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# *English Artillery 1189–1307: The Implications of Terminology**

It has come to be accepted as a commonplace by medieval military historians that sieges were the dominant form of warfare throughout the Middle Ages. Battles in the open field were comparatively rare, especially those involving large armies, and as a result medieval rulers routinely devoted extensive human and material resources to both defending and capturing fortresses and fortified cities.[1] One of the most distinctive aspects of siege warfare was the deployment of various types of artillery used by medieval soldiers to crush town and castle walls, wreak havoc on their defenders and devastate their material assets within the defensive works. Despite the prominence of artillery in both contemporary sources and in the works of modern scholars, however, there remains much confusion about the types of machines in use. The burden of this study is to provide an examination of the types of artillery that were built and deployed by the royal government of England during the period 1189–1307.

Specialists in the history of military technology have long recognised that it is exceptionally difficult to identify the types of artillery used by medieval armies on the basis of descriptions found in narrative sources, most of which were written by clerics, or even from images produced by illuminators.[2] In particular, specialists have noted two significant

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1. The observation by J. B. Gillingham, 'Richard I and the Science of War in the Middle Ages', in J. B. Gillingham and J. C. Holt (eds), *War and Government in the Middle Ages* (Woodbridge, 1984), 78–91, that King Richard engaged in a battle-avoiding rather than a battle-seeking strategy over the course of his career is generally applicable to the kings of England from the mid-twelfth to the early fourteenth century. Concerning the general point that sieges dominated medieval warfare, see Jim Bradbury, *The Medieval Siege* (Woodbridge, 1992).

2. Randal Rogers, *Latin Siege Warfare in the Twelfth Century* (Oxford, 1992), 251–73 provides an invaluable introduction to the problems inherent in identifying artillery types on the basis of discussions in narrative texts and manuscript illuminations. In particular, Rogers (254–60) notes the dispute between G. Köhler, *Die Entwicklung des Kriegswesens und der Kriegführung in der Ritterzeit von Mitte des 11 Jahrhunderts bis zu den Hussitenkriegen* (3 vols, Breslau, 1886–90), iii, 154, 159, and R. Schneider, *Die Artillerie des Mittelalters* (Berlin, 1910), 60–1 concerning the survival of torsion artillery as contrasted with lever artillery into the Middle Ages. Relying on the same body of narrative sources, Köhler and Schneider came to diametrically opposed conclusions with Köhler arguing that medieval armies continued to use torsion engines into the twelfth century and Schneider concluding that engines employing the lever were introduced in the ninth century. See also the recent survey of the literature in Paul E. Chevedden, Zvi Shiller, Samuel R. Gilbert and Donald J. Kagay, 'The Traction Trebuchet: A Triumph of Four Civilizations', *Viator*, xxxi (2000), 433–86, at 433–6. Peter Dinzelbacher, 'Quellenprobleme bei der Erforschung hochmittelalterlicher Bewaffnung', *Mediaevistik*, ii (1989) 43–79, at 46–61, emphasises the particular problems inherent in using contemporary images of weapons to draw conclusions about their construction.

problems that caused the authors of medieval narrative sources as well as contemporary artists to provide vague and even inaccurate descriptions of artillery. First, the authors and artists were frequently ill-informed about the technical aspects of engines, even if they were familiar with the fact that these engines were used in sieges.[3] Secondly, medieval authors, in particular, frequently allowed their knowledge of Roman and Late Antique texts to influence their description of contemporary events, so that even if they were familiar with specific aspects of contemporary artillery, these authors nevertheless did not provide accurate descriptions of these engines.[4] Despite these difficulties, however, scholars have relied almost entirely on these two types of source, namely narrative descriptions and manuscript images, to draw conclusions about the types of artillery employed by medieval armies.[5]

This approach can be explained, at least in part, for the period before 1200 by the relative dearth of documents that could shed light on the types of artillery built by medieval governments. In the period after 1200, however, the numbers of surviving administrative documents dealing with the production, storage, transportation, repair and use of artillery grows exponentially. This is particularly true in England where the government produced hundreds of thousands of documents over the course of the thirteenth century, many tens of thousands of which survive. By and large, however, specialists in medieval military technology have either ignored the existence of these documents or dismissed them wholesale as incapable of shedding light on the many questions surrounding the types of artillery employed by medieval governments.[6] This tendency is particularly unfortunate because the surviving administrative documents, as contrasted with the narrative texts noted above, were produced either by royal officers intimately familiar with the construction of various types of artillery or by royal clerks who copied or redacted documents produced by these officers. Administrative records therefore can be understood as the work product

3. On this point, see Dinzelbacher, 'Quellenprobleme'; and Bradbury, *Medieval Siege*, 251.

4. See Rogers, *Siege Warfare*, 251.

5. In this regard, see, for example, Köhler, *Entwicklung*; Schneider, *Artillerie*; Kalervo Huuri, *Zur Geschichte des mittelalterlichen Geschützwesens aus orientalischen Quellen* (Helsinki, 1941); J.-F. Finó, 'Machines de Jet médièvales', *Gladius*, x (1972), 25–43; and idem, *Forteresses de la France médiévale: Construction–Attaque–Défense* (3rd edn, Paris, 1977), 150–8; Donald R. Hill, 'Trebuchets', *Viator*, iv (1973), 99–115; David C. Nicolle, *Arms and Armour of the Crusading Era 1050–1350* (New York, 1988), *passim*; Kelly DeVries, *Medieval Military Technology* (Petersborough, 1992), 133–8; Bradbury, *Medieval Siege*, 250–5; Emilie Amt, 'Besieging Bedford: Military Logistics in 1224', *Journal of Medieval Military History*, i (2002), 101–24.

6. Even Michael Prestwich, the leading specialist in thirteenth-century English military-administrative history, is hesitant in his use of documents to identify artillery types, relying instead on narrative accounts. See, for example, Michael Prestwich, *Armies and Warfare in the Middle Ages: The English Experience* (Yale, 1996), 288.

of experts in contemporary artillery construction.[7] In contrast to traditional scholarly practice, therefore, this study brings to bear a vast corpus of surviving administrative documents, both printed and unprinted, to discuss the types of artillery built and deployed by the royal government of England during the long century between the accession of King Richard I and the death of Edward I.[8]

Although there is still some controversy on this point, most specialists now agree that by the thirteenth century, engineers had available three different means for propelling projectiles. These were torsion, tension and lever-action.[9]

1. Torsion engines provided lift to their projectiles through the transformation of potential energy stored in twisted fibrous material, ranging from gut to horsehair and hempen rope, into kinetic energy that drove a wooden beam. The wooden beam, which could be equipped with a basket attached directly to the beam, or with a sling attached to its end, then transferred this kinetic energy to a projectile, usually a stone, located in the basket or sling.[10]
2. Tension engines used the same principle as hand-held bows and crossbows, transferring the potential energy of the bow to the projectile, usually a long thin shaft equipped with an iron head, which looked like a large arrow or crossbow bolt.[11]
3. Engines employing the lever principle were essentially long beams fixed to a fulcrum. The front, shorter end of the beam, that is, the end closest to the target, was the target end, and the back longer end was the projectile end, because the projectile was attached there. Energy was generated by the rapid descent of the target end and the concomitant rapid rise of the projectile end. There were two means of causing the rapid descent of the target end. The first method was to have a large number of well-trained men pull down, in unison, on ropes attached to the target end. Engines employing this

7. Some scholars have questioned the reliability of the royal clerks who were assigned the duty of copying into the permanent records of the royal government those texts produced by the officers in charge of producing and keeping in repair the king's artillery. See, for example, Maurice Powicke, *The Loss of Normandy 1189–1204: Studies in the History of the Angevin Empire* (2nd edn, Manchester, 1960, repr. 1999), 224–5. However, an exhaustive survey of all of the surviving royal administrative records dealing with arms production makes it clear that when an original document, issued by an officer in charge of producing or repairing artillery, survives and can be compared with a later redaction of this document by a royal clerk, the later redaction maintains both the content and the terminology employed in the original text. See below, and David S. Bachrach, 'Crossbows for the King: The Crossbow during the Reigns of John and Henry III of England', *Technology and Culture*, xxxxv (2004), 102–19; and idem, 'The Royal Crossbow Makers of England, 1204–1272', *Nottingham Medieval Studies*, xxxxvii (2003), 168–97.

