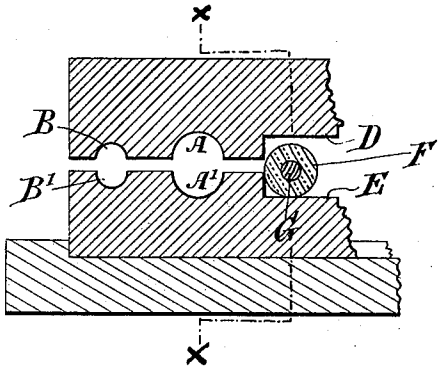
(No Model.)

W. GILLESPIE.

MANUFACTURE OF HOLLOW AXLES.

No. 367,289. Patented July 26, 1887.

Fig. 1



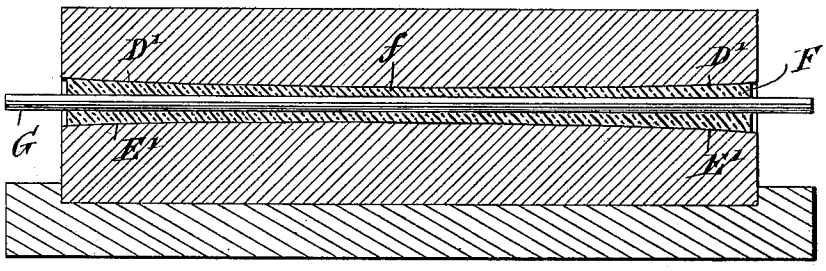
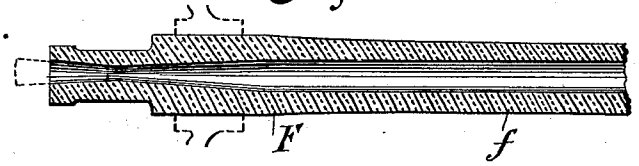


Fig. 2

Fig. 3



Witnesses.
O. W. M. Evans
W. M. Keast

Inventor
Walter Gillespie
Per Attys:
Lemuel W. Serrell & Co.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

WALTER GILLESPIE, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR OF ONE-HALF TO PILLANS SCARTH STEVENSON, OF SAME PLACE.

MANUFACTURE OF HOLLOW AXLES.

SPECIFICATION forming part of Letters Patent No. 367,289, dated July 26, 1887.

Application filed April 5, 1886. Serial No. 197,906. (No model.) Patented in Canada April 10, 1886, No. 23,796.

To all whom it may concern:

Be it known that I, WALTER GILLESPIE, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in the Manufacture of Hollow Axles; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention embodies an art or process by which railway-axles, whether of steel or iron, may be forged upon a mandrel, and such mandrel subsequently withdrawn.

It is well known that the hollow axle possesses over the solid axle the advantages of being both lighter and stronger and of furnishing bearings not so liable to become heated; but the difficulty which has as yet not been overcome in the forging of such axles is the withdrawal of the mandrel after the axle has been fairly shaped. To accomplish this is the object of my invention.

The process of making hollow forged steel axles by my invention can be thus described: The ingot is cast upon a core into a shape from which it can be easily forged and drawn out into the shape of an axle. When removed from the mold, the core is taken out. The ingot is then heated and a mandrel introduced into it, and it is then placed in the forming-die and operated upon by the hammer to partially shape and draw it out. The partially-formed axle holding the mandrel is then taken from this die and placed upon a surface flat lengthwise of the die or transversely to the axle, the face of the hammer working on the same being of exactly similar configuration, and the direction in which the blow is given at right angles to these faces. The axle is, while under the action of the hammer, (*i. e.*, between the stationary and moving flat faces,) constantly being turned, so that the blows spread it in every direction and enlarge the aperture in it, so that the mandrel can be easily withdrawn. The partially-formed axle is then returned to the dies, its shaping completed, and the neck or bearing drawn out, thus completing the axle, which is then ready for use.

In the drawings hereto annexed, and forming part of this specification, Figure 1 shows a longitudinal section through hammer and die; Fig. 2, a transverse section on line X X, Fig. 1, and Fig. 3 a part section of finished axle.

Similar letters of reference indicate like parts.

A A′ are the forming-dies, B B′ those for shaping and drawing the neck, and D and E the surfaces between which the axle F is enlarged sufficiently to release the mandrel G.

As shown in Fig. 2, the hollow ingot from which the axle is to be made is cast with the ends slightly wider than the main part of the body, the surfaces D and E corresponding to it, as shown at D′ E′. The blank or ingot is cast with the metal in the center thinner and lighter than at the ends, as shown at *f*, the working surfaces being so shaped as to give it the proper formation. When these ends have been forged and the necks drawn out to the proper size, the section will be as shown in Fig. 3—viz., with the greatest strength of metal at the shearing point between the wheel and bearing.

In the case of the iron axle, the mandrel can be introduced into the built-up and heated faggot and the forging, &c., effected as described.

Although primarily intended to be applied to the manufacture of railway-axles, my invention will be found equally useful in all cases in which hollow worked metal bars or shafts may be desired or can be utilized.

I am aware that Patent No. 233,634, granted October 26, 1880, to C. B. Morse, describes and claims a process of making a hollow metallic axle by drawing it out over a mandrel, and this I therefore disclaim; but in such patent no means are described by which the mandrel can be withdrawn from the finished axle after swaging.

What I claim is as follows:

1. The method or process of making hollow axles, which consists in first casting upon a core a tubular malleable ingot, then substituting a mandrel for the core and subjecting said ingot to the action of dies which draw it out, so that its greatest exterior diameter shall be at the ends, then spreading

same by hammering between two flat dies to enlarge the hollow center and release the mandrel, and finally reducing the ends over a smaller mandrel, substantially as and for the purpose set forth.

2. The devices herein described for forming hollow axles, consisting of shaping-dies A A', flat-surface dies D E, and finishing-dies B B', substantially as described.

WALTER GILLESPIE.

Witnesses:
FRAS. HY. REYNOLDS,
OWEN M. EVANS.