F. W. COLBY.

APPARATUS FOR MAKING REINFORCED SPIRAL PIPE.

APPLICATION FILED JUNE 15, 1908. RENEWED JAN. 31, 1917.

1,238,987. Patented Sept. 4, 1917.

3 SHEETS—SHEET 1.

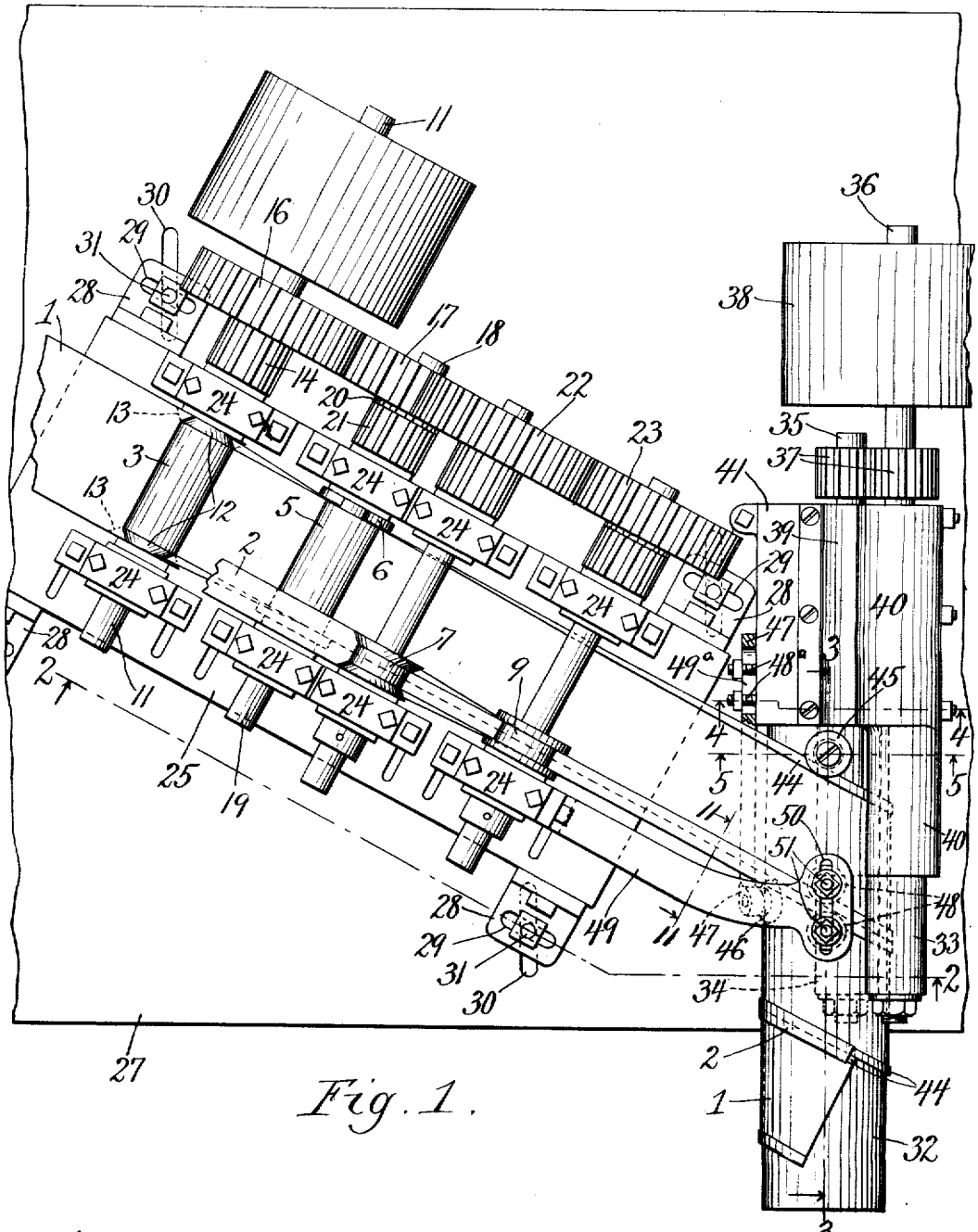


Fig. 1.

Witnesses,
Edward T. Wray.
Edna K. Reynolds.

