(No Model.)

E. PECKHAM.

TUBULAR AXLE.

No. 313,517. Patented Mar. 10, 1885.

FIG-1-

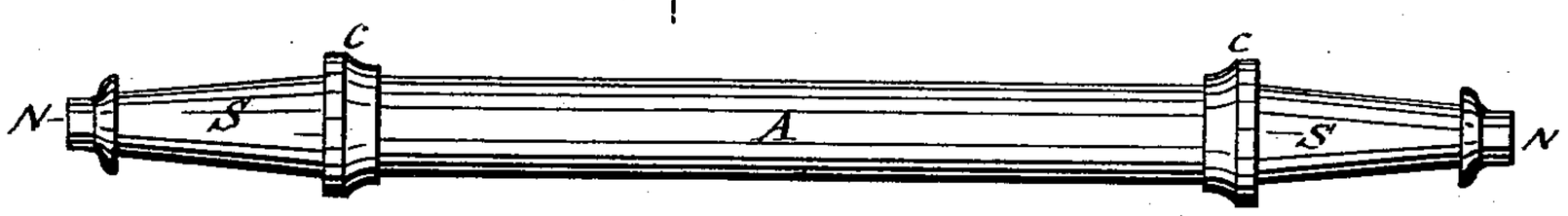


FIG-2-

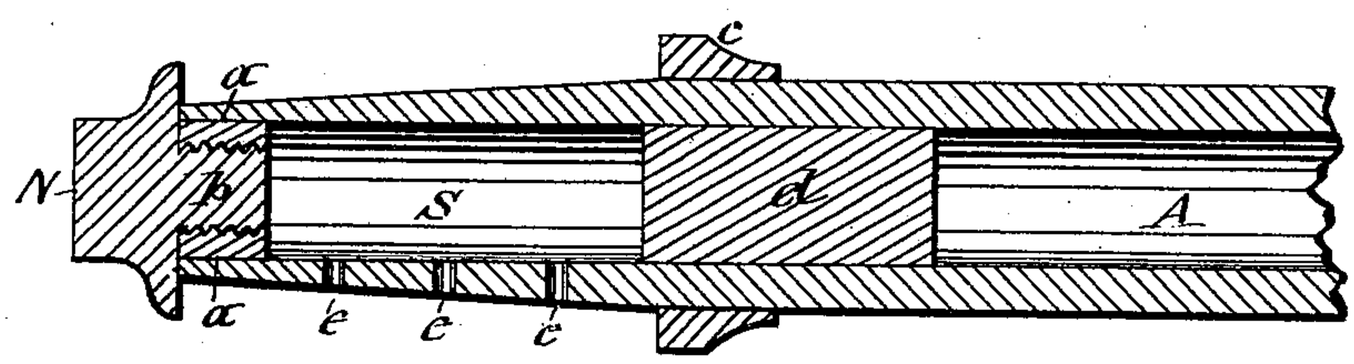
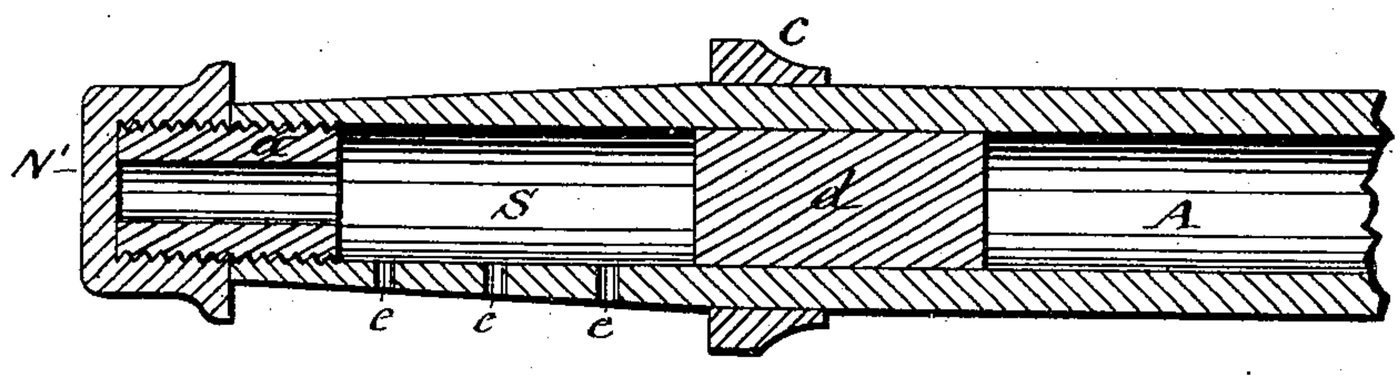


