G. H. Sellers,

Tube Rolling Machine.

No. 96,975. Patented Nov. 16. 1869.

Fig. 1.

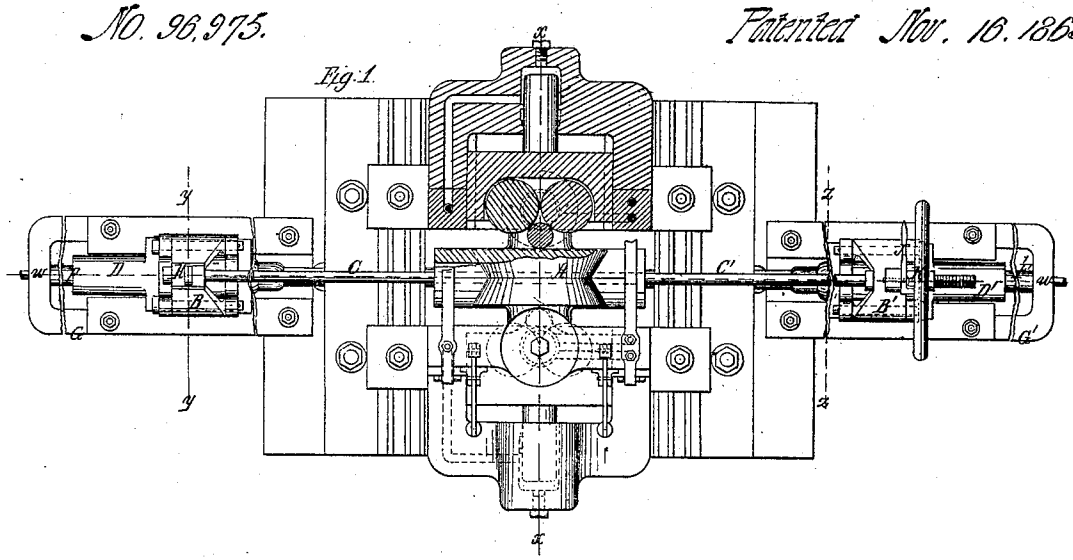


Fig. 2.

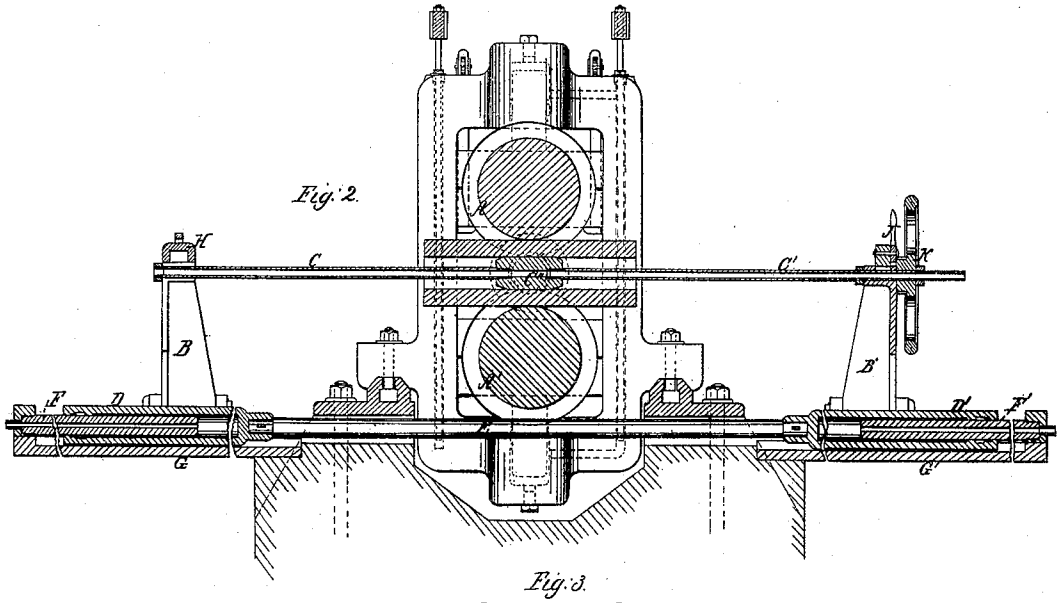


Fig. 3.

