Inventing scientific method: The privilege system as a model for scientific knowledge-production

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This paper argues that the development of early-modern science was strongly influenced by prevailing legal practices. This argument goes back to the work of Barbara Shapiro, who explored in a number of publications how the concept of ‘fact’ was first fleshed out in a legal context prior to becoming part of scientific understanding. However, Shapiro and others have mainly examined general debates about certainty on the English mainland. The claim of this paper is that the widespread practice of granting privileges to inventors provided a distinct working model for how to arrive at truth claims through the use of experimental method.

Inventor privileges were the forerunners of what we call patents nowadays. They were exclusive rights with a limited timeframe for the commercial exploitation of technological innovations. Rulers from all over Europe started to bring these inventor privileges into play from around 1550 onwards – that is, during what we (used to) call the Scientific Revolution. Because of a separation of historiographical traditions, however, the interconnections between these two developments have not yet been studied in much detail. This is curious, as the developments seem closely related. Not only were many of the figures whom we consider seminal to the Scientific Revolution fervent inventors (or at least involved in the privilege game); the method that early-modern ‘patent offices’ applied to test privilege applications also closely resembled the method that was later used to test theories about natural phenomena.

The focus of this paper is on the Dutch Republic at the turn of the seventeenth century (ca. 1585–1625). Studying the use of inventor privileges during this period and in this place is interesting, if only because the Dutch were a rising power that was renowned for its technological edge. But although my examples come from the Dutch Republic, the idea is that, subject to further research, the core of my argument here may also apply to other national contexts.

The paper proceeds as follows. The first part discusses the particularities of the Dutch privilege system, as well as the social composition of the actors involved. The second part addresses the legal characteristics of the privilege notion, giving special attention to methods of proof and persuasion. The third and final part offers a case study, where the different aspects of my argument will come together. It will become apparent, I hope, that some of the most interesting particularities of early-modern science can only be understood by crossing disciplinary boundaries: in this case, by reconnecting some aspects of an emergent ‘scientific method’ to the economic and legal contexts that were foundational for them.

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Inventor privileges in the Dutch Republic

The Dutch system of inventor privileges emerged in the mid-1580s, that is to say, at the height of the Dutch Revolt (1568–1648). For the most part, it was a continuation of the system that had existed under Habsburg-Burgundian rule, except that privileges were no longer granted by the king, but by the so-called States-General of the United Provinces. The States-General was an institutional remnant of the Habsburg-Burgundian period, but its function was thoroughly reinterpreted after it abjured Philip II in 1581. Originally a space for negotiations between the Burgundian overlord and the provinces, the States-General soon began to function as the central and coordinating authority in which each of the seven provinces that constituted the Republic was represented with one vote. Individual provinces also had their own assemblies, called the Provincial States, which guaranteed the promotion of more local affairs. But while some provinces (particularly the province of Holland) did issue a number of privileges in their own name, on the whole, privileges that related to the introduction of new technologies fell under the umbrella of the States-General.

The States-General was relatively liberal with its support for novel inventions, granting on average between five and fifteen privileges per year. As was the case in other European countries, most of these privileges related to inventions in the fields of military technology (such as cannons and shot), hydraulic equipment (pumps, dredging equipment), industrial technology (industrial mills, furnaces, stoves, and so on), and urban welfare (soot filters, water supply systems, and suchlike). At the moment inventors managed to obtain monopoly rights, however, many inventions had not yet been reduced to practice. An ‘invention’, in that respect, was often simply another word for a ‘project’ that had to be implemented in the near future. Hence, the authorities would grant the inventor a limited amount of time (usually about one year) to crystallize his ideas, or else his privilege rights would expire. This formula allowed the inventor to seek investors, who were prepared to put in the money to realize the invention in exchange for a percentage of the profit that could be made on the basis of the future monopoly rights.

The administrative procedure to obtain a privilege was set in motion when an inventor filed a request at the States-General, setting out why he considered his invention worthy of privilege. This request was often accompanied by a letter of recommendation written by those who wanted to implement the invention, and it frequently contained a sketch or a model that showed how the inventor planned to make his ideas work. The States-General then examined and discussed the request in camera, sometimes asking for further clarification from the inventor, and sometimes setting up a commission to inspect a prototype of his device (I will return to this issue later on).

