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Self-Machinery?

Steel Trusses and the Management of Ruptures
in Eighteenth-Century EuropeLILIANE HILAIRE-PÉREZ and CHRISTELLE RABIER

On 13 March 1761, Monsieur de Bompré from Saint-Poursaint in Auvergne wrote to William Blakey, a surgeon and watchmaker. Blakey ran a fashionable toyware business with his wife Elisabeth Aumerle whose retail shop was located on the rue des Prouvaires close to the faubourg Saint-Honoré. Bompré was writing on behalf of a friend, who had suffered from violent diarrhea for two months caused by a bilious humor, and was eventually saved by “epiquagonera,” the South American ipecacuanha. One night after his recovery, he slipped, causing light pain in the right-hand side of the navel. Not noticing it at first, he then ached each time he blew his

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nose or touched his belly. As the rupture grew, he called on both his physician and surgeon, who equipped him with a steel truss. He was sent a *brayer* (steel bandage) from Paris, which was dreadfully painful: the ball applied to the hernia was too big and the steel belt fitted so tightly that when he coughed, the left side of the navel nearly opened. As a consequence, he stopped wearing his steel truss. On his friend's behalf, Bompré inquired:

[H]ow are the trusses you make [constructed]? If they can be put on by oneself, if they do not incommode breeches as *brayers* do, and if they have a steel-belt. I am fairly sure that their belts could be made out of cotton, so that a person could attach it by oneself. Finally, please tell me how those you advertised are made, so that my friend can go to Paris, or order them if he thinks he can have use of them, put them on and take them off by himself.¹

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Bompré, one of Blakey's fifty corresponding customers during the period 1761–71, was actively seeking information on new body technologies to contain his friend's rupture. Like other patients, he had looked in the press and requested advice from surgeons; aware of the latest drugs available on the market to cure digestive problems, he also imagined designs or materials that would help improve these instruments for the body. He was, above all, an active consumer, making innovation happen.

In the case of Blakey's steel trusses, innovation relied upon the use of new materials, especially in the different varieties of cemented steel that were manufactured in northeast England and in the Sheffield region. Cemented steel's flexibility was a result of sophisticated processes of faggoting, forge-welding, and recarburing, and was first used in watch springs. It found new applications in trusses, or bandages, for ruptures, and in pessaries for prolapsed uteri; their manufacture into first springs and later waistbands provided powerful and precise fitting to the body. As has been argued, by the eighteenth century, steel had become the material par excellence for handy, precise, and adjustable tools.² The use of steel instruments enhanced manipulation, hand dexterity, and skills; as such, they belonged

1. William Blakey correspondence with Monsieur de Bompré, 13 March 1761, in Archives nationales, Paris (hereafter AN), Y 13701. Although most of the letters are addressed to "Monsieur Blakey," it is likely that Elisabeth Aumerle, Blakey's wife, dealt with some of them, considering her handwriting added to some of the incoming letters. In the following references, this set of mostly passive correspondence, with marginal notes by the recipients, is referred to as "Blakey's correspondence."

2. John Kirkup, "From Flint to Stainless Steel"; Chris Evans, "Crucible Steel as an Enlightened Material"; Liliane Pérez, "Steel and Toy Trade between England and France"; Chris Evans and Alun Withey, "An Enlightenment in Steel?" Our article slightly diverges from the latter's argument about steel as an "enlightened material." It was less the material itself than the coordination of practical knowledge of steel materials, technological invention, and consumers' needs that shaped Enlightenment steel goods, within what we conceptualize as a Smithian economy of "fitness of purpose."

to the numerous metallurgic devices that were ranged under the designation of toyware, which covered a large range of “curious commodities,” from chains, buckles, buttons, pins, and spurs to toothpicks, hair irons, and tweezers. Bodily technologies, which penetrated the skin or were applied to its surface, used a wide range of materials, including leather, human hair, tortoise shell, and baleen.³ From ore to skin, from Sheffield to Marennes or Gand, steel trusses, processed along complex and intertwining chains, exemplify the intricacies of the Enlightenment worlds of manufacturing, trade, and consumption. Steel trusses were part of an economy of variety and adaptability that relied upon a combination of media and the fitness of materials to supply consumers’ needs. They were emblematic of the praise for functionality, for “fitness of purpose” in Adam Smith’s words.⁴ We shall see that the careful management of the qualities of steel was pivotal to the making of steel trusses.

Steel trusses indeed fit into the burgeoning consumer society in which health care and medicine played an important part. The early modern consumption of medicine has been a major subject of research since the groundbreaking work of Roy Porter on patients as consumers. In his footsteps, scholars have studied the innovative marketing techniques used by practitioners throughout Europe to sell their secret medicines.⁵ Apart from drugs and domestic medicine pamphlets, however, very little attention has been given to other types of medical commodities, which have recently received closer historical scrutiny for the post-1800 era. Stanley Reiser, as early as 1978, promoted the idea that “modern” medicine was technological, where almost every major breakthrough came with devices aiding diagnosis, such as Laennec’s stethoscope, and information management.⁶ One could argue, however, that in a way not dissimilar to the path followed by “technological medicine” (Reiser), the face of medicine changed with the early modern use of instruments for therapeutics. Steel trusses, accordingly, represent a lens through which one can uncover not only the refashioning of medical care, but also the manufacturing, trade, and consumption of an eighteenth-century technology.

3. Maxine Berg and Helen Clifford, eds., *Consumers and Luxury*; Liliâne Hilaire-Pérez, “Invention, culture technique et entreprise entre France et Angleterre au XVIII^e siècle”; John Kirkup, *The Evolution of Surgical Instruments*; Lynn Sorge-English, *Stays and Body Image in London*.

4. Adam Smith, *The Theory of Moral Sentiments*, 179.

5. Roy Porter, “The Patient’s View”; Steve Shapin and Simon Schaffer, *Leviathan and the Air-Pump*; John Brewer and Roy Porter, eds., *Consumption and the World of Goods*; Jones, “The Great Chain of Buying”; David Gentilcore, *Medical Charlatanism in Early Modern Italy*; David Boyd Haycock and Patrick Wallis, eds., *Quackery and Commerce in Seventeenth-Century London*.

6. Stanley Joel Reiser, *Medicine and the Reign of Technology and Technological Medicine*. See also Carsten Timmermann and Julie Anderson, eds., *Devices and Designs*.

“Spring most Easy, Durable and Pleasant”: Innovative Herniary Management in the Eighteenth Century

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Hernias were among the most widespread of ailments in the eyes of eighteenth-century sufferers, although few records are as explicit on this matter as those of the French-based manufacturers and salesmen of toyware, Blakey and his wife.⁷ Leafing through their business correspondence, one is amazed at the variety of herniary problems that potential clients described; for example, ruptures affected children and adults and extruded from the belly, navel, or groin on either one or two sides. Patients' complaints thus matched the ailments that advertisers in London journals highlighted, such as truss-maker Guy Nutt, who offered trusses for “Men, Women and Children, in the Navel, Cod or Groys [Groin].”⁸ Most correspondents inquiring about Blakey's trusses depicted their ailments on a scale ranging from “undetectable” to “extremely painful.”⁹ Although extremely uncomfortable at times, some ruptures were thought of as a natural development of the body, especially the aging or the reproductive one (fig. 1). Three fathers requested trusses for their 9–10-year-old sons, one of whom had already been wearing a truss for three years. When she decided that the growth of her navel tumor had to be prevented, Madame de Berruyer wrote to Blakey, suggesting that the birth of her only son several years earlier had caused her recent rupture.¹⁰ Hernias were believed to be environment dependent or the result of a physiological condition.

More than a medical issue, ruptures had disruptive social consequences. A monk, Dom Matthieu Leblondot, complained that his fairly large rupture was becoming painful “when the weather changed, especially in winter or stormy weather”; yet, he was mostly annoyed by his being prevented from

7. In addition to the several editions of William Blakey's *Instruction pour prévenir les descentes ou hernies*, first published in 1758 and last translated and, with many additions, last published in 1792 as *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, the Blakeys left business papers that help us to understand how metalworking became medical. Last but not least, they left an invaluable correspondence with fifty customers between 1760 and 1770 who sought information about prices, patterns, and the technicalities of trusses, made orders, and requested post-sales services. This correspondence shows how customers purchased and actually fitted trusses to their bodies (in AN, Y 13701).

8. “Advertisements.” *The London Journal*, 2 May 1724, 9 (in Burney Collection Newspapers, hereafter BCN).

9. See, for example, Blakey correspondence with: Dacquet, “I can easily get [my hernia] in with my hands, without any pain. It does not incommode me, neither for walking, nor for other exercises; it has the size of a small egg” (n.d.); and Madame de Berruyer, “[My ailment] occasions awful gripes and pains in my bellow, my back, my side and whole body” (10 October 1762) (both in AN, Y 13701).

10. See Blakey correspondence with: St. Georges, 24 August, 4 September 1762; Depinefort, 25 August 1762; Duranville, 17 February 1763; and Berruyer, 10 October 1762 (all in AN, Y 13701).

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FIG. 1 "Case of Margaret White, showing the gut hanging out of the navel."
(Source: William Cheselden, *Anatomy of the Human Body* [London: William Bowyer, 1740]. Courtesy of the Wellcome Library, London.)

"singing in the choir." One Bourgier, who had been affected by an anal hernia since 1725, wrote to Blakey in 1764 that he "had to make the reduction of the anus' right part several times a day" for the past forty years. Strangulated hernias, which induced sure and quick death, were considered a medical problem, steadily growing in the literature at the time. Blakey's correspondents expressed fear of this eventuality and displayed wide anatomical and physiological knowledge of their ruptures, relating them to the out-

burst of the “epiploon” or the weakening of the “sphincters.”¹¹ Nearly a century earlier, Nicolas Lequin had already described patients’ experiences; for example, they had to hide their condition even more than if they suffered from venereal disease, and several families rejected prospective spouses on the grounds of existing ruptures.¹² Indeed, herniary problems, in the eyes of the sufferers, were not only medical, but also social problems whose management was a sensitive issue.

To deal with their ruptures, eighteenth-century sufferers relied upon their own bodily knowledge or reached out to experts for advice. In 1742, war engineer Abeille was affected by a hernia before he designed a special bandage for himself, an invention he subsequently offered to a military surgeon of Maubeuge.¹³ Blakey’s correspondents mention various strategies and devices they used to lessen their own herniary problems, ranging from soft materials to different types of trusses they had acquired locally. As a consequence, various trades became involved in truss-making, far exceeding the capacity of the medical trades. In early modern Paris, trusses were manufactured by *boursiers* (purse-makers), but also by cutlers and smiths and probably locksmiths, tailors, and stay-makers as well. For instance, one Dossemont, a tailor for ladies who, in 1774, offered a “device to support women’s bosom” and another one to “work for their belly if it were too fat” to the Académie royale de chirurgie. Bompré described both local bandage-making in Auvergne and Paris steel bandages that had been ordered for him by surgeons.¹⁴ In the eyes of the Blakeys’ correspondents, William Blakey represented only one option among numerous trades, from medical to manufacturing, to whom they could appeal for help with their ailments.

