No. 708,932. Patented Sept. 9, 1902.

E. H. SMITH.

PROCESS OF MANUFACTURING SHEET METAL PIPE ELBOWS.

(Application filed Nov. 26, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

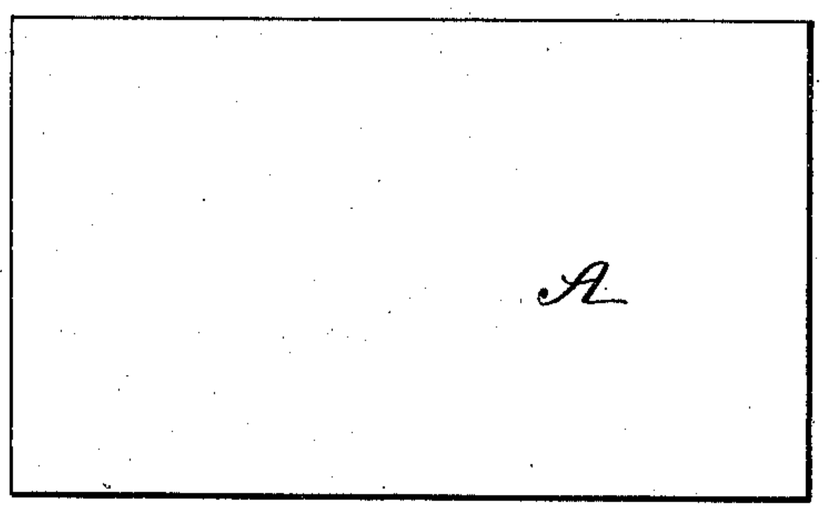

Fig. 2

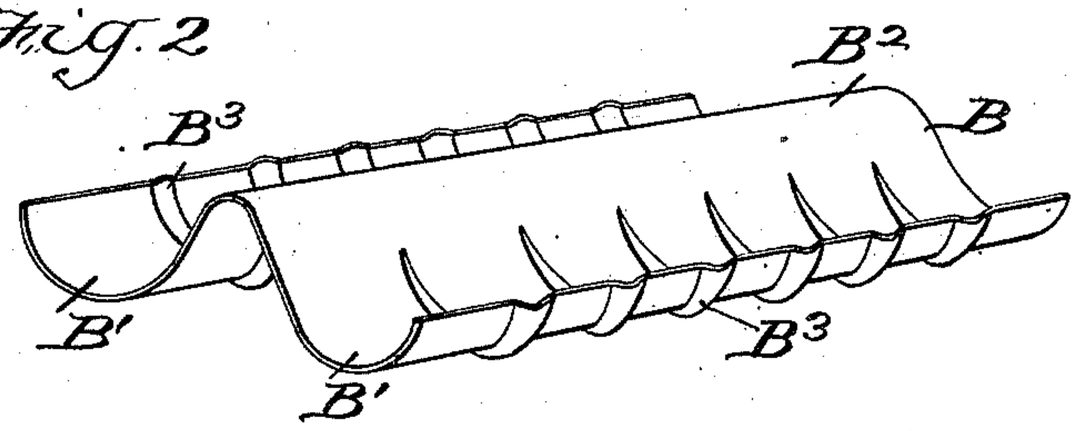

Fig. 3.

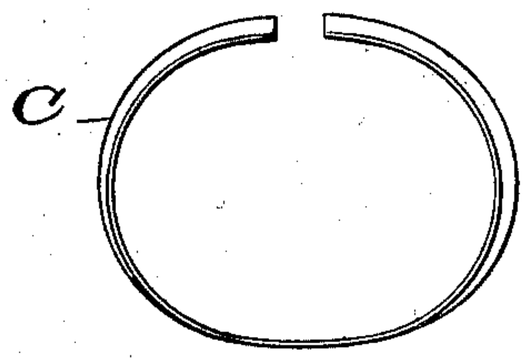

Fig. 4.

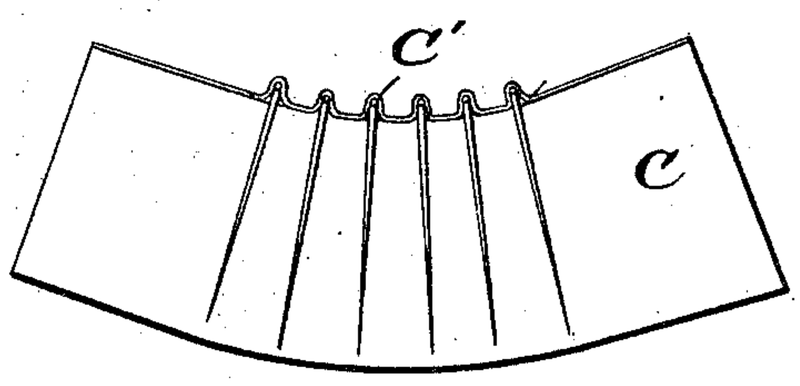

Fig. 5.