8. For a full discussion of these sources, see David S. Bachrach, 'The Military Administration of England: The Royal Artillery (1216–1272)', *Journal of Military History*, lxviii (2004), 1083–1104, esp. 1085–6.

9. See Rogers, *Siege Warfare*, 254–73; and Paul E. Chevedden, 'Artillery in Late Antiquity: Prelude to the Middle Ages', in Ivy A. Corfis and Michael Wolf (eds), *The Medieval City under Siege* (Woodbridge, 1995), 131–73, at 131–8.

10. E. W. Marsden, *Greek and Roman Artillery: Historical Development* (Oxford, 1969), 16–33.

11. Ibid., 5–12.

method have been identified by scholars as a 'traction type'. The second method used to cause the rapid descent of the target end was to attach a very heavy weight to it. The projectile end, in this type of engine, although substantially longer was therefore much lighter than the target end. In order to use this engine, the artillerymen had to drag down the projectile end and secure it. After it was loaded, the projectile end was set free and the much heavier weight on the target end fell rapidly and caused the projectile end to rise rapidly with the result that the projectile was sent on its way. Engines equipped with weights on their target ends have been designated by scholars as 'counterweight' lever engines.[12]

The English royal government produced two types of tension-powered engine during the thirteenth century. Both of these shot long bolts or arrows called *quarelli*.[13] The first of these engines, known as the *balista*, was essentially a large crossbow. In fact, royal clerks and other government officials used the term *balista* to refer to both hand-held crossbows and light artillery that used the same means of propulsion.[14] As a result, it is sometimes difficult to ascertain in these sources whether a *balista* being discussed in a government document is a hand-held weapon or a piece of light artillery. In most cases, however, it is possible to make this determination from the context provided by the surviving documents. For example, when on 25 November 1287, the Exchequer received orders from the Chancery to pay Thomas de Veffinis, the sheriff of Canterbury, for the production of sixty-eight *balistae*, it is almost certainly the case that the text is describing crossbows rather than engines.[15] Here, the sheer number of weapons under consideration makes it very unlikely that these *balistae* were artillery pieces. In other documents, the government officials are ordered to produce or purchase particular types of *balista* that only can have been crossbows. *Balistae ad unum pedem* and *balistae ad duos pedes*, for example, can only refer to crossbows and not to engines, since the foot in the 'one-foot' and 'two-foot' refers to a metal stirrup attached to the back side of the bow of hand-held weapons.[16]

In other cases, the context in which a *balista* is deployed makes it clear whether we are dealing with a piece of artillery or a crossbow. For example, a writ of *liberate* issued in 1298 notes that the sheriff of

12. Rogers, *Siege Warfare*, 266–9, provides a valuable discussion of the types of lever engines in use up to 1200. Also see Chevedden *et al.*, 'Traction Trebuchet', *passim*.

13. The term *quarellus* also was used by royal clerks and other royal officers to designate the ammunition for crossbows.

14. The term *balista* originally had been used by Roman authors to refer to a two-armed torsion, stone-throwing engine. By the fourth century, however, the term had come to be used for engines that had the shape and means of propulsion of very large crossbows. See Rogers, *Siege Warfare*, 264. Also see on this point, Bradbury, *Medieval Siege*, 250. On the double meaning of *balista* in English administrative sources, see Ralph Payne-Gallwey, *The Crossbow* (1903, repr. 1958), 301–8; Kelly Devries, *Military Technology*, 132; Bachrach, 'Crossbows for the King', 103.

15. C62/64, 1r. Chancery records in the National Archives.

16. On this point, see Bachrach, 'Crossbows for the King', *passim*.

Northumberland had expended resources in building a parapet (*bretagium*) on the wall of Newcastle upon Tyne in which to place a device (*ingenium*) that could span *balistae*.[17] In this case, the building of a platform on the wall to hold a piece of equipment that could be used as part of a *balista* indicates that the latter was itself of substantial size and, therefore, not a hand-held weapon. In still other documents, the use of the adjectives *magna* or *gros* can sometimes indicate that a particular *balista* is a piece of artillery rather than a hand-held crossbow. An account of the expenses undertaken by the mayor and bailiffs of Newcastle in 1304 in shipping military supplies to the siege of Stirling Castle includes the cost for transporting two *balistae magnae* and the winches (*ingenia*) used for spanning them.[18] The use of an entire wagon to transport two *balistae* suggests that they were pieces of artillery rather than small hand-held weapons. Moreover, if these had been hand-held weapons, we would expect to see the terms *turnus* or *vica*, invariably used by royal clerks to denote the winches used to span crossbows, rather than the term *ingenium*, the word used for the winches designed to span artillery.[19]

The use of the adjective *magna/gros* in an administrative document, however, does not prove that a *balista* was an artillery piece. In 1297, for example, the ship's captain William Kingston issued a receipt for arms delivered to his ship, *La Plente*, which included twenty-four crossbows of the 'one-foot' type, twelve crossbows of the 'two-foot' type and finally twenty-four *arbalastes gros de tourn*, meaning twenty-four large crossbows equipped with winches. The identification of the last named *arbalastes* as crossbows rather than as artillery pieces is indicated first by their inclusion in a list of what are clearly crossbows, and second by the fact that a single ship could hardly transport twenty-four pieces of artillery while fully loaded with other arms, food supplies, and water.[20]

Finally, some documents list materials used in the construction of *balistae* that can refer only to the larger artillery pieces rather than to hand-held weapons. The *Pipe Roll* account for 1214, for example, records that Richard de Marisco, the bishop of Durham, was credited for his expenditures on iron (*ferrum*) and cables (*cablae*) used in the production of *balistae*.[21] Hand-held crossbows did not require either

17. C62/74, 5r.

18. C47/22/4, #38.

19. By 1261, the royal government had developed replaceable spanning devices which could be detached from one crossbow and attached to another. The terms used to describe these winches were *turnus* and *vica*, sometimes written as *viz* or *vicia*. See, for example, *Close Rolls of the Reign of Henry III* (14 vols, 1902–38), xi, 449; E213/118 and E101/7/1, #7.

20. E101/6/20/14. These supplies included 300 quarters of unmilled wheat, 20 tuns of milled wheat, three springalds (engines to be discussed below), sixty-four cases of crossbow quarrels, as well as the crossbows noted above.

21. *The Great Roll of the Pipe for the Sixteenth Year of the Reign of King John Michaelmas* 1214 (*Pipe Roll 60*), ed Patricia M. Barnes (1962), 106.

iron or cables in their construction, although crossbow quarrels did have iron heads.

The second type of dart-throwing artillery piece produced by the royal government was called *springaldus* or *espringale* in those records that were written in French.[22] The first reference to a *springaldus* that I have found in the surviving administrative sources appears in an inventory of arms issued on 13 February 1278 by Robert Warren, then serving as the royal commander (*constabularius*) of Stirling Castle.[23] According to the constable, the castle at Stirling had in stock several artillery pieces including one *springaldus* with all of its equipment (*attilia*), and two *springaldi* that did not have ropes or the remainder of their equipment. This text makes clear that the *springaldus* was a spear-casting rather than a stone-throwing engine. Alongside the three *springaldi*, Robert Warren reported that the depot at Stirling contained 150 'quarelli pennati pro springaldis', that is, feathered quarrels for springalds.[24] A similar reference to the ammunition used by *springaldi* survives in a document issued on 4 February 1303 by John of Cambridge, the outgoing sheriff of Northumberland. According to John's memorandum, he handed over a *springaldus* with 400 *quarelli* to his successor when the latter took office in January 1303.[25]

This memorandum is of particular interest from an administrative perspective because its content is confirmed by two subsequent documents each of which used the same terminology for the transferred equipment that is found in John of Cambridge's text. First, a clerk named Adam de Benton, who worked for the incoming sheriff of Northumberland, wrote out a memorandum stating that his lord had received the *springaldus* along with the 400 *quarelli*.[26] Adam de Benton's text was then confirmed by the royal clerk John de Kingham, who worked for the royal wardrobe, which served as a clerical clearing house for much of the military expenditure made by Edward I's government.[27] John de Kingham's text also states that the transfer of one *springaldus* and 400 *quarelli* took place. It should be noted that in each of the three documents under consideration here, each written by a separate clerk in a different office, the term *springaldus* continued to be used, strongly suggesting that it was understood by all three men as a *terminus technicus*.