Inventor.
Frank W. Colby.
by Parker & Carter
Attorneys.

F. W. COLBY.

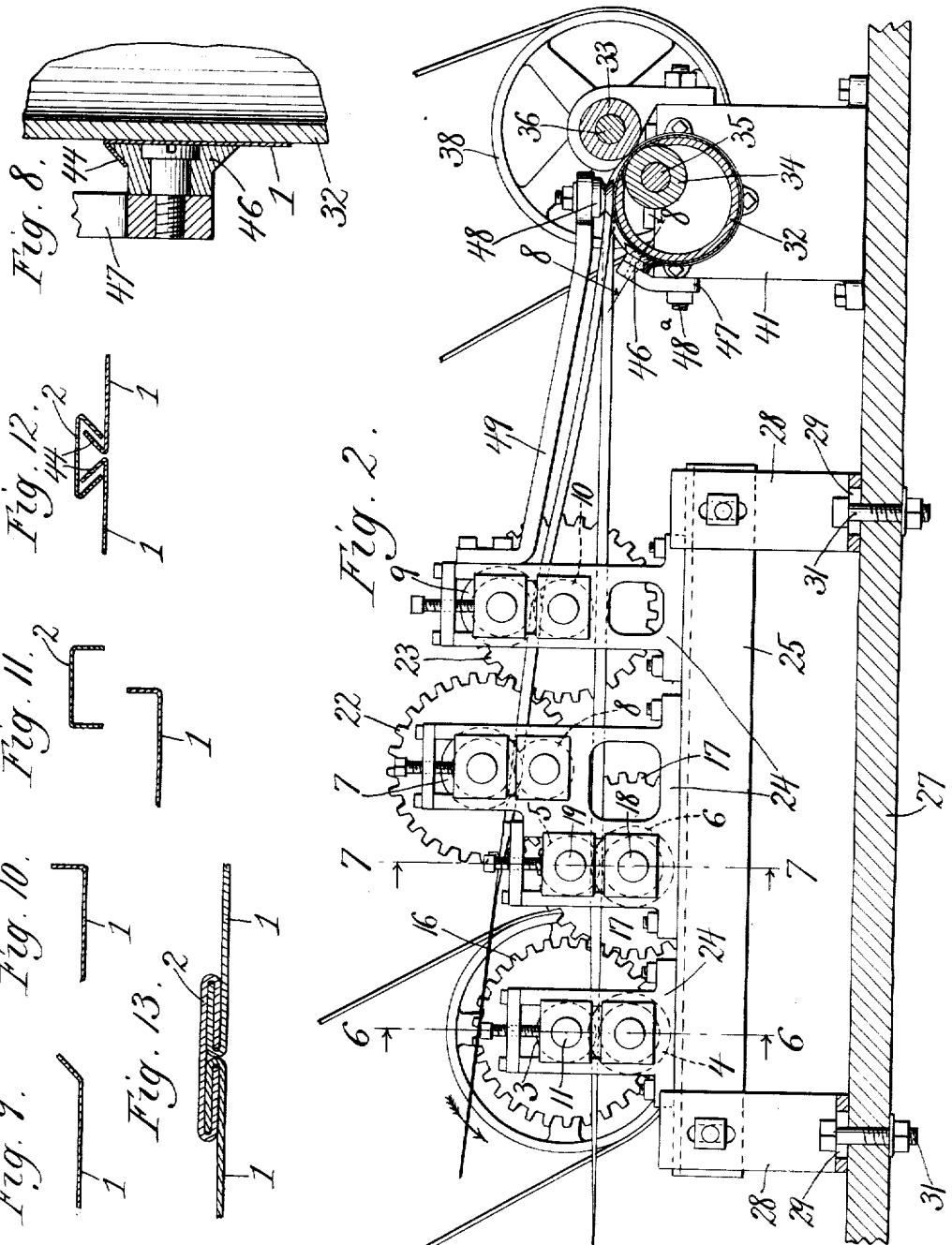
APPARATUS FOR MAKING REINFORCED SPIRAL PIPE.

APPLICATION FILED JUNE 15, 1908. RENEWED JAN. 31, 1917.

1,238,987.

Patented Sept. 4, 1917.