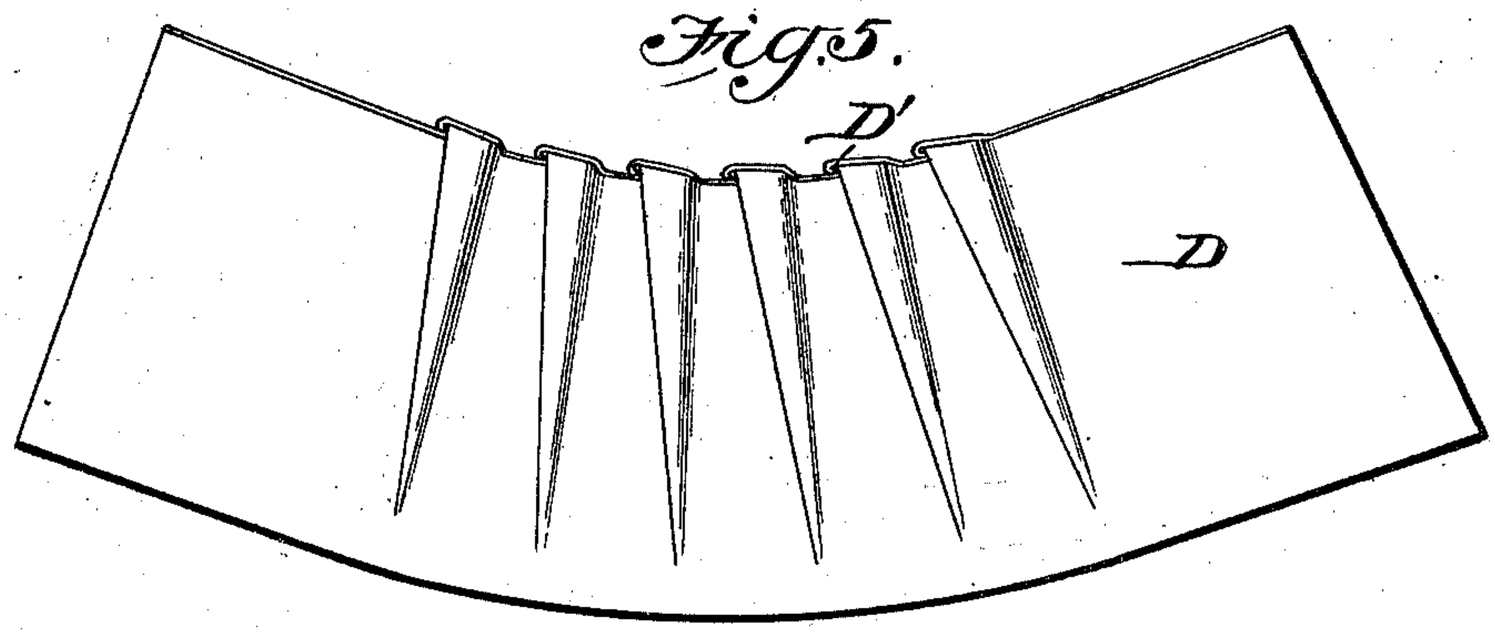

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Fig. 7.