It is not a simple matter to tease out a basic description of the *springaldus* from the surviving administrative records. Two surviving

22. According to Prestwich, *Armies and Warfare*, 291, *springaldi* were huge crossbows mounted on wheeled frames. Bradbury, *Medieval Siege*, 253, suggests that the *springaldus* may have been a type of *mangonellus*, and therefore a torsion engine rather than a spear-throwing tension engine.
23. E101/14/27. Excheques records in the National Archives.
24. E101/14/27.
25. E101/579/6, 1r.
26. Ibid., 3r.
27. Ibid., 1r.

documents, however, shed light on this question. An inventory of the arms, issued to the royal officer John Kirkeby from the magazine at Newcastle upon Tyne in 1300, lists three *cordae ad tendendum archum springaldi*.[28] Clearly, this text indicates that a springald was equipped with a bow (*archus*) which was to be spanned (*tendere*) when shot. The second document, an account issued in 1303 dealing with the military expenses of the Sheriff John Cambridge of Northumberland, notes that he purchased bows (*arcus*) to be used in the construction (*operandum*) of several *springaldi*.[29] It therefore seems clear that, at least superficially, the *springaldi* resembled the large, tension-powered *balistae* that had been deployed by the English government since at least the late twelfth century. Unfortunately, unless further information regarding the appearance of the English *springaldi* can be identified, it must remain an open question whether the springald was a type of *balista*, or differed from the *balista* in some significant manner that is not evident in the surviving administrative sources.

In contrast to the general scholarly agreement that tension engines were in use throughout the Middle Ages, including in twelfth- and thirteenth-century England, considerable controversy, as noted above, still remains about the deployment of both torsion and lever artillery. Indeed, this uncertainty extends to the meaning of the terms employed by medieval authors of narrative sources to designate different types of artillery. In considering the administrative evidence for England, it is clear that by the reign of Richard I, royal scribes routinely discussed two types of stone-throwing artillery. These were *petrariae* and *mangonelli*.[30]

Both *mangonelli* and *petrariae* were equipped with slings made of leather that were suitable for throwing stones rather than spears or large arrows. Numerous documents make reference to these slings. In 1194, for example, the constable of Windsor Castle was credited at the Exchequer for the funds he expended to repair hides (*coria*) used to make slings (*fundae*) for use on the *mangonelli* being stored in the magazine at Windsor.[31] The same account notes that the royal engineer

28. E372/145, 2v.

29. E101/579/6.

30. It is clear that these terms were used to refer to two distinct types of artillery since a very large number of documents refer to the production of both of them side by side. Amt, 'Besieging Bedford', 109, stresses that *petrariae* and *mangonelli* were different types of engine. For examples of orders issued to produce both *mangonelli* and *petrariae*, see *The Great Roll of the Pipe for the Fifth Year of the Reign of King Richard the First Michaelmas 1193* (*Pipe Roll 39*), ed. Doris M. Stenton (1927), 69, 74, 141; *The Great Roll of the Pipe for the Sixth Year of the Reign of King Richard the First Michaelmas 1194* (*Pipe Roll 40*), ed. Doris M. Stenton (1928), 95, 251; *The Great Roll of the Pipe for the Tenth Year of the Reign of King Richard the First Michaelmas 1198* (*Pipe Roll 44*), ed. Doris M. Stenton (1932), 76; *Rotuli litterarum clausarum in turri Londonensi asservati 1204–1227*, ed. Thomas D. Hardy (2 vols, 1833–4) [hereafter *CR I* and *CR II*] *I*, 82, 87, 108, 123, 138, 191, 448, 449, 617; *CR II*, 98, 198; *C[alendar of] L[iberate] R[olls] 1226–1272* (1916), *CLR 1226–1240*, 44; E372/75, 2 v.

31. *Pipe Roll 40*, 176.

Urric also was credited for the payments he made to have hides repaired for use in the *petrariae* stored at Windsor. Similarly, the Norman Exchequer accounts for 1198 record the use of hides in the production of *petrariae*, specifically for the making of slings (*fundae*).[32] On 12 April 1221, during the reign of Henry III, the English Chancery issued a writ to the barons of the Exchequer instructing them to credit the account of the royal officer Fawkes de Breauté for the expenses he had undertaken at the request of the crown. These included the purchase of two white hides which were to be used to make slings (*fundae*) for the king's *petrariae* and *mangonelli*.[33]

The fact that these slings were used to throw stones is confirmed by the purchase of stone ammunition for use in *petrariae* and *mangonelli*. The *Pipe Roll* account for 1193 notes that the sheriff of Buckingham and Bedford was credited at the Exchequer for the money he paid to William de Semeilli for having transported stones to Winchester for use by the *petraria* and the other stone-throwing machines (*alia ingenia*) stored there.[34] Moreover, archaeological research at Bedford Castle, which was the site of a siege in 1224 in which both *petrariae* and *mangonelli* were employed, has brought to light a large number of stones that appeared to have been 'shot' by these engines.[35]

In light of the consistent distinction drawn by royal clerks between *petrariae* and *mangonelli*, it seems reasonable to conclude that they were different types of artillery. Thus, it must be asked whether these same sources shed light on the particularities of each type of machine. Just as importantly, it is necessary to consider whether the surviving documents indicate whether the *mangonelli* and *petrariae* were torsion or lever-powered engines.[36] One very important piece of evidence that may illuminate the difference between the two types of artillery is contained in a writ issued on 14 October 1225 by the Chancery to the Exchequer. This Chancery writ ordered the barons of the Exchequer to credit the account of the sheriff of Bedford for his expenses during the siege of Bedford Castle. These expenses included fifty slings for *petrariae* and *mangonelli*. Much more significant in the present context, however, is the record of the sheriff's purchase of 'two circles of iron used in making winches (*turnus*) for *mangonelli*'.[37] Normally, when royal clerks used

32. *Magni rotuli scaccarii normanniae sub regibus anglie*, vol. ii, ed. Thomas Stapleton (1844), 464.

33. *CR I*, 452, 'v s. et vi d. quos posuit in duobus coriis albis emptis apud Northampton ad fundas petrariarum et mangonellorum nostrorum facias per preceptum nostrum'.

34. *Pipe Roll 39*, 141. The question of what these *alia ingenia* are is dealt with in detail below.

35. On this point, see Amt, 'Besieging Bedford', 111, n. 47.

36. Amt, 'Besieging Bedford', 109 is of the view that most or all of the *mangonelli* and *petrariae* employed at the siege of Bedford were traction trebuchets, meaning lever-action artillery. The fact that both types were sling-equipped stone-throwers does not shed light on the latter question, because both torsion and lever engines were stone-throwers and could be equipped with slings.