It was on account of their involvement with the privilege system that a wide variety of actors, who normally lived in separate social realities, came into contact with one another. Inventors, visionaries, merchants, and administrators: they all had to find a common language to reach an agreement concerning the privilege rights. As a result, the privilege system functioned as a place of encounter where different ways of understanding technological innovations could fuse.

The inventors who presented themselves at the doors of the States-General came from virtually every layer of society (see Figure 1). Nevertheless, a considerable number consisted of artisans who were merely trying to earn their daily bread. One reason for the dominant appearance of these artisans might have been the foundation of a new type of school for the training of military and civil engineers. Paralleled by developments at the University of Franeker, the University of Leiden agreed in 1600 ‘that here in the university arithmetic and surveying will be taught in proper lower German to particularly encourage those who would want to proceed to become an
Unfortunately, few documents remain that give insight into the daily operations of the school, but we do know (on the basis of an attendance list from ca. 1610) that the program was attended by carpenters, architects, and masons. New students were expected to learn some trigonometry, some basic Euclidean geometry, how to calculate surfaces, how to make drawings of cities, etc. It was perhaps no coincidence that these were exactly the kinds of skills that were needed for the proper presentation of an invention.

The examination of an invention, on the other hand, was primarily in the hands of government officials. The system in the United Provinces exposed most putative inventions to extensive, and dispersed, official examination. When an inventor had approached the States-General to announce his ideas, the States-General would generally first send the privilege request to the cities that were affected by the invention, requesting their advice. The city then exposed any possible objections, and referred the file to the assembly of the Provincial States; who, in turn, decided either to support or to refuse the request, before returning the entire application file to the States-General. There, finally, a complete assessment was made, and the decision was taken either to grant or deny the privilege.

Besides considering the feasibility of the project, the officials involved in the examination process mainly judged the novelty of a given invention, as well as its usefulness for the local economy. In their assessment, they frequently consulted people from outside the political spectrum as such. Thus, for instance, they might obtain expert advice from locally organized artisans (such as tin casters, gun manufacturers, or corporate textile guilds); city carpenters [stadstimmermänner]; the admiralties; or from the dike board of a specific region. In addition, professional mathematicians were sometimes called in for advice, especially when it came to finding a reliable method of determining longitude at sea. As Karel Davids has shown, some theoretical proposals of this kind were even submitted to experimental testing at sea. The theories put forward by Jan Henrick Jarichs van der Ley (1565–1639), for example, were submitted to experimental verification at sea after two commissions, consisting of all sorts of mathematicians, had extensively gone over the issue. This example adequately illustrates how, in the context of the privilege business, the language of mathematics became ever more interwoven with experimental practices – a feature that later became so typical of scientific thinking.
Theories of proof

Privileges had enjoyed a time-honored history, before they came to be used in the early-modern period to favor inventors. Both Roman law and canon law had extensively dealt with the topic, and hence a well-defined tradition had gradually developed in the legal domain. Privileges were ‘new laws’, as contemporaries would have it, that differed in three important respects from every other law issued in the early-modern period (such as ordinances or by-laws, for example). The first difference was that privilege rights were quite openly paid for, even if the official reasons for granting them were embedded in a rhetoric of merit and service. The second difference was that privileges were always in slight contrast to existing laws. Especially this aspect of the privilege notion preyed on the minds of contemporary legal scholars, as it seemed contradictory to have ‘a law against the law’. The point was not, however, that a privilege freed a legal subject from the law; but rather that it changed the legal status of the person to whom it applied. Thus, even if a privilege created new legislation, it still had to comply with existing legal structures. The last, and maybe most striking, difference between privileges and other legal remedies was that the cause for a privilege had to be proven. This contrasted sharply with other laws, which demanded no proof whatsoever.

It was against this legal background that innovation, in the early-modern period, began to take on new contours. Given the obligation to prove the grounds for a privilege, standard procedures concerning the law of evidence came to play a role in the appraisal of technological advancements. Now, juridical evidence in the early Dutch Republic came in various forms and degrees. It ranged from ‘full proof’ to ‘half proof’, and even to ‘quarter proof’: qualifications based on the degree of certainty attained by means of the truth claims. Thus, full proof was just another way of saying that the matter was clear, whereas half proof was ‘a claim that informs the judge to some degree, yet not completely, or not to the degree that it might serve as the basis for a verdict’.