3 SHEETS—SHEET 2.



Witnesses,
Edward T. Wray.
Edna K. Reynolds.

Inventor.
Frank W. Colby
by Parker & Carter
Attorneys

F. W. COLBY.

APPARATUS FOR MAKING REINFORCED SPIRAL PIPE.

APPLICATION FILED JUNE 15, 1908. RENEWED JAN. 31, 1917.

1,238,987. Patented Sept. 4, 1917.

3 SHEETS—SHEET 3.

Fig. 3.

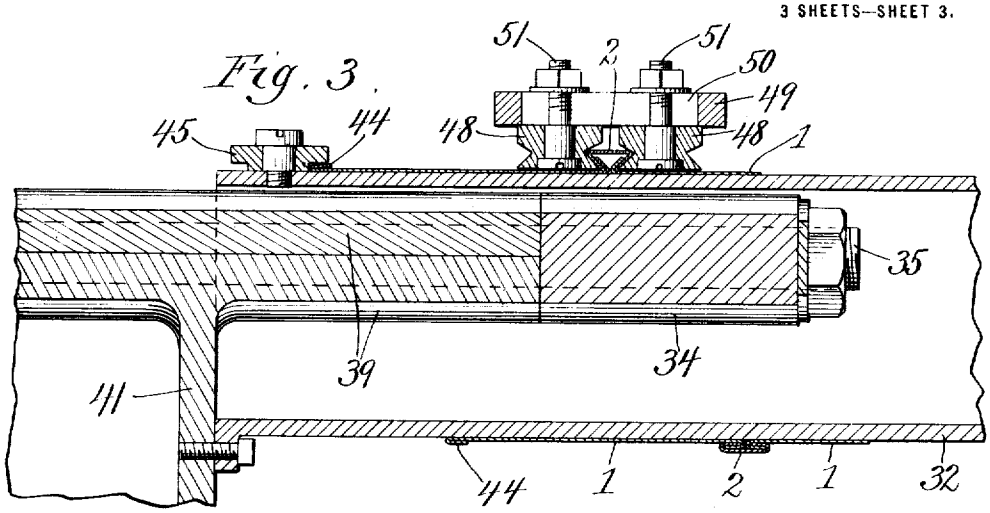


Fig. 5.

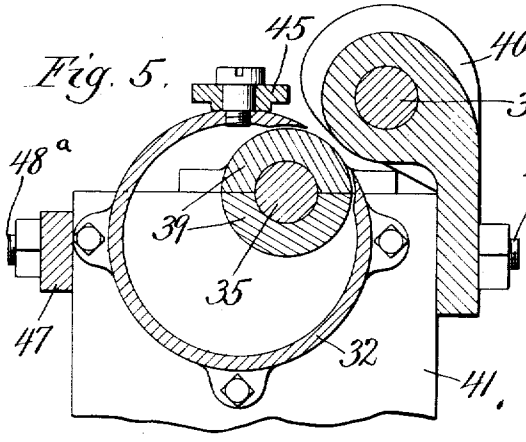


Fig. 4.

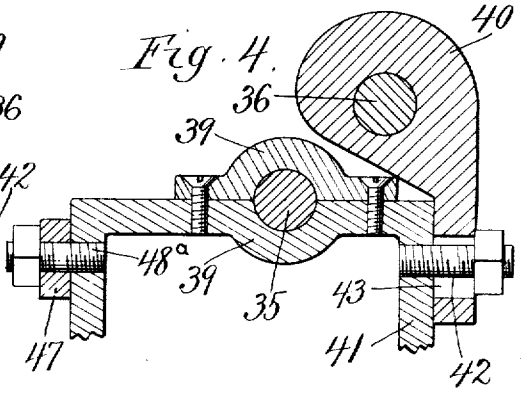


Fig. 6.

