(No Model.)

A. PATERSON.

TUBULAR AXLE AND METHOD OF MANUFACTURING THE SAME.

No. 367,438. Patented Aug. 2, 1887.

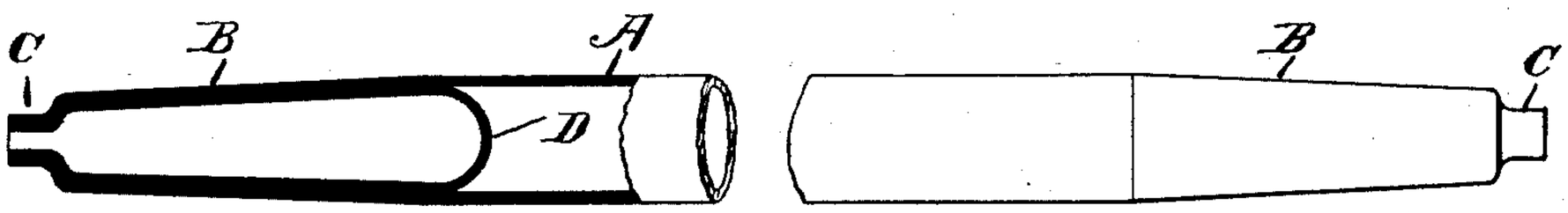

FIG. 1.

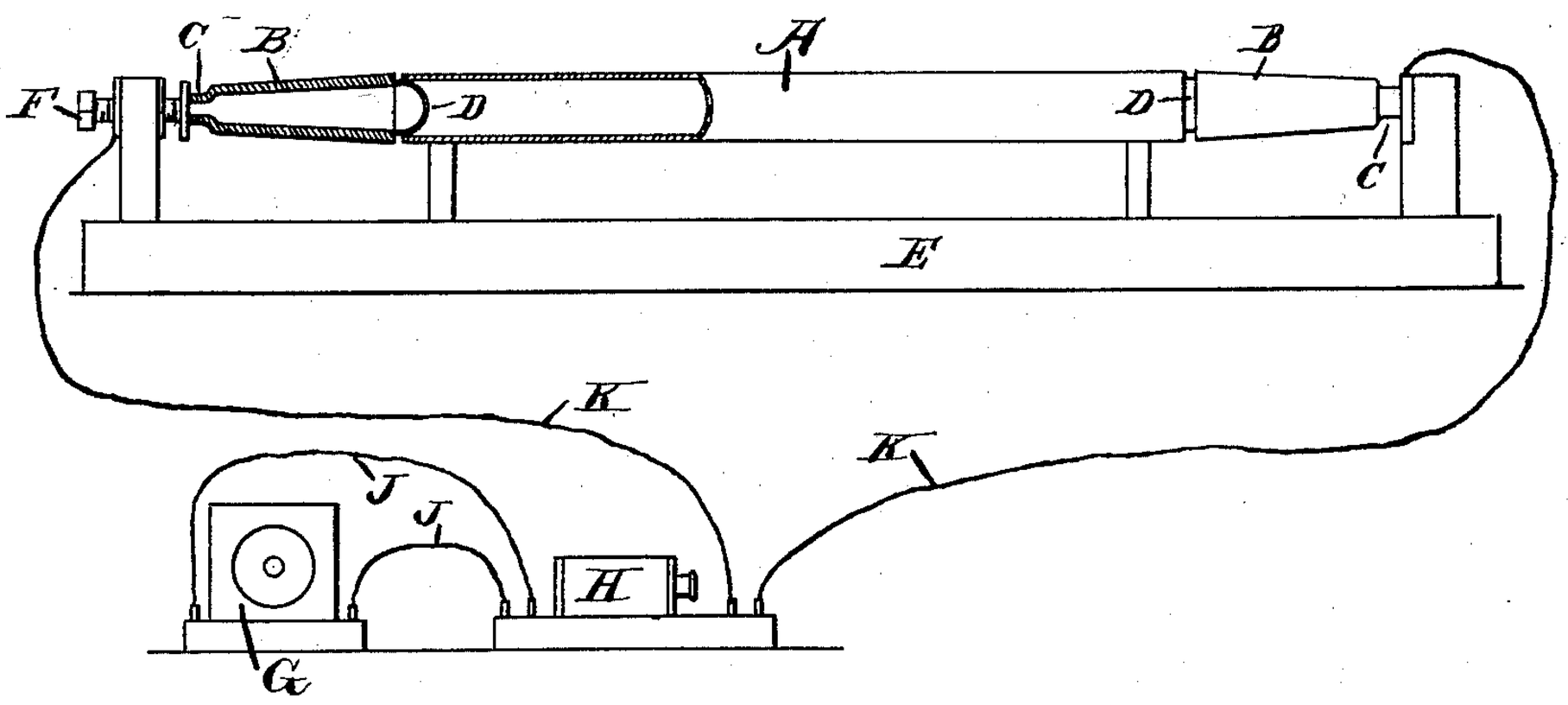

FIG. 2.

