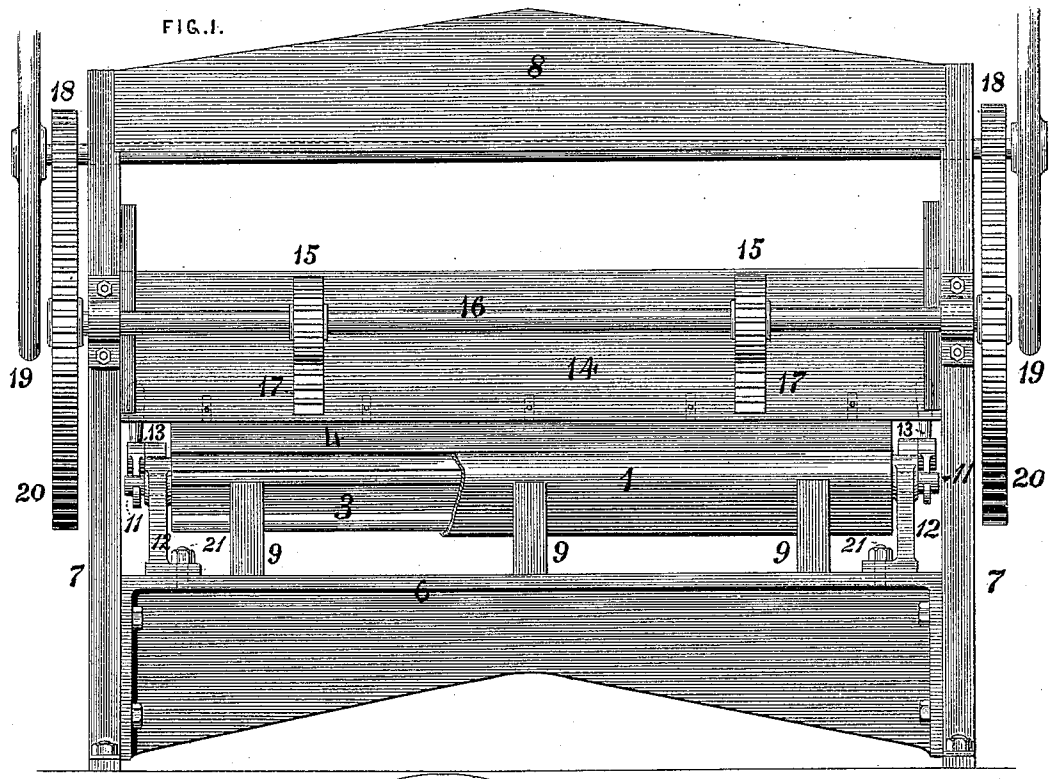
(No Model.) 2 Sheets—Sheet 1.

# J. F. STARR, Jr.

## METHOD OF MANUFACTURING SHEET METAL PIPE.

No. 312,301. Patented Feb. 17, 1885.

FIG. 1.



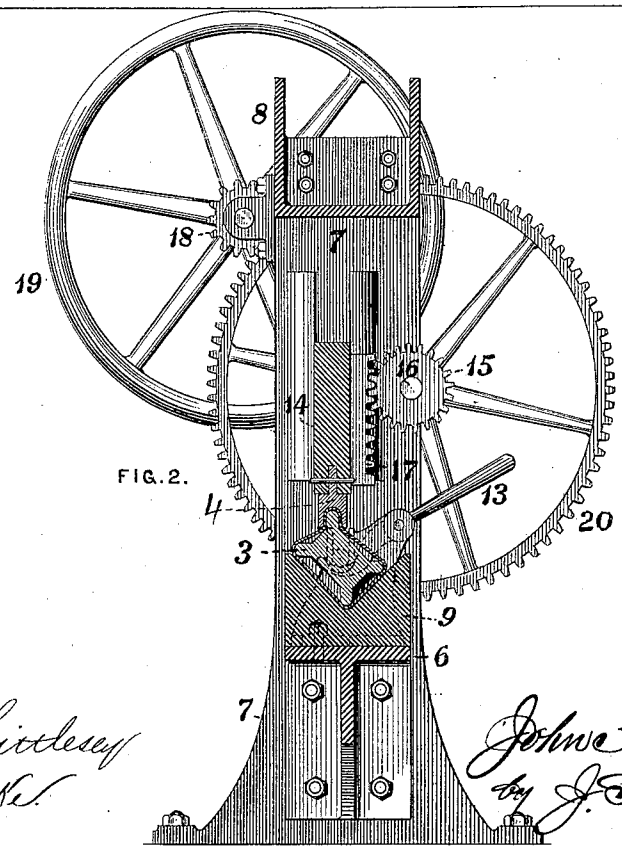




FIG. 2.