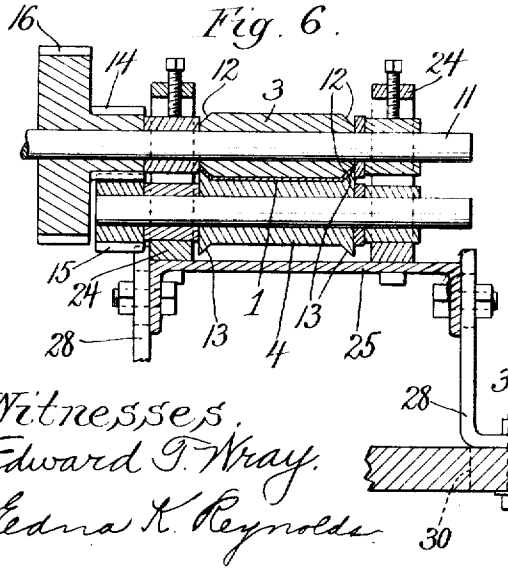
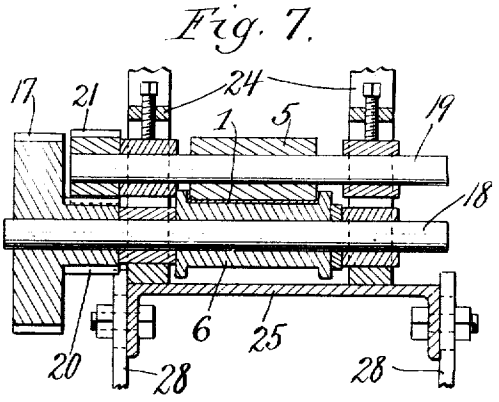


Fig. 7.



Witnesses.
Edward G. Wray.
Edna K. Reynolds.

Inventor.
Frank W. Colby.
by Parker & Burton
Attorneys.

UNITED STATES PATENT OFFICE.

FRANK W. COLBY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO STANDARD SPIRAL PIPE WORKS, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

APPARATUS FOR MAKING REINFORCED SPIRAL PIPE.

1,238,987. Specification of Letters Patent. Patented Sept. 4, 1917.

Original application filed November 11, 1907, Serial No. 401,583. Divided and this application filed June 15, 1906, Serial No. 438,518. Renewed January 31, 1917. Serial No. 145,818.

To all whom it may concern:

Be it known that I, FRANK W. COLBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apparatus for Making Reinforced Spiral Pipe, of which the following is a specification.

This invention relates to apparatus for making reinforced pipe, and has for its object to provide a new and improved apparatus of this description.

Fig. 1 is a plan view of one form of apparatus for carrying out my process;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 2;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 2;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 2;

Figs. 9, 10, 11, 12 and 13 are views showing the shape of the metal at different steps of the formation of the pipe.

This application is a divisional application taken from my application No. 401,583, filed November 11, 1907.

In the present case I have illustrated one form of apparatus by means of which a strong, continuous and reinforced pipe is formed from comparatively narrow strips of metal. Strips of metal of any desired size may be used. As herein shown the pipe is formed from the two strips of metal 1 and 2. Some means is provided for bending the edges of these strips. As herein shown the edges of the strip 1 are bent upwardly by means of suitable rollers between which it passes. In the apparatus herein shown the first set of rollers 3 and 4 (see Figs. 1 and 6) partially bend these edges. The roller 4 is cut away at the middle and the roller 3 fits into this cut away portion, the two rollers having beveled faces at 12 and 13 which cause the edges of the strip to be bent. The strip then passes between the rollers 5 and 6 (see Fig. 7). The roller 6 is spool shaped and the roller 5 fits therein so as to bend the edges of the strip of metal 1 at substantially right angles to the body portion. A similar set of rollers 7, 8, 9 and 10 act upon the strip 2 and bend the edges thereof down. These rollers may be operated in any desired manner, and as herein shown are driven from the shaft 11. This shaft directly drives the roller 3, the roller 4 being driven by means of suitable pinions 14, 15. A gear 16 on shaft 11 engages a gear 17 on the shaft 18 carrying the roller 6, while the shaft 19 carrying the roller 5 is driven by means of the pinions 20 and 21. In view of the fact that the roller 6 is driven from the upper roller 3 it will be noted that both sets of rollers will move in the same direction so as to assist in pulling the strip of metal therethrough. The gear 17 meshes with gear 22 connected with roller 7 so as to drive it, and roller 8 is driven from roller 7. The gear 22 engages a gear 23 which drives roller 10 and roller 9 is driven therefrom, the two sets of rollers being driven in the same direction so as to assist in pulling the strip 2 therethrough. The two rollers of each set, of course, are driven in opposite directions in the usual manner. The strip 1 may be termed the main strip, and the strip 2 the reinforcing strip. The supports 24 for the bearings of the various rollers are preferably adjustably mounted upon the frame 25 so that they may be spread apart to permit rollers of different lengths to be used in order that strips of material of different widths may be formed into pipe.

