

HUGH PLATTE'S COLLAPSIBLE WAGGON

Philip Butterworth

Hugh Platte's late sixteenth-century description of a waggon to be used by 'mariners or souldiers' may refer to an idiosyncratic design but it raises questions concerning constructional and operational features which may relate to those of pageant waggons. The following description and accompanying illustration occurs in Hugh Platte's *The Jewell House of Art and Nature*, published in 1594:

A Waggon to bee drawne with men in steade of horses. The ioynts and other parts of this waggon are so knit together with hookes and pinnes, as that it may easily bee disioynted and taken in sunder, whereby many of them may be couched in a narrow roome, and will lie close toither in a ship. It is to bee drawne with six men, whereof two of them muste labour at the fore-cariage thereof, and at either wheele other two, which must woorke by winding of the handles, (which are of purpose fastened both to the Naue of the wheele, and axletree) either forward or backward as occasion serueth. The vse therof is to conuey their vittails and other necessaries from place to place when the mariners or souldiers haue cause to land in some countries where the place affoordeth no horse or other beastes that are fit for labour or cariage. I know not the Author of this inuention, but because it came so happilie to my handes, and carieth some good conceipt with it, I thinke it necessarie to be published amongst other seruiceable deuises for the sea.¹

Although Platte was later knighted for his services as an inventor,² it is clear that the design offered here was not his own. It is also possible, though by no means certain, that the description and illustration is of a projected vehicle rather than an existing one, since Platte explains, 'I know not the Authour of this inuention ...' Nevertheless, coincidence of features in this description with previously assembled details concerning pageant waggons is of interest. How does Platte's description and illustration relate to the design and construction of pageant waggons?

Perhaps it might be useful to consider appropriate features of Platte's waggon before attempting to discuss that relationship.

When in use Platte's waggon is required to be drawn by 'men in steade of horses' and when not in use 'it may easily bee disioynted and taken in sunder ...' Both of these practices are known to have taken place with some pageant vehicles. The description calls upon six men to manoeuvre the waggon: two at the 'fore-cariage' and the other four 'at either wheele other two ...'³ Presumably the 'either wheele' refers to the larger rear wheels and the 'other two' refers to two men at each wheel. Perhaps the most striking and unusual feature of Platte's waggon is that of the handles attached to the rear wheels. Do the two men at 'either wheele' stand opposite each other or side by side in order to turn the handles? Either technique might apply depending on the load, speed, or sort of terrain being covered. Over rough ground, men positioned opposite each other may exert a greater 'push and pull' leverage on the handle, whereas two men operating side by side may be able to build up a faster rhythm over relatively smooth ground. Does the handle on each rear wheel need to be long enough to accommodate two men operating side by side? The value gained by having handles attached to the axletree and nave is not immediately clear, for the mechanical advantage offered by the handles would be poor compared with that afforded by manhandling the vehicle by the wheel rims or by pushing the waggon from behind. It is therefore important to determine whether the axletree revolves or is fixed. If it may be presumed that the rear wheels turn upon the axletree, then the operating handles need to turn with the wheels and thus be fixed to the wheels and not the axletree. Platte, however, says quite specifically that the handles are 'fastened both to the Nave of the wheele, and axletree'. This seems to suggest that the wheel and axletree are fastened and turn together. In this event a means of supporting a revolving axletree needs to be evident. The drawing appears to represent the axletree as a square-sectioned piece of timber which supports the sides and centre longitudinal strut, or perch,⁴ and is thus unlikely to have turned. If the support offered by the axletree to the waggon sides and perch as shown in the illustration determines that the axletree does not turn, how is it possible for the handle, nave, and axletree to turn together? In order to comply with Platte's description concerning handles which are 'fastened both to the Nave of the wheele, and axletree', the axletree seemingly needs to revolve. In which case the timber axletree apparent in the drawing may simply be the outer casting of a revolving metal axle. A revolving wooden axle

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FIG. 4: Platte's Collapsible Waggon