Herniary management was thus considered an ongoing process into which various tools could be involved, ranging from poultices to mechanical devices.¹⁵ Blakey, for instance, was offering a comprehensive treatment in the opinion of Leblondot: two visits for diagnosis, a prescription for a plaster, along with a *suspensoir* (jockstrap), which “greatly eased” him before he could wear a truss equipped with *pelote creuse* (concave cushions) that “was so efficient that the rupture was contained in a few days.” He was then able to fill up the pad as part of a permanent treatment.¹⁶ Blakey him-

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11. See Blakey correspondence with: Dom Matthieu Leblondot, n.d., 1764; Bourgier, 29 October 1764; and Charpentier, 16 April 1764 (all in AN, Y 13701).

12. Nicolas Lequin, *Traité des hernies, ou Découvertes*, 2–3.

13. Jean-Gaffin Gallon, *Machines et inventions approuvées par l’Académie royale des sciences*, 191–200.

14. “Rapport d’après l’examen des différens corps inventés par M. Dossemont, et présentés à l’Académie royale de chirurgie,” in Académie nationale de médecine, Académie royale de chirurgie, Paris (hereafter ARC), 32, dossier 3 (119), 13 October 1774; Blakey correspondence with Bompré, 13 March 1761 (in AN, Y 13701).

15. On late medieval management, see Michael McVaugh, “Cataracts and Hernias.”

16. See Blakey correspondence with: Leblondot, n.d., 1764; and Bourgier, 29 October 1764 (both in AN, Y 13701).

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self described the body in mechanical terms, as a material subject to forces of expansion and compression, very much like steel; he diagnosed the hernia as a tumor that could disappear by the pressure of a hand or when the body was at rest—when laying on one's back, for instance. Yet, Blakey regularly made use of ointments, in addition to his bandages. Patients and truss-makers, both of whom were likely to take a practical approach to herniary management, made alternate use of humoral or mechanical theories of the body, looking for greater ease more than full recovery. Men and women affected with herniary ailments actively sought new ways to contain them, thus playing a substantial role in innovation processes.

In late-seventeenth-century Paris, experts competed to offer a suitable and "radical" cure for hernias. Steel trusses, in the eyes of Pierre Dionis for instance, represented a real advantage to other preexisting "radical cures." The surgeon warned about castration and the "golden stitch" operation described by Ambroise Paré, which used gold, lead, or hemp thread to stitch the wound made by the surgeon to access the gut; both techniques endangered patients' lives, without necessarily curing the rupture.¹⁷ Indeed, diagnostics were critical for distinguishing tumors from true hernias, for which steel trusses had become a major therapy.

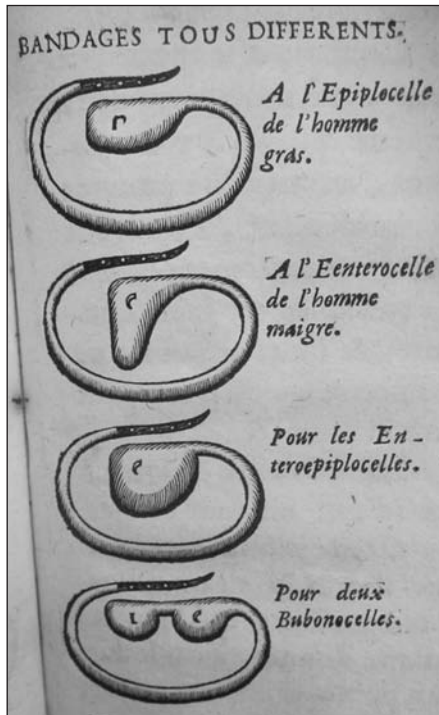
Herniary surgeons' experiments with materials and processes have left few traces apart from rare collected artifacts.¹⁸ In 1665, Lequin's steel bandage was approved, and indeed praised by court practitioners, the Paris Faculty of Medicine, and the College of Saint-Cosme for surgeons.¹⁹ In *Traité des hernies, ou Décéntes* (1685), Lequin made clear that his steel trusses presented a real advantage over the "cruel operations, castration, golden stitch and the like, which are no longer necessary"; once the rupture "reduced," or was partly put back into the belly by means of ointments or resting techniques, the patient could use the bandage, of which the book provided a drawing (fig. 2). Not only was the steel important to make a good spring waistband, but also the shape and material of the cushion required attention. Above all, however, Lequin favored the truss made with iron wire, which one could nearly apply for oneself. Iron wire, according to him, could be easily "governed" without breaking, though he warned his readers about using German wire iron²⁰ (fig. 3). Although the word "spring" (*ressort*) seems to designate the waistband in Lequin's trusses, springs might also have been used in the cushion device itself, where they were even more subject to

17. Pierre Dionis, *Cours d'opérations de chirurgie démontrées au Jardin royal*, 236ff.

18. This article was about to be edited when the authors discovered a collection of historical metal trusses at the Musée d'histoire de la médecine in Paris. This invaluable collection requires chemical analyses to determine the changes in materials and processes. We hope to do so in the near future.

19. See *Statuts, reglemens, arrests du conseil d'Etat et lettres patentes portant confirmation de la Déclaration du roy du mois de novembre 1634*.

20. Lequin, *Traité des hernies, ou Décéntes*, "Au lecteur" (n.p.).



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FIG. 2 Steel trusses necessary for the cure of hernias. (Source: Nicolas Lequin, *Traité des hernies, ou Décentes*, 2nd ed. [Paris: chez l'auteur, 1685]. Courtesy of the Wellcome Library, London.)



FIG. 3 Ironware truss, possibly by Nicolas Lequin. (Source: Rainal Collection, no. 42. Courtesy of the Musée d'histoire de la médecine, Paris.)

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corrosion and breakage. Nicolas de Blégny's trusses were much like Lequin's, although Blégny developed a range of therapeutic tools to prevent strangulation; the truss was only part of the curing techniques this surgeon and polymath retailed. Blégny's fortune partly rested on the manufacturing of Prieur de Cabrière medicine, whose secret was given to him by Louis XIV himself, and which the surgeon suggested be applied to extruding body parts within the humoral theoretical framework. In his 1676 treatise *L'Art de guérir les hernies* (The art of curing hernias), he offered external ointments, internal powders, and discussed the role of the magnet. He also advertised a wide range of functional trusses (fig. 4). Blakey's trusses (fig. 5), from the evidence of the Rainal Collection at the Musée d'histoire de la médecine in Paris, show a strikingly different object; although the shape remained similar, the waistband, compared to Lequin's (figs. 6–7), was significantly thinned down, transforming a heavy truss into a light and flexible containing device. As Blakey put it to Count Kaunitz-Rittberg: "a steel-truss was a watch-making work, made with as much precision as a watch movement, but whose springs are of a superior quality."²¹

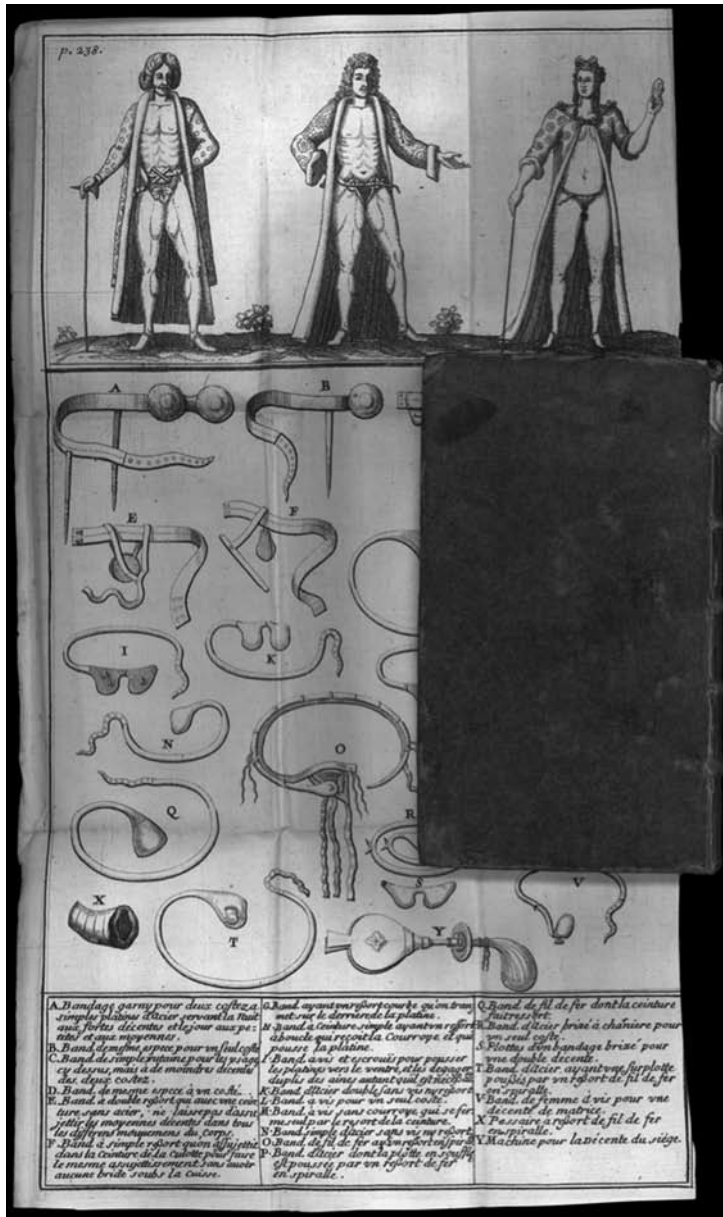
Steel trusses were soon viewed as having achieved real progress in herniary management within the rupture-containing, therapeutic armamentarium, as one can infer from bandage advertisements in eighteenth-century London. From 1713, the date of the first advertisement for trusses in the press, steel was their main material, except for those truss-makers who used a "spring most easy, durable and pleasant for such who cannot wear steel." John Antonio Rosa, who was from Tuscany, advertised his "knowledge of curing to Perfection all kind of RUPTURES in both sexes, Old and Young, with that Judgment and Ease that the Patient need not keep his bed, may eat, drink, walk about and do any Exercise as usually" and his making of "two sorts of Trusses (no Steel being in them)."²² Just as rubber would be used later, in the nineteenth century, the use of steel in trusses refashioned the entire sector because it had properties of spring and strength that no other material could offer at that time.²³ And from the late seventeenth century onward, truss-makers improved upon the steel truss by using the material in springs and waistbands.