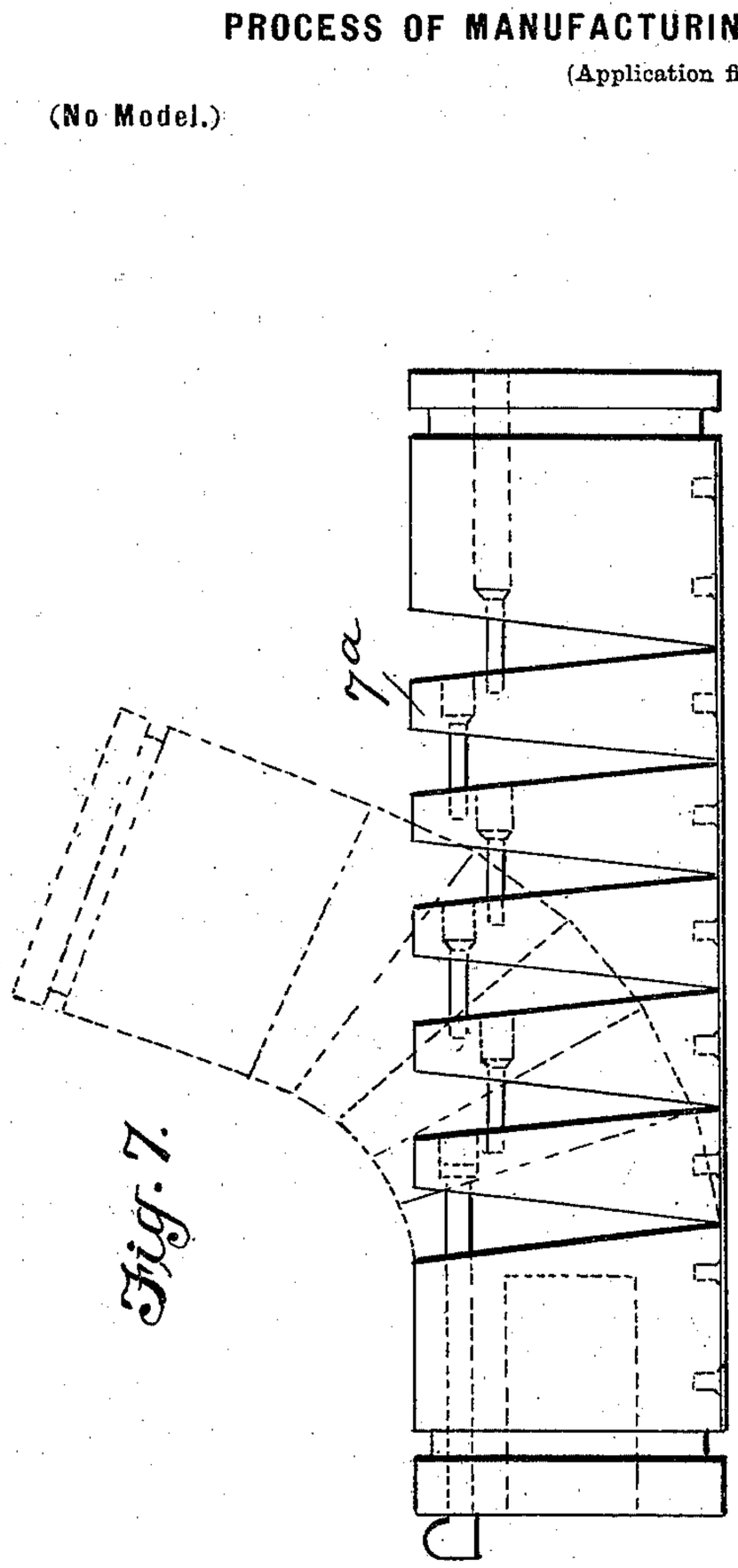


Fig. 8

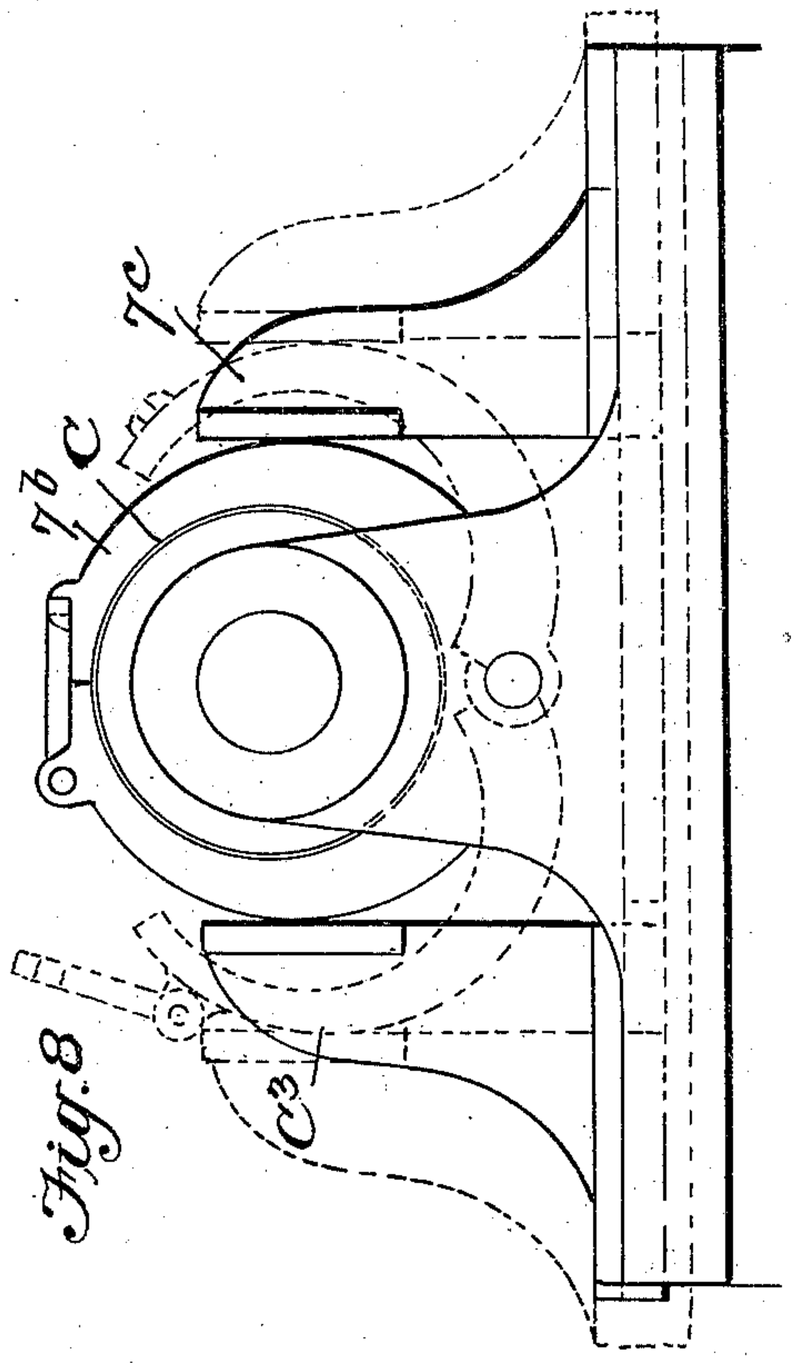