PLATTE' S COLLAPSIBLE WAGGON

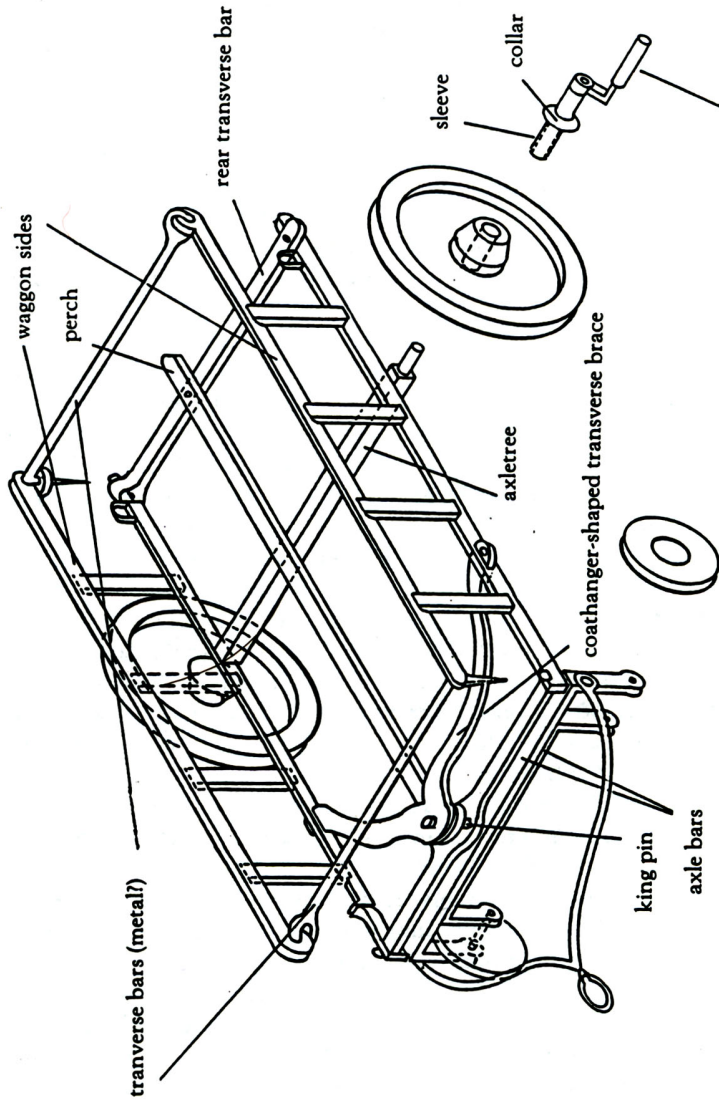


FIG. 5: Isometric reconstruction of Platte's wagon showing wheel, axle, and sub-frame details. The method of fixing the handle to the rear wheel is shown with an extended sleeve to fit over the axletree.

sheathed within an outer casing would not be strong enough to perform its function. It is possible that a metal axle extends beyond the nave and is terminated by the handle. Even so, it remains difficult to determine how the handle is fixed to both nave and axletree. If a revolving metal axle which extends beyond the nave is involved then the handle only needs to be fixed to the end of the axle. A means of securing the wheel on the axle may be achieved by a collar which fits over the axle, through which it is pinned and nailed into the nave. The drawing may permit this interpretation. If, on the other hand, the square-sectioned timber axletree is fixed to the sides and perch and does not revolve then other means of fixing the handles to the 'Nave of the wheele, and axletree' need to be considered. There seems little value in extending a wooden axle beyond the nave in order to fasten the handle; this appears to be a weak arrangement. It may be that part of the handle enters the nave and fits over the axle arm as a sleeve which is free to rotate around the axle, whilst a collar or plate attached to the handle is nailed to the nave. The drawing might also permit this interpretation. Although this assemblage allows the wheel, sleeve, and handle to turn together around a stationary axle, the means of locating the wheel on the axletree is not clear. Use of a linch-pin to maintain the position of the wheel on the axletree does not seem possible, unless the linch-pin is able to penetrate the axle without impeding the revolution of the sleeve. If the handle does enter the nave as a sleeve which is allowed to rotate around the axle arm then it may well perform the function of the later-termed 'box', which is the cast-iron socket wedged into the nave or stock which rotates upon the axle.⁵ Irrespective of whether the axle rotates or not, the presumed use of nails to fix such a plate or collar may well serve to weaken the nave, given the resultant pressure imposed by turning the handle.