The frame 25 is also adjustable upon the base 27 so as to secure a further adjustment. The parts are arranged to produce a universal adjustment. This is accomplished in the drawing by providing the foot 28 with a slot 29, and the base with a diagonal slot 30 and fastening the foot to the base by a bolt 31. It will be seen that any desired adjustment may thus be secured. These rollers may be called the shaping rollers. After the edges of the strips 1 and 2 are properly bent the strips are curved or bent into a spiral, and the adjacent edges united. Any suit-

able means for this purpose may be used. As herein shown a hollow tube or mandrel 32 is provided. Associated with the mandrel or hollow cylinder are two uniting rollers 33, 34, one within the cylinder and the other exterior thereto, the cylinder being cut away opposite these rollers so that they may compress between them anything passing around the cylinder. These two rollers are driven in any desired manner, as, for example, by means of the shafts 35 and 36 connected by gears 37 with the pulley 38. These uniting rollers may be driven from the same source of power as the shaping rollers, and the two sets of rollers are preferably driven at the same peripheral speed, so that the strips of material will be properly fed between them. The shaft 35 is mounted in a suitable bearing 39, and the shaft 36 in a suitable bearing 40. The bearing 40 is adjustable so that the space between the rollers may be varied. As herein shown this bearing is mounted upon the frame 41 by means of the bolt 42, there being a slot 43 to permit proper adjustment. In uniting the strips of material the strip 1 is first formed into a part of a spiral. This is preferably done by giving it, say, one turn about the cylinder 32. I have found that if the bent edge 44 is left in proper position to be interlocked with the bent edge of the strip 2 it will be injured when bent about the cylinder 32. In order to prevent this injury I therefore provide an edge-flattening device 45 which bends the edge 44 back upon the body of the strip 1 so that in passing around the cylinder it is not injured. This flattening device may be of any desired construction, and as herein shown consists of a wheel or disk fastened to the cylinder 32 (see Fig. 5). Before the edge 44 can be interlocked with the edges of the strip 2 it must be again loosened or raised to its proper interlocking position. Some suitable loosening or raising device may be provided. As herein shown such a device 46 is provided. This loosening or raising device as herein shown consists of a disk with a beveled edge located so that the beveled edge passing over the flattened edge of the strip loosens or lifts it to its interlocking position. This loosening or raising device is preferably adjustable so that its position may be varied to adjust it to strips of different widths. As herein shown it is connected to a supporting piece 47 which is adjustably connected to the frame by means of the bolts 48^a which pass through a slot 49^a in the support. When the two edges of the strip 1 are brought opposite each other by the turn about the cylinder 32, the bent edges of the strip 2 are brought into proximity to the edges of the strip 1 and some means is provided for interlocking these edges. As herein shown the interlocking device consists of the beveled wheels 48 between which the strip 2 passes, said beveled wheels being adjustably supported upon a supporting device 49, attached to a suitable fixed part. These wheels 48 are adjustable upon the support so as to adjust the device for strips of various widths. This adjustment is secured by providing the support with a slot 50 (see Figs. 1 and 3), and connecting the rollers thereto by means of bolts 51. The support 49 may be connected with the bearing support for the rollers 9 and 10 so that it will be moved to a proper position when the parts are adjusted for using strips of various widths. When the adjacent bent edges of the strip 1 and the strip 2 and the bent edges thereof pass between these rollers 48 they cause the bent edges to interlock as shown in Figs. 3 and 12. These interlocking edges then pass between the rollers 33 and 34, and are clamped or united together, the parts then being moved to the position shown in Fig. 13. The strips 1 and 2 are thus pulled along, and formed into spirals and fastened or united together so as to form a continuous spiral pipe, such pipe being reinforced, as it were, by the strip 2 so as to be made strong and durable. After the pipe is formed it may be galvanized or otherwise treated, and the joints between the two strips may be soldered or otherwise treated, although such treatment is not ordinarily required, the joint being tight and secure as soon as the pipe is formed.

