(No Model.)

N. L. HOLMES.

WAGON AXLE.

No. 343,272. Patented June 8, 1886.

Fig. 1.

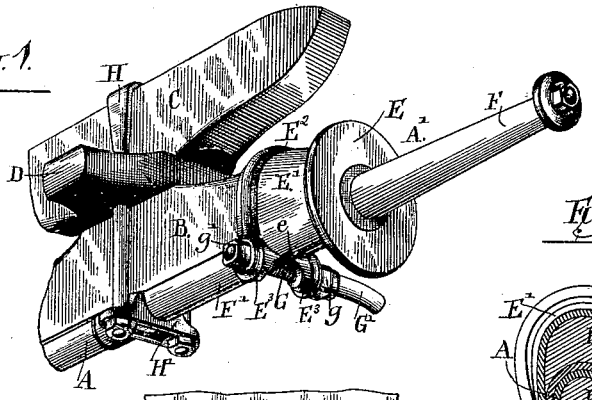


Fig. 3.

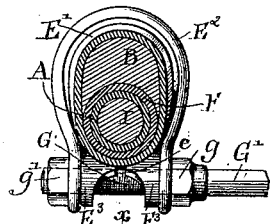
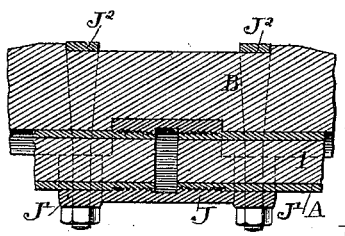


Fig. 2.



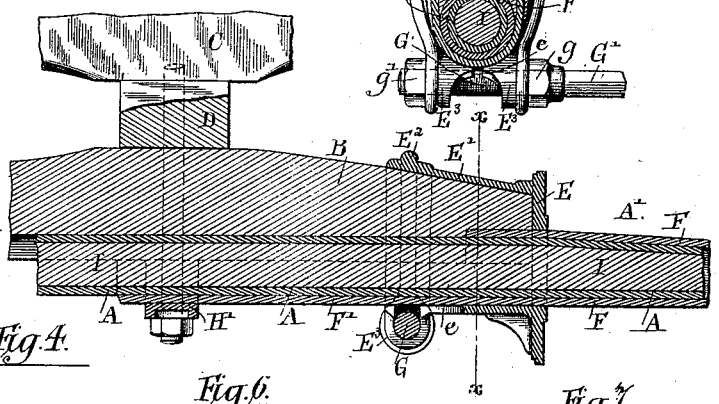


Fig. 4.

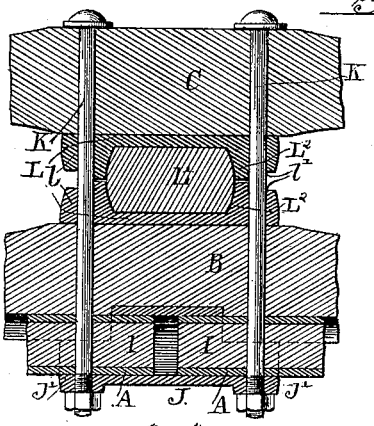


Fig. 6.

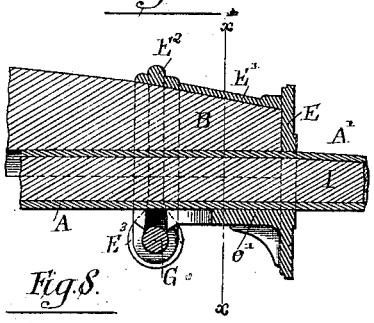


Fig. 7.

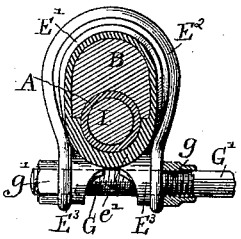
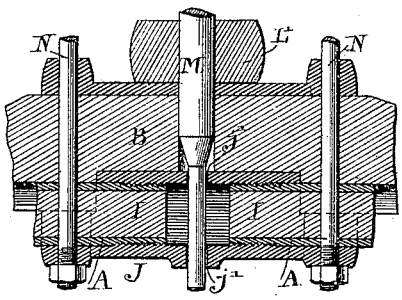


Fig. 8.