Steel trusses became internationally successful. For his part, Blakey recorded that, in 1732 or 1733, a fellow compatriot named Neilson, who had joined the Paris guild of surgeons as an expert in ruptures, came to Blakey's

21. Nicolas de Blégny, *L'Art de guérir les hernies*. Blakey used several poultices. See his correspondence with: an unknown correspondent, 13 September 1760; and Kaunitz-Rittberg, 23 February 1764 (both in AN, Y 13701).

22. *The Daily Journal*, 12 May 1729, 2 (in BCN).

23. Acknowledged in the eighteenth century, rubber was extensively used later in manufacturing medical devices when the vulcanization technology was stabilized; see John Loadman, *Tears of the Tree*. On vulcanization, see Cai Guise-Richardson, "Redefining Vulcanization." On the use of rubber by nineteenth-century herniary surgeons, see Manuel Charpy, "Craze and Shame," 443.



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FIG. 4 Folded plate, intended as an image catalog in the treatise. Human models are, on the left, two men equipped with trusses for the navel, and on the right, a woman wearing a pessary. The double-sided truss depicted in A is similar to a drawing in Nicolas Lequin's *Traité des hernies, ou Découvertes*. (Source: Nicolas de Bléigny, *L'Art de guérir les hernies*. [Paris: Laurent d'Houry, 1688]. Courtesy of the Académie de médecine, Paris.)

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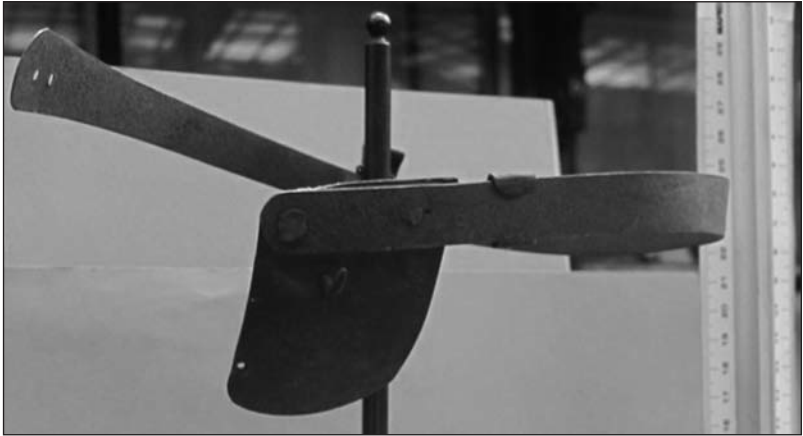


FIG. 5 Flexible watch-spring truss by William Blakey (ca.1760). The waistband's flexibility is achieved by the thin lamination of the steel. (Source: Rainal Collection, no. 36. Courtesy of the Musée d'histoire de la médecine, Paris.)



FIG. 6 Nicolas Lequin's "broken" truss. (Source: Rainal Collection, no. 16. Courtesy of the Musée d'histoire de la médecine, Paris.)

father with the aim of adapting watch springs to trusses. Blakey recalled that because Neilson's device was not reliable, he told the surgeon that the waistband itself, and not only the springs adapted to the cushion, "had to be tempered like watch-springs."²⁴ Blakey's father, an English Jacobite who was also

24. Blakey, *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, 55–57.

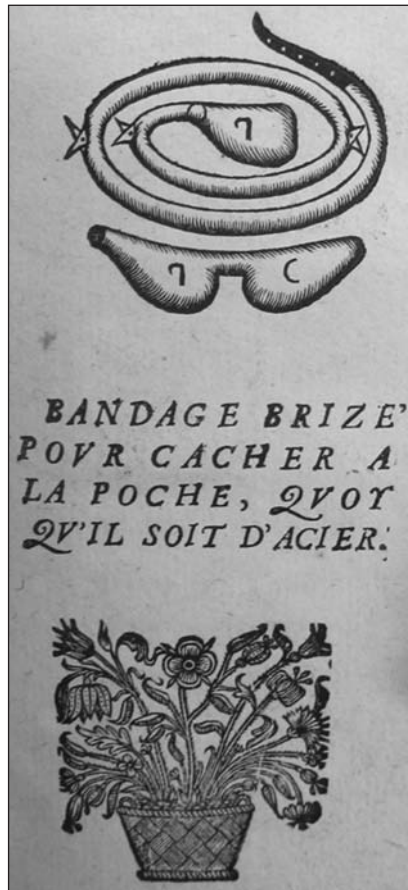


FIG. 7 Nicolas Lequin's "broken" truss, "to hide in the pocket although being in steel." (Source: Nicolas Lequin, *Traité des hernies, ou Décentes*, 2nd ed. [Paris: chez l'auteur, 1685]. Courtesy of the Wellcome Library, London.)

named William, had contributed, along with other compatriots, to initiating a large transfer of skills at the invitation of John Law, director general of finance in France during the Regency. Since the late 1720s, William Blakey had been an innovative manufacturer of watch pinions and springs at Crécy-en-Brie, and his factory was passed to his son who later purchased a factory for iron-rolling in Essonne. There, he developed a steel-wire mill, for which the Académie des sciences granted a *privilège* (patent) in 1744. Madame Blakey, as mentioned earlier, had a shop selling toys and tools in Paris; a "privileged merchant attached to the court," she was the exclusive seller of Benjamin Huntsman's steel in France. Blister and cast steel from Sheffield were produced at Essonne specifically for making trusses.²⁵ Steel trusses

25. Pérez, "Steel and Toy Trade between England and France," 129.

were the primary product of the Blakey firm, which later developed a wide range of innovative devices, from mechanical clocks to mining pumps.

Madame Blakey used a range of steel of different qualities from a wide network of British suppliers, but especially Huntsman's from Sheffield, carefully managing her imports according to their respective uses in the Essonne factory. Her "Book of Foreign Goods" (1768–69), along with the British invoices of 1769, indicate that her trade in steel was by no mean limited to only one type.²⁶ Huntsman manufactured a variety of steels, ranging from 3d/lb to 37,5d/lb and from blister to cast, and in different qualities, such as "common blister," "best blister steel," and "super fine cast steel." Another was called "barr steel," which was priced similarly to blister. Steel products were priced according to their shapes; for example, plates, thin rolled plates, bars and wire, strong steel wire, and small steel wire. Cast steel itself was not restricted to one generic quality or price. In December 1765, Huntsman informed the Blakeys about the types of cast steel he could supply for varied uses, each use determining the required quality and hence the price. Even units of weights were heterogeneous. For example, Huntsman listed "cast steel for razors and penknives 81sh/C," "rowled steel 93sh4d/C," "small square 112sh/C," and "small round & square for watch & clockmakers' use the very best sort 20d/lb." He summarized all this as "the above sorted sorts of my steel." In this economy of variety, the customer ruled the trade more than the producer, and therefore, to some extent, Madame Blakey helped shape British steel. Cast steel was made "to the pattern." Huntsman wrote to Blakey in 1766 that he had sent him "3C to the pattern you left when at Sheffield and 1C of each n°1&2 which are in plates at 11 inch broad & 24 inch long. Since the forward have recvd a letter from Mrs. Blakey with pattern of 4C of steel rowled and should be glad you'll inform me the best length & bredth; the same should be rowled in that it be no disadvantage to the customer abroad."²⁷ In a 1768 order, Madame Blakey required "plates 5 to 6 feet long on the greatest breadth, and that the edges be cut off, that is raised by shears (*dressés aux ciseaux*), and that thickness be, in keeping with the sample that Mr. Blakey gave you . . . , neither thin nor thick but roughly $\frac{1}{4}$ of line thick."²⁸ As a mercer, Madame Blakey valued precision, conditioning, and conformity of the material to samples in all sorts of consumer goods. She drew an analogy between steel and fabric and other samples, much as Blakey had done between truss-making and watch-making. The economy of quality, based on consumers' needs, was starting to operate on the principle of "fitness to purpose," opening the way to the conformity of materials for use and function.

26. Elisabeth Blakey, "Book of Foreign Goods" (1768–69) and British invoices in the bundle entitled "Factures diverses de Londres 1769" (both in AN, Y 13701).

27. Blakey correspondence with Benjamin Huntsman, 28 July 1766 (in AN, Y 13701).

28. Blakey correspondence, letter to William Huntsman, 18 July 1768 (in AN, Y 13701).

As the exclusive manufacturer of British cast steel, which he knew how to properly temper, over the course of a year Blakey designed a steel waist-band truss, with no under-thigh, which could contain hernias in an easier and stronger manner. In applying to the body the spring-steel properties he had achieved in watchmaking, Blakey was finally able to secure a *privilège* for Neilson around 1733, and secure for himself the exclusive manufacturing rights for twelve years. Before Neilson approached his father about his device, Blakey had had no interest in rupture management:

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Seeing the quantity of bandages M. Neilson applied and exported, I conceived the idea of examining the disorder. . . . I found, in the most reputed authors, that no less than the tenth part of human kind [was] afflicted with ruptures, who make a great secret of it. . . . After having studied what was necessary to understand the nature of the different ruptures, I went through an examination in the college of surgeons at Paris and was received; which being done, I had soon practice enough to employ pupils, and fitters-up of elastic bandages.²⁹

Although he does not give his source for the figure of 10 percent (“tenth part”) of the general population that was afflicted, Blakey made it clear that truss-making was a successful trade by the mid-eighteenth century. With Neilson’s collaboration, he himself had discovered the vast potential of the truss market. Thereafter, Blakey developed new processes for manufacturing them.

Innovation in rupture treatment resulted in a quite unusual innovation-protection policy in France. When the French royal authorities started to regulate the steel truss industry in the late seventeenth century, rather than allowing the new device to be patented, they assigned the manufacturing of steel trusses to the surgical guild in order to protect the “composition of special drugs and the manufacturing and trimming of trusses, strapping bands and bandages with iron and steel threads.”³⁰ Ruptures had indeed attracted some attention from medical practitioners during the seventeenth century, particularly when they affected the genitals. As a means of control over the new technology, however, the French monarchy created the occupational category of “herniary surgeons” (*chirurgiens herniaires*), which was included in the guild of master surgeons, albeit with a lesser entrance fee and lighter examination. The master surgeons put up strong resistance against what they felt a dangerous reform of their trade and an

29. Blakey, *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, 57–58. On the possible date of Neilson’s privilege (1733), see advertisement that reads, “[These bandages’] good effects have made them chiefly used by the best practitioners in Europe for these past 37 years” in *Gazetteer and New Daily Advertiser*, 19 October 1770, 3 (in BCN).