The use and operation of my invention are as follows:

The edges of the two strips of material are properly bent by passing them between the respective rollers. When the strip 1 passes between the rollers 3 and 4 each edge takes the position shown in Fig. 9. When the strip passes between the rollers 5 and 6 each edge takes the position shown in Fig. 10. When the strip 2 passes between its two sets of rollers the edges thereof takes the position shown in Fig. 11. The strips are then passed about the cylinder 32, the edge 44 being first turned down by the flattening device 45, such edge after passing around the cylinder and just before reaching its interlocking position, being loosened or turned up by the loosening device 46, as shown in Fig. 8. The interlocking device then acts on the adjacent edges of the strip 1 and the edges of the strip 2, moving them into the interlocking position shown in Fig. 12. These edges then pass between the uniting rollers 33 and 34, whereupon they are mashed down and fastened firmly together, as shown in Fig. 13. The process is then continued and the pipe formed of any desired length, such pipe being reinforced by the strip 2.

In this device the strip 1 may be said to be the main strip, and the strip 2, the inter-

locking strip, because the feature of the strip 2 is to interlock and bind the edges of the other strip together. The interlocking strip is preferably narrower than the main strip, so as to bring the edges of the main strip close together.

I claim:

1. An apparatus for forming spiral pipe from a plurality of strips of material, comprising a cylindrical device about which the strips are bent in spiral form, means for bending the edges of said strips at an angle to the main body thereof while the strips are moving toward said cylindrical device, an interlocking device in proximity to the surface of said cylindrical device, for engaging the bent edges of one strip and binding them under the bent edges of the other strip while the two strips are in motion, so as to interlock the edges of the two strips, and mechanism separate from said interlocking device, for permanently fastening the interlocking edges of the strips together to form a spiral sealed pressure resisting joint.

2. An apparatus for forming pipe from strips of material comprising a plurality of rollers for bending the edges of the strips, a stationary cylindrical device about which the strips are bent, an interlocking device for positively moving and interlocking the bent edges and uniting rollers beyond the interlocking device about which the bent edges pass so as to be fastened together to form a spiral sealed joint.

3. An apparatus for forming pipe from strips of material comprising means for bending the edges of said strips, a cylindrical device about which the strips are wrapped, a flattening device for flattening the bent edge of one strip before it passes about the cylindrical device, an interlocking device for interlocking the edges of the strips, a loosening device for loosening the said flattened edge before it reaches the interlocking device and means for compressing the interlocking edges so as to fasten the strips together.

4. An apparatus for forming pipe from a plurality of strips of metal, comprising shaping rollers which bend the edges of the strips, a cylindrical device about which said strips are wrapped, an interlocking device for interlocking the bent edges of the strips, said interlocking device comprising two rollers with their axes at an angle to the axis of said cylindrical device.

5. An apparatus for forming pipe from a plurality of strips of material comprising shaping rollers which bend the edges of the strips, a two-part interlocking device for interlocking such bent edges, a cylindrical device about which said strips are wrapped after the edges have been interlocked so as to form a continuous pipe, means for adjusting the parts of said interlocking device to adapt it to strips of various widths.

6. An apparatus for forming pipe from a plurality of strips of material comprising shaping rollers which bend the edges of the strips, an interlocking device for interlocking such bent edges, a cylindrical device about which said strips are wrapped, a flattening device for flattening the edge of one strip before it passes around said cylindrical device, a loosening device adapted to loosen said flattened edge before it reaches the interlocking device and means for adjusting the loosening and interlocking devices so that strips of various widths may be used.

7. An apparatus for forming pipe from a plurality of strips of material comprising means for bending the edges of said strips at an angle to the body portion thereof, a cylindrical device about which said strips are bent, two wheels with beveled faces between which the bent edges of said strips pass so as to be interlocked, two uniting rollers, one within the cylindrical part and one exterior thereto, the cylindrical part being cut away at this point so that the two rollers may engage the interlocking edges of said strips.

