A. T. WHITEHOUSE.

Machine for Forming Seamless Metal Tubes.

No. 227,462. Patented May 11, 1880.

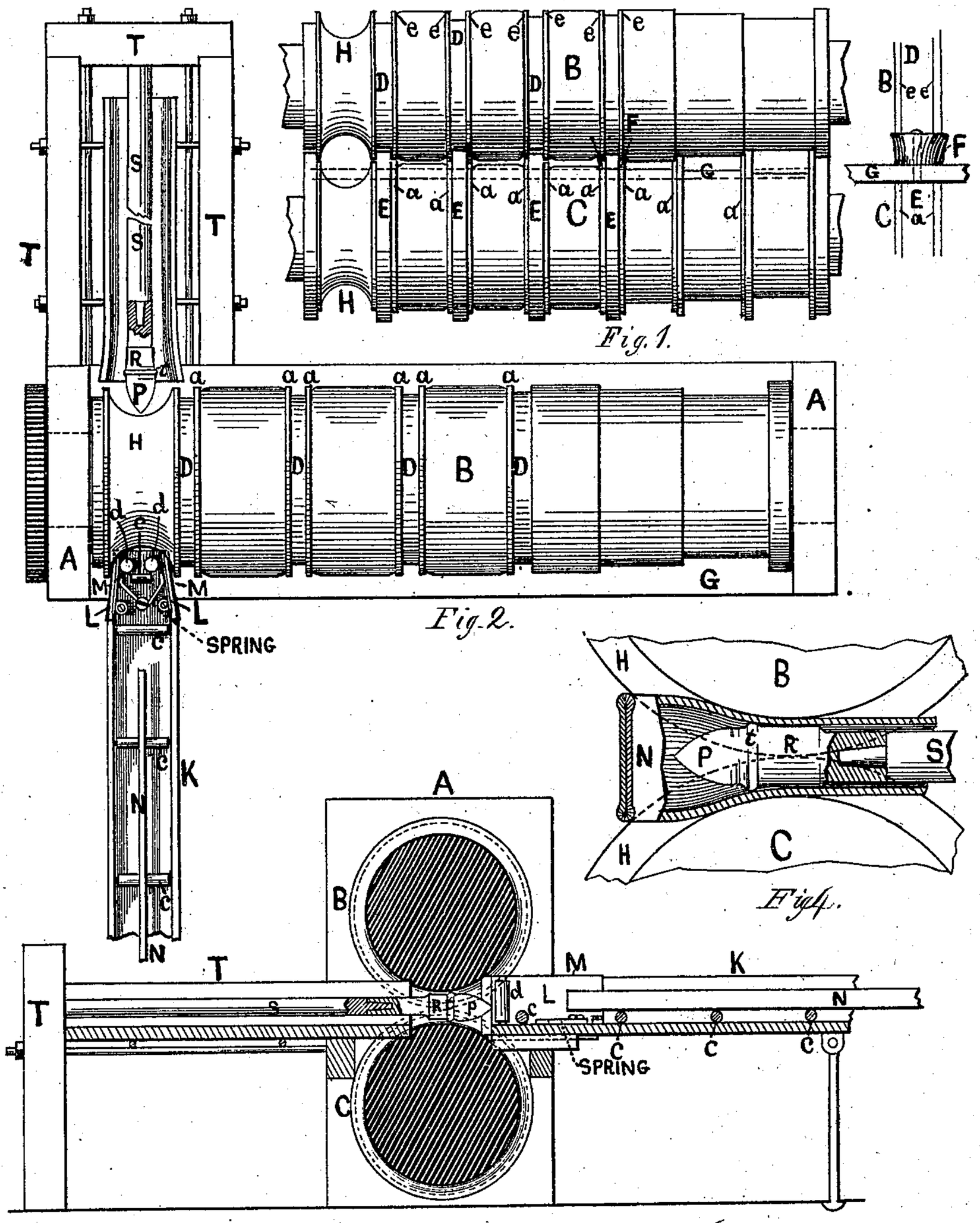

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses:

H. S. Talbot

W. R. Marble

Inventor:

Arthur T. Whitehouse

By Sylvenus Walker

Atty

UNITED STATES PATENT OFFICE.

ARTHUR T. WHITEHOUSE, OF SOMERVILLE, MASSACHUSETTS.

MACHINE FOR FORMING SEAMLESS METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 227,462, dated May 11, 1880.

Application filed October 14, 1878.

To all whom it may concern:

Be it known that I, ARTHUR T. WHITEHOUSE, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Machines for Forming Seamless Metal Tubes, of which the following is a specification.

The object of my invention is to provide certain mechanisms which shall prevent the many imperfections which occur in nearly all seamless tubing as formed by the machines heretofore constructed for rolling and drawing such tubes from steel ingots cast with a core forming an oblong or oval hole through the same, which is afterward flattened and then opened out by being drawn over a mandrel-head by means of grooved rolls and fixed or rigid guides which come in contact with the metal being drawn, so as to cause great friction upon the same, and, the metal being worked while very hot, is frequently drawn against such guides and bearings with great force, so as to tear away the metal and disintegrate the fiber thereof, to the injury of the tubing when finished, thus rendering a large portion thereof worthless for the purposes contemplated, particularly boiler-tubing, which is subject to various conditions which require strength and durability; and it consists in the construction, combination, and arrangement of the several parts, as hereinafter more fully described and set forth.

