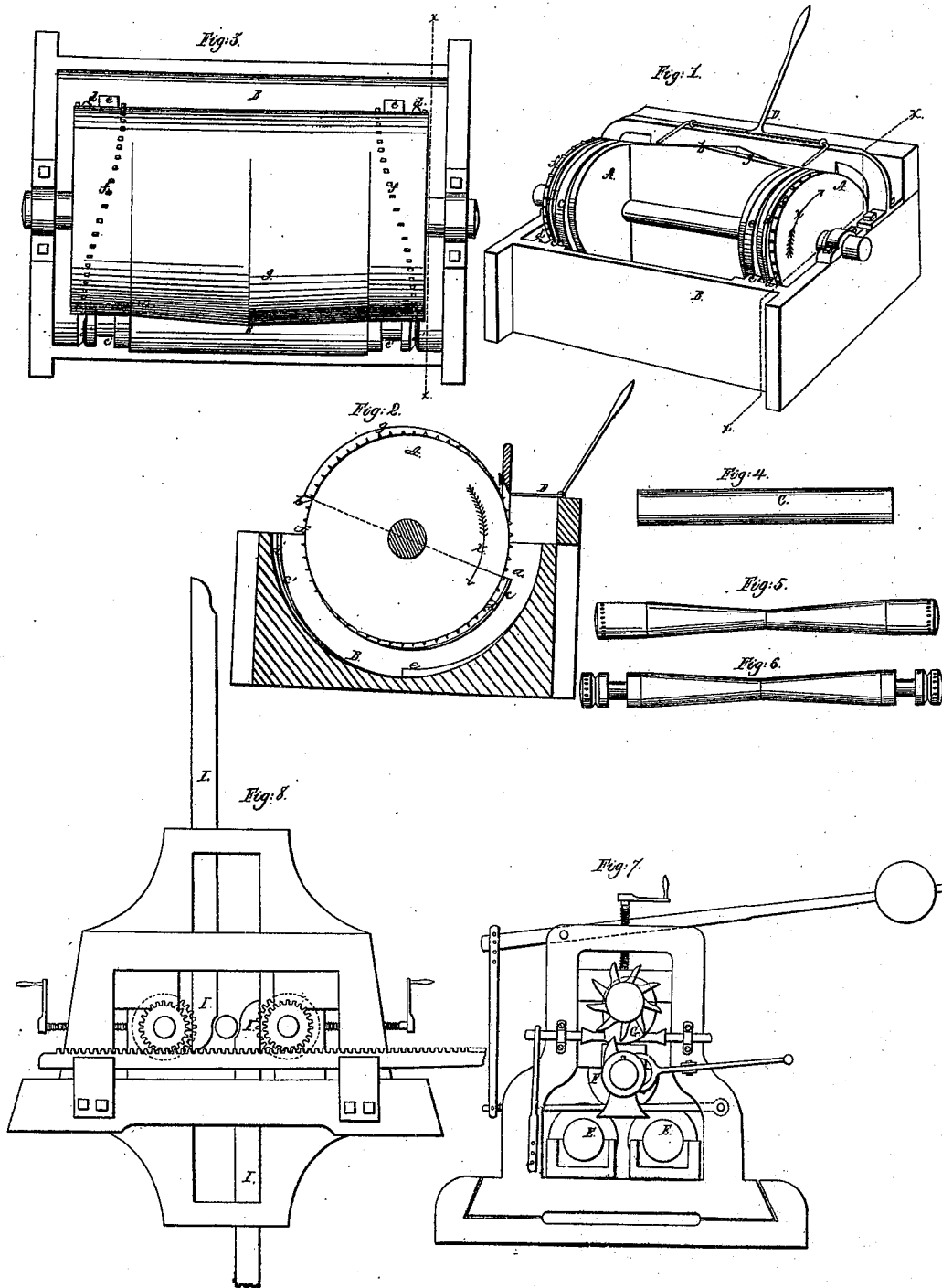


J. REESE.
ROLLING AXLES AND SHAFTS.

No. 10,460.

Patented Jan. 24, 1854.



UNITED STATES PATENT OFFICE.

JACOB REESE, OF SHARON, PENNSYLVANIA.

ROLLING AXLES AND SHAFTS.

Specification of Letters Patent No. 10,460, dated January 24, 1854.

To all whom it may concern:

Be it known that I, JACOB REESE, of Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Car and other Axles and Shafts, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a view in perspective of one of the proposed mechanical arrangements, for carrying my improvements into effect, in the manufacture of car axles; Fig. 2 a transverse section of the same at the line *x x* of Fig. 1; Fig. 3 a plan thereof; and Figs. 4, 5, and 6 represent an axle in various stages of its formation; and Figs. 7 and 8 represent modified forms and arrangement of machinery for manufacturing shafts and axles by my improved mode of operation.

