A Barrier to Medical Treatment?

British Medical Practitioners, Medical Appliances and the Patent Controversy, 1870 - 1920

In 1902, Robert Saundby, Professor of Medicine at the University of Birmingham and secretary of the British Medical Association published Medical Ethics: A Guide to Professional Conduct.[1] In the absence of any formalised professional ethical code, Saundby's guide functioned as an instruction manual, with a view to aiding fellow doctors and medical students through difficult professional circumstances and to highlight appropriate ways to conduct themselves among colleagues and peers.[2] Crucially, it provided revisions to outdated tenants of prior published codes in order to make them more relevant to the recent developments in medical practice. The last such code had been written in 1878, some 25 years earlier, by Jukes de Styrap, physician at Salop Infirmary and founder of and late honorary secretary to the Salopian Medico-Ethical Society, and Shropshire Ethical Branch of the British Medical Association.[3] Saundby's most significant revision of de Styrap's guide was his code on patenting: 'An instrument or other article may be patented to secure proprietary rights, and then sold outright, so as not to retain any commercial interest in it, but it is even better to give such discoveries and inventions freely to the profession and the public.'[4] In his earlier code, de Styrap had stated in no uncertain terms that it was 'derogatory to professional character [….] for a practitioner to hold a patent for any proprietary medicine or surgical instrument.'[5] The contrast between these two positions can be made sharper by focussing on their primary concerns: Saundby emphasising commercial interest and de Styrap employing a rhetoric of professional character. By situating patents and attitudes towards patenting within the wider culture of professional practices, we gain new insights into medicine's moral economy.[6]

It is the purpose of this article to examine the changes in attitudes and behaviour among qualified medical practitioners towards patenting between 1870 and 1920, paying particular attention to changes that occurred in the 1890s that warranted Saundby's 1902 revised version of the ethical code. Changes in published codes evidence shifting attitudes and behaviours among a small but growing number of practitioners who began to embrace patenting and question its relationship to professionalism found in de Stryap's 1878 guide. Partial rejection of these codes was not without controversy, and served to threaten a practitioner's livelihood. The trajectory of the debate demonstrates an increasing concern within the profession that patenting should not be considered the ethical problem it had once been. More importantly, tracing the changes in ethical codes and in practitioner attitude and behaviour in this period is important because it serves to demonstrate that they did not necessarily correlate; codes of conduct built an ideal rather than reality, with implications for our understanding of medical practice. In this case, it serves to demonstrate that medicine was not a profession isolated from the commercial world, but formed an important and complicit part of it. Practitioners could be self-interested despite the professional ideal and selfless rhetoric of medicine as a vocation, a calling and an art. Some sought to protect their proprietary rights and procure profits from their inventions through the increasingly efficient and widely popular English patent system, and in so doing, sought to reshape ethical codes of behaviour in line with their interests or the interests of their profession.

The relationship between medicine, commerce and forms of intellectual property is attracting increasing attention from historians. In particular, growing scholarship in this area demonstrates that medicine was not, nor has it ever been, a profession removed from the influence of commerce. In 1993, Robert Baker, Dorothy and Roy Porter

identified that the emergence of this tension between professional medicine and commerce as medicine became an increasingly viable and respectable way of making a living from the eighteenth century: 'At the root of all ethical medicine was the distinction between medicine as an art in service of humanity, and medicine as a commercial endeavour, engaged in primarily for the profit of its practitioners.'[7] More recent scholarship reinterprets longstanding histories and sociologies of medicine in the nineteenth century, a period during which medicine's status as a profession became formalised in legislation beginning with the 1858 Medical Act.[8] These histories and sociologies often took the informal codes of ethical conduct that developed alongside medicine's new professional status at face value and assumed the professional ideal matched individual practitioners' attitudes and practice. Indeed, as both recent studies and this article recognises, the 'profession' was far from one homogenous group; in reality, it consisted of an assortment of individuals and clusters, from elite metropolitan physicians with university and hospital positions and private practices on Harley Street to general practitioners with small rural practices and medical officers with appointments in public institutions, such as workhouses and asylums, and private firms like insurance companies.[9] Accordingly, the experiences and behaviours of those within the profession and their attitudes towards commercial matters were wildly diverse, despite the informal codes of conduct established to unite them. Yet, for all of their differences, the diverse individuals who formed part of the profession were undeniably united by certain shared social tenets. These tenets included educational standards and qualifications, as verifiable by the Medical Register, and access to membership and the publications of medical organisations and professional bodies, such as the British Medical Association and the British Medical Journal. It is therefore appropriate to continue to refer to medicine as a

‘profession’ and to its members as ‘practitioners’ as descriptors. While some individuals within the profession were not in practice per se, they themselves often used this term as a self-identifying category and remained part of professional networks.