Another important distinction in the legal literature of the time was whether the topic of dispute was tangible, or not (i.e. whether it could be ‘observed’). When the topic was intangible, the case was supposed to proceed ‘according to laws’ [in regten]. This meant that the admissible evidence could only be presented by ‘the advertisement of laws’ or by means of so-called memorien, which were short written statements that described the matter at hand, as well as the current relevant state of affairs. When, on the other hand, a justiciable issue bore upon something tangible, the case was supposed to proceed ‘according to facts’ [in feyten]. In these cases, admissible evidence was primarily presented in the form of testimonies and by ‘ocular inspection’ [Inspectie Oculaire] by court commissioners. These inspections provided full proof in matters of land division and easement on a property, but they were also used ‘to determine whether the wound of some-one who was struck down had been deadly, and [to judge] on matters of divorce for the reason that some-one is unapt to reproduce, and to determine whether a woman is expecting, and suchlike’. It was particularly in this context of fact-finding procedures that experts from outside of the court, such as medical practitioners or land surveyors, began to play an increasingly important role.

Experts could also be called in as witnesses to provide testimony, which was the other way to argue a case proceeding ‘according to facts’. Generally speaking, one needed two or three people to pledge upon a ‘thing’ [het ding] unanimously, to give a testimony the value of a public instrument. But there were other cases in which larger groups were required, while in yet others, a single witness would suffice. In addition, it was commonly agreed that one ought to attach more credibility to the testimony of ‘those that are in Dignity than [to that of] normal People’ and more to the testimony of ‘the Rich than [to that] of the Poor, for fear of Corruption’. Yet this did not mean
that all the witnesses belonged to the higher strata of society. The main concern remained to obtain testimonials from those who were knowledgeable about the topic.40

I will now illustrate how the different forms of evidence were used in the daily reality of the Dutch privilege system, and how the use of these methods of proof invoked the use of controlled experiments. The case at hand is a testimonial that was passed before a notary to confirm the utility of a privileged drainage mill, which had been invented by the famous engineer Simon Stevin (1548–1620).41 To be sure, Stevin was not the only ‘scientist’ involved in the privilege business in the period; some other, better-known figures include Blaise Pascal, Isaac Beeckman, Galileo Galilei, Christiaan Huygens, Gottfried Wilhelm Leibniz, and, not to forget, England’s Attorney General and Lord Chancellor, Sir Francis Bacon. By that token, it was not only in the United Provinces that privileges were worked out, and I am not presenting an argument here for a Dutch priority in our evolving understanding of this period system. Nonetheless, Stevin’s mill provides a coherent and tractable test case, giving us a look into at least one area of the complex privilege business, and allowing us to consider its epistemic ramifications.

**Experimental practices**

On 26 March 1590, a group of people gathered in the vicinity of the city of Gouda to test a new type of drainage mill that had recently been invented by Stevin.42 The group was divided into two parties. On one side were two aldermen from Gouda, who vouched for Stevin, and on the other were two men chosen to represent the interest of the bailiff and dike-reeves of Stolwijk (a village close to Gouda). The two groups gathered, as they said, to ‘be informed of the assessment of what the Stolwijckse mill, which had been remodeled after the way of Stevin by the carpenter M. Joost Govertsz, would do against the Beyersche mill standing next to it.’43

By reading a surveyor’s rod that had been put into the water, the witnesses were able to testify that the water had decreased because ‘the Beyersche mill had continuously drained for the duration of three hours, as the Attestants had marked and remembered by means of an hourglass.’44 The witnesses further declared ‘that the Stolwijckse Mill remodeled after the way of Mr. Simon Stevin had then drained only for one hour in the aforementioned soil, according to the above-mentioned hourglass’, upon which they had recorded a similar mark on the surveyor’s rod.45 Their conclusion was that ‘during the conference, the Stolwijckse Mill had drained as much water out from the soil as the Beyersche mill had done in three hours.’46

Simple mathematics, one might say: nothing special. Yet here, because of the necessity to measure the efficiency of the new invention, one can see the emergence of a form of experimental method *avant la lettre*. Translating the results of the Stolwijk meeting into modern scientific discourse, one could say that the Stolwijkse mill was the ‘experimental group’ and the Beyersche mill the ‘control group’, while the surveyor’s rod and the hourglass served as objective scales of measurement to visualize the results. Other cases, both in the Republic and abroad, revealed the same dynamic, as examiners attempted to ensure identical conditions when comparing an invention against its competition.47 Thus, because of the necessity to test one thing against the other, a form of controlled experiment emerged.

