

July 5, 1932.

R. H. DYER

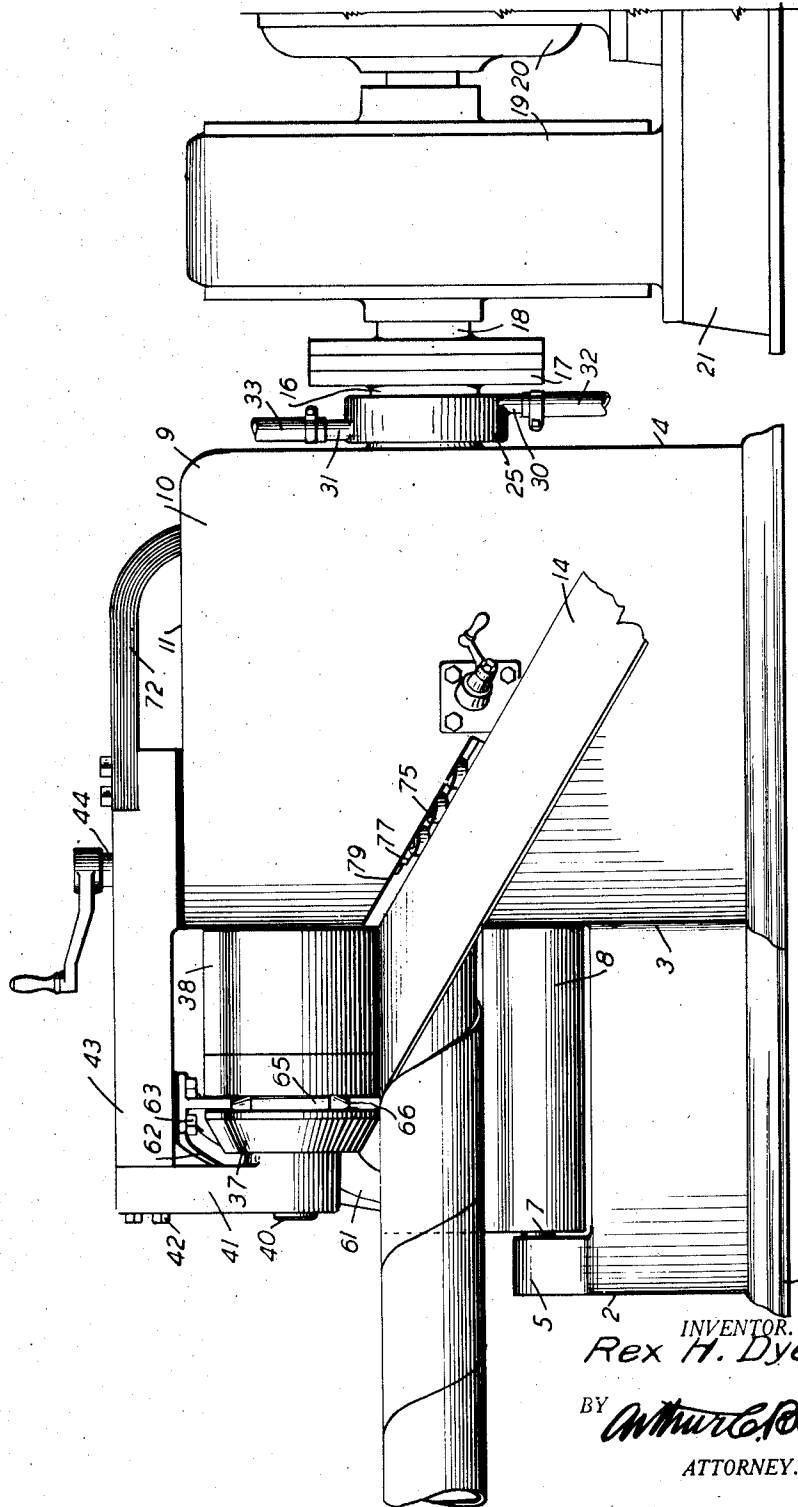
1,865,845

PIPE MAKING MACHINE

Filed Dec. 10, 1930

3 Sheets-Sheet 1

Fig. 1.



