(No Model.)

N. L. HOLMES.

WAGON AXLE.

No. 307,649. Patented Nov. 4, 1884.

Fig. 1.

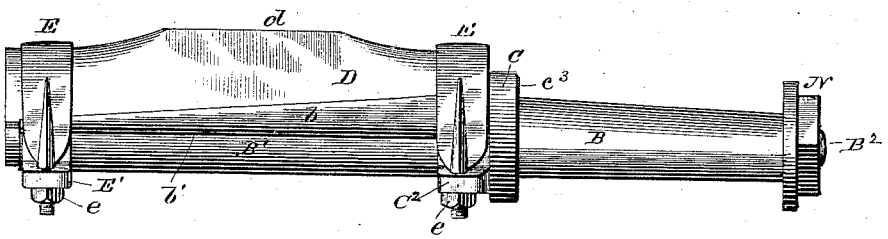


Fig. 2.

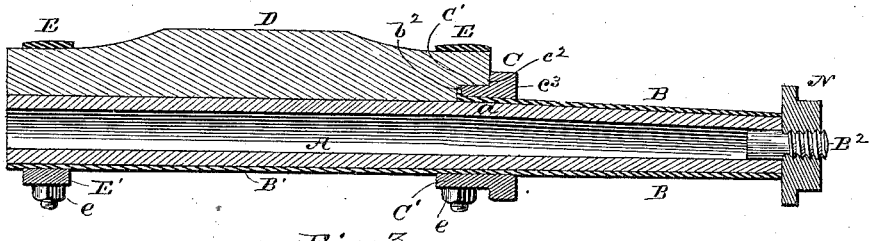


Fig. 3.

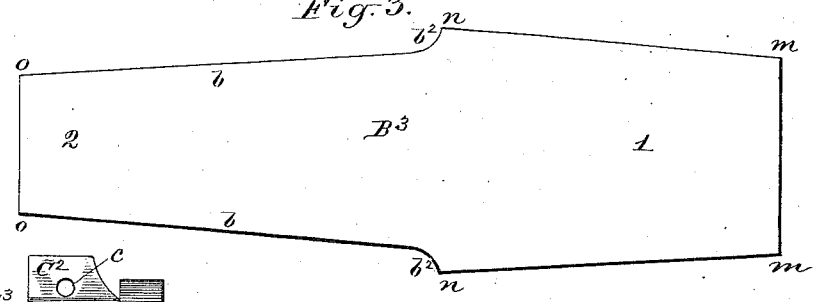


Fig. 5.

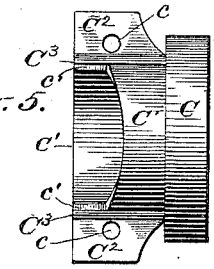
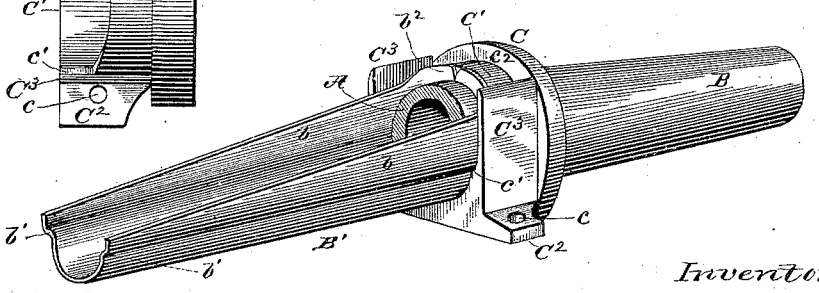


Fig. 4.



Witnesses.
Jno. H. Stockett.
C. C. Poole

Inventor.
Nathan L. Holmes.
Per M. E. Dayton
Attorney.

UNITED STATES PATENT OFFICE.

NATHAN L. HOLMES, OF RACINE, WISCONSIN.

WAGON-AXLE.

SPECIFICATION forming part of Letters Patent No. 307,649, dated November 4, 1884.

Application filed October 17, 1883. (No model.)

To all whom it may concern:

Be it known that I, NATHAN L. HOLMES, of Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Wagon-Axles; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in tubular iron wagon-axles, and has for its object to provide a construction whereby the desired size and strength may be obtained in and adjacent to the arms or spindles of the axle, while employing a tube of only appropriate size to give the desired strength to the intermediate parts of the axle, and whereby, also, the general character and appearance of the axle, as a whole, will be improved.