Fig. 5.



Witnesses:-

Louis M. Whitehead.

C. C. Poole

Inventor:-

Nathan L. Holmes.-

by:-

W. E. Dawson

Attorney.-

UNITED STATES PATENT OFFICE.

NATHAN L. HOLMES, OF RACINE, WISCONSIN.

WAGON-AXLE.

SPECIFICATION forming part of Letters Patent No. 343,272, dated June 8, 1886.

Application filed July 11, 1885. Serial No. 171,278. (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 the construction of wagon-axles; and it consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a perspective view of the end portion of a rear axle and axle-arm embodying parts of my invention. Fig. 2 is a longitudinal vertical central section of an axle, illustrating the construction of the end and middle portions thereof. Fig. 3 is a transverse section taken upon line *x x* of Fig. 2. Fig. 4 is a central vertical section of the middle part of an axle, showing a modified form of device for uniting the adjacent ends of a two-part tubular axle, and other devices hereinafter described. Fig. 5 is a detail plan view of a plate or casting shown in Fig. 4. Fig. 6 is a sectional view of the end portion of an axle, showing a modified form of the devices shown in Figs. 1, 2, and 3. Fig. 7 is a transverse section of the parts shown in Fig. 6, taken upon line *x x* of said figure. Fig. 8 is a sectional view of the middle part of a front axle, illustrating parts of my invention.

In the particular devices herein shown as one way of carrying out the several features of my invention, A indicates the tubular metal axle; B, the wooden part of the axle; C, the bolster; D, the rear hounds, and E the axle-collars.

As shown in Figs. 1, 2, and 3, the axle-arm A′ of the axle A is provided with a tubular thimble-skein, F, forming the wearing-surface of the axle-arm, and provided with a part, F′, extending inwardly beneath the axle A, as fully set forth in Letters Patent No. 307,649, granted to the present applicant upon the 4th day of November, 1884. The collar E, as shown in said Figs. 1, 2, and 3, and in Figs. 6 and 7, is cast integral with a tubular part or sleeve, E′, adapted to embrace the tubular axle and the end portion of the wooden part B thereof, the part of the said sleeve remote from the collar E being split, as indicated at *e*, and provided with a clamping bolt or rod, G, whereby the said wooden part B and the tubular axle A may be firmly clamped together. The marginal part of the said sleeve remote from the collar is preferably cast with a re-enforcing rib, E^2, having the appearance of a separate band or clip, said rib being extended at the bottom of the sleeve to form two depending lugs, E^3, located upon either side of the split *e*, and with which the bolt or rod G is engaged. The rod G in the particular construction illustrated forms the end portion of a brace-rod, G′, extending to the forward ends of the hounds, a nut, *g*, being placed upon the end of the rod to form a shoulder, between which and a nut, *g′*, upon the end of the rod the lugs E^3 are held. This construction affords a convenient means of attaching the brace-rod to the axle, and enables the said rod to be accurately adjusted in position, inasmuch as the nut *g* may be moved upon the rod so as to bring the forward end thereof into the desired position, and the nut *g′* then tightened so as to hold the rod in place, and at the same time to firmly clamp the sleeve upon the axle. The nut *g* is desirably made longer or thicker than usual, and the aperture of the said nut is made smooth or unthreaded in its outer part, so as to extend over and fit or slide upon the unthreaded part of the rod G. By this means the threaded part of the rod may be entirely covered by the nut, and the latter may be moved upon the rod for the purpose of adjustment without exposing the screw-thread. This construction also gives a neater finish to the part, and makes the rod stronger at its point of connection with the nut, inasmuch as the lateral strain upon the rod will come upon the full-sized part engaged with the nut instead of upon the point thereof, at which it is reduced in diameter by the presence of the screw-thread. The collar E is fitted closely about the axle, and will be usually and preferably shrunk upon the latter, this affording a cheap, simple, and reliable means of attaching said collar. Other means may, however, be employed for this purpose, with the same general advantages as far as the operation of the sleeve E′ is concerned; and I do not desire to limit my

invention, as it relates to the parts referred to, to the construction in which the collar is fastened by being shrunk upon the axle, excepting as this latter construction is herein specifically claimed.