8. An apparatus for forming pipe from two strips of material, one the main strip and the other the reënforcing strip, comprising means for bending the edges of the main strip in one direction and the edges of the reënforcing strip in the opposite direction, a cylindrical device about which the main strip is wrapped so that the bent edge on one side will be brought adjacent to the bent edge on the other side, two engaging devices between which said adjacent bent edges pass, the reënforcing strip also passing between said engaging devices so that the bent edges thereof are interlocked with the bent edges of the main strip prior to their being mechanically clamped together and means for mechanically clamping said edges together after they have been interlocked.

9. An apparatus for forming pipe from two strips of material, one the main strip and the other the reinforcing strip comprising means for bending the edges of the main strip, in one direction and the edges of the reinforcing strip in the opposite direction, a cylindrical device about which the main strip is wrapped so that the bent edge on one side will be brought adjacent to the bent edge on the other side, two engaging devices between which said adjacent bent edges pass, the reinforcing strip also passing between said engaging devices so that the bent edges thereof are interlocked with the bent edges of the main strip, a flattening device for flattening one edge of the main strip before it passes about the cylindrical device, and

a loosening device for loosening said flattened edge before it passes between the engaging devices.

10. An apparatus for forming pipe from two strips of material, one the main strip and the other the reinforcing strip, comprising means for bending the edges of the main strip in one direction and the edges of the reinforcing strip in the opposite direction, a cylindrical device about which the main strip is wrapped so that the bent edge on one side will be brought adjacent to the bent edge on the other side, two engaging devices between which said adjacent bent edges pass, the reinforcing strip also passing between said engaging devices so that the bent edges thereof are interlocked with the bent edges of the main strip, a flattening device for flattening one edge of the main strip before it passes about the cylindrical device, and a loosening device for loosening said flattened edge before it passes between the engaging devices, and means for compressing said interlocking edges so as to unite the strips into a continuous pipe.

11. An apparatus for forming pipe from strips of material comprising means for bending the edges of said strips, a cylindrical device about which the strips are simultaneously wrapped, a flattening device for flattening the bent edge of one strip before it passes around the cylindrical device and a loosening device for loosening said flattened edge after the strip has passed around said cylindrical device.

12. An apparatus for forming pipe from two strips of material comprising means for bending the edges of said strips, an interlocking device for interlocking the adjacent edges of one strip with the edges of the other strip prior to the time when said edges are clamped together, a cylindrical device about which said strips are bent in spiral form, and mechanism separate from the interlocking device for pressing the bent edges of the strips together to permanently unite them so as to form a spiral pressure resisting sealed joint.

13. An apparatus for forming pipe from two strips of material comprising means for bending the edges of said strips at an angle to the main body thereof, a device about which said strips are wrapped, an interlocking device for simultaneously interlocking one bent edge of one strip with one bent edge of the other strip before said other strip is wrapped about said device, and for interlocking the other bent edge of said first mentioned strip with the other bent edge of said other strip after said other strip has been wrapped about said device, means for permanently fastening said interlocking edges together to form a continuous spiral pipe.

14. An apparatus for forming pipe from two strips of material, a main strip and an interlocking strip, comprising a device about which said strips are wrapped, means for uniting one edge of the interlocking strip with one edge of the main strip after the main strip has been wrapped about said device and for uniting the other edge of the interlocking strip with the other edge of the main strip before the main strip has been wrapped about said device to form a spiral pressure resisting sealed joint between said strips.

15. An apparatus for forming pipe from a continuous narrow strip of material and a continuous wide strip of material comprising a device about which said strips are wrapped, means for permanently interlocking and fastening one edge of the narrow strip with one edge of a portion of the wide strip which has been wrapped about said device and for interlocking and permanently uniting the other edge of the narrow strip with the other edge of a porton of the wide strip before said latter portion is wrapped about said device to form a spiral pressure resisting sealed joint between said strips.

16. An apparatus for forming pipe from a plurality of strips of material, comprising shaping rolls which bend the edges of the strips at an angle to the main body thereof, a cylindrical device about which said strips are wrapped, an interlocking device for interlocking the bent edges of the two strips, said interlocking device comprising two rollers with their axes at an angle to the axis of said cylindrical device, and a fastening device for permanently fastening said interlocked edges together, said fastening device comprising two rollers with their axes substantially parallel to the axis of said cylindrical device.

FRANK W. COLBY.

Witnesses:
EDNA K. REYNOLDS,
MINNIE M. LINDENAN.

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