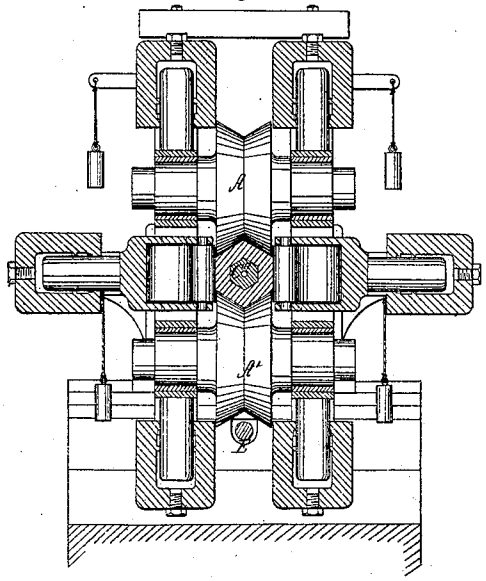


Fig. 4.

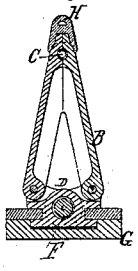
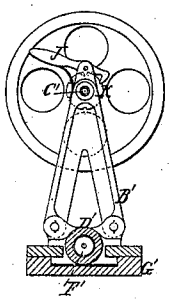


Fig. 5.



Witnesses;

J. Bowden Kell

Jos. S. Peyton.

Inventor;

Geo H. Sellers

by his Attys

Wm. D. Baldwin

UNITED STATES PATENT OFFICE.

GEORGE H. SELLERS, OF WILMINGTON, DELAWARE.

IMPROVED MACHINE FOR ROLLING TUBES.

Specification forming part of Letters Patent No. **96,975**, dated November 16, 1869.

To all whom it may concern:

Be it known that I, GEORGE H. SELLERS, of Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Machinery for Rolling Metal Tubes, Cylinders, or Hollow Columns, of which improvements the following is a full, clear, and exact description.

The method of making wrought-iron or steel tubes or pipes heretofore employed is to take a flat bar, equal in width to the circumference of the tube or pipe desired, and of conformable length and thickness. This bar is heated, and while hot its edge surfaces are bent toward each other until they touch. The tube or pipe thus formed is then reheated to a welding-heat, and passed between compressing-rolls, and pressed over a ball-mandrel held on the end of a rod, extending to a stop located at a distance from the rolls greater than the length of the finished tube. The rolls thus compress the edges of the bar together, causing them (when properly heated) to weld. Difficulties are encountered, however, in making perfect welds by this method, and no considerable reduction can be made upon the round tube, as the aperture between the closing or welding rolls, if much contracted, would become oval, and cause the rolls to bind on the top and bottom only of the pipe, in which case the friction of the rolls would be insufficient to force the pipe over the ball or mandrel.

The objects of my invention are, instead of welding a thin sheet of metal, as above described, to form a seamless tube or column by passing a hollow ingot between suitable rolls, to subject the rod or pipe which sustains the mandrel to a tensile strain instead of the compressing (densile) strain to which it has heretofore been subjected, and to avoid changing the ingot from one groove to another in forming the tube or column; to which ends the improvements herein claimed consist, first, in combining shaping-rolls (whether plane-surfaced or grooved in a form the counterpart of that of the finished column or tube) and compressing-rolls, which prevent the lateral spread of the ingot while passing between the shaping-rolls, with a mandrel suspended in an axial plane relatively to which all the rolls are adjustable; second, in combining shaping-rolls and compressing-rolls, adjustable relatively to a common center, a mandrel suspended between the rolls, and devices for rotating the mandrel after each passage of the ingot through the rolls, in order to present a new face of the ingot to the shaping-rolls; third, in combining shaping-rolls and compressing-rolls having a reversible rotary motion with a mandrel which remains fixed until the ingot has passed through the rolls, and then follows the ingot, for the purpose hereinafter set forth; fourth, in combining adjustable shaping and compressing rolls having reversible rotary motion with an interposed tubular mandrel, through which a current of water is passed to keep the mandrel cool.

In the accompanying drawings my improvements are shown as adapted to a machine for rolling hexagonal columns.

Figure 1 represents a plan or top view, partly in section, of so much of my improved machine as is necessary to illustrat the invention herein claimed. Fig. 2 represents a vertical longitudinal central section through the same at the line *w w* of Fig. 1. Fig. 3 represents a vertical transverse section through the same at the line *x x* of Fig. 1. Fig. 4 represents a similar section through the clamping-stand, at the line *y y* of Fig. 1, looking outward. Fig 5 represents a similar section, at the line *z z* of Fig. 1, looking outward.