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TUBULAR AXLE AND METHOD OF MANUFACTURING THE SAME.

SPECIFICATION forming part of Letters Patent No. 367,438, dated August 2, 1887.

Application filed February 28, 1887. Serial No. 229,128. (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 Tubular Axles and Methods of Manufacturing the Same, of which the following is a specification.

This invention pertains to tubular axles for vehicles and to the method of making the same. In such tubular axles the ends or bearing portions of the axles are of less diameter than the body portion, and it is desirable that the end portions be of thicker material in order that they may better resist the strains and wear. The extreme ends of the axle are preferably further condensed or reduced, so as to form nipples for the reception of the axle-nuts. It is also desirable that transverse partitions be inserted in the axle at about the inner end of the tapering portion, so as to permit the cavities within the tapering portions to serve as reservoirs for a lubricant, the lubricant finding its way out through the usual oil-holes drilled in the bearing portions.

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

Figure 1 is a side view of a tubular axle, with the left hand end in vertical diametrical section, serving to illustrate the completed axle; and Fig. 2, a view of an axle with the left-hand portion in diametrical section in a welding-machine and under process of construction.

In the drawings, A indicates the tubular body of the axle; B, the tapering ends of the axle, the same being tubular and with walls much thicker than the walls of the body portion; C, the condensed ends of the taper portion, these ends forming nipples to be finally threaded or otherwise fitted for the reception of axle-nuts or analogous scrapers; D, a cup-shaped partition or diaphragm at the inner end of the taper portion, there being one, of course, for each end of the axle, these cups, when the axle is completed, forming an integral portion of the axle and serving in forming chambers for the reception of lubricant in the taper portions of the axle; E, a supporting-frame in which the parts may be rested while the axle is being constructed, this frame being provided with standards or abutments, between which the axle is disposed endwise; F, a screw in one of these abutments, serving as a means by which one end of the axle may have endwise pressure exerted upon it while the other end seats against the opposite abutment; G, a dynamo for producing intense currents of electricity; H, an induction-coil for converting the currents of electricity produced by the dynamo into induced currents; J, primary circuit-wires to be connected with the dynamo and with the primary wires of the induction-coil, and K secondary circuit-wires to be connected with the secondary wire of the induction-coil and with each end of the axle being operated upon.

The body portion A of the axle is cut from ordinary drawn tubing. The tapered portions B of the axle are to be formed in the manner usually employed in the production of tapered tubular articles. They may be produced by taking a parallel tube of a diameter corresponding substantially with the small end of the taper and having the proper thickness of wall, and expanding the tube into the tapering form by the insertion of the tapering-mandrel or otherwise, and the nipple part may be swaged down in the usual manner; or the taper part may be formed by swaging down a parallel tube having a diameter of the large end of the taper, the swaging producing the desired taper and also the nipple; or the taper may be produced by treatment in a roller-machine, in which the tube is received between rolls lying lengthwise of the tube, the rolls and tube revolving together, and the taper being produced by the inward feeding of the rolls as the rolling proceeds, and the nipple will be produced by similar rolling operation. The cups D may be produced by the ordinary process of striking up sheet metal in dies. The thickness of the walls of the taper portion B should equal the sum of the thickness of the walls of the cup and the body portion.

The body portion, the tapering end portion, and the cups having been separately produced, the cups are inserted in the ends of the body portion, as indicated in Fig. 2. The parts to be united are then subjected to a welding heat, and placed in proper juxtaposition in a suitable

supporting-frame—such, for instance, as illustrated in Fig. 2—and pressure is applied endwise upon the axle, as by means of the screws F in the illustrative machine. This operation serves to press the large end of the taper portions against the ends of the body portion and against the edge faces of the cups and to unite the parts or butt-heads into an integral structure, the periphery of the cup welding to the inner surface of the ends of the body portion. The heating of the portions to be heated may be effected by fires, or by blow-pipes, or by means of an intense current of electricity caused to pass through the points to be heated, the effect of the current being to raise the temperature at the open joints in the axle to the welding-point.

I claim as my invention—

1. An integrally-formed axle having a tubular body portion, tubular tapering end portions with thicker walls, and diaphragms at the inner ends of the tapering portions, substantially as and for the purpose set forth.

2. That improvement in the art of manufacturing integrally-formed axles having tubular body portions and tapering end portions, which consists in forming the body portion and the tapering end portions separately, presenting the large ends of the tapering portions to the ends of the body portion, subjecting the joints thus formed to a welding heat, and exerting an endwise pressure upon the ends of the axle, substantially as set forth.

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Witnesses:
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