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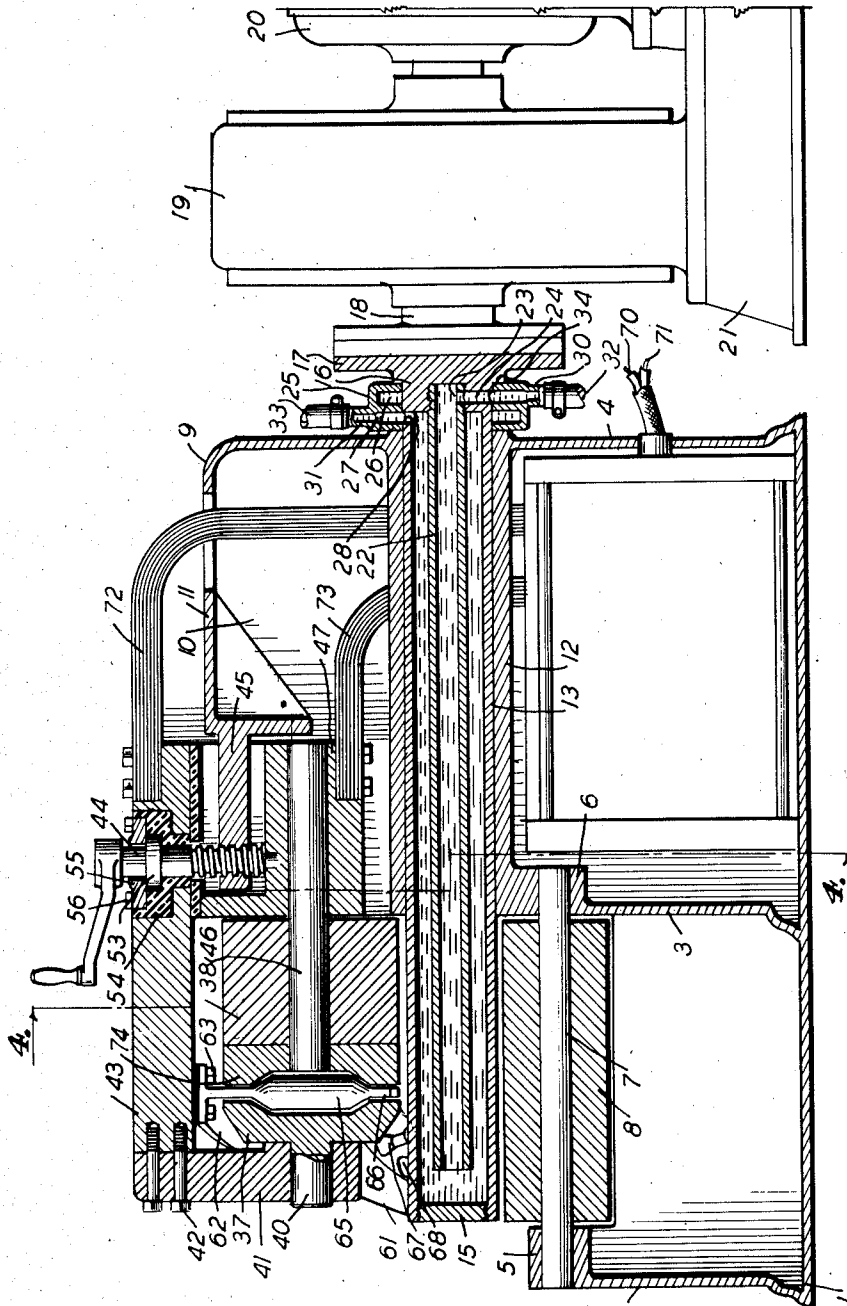
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Fig. 2.



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Fig. 4.