In the case of Stevin’s drainage mill, there was no negative or positive control of the experiment. Such a control would have included a third mill, which would have been a somewhat costly affair. The attestants for Stolwijk did take confounding variables into consideration, however, indicating at the end of their declaration that ‘the Beyersche mill had had the [advantage of] pre-grinding.’48 In comparable cases, the term ‘contra-experiment’ [*contra-proeve*] was explicitly mentioned. In a case that passed before the High Court of Holland, for instance, which dealt with a privilege for the exclusive production of alloyed silver, it was explicitly mentioned that a ‘contra-experiment was brought forth [ … ] to point out the weakness of the first experiment.’49 Thus, the
privilege system comprised a highly developed vocabulary of experiment that later became an indispensable feature of scientific practices.50

Conclusion

Over the past century, historians have become ever more aware of the importance of artisanal culture for the development of early-modern science.51 Practical mathematics, experimentation, and natural observation all belonged to the ordinary artisanal stock-in-trade knowledge, long before their integration into the ‘scientific’ language of natural philosophy. It has remained an open question, however, where the different epistemologies and pedagogical systems of the period intersected. This paper has argued that the privilege system, in particular, provided intellectuals and craftsmen with at least one important ‘meeting place’ where they could become acquainted with each other, and each other’s methods, thus enabling actors from different social backgrounds to develop new modes of shared knowledge.52

Indeed, the privilege system provided a blueprint for how to arrive at knowledge claims through the use of an experimental method. Borrowed from the courts, and applied to the world, rules of evidence began to discipline the nexus of knowledge with power. In the Dutch context, various actors belonging to the civil administration were commissioned to adjudicate whether a given invention was ‘novel’ and ‘useful’. It was precisely because of this necessity to verify whether the new invention was really an improvement to the existing situation that a form of controlled experiment could emerge. As the case study of Stevin’s drainage mill showed, new inventions were often literally put next to existing technology, as ‘experimental group’ next to ‘control group’. In cases such as this, legal practice gave period actors a way to invent an epistemic method that we now call scientific.

Notes
1. Primary source material has been presented using original spelling and grammar, except that the long ‘s’ has been replaced by its modern equivalent. Translations are by the author unless otherwise stated.
2. Shapiro, ‘The Concept “Fact”; A Culture of Fact; and Probability and Certainty’. Earlier references to the interconnections between early-modern science and law can be found in Kocher, ‘Francis Bacon’; and Loevinger, ‘Law and Science as Rival Systems’. Of particular importance to the history of science were the comments made on the assessment of witnesses in Shapin and Schaffer, Leviathan, 55–60, 326–329. Recent studies have focussed more on the emergence of the concept of ‘natural law’: see e.g. Daston and Stolles, Natural Law. In consequence, less space has been devoted to the particularity of legal practices.
3. For a concise overview of the similarities and disparities between ‘privileges’ and ‘patents’, see Biagioli, ‘Patent Specification’. Please note that I use the expression ‘inventor privileges’ rather than ‘patents’ in this paper in order to avoid misunderstandings and anachronistic interpretations. Although early-modern legal scholars did use the word ‘patent’ in the expression of a ‘letter patent’, these patent letters had very little to do with what we nowadays understand a patent to be. ‘Letters patent’ was the literal translation of the Latin litterae patentes, which meant ‘open letters’ (from the verb pateo) as opposed to sealed letters (i.e. ‘closed letters’). See Hill, ‘Origin and Development’, 406. Patent letters thus alluded to the form – not to the content – of a legal decision and, in consequence, they could be used for a variety of purposes.
4. Historians generally take Venetian law from 1474 as the starting point for a more systematic approach to inventor privileges. On this ‘Venetian moment’, see notably Mandich, ‘Le privative industriali veneziane (1450–1550)’. It was only by the mid-sixteenth century, however, that the use of inventor privileges had spread widely throughout Europe, including to the kingdoms of Spain, France, and England, and the majority of Italian city-states. For the different phases in the use of inventor privileges, see Silberstein, Erfindungsschutz und merkantilistische Gewerbeprivilegien. For an excellent bibliography with regard to the privilege practices in individual countries, see Biagioli, ‘From Print to Patents’.
5. Over the last 30 years, our understanding of the Scientific Revolution has been broadened and thoroughly redefined. For an introduction to this issue, see Lindberg and Westman, *Reappraisals*; and Osler, *Rethinking the Scientific Revolution*. Also useful are: Porter, *The Scientific Revolution*; and Cunningham and Williams, *De-centring*.