Figure 1 is a front elevation of a pair of rolls as constructed according to my invention. Fig. 2 is a sectional view taken between the rolls. Fig. 3 is a longitudinal vertical section through the guideways. Fig. 4 is a detail view, showing the mandrel-head in position with tube being opened out.

A A represent a strong heavy frame, to which are journaled the reducing and finishing rolls B C, the roll B having grooves D and small raised ribs or flanges *e*, in addition to the usual grooves, to form the thickened edges of the flattened strip. The roll C is provided with the flanges E, which fit the grooves D in roll B, and with the projections *a*, which fit or correspond to the small flanges or ribs *e* upon the roll B, thus forming a lap or double flange, so as to prevent the metal of the tube being forced longitudinally between the bite of the rolls, so as to form fins or thin web-edges extending beyond the true sides of the flattened strip, as is frequently the case when reducing or finishing rolls are employed of usual construction, thus necessitating the cutting off or removal of such fins, which my improved rolls entirely obviate.

F represents friction-rolls, which are placed upon the inner edge of the table G, near the bite of the rolls and at the several points of the grooves D and the flanges E of the said rolls, and of a diameter adapted to the breadth of the same, as shown at the right hand of Fig. 1. These friction-rolls F guide the flattened strip in a position to enter the bite of the rolls uniformly and keep the free part of the strip true and straight just previous to its being acted upon by the rolls.

H represents semicircular grooves formed in each roll B C, and of such size as may be required for the exterior diameter of the tube N when opened out and finished by being drawn over the mandrel-head P, as shown in Fig. 4, and described hereinafter.

The hollow ingot or blank constructed, as heretofore, with a suitable hole, which is washed with salt and water to prevent the inner surfaces from adhering together when afterward closed by rolling while at a red heat, it being passed between suitable grooved rolls, is flattened and lengthened in the usual manner until it assumes the shape shown in cross-section at the left-hand end of Fig. 4. Being heated, as before, it is placed on edge in the movable guideway K, resting upon friction-rollers *c*. Its forward end is held firmly in position between the vertical friction clamping-rolls *d*, which are pivoted to the hinged jaws L, attached to the bottom of the guideway K, which jaws incline toward each other horizontally and fit between the two sides of the guide-box M, as shown at the left hand of Fig. 2. The sides of this guide-box being formed on an angle, or so as to incline toward each other, the jaws are brought toward each other at their front ends as the guideway K is pushed or held toward the rolls B C, thus causing the friction clamping-rolls *d* to hold the flattened strip N true on edge, so as to enter the grooves H in an exact central position, so as to be opened out by being drawn over the mandrel-head P, which is provided with a rib, *t*, which brings the tube N in contact with the grooves abruptly, so as to form

a secure nip before the tube is brought in contact with the bite on the mandrel-head formed by its parallel sides R, which finish the tube, when it passes free upon the smaller portion, S, of the mandrel, which is secured at its rear end to a frame, T, as heretofore. This mandrel S is shown broken away in Fig. 2, and the head portion drawn back from between the finishing-rolls; but its position in relation to the rolls is shown in Fig. 3, and is further shown in position opening out the tube N in Fig. 4, where it will be seen that its reduced diameter immediately in front of the rib *t* serves to reduce the friction of the flattened tube as it is drawn over the mandrel-head P, which is conical or pointed, as shown in the drawings. This taper of the head end of the mandrel secures the gradual opening out of the blank or flattened strip from its closed condition, and also gradually opens it out for passing on and over the nip-rib *t*, and from thence to the biting-plane R, where it is finished directly into a round seamless tube, and passes freely upon the smaller portion, S, of the mandrel, which, being reduced suddenly after or beyond the finishing portion or bite R, allows the tube to cool and contract without coming in contact with the mandrel after leaving or passing the finishing point or bite of the rolls, and thereby avoids friction, which otherwise would occur.

I am aware that friction-rolls have heretofore been employed in connection with straight cylindric reducing-rolls. Therefore I disclaim friction-rolls in combination with reducing-rolls, and limit my invention to the combination of friction guide-rolls with grooved and double-flanged rolls, as above described.

Having thus described my invention, what I claim is—

1. The pair of rolls B C, provided with flanges E, grooves D, secondary flanges *a e*, and the grooves for receiving the thickened edges of the flattened hollow ingot or blank, substantially as set forth.

2. In combination with the tapering guide-box M and hinged jaws L, having rolls *d*, the guideway K and friction-rolls *c*, substantially as set forth.

3. The improved mandrel-head P, having the rib *t* and cylindric bite portion R, formed as shown, and constructed to operate with the finishing-rolls in the manner described, as and for the purposes set forth.

ARTHUR T. WHITEHOUSE.

Witnesses:

SYLVENUS WALKER,

H. S. TALBOT.