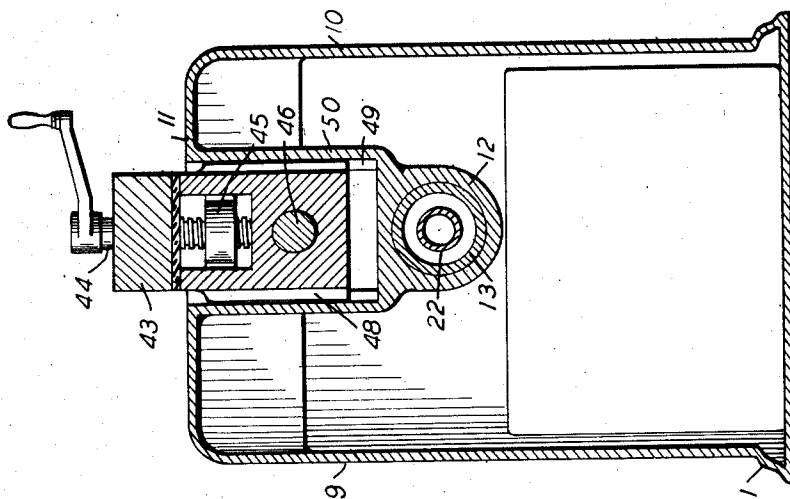
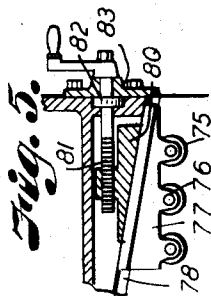
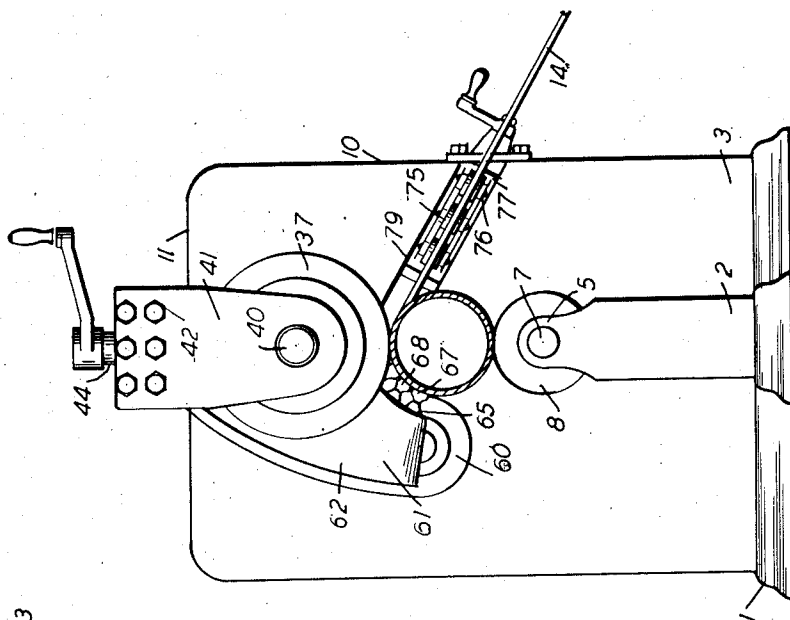


Fig. 3.



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PIPE MAKING MACHINE

Application filed December 10, 1930. Serial No. 501,294.

My invention relates to a method of and apparatus for making pipe and has for its principal objects to form integral tubes from ribbon material and to provide pipe made from metal ribbon having superior strength and quality at a reduced cost.

In accomplishing these and other objects of my invention, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of an apparatus adapted to produce pipe in accordance with my method, the metal ribbon comprising material of which the pipe is made being shown fragmentarily.

Fig. 2 is a longitudinal section through the machine.

Fig. 3 is an end view of the machine, the formed pipe being shown in section.

Fig. 4 is a transverse section through the machine on the line 4-4, Fig. 2.