30. *Statuts, reglemens, arrests du conseil d’Etat*, Arrêt du Conseil d’État (6 April 1694).

unnecessary infringement of court practitioners in the guild's affairs.³¹ By the early eighteenth century, herniary surgery was at the forefront of surgeons' claims as a profession, and innovative steel trusses were instrumental in enhancing their standing in the eyes of the public. When the college of surgeons acquired the right to publicly teach their trade with the financial support of the monarchy, and without the supervision of the medical faculty, public lessons about ruptures management were among the first offered.³² As the self-proclaimed learned body on surgery in 1732, before royal approval of its missions in 1748 as the Académie royale de chirurgie, the Société de chirurgie gave official approval to innovative surgical instruments, which included new bandages. Yet, in the words of a major herniary surgeon, Georges Arnauld, who had to migrate to London because of a lack of occupational support, herniary surgery was perceived as the poor stepchild of surgical science. In 1769, master *boursiers* had regained the right to manufacture and sell herniary bandages in court.³³ Yet, by then, herniary surgeons, whose occupation was still acknowledged in the nineteenth century, controlled part of the manufacturing of medical artifacts.

Successful steel-making processes, however much under the protection of one guild, required collaboration between the metal and surgical trades. Although reports from the Académie de chirurgie concerning trusses made throughout France, and also in Florence, Turin, London, and Edinburgh, tended to overplay the surgeons' part in the invention of steel trusses, the actual inventions themselves involved multiple skills. Truss-makers kept improving their designs and products through collaboration with other trades. According to evidence from the Académie royale de chirurgie, however, such collaboration was difficult to attain. One Paret, physician at St-Étienne-en-Forez, wishing to make use of a "parcel of the task force constituted by the 60,000 inhabitants of one or the other sex, who [had been] engaged in changing iron into varied shapes," with a view toward making flexible metal trusses, finally managed to "extract [it] from these machine men." The referee criticized the outcome, offering instead a description of a better process: "the iron must come from Germany, in rolled plates, and then must be passed into a draw hole, maintained by a brass thread, reddened to give flexibility and then cooled to give strength."³⁴ By no means was matching anatomical knowledge with metallurgic know-how an easy task.

31. Michael Döring, *Epistola de nova, rara et admiranda herniae uterinae, atque hanc justo tempore subsequentis partus caesarei historia*; Henri le Dran and Antoine Passerat, *Au Roy*; Alexandre Lunel, *La Maison médicale du Roi, XVI^e–XVIII^e siècles*, 238–39.

32. Michel Louis Reneaulme de Lagaranne, *Discours pour l'ouverture de l'École de Chirurgie*.

33. Georges Arnaud, *Mémoires de Chirurgie*, v; *Sentence de police rendue en faveur de la communauté des maîtres boursiers à Paris contre le corps des maîtres en l'art de chirurgie de Paris*.

34. "Bandages élastiques de M. Paret, St-Étienne en Forez," in ARC 16, dossier 1 (17), n.d.

Primarily trained in the watchmaking trade, William Blakey achieved his substantial success through education in various trades. When he began to market his own steel trusses, Blakey had previously been involved in the iron-and-steel trade for a long while before he joined the watchmakers' guild in 1750. In his eyes, however, his education in surgery was crucial to the innovative process. As he asserted in his treatise: "the study of surgery alone can never give the understanding that is required to make a good elastic bandage: nor can a mechanic, without anatomical knowledge of the exterior and interior parts, make a good instrument to contain a hernia in its proper place without pain."³⁵ When the engineer decided to study the bodily disorder:

Though I had a general notion of the human structure, having studied osteology, and the muscular part of our frame for drawing; and likewise the interior part for my own speculation, I went to Mr. Férin's anatomical amphitheatre to look more minutely into the muscles of the abdomen, or lower part of the body; I saw that no bandage-maker had even known how to make a cushion proper to press on the parts where hernias appear; and that [the] iron or steel parts of the waistband[s] were wrongly shaped.

Having experienced the need for licensed trade, Blakey was received into the Collège de chirurgie in 1742 as an expert on trusses, even before buying his mastership as a watchmaker in 1750. Additional reasons might explain his refashioning as a surgeon: Blakey believed that, when the patent expired, his better knowledge of anatomy would help him improve the devices. He already had some anatomical knowledge because this was one way to acquire the necessary drawing skills of his trade.³⁶ He was also able to cultivate relationships among surgical trainees, who might, in the long run, refer cases to him. Elsewhere, such as in London, his surgical training was of little use because his technological breakthrough on trusses was deemed sufficient for successful marketing, although his title of surgeon might enhance their authenticity.

Innovation in truss-making was therefore an ongoing process involving more than one trade that soon spread all over Europe. In France, surgeons were at the forefront of rupture management, as the monarchy conferred privileged rights to the guild of master surgeons over the manufacturing and selling of bandages. Everywhere else, the truss sector was divided between steel trusses and lesser substitutes for them, which included medication or devices made out of traditional materials like fabrics and leather. Yet, for truss manufacturing, which was becoming embedded into the highly interrelated production of toys and tools, a commercial strategy was

35. Blakey, *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, 57–58.

36. Frédéric Morvan, "L'École gratuite de dessin de Rouen."

crucial because such manufacturing operated in an open and growing world of exchange. Not only did truss-makers innovate; they also managed a chain of processes and a network in which suppliers, together with partners, sale representatives, and customers, were shaping the products.

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When Truss-Makers and Customers Met: Trading Steel Trusses in Eighteenth-Century Paris and London

In the early modern period, the selling of steel trusses combined different scales and modes of retailing, which contributed to making it profitable. On the local level, a storefront was the most obvious way to attain a clientele within a neighborhood. In the changing early modern economy, signs also became an efficient way to advertise the medical trade, although their regulation differed from one place to another. As the French monarchy established the financial security of surgeons in exchange for serving the public, the late-seventeenth-century ruling about herniary surgery made clear the advantages that truss-makers gained with guild membership.³⁷ Nonmembers were forbidden “any board, notice, sign, poster, bill or display of truss within or without their houses.”³⁸ Blégnys’s “Manufacture royale des bandages,” which opened in the late 1670s, had its main entrance on rue Guénégaud, where he retailed a large array of goods—trusses, Prieur de Cabrière ointment and other medicines, medical books—for self-medicating patients and medical students, who in the later years could attend public conferences on medical topics as well. In the early 1690s, Blégnys opened an alternative back entrance in the shop of de Blegny son, King’s apothecary, on the quay de Nesle at the “Devisé royale.” He strongly suggested that ashamed male and female hernia sufferers could discreetly enquire about trusses, buy medicines, or access fomentations on the first floor.³⁹ Shop signs helped locate truss-makers’ shops in cities. Even after the 1762–63 removal of hanging shop signs within the cities of London and Westminster, truss-makers continued to reproduce shop sign designs in advertisements.⁴⁰ Paris’s street boutiques and apartments on first floors had separate spaces for patients’ reception and truss-fitting. François Lidon’s boutique received his clientele in a front shop, which was decorated with paintings and had a back office, where he kept a small stock of fitted trusses (*bandages garnis*), as well as an anvil block, metal files, a small pair

37. Jean-Pierre Willems, *Enseignes du Musée Carnavalet, histoire de Paris*; Ambrose Heal, *The Signboards of Old London Shops*; David Garrioch, “House Names, Shop Signs and Social Organization in Western European Cities.” On Paris surgeons’ public service, see Christelle Rabier, “Le ‘service public’ de la chirurgie.”

38. *Statuts, reglemens, arrests du conseil d’Etat*, Arrêt du Conseil d’État (6 April 1694).

39. Blégnys, *L’Art de guérir les hernies*, 285; Abraham du Pradel, *Le Livre commode*, 115.

40. Heal, *The Signboards of Old London Shops*, 2–4; Nancy Cox and Karin Dannehl, *Perceptions of Retailing in Early Modern England*, 34.

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FIG. 8 Advertisement addressed to “workmen” (1763). Trade card of Holmes and Laurie, truss-makers “at the Golden Key” on Bartholomew Close, London. Holmes’s wife is assisting the women. (Source: Courtesy of the Museum of London.)

of shears, metal hammers, and used springs. Another truss-maker, one Ronsil, used curtains to separate the reception area, which had a long chair and copper water fountain, from his workshop.⁴¹ In Blakey’s case, his shop was first established in the Rouen court, off rue de l’Éperon. He had a placard made advertising “elastic bandages, very soft and light, not subject to breakage,” and stipulating that the poor would get them at three livres, for which he was licensed by the Lieutenant de Police Bertin. This placard most probably operated like the London trade cards that advertised to suitable customers⁴² (fig. 8). However, a part of Blakey’s business was not conducted

41. “Inventaire après le décès du Sr François Lidon, maître en chirurgie en une maison sise rue Tiquetonne n°120,” in AN, Minutier central, Étude XV, 1175 (13 February–13 March 1804); “Inventaire après décès de Valentin Gabriel Ronsil, chirurgien herniaire des Hôpitaux et Prisons de Paris,” in AN, Minutier central, Étude XLIII, 777 (8 April 1830).

42. “Avis au public. Bandages élastiques. Ces bandages sont faits avec l’acier le plus fin trempé de la même manière que les ressorts de montres et pendules, très légers, très

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at his shop. When clients were wealthy enough, they were treated in person during visits made by Blakey himself or his servants. A client named Debar, who from Versailles had requested information on trusses, was sent a “Mr. Brognard” with a truss two days later. “In Paris this business [was] carried on with more delicacy and secrecy, being wholly transacted in private dwelling-houses,” according to Blakey, in contrast to London, where health care was made a public affair.⁴³ Made-to-order retailing was key to accessing the wealthy.

For customers who did not wish to or could not make a day trip to the capital city, correspondence and mail order proved invaluable for obtaining special technologies and avoiding expensive journeys. With the exception of one Paris correspondent, who was unwell and therefore unable to come in person, Blakey’s correspondents lived some distance from his shop on the rue St. Honoré, where he had moved. Seven purchasers wrote from the region around Paris, and also from Tours, Orléans, Montargis, and Montgeron (fig. 9). Most of Blakey’s correspondents were located not far from the main postal routes in Normandy, Brittany, Champagne, Lorraine, Burgundy, and northern France. In 1685, Lequin had noted the practice of making medical trips like these, warning that most of his provincial customers suffered from the poor adjustment of their trusses.⁴⁴ Blakey’s five foreign customers dwelled in the Low Countries, where he had an interest in business ventures for manufacturing steam engines in northern Europe. Through the practice of mail order, Blakey’s business stretched throughout Europe. Yet, finding a truss-maker—a good one—was no easy task for a potential customer, especially in the provinces, hence letters and mail orders proved to be indispensable. Blakey’s correspondence indicates the various ways in which sufferers accessed herniary surgeons.