To these and other ends that will further appear the invention consists in the combination, with a tube extending from end to end of the axle, of metal thimble-skeins secured externally to the ends of the tube, and in other matters, substantially as hereinafter described, and pointed out in the appended claims.

In the use of tubular iron axles for wagons it has been observed that the gas-pipe or similar tubing of which such axles have been constructed is too soft to afford durable wearing-surfaces for the wheel-boxes, and also that in providing for necessary size of the spindles and needful strength at points near the spindles, where the axle is subjected to greatest strain, an objectionably large tube has been required, which, by extending the entire length of the axle, gives superfluous weight and size to the latter at points where the full strength of the metal is not needed. An attempt to obviate this last-mentioned objection has been made, which consisted in upsetting the tube at and in the neighborhood of the inner ends of the spindles, so as to increase its diameter at these points of greatest strain and to provide for the necessary taper of the spindles or arms. This construction is attended with the objection that the metal of the tube, though enlarged by being upset, is also weakened by longitudinal compression and lateral separation of its fibers in the act of upsetting, so that the desired strength is not obtained by the enlargement of the axle thus produced. In the improved construction herein shown the tube employed for an axle of a heavy wagon is about half an inch less in diameter than that heretofore employed, and, generally, by said improvement the diameter of the axle-tubes for all sizes of wagons will be reduced at least twenty per cent. The ends of the tube are drawn down to give the required taper to the arms, and the necessary size and strength are given to said arms and to the adjacent portions of the axle by means of metal (usually steel) thimble-skeins having inward extensions, which embrace or partially embrace the axle at the points of strain near the arms. The addition of the thimble-skeins, when of steel or hardened metal, also provides better wearing-surfaces for the wheel-boxes, so that the axle is not only lighter in appearance and in fact, and of equal or greater strength at the points of strain than in former constructions, but is far more durable at the wearing-points.

Referring to the drawings for a fuller explanation of my improvements, Figure 1 is a side elevation of a portion of a wagon-axle, showing my improvement. Fig. 2 is a central vertical section of the parts shown in Fig. 1. Fig. 3 represents a blank, or a plan view of a piece of sheet metal of proper form to give the thimble-skein and its extension, shown in Figs. 1 and 4, when bent to shape. Fig. 4 is a perspective view of the steel thimble-skein and its extension, together with a collar of peculiar construction applied thereto, the wooden portion of the axle and a part of the axle-tube being removed. Fig. 5 is a top or plan view of the collar or hurter-band and its adjuncts shown in Fig. 4.

A is a wrought-iron tube forming the principal metal portion of the axle, and having its extremities formed to give the desired taper to the arms or spindles.

B is a thimble, usually made of sheet-steel shaped up from a blank, of which a suitable form is shown in Fig. 3. Said thimble closely embraces the tapered end of the tube A, and may wholly or partially embrace the axle for any desired distance beyond the collar or hurter-band. When formed from a blank, said

blank should have its edges, as *m n*, welded together for the entire length of the arm, and preferably along the top of the arm, as intended in the particular form of blank shown in Fig. 3.

B′ is an extension of the thimble extending inwardly from the arm along the under surface of the axle, and laterally embracing both the tubular and wooden portions of the axle, as indicated in Fig. 1.

C C are collars shrunk or otherwise secured upon the thimbles B at the inner ends of the arms or spindles to form the necessary shoulders for the wheels.

D is a wooden portion of the axle, grooved on its under surface to fit the upper surface of the tube, and abutting against the inner vertical surfaces of the collars C.

E E are clips which bind the parts together, and B^2 is a plug welded in the end of the tube A, and threaded to receive the nut N.