37. *CR II*, 65, money spent 'in duobus circulis ferri ad turnos mangonellos'. Amt does not mention this text.

the term *turnus*, they were dealing with crossbows equipped with a winch that was used to span them.[38] In this case, however, it seems clear that a weapon equipped with a sling would not be spanned in the manner of a crossbow, that is a tension-powered weapon. The likeliest explanation is that the *turnus* mentioned by the royal clerks was a mechanical winch that could be used to draw down the lever of the *mangonellus* into its firing position.[39]

If this interpretation of the use of the *turnus* on the *mangonelli* employed at Bedford in 1224 is correct, then we can exclude the possibility that *mangonelli* were traction lever engines. Traction lever engines required a team of pullers to shoot because the projectile end (the back end) was much longer and, therefore, heavier than the target or front end (the end closest to the target). This means that the natural resting position of the projectile engine was down on the ground. The pullers were necessary to bring the target end down towards the ground and the projectile end up in the air. Under no circumstances would it ever be necessary for a traction lever engine to have a winch to bring down the projectile end, since the natural resting place of the projectile end was down. The winch would also be useless on the target end since this end had to be brought down with great velocity, hence the team of pullers, rather than being slowly winched down with a *turnus*.

This leaves two possibilities for the identification of the construction of the *mangonellus*. It must have been either a counterweight lever engine or a torsion engine. In the surviving administrative records that deal with the construction of *mangonelli*, I have found frequent references to hides, wood and iron fittings, but no references to counterweights.[40] It therefore seems reasonable to suggest that *mangonelli* were not supplied with counterweights and that they were, in fact, torsion engines.[41] This means that the *mangonelli* worked essentially on the 'rubber-band' principle. The arm of the *mangonellus*, having been drawn back by a winch (*turnus*) against the twisted fibrous material, whether gut or horsehair, shot its load when it was released.

This leaves the identification of the *petrariae* deployed by Richard and John. Given that the *petraria* was a stone-thrower, the possibility that it was a tension engine can be excluded because tension engines shot only long bolts or spears. This still leaves the problem of whether the *petraria* was a torsion or lever engine. The first possibility is that the *petrariae* and *mangonelli* were both torsion engines different only in the means by which they were drawn into the firing position; the *mangonelli*

38. Bachrach, 'Crossbows for the King', *passim*.

39. See, for example, the image of a *mangonellus* equipped in this manner in Bradbury, *Medieval Siege*, 253.

40. In fact, I have found no specific references to materials used in counterweights before 1245. See *CLR 1240–1245*, 245.

41. See Bradbury, *Medieval Siege*, 253.

through a mechanical device and the *petrariae* by hand. This seems unlikely, however, for one major reason. As noted above, the royal clerks, and particularly the royal officers in charge of building both the *mangonelli* and *petrariae*, consistently treat them as entirely different types of artillery. The terms *mangonellus* and *petraria* are never used as synonyms. This is not what one would expect if *mangonelli* and *petrariae* were fundamentally the same type of engine differing only in the means by which they were brought into a firing position. If we consider briefly the vocabulary used by royal clerks when dealing with crossbows this point becomes very clear. Some crossbows were equipped with a mechanical spanning device called a *turnus*, and others, the 'one-foot' and 'two-foot' types mentioned above, were spanned by hand.[42] Royal clerks and officials nevertheless called all of these weapons *balistae*. In the view of the royal officials responsible for writing about the king's armaments, *balistae* equipped with different types of spanning technology were still the same kind of weapon. Given this administrative reality, it seems unlikely that a mere difference in the manner in which *petrariae* and *mangonelli* were spanned, that is drawn into firing position, would have led royal officials to use two entirely different terms for these types of artillery.

Consequently, the second possible identification for the construction of the *petrariae* is as lever artillery, would seem to be more likely. In this context, it must first be emphasised that *petrariae*, like *mangonelli*, were produced regularly in England during the reign of Richard I (1189–99), more than two decades before the first reported introduction of a counterweight engine into England in 1216, during the invasion of the island by Prince Louis of France.[43] Second, as is true of the *mangonellus*, the surviving administrative sources make frequent references to the materials used in the construction of *petrariae*, but make no mention of counterweights. This is a strong indication that *petrariae* were not equipped with counterweights. These factors combined indicate that it is unlikely that *petrariae* were counterweight lever engines. The only remaining plausible identification of the *petraria*, therefore, is as traction lever artillery, that is, artillery powered by teams of pullers on the target end. Happily, this conclusion fits well with the accounts of contemporary chroniclers who comment on the large number of men mobilised to operate the *petrariae* at the siege of Bedford Castle in 1224.[44]

If we can draw the tentative conclusion that *mangonelli* and *petrariae* were, respectively, torsion and traction lever engines, it is clear that not all *petrariae* and *mangonelli* were built to the same specifications. By

42. Bachrach, 'Crossbows for the King', *passim*.

43. Prestwich, *Armies and Warfare*, 289; John France, *Western Warfare in the Age of the Crusades 1000–1300* (1999), 122–3.

44. On this point, see *Annales Monastici*, ed. Henry Richard Luard (1864–9), iii, 86–7, and the commentary on this text by Amt, 'Besieging Bedford', 109–10.

1211, royal clerks begin to make reference to 'Turkish' *petrariae*.[45] In this year, for example, royal officers in charge of the vacant see of Durham were credited by the Exchequer for the expenses they incurred in producing four *petrariae*. The first two weapons are characterised as large (*magnae*) and the latter two are characterised as 'Turkish'.[46] It would seem to be a reasonable interpretation that the 'Turkish' *petrariae* were smaller weapons. The production by royal officers of two different types of *petraria* characterised by their different sizes is confirmed in an order issued to the royal officer Peter de Maulay on 9 March 1214.[47] Peter was ordered to purchase ropes (*cordae*) suitable for both small (*parvae*) and large (*magnae*) *petrariae*.[48]

'Turkish' missile weapons appear several times over the next 2 years in the surviving royal administrative records. On 2 August 1212, the Chancery issued a writ to Philip Mark, the sheriff of Nottingham, informing this officer that two master carpenters named Nicholas and Ralph, along with a team of assistants (*socii*) are being sent to him to build 'duas petrarias turkesias'.[49] Philip Mark received credit for the expenses he incurred in building these weapons which were recorded in the *Pipe Roll* account for 1214.[50] Evidently, 'Turkish' was used as an administrative *terminus technicus* by both Chancery and Exchequer clerks. On 2 May 1216, the Chancery issued a writ to Roel Bloet, the royal keeper of the forest at Knap (Sussex), informing him that Nicholas was being sent to produce as many *petrariae turkesiae* as possible. Once the *petrariae* were completed, Roel was ordered to send them along with their ropes (*funes*) and other equipment (*attilia*) to Dover.[51] In 1216, for the first time in the surviving administrative records, the adjective 'Turkish' was applied to the weapon known as a *mangonellus* rather than to *petrariae*. The *Pipe Roll* for 1216 includes the administrative account submitted by Brian de L'isle for his expenses as commander of the fortress of Cnaresburgh in Yorkshire.[52] These expenses included the pay of five master carpenters who constructed two *petrariae* and 'tres mangunellos turkesios'.[53]

Thus far, the discussion of torsion and lever engines produced under King Richard and John, and in the first decade of Henry III's reign has

45. David C. Nicolle, *Arms and Armour of the Crusading Era 1050–1350* (New York, 1988), 212, suggests that 'Turkish' engines, specifically 'Turkish' *mangonelli*, may be considered a simpler design in use by nomads.

46. *The Great Roll of the Pipe for the Thirteenth Year of the Reign of King John Michaelmas 1211* (*Pipe Roll 57*), ed. Doris M. Stenton (1953), 39.

47. *CR I*, 141.

48. Ibid., 'quod emere faciat cordas tam ad parvas petrarias quam ad magnas usque ad summam xx libr. Pictavie'.

49. *CR I*, 122.

50. *The Great Roll of the Pipe for the Sixteenth Year of the Reign of King John Michaelmas 1214* (*Pipe Roll 60*), ed Patricia M. Barnes (1962), 156.

51. *CR I*, 267.

52. *Pipe Roll 17 John*, ed. R. A. Brown (1964), 13.