The machine represented in Figs. 1, 2, and 3 of the drawings, consists of a revolving former (A) that should be turned in the direction of the arrow (*x*); this former is represented as lying horizontal; it is of any suitable diameter, and of the same length, or thereabout, as the axle to be made; it is cylindrical at both ends for a given width, but is "cut away" for the half of its diameter, more or less, in its body, between the cylindrical ends; the body of it is gradually swelled out from the ends toward the middle, commencing at its advancing edge (*a*) and gradually increasing toward its rear edge (*b*) which is the counterpart in configuration or outline of the body of the intended axle; the cylindrical ends of the former (A) have projecting ribs (*c* and *d*) on their peripheries; the ribs are eccentric to the axis, and extend over only a portion of the circumference of the former as represented; they swell gradually in an opposite direction to that of the body of the former (A), commencing in or about the same line as the rear edge of the body and terminating in or about the line of the advancing edge thereof; the distance apart of the inner ribs (*c*) is the same as the length of the axle between its journals when finished, and the width of the ribs, equal to that of the finished journals, while the height of their projection at their rear extremities is equivalent to the depth of the collars forming the sides of the journals; the space between the ribs (*c* and *d*) corresponds with the de-

signed width of the outside collar of the axle; the angular rib (*d*) makes a deep crease in the axle, at the point where the ends of the bar are to be cut off; the former (A) thus constructed, is seated within a shell or box (B), the interior of which forms a concave; this concave, which is symmetrical in form with the former (A) is placed at any suitable distance from the former, and throughout its front quadrant is gradually swelled inward from the ends toward the middle, commencing at its front side and gradually increasing till arriving at the end of the swell (*e*) which extends throughout about half the concave; the other or back half of the concave has projecting ribs (*c'* and *d'*) at either end symmetrical with the eccentric ribs on the former (A) opposite to which they lie; these ribs (*c'* and *d'*) project most as they approach the top or rear edge of the concave. The former should be provided with projecting teeth (*f*) commencing on the inside of the ribs (*c*) at their rear ends and arranged spirally toward the advance ends of the outer ribs (*d*) on the outsides of which they may be continued in a direction parallel to the ribs.

Previously to putting the former (A) in motion which may be done by any suitable means, it is set with the advance edge (*a*) of its body a little below the top front edge of the concave as represented in Fig. 2. A plain, round, and well heated bar (C), Fig. 4, of which the axle is to be made, is then dropped by means of a cradle (D) between the front edges of the former (A) and concave, when by setting the former in motion, in the direction indicated, the bar will be rolled around by it, an even rotation at both ends being insured by the teeth (*f*) whose spiral arrangement on the body of the former (A), admit of the elongation of the bar that takes place by the action of the swelled or projecting faces (*e* and *g*) of the former, and concave, as it is rolled between them; when the bar has been rolled through the converging or gradually narrowing space between the roll and concave to their point of closest approximation it is reduced to the shape represented in Fig. 5. Thus is the body of the axle formed. By the continual motion of the former (A) the journals and collars of the axle will be similarly produced, rolling the bar forward between the eccentric ribs (*c* and *d*) of the former

(A) and those of the concave, when it is discharged in a finished state (as represented in Fig. 6). Thus the formation of the tapering body of the axle, and the construction of the journals and collars on it, are performed at a single heat and by a single operation in a most perfect, and rapid manner, by the automatic action of the machine itself, and with little or no skill on the part of the workman, while the roundness and accuracy of the axle, in all respects will be far superior to anything that has heretofore been produced by forging in the usual manner, and any required number of the same dimensions can be made.

The eccentric ribs which form the journals and collars of the axles, may be arranged so as to be adjustable to suit different lengths of axles and widths of journals, and numerous other modifications may be adopted, as for instance, instead of the machine described, the same operation may be similarly performed by that represented in Fig. 7, wherein it is designed to submit the heated bar to the action of three rollers of suitable configuration to give the double taper to the body of the axle and shape the journals and collars thereof. In this machine the two lower rollers (E), which have motions in suitable directions, support and turn the heated bar, which is placed between them, while the upper roller (F) is caused to give the necessary compressing force to shape the axle; this may be effected by means of a revolving cam (G) acting upon the upper roller to depress it against the heated bar, which when shaped as required, may be readily removed by the elevation of the upper roll by means of a counter weight, or any other suitable contrivance; or instead of thus forming the axle by the arrangement of rolls represented in Fig. 7, the heated bar may be passed transversely between or through eccentric grooved rolls, which as they rotate admit the bar between them when presenting the widest opening and gradually drawing out the bar to taper it at the center, and as they continue their rotation leave the bar gradually thicker toward its other end, the attendant continually turning the bar to give it the requisite roundness, as he passes it repeatedly through the same, or adjoining smaller grooves in

the rolls; this action will give the required double taper form to the axle, which may then while hot, be transferred to a pair of small adjacent rolls, that, having ribs on their peripheries, and working in connection with suitable eccentric ribbed concaves, shape the journals and collars on the axle by the rolling and pressure of the axle between the rolls and concaves, similarly to the like operation produced by the former (A), and concave represented in Figs. 1, 2, and 3. Another modification is shown in Fig. 8, of the drawings; in this arrangement the heated bar is introduced transversely between reciprocating formers (I) that, by means of racks and pinions are caused to work in opposite parallel directions to one another; these formers are inclined on their inner faces, so as to present a wide opening between when their inner ends approach one another to admit the bar, but as they move in opposite courses the distance between their faces is gradually lessened, so that the bar as it rolls between them is drawn out at the middle, and by suitable swells, and ribs, on the faces of the formers, has the required journals and collars produced on it, substantially as before specified. The journals of the two ends of the axle may be rolled separately if preferred. But the mere modification of mechanical arrangements by which the principles of my invention are capable of being reduced to practice, are obviously too numerous to admit of description here, nor is any further allusion thereto deemed necessary.

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

The method of shaping bars of heated iron, into axles and shafts of the usual proportions and with collars and journals by rolling them on their own axes, and under pressure, between properly shaped converging surfaces, substantially as herein described, but I make no claim to mere converging surfaces whether fixed or movable.

In testimony whereof I have hereunto subscribed my name.

JACOB REESE.

Witnesses:

P. H. WATSON,
A. E. H. JOHNSON.