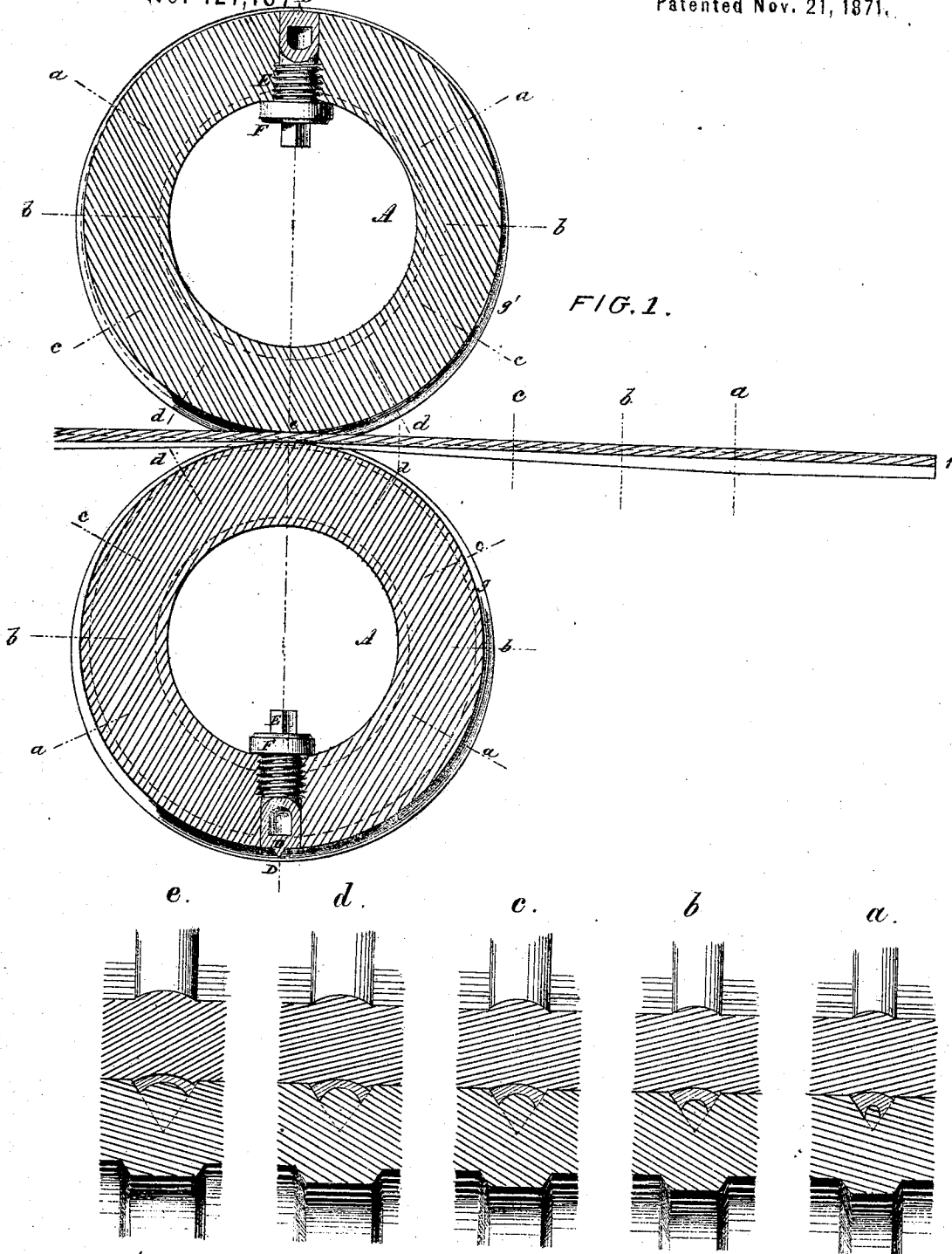


ROLLING AXLES & SHAFTS.

No. 121,187

Patented Nov. 21, 1871.



Witnesses
W. B. Deming
Jas. Lewin

James Montgomery
by *Knight Bros*
Attorneys

JAMES MONTGOMERY.
Rolling Axles and Shafts.

2 Sheets--Sheet 2.

No. 121,187.

FIG. 3
Patented Nov. 21, 1871.