53. Ibid.

focused on *petrariae* and *mangonelli*. However, royal clerks in this period (1189–*c.*1225) routinely employed a third term for stone-throwing artillery, namely *ingenium*. It would appear, however, that the term *ingenium* referred not to a third type of artillery, but rather was used as a synonym, at least down to 1225, for *mangonellus*. Throughout the reigns of both Richard and John, the royal clerks consistently contrast the *petrariae* with the *ingenia*. As noted above, the *Pipe Roll* for 1193 deals with the purchase of stones to be used as ammunition for the king's *petrariae* and *alia ingenia Regis*.[54] This same pattern of contrasting *petrariae* with *ingenia* appears in numerous documents. For example, Ralph, the son of Stephen, is credited at the Exchequer in the Surrey *Pipe Roll* account of 1193 with providing hides and iron for constructing two *petrariae* and for transporting wood for the construction of *ingenia*.[55] In 1194, Reginald Basset was credited at the Exchequer for the expenses he incurred in transporting *petrariae* and *plurima ingenia* to the army at Nottingham.[56] In the same year, the royal engineer Urric was authorised to receive reimbursement for the money he spent on ropes for *ingenia* and *petraria* stored at Nottingham Castle.[57] In March 1221, the royal officer Alexander of Sawbridgeworth was credited at the Exchequer for the money he spent on having the master engineer William build *ingenia* as well as for the money he spent having ropes purchased for the king's *petrariae*.[58]

By contrast, the surviving administrative documents from the reigns of kings Richard, John and Henry III down to the year 1225, do not contrast the term *mangonellus* with the term *ingenium. Mangonelli* appear in the royal documents either alone or in conjunction with *petrariae*.[59] It therefore seems reasonable to draw the inference that up to 1225, royal clerks used the terms *ingenium* and *mangonellus* as synonyms for torsion-powered stone-throwing artillery as contrasted with the *petrariae*, which were traction lever engines that used pullers.

The *mangonellus* appears to have remained in service throughout most of Henry III's reign. In August 1227, for example, the master carpenters Thomas and Nicholas began production of three *mangonelli* at the

54. *The Great Roll of the Pipe for the Fifth Year of the Reign of King Richard the First Michaelmas 1193* (*Pipe Roll 39*), ed. Doris M. Stenton (1927), 141.

55. Ibid., 154.

56. *Pipe Roll 40*, 43.

57. Ibid., 176.

58. *CR I*, 453.

59. The single instance in the period 1189–1225 in which I have found the term *mangonellus* being used in conjunction with the term *ingenium* is from Chinon, in Normandy. On 30 May 1200, the provost of Chinon was issued orders to obtain sufficient supplies of wood for the master carpenter Urric to build *petrariae*, *mangonelli* and *ingenia nostra*. See *Rot[uli] Norm[annie in Turri Londinensi Asservati Johanne et Henrico Quinto Anglie Regibus]*, ed. Thomas D. Hardy (1835), 24. The fact that this order was issued in Normandy rather than England may explain the difference in terminological usage.

forest of Trivel.[60] In March 1235, two *mangonelli* were shipped from storage in Winchester to Porcester for use in Gascony.[61] An inventory of Corfe Castle, conducted in 1252, found two *mangonelli* stored there.[62] Elyias de Rayban, who carried out the inventory, subsequently obtained supplies sufficient to construct two additional *mangonelli* at Corfe in the same year.[63] In his expense report for Rochester Castle in 1264, submitted to the Exchequer, Roger Leyburn, the constable, recorded that he had purchased three ropes for the *mangonellus* stored there.[64]

After 1264, however, *mangonelli* no longer appear in the surviving English administrative records. The absolute silence of sources that previously included frequent references to the production, repair, storage, maintenance and transport of *mangonelli* must be given serious consideration. If *mangonelli* continued to be produced and used after 1264, why are they no longer mentioned under this *titulus* by the men who were responsible for building, storing and most importantly, paying for them? There are two likely possibilities. The first is that the royal government introduced a new term to designate these torsion engines. But no new terms appear in the royal records in 1264, or at any point after that year through the end of Edward I's reign (1307), that could conceivably have been used to denote torsion engines. The other, more likely, possibility is that after 1264, the government ceased to purchase new *mangonelli* and no longer repaired those that survived in royal arsenals and magazines.

As noted above, *petrariae* were produced in large numbers during the first decade of Henry III's reign, and they were deployed in the sieges of Bytham (1220) and Bedford (1224). The royal government appears, however, to have ceased deploying *petrariae* in significant numbers by the mid-1220s, and completely phased them out of service by the mid-1230s. The final reference to a *petraria* that I have found in the surviving royal documents is a report in the *Pipe Roll* account for 1236 dealing with the lands of the Clare family which records that the royal carpenter Peter and his team of assistants (*socii*) had cut forty planks (*virgae*) for use in the repair of the king's *mangonelli* and *petrariae*.[65] As was the case with respect to *mangonelli*, it seems that the disappearance of the term *petraria* from royal records did not result from a decision to call these engines by another name. No other new terms for artillery appear in the royal records in 1236 or, indeed, at any point up to the 1240s.[66] Rather,

60. *CR II*, 198.
61. *C[alendar of Close] R[olls] 1272–1307* (1900–8); *CR 1234–1236*, 65.
62. C47/2/1.
63. C47/2/1/4.
64. E101/3/3, 2r.
65. E372/80, 1r.
66. Beginning in *c.*1241, the royal records begin to deal with an engine called a *blida*. This type of artillery will be discussed in detail below.

the disappearance of *petrariae* from the royal administrative records likely was caused by the decision of the government to phase out use of these traction lever engines in favour of the newer and better counterweight engine known to modern scholars as the trebuchet.

The English term trebuchet is frequently used by scholars in a generic manner to refer to all large lever engines whether of the traction or the counterweight type.[67] In this discussion, however, the English term trebuchet will be reserved for a specific type of counterweight lever engine introduced into England in 1225. It will be argued that the Latin term *trubechetum* was used by English royal clerks to denote a relatively small type of counterweight lever artillery. Larger counterweight lever engines, of the type often described by scholars in English as trebuchets, were, in fact, denoted by royal clerks and officers as *blidae*.[68] To complicate matters even further, in the decades after 1245 until the end of Edward I's reign in 1307, royal clerks generally used the generic term *ingenium* to denote both *trubecheta* and *blidae*, so that distinguishing between the two types depends on the context in which they are mentioned.

The first indication in the surviving administrative records that the royal government had begun to deploy counterweight lever artillery in England is an order issued to the Exchequer by the Chancery on 19 April 1225 authorising the master carpenter Jordan to receive 6 marks, in partial payment of his wages, for work on the king's *trubechetum* at Dover Castle.[69] Jordan appears numerous times in the surviving royal records between 1225 and 1230 working on the king's trebuchets.[70] On 19 September 1225, for example, the Chancery issued orders to Adam de Bedenges, the royal forester at Odiham, to send two logs to Winchester.[71] The wood was to be delivered to Jordan so that he could make two beams for the king's *trubechetum* that he was building at the castle there.[72] By 8 June 1226, Jordan was building another *trubechetum*, this time at Windsor Castle, where he received 3 marks in partial payment of his wages.[73] Windsor subsequently became Jordan's centre of operations as he appears serving there regularly until the end of 1229.[74]

In addition to being described by the clerks as the man who built the king's *trubecheta*, Jordan was also accorded the title *trubechetarius*, that

67. Rogers, *Siege Warfare*, 266–7, suggests that it is possible, at least in English, to use trebuchet as a generic term for lever artillery. France, *Western Warfare*, 119–24, also uses trebuchet as a generic term for all lever engines, including both traction and counterweight artillery.

68. These *blidae* will be discussed in the next section.

69. *CR II*, 31.

70. Jordan last appears in the surviving administrative records on 28 Feb. 1230. See *CLR 1226–1240*, 169.

71. *CR II*, 62.

72. Ibid.

73. *CR II*, 119.