Recent historiography has been able to present this more diverse picture of late nineteenth century professional medicine by acknowledging the effect of broader economic shifts on medical supply and demand. In particular, the emergence of corporate capitalism in North America, Britain and much of Europe between the 1880s and World War One promoted a culture of invention and competition within the profession, a situation that was also compounded by the concomitant outpouring of a tremendous volume of medical consumer goods. To outline a more accurate reconstruction of the economic realities faced by late-nineteenth and early-twentieth century professional medicine, recent studies have examined particular parts of practice in depth. Taking her lead from Peter Bartrip, Lori Loeb has focused on practitioners’ increasing interactions with proprietary and patent medicines following the unprecedented flood of such products into the market from the 1880s and has demonstrated the controversy surrounding their recommendation and prescription into the early twentieth century.[10] She outlines how practitioners contravened the profession’s prohibition of these medicines by prescribing them to their patients. Practitioners who risked their career to prescribe them did so because it was in their financial interest: their patients demanded these products and, in a competitive profession, practitioners ignored their patients’ wishes at their peril. Focusing on pharmaceuticals rather than patent and proprietary medicines, Joseph M. Gabriel has similarly demonstrated that American physicians of the same period were willing to prescribe a growing number of (genuinely) patented products manufactured by multi-

national pharmaceutical firms because the patents meant that ingredients - which had been subjected to scientific testing - were disclosed.[11] Gabriel highlights the importance of the expansion of corporate capitalism into professional medicine by highlighting that it represented a 'decisive shift in the ethical sensibilities of the orthodox medical community toward medical patenting'.[12]

Yet while these studies provide crucial insights into the ways in which practitioners responded to corporate capitalism, our knowledge of practitioner interactions with patents remains limited. Bartrip, Gabriel and Loeb have focused on practitioner interactions with products patented by those from outside the profession and for use by those beyond its professional boundaries, but there has been little mention to date of practitioners filing patents themselves for products they desired to use.[13] Practitioners did in fact register patents for their own designs and noticeably did so with medical tools and appliances, towards which the elite membership of the British Medical Association and the General Medical Council, the profession's regulatory body, became increasingly hostile. While late nineteenth century legislation following the Patent Amendment Act of 1852 made the process of obtaining a patent easier and more affordable, it is important to note that the number of practitioners filing patents for their tool designs remained small. Patent numbers for medical appliances reached nowhere near those for pharmaceuticals filed by large corporations, which began to invest heavily in research and development during this period.[14] Indeed, patents for medical tools as a whole only remained about 5 per cent of total number of inventions throughout the period and of those, only approximately 5 per cent were registered by medical practitioners.[15] While the number of practitioners filing for patients was comparatively small, the phenomenon requires further investigation, not least because it is suggestive of medicine's wider alignment with commerce, and signals the

importance of the profession's inventive tradition in this period. The significant developments in practice and profession that characterised late nineteenth and early twentieth century medicine – namely, antisepsis, asepsis and anaesthesia in surgery, and the emergence of medical specialisms, including orthopaedics and radiology - allowed for more invasive procedures, which were accompanied by developments in a vast array of all manner of surgical instruments and medical appliances. While practitioners rarely patented knives and saws, they did patent appliances crucial for the success of new types of surgical procedure, including anaesthetic inhalers, mouth gags and feet clamps. Patented tools also included those important for diagnosis, rehabilitation and for non-life threatening medical conditions, including orthopaedic appliances, artificial teeth and trusses.

Debates over patenting within medicine centred on three important points – the nature of invention, profit and professional sensibility – and were thus analogous to those taking place in other professions with similar ethical concerns, like law and the clergy, and in trades with similar inventive outputs, such as the physical sciences.[16] In what follows then, this article traces these three main points of debate and outlines the ways in which some practitioners deviated from, and thus attempted to reshape, professional norms. The debate received extensive coverage in the medical press, and in particular, in the two leading medical journals of the period, the British Medical Journal and the Lancet, on which this chapter draws. Discussion was usually confined to the correspondence pages and the lack of information contained within editorials on this topic may explain why historians have not yet discussed this debate. Indeed, scholars are only just beginning to draw on evidence contained in extra-marginal text, including correspondence, advertising and notices. Of course, there are inherent problems with using such forms of evidence to uncover practice. The reporting of a

practice may have been very different from its actual conduct. Accordingly, I draw on other forms of evidence, such as the patent record and information from business archives, alongside the correspondence, where possible, in order to more faithfully reconstruct the practices at the heart of medical patent cultures in the late nineteenth and early twentieth century. In drawing on this evidence then, my analysis reveals that the patenting of medical tools is an important yet hitherto neglected example of the ways in which professional and commercial medicine interacted and conflicted.

