J. FRASER.

MACHINE FOR FORMING SHEET METAL PIPES.

APPLICATION FILED NOV. 12, 1909.

1,109,522.

Patented Sept. 1, 1914.

3 SHEETS-SHEET 1.

Fig. 1.

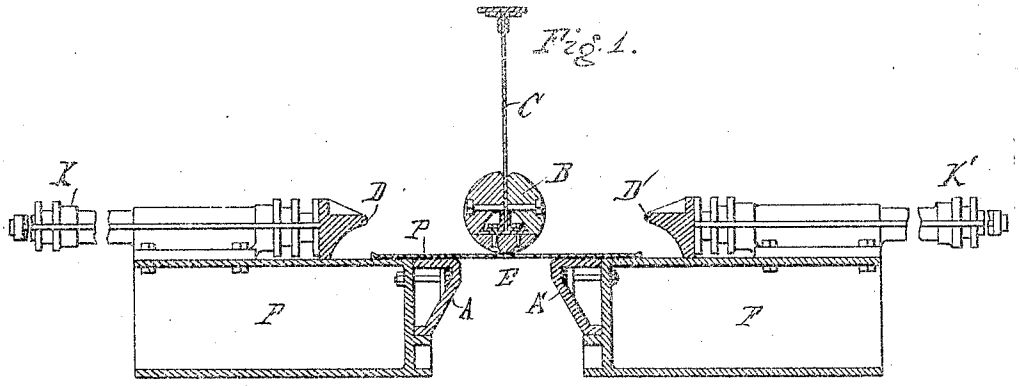


Fig. 2.

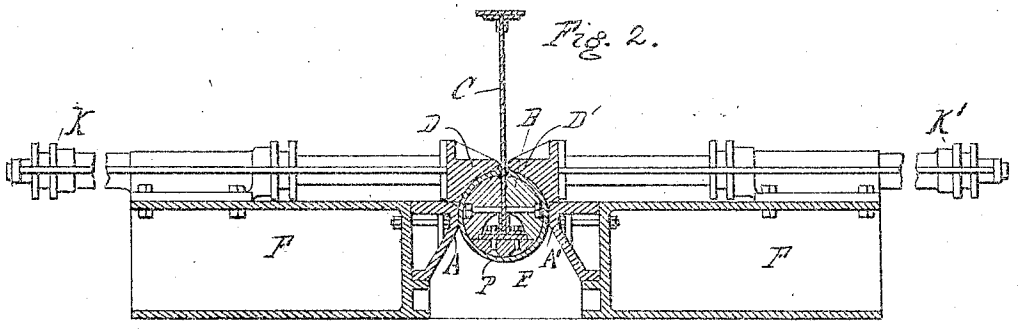
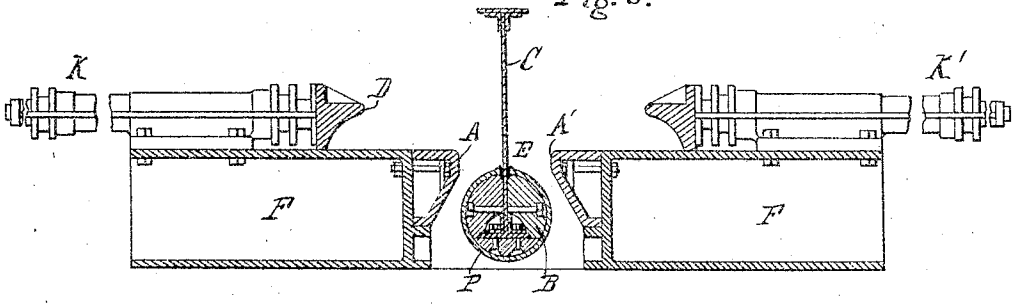


Fig. 3.



WITNESSES

L. H. Grote

W. E. Klein

INVENTOR

John Fraser

BY

Howson and Howson

His ATTORNEYS

J. FRASER.

MACHINE FOR FORMING SHEET METAL PIPES.

APPLICATION FILED NOV. 12, 1908.

1,109,522. Patented Sept. 1, 1914.

3 SHEETS—SHEET 2.

Fig. 4.