It will be observed that the collar E and sleeve E′ are constructed and operate in the same general manner to hold the end of the wooden part B upon the axle A, whether the latter is or is not provided with the thimble-skein F. The tubular axle A is usually made to enter one-half its diameter into the wooden part B, and the end portion of the latter, when the construction shown in Figs. 1, 2, and 3 is used, is made of about the same width as the skein F, so that the sleeve E′, which is fitted closely to the lower surfaces of the skein and to the wooden part, takes the form of a smooth oval. When the skein is absent, however, and the axle A and part B retain the same relative proportions, the lower part of the sleeve E′ will usually be made thicker than the upper part, as indicated at *e′* in Fig. 7.

The axle-hound D and bolster C are shown in Figs. 1 and 2 as secured together by a clip, H, passing over the bolster and through the hound and engaged at its ends with the ends of a transverse bar or casting, H′, fitted at its upper surface to the surface of the part F′ of the skein.

The tubular metallic axle A is, as shown, provided with a filling, I, which may be of wood or other relatively light material approximating the latter in hardness. This filling is found to greatly increase the strength of the tubular axle without increasing its size or the quantity of metal therein, and with little addition to its weight, this result being thought to follow principally from the fact that the said filling prevents the collapsing of the tube, so that a direct rupture thereof is required before it will yield or break.

As the best manner of carrying out my invention, I make the said filling of hard wood prepared in pieces considerably larger in diameter than the interior of the tube, which are forced endwise into the tube, so that the wood is materially compressed or reduced in bulk, this construction having the obvious advantage of making the wood less liable to yield under compressive strain. Inasmuch, however, as some of the advantages arising from the use of a filling may be obtained when the latter is of other material than compressed wood, this part of my invention is not limited to a compressed-wood filling, except as the latter is herein specifically claimed.

The axle A, herein illustrated, is made in two parts, which are joined at the middle of the axle by a coupling device, several practicable forms of which are shown in Figs. 2 and 4. One advantage of this construction is, that the axle is thereby made adjustable in length, so that the wheel-arms may be accurately brought into proper relative position after they are completed. In an axle in which the end portions are tapered to form the wheel-arms, and which is provided with a filling, as above set forth, it is also desirable to make the axle in two parts, in order to enable the said filling to be inserted after the axle-arms have been forged to shape. The said coupling device, as shown in the said figures, consists of a tubular casting, J, fitted to the lower surface of the part B by recessing the latter or otherwise, and adapted to receive the adjacent ends of the parts of the axle. As shown in Figs. 2 and 8, the said casting J is interiorly screw-threaded to receive the ends of the axle, and in the form thereof illustrated in Fig. 4 the coupling is fitted smoothly to the axle ends and shrunk upon the latter.

The tubular coupling-piece J is, as shown in Fig. 2, provided at its ends with parts J′, extending beneath the axle and provided with laterally-projecting parts adapted to engage the lower ends of clips J^2, passing over the wooden part of the axle. This means of holding the coupling-piece in place is obviously adapted as well for use when the coupling-piece is shrunk upon the axle ends, or it may be employed to hold the ends of the axles and coupling-piece in position when the latter are unthreaded, as shown in Fig. 4, by clamping the axle ends between the parts J′ of the coupling-piece and the opposing surface of the wooden part B.

In Fig. 4 the coupling piece is shown as held in place by bolts K K, passing through the parts J′ of said coupling-piece, the adjacent part of the axle ends, and upwardly through the part B of the axle and the bolster C. Said bolts are, as shown, conveniently utilized to hold in place two plates, L, located between the rear axle and bolster, and provided with vertical side flanges, L^2, arranged to meet at their edges and constructed to form a guide-aperture for the reach L′, said bolts passing through apertures *l′* in ears *l* upon said plates, as clearly shown in Figs. 4 and 5. Said plates L are generally similar to those shown and claimed in a prior application, Serial No. 148,638, made by me upon the 24th day of November, 1884, and are herein claimed in combination with the vertical bolts as a means of sustaining them in proper relative position.