Another distinctive feature of Platte's waggon is that it appears to possess a turning train since the use of smaller, disc fore-wheels appear to be able to turn into and under the sides of the waggon and perhaps more importantly, the axle/wheel arrangement is required to pivot around a form of king-pin or king-bolt. The king-pin is also used to locate the apex of a coat-hanger-shaped transverse brace which is intended to provide lateral strength. This brace does not have an exact counterpart in later waggon construction. The pins necessary to locate and lock the arms of the coat-hanger-shaped brace into the side of the waggon are not shown, although the holes through which such pins should pass are indicated. The two men required by Platte to 'labour at the fore-cariage' are thus able

to pull and steer the waggon. Whether the two men who 'labour at the fore-cariage' do so by gripping the handle of the waggon or by pulling on ropes attached through the 'eye' of the handle is not clear. If two men pull the waggon by the handle and face forwards then they are each likely to pull with one hand. If the two men face backwards then they may use two hands. In the event that ropes are used then each man may pull the waggon by passing the rope over his shoulder. The axle/wheel arrangement of the 'fore-cariage' is quite different from that of the rear wheels. Not only are the fore wheels represented as discs, but the means of fixing them to the axles is quite different and appears to consist of downward extensions from the respective parts of the axle through which the wheels are pinned. The inside of the offside fore wheel suggests that the bracket supporting the wheel is the same design as that seen on the outside of the nearside fore-wheel. The inside brackets are likely to be part of a lower axle-bar since the technology required to weld them to the same axle-bar as the outer brackets did not exist. It is of course possible that both the inner and outer brackets form the legs of an inverted 'U'-shaped bracket which is riveted to the axle bar.

The extent to which the waggon can be 'taken in sunder' is not entirely clear. The whole of the 'fore-cariage' may be separated from the rest of the waggon by disconnecting it from the front nearside and offside sections, although it is uncertain whether further separation of the 'fore-cariage' takes place. The king-pin may well stay in position. It is unclear whether the rear wheels are separated from the axletree when it is removed or whether the handles are retained on the naves. Repeated unfastening of the handles may serve to weaken the nave/handle joints, particularly if nailed in place. The sides of the waggon appear to remain intact, each side retaining a transverse bar which hooks into an 'eye' on the other side. These two bars may be made of metal given that they terminate in right-angled ends which are pointed. Indeed, a considerable amount of this waggon may be made of metal; the parts excepted being the wheels, the rear axletree (or axletree casing) and the side railings. The rear transverse bar at the base of the waggon slots on to the rear of one side and is pinned at two other points. The coat-hanger-shaped lateral brace presumably lifts up over the king-pin and is unpinned from the sides. Similarly, the perch may also be unpinned. Platte's drawing does not clearly establish where the left-hand end of the perch terminates. The partial reconstruction attempts to show the end of the perch fitting over the king-pin and under the coat-hanger-shaped brace.

It is clear that later wheelwright practice involved binding the nave with metal bands in order to strengthen the structure of the wheel and it may be that similar support is required by Platte's rear wheels, both to strengthen the wheel structure and to prevent the consequences of nails splitting the grain of the nave. Metal bands appear to have been placed around the naves of wheels of the pageant waggons of the Shoemakers, Smiths, and Coopers at Chester. The Shoemakers' records for 1549/50 detail payment for 'ffreytyng of the weyles' of their waggon.⁶ Although suggestions as to the meaning of this process have been advanced as decorating⁷ or binding⁸ the wheels, another use of the term 'fret' is defined as 'a ferrule, ring' for which the OED offers the following example: 'The Frets ... of a Wheel ... are Iron Hoops about the Nave'.⁹ It seems therefore that the 'fret' is the same wheel component as the later termed 'nave-band' or 'stock-bond',¹⁰ which is the metal band fastened around the nave in order to tighten the joints between spokes and nave. Such bands or bonds are fastened to the nave on either side of the spokes. Three adjacent payments for 1565 in the Drapers' accounts at Coventry indicate such use of 'fretts':

Itm payde for vj fretts to the wheles	ijs
Itm payde for iij Carte nayles to wheles	vjd
Itm payde for nayles to Sett on the fretts wall	vd ¹¹

Thorold Rogers identifies 'cart nails' as strake nails, so it is unlikely that the 'vj fretts' recorded here refer to strake nails, since a separate payment for 'cart nayles' is recorded.¹² The 'vj fretts' are also not likely to be tyres to bind the wheels since more 'Carte nayles' would be required to complete the binding. The fact that a separate payment for 'nayles' specifically required to 'Sett on the fretts wall' further suggests that the 'fretts' indicated here are those performing the function of stock-bonds. A total of eight 'fretts' of stock-bonds are required on a four-wheeled waggon and in this case the 'vj fretts' are likely to be used in three pairs on three wheels. No doubt single 'fretts' can be applied to a nave but this is likely to lead to an imbalance of tension between new and old 'fretts'. Similar payment is recorded at Chester 'for frettinge the wheles & nayles' in the 1560/1 Smiths' accounts¹³ and 'for frettes' in the Coopers' records for 1571/2.¹⁴ Interestingly, both examples offered by the OED in support of this latter meaning are from Cheshire.¹⁵ George Sturt says that the stock-bond is usually the last component to be applied during the wheel-

building process since the hot metal bond serves to tighten the joints on cooling:

A stock-bond was put on hot, driven down into place — evenburning its way in sometimes — and at last fastened with three ‘sprigs’ — three tiny iron pegs specially made to drive into the elm and clench neatly over the iron bond.¹⁶

The application of new stock-bonds to an old wheel may therefore be one means of tightening up loosened parts. A similar effect is also possible by wetting the wheels.¹⁷ Two instances of this remedy seem to occur in the Chester accounts: the Smiths’ records for 1560/1 detail payment for ‘the wrights for settinge the wheles ... & Carriage forth of the water’¹⁸ and the Coopers’ records for 1571/2 itemise ‘for ye carynge ye welles to the water and frome ...’¹⁹ Clearly, the need for stock-bonds as part of the tightening arrangement on a spoked wheel is essential to its normal operation. The additional leverage and pressure imposed on the nave of a wheel to which is attached a handle demands support of the kind offered by stock-bonds.

Some of the discussion concerned with pageant wagon construction has centred upon the issue of the turning train. Did pageant waggons possess smaller fore-wheels which could turn into or under the sub-frame in order to steer the vehicle? Reference to guild payments and pictorial evidence has been used to discuss this question and in general the arguments tend to suggest that turning trains were not involved.²⁰ Other methods of turning the vehicles have been advanced.²¹ Attempts to discover whether discrepancies in guild payments refer to the construction and use of smaller fore-wheels as a pointer to the possible use of turning trains have yielded no clear evidence.²²

It is the notion that Platte’s wagon is designed to be taken apart and reassembled which invites comparison with treatment of the Smiths’ and Coopers’ pageant waggons at Chester. The Smiths’ records for 1566/7 detail payment ‘for gettinge the Carriage out of the Axeltree viijd’.²³ Similar payment is itemised in the Smiths’ records for 1567/8 as ‘to the Right for gettinge the Carriag off & on viijd’.²⁴ These two payments apparently refer to the same process of removing the body of the vehicle from the axletrees. The Coopers’ records for 1571/2 also itemise payments for dismantling their vehicle in order to store and subsequently rebuild it:

more payde to Iohn croulay for the makyng of ye caryge
and nayles
iiiiis

Item payde to Iohn proulay for the brekyng of ye caryghe	viid
more payde to Iohn Ioanson for laynge the caryghe	
in hys seller	xviiiid
more spend at ye takyng done of yt & ye laynge in of yt	viid ²⁵

Why were the Smiths' and Coopers' vehicles dismantled and respectively stored in the 'weuers house' and Iohn Ioanson's 'seller'? A seemingly obvious reason for dismantling the waggons is concerned with the lack of storage space, whether in the 'weuers house' or in Iohn Ioanson's 'seller'. In his description, Platte declares that 'many of them may be couched in a narrow roome, and will lie close togethir in a ship'. Even though the Smiths' and Coopers' waggons at Chester were possibly dismantled to a lesser degree than Platte's waggon, they were, nevertheless, stored in what appears to have been a confined space and in the case of the Smiths, confined to a space shared with another waggon. However, the notion concerning lack of storage space suggests that the act of dismantling the waggon is an expedient rather than an intended feature. It is entirely possible that the Smiths' and Coopers' waggons at Chester are dismantled by design rather than default. In which case the concern for lack of storage space is not of central importance, unless the requirement of a small amount of space in which to store the waggon is seen as a virtue.

Handles attached to the naves of wheels as shown in Platte's design are not known to have existed on pageant waggons. The viability of such a device remains dubious given the leverage and pressure involved in moving a loaded waggon. Strengthening of the nave by the use of stock-bonds seems to be an essential requirement if use of the handles is to be considered practical. The description and illustration clearly demonstrates the feasibility of a collapsible waggon design. In this instance the principal purpose of the design is to enable dismantling of the waggon for the purpose of storage. The design thus stands as a reference point to the treatment of some pageant waggons which were similarly constructed in order to be dismantled and stored.²⁶

Bretton Hall College

NOTES

1. Hugh Platte *The Jewell House of Art and Nature* (London, 1594) 93, 94. The illustration on 93 is also repeated in the frontispiece of the British Library copy.
2. See *Dictionary of National Biography* edited Sydney Lee (Smith, Elder, London, 1896) 45, 407–409.