These sufferers actively sought innovative devices or reliable assessments of their quality. As the letters from Blakey’s clients demonstrate, word of mouth, gazettes, and competing practitioners were all within reach. A few correspondents approached other surgeons to test their devices. A middle-class woman from Rouen described how, having noticed a small tumor, she discussed it with her husband, who then consulted a business colleague, who gave his opinion based on what his own wife was experiencing. The

doux, se prêtant à tous les mouvements du corps, tenant en toute situation les parties réduites et point sujets à se casser dans les chûtes ou mouvements violents. Le bureau est ouvert tous les jours au fond de la cour de Rouen, rue de lépron, quartier saint-André des Arts. On les fournit aux pauvres à trois livres. Permis d’imprimer et d’afficher, ce 7 juin 1758. Bertin” (in Archives départementales de la Gironde, Bordeaux [hereafter ADG], 7 B 1121).

43. Blakey correspondence with Debar, 26 February, 1 March (year not indicated) (in AN, Y 13701). The quote is from Blakey, *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, 60.

44. Guy Arbellot, *Autour des routes de postes*; Patrick Marchand, *Le Maître de poste et le messager*; Lequin, *Traité des hernies, ou Décences*, 58.

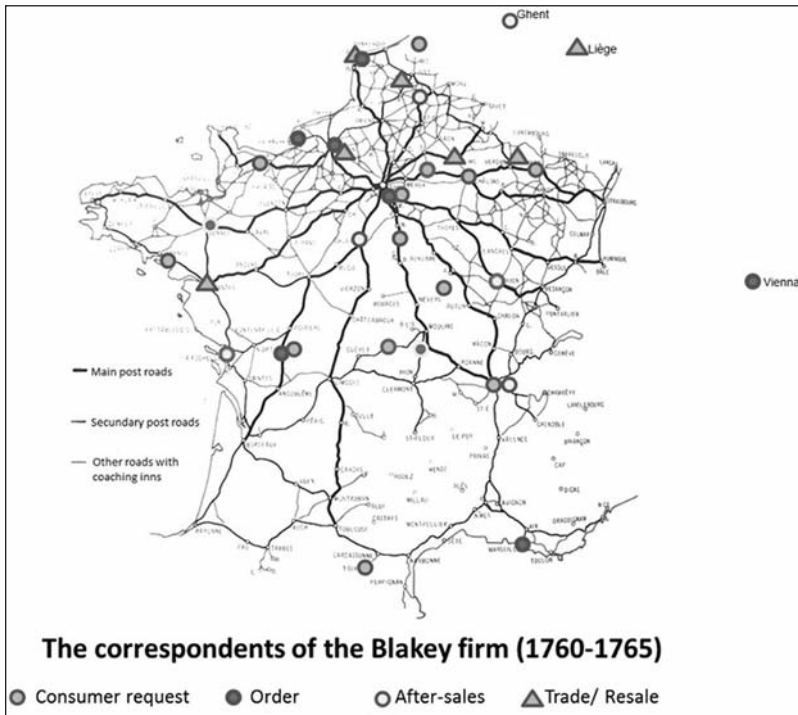
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FIG. 9 Map showing the locations of William Blakey's private clients. (Source: Correspondence of William Blakey, in Archives nationales, Paris, Y 13701.)

Rouen woman even hinted that, if it proved effective, the device would be sold to another woman, one with “substantial property.” The network of correspondents was thus crucial in procuring information and shaping demand and supply, and even for distribution. One correspondent named Renoir went as far as to offer his “little services” as *contrôleur des postes* for a discount on his orders.⁴⁵ Social connections, in relation to gender or class, determined economic information and, consequently, trade.

If signs and word-of-mouth publicity were part of the marketing process, British and French entrepreneurs in trusses made substantial use of publishing to support their businesses. Newspapers proved efficient: sufferers keen to find new devices read advertisements in the press. For example, a printer named Kints, who was printer to the cardinal of Bavaria in Liège, mentioned that he had heard about two new trusses through a friend who had read about them in Brussels's *Annonces*; and Count Kaunitz-Rittberg, in Vienna at the time, had seen an advertisement in the Paris weekly

45. See, for example, Blakey correspondence with: Leblondot, n.d., 1764; Berruyer, 10 October 1762; and Renoir, 10 July 1761 (all in AN, Y 13701).

L'Avant-Coureur in 1763 about a special truss for anal rupture.⁴⁶ Blakey had recourse to an even more specialized way of advertising his goods: leaflets. In their correspondence, many of his clients referred to leaflets they had received from the manufacturer, a possible early instance of mass mailing.⁴⁷ This form of marketing can be documented as early as 1715, when Herbinet, a Parisian expert surgeon of Saint-Cosme “for the manufacturing, conforming and application of trusses for the cure of hernias and ruptures,” attempted to attract a London clientele. He had written to Hans Sloane on the recommendation of Abbé Bignon to obtain retailing advice. He then attached a one-page printed catalog of an impressive range of steel and non-steel trusses, spring wooden legs, “very light” hands in wood, boiled leather, and cardboard, boots for crooked legs, iron bodices for children, and *suspensoirs* that did wonders for pregnant women.⁴⁸ Treatises also played an advertising role. Lequin’s *Traité des hernies, ou Décentes* included drawings of trusses (see figs. 2 and 7), as did the 1688 edition of Blégny’s *L’Art de guérir les hernies* (see fig. 4). Both thereby turned their treatises into sales catalogs. This trend was confirmed in the eighteenth-century practice of using lavish prints. For example, Jean Juville mentioned that he used expensive color print in his treatise on trusses because “they pleased foreigners more,” suggesting that his treatise was used as a catalog for international trade⁴⁹ (fig. 10). In that case, information strategies included various print formats, including advertisements in newspapers, small pamphlets, and lavishly illustrated treatises, each targeting diverse segments of the truss market. Later editions of Blakey’s inexpensive *Instruction pour prévenir les descentes ou hernies* included devices for child upbringing and gout cures as an entertaining way to market his trusses. He also included a “List of bandages” that were to be found in his shop, a sort of catalog of the devices he shipped to his clients, including those with large and narrow waists; those for the navel and for holding the bellies for women; trusses for uterus and anus ruptures; “hidden trusses, so that one can change underwear in front of people without being noticed”; preventive trusses; and trusses for redressing legs and spines (fig. 11). The financially disadvantaged were not excluded, as the poor were “invited to come to the Author’s, every morning before noon: they will find rescue.”⁵⁰ The successful truss-maker clearly

46. Victoria Morgan, “Beyond the Boundary of the Shop,” 59–80; Blakey correspondence with: Kints, 24 March 1761; and Kaunitz-Rittberg, 23 February 1764 (both in AN, Y 13701).

47. Blakey correspondence with the priest Debourges, 8 February 1763 (in AN, Y 13701).

48. Correspondence of Hans Sloane, MS 4044, folios 15–16, in British Library, London (hereafter BL).

49. Jean Juville, *Traité des bandages herniaires*, “Avertissement sur les planches,” 231–32.

50. Blakey, *Instruction pour prévenir les descentes ou hernies*, 22.

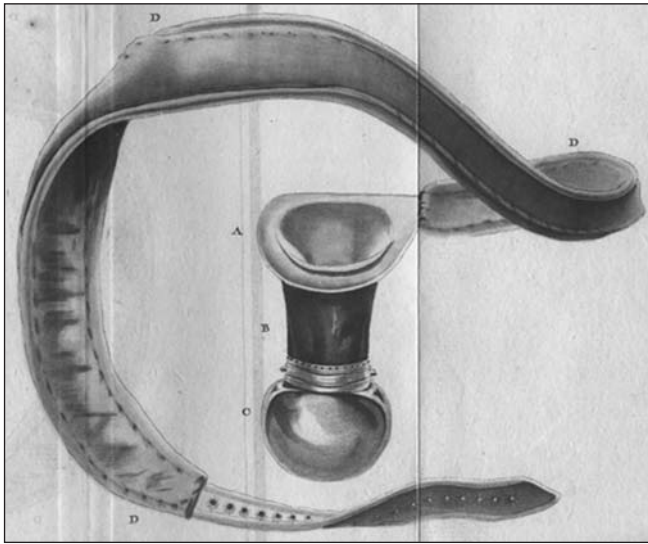
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FIG. 10 Bandage for anal rupture. (Source: Jean Juville, *Traité des bandages herniaires* [Paris: Belin, Hardouin, Gattey, and l'Auteur, 1786], plate 7. Courtesy of the Wellcome Library, London.)

named trusses according to their physiological, as well as their social, uses, such as the “broken” truss by Lequin (see figs. 6–7) and the concealed bandage, “so that one can change underwear in front of people without being noticed,” which Blakey supplied. Do-it-yourself handbooks like Blakey’s *Instruction pour prévenir les descentes ou hernies* represent a common mode for marketing inventions, as they informed potential clients and created trust in the technology.⁵¹

In the provinces, local branches made retailing even more successful. Blakey, like other eighteenth-century entrepreneurs, established local businesses managed by sale representatives. In targeting female clients through the use of saleswomen, Blakey was not alone. London advertisements regularly mentioned the role of the truss-maker’s mother or a person “of the sex” in advising customers, a strategy initiated by the first truss-maker to advertise, Peter Bartlett.⁵² When, in 1764, Blakey opened another shop in London for his “original elastic trusses,” he repeatedly advertised the use of the services of male and female salespersons, who adapted the trusses to the clien-

51. Liliane Hilaire-Pérez and Marie Thébaud-Sorger, “Les techniques dans l’espace public.” On early modern medical device cataloging, see the article by Claire Jones, “Instruments of Medical Information,” in this special issue.

52. See, for example, the advertisements in *The Post Boy* from November 1712 through April 1714 (in BCN); see also Cox and Dannelh, *Perceptions of Retailing in Early Modern England*, 88–89.

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FIG. 11 William Blakey's "List of bandages," a truss catalog included in his treatise on hernias. (Source: William Blakey, *Instruction pour prévenir les descentes ou hernies, et pour en empêcher les progrès* [Paris: G. Desprez, 1758], 22. Courtesy of the Wellcome Library, London.)

tele, including "Madame Le Roi," who consulted customers of the sex.⁵³ Among truss salesmen, surgeons were critical in retailing devices, either directly or indirectly. In 1770, a man named Rigaut, who was the newly appointed sales representative in Reims, assured Madame Blakey that he was planning to approach local surgeons about trusses. In the provinces of

53. Advertisement for Blakey's trusses in *Gazetteer and New Daily Advertiser*, 19 October 1770, 2 (in BCN).

France, Blakey would first write to potential agents like Decours, who was a servant to an army general based near Nantes. Decours provided invaluable information. He first contacted Veillard, a master surgeon, as a potential retailer, who informed him about local competition—namely, a herniary surgeon named Lenfant—and agreed to serve as a go-between for Blakey’s branch advertised in the press. Decours added in his letter that Veillard did “not mind, but did not wish to sell them under his own name, lest it looked quackish.”⁵⁴ Key to the success of local retailing, medical middlemen established trust for the technologies.