The Spirit of Invention

Innovation in medical tools and instruments has always been largely driven by the profession itself. In the nineteenth and twentieth centuries, as today, practitioners designed new tools to solve surgical and medical problems and enlisted a preferred instrument maker to construct them to their exact requirements. While those external to the medical profession manufactured pharmaceuticals and patent medicines, it was practitioners with appropriate medical knowledge within a clinical setting who most frequently invented new tools for the profession's use. A key concern of both the medical profession and of instrument manufacturers was ownership and proprietary rights. The most common form of proprietary recognition for the invention of tools among the profession was not patenting but eponymy. From the sixteenth century (most notably beginning with one of the so-called fathers of surgery, Ambroise Paré) tools became known by the name of their inventor. Among the many examples perhaps the most well-known is Liston's knife, a surgical knife named after Robert Liston, the pioneering Scottish surgeon (1794-1847), and recognisable by its long tapered shape and sharpness designed to enable swifter amputations. At a time

before the use of anaesthetics, Liston was reputed to have performed amputations with his knife, and stitch the end of the remaining limb back up, in under 30 seconds. Liston's overwhelming success with this revolutionary surgical practice was a key factor in the commercial success of his knife. The knife was not only continually used by surgeons practising throughout the nineteenth and twentieth centuries but was also modified by them to suit their own particular surgical technique.[17]

Eponymy began to function as an unofficial trade name for instruments. The ever increasing invention of new tools during the nineteenth century - many of which were new varieties of the same instrument - rendered eponymy a necessity for practitioners to distinguish between similar inventions. For example, Weiss & Sons, renowned medical instrument maker of the Strand, London, promoted over fifty different varieties of obstetric forceps in its trade catalogue of 1889, some only varied slightly from another with a different hinge or handle to address a particular obstetric condition or problem **[Figures 1. And 2. Weiss & Sons, Catalogue of Surgical Instruments, 1889]**. Each pair of forceps was named after the practitioner who had designed it.

Eponymising one's tools, and operative procedures, according to Sally Frampton, was therefore a necessary and accepted practice within the profession; it not only allowed other practitioners to identify specific designs but crucially created a reputation for the inventor as a medical innovator among both his or her peers and the public.[18] Medical print culture also played an important role in demonstrating inventor priority. The simple manufacture of a design was often not enough to prove it was the first design of its kind; the publication of practitioner designs in medical periodicals, text books and trade catalogues served to trace priority claims chronologically should any disputes arise. Within the confines of the profession, this kind of career advancing was positively encouraged and obtaining such a reputation was seen a fitting reward to

those who allowed medical science to advance through the development of new tools.[19] Nor was eponymy restricted to surgical devices. Procedures, body parts and diseases all took on the name of their discoverer or originator so that Fallopian tubes and Parkinson's disease, for example, were forever more associated with a single, heroic medical figure.[20]

While acknowledging proprietary rights, eponymy crucially allowed other members of the medical profession to modify these inventions in order to meet their own practical requirements. Indeed no new tool was ever really a true invention and eponymy allowed both instrument maker and practitioner to freely borrow elements from existing tools and combine them in a novel configuration, which they later claimed as their own.[21] This principle is reflected in Saundby's statement about giving discoveries and inventions freely to the profession and the public. The medical journals and trade catalogues of the period are littered with examples of this kind of borrowing. For example, the British Medical Journal in 1903 included information about a new sphygmograph by John Fletcher Little, an elite physician with an established private practice in Harley Street and honorary positions at the North London Hospital for Consumption, the London Temperance Hospital and the West End Hospital for Diseases of the Nervous System. Little was clear to point out that his sphygmograph was a modification of Richardson's Sphygomograph, a design developed several years before, but also argued that it aimed to correct several deficiencies of Richardson's model, including the ability to apply more than four ounces of pressure. Allen & Hanburys, the maker of Little's sphygmograph, included extracts from the British Medical Journal's piece in its promotional catalogue of 1910.[22]

While upholding eponymy as a respectable practice, professional orthodoxy condemned patenting on the grounds that it represented a barrier to medical

treatment. It stated that practitioners were unable to modify and improve patented tools because it placed invention and a form of monopolistic ownership in the hands of a sole inventor to the detriment of medical practice and patient safety. The formalised monopoly individual patentees had over their registered designs restricted medical knowledge and thus medical progress.[23] This argument against patenting was, of course, not restricted to the medical profession; many of those in trades beyond medicine had long argued that patenting restricted 'the spirit of invention.'[24] As Christine Macleod and others have demonstrated over a wider time period, patent systems frequently embodied a tension between patent monopoly as a stimulator of invention among individuals, and as a restriction on innovation among other inventors.[25] However, professional orthodoxy maintained that by patenting their tools, practitioners were not only restricting invention and innovation, but were also putting the lives of their patients at risk. Unlike debates in other trades, the medical profession saw limiting the level of potential inventive activity by patenting as, quite literally, a case of life or death.