74. See *CLR 1226–1240*, 8, 26, 94, 128, 138.

is, the king's trebuchet builder.[75] Jordan is the only man to be called *trubechetarius* by the royal clerks during the reigns of both Henry III and Edward I. Other specialists in the construction of counterweight lever artillery were called either engineer (*ingeniator*) or master carpenter (*magister carpentarius*). Not even Jordan's successors in the building of *trubecheta* were called *trubechetarius*. On 15 December 1233, for example, the royal officer Nicholas de Molis was issued orders by the Chancery to provide lumber from the Forest of Dean to Master Nicholas, *carpentarius regis*, and his team of assistants (*socii*) so that they could build the king's *trubechetum* there.[76]

The concomitant introduction of a new term for artillery (*trubechetum*) and a special appellation (*trubechetarius*) for the man who was in charge of building these new *trubecheta*, suggests that royal clerks were dealing with an entirely new type of artillery. But what type of artillery was this? As will be argued below, it seems likely that the *trubechetum*, as contrasted with the *petraria*, was a counterweight lever engine and not a traction lever engine.

The one major impediment to this interpretation is the lack of evidence for counterweights in the surviving administrative sources for the 1220s and 1230s. The first specific reference in these sources to the purchase of materials, namely large quantities of lead, required for counterweights is in 1245, some two decades after Jordan began his work at Dover Castle. At first glance, this lacuna in the surviving documents poses an insurmountable problem. However, a closer examination of the records for the production of *trubecheta*, should serve to alleviate concerns about the silence of the royal clerks about counterweights. As noted above, the texts dealing with the actual production of *petrariae* and *mangonelli* routinely refer to the types of materials purchased by royal officials in order to build them.[77] By contrast, the texts dealing with the production of *trubecheta* deal almost entirely with the wages paid to the specialists building these engines, or to the transport of wood needed in their construction.[78] Therefore, while one would expect to find references to counterweights, as noted above, if they had been used on *petrariae* and *mangonelli*, one would not expect to find reference to them with respect to the construction of *trubecheta* at least up to 1245.[79]

This is, however, essentially a negative argument regarding the construction of *trubecheta*. What is required is positive evidence. The

75. See *CLR 1226–1240*, 110, 113, 121, 128, 129, 141, 147, 155, 169.

76. *CR 1231–1234*, 352.

77. See, for example, *PR 5 Richard*, 74, 141, 154, 158; PR 6R, 176; *Rot. Norm.*, 24; *The Great Roll of the Pipe for the Tenth Year of the Reign of King John Michaelmas 1208* (*Pipe Roll 54*), ed Doris M. Stenton (1947), 201–2; *CR I*, 108, 123, 191, 452, 454; *CR II*, 65; *CLR 1226–1240*, 47–8.

78. See *CLR 1226–1240*, 8, 26. 71, 94. 110, 113, 121, 128, 129, 138, 141, 147, 155, 169, 320; *CR II*, 44, 62, 119; *CR 1231–1234*, 352.

79. In 1245, and thereafter, royal clerks began to describe in greater detail the materials used in the construction of trebuchets. It is not clear why they began to do this.

first point to emphasise, in this context, is that a traction lever engine, the *petraria*, was already being used, and had been used by the royal government for many decades prior to 1225. Moreover, as was noted above, *petrariae* came in at least two sizes. It therefore seems unlikely that the introduction of a new type of *petraria*, even one that was substantially larger than the types already in use, would have caused the king's officers, who had already demonstrated great conservatism in their use of terminology, to coin new terms for traction lever engines and for the first man to build them.[80]

Secondly, as noted above, it is important to keep in mind that royal clerks cease to mention *petraria* in the period after 1236. Given that for many decades the governments of kings Richard, John and Henry III considered it useful to expend considerable resources to produce and maintain these engines, it seems reasonable to conclude that the *petrariae* only ceased to be used when they wore out and were replaced by something better. As noted above, Jordan the *trubechetarius* worked steadily for 5 years (1225–30) to fill the king's arsenal with the new *trubecheta*, at Dover, Winchester and finally Windsor. He, in turn, was succeeded no later than 1233 by the master carpenter Nicholas, and then by the engineer Gerard, who appears for the first time in the surviving records in 1238.[81] The *petrariae* disappear from the royal records after 1236 following a decade of steady building of *trubechetta*. The timing may simply be a coincidence, but it seems likely that Jordan, and then Nicholas and Gerard, were overseeing the production of counterweight lever engines (*trubecheta*) as replacements for the king's traction-powered *petrariae*.

The identification of the *trubecheta* as relatively small counterweight lever engines as contrasted with the giant counterweight machines featured in manuscript illuminations rests on three arguments. First, in order to replace the scores, if not hundreds, of stone-throwing *petrariae*, used so effectively by the crown during Henry III's minority at sieges such as Bytham and Bedford, noted above, the royal government required a tactically flexible and relatively inexpensive piece of easily constructed artillery. These factors point towards a smaller rather than an exceptionally large engine. Second, the documents dealing with the production of *trubecheta* do not present the image of immense construction projects. Rather, they seem to indicate relatively small-scale projects. Typical in this regard is an order issued in September 1225 to Adam de Bendenges, noted above, to ship two beams (*virgae*) to Jordan at Winchester for his work on a *trubechetum* there.[82] Third, an

80. The same reasoning applies to the introduction of a larger *mangonellus*. In this case, moreover, the use of the term *trubechetum* to designate a torsion engine would contradict the settled scholarly consensus that a trebuchet was, by definition, a lever engine.

81. Concerning their service in the production of trebuchets, see *CR 1231–1234*, 352, and *CLR 1226–1240*, 320.

82. *CR II*, 62.

inventory of the arms stored at Beaumarais Castle, conducted in 1306, lists 'unum parvum ingenium stans super murum quod vocatur trubechetum'.[83] The identification here of the *trubechetum* as a 'small engine' that stands atop the wall of the castle, certainly excludes the possibility that *trubecheta* or at least this *trebuchetum* is to be identified with the giant wall-breaking *ingenia* such as the famous *Warwolf* employed by Edward I at the siege of Stirling Castle in 1304.[84]

It has been observed recently that thirteenth-century English narrative sources rarely use the term trebuchet.[85] This failure may be explained, in part, by the fact, noted above, that the royal government, itself, largely ceased to use to the term *trubechetum* after 1245.[86] Unlike both the *petraria* and *mangonellus*, however, the disappearance of the term *trubechetum* from the royal administrative records was accompanied by the introduction of a new term, that is, *ingenium*, to takes its place. In 1244, for example, Bertram de Cryoil was issued orders by the Chancery to take possession of two *ingenia* that were being sent to him, to find appropriate storage for them and to have them repaired.[87] These engines were identified by the royal clerk as 'videlicet unum ingenium quod vocatur blideh et unum trubechetum'.[88] The *Pipe Roll* account for Kent for this year, which was written out by clerks of the Exchequer rather than clerks of the Chancery, noted that Bertram had received these *ingenia*.[89] Moreover, the Exchequer clerks also identified these *ingenia* as a *trubechetum* and a *blida*.[90] These two examples make clear that by 1244, at the latest, *ingenium* was considered a suitable synonym for the terms *trebuchetum* and *blida* at both the Exchequer and at the Chancery.

From an administrative point of view, the use of the apparently generic term 'engine' to designate a specific type of artillery was not unprecedented in royal administrative practice.[91] As noted above, it

83. E101/486/20.

84. See Prestwich, *War, Politics and Finance*, 53.

85. France, *Western Warfare*, 123. France notes the fact that Jordan built trebuchets at Dover and Windsor, but gets the dates wrong, and fails to mention that Jordan also built a trebuchet at Winchester. More importantly, however, France does not seem to appreciate the fact that Jordan worked continuously for almost 5 years on the construction of trebuchets, indicating an exceptional commitment by the royal government to produce a relatively large number of these engines.

86. The final reference to a *trubechetum* in the surviving administrative documents from the reign of Henry III appears in a text issued on 13 Sept. 1244. See *CLR 1240–1245*, 265. The term *trubechetum* does appear at least once in the surviving records from the reign of Edward I. An inventory of the arms at Beaumarais Castle, conducted in 1306, lists 'unum parvum ingenium stans super murum quod vocatur trubechetum'. See E101/486/20. This text will be discussed in greater detail below.