Fig. 5 is a fragmentary cross section illustrating wedge means for urging the metal ribbon into pipe forming position, and upsetting heat-softened abutting edges of the ribbon.

Referring in detail to the drawings:

1 designates generally a hollow base including a relatively narrow outer end portion having an outer end wall 2, a relatively wide portion having one end wall 3 in common with the first named portion, and an inner end wall 4. The walls 2 and 3 are provided respectively with bearings 5 and 6 rotatably supporting a shaft 7 on which is mounted an elongated lower roller 8. The broad portion of the base is extended upwardly to provide a housing 9 including side walls 10 and a top or cover 11, and having an elongated cylindrical bearing 12 supported by the walls 3 and 4 to receive a tubular mandrel 13 having a portion projecting from the housing over the roller 8 for supporting a metal ribbon 14 adapted to be wound thereon as presently described to form a pipe. The mandrel is made of high melting point alloy to resist the heat of welding and prevent parts being welded from adhering thereto.

The outer end of the mandrel is closed by

a plug 15, and a wall 16 closing the inner end of the mandrel has a radial flange 17 connected to a shaft 18 operable through reducing gearing, represented by the casing 19, by a motor 20 whereby the mandrel may be rotated at a desired speed. The reducing gearing and motor are mounted on a base 21 adjacent the frame of the machine.

A tube 22 of substantially smaller diameter and length than the mandrel and located therein has an inlet opening 23 communicating with a radial inlet bore 24 in said wall. A collar 25 mounted on the inner end of the mandrel is provided with an annular chamber 26 communicating with said inlets 23 and 24 and an annular chamber 27 communicating with the mandrel through an outlet opening 28 therein. Inlet and outlet nipples 30 and 31 on the collar receive tubes 32 and 33 respectively whereby water may be circulated through the mandrel to cool the same. The collar abuts the inner end of the cylindrical bearing 12 and has sliding fit against a shoulder 34 on the mandrel, and the periphery thereof, whereby the mandrel may rotate freely within the collar.

Rotatively and adjustably mounted on the frame as presently described, are forming rolls 37 and 38 adapted to engage the metal ribbon being wound in helical form on the mandrel to shape the ribbon into tubular form.

The roll 37 has a stub shaft 40 mounted in a bracket 41 fixed by bolts 42 to a longitudinal beam 43 supported and vertically adjustable by a screw shaft 44 threadedly engaged with a bracket 45 extending longitudinally toward the roll from the housing 9.

The roll 38 is mounted on a shaft 46 journaled in a relatively long bearing block 47 which is fixed to and insulated from the beam 43 and is provided with vertical side wings 48 engaging in guide grooves 49 in side walls 50, Fig. 4, depending from the top wall 11 of the housing. A recess 51 in the block receives the bracket 43 and permits the block to move over the bracket.

The screw has a radial flange 53 rotatively anchored in an insulating block 54 set into the beam 43 and retained therein by a col-

lar 55 and bolts 56, whereby rotation of the screw in the supporting bracket 45 will coincidentally operate the rolls to press the same into operative engagement with the metal ribbon, and withdraw the rolls from the ribbon or mandrel.

A further forming roll 60 is supported by an arcuate bracket 61 having an arm 62 fixed to the beam by bolts 63 whereby said roll may be moved into engagement with the ribbon.

The roll 60 is located above and adjacent the lower roll 8 to assist in shaping the metal ribbon into helical form.

Mounted between the forming rolls 37 and 38 is a percussion means for forging the abutting edges of the ribbon at the time the same are heated by an electric current to form a welded joint, comprising an air or like hammer of any standard type to produce a succession of rapid impacts or forging blows to complete a weld as later described, the hammer being indicated by the casing 65 and hammer head 66 and is supported by the bracket 61 directly between the rolls 37 and 38. Additional hammers such as 67 and 68 are preferably provided to provide a series for applying rapid impacts subsequent to the weld formed below said first named hammer, the bracket being extended in arcuate shape to conform to the spiral location of the seam on the mandrel.