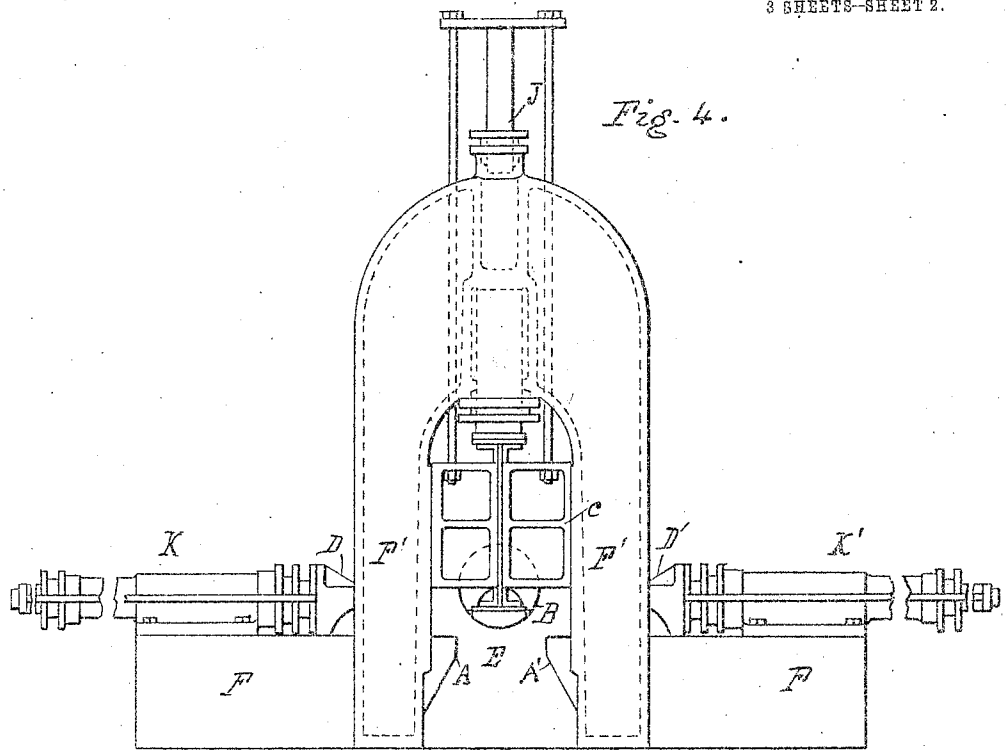
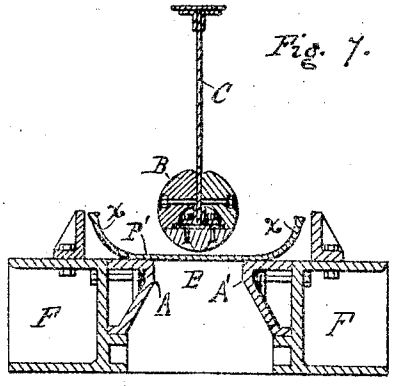


Fig. 7.



WITNESSES

L. H. Grote

M. E. Keir

INVENTOR

John Fraser

BY

Howson and Howson

his ATTORNEYS

J. FRASER.

MACHINE FOR FORMING SHEET METAL PIPES.

APPLICATION FILED NOV. 12, 1909.

1,109,522.

Patented Sept. 1, 1914.