6. Among the rare exceptions are Biagioli, *From Print to Patents*; Iliffe, *In the Warehouse*; Popplow, *Models of Machines*. See also Harkness, *The Jewel House*, in particular 142–180.

7. De Vries, *Economy of Europe*, 92; Israel, *Dutch Primacy*, 410. Recently, Karel Davids has provided a dazzling summary of technological developments in the Netherlands between 1350-1800 in terms of technological leadership: see Davids, *The Rise and Decline*. For the importance of privileges in this context, see Davids, *The Rise and Decline*, 400–420. For the study of inventor privileges in the Dutch Republic more generally, the work by Gerard Doorman remains invaluable: Doorman, *Octrooien*.

8. There is a great number of good books on the history of the Dutch Republic. For a general overview, see for instance Israel, *The Dutch Republic*. For the more economic aspects, see De Vries and Woude, *The First Modern Economy*. For an overview of political institutions, see Fruin, *Geschiedenis der staatsinstellingen*.

9. The Dutch Republic consisted of seven provinces with voting rights that were united on the basis of the Union of Utrecht (1579). Although nominally these provinces were sovereign, they gave up these sovereign rights on a number of issues that were of common interest, such as defense and finance. These issues were decided upon in the assembly of the States-General in consultation with the Council of State.

10. The number of privileges issued by the individual provinces remained negligible until the 1640s. See Davids, *Patents and Patentees*, 264–265.

11. In terms of numbers, there was a sharp rise in the 1620s before the number dropped significantly, settling to around one per year at the beginning of the eighteenth century. For an overview of the number of privileges, the fields in which they were granted, etc., see Davids, *Patents and Patentees*.

12. For concrete examples of this practice in the Dutch Republic, see ibid., 273–275.

13. Although the official procedure was only set in motion when the inventor submitted a petition, in some cases he had been asked by the authorities (both on an urban and on an interprovincial level) to develop a specific technology. In those cases, the act of petitioning was more or less just *pro forma*.

14. These drawings and models (the precursors of what we call ‘patent specifications’ nowadays) have received relatively little scholarly attention, but see Biagioli, *Patent Republic*; Davies, *The Early History*; and Popplow, *Models of Machines*.

15. In my broader ongoing research, I have found that inventors from deviant creeds, such as Anabaptists or Catholics, had little problem in accessing the privilege system; what mattered was simply whether an invention would be profitable for the local economy.

16. In 1600, the first full-time chair for mathematics in the Republic was established at the University of Franeker. It was held by Adriaan Adriaensz. Metius (1571–1635), who taught in the vernacular, and who was directly involved with the privilege business on several occasions.

17. ‘dat in de Universiteit alhyer soude worden gedoeceert in goeder duytscer tale die telconste ende landmeten principalycken tot bevordering van de geenien die hen souden willen begeven tottet ingenieurs-cap.’ Molhuysen, *Bronnen*, 1:122. The program of the new school, later renamed the *Nederduytsche Matematique*, had been designed by none other than Simon Stevin at the instigation of Stadholder Count Maurice of Orange (1567–1625). For the program, see Molhuysen, *Bronnen*, 1:389*.

18. Molhuysen, *Bronnen*, 1:392*. The attendance list dates from somewhere between 1600–1611.

19. Moreover, the first directors of the *Nederduytsche Matematique* were Ludolph van Ceulen (1540–1610) and Symon Fransz. van Merwen (1548–1610), who were both involved in the examination of privilege applications.

20. See, for example, the application by Gregoris Sir Jacob (dated 14 July 1599). Doorman, *Octrooien*, 101; Japikse and Rijperman, *Resolutiën*, 10:824. It should be noted here that there were many variations on the general procedure.

21. The negotiations about the duration of the privilege also took place at the assembly of the States-General; unfortunately, most of these negotiations took place behind closed doors and have not been recorded.