The top and bottom or shaping rolls A A′ are, in this instance, grooved at an angle of one hundred and twenty degrees, and constitute, when in position, four sides of a regular hexagon, the remaining two sides of the figure being made up by two vertical compressing-rolls, revolving, in this instance, in close contact with the bodies of the shaping-rolls. These rolls may all be moved toward or from their common center, or each one of them toward or from the others, and still the hexagonal outline of the aperture will be preserved.

A hollow hexagonal mandrel, C″, is suspended in the center line, around which the rolls are adjustable, by tubes C C′, through which a current of water is caused to flow, in any proper well-known way, to keep the mandrel cool, and thus prevent its rapid wear as the ingot is drawn over it.

The tubes C C′ are supported by vertically-divided clamping-stands B B′, hinged to their respective cylinders D D′. These cylinders are united by a rod, E E′, in such manner as to form a strong frame, which is reciprocated horizontally by the inlet or outflow of water or other fluid, which enters or leaves the cylinders D D′ through tubular pistons F F′, attached to frames G G′, firmly secured to proper foundations, and placed equidistant from the rolls.

As the mandrel must be allowed to follow after the ingot far enough in either direction to allow the ingot to be turned after each passage through the rolls, the frames G G′ must each be at a distance from the rolls greater than the length of the column to be formed.

The clamp B being opened and turned down on its hinges, the ingot, which has been properly heated, is slipped over the tube C, and the clamp raised and again closed on the tube, and secured by means of the cap H.

Rotary motion being imparted to the rolls A A′, the ingot is forced on the mandrel C″, to facilitate which operation the cavity in the ingot should be larger than the mandrel.

As the rolls reduce the ingot, they of course close it on the hexagonal or other shaped mandrel, and thus bring the ingot, in this instance, to the same shape internally and externally, the shape of the interior simply depending upon and being governed by the shape of the mandrel.

The rolls will draw the pipe through between them, and when it has passed through, the water is forced out of the cylinder D′ and into the cylinder D, thus causing the mandrel to move toward the ingot and out from between the rolls.

The center of the mandrel, it will be observed, coincides with the center line, relatively to which all the rolls are severally and jointly adjustable.

The pawl J is now unlocked from its notch in the wheel K on the mandrel-pipe C′, and the mandrel and ingot are turned one-sixth of a revolution, thus presenting another angle of the ingot to the shaping-rolls. The mandrel is again locked by the pawl and moved back to its central position between the rolls by reversing the movement of the cylinders D D′.

The aperture of the groove is now diminished by moving the rolls toward their common center, or by moving one or more of them, as the case may be, the motion of the rolls reversed, and the ingot drawn through the rolls in a direction opposite to that of its first passage. This process is repeated, the ingot being reduced in diameter and increased in length at each successive passage to and fro through the rolls, until it is reduced to a hexagonal column of the length and thickness required.

It will be observed that at the commencement of the operation there will be a space between the side or compressing rolls and the vertical or shaping rolls, which will, of course, leave a fin upon the ingot, which fin will be rolled down at the next pass when the ingot has been turned, and so on successively, the fin formed at one pass being removed at the next, the final pass leaving the tube free from fin.

After having been thus rendered hexagonal the ingot may be removed by opening the clamp B, and, if hot enough, or being reheated, can be passed over a round ball, between round grooved rolls, thus forming it into a round pipe.

A pipe made in this manner from homogeneous metal will be free from welds, and thus avoid all risks incident to the old welding process, and even if formed from two semi-hexagonal ingots, the risk attendant upon welding a thin sheet is avoided.

I do not mean to confine myself to hydraulic mechanism for shifting the mandrel in and out of the groove, as this may be done by a screw, rack and pinion, or other mechanical device.

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

1. The combination of the suspended mandrel with the shaping and the compressing rolls, adjustable relatively to the axis of the mandrel, the combination being and operating substantially as set forth.

2. The combination, with the rolls, of the mandrel, the clamping-stands, and the rotating wheel, the combination being and operating substantially as set forth.

3. The combination of adjustable rolls having reversible rotary motion with an interposed mandrel, which follows the ingot after it has passed through the roll, the combination being and operating substantially as set forth.

4. The combination, with the rolls, of the tubular following mandrel, the combination being and operating substantially as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

GEORGE H. SELLERS.

Witnesses:
ELI GARRETT,
WM. B. WIGGINS.