In order to raise the temperature of the abutting edges of the ribbon to effect a weld I preferably connect the roller elements 37 and 38 above described, with an electrical circuit including conductors 70 and 71 and preferably connect the beam 43 and block 47 with the circuit by conductors 72 and 73 respectively whereby a low tension current of high amperage may be passed through the rolls 37 and 38 due to their conductive relation set up by contact with the abutting edges of the metal ribbon, whereby the edge portions of the ribbon may be heated, due to resistance of the current, sufficiently to effect a weld upon actuation of the first hammer indicated by the casing 65.

The rolls thus comprise electrodes and must be constructed of metal having high conductivity. In order that the roll 38 may withstand the necessary pressure to shape the ribbon, it preferably comprises a relatively hard body portion to provide a forming roll and may have a head 74 formed of highly conductive metal, whereby the current may pass with relatively slight resistance to and from the ribbon and resistance of the ribbon material to passage of the current will result in sufficient heat to soften the material. The roll 37 and head 74 are preferably provided with recessed side faces respectively, to accommodate the first hammer casing, as is clearly shown in Fig. 2, whereby the head of the hammer is positioned directly above the path of

current passing across the seam between the electrode rolls.

In order to urge the straight portion of the ribbon into edge abutting relation with the formed portion on the mandrel, I provide a set of rollers 75 rotatively mounted on ears 76 of a carriage 77 slidable in guide groove 78 formed in one side wall of the housing and projecting through a slot 79 therein into engagement with one edge of the ribbon.

A wedge 80 slidably engaging the rear face of the carriage may be moved therealong by a screw 81 having a collar 82 retained by a block 83 in rotative engagement with said side wall to vary the tension on the ribbon.

The roller carriage therefore serves to press the incoming portion of the ribbon against the formed portion to form a welded joint and the pressure is made sufficient to upset the softened abutting edges to provide a relatively thick seam.

In using the invention, a metal ribbon is fed to the machine, and shaped in spiral form on the mandrel, the abutting edges being held and pressed into close engagement and upset while heat is applied. At the same time the first hammer is acting at the point of heat to bring the edges and any irregular surfaces thereof into direct uniform contact, thereby establishing a path for the current which has uniform resistance along the entire length of the seam. The impacting also effects union of the edges while they are at their highest heat to form a weld of uniform texture and strength throughout the length of the pipe and free from stitch or recurrent welds. The succeeding hammers 67 and 68 cooperate in finishing and smoothing the weld to the gage of the pipe. As the formation of the pipe progresses, the formed pipe is pushed from the outer end of the mandrel by the pressure of the ribbon being fed to provide a continuous process.

What I claim and desire to secure by Letters Patent is:

1. In a machine of the character described for progressively welding adjacent edges of metal for forming a joint including spaced electrodes arranged to pass a current through the edges to be welded to heat the metal, and percussion means arranged to strike the metal directly in the path of the current to force any irregular surfaces into complete uniform electrical contact simultaneously with the heating to effect a weld of the joint whereby stitch weld is eliminated and a joint of substantially uniform texture is effected.

2. In a machine of the character described for progressively welding adjacent edges of metal for forming a joint including spaced electrodes arranged to pass a current through the edges to be welded to heat the metal, and percussion means arranged to strike the metal directly in the path of the current to force any

irregular surfaces into complete uniform electrical contact simultaneously with the heating to effect a weld, and means for applying lateral pressure to the metal to force additional metal into the weld during operation of the percussion means thereon.

percussion device carried by the frame member for striking the metal in the path of the current to force any irregular surfaces into complete electrical contact simultaneously with the heating to effect a weld, means for applying lateral pressure to the metal to force additional metal into the weld, and means for moving the metal to form a continuous joint.

3. In a machine of the character described for progressively welding adjacent edges of metal, including spaced electrodes contacting points on the respective edges of the metal, means for passing a current through the electrodes and across said edges in a path between the points of contact to heat the metal, percussion means supported for striking the metal in the path of the current to force any irregular surfaces into complete uniform electrical contact simultaneously with the heating to effect a weld, and means for applying lateral pressure to the metal simultaneously with the welding to force additional metal into the weld.