3 SHEETS—SHEET 3.

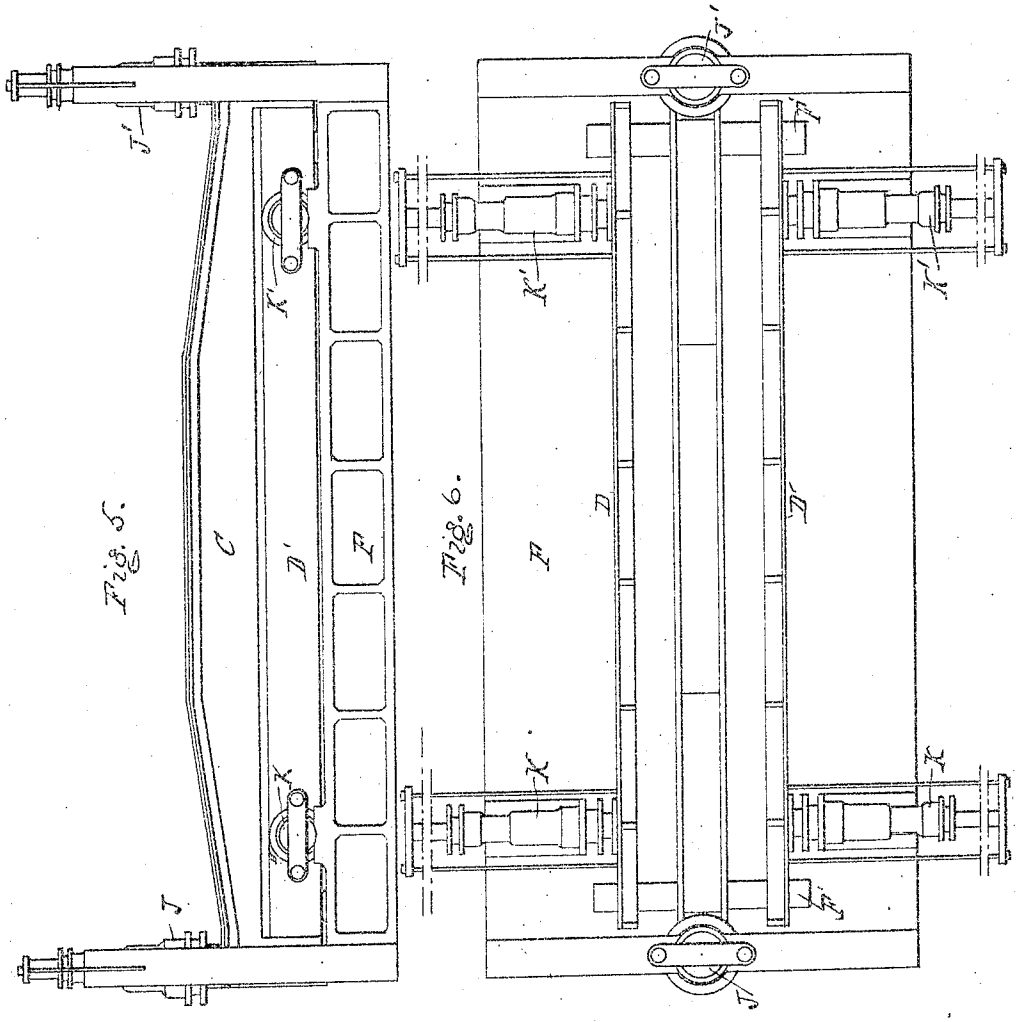


Fig. 5.

Fig. 6.

WITNESSES

L. H. Grote

W. E. Kiis

INVENTOR

John Fraser

By

Howson and Howson

his ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN FRASER, OF HACKENSACK, NEW JERSEY.

MACHINE FOR FORMING SHEET-METAL PIPES.

1,109,522. Specification of Letters Patent. Patented Sept. 1, 1914.

Application filed November 12, 1909. Serial No. 527,706.

To all whom it may concern:

Be it known that I, JOHN FRASER, a citizen of the United States of America, residing in Hackensack, in the county of Bergen, in the State of New Jersey, have invented a certain new and useful Improved Machine for Forming Sheet-Metal Pipes, of which the following is a specification.

My invention consists of an improved machine for bending up sheets of metal into the form of pipe sections, with longitudinal joints to be closed by lock bars or rivets. The usual method of bending up sheets for such a purpose is by a rolling operation, wherein the sheet is rolled back and forth between a pair of oscillating driven rolls and a third or forming roll. It will be readily understood that the length of the sections which can thus be rolled is limited by the length of this third roller, and if the latter is of relatively small diameter for the making of small diameter pipe, this roll must be made proportionately short; otherwise the roll would be too weak.

To permit the formation of tube sections of great length with even small diameters is the main object of my present invention. For this purpose I construct a machine with a forming mandrel having a re-inforced or strong back, preferably in the form of an I-beam secured along the back of the mandrel, in combination with means for forcing this mandrel between opposite die faces to cause the sheet to be bent around the mandrel.

In the accompanying drawings, Figure 1 is a vertical section showing the parts at the beginning of the operation; Fig. 2 is a similar view showing the parts at the end of the bending operation; Fig. 3 is a similar view showing the parts in the positions when the formed tube sheet is ready to be withdrawn endwise from the mandrel; Fig. 4 is an end elevation of the machine; Fig. 5 is a side elevation, drawn to a smaller scale; Fig. 6 is a corresponding plan view; Fig. 7 is a sectional view, illustrating a modification.