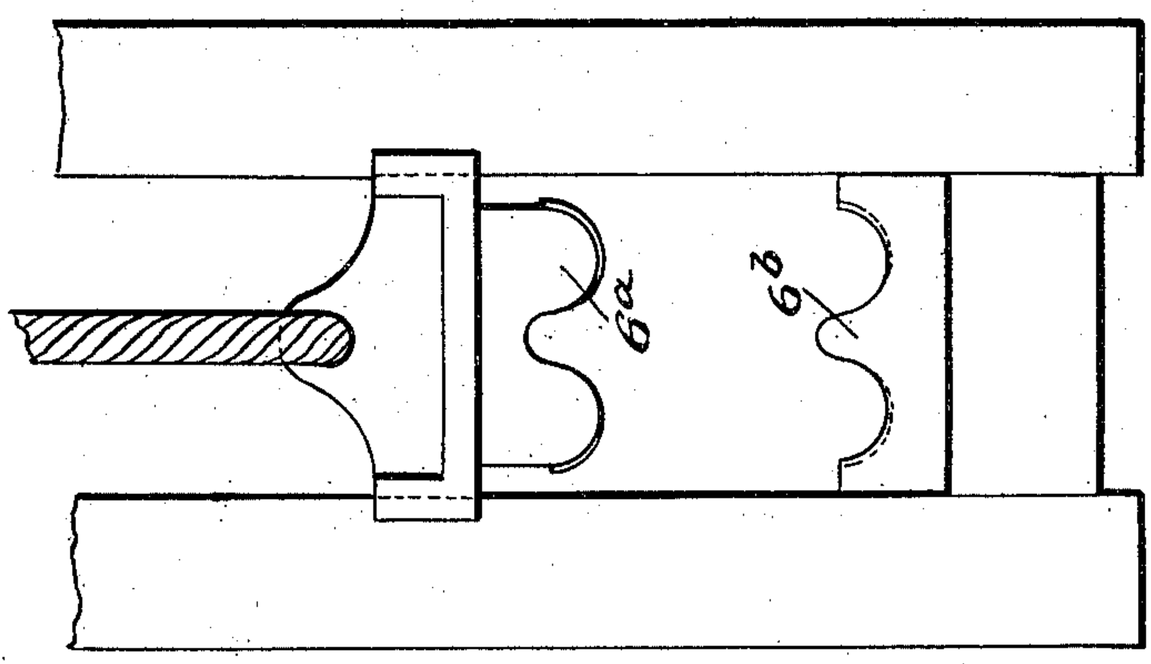


Fig. 6.