3. The size of Platte's waggon is unclear although the fact that six men are required to manoeuvre it may be compared with references to pageant waggons. At York in 1396 the play performed before Richard II used eight porters to guide and move a pageant: *REED: York* edited Alexandra F. Johnston and Margaret Rogerson, 2 vols (Toronto UP, 1979) 1 9: 2 695. The Smiths' records at Chester for 1566/7 required 'x porters of the Carrage ...': *REED: Chester* edited Lawrence M. Clopper (Toronto UP, 1979) 78. The Painters' records at Chester for 1567/8 itemise payment for 'viii putters of the caryge ...': *REED: Chester* 82. The Coopers' records for 1571/2 at Chester detail payment for 'vii men putters of the caryghe ...': *REED: Chester* 96. The Cappers' records at Coventry for 1540 record payment for 'x drywares of the pagant ...': *REED: Coventry* edited R.W. Ingram (Toronto UP, 1981) 153. Four years later the Cappers at Coventry paid for 'xij ment for dryvyng the pageant ...': *REED: Coventry* 167. In 1552 the Cappers required only 'vii men yat dryved ye pagyon ...': *REED: Coventry* 191. The 'Accounts of the Churchwardens of Chelmsford' for 1563 record payment 'for tenn men to beare the pagiante ...': Karl Pearson *The Chances of Death* 2 vols (Edward Arnold, London, 1897) 2 419. The Lincoln Cordwainers record payment for 'vj berars of yhe pageaunt in ye said gild ...': *Records of Plays and Players in Lincolnshire* edited Stanley J. Kahrl (Malone Society Collections 8: Oxford UP, 1974 for 1969).
4. *OED: Perch sb 2 d*. See also Laszlo Tarr *The History of the Carriage* (Vision Press, London, 1969) 162, 163.
5. George Sturt *The Wheelwright's Shop* (Cambridge UP, 1923) 129.
6. *REED: Chester* 49.
7. *REED: Chester* Glossary 547. See also R.M. Lumiansky and David Mills *The Chester Mystery Cycle: Essays and Documents* (Chapel Hill, 1983) 234 n.32.
8. John Marshall "The Manner of these Plays": The Chester pageant carriages and the places where they played' in *Staging the Chester Cycle* edited David Mills (Leeds Texts and Monographs 9: Leeds, 1985) 26.
9. *OED Fret sb 5*.
10. Sturt 117, 131, 160, 162, 182. J. Geraint Jenkins *The English Farm Waggon-Origins and Structure* (David & Charles, Newton Abbot, 1972) 63, 66, 81, 84. J. Geraint Jenkins *Agricultural Transport in Wales* (Cardiff, 1962) 66.
11. *REED: Coventry* 230.
12. James E. Thorold Rogers *A History of Agriculture and Prices in England, Volume 1 (1259-1400)* (Oxford, 1866) 544.
13. *REED: Chester* 66.
14. *REED: Chester* 95.

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15. See *OED Fret sb* 5. Randle Holme's *An Accademie of Armory or A Store House of Armory & Blazon ...* was printed at Chester.
16. Sturt 129.
17. Sturt 182.
18. *REED: Chester* 66.
19. *REED: Chester* 95.
20. See John Marshall 'The Chester Pageant Carriage — How right was Rogers?' *METH* 1:2 (1979) 49—55. Philip Butterworth 'The York Mercers' Pageant Vehicle, 1433-1467: Wheels, Steering and Control' *METH* 1:2 (1979) 72—81. John Marshall "The Manner of these Playes" (see note 8) *Staging the Chester Cycle* 26.
21. Marshall 26.
22. Marshall 26.
23. *REED: Chester* 78.
24. *REED: Chester* 86.
25. *REED: Chester* 95,96.
26. The Norwich Grocers' waggon was dismantled and stored less by design and more by reason of neglect. See *Non-Cycle Plays and Fragments* edited by Norman Davis *EETS SSI* (1970) xxxvi. The Plough Ship used in the Hull Noah Play was also partially dismantled by parting the ship superstructure from its wheels and axles and hanging it in Holy Trinity Church. See Anna J. Mill 'The Hull Noah Play' *Modern Language Review* 33 (1938) 489—505.