In constructing the axle shown, the ends of the tube A are heated and drawn or swaged by any suitable means from points about at *a* to the extremities, in order to give the desired taper to the arms. In the open ends of the tube are welded the plugs B^2, which project and are threaded in the usual manner to receive the nuts N. In the use of a thimble formed of sheet metal, the part 1 of the blank B^3 is cut of suitable size and shape to admit of being bent to form a tapering thimble closely fitting the tapered portion or arm of the tube A, and the edges *m n* of said blank, which meet and are welded together along the top of the arm, are preferably of such length as to reach a little beyond the inner vertical face of the collar C, for a purpose that will be explained. The edges *n o* of the extension 2 of the blank which incline toward each other, as shown, are preferably curved inwardly at b^2, for a purpose which will also further appear. The part 2 of the blank B^3 is of such dimensions as to admit of being bent to form an extension of the thimble reaching along the under side of the axle to a point beyond the hound-rest, (at *d*,) and is secured at its end by a clip, E. The blank extension is also preferably of such form and size as to rise at the sides of the axle far enough to cover the tube, and to also reach above the adjacent edges of the wood portion D. After bending up and welding the edges *m n* of the arm or spindle portion 1 of the blank B^3, the extension 2 is, in this case, swaged by a suitable "former" into proper shape to closely fit the under side of the tube and the side faces of the wood D, as shown in Figs. 1 and 4. Said wood portion D being thicker than the diameter of the tube, an offset, *b′*, is preferably formed along each side of the extension B′, to give room for the edges of the wood, so that the said extension will closely fit and bear against the entire surface which it covers. The thimble may be secured to the tube either by welding it at the outer end of the arm or by shrinking it upon the tube, as may be thought advisable. Since it may be desirable to some time renew a thimble, the method of fastening it by shrinking it upon the tube will obviously be preferable. After securing the thimble upon the tube the arm should be placed in a suitable swage or former, by which it may be accurately trued and brought to size, and by which it may also be compressed firmly upon the tube throughout the length of the arm, in case it is fastened to the tube by welding at the end, as above described. The collar or hurter-band C is secured in place preferably and usually by shrinking it on. For the general purposes of my invention said hurter-band may be of any desired form. I have, however, devised a particular construction of said band, particularly adapted to confine the wood and metal parts of the axle, as shown in the drawings. This band is of malleable iron, and by its use greater strength in the finished axle and greater facility of manufacture of the axle are attained.

Referring to the drawings, C is the hurter-band referred to, having a shoulder, c^3, against which the wheel-box bears. C′ is an inwardly or rearwardly directed flange or extension thereon, made narrower at its top or in its upper half than at the bottom or lower half.

C^2 C^2 are lateral projections on the flange C′, having holes *c* to receive the ends of a clip, E, and C^3 are parallel vertical side projections or flanges continuous with the wider lower part of the flange C′, and reaching upward from the said flange C′ in position to be embraced beneath the clip E, preferably as high as the points where the upper rounded surface of the wood portion D begins, and above the margins *b* of the thimble-extension B′. At *c′* said flanges C^3 are cast with offsets to admit the corresponding offsets, *b′*, on the skein-extension B′, as clearly indicated in Fig. 4. The inner surface of the hurter-band and its flange C′ is cylindric or slightly tapered to fit the surface of the thimble, as indicated in Fig. 2.

When the hurter-band C is secured in place upon the thimble, constructed as shown, the exposed edges b^2 of the thimble are swaged upward against the inner edge of the narrow part of the flange C′, and the adjacent parts of the margins *b* of the blank are forced outwardly closely against the flanges C^3. The curved form given to the blank at b^2, Fig. 3, facilitates their being upturned, as just described, and also gives to said edges, when so bent, a conformity with the upper curved surface of the flange C′. A smooth effect in the upward swaging of said edges b^2 is further facilitated by making the edge of the flange C′ curved, as indicated in Fig. 5.

By the feature of the upturned edges b^2 of the spindle back of the flange C′, as above described, the band C is obviously more perfectly and permanently held in place against any tendency of the wheel to force it inward upon the axle.

The tube, spindle, and hurter-band having been joined as set forth, and as particularly shown in Fig. 4, the wood portion D of the axle is fitted and secured. Such fitting of the wood D consists in grooving its under surface to admit one-half the diameter or depth of the tube A, and in cutting away the under surface at the ends of the stick to accommodate the flanges C′ on the hurter-bands. The ends of the wood portion abut against the shoulders c^2 of the hurter-bands, as shown in Fig. 2. Thus fitted and applied, the wood and metal parts are secured by the clips E E, one of which fastens the inner end of the thimble-extension B′, and the other of which secures the end of the wood. The clip-tie E′ at the inner end of the thimble-extension B′ is of malleable iron, shaped to conform with the curved under surface of the axle. The lateral projections C^2 upon the under portion of the flange C′ of the hurter-band also form a clip-tie of the same piece of metal with the collar C.