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(No Model.)

4 Sheets—Sheet 3.

Fig. 9.

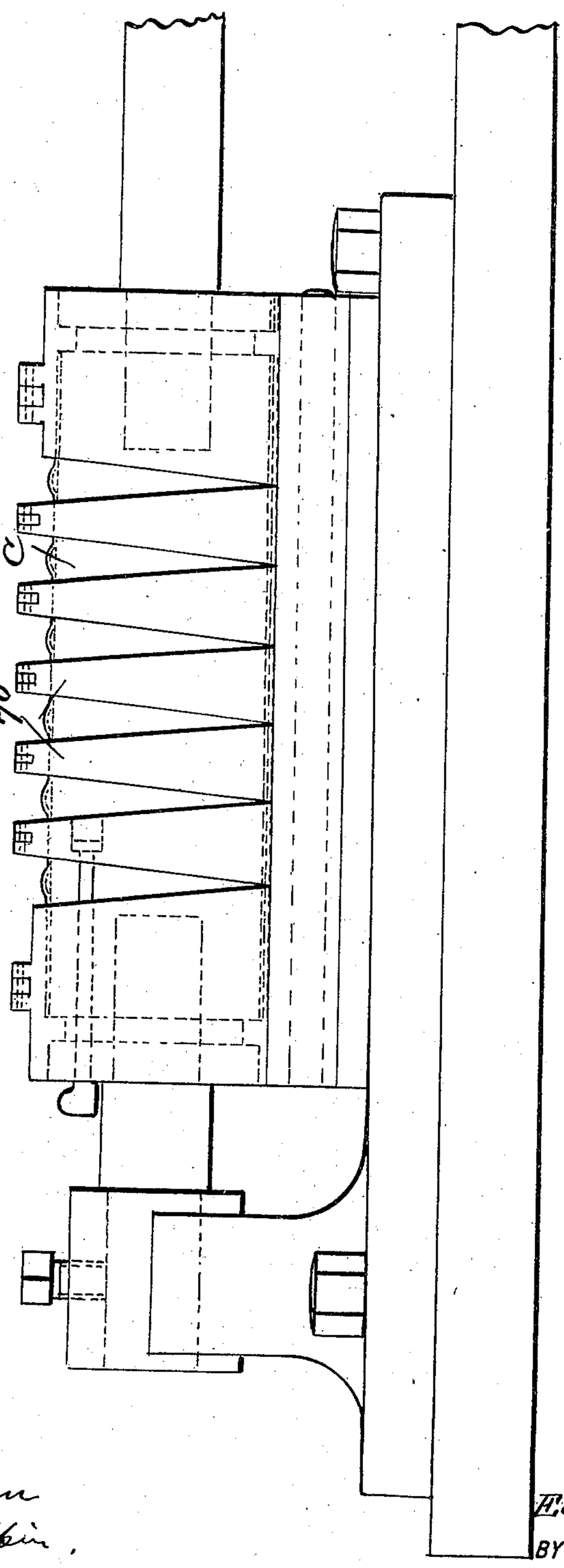

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Fig. 11.