22. Compared to the modern patent system, the notions of ‘utility’ and ‘novelty’ had a completely different meaning. What mattered was that an inventor was the first to practice a certain craft in the territory of the Dutch Republic; that he would be the first to reveal the technical details of an invention and thus
render the invention useful to the local economy. For a more detailed discussion of these issues, see Biagioli, ‘Patent Specification’.

23. For the involvement of tin manufacturers, see Doorman, *Octrooien*, 101 (2 January 1599); Japikse and Rijperman, *Resolutiën*, 10:821. For gun manufacturers, see Japikse and Rijperman, *Resolutiën*, 10:370 (6 June 1598). For an example of the role played by the corporate textile guilds, see Posthumus, *Bronnen*, 4:82 (no. 65). This example relates to the Leyden *saaining*, a professional organization of textile workers. A *nering*, following Posthumus’ definition, was an ‘organization of house-industrial producers completed with industrial entrepreneurs’. Posthumus, *Neringen*, 20. For ‘city carpenters’, see Doorman, *Octrooien*, 107 (12 January 1602). For the admiralties, see Doorman, *Octrooien*, 129 (6 June 1615).

24. Davids, *Zeeuwen en wetenschap*, especially 65–85.

25. Some of the people on these commissions included: Willem Janszoon Blaeu, Samuel Marolois, Adriaan Adriaanszoon Metius, Joseph Justus Scaliger, Willebrord Snellius, and Simon Stevin. The case of Jarichs has been diligently studied by Davids: ibid., 73–85.

26. For an overview of the legal history of privileges, see Dölemeyer and Mohnhaupt, *Das Privileg*. Despite the long pre-history, the practice of using a privilege to establish a monopoly was unique to the early-modern period. Fiercely condemned by both Roman and canon law, monopolies had always been believed to lead to a disturbance of the ‘just price’. See Höffner, *Wirtschaftsethik*, 64–100, 135–146; Roover, ‘Monopoly Theory Prior to Adam Smith: A Revision’, 495–499. The transformation of these ideas was related to the rise of new ideas about how to run a political economy; I intend to publish more extensively about this in the near future.

27. As in other countries, treatises that explicate the logic of early-modern inventor privileges were rare in the Dutch Republic. The most elaborate legal commentary I have encountered was by the Leiden University scholar Paullus Merula (1558–1607). Merula belonged (together with Hugo Grotius, among others) to an exclusive group of scholars that gathered around the humanist Joseph Justus Scaliger (1540–1609) with the goal of developing a new legal framework that would serve as the basis for the administration of justice in the young Dutch Republic. In that context, he wrote an incomplete legal textbook, later quoted extensively in other Dutch legal treatises, entitled: *Manier van procederen in de provintien van Holland, Zeeland ende West-Friesland belangende civile zaaken*. The book was first printed in Amsterdam in 1592; I use a reprint from 1705 by Adrian Beeman. See for a (somewhat outdated) biography of Merula: Haak, *Paullus Merula*. For the use of Merula’s book in the University of Leiden, see Ahsmann, *Collegia en colleges*, 21–23.

28. Monté Verloren, *Hoofdlijnen*, 235. Cf. Merula, *Manier van procederen*, 52.

29. The generally accepted solution was that a privilege should not be entirely [ex diametro] in conflict with the common law [*gemeene rechten*] but that ‘the word Slightly […] softens the contradiction’ (Het woord Eenigsints […] versacht de Contrarietiteit). Moreover, a privilege should not infringe on the existing rights of third parties. Merula, *Manier van procederen*, 41. See also Franceschelli, ‘Lo origini’, 163.

30. Quaritsch, *Staat und Souveränität*, 129. Quaritsch makes the interesting observation that, as long as the privilege (an *Einzelfällgesetz*) only transformed the legal status of the person to whom it applied (namely, from general to particular), common law and privilege were pretty well matched. Only when general laws came to set aside privileges was the way freed for an absolutist understanding of legal power that turned the king into the *origio iuris*. Ibid., 129–136. Quaritsch traces the roots of this transformation to events in thirteenth-century Germany.