FIG. 2

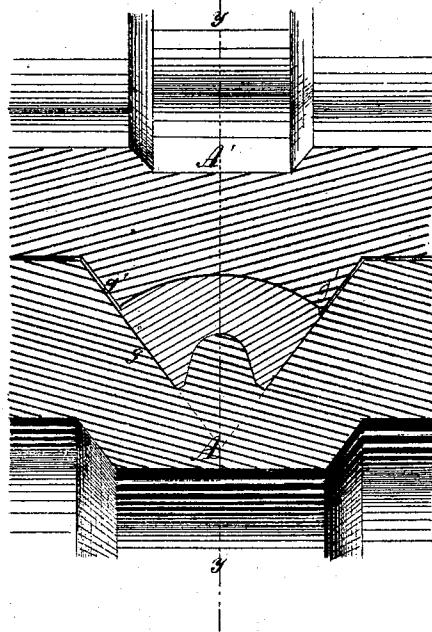
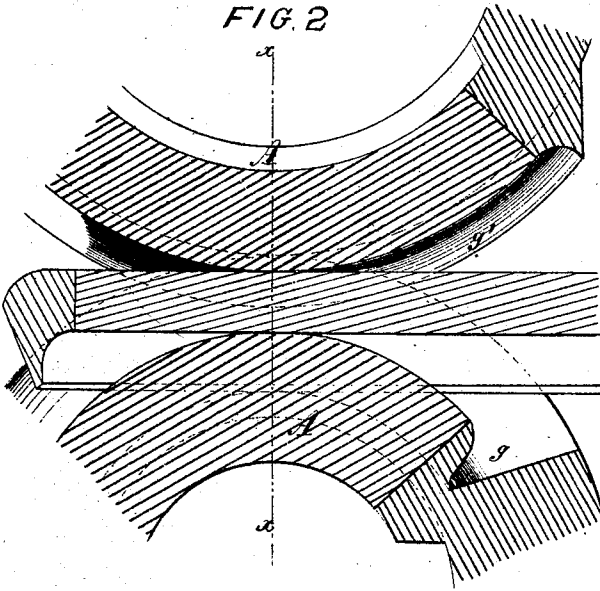
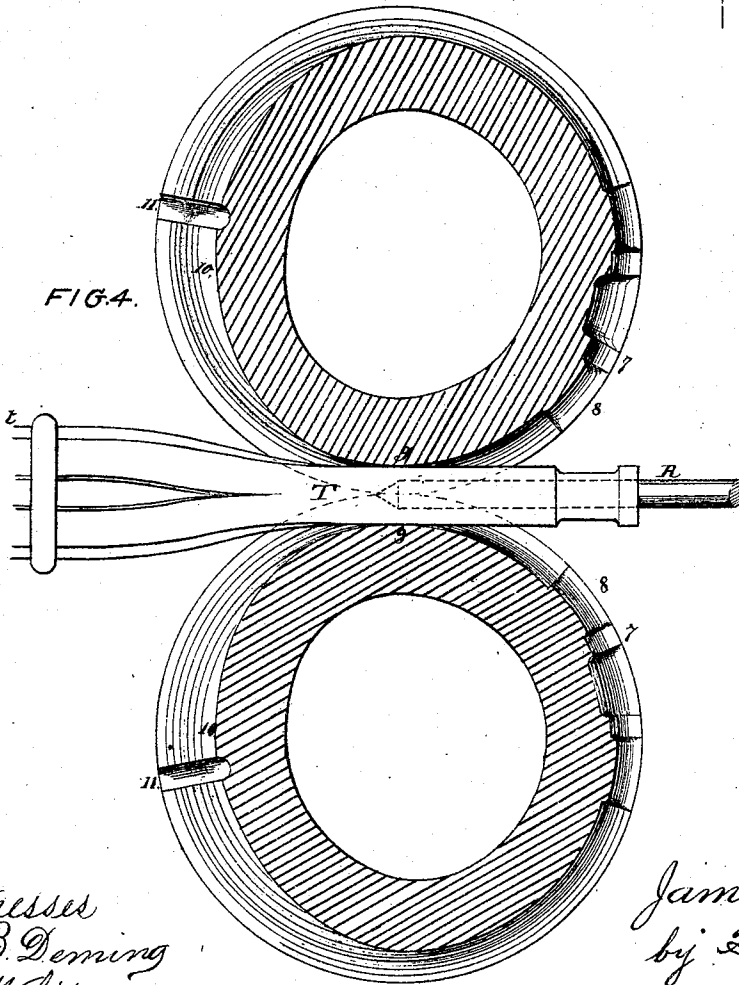


FIG. 4.



Witnesses
W. B. Deming
F. White

James Montgomery
by Knight, Broz & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JAMES MONTGOMERY, OF NEW YORK, N. Y.

IMPROVEMENT IN CONSTRUCTING AXLES.

Specification forming part of Letters Patent No. 121,187, dated November 21, 1871; antedated November 9, 1871.

To all whom it may concern:

Be it known that I, JAMES MONTGOMERY, of the city, county, and State of New York, have invented a new and useful Process and Apparatus for Forming and Constructing Axles or Shafts, which invention is described as follows:

In carrying out my invention I first prepare, by rolling, a number of bars, having a curved or segmental form in their transverse section, and also curved longitudinally in such a manner that a number of the said bars may be assembled with their ends meeting and their central parts at a considerable distance asunder. This, however, is no part of my invention; but having thus arranged and fagoted a number of these bars so that their combined ends will form a cylinder at each end of the fagot for a certain distance, I heat the fagot and pass it between rolls, properly grooved and recessed, to weld the ends to a requisite distance and form upon them symmetrical journals, the central part being left in open or skeleton form. The structure thus made will possess great lightness, strength, transverse rigidity, and torsional elasticity.