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(No Model.) 2 Sheets—Sheet 2.

# J. F. STARR, Jr.

## METHOD OF MANUFACTURING SHEET METAL PIPE.

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FIG. 3.

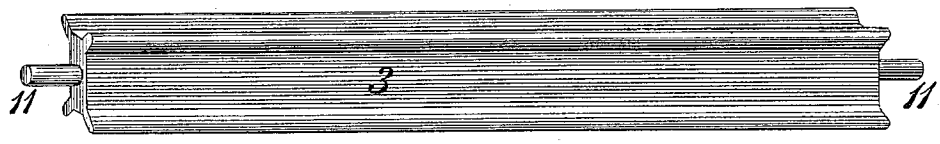



FIG. 4

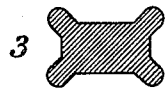



FIG. 5.




FIG. 6.

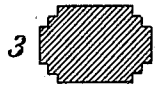



FIG. 7.

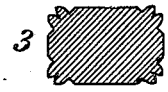



FIG. 9.

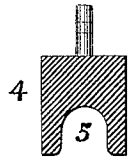



FIG. 8.

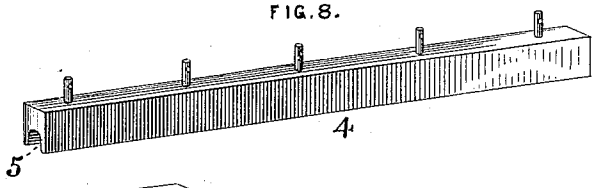



FIG. 10.

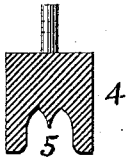
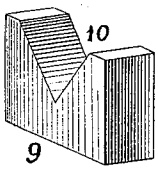



FIG. 11.



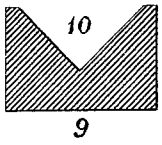




FIG. 12.

FIG. 13.

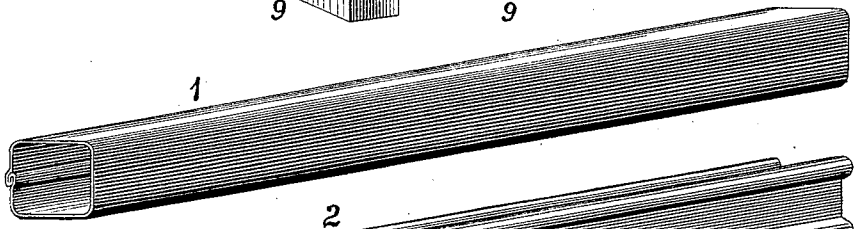



FIG. 15.

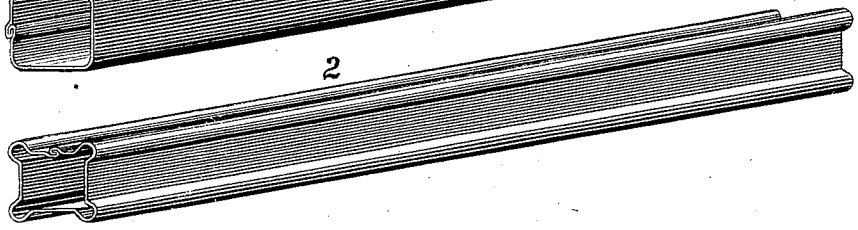



FIG. 14.

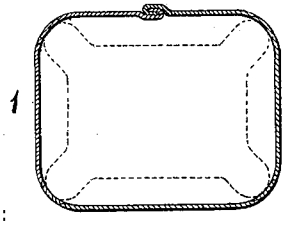
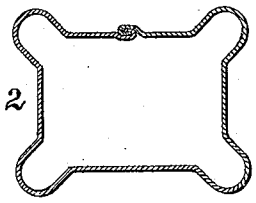



FIG. 16.




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# UNITED STATES PATENT OFFICE.

JOHN F. STARR, JR., OF CAMDEN, NEW JERSEY.

## METHOD OF MANUFACTURING SHEET-METAL PIPE.

SPECIFICATION forming part of Letters Patent No. 312,301, dated February 17, 1885.

Application filed April 16, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. STARR, Jr., of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in the Manufacture of Sheet-Metal Pipe, of which improvements the following is a specification.