FIG-3-



ATTEST—

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INVENTOR—

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UNITED STATES PATENT OFFICE.

EDGAR PECKHAM, OF SYRACUSE, NEW YORK, ASSIGNOR TO LAKE SHORE TUBULAR AXLE COMPANY, OF CLEVELAND, OHIO.

TUBULAR AXLE.

SPECIFICATION forming part of Letters Patent No. 313,517, dated March 10, 1885.

Application filed April 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDGAR PECKHAM, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Tubular Axles, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

The object of my invention is to furnish at a reduced cost of manufacture a hollow axle with tapering spindles which shall be self-lubricating and possess the same advantages of maximum strength with minimum weight of material as the ordinary taper swaged axle with the smooth finish of the solid carriage-axle, but have a greater diameter throughout, and thus obtain a better bearing in the boxes of the wheels, and consequently cause the wagon to run easier than either of the aforesaid prior axles.

Hitherto tubular axles with tapering spindles have been formed solely by the swaging process, which compresses the spindles circumferentially to the requisite taper. The consequence was that the interior of the spindles became contracted gradually from the inner end of the spindles to the outer end thereof, and the bottom portion of the cavity of the spindles was thus made descending toward the inner end. This renders it impossible to utilize said cavity as a lubricant-reservoir to successfully lubricate the exterior of the spindle, inasmuch as the lubricant is caused to flow toward the inner end of the cavity of the spindle, and if emitted there to the exterior of the spindle the outer and greater portion of the spindle would be left dry. Furthermore, the swaging process left the spindles with a rough surface, and sometimes out of true, owing to the want of a proper fit of the dies; hence, when it is desired to render said swaged spindles smooth and true the extra expense of grinding or polishing the same is incurred, although tubular taper swaged axles finished as aforesaid are not generally furnished to the trade, but are usually rough and defective, as aforesaid.

By my invention I am enabled to supply the trade with a self-lubricating tubular axle having smooth and true tapering spindles of comparatively greater diameter throughout their length and properly braced to resist the strain they are subjected to, and at a materially reduced cost.

In the annexed drawings, Figure 1 is a plan view of an axle embodying my improvements; and Figs. 2 and 3 are longitudinal sections of the end portions thereof, illustrating the means for stiffening the same and for connecting the nut thereto, and also for rendering the same self-lubricating.

In constructing my said improved tubular axle I take a plain wrought-metal tube of the length of the axle to be formed, and after heating the end portions thereof I insert therein a cold metal bush or plug, *d*, fitted closely to the interior of the tube, said bush being forced into the tube the requisite distance to bring it at or near the point where the usual collar, *c*, is affixed to the exterior of the axle. The cooling and consequent shrinking of the tube securely retains the bush or plug *d* in its position. In the ends of the tube I secure another bush or thimble, *a*, as illustrated in Figs. 2 and 3 of the drawings.

The attachment of the bush *a* shown in Fig. 2 of the drawings is made by inserting said bush into the end of the tube, and then subjecting said portion of the tube to a welding-heat and to sufficient hammering to effectually weld the bush in the tube. A cold iron or steel bar should be inserted in the bush during the operation.