31. Merula, *Manier van procederen*, 41.

32. Ibid., 52.

33. ‘Halve preuve, is sodanige bewering, daar by den Regter wel enige kennis van de saak krygd, maar niet volkome, of sodanig, dat daar uit de saak by vonnis mag werden gewesen, of voor Regt kan werden uitgesproken.’ Leeuwen, *Het Rooms-Hollands-regt*, 618. Cf. Merula, *Manier van procederen*, 527.

34. Leeuwen, *Het Rooms-Hollands-regt*, 695.

35. Ibid. The claimant would provide a brief statement with the arguments why he thought he was right, whereupon the defendant would have the possibility to make a statement to the contrary. It was then up to the judge to further decide upon the matter.

36. Ibid., 616. Other methods to furnish evidence, such as presumption, rumors, and hearsay, were never conclusive in the court of law. Ibid., 619.

37. ‘By oculaire inspectie, dat is, vertoog en aanwysing op en omtrent de ding-pligtige saak, werden ten vollen bewesen alle grond-scheidingen, of Erf of Land-diensstbaarheden. […]’ De welk ook in veel andre gelegenheden nodig is: als om te oordelen van een wonde van een nedergeslagen, of deselve doodlyk is geweest, en over Egt-scheiding om oorsaak dat yemand tot voortteling onbequaam is, en om te oordelen of een Vrouwe swanger gaat, en diergelyke, werden deselve personen aan de ervare
Medicyns en Vroed-wyven ten ondersoek voorgesteld, de welk daar van na genomen inspectie en klaar betoog, oordelen wat van de saak is.’ Leeuwen, Het Rooms-Hollands-regt, 617–618. Cf. Merula, Manier van procederen, 485.

38. Merula, Manier van procederen, 502–503.

39. ‘meer den geenen die in Dignityyt zijn, dan andere gemeende Luyden [...] Meer den Rijcken dan den Armen, om de vreeze van Corruption [...] meer den Armen van goeden leven ende opregt in haaren handel; dan den Rijcken quaad van Leven ende gedisfameerd.’ Ibid., 500.

40. Ibid., 501. As Merula formulated it, the most reliable testimony was that of ‘each in his art’ (Maar voor al een eyder in zyne konste). For similar observations in the English context, see Shapiro, A Culture of Fact, 75–76. Legislation in the Dutch Republic, for that matter, always called for the full disclosure of any of the witnesses. See, for instance, Instructiën vanden Hove van Hollandt, Zeelandt, ende Vrieslandt (The Hague: Jacobus Scheltus, ca.1699), 1–8 (‘Octroy beroerende de openinge van informatieën van gegeeven getuygenissen’).

41. The standard biography for Stevin is Dijkstra, Simon Stevin, notably chapter 1. Stevin was born in Bruges into a family with a certain standing. In 1583, he registered as a student at the faculty of Artes Liberales at Leiden University, where he probably became acquainted with the Stadtholder Count Maurice of Orange. Stevin was then taken into the service of the Court of Maurice in 1593 as his private tutor and personal advisor. On the relationship between Stevin and Maurice, see also Kubbinga, ‘Stevin en Maurit’. Throughout his career Stevin obtained several inventor privileges that affirmed his importance as one of the leading military engineers in the service of the state. On Stevin’s ‘patents’, see Stevin, Principal Works, 5:11–38.

42. There were a number of testimonials that confirmed the utility of Stevin’s invention. These are given in full by Stevin’s son Hendric; Stevin, Wisconstich filosofisch bedryf, Book X, 3–10. A transcription can be found in Stevin, Principal Works, 5:386–390. An English summary is in ibid., 5:391–392. I shall not deal with the entire application in every detail: Stevin had first obtained a privilege for a drainage mill on 24 November 1586 from the States-General, and one on 23 February 1588 from Sir Robert Dudley, 1st Earl of Leicester (1533–1588), who acted as the Governor-General of the Republic during the years 1585–1588. They were both inscribed in the Rekenkamer (Audit Office) of Holland on 15 September 1588 (Camer van Rekening in Hollant, Witte register met de Rode roos, fol. 51). On 23 August 1588, Stevin entered into a contract with his friend Johan Cornelis de Groot (1554–1640), the later mayor of Delft, for the exploitation of his inventions. de Groot would have an equal share in the proceeds of the two privileges, and together Stevin and de Groot implemented the invention at several locations. Ibid., 5:13–14. On the fate and fortune of the mills invented by Stevin, see ibid., 5:309–412, especially 324–332.