My invention relates to sheet-metal pipes, more particularly those employed as rain-water conductors, which are of substantially rectangular section, and are ornamented by ribs, flutes, or relieved projections at their corners, instances of which are shown in Design Letters Patent Nos. 9,871 and 10,632, granted and issued to me under dates of April 3, 1877, and April 16, 1878, respectively.

The object of my invention is to enable the manufacture of pipes of such character to be economically and expeditiously conducted, and to insure uniformity and excellence of finish and quality in the product.

To this end my improvements consist in a certain novel method for the manufacture of sheet-metal pipe, as hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a front view in elevation of a machine for manufacturing sheet-metal pipe in accordance with my invention; Fig. 2, a vertical section through the same; Fig. 3, a view in perspective of a forming-die; Fig. 4, a transverse section through the same; Figs. 5, 6, and 7, similar sections through forming-dies for pipes of different designs, respectively; Fig. 8, a view in perspective of a setting-die; Fig. 9, a transverse section through the same; Fig. 10, a similar section through a setting-die adapted for use in connection with the forming-die shown in Fig. 7; Fig. 11, a view in perspective of a bearing-block; Fig. 12, a transverse section through the same; Fig. 13, a view in perspective of a length of pipe as fitted over the forming-die; Fig. 14, a transverse section on an enlarged scale through the same; Fig. 15, a view in perspective of a length of finished pipe, and Fig. 16 a transverse section on an enlarged scale through the same.

In the practice of my invention I take a sheet of metal the length of which is equal to the length of the piece or section of pipe desired to be formed, and of such width as to admit of being bent and united at its edges into a tube, 1, having plane sides—that is to say, sides which are without depressions or projections—and such operation is effected by bending the sheet around a forming-die, 3, Figs. 3 to 7, the transverse section of which substantially corresponds with the figure which would be inclosed by a pipe of the shape desired to be made, and securing the edges of the sheet by a proper lap-seam. The tube thus formed, which is shown in Figs. 13 and 14, abuts at its corners only against the forming-die, and is consequently supported internally on detached longitudinal lines, spaces being left between its sides and the sides of the forming-die, as indicated in Fig. 14, in which figure the forming-die is shown in dotted lines. The plane-sided tube 1 may, if preferred, be formed upon a plain die or mandrel, and afterward fitted over the forming-die; but the use of the forming-die only will be found more expeditious and desirable. The tube 1 is then bent into a finished pipe-section, 2, of the form desired, by pressing down the metal on its sides toward the adjacent sides of the forming-die, such operation being effected by the employment of a setting-die, 4, Figs. 8 to 10, of substantially equal length with the forming-die, and having a longitudinal recess or groove, 5, corresponding in form with the flutes, ribs, or moldings to be formed on the corners of the pipe, said groove being successively applied under sufficient pressure to the four corners of the tube 1, while the same is supported upon the forming-die 3. The pressure of the setting-die bends the metal of the tube 3 into corner ribs, flutes, or moldings, corresponding in shape with the groove 5 by forcing the metal of the sides of the tube downwardly toward the forming-die, which serves as an abutment, and the finished pipe-section 2, which consequently corresponds in shape with the forming-die, is ready for use when removed therefrom.

I am enabled by the above method to manufacture sections of pipe of any desired length required in the trade in an expeditious and economical manner, and attain, further, in point of uniformity and accuracy of finish, a substantial advantage as compared with the methods of manufacture ordinarily practiced heretofore.

While I have herein described and shown

the application of my invention in the manufacture of sheet-metal pipes of substantially rectangular section by reason of the preferred use thereof for rain-water conductors as being elements of appropriate architectural design, as well as possessing the capacity of expansion to prevent bursting under the influence of the freezing of water within them, I do not desire to limit myself to such specific application, as it will be obvious that the manufacture of ribbed or corrugated pipes of substantially circular section, or of section embodying elliptical or segmental faces, may, by the employment of suitably-shaped forming and setting dies, be conducted in a similar manner.

The practice of my invention may be materially facilitated by the employment of a machine in which the setting-die is actuated by suitable mechanism operated by hand or power, an instance of which is illustrated in Figs. 1 and 2. Said machine, however, not forming part of the invention herein claimed, need not be at length described, but will, together with the dies employed in connection therewith, be made the subject of a separate application for Letters Patent by me.

I claim as my invention and desire to secure by Letters Patent—

The improvement in the method of manufacture of sheet-metal pipe, which consists in first bending a sheet of metal into a plane-sided tube, and thereafter forming ribs, flutes, or projections on said tube by the application of external pressure thereto while supported internally on detached longitudinal lines, substantially as set forth.

JOHN F. STARR, JR.

Witnesses:
I. S. NEKERVIE,
WATSON DEPUY.