The attachment of the bush *a* as represented in Fig. 3 of the drawings consists in providing the interior of the end portion of the tube and the exterior of the bush with corresponding screw-threads, and, after applying to the bush sal-ammoniac or other corrosive, screwing the bush into the tube. The corrosion of the surfaces in contact with each other serves to cement the parts together. After the two bushes *d* and *a* are secured in the tube I mount the latter on a suitable lathe, the bushes then serving as central bearings for the live and dead spindles of the lathe, and after setting the lathe in motion I apply a suitable cutting or abrading tool, by which I trim the end por-

tions of the tube to a uniform and smooth taper from the collars *c* to the extremities of the tube. I thus maintain the interior of the tube of uniform size from end to end thereof, and produce in a very expeditious and comparatively inexpensive manner a tubular axle having smoothly-finished tapering spindles with a cylindrical interior. The cylindrical cavity of the said axle I utilize as reservoirs for lubricant, the bushes *a* and *d* constituting dams of said reservoirs, the outer thimble or bush, *a*, having a central orifice, through which to introduce the lubricant into the reservoir, and apertures or ports *e e* being made in the bottom portion of the spindle to allow the lubricant to escape to the exterior of the spindle.

The importance of combining a cylindrical cavity in the spindle with a tapering exterior of the same will be apparent when considering their joint operation. The cylindrical cavity allows the lubricant to flow from end to end thereof, and to be uniformly distributed therein, and by a proper disposition of the ports *e e* the lubricant becomes likewise distributed over the exterior of the spindle, the taper of which tends to conduct the lubricant toward the large end of the spindle, at which point the lubricant is most required.

In addition to the functions already ascribed to the bushes *a* and *d*, these bushes also serve to brace the axle, and the outer bush, *a*, affords effective means for the attachment of the wheel-retaining nut, by means of which I close the channel through said bush.

The nut and its attachment may be made in either of the forms shown in Figs. 2 and 3 of the drawings.

In Fig. 2 the bush *a* terminates flush with the end of the spindle, and is screw-threaded internally for the reception of a screw-threaded shank, *b*, on the nut N.

In Fig. 3 of the drawings the bush *a* is made to project from the end of the spindle, and the protruding portion of the bush is screw-threaded externally for the reception of the nut N′, which is in the form of a female screw-threaded cap screwed onto the bush, and effectually closing the longitudinal channel thereof. I prefer the last-described construction and combination of the nut and bush, inasmuch as the nut is much lighter than that shown in Fig. 2 of the drawings, and its screw-threaded portion is of greater circumference, and consequently has a more secure hold on the bush.

I wish it to be distinctly understood that I do not claim a tubular axle which has its spindles tapered internally as well as externally. Such construction does not accomplish the object of my invention, it being impossible to render such axle successfully self-lubricating for the reason hereinbefore set forth.

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

1. The within-described tubular axle, consisting of a plain wrought-metal tube of uniform dimensions internally from end to end thereof, and having the exterior of its end portions turned off or cut down gradually to a uniform taper and smooth surface, substantially as specified.

2. A tubular axle composed of a plain wrought-metal tube of uniform dimensions internally from end to end thereof, and having the exterior of its end portions cut down gradually to a uniform taper and re-enforced by bushings inserted in the ends of the tube, substantially as described and shown.

3. An axle composed of a metal tube having its interior of uniform dimensions from end to end thereof and its spindles tapered externally, lubricating-ports in the spindles, a dam at the inner end of the interior of the spindles, a dam at the outer end of the spindles, and provided with a lubricant-induction port or channel, and a wheel-retaining nut attached to said dam and closing the channel thereof, all constructed and combined substantially in the manner specified and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 24th day of April, 1884.

EDGAR PECKHAM. [L. S.]

Witnesses:
C. BENDIXON,
WM. C. RAYMOND.