In order to insure a close fit of the clips E, said clips are preferably made of wrought or malleable iron, and the flanges C^3 upon the hurter-band are made thin at their upper edges, so as to yield or bend inwardly slightly under the strain applied to the clip, which closely hugs the outer faces of said flanges. If desired, said flanges C^3 may be recessed to admit the wings *b* of the thimble-extension, so as to give a flush surface therewith against the wood. A good finish and a close fit of the clips will also be produced if the upper edges, *b*, of the thimble-extension B′ are thinned down by hammering.

Instead of first forming the thimble and its extension B′ and thereafter securing it to the tube A, the thimble or arm portion B only may be formed up and then fastened to the tube, after which the extension B′ may be swaged down to fit the tube by the aid of swages or formers, one of which has the shape of the wood portion D, and another of which bears externally upon the plate-extension and gives it the shape desired. The invention is not restricted to any particular order of steps to be pursued in making the device, and the methods above set forth are given as merely advisory.

An inferior construction within the scope of my invention would be formed by making the flanges C^3 on the hurter-band continuous with each other over the top of the wood portion D, and omitting the clip E at this point, and also omitting the lugs C^2, and, if desired, the upper or narrowed portion of the flange C′. In this case the hurter-bands, or one of them, would be applied to the spindle after the wood part D was placed upon the tube A. It will also be practicable to construct the thimble with a wrist-extension extending over and embracing the end of the wood portion D; but in that case it will preferably be prolonged on the under side to receive the inner clip, E.

A hurter-band of the general construction set forth is obviously adapted to be used upon a thimble embracing the arm of an axle made entirely of wood, or not having a metal part A. Of course the projections C^2 on the said hurter-band may be omitted, and a separate piece employed for a clip-tie; but the construction shown is preferable.

The first following claim is intended to cover a tubular axle without the wood adjunct D.

In another application for patent filed by me of even date herewith, a particular construction of the thimble is set forth and claimed, which consists in making the thimble and its extension of tubing of proper size to fit the main or axle tube A.

I claim as my invention—

1. The combination, with a tubular wagon-axle having its ends or arms tapered, of sheet-metal thimble-skeins fitted and secured upon the ends or arms of the tube, substantially as described, and for the purposes set forth.

2. The combination, with the tube A and a wood portion, D, of a thimble skein, B, provided with an inner extension a hurter-band or collar, and means for confining the skein-extension and the wood and tubular portions of the axle together, substantially as described.

3. The combination, with the tube A, thimble B, having an inner extension, B′, wood portion D, and hurter-band, of clips E E, applied, respectively, to the end of the wood and the end of the thimble-extension, substantially as described.

4. In combination with an axle and a thimble having an extension, B′, a hurter-band having a shoulder at c^2, and provided with a flange, C′, and side flanges at C^3, substantially as and for the purposes set forth.

5. In combination with an axle and thimble, the hurter-band constructed with a collar, C, and top flange, C′, affording a shoulder at c^2, and provided with flanges C^3 and a clip, E, embracing said flanges C^3, substantially as described.

6. The combination, with the tube A and thimble, of the hurter-band having a flange, C′, and side flanges, C^3, the upper part of the flange C′ being narrower than the lower part, and the edge of the thimble being upturned against the rear or inner edge of said flange C′, substantially as described.

7. The combination, with the tube and grooved wood portion D, thicker than the diameter of the tube, of the thimble provided with an extension, B′, having offsets *b*′, substantially as described.

8. The combination, with the thimble-extension having offsets *b*′, and with the metal and wooden portions of the axle, of the hurter-band having side flanges, C^3, offset at *c*′ to fit the thimble-extension, substantially as described.

9. The combination, with the tubular and wood portions of the axle, of a thimble, B, having an open extension, B′, whose edges are curved at b^2, and a hurter-band having a

flange, C′, cut away in its upper portion, substantially as shown, and for the purposes set forth.

10. In combination with an axle and thimble, a hurter-band constructed with flanges C′ and C^3, and laterally-apertured projections C^2, and with a clip-band E′, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

NATHAN L. HOLMES.

Witnesses:
M. E. DAYTON,
W. C. ADAMS.