Attracting customers indeed presupposed the establishing of trust, for which there was no straightforward process. Looking through the collections of medical advertisements in the British Library, retailers displayed different strategies, ranging from the striking “No cure no money, until two Months after you be well” to the reassuring permission of the Royal College of Physicians.⁵⁵ Whatever the importance of marketing strategies, whether print advertisements or institutional support, the clients themselves were ultimately the actual proofs of successful innovations.

The Manifold Faces of the Customer

Customers for trusses belonged to a variety of social worlds. The prevalence of the ailments among soldiers and sailors is well known: due to the poor health of conscripted servicemen and the sporadic nature of warfare, ruptures occasioned early procurements of special devices, as well as assessments of unfitness for hernia sufferers.⁵⁶ However, as Blakey’s correspondence shows, most of his clients belonged to the upper social classes, with the exception of an *ouvrier*—most probably a trade master (fig. 12). His clients included fathers, heads of household who were commissioning trusses for their offspring; parish priests who requested trusses for themselves or their parishioners; members of the aristocracy, including one who ordered an “artificial anus” for a “most cherished male friend.” Even in the commerce of trusses, the elite exerted patronage.

The category of medical practitioners calls for particular attention. Surgeons and physicians played a significant role as information or device suppliers. London truss-makers referred to themselves as “doctors,” or advertised the consulting services of “surgeons” in their shops for diagnosis or fitting of bandages, thus fashioning their toy and tool business as a medical one.⁵⁷ According to Blakey’s correspondents, medical practitioners in-

54. Blakey correspondence with: Rigaut, 8 May 1770; and Decours, n.d., 1763 (both in AN, Y 13701).

55. Lysons Collection, c.191.c.16, in BL.

56. Philip R. Mills, “Privates on Parade.” On military health-care procurements and sanitary-administration expenses, see Peter Mathias, “Swords and Ploughshares,” 73–90.

57. Various examples include: Guy Nutt, who had a “Surgeon over on Thursday from

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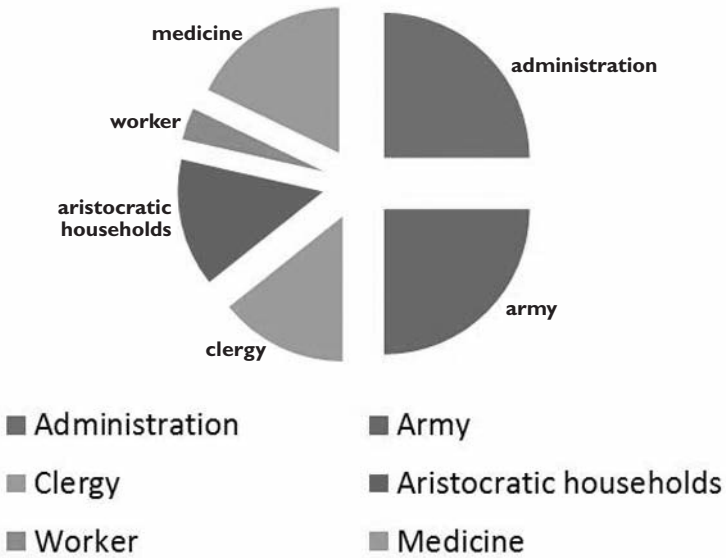


FIG. 12 Occupations of William Blakey's clients. (Source: Correspondence of William Blakey, in Archives nationales, Paris, Y 13701.)

formed patients about new models—Veillard of Nantes, for instance, mentioned that he would have recently sold a truss for anal descent if he had known about it then—as well as selling them. An apothecary named Denout received trusses at his shop in Orléans.⁵⁸ Male-midwife Pierre Robin of Reims sold them around 1770 for a short period before being replaced by a nonmedical sales representative.⁵⁹ Surgeon Dufour from Montargis, having been informed about Blakey's trusses by an acquaintance, ordered one for a lady in 1761.⁶⁰ Such practices were not unlike those in London. For example, between 1788 and 1800, John Eddy advertised in various newspapers that his trusses were available for the “Faculty, the Country and for Exportation,” and in his short advertising pamphlets for the “true

two to four” for those willing to speak with one (*The London Journal*, 4 April 1724, 6); and Rock's advertising of steel trusses for female customers, who could find help at the “Doctor's or at home, if in London, by a person of their own sex, bred in the practice” (*Public Advertiser*, 2 October 1765, 4) (both sources in BCN).

58. Blakey correspondence with Ambert, 12 July (year not indicated) (in AN, Y 13701).

59. Blakey correspondence with Pierre Robin, 27 June 1770 (in AN, Y 13701). After the breaking of the resale agreement, Robin returned the five right, eight left, and thirteen double trusses remaining from the resale, having made an eighteen-livres profit on his resale of three right trusses. On Robin, whose 1770–92 account book has survived (in the Reims Bibliothèque municipale, MS 1082), see Laurence Brockliss and Colin Jones, *The Medical World of Early Modern France*. Neither Brockliss and Jones nor Jacques Gélis's “La pratique obstétricale dans la France moderne” mention Robin's resale business.

60. Blakey correspondence with Dufour, 14 May 1761 (in AN, Y 13701).

method of applying trusses,” Robert Brand listed the testimonies of surgeons and physicians who used them.⁶¹ Four correspondents of Blakey were either surgeons or physicians seeking information about his trusses for colleagues or patients; a lawyer in Normandy, Duranville, was keen on reminding him that he had agreed to sell trusses through Drieu, a surgeon at the Harfleur Hôtel-Dieu. It is very likely that a fairly efficient information circuit functioned among local practitioners, who could either access them for their clients or market trusses for themselves. The case of Ducluzeau, who was a hospital surgeon at the Hôtel Royal des Invalides, is revealing; he became an intermediary in the truss-making trade because of a provincial colleague.⁶² Another example is Lewigues of Douai, who wrote to a Parisian acquaintance, who, in turn, forwarded the letter to Blakey:

One of the first ladies in our town, about to give birth, having heard of a truss to be used by newly-delivered women, and not willing to order any without some detail, I please beg you to go to the Sieur Blakey, maker thereof, rue des Prouvaires, . . . and get information about their width, their materials, how one can fit them and when newly-delivered women have to make use of it. Be so kind as to ask if it could serve as a waistband for a horse-riding lady and its price. We will then determine to write to him, and if they are found handy, he will sell a fair number of them. I would recommend that you approach your uncle and ask him whether he knows this type of truss and his sense of their use.⁶³

Hospital and navy surgeons had privileged access to truss devices and are likely to have contributed to some retailing by hospitals, such as Chelsea and Greenwich.⁶⁴ Medical practitioners could reach out for information more efficiently than others through their seemingly effective occupational network.

In expanding their clientele, a few herniary surgeons developed into genuine entrepreneurs, reaching out to complementary segments of the truss market. One facet of the successful truss-makers’ business model, charity, may have been understood as a way to secure deals. Lequin’s self-acclaimed charity matched the monarch’s charitable liberality in supplying the poor and gained recommendations for his business in physicians’ and surgeons’ prescriptions.⁶⁵ Blakey, as mentioned above, regularly advertised

61. Robert Brand, *The True Method of Applying of Trusses, for the Cure of Ruptures*, 11–12, reproduces the testimony of Alexander Forbes, who also mentioned the role of a Mr. Rose, the king’s receiver in Guernsey Island, in supplying trusses.

62. Blakey correspondence with: Duranville, 17 February 1763; and Ducluzeau, 17 May (year not indicated) (both in AN, Y 13701).

63. Letter of Lewigues to an unknown correspondent, 13 May 1763 (in AN, Y 13701).

64. Brand, *The True Method of Applying of Trusses, for the Cure of Ruptures*, 11.

65. Lequin, *Traité des hernies, ou Décèntes*, advertisement.

that poor people could get free assistance if they came to his shop in the morning (see fig. 11); one of his marketing strategies was to supply the poor and needy with free or inexpensive treatments. Whether they did it genuinely or only as a means to obtain a discount, many correspondents referred to Blakey's benevolence, contrasting it with the manifest self-interest of many other truss-makers.⁶⁶ One could argue that Blakey's making patented technologies available to the poor was a way of contesting the claim that his monopoly was harmful to society. As Joannes Groenevelt did in seventeenth-century London, Blakey might also have expected and reaped indirect benefits from his charity, including word-of-mouth advertising and the support of wealthy clients and public servants.⁶⁷ Indeed, in London, such practitioners garnered a threefold benefit from their charitable cases. First, their positions in hospitals helped them to derive a modest income from fee-paying pupils and facilitated connections to wealthy relations among hospital donors.⁶⁸ Second, poor patients advanced the training of workers and assistants, thereby contributing to the accumulation of knowledge of ailments and their cures. And last, hospital procurements became a steady source of income. For example, Holmes and Laurie, truss-makers from at least 1762 to 1773, worked for St. Bartholomew's, St. Thomas's, Guy's, St. George's, the Middlesex and Foundling hospitals, and the Royal Infirmary; these institutional clients most likely provided Holmes and Laurie's comfortable income⁶⁹ (see fig. 8). In La Miséricorde Hospital of Marseilles, a "demoiselle Magnard" first supplied its trusses (without specification of material) for about fifty livres per month, but was replaced in 1766 by a "Grégoire Ollion, chirurgien herniaire," who invoiced the hospital for about 150 livres every three months. This 600-livre annual procurement for trusses represented more than a fifth of the annual budget for drugs, which was outsourced to the Hôtel-Dieu's *apothecairerie*. Access to hospital surgeons, as evidenced by Blakey's correspondence, was an efficient way of selling trusses, similar to the way medical instruments were marketed in early-nineteenth-century London.⁷⁰

66. See, for example, Blakey correspondence with Belland, 13 July 1763 (in AN, Y 13701).

67. *Gazetteer and New Daily Advertiser*, 19 October 1770, 3 (in BCN) reads "Every Monday and Saturday, Mr. Blakey gives and applies *gratis* these bandages to all the poor of London and Westminster, they bringing certificates from their parish officers"; see also Harold J. Cook, *Trials of an Ordinary Doctor* (emphasis in original).

68. Susan C. Lawrence, *Charitable Knowledge*.

69. Trade cards and billheads of Holmes and Laurie (1762, 1766, 1773), in London Metropolitan Archive (hereafter LMA).

70. See 17 HD E 18, 1755–64, in Archives départementales des Bouches-du-Rhône, Marseilles; Blakey correspondence with Duranville, 17 February 1763 (in AN, Y 13701). Duranville boasted to have helped him sell several trusses through Dieur, a surgeon at Harfleur's Hôtel-Dieu. For London, see Jones's "Instruments of Medical Information" in this special issue.

