

(No Model.)

A. PATERSON.

METHOD OF AND MEANS FOR REDUCING THE DIAMETER OF TUBES.

No. 376,106.

Patented Jan. 10, 1888.

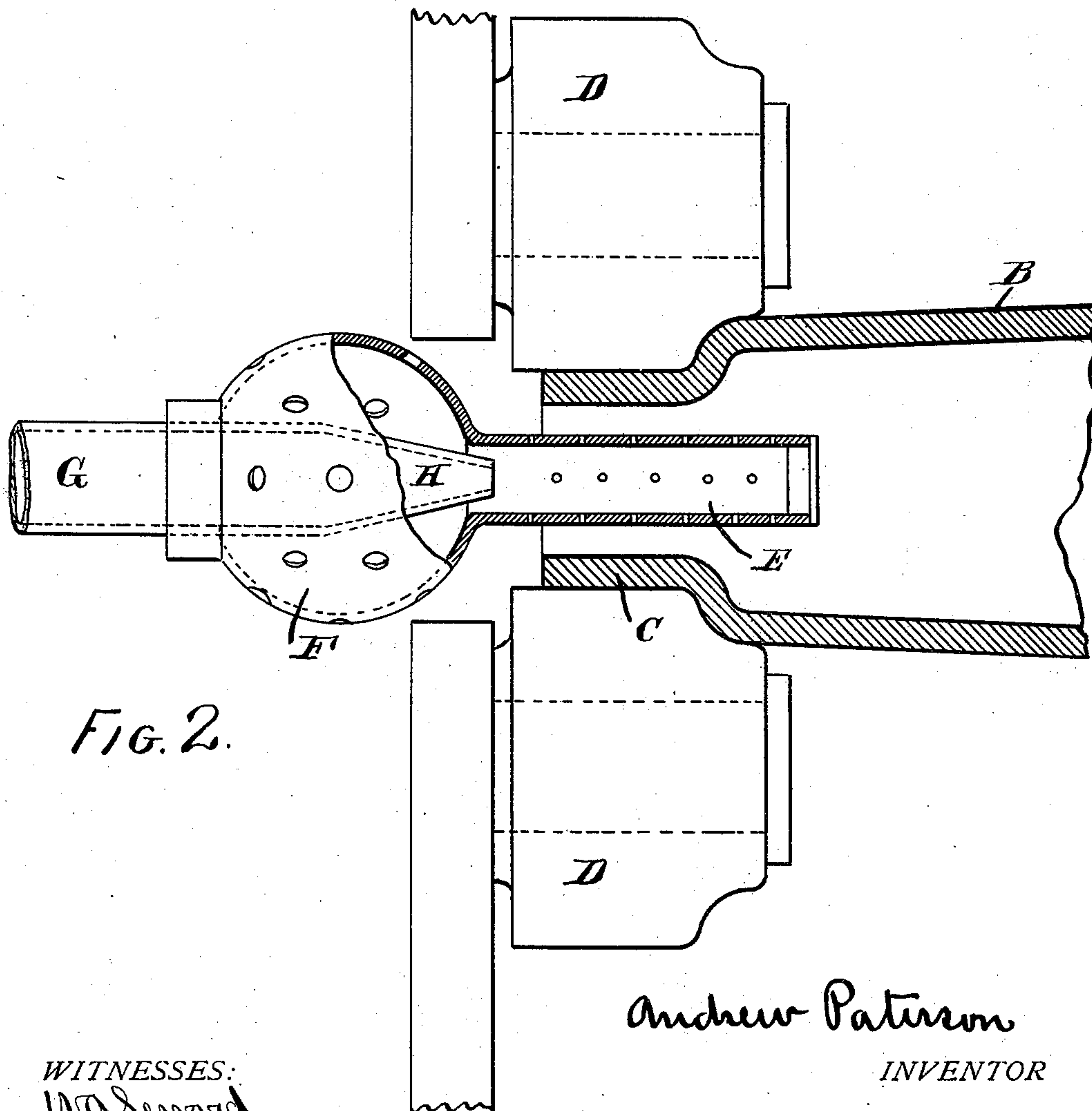
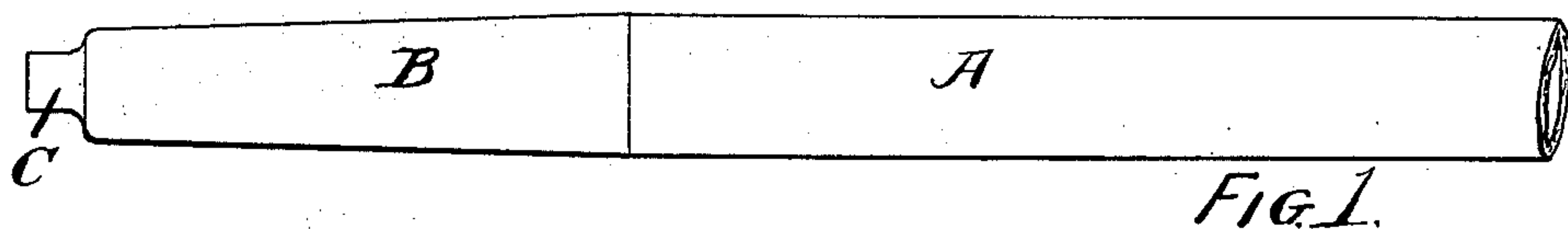


FIG. 2.