In the accompanying drawing, Figure 1 represents a transverse section of a pair of rolls employed for rolling the segment bars with a bar or segment in position, the plane of section being taken through the center of the groove and bar.

The diagrams marked *a*, *b*, *c*, *d*, and *e*, referring to Fig. 1, represent the form of the bar in transverse section, and also of the grooves at the various points indicated by corresponding letters in Fig. 1. Fig. 2 represents, on a larger scale, a similar section of the parts of the rolls which are marked *a* in Fig. 1. Fig. 3 represents a section longitudinally of the rolls in the plane indicated by the lines *x x* in Fig. 2. The line *y y* in Fig. 3 indicates the plane of the section represented in Figs. 1 and 2. Fig. 4 represents a transverse section of a pair of rolls employed for uniting the bars or segments to form an axle, one end of the axle being shown in position.

Similar letters of reference in the various figures indicate like parts.

A *A'*, Figs. 1, 2, and 3, represent a pair of rolls made hollow for the purpose of circulating water or other fluid through them to keep them cool. The grooves *g g'* are made of varying depth, width, and shape, so as, by a single revolution, to change the bar from a common flat form to the shape in-

dicated by the longitudinal section of said bar, seen in Fig. 1, and the transverse section of its various parts shown in the diagrams *a*, *b*, *c*, *d*, and *e*. The arrows indicate the direction of rotation of the rolls. From the end of the bar to the part marked *a*, in Fig. 1, the bar is grooved uniformly in shape and size, such as indicated in transverse section in the diagram *a*. From *a* it is tapered in thickness and expanded in width, as illustrated in the successive diagrams, to *e*, which represents the longitudinal center of the bar. From this center it is gradually contracted in width and increased in thickness, as may be understood by the corresponding letters on the other half of each roll, so that the two ends of the bar or segment will be of similar shape. The dies or cutters *D* serve as guides or gauges in entering the end of each new bar, and sever the rolled bars at a uniform length. These dies are supported, and are adjusted radially in respect to the rolls, by set-screws *E*, held by jam-nuts *F*, and are made with chambers connecting by suitable ducts with the hollow interior of the rolls, so that water or other cooling fluid may pass through said dies. By forming the groove principally in one roll, as shown at *g* in Figs. 2 and 3, and making the said groove with oblique faces and large and deep enough to receive a rim, *g' g'*, which operates on the outside surface of the segment and projects from the upper roller *A'*, I am enabled to roll the bar without fins. The extreme corners of the rim *g'* are chilled, so as to make them very hard and durable, and the obliquity of the sides of the groove in the roll *A* and the corresponding shape of the rim or projection of the roll *A'* make the corners or angles less acute than they otherwise would be. Their capacity to wear is thus further increased; but as fast as the chilled corners do wear the other less hard parts of the rolls can be readily turned down to corresponding shape and dimensions. This method of manufacturing axles is described in my patent No. 28,004, dated April 24, 1860, and I therefore lay no claim thereto.

Fig. 4 represents a transverse section of a pair of rolls adapted for the formation of hollow axles of larger diameter in the center than at the ends. The drawing shows one end of a car-axle, *T*, in the course of being rolled, and uniting the segments, and for making the journals. The metal to form the axle is fagoted out of a number of

bars or segments stave-shaped, of steel or iron, their ends being placed in contact around mandrels R, and their central portions held at some distance asunder by supports placed between them. The fagot thus prepared is, by the aid of a gauge, adjusted upon a car, which is so connected to the rolls that it will move at a speed corresponding with that of the working surfaces of the rolls. One end of the fagot is then introduced between the rolls at the point marked 7. The projections 8 form the proper depression for the journal. From thence to 9 the grooves continue of about equal size, and form the cylindrical or nearly cylindrical portion of the axle which receives the wheel, the segments being securely welded together from 7 to 9. From the point 9 the grooves increase rapidly in size to 10, to form the flaring central portion of the axle, toward which point the bars or segments diverge. The cavity 11 is to afford space for a projecting flange or ring, which may be placed upon or around the largest part at the center of the axle and welded thereon in the act of rolling. The axle may be heated at both ends simultaneously by furnaces placed at proper distances asunder, so that a single revolution of the

rolls will complete both on the ends, uniting the segments and forming the journals; but in most instances it will be found more practicable to heat and roll the ends separately.

The separate parts of my shaft or axle may be made with parallel sides; but I prefer to form them of greater width toward the centers; and, by imparting sufficient transverse curvature, so as to make the shaft or axle very much larger at the center than at the ends, the center will still have a skeleton form, while the parts forming the journals are in close contact and welded together.

I claim as my invention—

As an improvement of the method of manufacturing axles set forth in the patent No. 28,004, granted to me April 24, 1860, for improvements in railroad axles and other shafts, jointly, the mode of and mechanism for welding the ends of the stave-shaped bars together and forming the journals thereon as herein described.

JAMES MONTGOMERY.

Witnesses:

THOS. B. KINGSLAND,
OCTAVIUS KNIGHT.

(125)