7. A machine of the character described for progressively welding adjacent edges of metal to form a joint including a base member, means carried by the base member for supporting the edges of the metal in contacting relation, a frame member adjustably supported by the base member and movable to and from the metal to be welded, spaced shafts carried by the frame member, electrode rollers on the respective shafts and contacting the respective edges of the metal, a percussion device carried by the frame member for striking the metal in the path of the current to force any irregular surfaces into complete electrical contact simultaneously with the heating to effect a weld, means for applying lateral pressure to the metal to force additional metal into the weld, and means for moving the metal to form a continuous joint, and a second percussion device operable upon the weld to reduce the thickness of the weld to the gage of the metal.

4. In a machine of the character described for progressively welding adjacent edges of metal for forming a joint including spaced electrodes arranged to pass a current through the edges to be welded to heat the metal, and percussion means arranged to strike the metal directly in the path of the current to force any irregular surfaces into complete uniform electrical contact simultaneously with the heating to effect a weld, and means for applying lateral pressure to the metal to force additional metal into the weld during operation of the percussion means thereon, and a second percussion means operable upon the weld to reduce the thickness of the weld to the gage of the metal.

8. In a machine for progressively welding the edges of metal including means for supporting the edges of the metal in abutting relation, a percussion device supported for striking the metal with a series of blows to bring the edges of the metal into electrical contact with each other, means for simultaneously passing an electric current through said contacting edges at a point directly in the path of said blows to effect a weld at the time of said blows.

5. A machine of the character described for progressively welding adjacent edges of metal to form a joint including a base member, means carried by the base member for supporting the edges of the metal in contacting relation, a frame member adjustably supported by the base member and movable to and from the metal to be welded, spaced electrodes carried by the frame member and arranged to pass a current through the edges to heat the metal, a percussion device carried by the frame member for striking the metal in the path of the current to force any irregular surfaces into complete uniform electrical contact simultaneously with the heating to effect a weld, and means for moving the metal to form a continuous joint.

9. In a machine of the character described for welding contacting edges of metal to form a joint, spaced electrode rolls contacting the respective edges of the metal and having recesses in their adjacent side faces, means for passing a current through said electrodes to heat the metal to welding temperature, and percussion means positioned in said recesses for striking the metal in the path of the current simultaneously with the heating to effect a weld.

6. A machine of the character described for progressively welding adjacent edges of metal to form a joint including a base member, means carried by the base member for supporting the edges of the metal in contacting relation, a frame member adjustably supported by the base member and movable to and from the metal to be welded, spaced shafts carried by the frame member, electrode rollers on the respective shafts and contacting the respective edges of the metal, a

10. The method of progressively welding the edges of metal including arranging the edges of the metal in welding position, striking the metal with a series of blows to bring any irregular surfaces of the edges into complete electrical contact, and passing an electric current through said contacting edges at a point directly in the path of the blows to effect a weld at the time and place of striking the metal.

11. The method of progressively welding the edges of metal including arranging the

edges of the metal in welding position, striking the metal with a series of blows to bring any irregular surfaces of the edges into complete electrical contact, passing an electric
5 current through said contacting edges at a point directly in the path of the blows to effect a weld at the time and place of striking the metal, and forcing additional metal into the weld simultaneously with the striking
10 and heating.

12. The method of progressively welding the edges of metal including arranging the edges of the metal in welding position, striking the metal with a series of blows to bring
15 any irregular surfaces of the edges into complete electrical contact, passing an electric current through said contacting edges at a point directly in the path of the blows to effect a weld at the time and place of striking
20 the metal, forcing additional metal into the weld simultaneously with the striking and heating, and finally reducing the thickness of the weld to the gage of the metal.

In testimony whereof I affix my signature.
25 REX H. DYER.

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