43. ‘omme kennisse te dragen vande prouf die de Stolwijksche Molen, by M. Joost Govertsz Timmerman, op de nieuwe maniere vandoorschreven Mr. Simon Stevin vermaakte ende geheirgeert, doen soude tegens de Beeyersche Molen, daer benefens staende.’ Stevin, Principal Works, 5:387. The Beyersche mill was located in Het Beijersche, a hamlet in the province of Holland, between Gouda and Stolwijk.

44. ‘voorsz Requirant seecckere peyl neffeens twarter hebbe gestelt [...] , inder voegen dat dien volgende de] Beeyersche Molen in den bosem, een tijt van drie uyer aen maldcraneren eerst heeft gemalen, sulx Sylieden Attestanten, by een Santloper gemerkt ende onthouden hebben.’ Ibid.

45. ‘dat de voorschreve Stolwijksche Molen op de maniere vandoorschreven Mr. Simon Stevin als vooren geirgeert, daer uyn in de voorschreve bosem, daen tijt van een uyre alleenick heeft gemalen, nae het Santloper teyckyns voorsz, ende daen Sylieden alsdoen insgelijcx ey peytleeyckyns daer van genomen.’ Ibid., 5:388.

46. ‘by de selve conferentie bevonden hebben, dat de voorschreven Stolwijksche Molen in een uyre so veel water inden voorschreven bosem heeft gemalen as de Beeyersche Molen in drie uyer.’ Ibid.

47. For a similar case in the Spanish context, see Goodman, Power and Penury, 134–136. Cf. Barrera-Osorio, Experiencing Nature, 62–63. For a similar case in the Venetian context, see Berseglieri, Inventori stranieri a Venezia, 111–115 (no.48, Giacomo Obertraut).

48. ‘dat de Beeyersche Molen het voormalen heeft gehadt.’ Stevin, Principal Works, 5:388.

49. ‘D’voorsz, contra-proeve wierdt by Hellinx voortgebracht, om tot enervatio ende confusie vande 1. proeve te bethoonen dat gallelyoerde penn: of silver, mede konde gesneden werden.’ Coren, Observationes rerum, in the margins of page 181 (note 33). For more detail, see Buning, ‘Privileged Knowledge’.

50. Moreover, experiments performed within the legal framework of inventor privileges did not deal necessarily with the examination of any tangible reality. I suspect that further research will show
that the speculation on the feasibility of these projects contributed to the increasing importance of probability theories in the course of the sixteenth and seventeenth centuries. In other words, the thoughts of Blaise Pascal or Cristiaan Huygens on this matter only made sense when there was something at stake, and it was perhaps more than a coincidence that these two ‘scientists’ were closely involved in the privilege business. Cf. Franklin, The Science of Conjecture, 350.

51. This awareness primarily finds its roots in the work of Edgar Zilsel. More recent scholarship has in many ways refined the harsh dichotomy between ‘artisans’ and ‘scholars’, ‘practice’ and ‘theory’. For a useful discussion of the historiography on this issue, see Long, Artisan/Practitioners and the Rise of the New Sciences, 1400–1600, particularly 10–29. Other recent studies that take a more differentiated look at contemporary technological and scientific practice include Roberts, Schaffer, and Dear, The Mindful Hand; Harkness, The Jewel House; and Smith, The Body of the Artisan.

52. Whereas relatively little research has been done on the first centuries of the patent system, quite a lot of attention has been devoted over the last 30 years to the study of patents in the Industrial Revolution. Examples are: Dutton, The Patent System; MacLeod, Inventing the Industrial Revolution; Hilaire-Pérez, Inventions et Inventeurs; Seckelmann, Industrialisierung, Internationalisierung und Patentrecht. Aside from the fact that these studies cover a different period as well as different geographical areas, they differ from the approach presented in this paper in the sense that they are not occupied with the correlation between legal proof and scientific practice. All the same, these studies provide some valuable insights. They show, for instance, a clear notion of the patent office as a place where different actors intersected with one another at different levels. For illustration, see Seckelmann, Industrialisierung, Internationalisierung und Patentrecht, 245–307. One can apply this observation to the early-modern ‘patent office’ as well, where a wild bunch of inventors, merchants, scribes, state officials, impostors, professors, army commanders, etc., came in contact with one another.

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