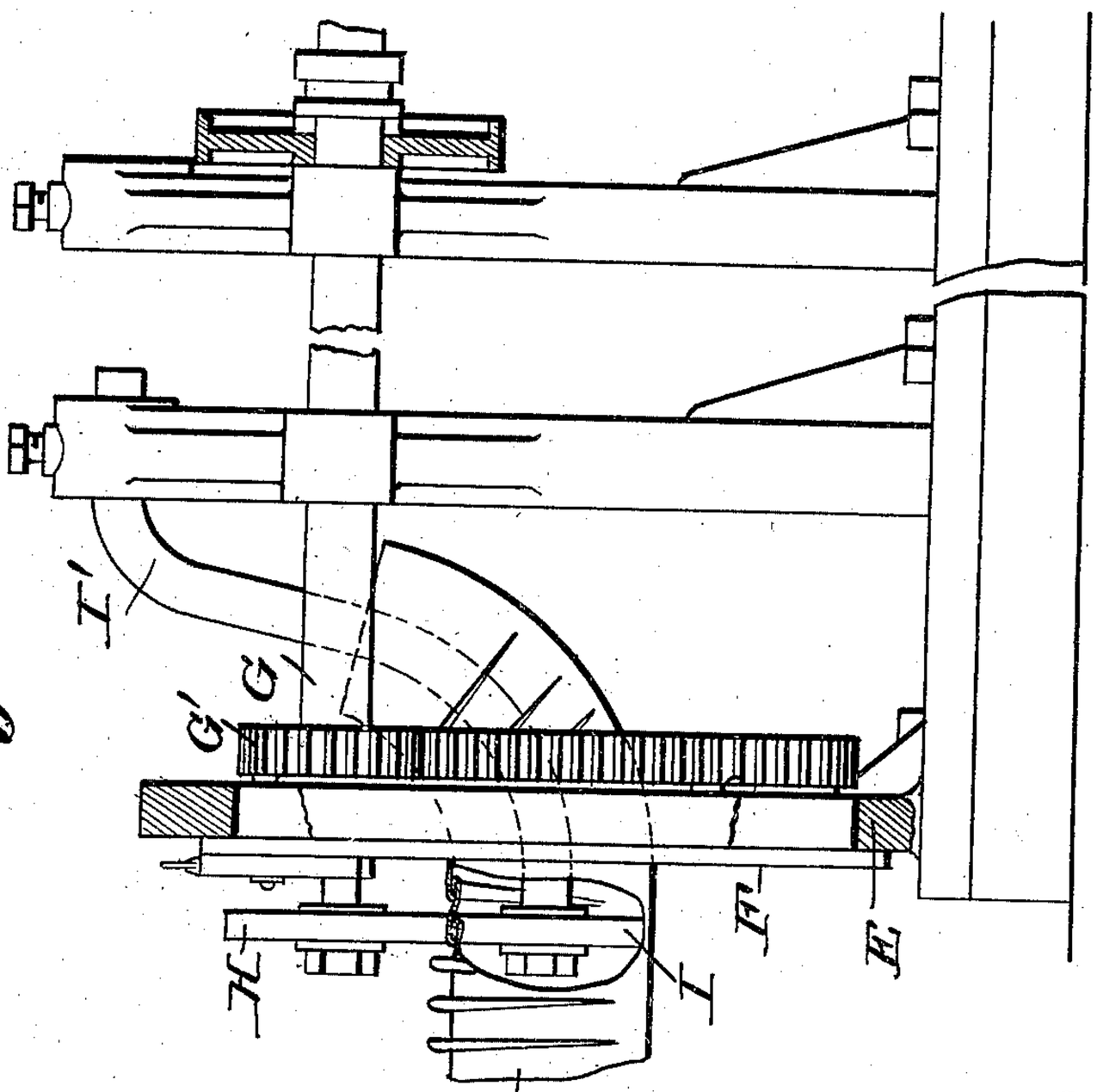
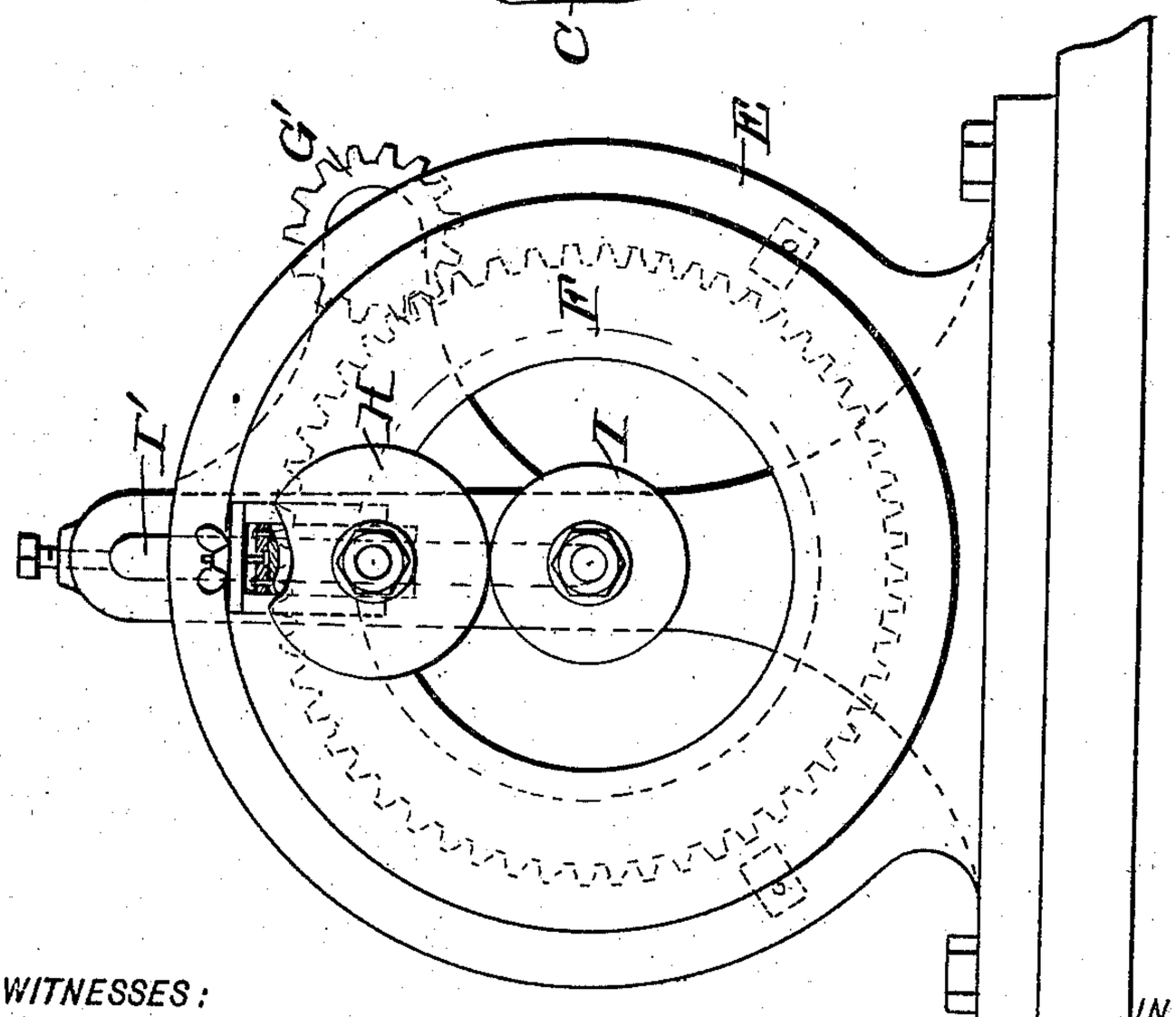