87. *CR 1242–1247*, 219.

88. Ibid., namely one engine, which is called a *blida*, and one trebuchet.

89. E372/89, 5r.

90. Ibid.

91. Royal clerks used the term *ingenium* to refer to devices other than types of artillery. The term was used, for example, to designate the winch used to draw *balistae* into firing position. See E101/14/27.

appears that from at least 1193 up to 1225 royal clerks had used *ingenium* as a synonym for *mangonellus*. Between 1225 and 1241, however, royal clerks ceased to use *ingenium* to discuss any type of artillery, a period of perhaps 15 years. As a result, the term was now free for use as the new attribution for *trubechetum* as well as *blida*.[92]

It has been argued here that the term *trubechetum* was used by royal clerks to designate a counterweight engine. The new engine would appear to have replaced the *petraria*, but not the *mangonellus*, in rapid order since the *petraria* disappears from royal administrative records after 1236. The phasing out of use by the royal government of its traction lever engines but not of its torsion engines suggests that we are *not* seeing the wholesale replacement of all older equipment but rather a selective replacement that worked out over a period of time consistent with royal resources, needs and the availability of specialist personnel. This, in turn, indicates that the *trubechetum* was seen by contemporaries as superior to the *petraria*. It seems reasonable to suggest that the superiority of the *trubechetum* was to be found in its use of a counterweight rather than of teams of pullers, who worked traction lever engines, who had to be trained and sustained at government expense. One final point in this discussion is the description, noted above, of the *parvum ingenium*, identified as *trubechetum*, placed atop the wall at Beaumarais Castle in Wales.[93] It is clearly impossible for such an engine to have been a traction lever engine since the parapet at Beaumarais provides no room for a team of pullers. This *trubechetum* must, therefore, have been a counterweight engine.

After 1244, when government records begin to record in detail the supplies provided for the construction of *ingenia*, it is clear that these supplies included lead, whose only use was in the production of counterweights. For example, on 27 June 1244 the Chancery issued orders to the sheriff of Lincoln to purchase twenty cart-loads of lead at the Boston fair and to transport this very heavy cargo to Newcastle upon Tyne for delivery to Gerard the engineer (*ingeniator*) to build the king's engines (*ingenia*) there demonstrating conclusively that the term *ingenia* was used by royal clerks to denote counterweight engines.[94] A similar shipment of lead for use in the king's *ingenia*, on this occasion in Gascony, is recorded in the *Patent Rolls*. On 20 October 1254, a merchant named William de Forges was authorised to receive payment for the lead he delivered to the king's engineer Gerard, for use on the king's *ingenia*.[95]

92. I have found no examples of *ingenium* during the period from 6 June 1225 to 4 June 1241 in any of the surviving royal administrative documents. The term reappears in the surviving administrative documents on 4 June 1241. See *CLR 1240–1245*, 67.

93. E101/486/20.

94. *CLR 1240–1245*, 245.

95. See *C[alendar of] P[atent Rolls] 1216–1272* (1901–3); *CPR 1247–1258*, 348.

Henry III's government introduced a second type of counterweight engine in the early 1240s. The term *blida* appears for the first time in the surviving royal administrative records on 8 August 1241, when the Chancery issued a writ to the sheriff at Hereford in Wales ordering him to build an engine there 'called a blida' under the direction of Master Gerard, who was being sent to Wales to oversee the project.[96] The expression used by the clerk in this writ, namely 'which is called a blida,' suggests that we are dealing with an early instance of the term *blida* being employed by the Chancery. Even 4 years later, in August 1244, a Chancery writ to the constable of Dover Castle used the expression 'quod vocatur blida' to describe one of the two *ingenia* being shipped to this castle.[97] By contrast, the clerk apparently did not feel any need to qualify the term *trubechetum* with the phrase 'quod vocatur', which makes sense since by then *trebuchetum* had been a standard administrative term for almost 20 years.[98] After its initial years of deployment, however, royal clerks and officers no longer used the expression *ut vocatur* when discussing the *blida*. Indeed, by late 1244, Chancery clerks used the term *blida* without any qualification.[99]

The *blida* clearly was a stone-throwing engine. On 20 September 1245, the Chancery issued orders to John Lestrange, the justiciar of Chester, directing him to cooperate with the royal engineer Gerard, in selecting supplies for the construction of a *blida* and several *mangonelli* at Gannoc Castle.[100] These supplies included tanned hides (*coria tannata*) to be used to make slings (*fundae*) for both types of weapon described here as *machinae*.

It is of significant interest that the royal clerks used the generic term *machinae* rather than *ingenia* as a collective description for the *blida* and *mangonelli* discussed in this text. The plural *machinae* was used by royal officials as a generic term for all kinds of engine and large pieces of equipment, including belfry towers.[101] The use of *machinae* here,

96. E372/85, 1r: 'Precipimus tibi quod ingenium nostrum quod vocatur blithe per consilium magistri Gerardi facias … '.

97. *CR 1242–1247*, 219.

98. Ibid.

99. E372/88, 5r.

100. C62/25, 3r. The production of slings for *blidae* is also noted in *CLR 1251–1260*, 267.

101. It does not appear that the royal clerks serving during the reigns of either Richard or John ever used a generic term for large, stone-throwing weapons. It is not until the reign of Henry III that the royal clerks introduce the practice of using a collective term to designate the king's siege weapons. On 19 Aug. 1224, the Chancery issue, a writ to the sheriff of Bedford ordering him to have the *petrariae*, *mangonelli* and siege tower (*belefridum*), which had been used during the siege of Bedford Castle, dismantled and shipped to Northampton to be delivered to the sheriff of Northampton. See *CR I*, 617. The writ went on to add that a similar writ had been sent to the sheriff of Northampton ordering him to receive 'praedictas machinas'. The term *machinae* as a generic description for the king's siege engines appears periodically in the surviving royal documents through the remainder of Henry III's reign, but would seem to have dropped out of usage before the accession of Edward I in 1272. For the use of the term *machinae* by Henry III's clerks, see *CLR 1240–1245*, 135, 323; *CR 1259–1261*, 258.

therefore, is a clear indication that royal clerks recognised that the *mangonelli* were not *ingenia*. The obvious conclusion is that although both the *mangonelli* and the *blida* were stone-throwers, the *blida* was a counterweight lever engine, like the *trebuchetum*, while the *mangonelli*, as discussed above, were torsion engines. This identification of the *blida* as a counterweight lever engine is confirmed by the fact that among the supplies shipped to Gerard at Gannoc Castle were six cart-loads (*carretae*) of lead (*plumbum*). As noted above, the only purpose lead served in the construction of siege weapons was as a counterweight.[102]

From the time that the new counterweight lever artillery was introduced, it is clear that the royal clerks used the terms *blida* and *ingenium* as synonyms. The first surviving reference to a *blida* from 1241, notes that Master Gerard, who had worked previously on the king's *trubecheta*, was now in charge of building an *ingenium* 'which is called a *blida*'.[103] In some cases, the clerks used both terms together. The *Pipe Roll* for 1244, noted above, mentions the shipment of the king's *ingenia* from Sandwich to Dover, and records that these were one *blida* and one *trebuchetum*.[104] In far more cases, however, the surviving administrative records simply refer to *ingenia*, without specifying whether they are *trubecheta* or *blidae*. It is therefore difficult, in the absence of further information, to determine the identity of a particular *ingenium* as a trebuchet or a *blida*. However, since the *trubecheta* were much smaller than the *blidae*, they likely were more numerous.