Outside hospitals, truss-makers' entrepreneurial strategies also reached other consumer markets, ranging from large institutions to the colonies. Blakey thought of adding his trusses to the goods being shipped to the colonies via La Rochelle.⁷¹ In addition to the merchant companies, the army and navy may have been a sizeable market if the British Sick and Hurt Board, established in 1702, or the French medical military administration purchased the devices for their servicemen. Holmes and Laurie, for instance, claimed to be suppliers to the Royal Navy.⁷² Blakey claimed to supply trusses to the French military hospitals, although complaining that he had been reimbursed for only a thousand livres for over 800 bandages at fifteen livres apiece—a total of over 12,000 livres.⁷³ Although military procurements, or *soumissions*, could prove risky evidently, they were sought after by a handful of French truss-makers, such as Juville and Morin. In their cases, upper military administrators delegated information to academicians like Louis, who was secretary to the Académie royale de chirurgie and inspector of military hospitals. After Morin's successful *soumission*, Montbarrey, who was head of the military sanitary administration, faced rioting from servicemen in 1777, supported by their superiors, who wanted to keep their old trusses rather than use the new ones manufactured by Morin, thus transforming herniary ailments into a political problem, which Montbarrey pressed the academicians to resolve quickly⁷⁴ (fig. 13). By the end of the century, the Académie royale de chirurgie's experts included "the public good" and manufacturing costs in their criteria.⁷⁵ The colonial trade and hospital procurements transformed the industry, and the devices themselves in the process.

Assessments of these technologies happened *ex ante*, when artisans requested retailing privileges, or *ex post*, through testimonies from clients. To have his trusses approved, Juville accessed indirect prescribers like Louis by applying to the Académie royale de chirurgie for approval of different innovative designs, such as an artificial anus, positively assessed by Robert-Bienvenuë Sabatier, a member of the Académie royale des sciences, and Vaucanson, a mechanical engineer who evaluated instruments on behalf of the same academy.⁷⁶ Juville also approached court patrons, some of whom

71. See 7 B 1111, register 1775, in ADG.

72. Trade cards and billheads of Holmes and Laurie (1773), in LMA.

73. Correspondence of Dureux and Blakey, 23 November 1758, in ADG, 7 B 1121; see also *Gazetteer and New Daily Advertiser*, 19 October 1770, 3 (in BCN), which reads, "[These bandages'] good effects . . . occasioned a contract to be made the 8th of March, 1756, between the Marquis de Paulmi, Secretary of State, and the inventor, Mr. Blakey, for supplying all the military hospitals of France, and naval hospitals of Brest and Rochefort."

74. Correspondence on defective trusses, in ARC 8, dossier 2 (6), 1777.

75. See, for example, the report on the description of a truss for navel ruptures sent to the Académie royale de chirurgie by Evrat on 13 January 1791, in ARC 16, dossier 22.

76. Report by Robert-Bienvenuë Sabatier on Juville's artificial anus, in ARC 32, dossier 4, 1776; letter from Louis to Pacot, in ARC 8, dossier 1, 29 November 1773.

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FIG. 13 Waistband to contain reduced ruptures by Petit, with adjustable ready-waive fastening for plates. (Source: Rainal Collection, no. 32. Courtesy of the Musée d'histoire de la médecine, Paris.)

were in charge of military or medical administrations, and also various medical officers in military hospitals—a time-consuming though apparently efficient way to supplant a competitor. He also experimented on soldiers in local military hospitals and participated in a public competition at the Paris military hospital, the Hôtel-Dieu des Invalides, the results of which were assessed by Richard, Louis, and Sabatier.⁷⁷ In Chelsea Hospital as well, the procurement process put different candidates into competition with one another, some of them supported by “W. B.’ of the College of Surgeons in Paris” and a reference “signed with a list of surgeons’ names as long as [the] arm.” Yet, the duration of the process, two months, indicates that individual assessments of patients were taken into account and mediated by hospital faculty members, who made the final decisions.⁷⁸ The testing of these technologies relied upon the consumers’ opinions, of course, although these were filtered by the criteria of the practitioners in charge.

As a result of their marketing strategies, which included segment-targeting, advertising, and complementary retailing and ranged from shop to mail order and public procurements, truss-makers succeeded in organizing fairly large businesses that spread throughout Europe, as is documented in Bla-

77. They included courtiers and Richard de Hautsierck, first physician of the king’s camps and armies, and inspector general of hospitals and charities. Letter from Louis to Pacot, in ARC 8, dossier 1, 29 November 1773; copy of an appeal to the Prince of Montbarrey by Juville, 28 March 1779, in ARC 8, dossier 1; letter from Charrin to Louis, 13 January 1779, in ARC 8, dossier 2 (6).

78. Brand, *The True Method of Applying of Trusses*, 15.

key's business correspondence. The Blakeys had collected their clientele in many complementary ways: through local people in both capital cities and provincial towns; through shops; and by mail orders to the French provinces and other European cities. As did his competitors, Blakey addressed different segments of the market, distinguishing among his potential clients by class (for example, by using expensive materials like silver buckles on trusses), age (such as specifically advertising his trusses for children), and gender. By and large, the consumers themselves were essential in dictating novel marketing strategies. Even in the case of military procurements, end-users may have played this same crucial role.⁷⁹ By carefully tailoring their products to clients, truss-makers invented new commercial behaviors.

Consuming Steel Trusses: The Manufacturing Role of the Users

Health-care technologies created a special commercial relationship that mixed the tradition of medical consultations with mail ordering. When satisfied by the information on truss technology, potential customers were anxious to learn about commercial details like prices, which were a real concern. Once they had opted for a truss, however, clients rarely discussed prices, although some resorted to using credit.⁸⁰ Instead, their main concern was postage, a few mail clients developing various ways to lessen the price or cost of mailing by using the administrative postal network and preferring the most secure routes.⁸¹ As with other items, theft was not an uncommon way of obtaining a truss, as press notices for rewards attest. From afar, most consumers' correspondence concerned medical consultation.⁸² Half of Blakey's correspondents wrote illness narratives and sometimes used technical anatomical terms, therefore reinterpreting business correspondence in the light of medical discourse. Technical terms, the precise

79. Several letters concerned trusses for children: a workman named St. George, from Poitou, ordered a truss for a 9-year-old boy (24 August, 4 September 1762); Baron Depinefort ordered one for his "extremely spirited and delicate" 10-year-old son, who had been wearing one for three years (August 1762); and Duranville requested the repairing of his son's truss (17 February 1763) (all in AN, Y 13701). The military riot over inadequate new steel trusses—with soldiers refusing to use them, preferring instead to fix their old ones and being supported in this by their superiors—eventually led to Morin's dismissal; see "Mémoire sur le choix des bandages propres aux militaires," in ARC 8, dossier 2 (6), 1 February 1775.

80. Blakey correspondence with: Charpentier, "I already owe you a small invoice, which I will settle with this one" (16 April 1764); and Charpentier, "As you requested your small bill, I present it to you countersigned, so that you avoid postage" (n.d.) (both in AN, Y 13701).

81. Blakey correspondence with: Charpentier, 16 April 1764; and priest of De-bourges, 23 February 1763 (both in AN, Y 13701).

82. On patients' correspondence, see Lisa W. Smith, "Reassessing the Role of the Family"; Micheline Louis-Courvoisier and Séverine Pilloud, "Consulting by Letter in the Eighteenth Century"; Marion Maria Ruisinger, *Patientenwege*; Willemijn Ruberg, "The Letter as Medicine"; and Philip Rieder, *La Figure du patient au XVIII^e siècle*.

locations and progresses of ailments, and the intimate tones of letters resulted in a special commercial correspondence that was much informed by the patient–practitioner relationship.

Swift and polite answers, along with efficient devices and adapted pricing, were a way of building up trustworthy relationships, which customers praised in their letters. In a certain sense, the pricing was less for the product than for the service attached to it.⁸³ In Blakey’s correspondence, marginal annotations, often by Mrs. Blakey, included the price and mode of delivery. The short delay between postage and reply—from two to five days—was an additional indication of the high quality of customer service Mrs. Blakey favored. Letters frequently mention concerns about the care with which the truss-maker was manufacturing or fixing the bandages.⁸⁴ They were also concerned about self-fitting; in one instance, Blakey’s reply suggested an ointment that ought to “grease the mushroom, before set in the anus,” which had been “drilled to allow winds to come through,” and adding to this same order two additional trusses in case of breakage.⁸⁵

Mail orders required the establishing of measurements and standards in order to fit the trusses to clients’ bodies in the same way that spectacles were fit to vision impairments. As trusses shifted to the ready-to-wear trade, clients had to specify details about both their ailments and bodies in order to ensure getting precisely what was required (fig. 14). By doing so, truss-makers and customers devised ways to describe bodily needs and to specify morphology and pathologies. Unlike the spread of ready-to-wear items like garments and footwear, problems with fitting trusses to bodies and using them for pathologies placed limitations on standardization.⁸⁶ Measurements, descriptions, comparisons, and “paper technologies” did circulate, however. Herbinet recommended

persons from the countryside to send him the measurement of body size, taken at the groins, with a ribbon or thread, and a Memoir in which he would learn if the simple rupture is on the right or left side, if the double rupture is equivalent on the two sides, or which side is bigger; if it falls as far down as the men’s scrotum, and in women in the vaginal labia; if the patient has a big or flat belly, the bottom high or low, in order for him to know the form he ought to give to the truss.⁸⁷

83. Charpentier’s letter to Blakey: “Nobody can be as satisfied as I am” (2 June 1764) (in AN, Y 13701).

84. Blakey’s letter to Rosnyvenen: “I did not think, in what regards your service, not to give you what I had as best devices” (14 September 1763) (in AN, Y 13701).

85. Blakey correspondence with: Meusérier, 24 June 1762 (for an example of self-fitting); and Kaunitz-Rittberg, n.d. (on the anal truss) (both in AN, Y 13701).

86. Giorgio Riello, *A Foot in the Past*, 50–57.

87. See Sloane, MS 4044, folio 16, in BL.

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FIG. 14 Count Rodoan's indexed paper straps providing William Blakey with the correct location of the cushion (7 July 1770). (Source: Correspondence of William Blakey, in Archives nationales, Paris, Y 13701.)

Body measurements were indicated by means of threads cut at the correct lengths or by actual measurements.⁸⁸

In another instance, a client's agent was probably chosen as a proxy because of his overall size, shape, and "temperament."⁸⁹ Count Rodoan, who was from the Low Countries, sent indexed paper straps reproducing the measurements of the truss that was not exactly convenient to him, being "too strong" due to its double layer; because Blakey was already in possession of his measurements, which he always supplied, Rodoan reproduced the device in paper, showing the location of the cushion⁹⁰ (see fig. 14). Threads for taking measures were also circulated through the mail: for example, the priest Debourges, curate of Vilfort, near Château-Thierry mentioned that he would send a "a piece of thread" in his next letter; and Madame Blakey asked one patient to take her own measures by using a thick string all around her body.⁹¹ Sufferers also tried to specify the size of

88. Leblondot referred to his waistband's size being "thirty-four pouces de France" (n.d., 1764) (Blakey correspondence, in AN, Y 13701).