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDWARD HERBERT SMITH, OF MOUNT VERNON, OHIO, ASSIGNOR TO DICKELMAN-BOWERS MANUFACTURING COMPANY, OF FOREST, OHIO, A COPARTNERSHIP.

PROCESS OF MANUFACTURING SHEET-METAL PIPE-ELBOWS.

SPECIFICATION forming part of Letters Patent No. 708,932, dated September 9, 1902.

Application filed November 26, 1901. Serial No. 83,753. (No specimens.)

To all whom it may concern:

Be it known that I, EDWARD HERBERT SMITH, a citizen of the United States, residing at Mount Vernon, in the county of Knox and State of Ohio, have made certain new and useful Improvements in Processes of Manufacturing Sheet-Metal Pipe-Elbows, of which the following is a specification.

This invention is an improvement in processes of manufacturing sheet-metal pipe-elbows, and has for an object to provide a novel method including a step whereby is produced what for convenience of reference I term the "intermediate" blank; and the invention consists in the process as will be hereinafter described and claimed.

In the drawings, Figure 1 is a plan view of the plate of sheet metal from which the pipe-elbow is to be formed. Fig. 2 is a perspective view of the so-called "intermediate" blank. Fig. 3 is an end view showing the intermediate blank bent into approximately cylindrical form. Fig. 4 is a longitudinal section of the elbow with the flanges or crimped ribs projecting at a right angle to the axis of the elbow. Fig. 5 is a longitudinal section of the completed elbow. Fig. 6 is an elevation of the die-press for forming the intermediate blank. Fig. 7 is a detail side view of the sectional mandrel upon which the construction shown in Fig. 3 is placed. Fig. 8 is an end view of a portion of the bending-machine in which the straight pipe is bent to elbow form. Fig. 9 is a side elevation showing the construction represented in Fig. 3 applied to the inner mandrel and with the sectional clasp fitted and held thereon. Fig. 10 is an end elevation, and Fig. 11 a sectional side elevation, of the flattening-machine.