The principal parts of the machine shown in Figs. 1 to 6 are a pair of die edges A, A^1, a vertically movable forming mandrel B with "strong back" C longitudinally secured to the back of the mandrel, and a pair of laterally movable folding bars D, D^1, and means, such as fluid pressure jacks, for example, to move the mandrel and folding bars. The die edges A, A^1 of a length as great as, or greater than the longest sheet of metal to be bent, are preferably separable from, or in other words, detachably secured to the framework F of the machine with the acting edges of the dies at a distance apart about equal to the external diameter of the tube to be formed. Thus there is formed a central opening E longitudinally of the machine, and in line with it is the cylindrical forming mandrel B which normally stands above the slot E and is carried by the "strong back" C. This latter is preferably in the form of an I-beam with end pieces *c*, Fig. 4, guided vertically in the end frames F^1, F^1 of the machine. The mandrel, the I-beam and its end-pieces may be supported by hydraulic or other fluid pressure jacks J, J^1 by the manipulation of which the forming mandrel may be depressed from the position shown in Fig. 1 to the positions shown in Figs. 2 and 3 successively, and elevated again as desired. The folding bars D, D^1, which likewise extend the length of the machine, are arranged on opposite sides of the opening E and die edges, are arranged to be horizontally movable toward and from this central opening by means of fluid pressure jacks K, K^1 or other suitable means.

The diameter of pipe to be made having been determined, a mandrel of corresponding diameter is secured to the under edge of the strong back C. Conveniently this mandrel may be built up of segments to be bolted to the I-beam. Die edges A, A^1 of a size to give the proper width of opening E are secured in position in the frame and then the plate P, which may be bent cold, is laid over the slot E, while the folding bars D, D^1 are drawn back as in Fig. 1, and the outer faces of the U-shaped plate to be drawn across the edge dies, which thus draw the fibers of those faces and help to give the plate the desired shape. Then the mandrel and strong back are lowered in the position shown in Fig. 2, thereby causing the plate to be bent to a U-shape. Thereupon, with the mandrel still in the position, Fig. 2, the side bars D, D^1 are moved inwardly to the positions shown in Fig. 2 to fold the edges of the plate down onto the mandrel, and thereby complete the bending of the sheet to pipe form. Thereupon, the mandrel may be further lowered into the space below the edge dies, as shown in Fig.

3, and the folding bars D, D^1 drawn back, after which the tube may be slipped off the mandrel endwise.

The folding bars D, D^1 are not necessary in all cases. Thus in Fig. 7, I have shown a machine in which they are dispensed with, but in such case it is necessary to previously form the plate P^1 in longitudinal channel form, with the edges x, x, curved on radii about the same as the radius of the finished pipe, so that when the mandrel B pushes the plate down through the opening E, these curved edges will be folded down onto the upper parts of the mandrel the same as if they had been pressed thereon by folding bars as in Fig. 2.

I claim as my invention—

1. A machine for bending plates into pipe form, comprising a pair of longitudinal edge dies, a longitudinal mandrel and a strong back secured to the mandrel longitudinally, and means to move the mandrel and plate between and over the edge dies, a space being left below the latter to facilitate endwise removal of the pipe form, substantially as described.

2. A machine for bending plates into pipe form, comprising a pair of longitudinal edge dies, a longitudinal mandrel a strong back secured to the back of the mandrel longitudinally, and means to move the mandrel and plate between and over the edge dies, in combination with a pair of laterally movable folding bars to finish the folding of the edges and means to move the strong back and mandrel and the folding bars, substantially as described.

3. A machine for bending plates into pipe form, comprising a frame-work, a pair of detachable edge dies, a mandrel and an I-beam secured to the mandrel longitudinally, and means to raise and lower the mandrel and I-beam.

4. A machine for bending plates into pipe form, comprising a framework, a pair of detachable edge dies, a mandrel and an I-beam secured to the mandrel longitudinally, laterally movable folding bars, means to raise and lower the mandrel and beam and means to move the folding bars.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN FRASER.

Witnesses:
WALTER ABBE,
HUBERT HOWSON.