The coupling-piece J (shown in Fig. 8) is more especially intended for use in connection with the forward axle. The said coupling-piece in this case is provided with central apertures, *j′*, for the passage of a king-bolt, M, and may be secured in place by means of the bolts N, extending through the front axle and sand-board, or otherwise, as desired.

It is to be understood that the appended claims cover the several parts or devices therein set forth, when said parts or devices are constructed in form to obtain either, any, or all of the advantages herein stated as belonging to them, or when said parts are adapted to perform or fulfill either, any, or all of the functions or purposes which they are shown

or described as performing or fulfilling in the drawings and foregoing description.

I am aware that it has been proposed heretofore to employ in the construction of wheel-fellies a metal tube filled with wood; but I am not aware that a tubular wagon-axle has ever been provided with a wood filling in the manner and with the results hereinbefore set forth.

I claim as my invention—

1. The combination, with a metal axle and wooden part B, of an axle-collar and a split sleeve cast integral with the collar, substantially as described.

2. The combination, with a metal axle and wooden part B, of an axle-collar fitted to the metal axle and shrunk upon the latter, and a split sleeve cast integral with the collar, substantially as described.

3. The combination, with a metal axle and a wooden part, B, of an axle-collar, E, and a sleeve, E′, cast integral with the collar and split in its part remote from said collar, and a clamping-bolt for said sleeve, substantially as described.

4. The combination, with a metal axle and wooden part B, of an axle-collar, a split sleeve cast integral therewith, and a brace-rod, G′, engaged at its end with the sleeve, and forming the clamping-bolt thereof, substantially as described.

5. The combination, with the collar E and the split sleeve E′ cast integral therewith, of a brace-rod, G′, threaded upon its end and provided with nuts *g* and *g′*, and engaged with the sleeve to form the clamp-bolt thereof, substantially as described.

6. The combination, with a sleeve, E′, or other part attached to a wagon-axle and provided with a bolt-aperture, of a brace-rod, G′, screw-threaded upon its end portion and engaged with said bolt-aperture, and a nut, *g*, having a portion of its aperture smooth or unthreaded and adapted to extend over the adjacent unthreaded portion of the rod, substantially as described.

7. A tubular wagon-axle made in two parts and provided with a filling of wood or equivalent material and means for uniting the parts of the axle, substantially as described.

8. The combination, with a metal axle made in two parts and a wooden part, B, of a coupling-piece, J, constructed to engage the adjacent ends of the axle, and means for connecting said coupling-piece with the said part B, substantially as described.

9. The combination, with a metal axle made in two parts and a wooden part, B, of a tubular coupling-piece, J, embracing the adjacent ends of the axle and provided with parts J′, extending outwardly beneath the axle, and means engaged with said parts J′, constructed to hold the coupling upon the part B, substantially as described.

10. The combination, with a metal axle made in two parts and a wooden part, B, of a tubular coupling-piece, J, and bolts passing through the said coupling-piece, the parts of the axle, and the part B, for securing said parts together, substantially as described.

11. The combination, with a rear axle, bolster, and reach, of plates L, provided with side flanges, L^2, and constructed to form a guide-aperture for the reach, and having lugs *l*, provided with vertical bolt-apertures *l′*, and bolts passing through the said axle, reach, and bolt-apertures, substantially as described.

12. The combination, with a metal axle made in two parts, a wooden part, B, a bolster, and reach, of a coupling-piece uniting the ends of the parts of the axle, plates L, forming a guide-aperture for the reach, and vertical bolts connecting the coupling-piece, axle, and bolster, and engaged with the said plates L, substantially as described.

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

NATHAN L. HOLMES.

Witnesses:

C. CLARENCE POOLE,

G. F. LANAGHEN.