Finally, as was true regarding both the *petrariae* and the *mangonelli*, it would appear that there were at least two different sizes of *blida*. On 20 January 1256, the Chancery issued orders to the sheriff of Cumberland to complete two large (*magnae*) *blidae* that were under construction at Carlisle under the direction of the royal engineer Gerard.[105] How smaller *blidae* compared in size with *trubecheta* cannot be determined from the surviving administrative sources. However, the shipment, noted above, of six cart-loads of lead to Gannoc Castle in 1245 for use in the counterweight of a single *blida* certainly suggests that this was a large piece of artillery.[106]

In considering the evidence developed thus far, it would appear that by the time Edward I ascended the throne in 1272, the royal government had discontinued use of both the torsion-powered *mangonellus*, and the traction lever engine (*petraria*). The counterweight engines known originally as *trubecheta* and the *blida*, both of which were introduced during

102. C62/25, 3r.
103. E372/85, 1r.
104. E372/88, 5r.
105. C62/32, 15r.
106. C62/25, 3r.

Henry III's reign, would appear to have been the basic stone-throwing artillery used during the final three decades of the thirteenth and first decade of the fourteenth century. As had been true throughout the final 25 years of Henry III's reign both types of artillery continued to be referred to both individually and collectively as *ingenia*.

The *Pipe Roll* account for 1287, for example, records that during the Welsh revolt that year, royal officials hired the master mason (*cementarius*) Adam and his team of assistants (*socii*) to quarry and prepare stone ammunition (*lapides*) for used by the king's *ingenia*.[107] The account (*compotus*) of Robert Tibetot for his expenses in commanding Newcastle in 1288 records that he spent money to have 480 stones (*lapidae*) transferred to Newcastle for use as ammunition by his *ingenia*.[108] Robert also purchased ropes and cords for use on the *ingenia*, hides for making slings (*funda*) and boards for making a basket (*cista*), likely to hold the ammunition, to attach to one of the *ingenia* stored at Newcastle.[109] Robert's greatest expense, however, was paying the smiths to produce iron fittings (*ferramenta*) constructed for the *ingenia*.[110] Similarly, in 1299, Walter de Langton, bishop of Conventry and Lichfield, was credited at the Exchequer for the expenses he incurred in 1296–7 in the production of four *ingenia*.[111] These expenses included the purchase of iron, bronze and hemp, the purchase and transport of timber, and the wages paid to rope-makers.

Because the royal clerks serving Edward I maintained the policy, which had become traditional, of denoting both *trubecheta* and *blidae* as *ingenia* it is not possible, except in rare circumstances, to identify a specific piece of stone-throwing artillery as one or the other. One important exception, noted above, is the *ingenium parvum* stationed at Beaumarais Castle in 1306 which is identified explicitly in the arms inventory as a *trubechetum*.[112] Nevertheless, the numerous financial accounts submitted by royal officials do permit the observation that the royal government built not only small artillery pieces for use in the defence of fortifications, but also a significant number of very large stone-throwing engines that had the destruction of fortifications as their main task. One famous engine, the *Warwolf*, is noted above. But most of these very large counterweight lever engines did not receive names, or at least official or semi-official names that were recorded in surviving administrative documents.

The *Pipe Roll* for 1279, for example, records that Egidius de Adenarde, the constable of the Tower of London, paid out in excess of 870 pounds

107. E372/132, 1r.
108. E101/4/21.
109. Ibid.
110. Ibid.
111. C62/75, 8r.
112. E101/486/20.

to build three *ingenia* at the Tower under the direction of Master Bertram the engineer.[113] These costs included fifteen ship-loads (*batella*) of timber, over sixty-one cart-loads of lead purchased for the counterweights (*contraponda*) of the engines and 4,000 pounds of copper (*cuprum*) to provide shielding (*scuta*) for two of the engines.[114] Clearly, we are dealing here with large pieces of artillery.

We can see similar evidence for the building of large pieces of artillery during Edward's siege of Stirling Castle in 1303. Three Exchequer documents from this year record that the royal government required a number of ecclesiastical institutions in Scotland to support the king's campaign through the sale of the lead contained in the roofing materials on their buildings. Bishop John of Brechin was paid in excess of 17 pounds for five cart-loads of lead taken 'pro pondere ingeniarum regis'.[115] The prior and convent of St Andrew's received 78 pounds for twenty-two cart-loads of lead, and the abbot and brothers of the monastery of Dunferm received over 41 pounds for twelve cart-loads of lead.[116]

Once these large *ingenia* were built, it required a great deal of effort to move them, including the assembling of ships, wagons, horses, sailors, drivers and providing pay and food for all of the men involved in the operation. In 1288, for example, royal officials recruited twenty-four men, forty oxen and four wagons to transport a single *ingenium* to Carmarthen Castle.[117] The same text records that a ship transported over 3 tons of lead to the new castle of Emelyn (in Wales) for use as engine counterweights.[118] In 1300, the royal government employed twenty-one ox-drawn carts to transfer a single *magnum ingenium*, the equipment of some carpenters, lead and stones from Linlithgow to Stirling, a journey that took 4 days and cost a total of 6 pounds.[119]

# Conclusion

A comprehensive examination of all of the surviving administrative documents from the reigns of Richard, John, Henry III and Edward I

113. E372/123, 21r. Concerning Bertram's career, see A. J. Taylor, 'Master Bertram, Ingeniatoris Regis', in *Studies in Medieval History Presented to R. Allen Brown* (Woodbridge, 1989), 289–315.

114. E372/123, 21r.

115. E101/12/28. In this case, the possibility cannot be excluded that the lead was taken to produce counterweights for numerous smaller engines rather than a few larger counterweights for giant stone-throwing machines.

116. Ibid. There is some evidence to suggest that the royal government used other materials besides lead to construct counterweights. The *Liberate Roll* for 1299, for example, records that Walter Langton, bishop of Conventry and Lichfield and royal treasurer, spent in excess of 40 pounds purchasing cart-loads of stone (*petra*) and clay (*argillum*) 'ad pondus' of four *ingenia* being built at Carlisle. See C62/75, 8r.

117. E101/14/21.

118. Ibid.

119. E101/12/9.

makes it clear, by contrast with the numerous narrative sources, that the royal officials in charge of building the king's artillery and the royal clerks responsible for recording information about its construction, movement and storage, provide an exceptionally important corpus of information about what types of artillery were constructed and deployed by the royal government from the late twelfth through the early fourteenth century. During the reigns of Richard and John, royal engineers built three different types of engine, the tension-powered *balista*, the torsion-powered *mangonellus* and the traction lever *petraria*. Perhaps inspired by the new counterweight lever engine deployed by Prince Louis during his invasion of England in 1216, the royal government under Henry III began to construct these engines as well. The *trubechetum*, as it was called by royal clerks, was not a large wall-breaking engine of the type featured in many manuscript illustrations of a later date and used by scholars to represent earlier technology, but rather a smaller type of artillery intended to replace the relatively awkward traction lever *petraria*. By 1236, at the latest, the royal government no longer deployed the traction lever *petraria* engine, and had replaced it with two distinct types of counterweight lever engine, namely the *trubechetum* and the *blida*. By the last decade of Henry III's reign, the torsion-powered *mangonellus*, a mainstay of the royal artillery since at least the reign of King Richard, had also been phased out of use. King Edward's government continued to deploy both the *trubechetum* and the *blida* as stone-throwing artillery. The *trubechetum* likely served the role of the smaller, anti-personnel weapon, which could also be deployed as defensive artillery on fortress and city walls. The *blida* likely was the larger wall-smashing artillery of the type identified with the well-known *Warwolf*. Edward's government also introduced a new type of tension-powered engine called a *springaldus* that shot long arrow or bolt-shaped ammunition and was deployed alongside the seemingly ageless *balista*.

When considered from an administrative point of view, it is clear that the English government possessed a highly professional and well-organised bureaucracy to oversee military affairs for well over a century. Royal officers and clerks maintained careful records regarding all aspects of the production, maintenance, storage and deployment of a wide range of artillery. Even more importantly, royal officials demonstrated an appreciation for the development and use of a highly specialised technical vocabulary to describe these engines. Indeed, it is their regular and systematic use of this vocabulary that makes it possible to identify the rather dramatic efforts by the royal government to deploy newer and better types of artillery over the course of the thirteenth century.

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