In carrying out my process I employ a flat blank, as shown at A in Fig. 1 and consisting of a rectangular sheet-metal plate of suitable length and width to form a stovepipe-elbow of the desired size. I then produce from this flat metal plate what for convenience of reference I term the "intermediate" blank B, as shown in Fig. 2. This is formed with the opposite longitudinal and parallel semicylindrical portions B′, the intermediate upwardly-projecting portions B^2, and with the transverse corrugations B^3, extending across the semicylindrical portions B′ at a right angle to the direction of length thereof and gradually widening from their inner ends toward their outer ends, the latter extending to the edges of the semicylindrical portions B′ and the opposite corrugations B^3 being in alinement, so their outer ends will fit together in the production of the elbow. By preference I produce this intermediate blank in the press shown in Fig. 6 and having the die-sections 6^a and 6^b formed to produce the shape shown in Fig. 2. The intermediate blank B is then bent in any suitable manner into the approximately cylindrical form shown in Fig. 3. So far as I am informed it is new to produce a preliminary blank for an elbow having opposite semicylindrical longitudinally-extended portions provided with transverse crimps and separated by an intermediate upwardly-projecting portion. I find it advantageous to follow this process in the production of an elbow, as thereby I am enabled to form the preliminary crimps B^3, extending partly from the opposite edges of the plate, without any distortion of the plate in the first instance and without interfering with the bending of the cylindrical form endwise into the elbow form, as desired, and I have thought it best to show in Fig. 6 the preferred means by which to secure the form of intermediate blank shown, as thereby the die will operate to produce the preliminary crimps, as desired. The cylindrical form shown in Fig. 3 is then compressed laterally to cause its separated edges to overlap, and the cylinder so formed is bent edgewise into the elbow form shown in Fig. 4, in which the preliminary crimps B^3 are flattened in the direction of length of the elbow, as shown in the said Fig. 4. This is preferably accomplished on a machine which is illustrated in Figs. 7, 8, and 9 and includes a sectional mandrel 7^a to receive the cylinder C, (shown in Fig. 3), a sectional clasp 7^b to encircle the elbow-cylinder C, and clamping devices 7^c for closing the clasp-sections, and thus bringing the cylinder C into form with its edges over-

lapped, the sectional mandrel and clasp with the cylinder C between them being bent, as indicated in dotted lines, Fig. 7, into elbow form and producing the construction shown in Fig. 4. I then flatten the crimps shown at C′ upon the surface of the elbow, as shown at D′, on the completed elbow D in Fig. 5, so there is produced an elbow substantially free of projecting ribs or crimps and one of unusual strength and rigidity. In flattening the crimps C′ to the form D′ (shown in Fig. 5) I prefer to employ the machine shown in Figs. 10 and 11 and including a suitable frame having a bearing-ring E, in which is supported a revolving ring F, arranged to be turned by the pinion G′ of a drive-shaft G and carrying a pressing-roller H, which operates upon the ribs C′ when the elbow C is fitted upon a roller I, carried by a bent arbor suitably supported by the framework.

It should be understood that the die-press shown in Fig. 6, the bending-machine shown in Figs. 7, 8, and 9, and the flattening-machine shown in Figs. 10 and 11 form the subjects-matter of separate applications for patent executed of even date herewith.

I do not in this application claim specifically the intermediate blank shown in Fig. 2, as this forms the subject-matter of a separate application for patent, Serial No. 83,754, filed November 26, 1901, or the bending-machine shown in Figs. 7, 8, and 9, as this forms the subject-matter of a separate application for patent, Serial No. 83,752, filed November 26, 1901, or the crimp-flattening machine shown in Figs. 10 and 11, as this forms the subject-matter of an application, Serial No. 83,755, filed November 26, 1901.

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

1. The herein-described process of making pipe-elbows consisting in shaping up from a plain blank an intermediate blank having opposite longitudinally-extended and parallel semicylindrical portions provided with transverse crimps or corrugations extending to their edges and an intermediate elevated portion, bending such intermediate blank into approximately a cylindrical form, bending the cylinder so formed into elbow form whereby the preliminary crimps or corrugations are flattened radially and flattening said ribs or crimps upon the surface of the elbow, substantially as and for the purposes set forth.

2. The process of producing stovepipe-elbows which consists in forming a plate into a preliminary blank having opposite semicylindrical portions lying approximately in the same plane and separated by an intermediate projecting portion, and crimping or corrugating said semicylindrical portions transversely, bending the intermediate blank so formed into approximately a cylindrical form and bending said cylindrical form into elbow form, substantially as set forth.

3. The improvement in the art of making pipe-elbows with crimps extending partially around the circumference thereof, which consists in shaping up a plain blank into the intermediate blank with longitudinal parallel semicylindrical portions facing in the same direction and crimping them for a short distance from their outer edges to produce transverse crimps which disappear short of the inner sides of the said portions and subsequently transversely and longitudinally bending the intermediate blank into elbow form, substantially as set forth.

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