89. Blakey correspondence with Bourcier: "I have about the temper and the height of the person who will hand my letter to you" (29 September 1763) (in AN, Y 13701).

90. Blakey correspondence with Rodoan, 7 July 1770 (in AN, Y 13701).

91. Blakey correspondence with: priest Debourges, 23 February 1763; and an unknown patient, 13 November 1760 (both in AN, Y 13701).

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their tumor by drawing it. In addition to size, trusses' elasticity and tightness required description. On one occasion, Blakey sent the priest Debourses several types of trusses with different degrees of elasticity that he had numbered so that the customer could choose which one was best.⁹² Some formalization of diagnosis and reduction of the diversity of morphologies and pathologies were at work; Blakey and his clients were forging a technical mediation through commercial practice.

Although important, body measurements were not sufficient; consumers also had to learn the technical skills to fit trusses and adjust them to their bodies, and eventually to repair them. In the correspondence, Blakey provided detailed advice on how a user could self-fit a truss: the patient had to "rise up, put one foot on a high chair, cross his legs, take up anything from the ground, cough, sneeze, and blow his nose hard in a handkerchief"—thus establishing quality standards.⁹³ One customer complained that the different parts of the trusses did not fit him well, as "articularity [*sic*] was not strong enough"; other clients compared different fitting systems like buttons, hinges, and staples⁹⁴ (figs. 15–19). Renoir, the *contrôleur des postes* who was afflicted by a hernia in his left groin, argued that a staple belt would be more helpful than one that was tied by placing a small iron button into a hole—a system of fitting that so often hurt him and whose tying and untying was difficult. He then compared Blakey's devices to Chomerat's, the former being more comfortable though less strong. Other correspondents, in turn, devised contrivances to adapt ready-to-wear trusses to their bodies and prevent them from aching.⁹⁵

What is more, trusses were fragile, thus increasing the possibility of ongoing business. Contact with the skin and perspiration caused corrosion of the metal fittings and led to breakages, which required frequent repairs—a major subject of Blakey's correspondence. A man named Mésurier wrote to him saying that his trusses had broken because of the rust on springs wrought by sweating, and he returned the items. Belland, a priest, also returned his trusses because they needed to be re-covered with fabric.⁹⁶ Blakey graciously mended trusses when returned; he also shipped additional springs so that customers could fix their trusses, and advised them how to make trusses on their own in case of emergency. A tax collector named Charpentier, before returning his broken trusses, had "undone them to see

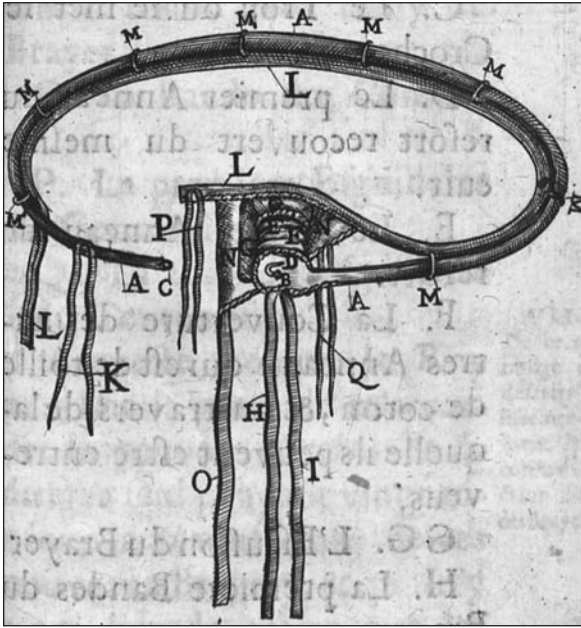
92. Blakey correspondence with: Berruyer, 10 October 1762; and priest Debourses, 8 February 1763 (both in AN, Y 13701).

93. Blakey, *Essay on the Manner of Preserving Children and Grown Persons from Ruptures*, art. 14, 62–63.

94. Blakey correspondence with Villette, 17 July 1763 (in AN, Y 13701).

95. Blakey correspondence with: Renoir, 30 July 1761; and priest Debourses, 23 February 1763 (both in AN, Y 13701).

96. Blakey correspondence with: Mésurier, 12 August 1760; and Belland, 6 June 1763 (both in AN, Y 13701).



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FIG. 15 Print of the “spring” brayer invented by Nicolas de Blégny. (Source: Nicolas de Blégny, *L’Art de guérir les hernies* [Paris: Nicolas de Blégny, 1676], 205. © BiuSanté, Paris.)

whether he could find the reason why they broke so easily.” Ten years previously, he added, the bandage was doubled, which might have prevented their breakage. At the end of his letter, the priest Debourges asked whether the waste pieces of his trusses could be recycled or forged again. Some other customers tried homemade devices to improve their trusses. Leblondot wrote that he had added some cotton wool and sheep skin to his trusses.⁹⁷ Charpentier provided Blakey with silver buckles for his trusses because he would like to avoid having “bad buckles” that spoiled the linen.⁹⁸ Fitting, mending, assembling, and substituting dominate the correspondence, thus reflecting what was developing in other trades. A public was evolving for useful knowledge, one that was ready to learn how to contrive, adapt, repair, and combine and assemble materials, pieces, springs, and staples for fittings. Blakey’s correspondence provides evidence that consumers had become technical actors, taking part in the actual manufacturing of steel trusses that was essential to the innovative process.

97. Blakey correspondence with: Charpentier, 10 April 1764; priest Debourges, 8 February 1763; and Leblondot, n.d., 1764 (all in AN, Y 13701).

98. Blakey correspondence with Charpentier, 10 April 1764 (in AN, Y 13701).

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FIG. 16 Bandage with the inside spring covered in leather. (Source: Rainal Collection, no. 13. Courtesy of the Musée d'histoire de la médecine, Paris.)

Conclusion

Steel trusses were indeed an innovation in early modern Europe. The use of tempered (and later cemented) steel offered afflicted customers new ways to contain hernias. As they required adjustments to individuals' ailments, steel trusses played a prominent role in the enlightened (Adam) Smithian-based technological culture in which technology and commerce went hand in hand. Steel materials, both cemented and cast, perfectly suited the requirements of care, variety, and adaptability that characterized toys and tools. During the Enlightenment, these qualities were the basis of an economy of products and variations that relied upon "fitness of purpose." In Smith's words, such commodities conveyed the beauty that "the appearance of utility bestows upon all the productions of art."⁹⁹ Steel trusses were emblematic of the modern culture of functionality, which was opening the way to an economy of tasks and pieces. Trusses involved an entire process of exchange, adaptation, and repair because they were fragile and composed of many separate pieces. Their manufacture was the

99. Smith, *The Theory of Moral Sentiments*, 179.



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FIG. 17 Truss aiming at preventing the waistband's moves, described in Étienne-Louis Geoffroy's *Mémoires sur les bandages propres à retenir les hernies*. (Source: Rainal Collection, no. 44. Courtesy of the Musée d'histoire de la médecine, Paris.)

result of ongoing processes along the continuum from producing to retailing. With steel trusses, body equipment fostered what Daniel Roche calls the “culture of commerce.”¹⁰⁰

From a technical perspective, the making of steel trusses required a combination of different sorts of knowledge: Blakey realized a “technological convergence” between watchmaking and surgery by enhancing the elasticity of both the body and steel. The quest for elasticity was a major research field during the Enlightenment. The materials and their properties were isolated from products and objects, and were examined with respect to their behaviors in the circumstances of specific actions and forces like expansion, draft, and compression. Such an operative culture at the heart of the innovative process relied upon technological practices that emerged from the increasing boundary-crossing between trade guilds and urban crafts. Forty years before, Blakey's father had played a prominent role in creating the Paris Society of Arts, which promoted technical knowledge by gathering artisans from different trades and enhancing hand-skills, tools, and instruments as the basis for reforming the crafts and science. Through

100. Daniel Roche, *France in the Enlightenment*, 140. See also Maxine Berg, *The Age of Manufactures, 1700–1820* and *Luxury and Pleasure in Eighteenth-Century Britain*; Helen Clifford, “The Myth of the Maker”; Giorgio Riello, “Strategies and Boundaries”; and Catherine Lanoë, *La Poudre et le fard*.

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FIG. 18 Truss moving around its axis by Morin. Detail of the hinge in figure 19. (Source: Rainal Collection, no. 40. Courtesy of the Musée d'histoire de la médecine, Paris.)

the commercialization of health-care products, useful knowledge was diffusing across and outside crafts to wider audiences, thereby shaping a new cultural space for technology. The ideal of the Paris Society of Arts was realized in an unexpected way—in the marketplace. By creating a market for steel trusses, the Blakeys created a new audience for technology.

However, entrepreneurs like Blakey were not the only ones involved in this process. The trade for steel trusses during the eighteenth century was the result of new entrepreneurial models, which involved the intensive use of in-formation for marketing novelties. Models also relied upon businessmen who connected different trades, worlds (manufacturing, urban crafts, shop retailing), and segments of production and consumption markets, designing a new commerce of health care. Because the body was at stake and health care had become a commercial venture, consumers were actively shaping the new technology. In addition to gathering useful information,



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FIG. 19 Detail of the truss's hinge. (Source: Rainal Collection, no. 40. Courtesy of the Musée d'histoire de la médecine, Paris.)

they selected, adapted, and mended new devices and attempted to fit the mechanisms to their bodies. Whereas technology gained autonomy as a specific discipline during the nineteenth century, commercial networks for highly differentiated wares like trusses fostered the ability to adjust, substitute, combine, and compare—an entire range of intellectual reasoning that would be crucial to engineering. Medical practitioners served not only as go-betweens, but also as crucial agents in shaping both the technology and the clientele.

Commerce, accordingly, vastly contributed to innovation, as much as technological innovation invented commerce's retailing ways, from selling and individual service to the use of sales representatives, marketing tools, and the search for new markets. Caring for health and working with care echoed each other. In startling contrast to the later tendency of viewing technology primarily in relation to its standardization and mass production, this operative culture was fostered by heterogeneous markets and a Smithian economy based on fitness of purpose in which body technologies, as technologies of the self, played an important role. By demanding customized service, consumers contributed to shaping new ways of manufacturing and consumption in which commercial suppliers complemented and eventually replaced that which previously would have been done entirely by self-care.

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- Reneaulme de Lagaranne, Michel Louis. *Discours pour l'ouverture de l'École de Chirurgie, avec une thèse paraphrasée, sous ce titre, "Essay d'un traité des hernies, nommées descentes."* Paris: veuve A. U. Coustelier, 1726.
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