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METHOD OF AND MEANS FOR REDUCING THE DIAMETER OF TUBES.

SPECIFICATION forming part of Letters Patent No. 376,106, dated January 10, 1888.

Application filed March 5, 1887. Serial No. 229,746. (No model.)

To all whom it may concern:

Be it known that I, ANDREW PATERSON, of McKeesport, Allegheny county, Pennsylvania, have invented certain new and useful Improvements in Tube-Working, of which the following is a specification.

Axles for vehicles are frequently made of tubing, the method being to take parallel tubing and condense the tapered portions and the nipples for the axle-nuts by swaging or rolling process while the tube is sufficiently hot to permit the proper flow and condensation of the metal. The result of the swaging or rolling operation is the production of what might be called a "hollow forging." The outer skin of the metal has been closely compacted and is the strongest portion of the metal, and during the swaging or rolling operation the outer skin of metal is that which has come in contact with the condensing-tools. A comparatively high heat is required to permit the proper condensation of the metal, and under ordinary procedures the exterior of the tube is the hottest, and the tendency of this extra-hot exterior portion is to corrugate or wrinkle under the action of the condensing-tools, the highly-heated skin of the metal even preferring to flow in circumferential paths rather than move radially in true lines of condensation of diameter. Such wrinkling of the skin of the forgings is very objectionable and often necessitates the cutting away of considerable metal in subsequent operations in order to get a smooth surface, by which method that portion of the metal possessing some of the most desirable qualities is removed from the work.

In my improved system of tube-working I apply the heat to the interior of the tube.

My improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 represents in the rough a portion of a tubular vehicle-axle; and Fig. 2 a longitudinal vertical section of the end portion of the same, in connection with a pair of condensing-rolls and in connection with a blow-pipe for heating the tube.

In the drawings, A indicates the tubular body portion of the axle; B, the tubular tapered

portion of the same; C, the nipple portion of the same; D, a pair of rolls pertaining to a tube-rolling machine and serving to form the nipples of the axle; E, a gas-burner in the form of a tube, adapted for insertion within the end of the axle and provided with perforations for the escape of gas and air from the burner; F, an enlargement at the outer end of the tube, perforated for the free admission of atmospheric air; G, a gas-pipe passing tightly through the wall of the enlargement F and protruding into the same, this gas-pipe being intended for connection with a source of gas-supply under pressure, preferably with a reservoir of natural gas; and H, a nozzle upon the inner end of the gas-pipe, the same presenting axially into the gas-burner.

Gas under pressure issues forcibly from the nozzle H and finds its way out through the perforations of the gas-burner. The injector-like action of the gas flows from the nozzle, serving to draw the air freely in through the perforations of the enlargement, and forces the same into a mixture in the gas-burner, the mingled gas and air passing out through the apertures in the gas-burner. The gas and air issuing from the perforations in the gas-burner is ignited, and the result is a cylinder of radial blast-jets of highly-heating flame within the end of the tubular axle, the cavity of the axle forming the heating-chamber. By means of this flame the tube may be heated while being operated upon by the rolls; or, if desired, the tube may be first heated in an open fire and the gas-burner may be employed in maintaining the final heats during the finishing process.

It is not new to apply heat to the interior of metal tube, and then or coincidently subject the metal to the action of welding-dies acting compressively on opposite sides of the metal, or coincidently on one side of the metal by a compressing-roll while a mandrel acts on the other side of the metal, and I do not claim such method as of my invention. The problem of avoiding exterior wrinkles does not present itself under such circumstances, and the metal cannot be thickened in that manner.

In my device two condensing-rolls act upon the opposite exterior sides of a revolving tube

having no interior element to furnish an abutment for the condensing-rolls. The presence of an interior abutment would prevent that thickening of the metal which is essential to a condensation of diameter.

I claim as my invention—

1. That improvement in the art of condensing the diameter and increasing the thickness of tubes without forming exterior wrinkles which consists in subjecting a revolving tube to the action of exteriorly and oppositely disposed condensing-rolls, while the inner surface of the tube is left free to move radially inward and simultaneously subjecting the inner surface of the tube to the action of outward radial blasts of ignited gas, substantially as set forth.

2. In a device for simultaneously reducing the diameter and increasing the thickness of tubes without forming exterior wrinkles, the combination of a pair of condensing-rolls, D, adapted to act upon the exterior of a tube revolved between them, and a tubular gas-burner, E, disposed between and with its axis parallel to the axis of said rolls and provided with perforations adapted to supply radial jets of burning gas to the interior of such revolving tube, substantially as set forth.

ANDREW PATERSON.

Witnesses:

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