Yet despite this professional rhetoric, an examination of the medical press between 1870 and 1920 demonstrates that not only was the message presented to practitioners confused and contradictory, but that not all practitioners subscribed to the established view that patenting restricted medicine's inventive spirit. Peter Bartrip has demonstrated the British Medical Journal's lack of ethical consistency through its simultaneous condemnation of patent medicines in its editorial pages and promotion of them in its advertisement sections.[26] Similarly, during the 1880 and 1890s, the journal published both reviews of books by patent agents and instructions to correspondents who requested information on how to patent an invention, while condemning professional patenting through its continual reference to de Styrap's 1878

Code of Medical Ethics. In 1889, for example, the journal published a review of a book by patent agent William Jordan titled Instructions to Inventors as to obtaining letters patent and registering Trade Marks and designs. The review made no mention of the view that patenting restricted medical progress and in fact portrayed the book in a positive light suggesting it did well 'to indicate the course which an inventor must pursue in order to obtain proper protection for his skill.'[27] Simultaneously, the journal responded in no uncertain terms to queries on how to patent inventions from Francis W. Clark in 1892 and five other correspondents between 1893 and 1895, who gave only pseudonyms - 'Invention', 'Medico' from Co. Clare, 'Young Practitioner' from Bournemouth, 'A Patentee not a Practitioner' and 'Surgeon-Captain' - by referring to patenting's 'derogatory nature' as laid out in de Styrap's Code.[28]

Certainly here we can see the encroaching infringement of the professional boundaries of medicine by professionalising patent agents, who were keen to enlist practitioners as clients, but the fact that the journal responded to Clark under the heading 'Repeated Inquiries on the Same Subject' suggests that practitioners were more willing to pursue patents for their inventions than is reflected by the limited number of letters published in the British Medical Journal.[29] Moreover, the fact that Clark, a recently qualified and therefore relatively inexperienced medical officer practising in South Shields in the North East of England, was the only one among these correspondents willing to put his name in print suggests a general fear among practitioners of professional reprisal for requesting such information. The use of pseudonyms makes it difficult to identify the other five correspondents, but those given here do, nonetheless, provide clues as to their professional status and thus their stance on patenting ethics; 'Young Practitioner' from Bournemouth, along with Clark, was clearly not of high status and thus less likely to be aware of or be willing to uphold

professional codes of conduct that had been in place long before they had qualified, while ‘Surgeon-Captain’ was of higher professional status but within the navy, a sub-branch of professional medicine that, along with the army, had long been known and recognised for its technical ingenuity and surgical craftsmanship.[30] Yet, in order to dispel any misapprehension that it was only young, inexperienced or ignorant practitioners or those within the armed forces who dismissed existing professional orthodoxy, the journal was keen to point out that ‘A Patentee not a Practitioner’ was an old graduate of a distinguished University, and although not in actual practice, held an official medical appointment. By referring to himself as ‘A Patentee not a Practitioner’, this correspondent had attempted to make a distinction between those who engaged in patenting and practitioners who formed part of the profession and thus do not patent. Yet, by highlighting the personal information about this correspondent, the journal inferred that ‘A Patentee not a Practitioner’ was in fact part of the profession’s elite and should thus should not be a patentee at all.

From the mid-1890s, when corporate capitalism was beginning to have more of an obvious impact on the medical profession, it remained common for practitioners to enquire about patents to journals with letters marked only with their initials or pseudonyms, but it is also clear that these practitioners were becoming much more vocal in their support of patenting on the grounds that it positively encouraged professional invention. Moreover, for all of its emphasis on de Styrap’s Code, the British Medical Journal was playing an increasingly important role in providing a voice to inventive practitioners looking to enhance medical progress by patenting their tools and appliances. A correspondent who identified themselves only as ‘H. M’ stated in the journal in 1894 that individual practitioners did not receive anywhere near enough recognition for their professional inventive achievements through eponymy alone.

Allowing practitioners to register patents for their designs would encourage them to invent. He asked: 'why is the medical profession to lay its inventive genius at the foot of manufacturers and let them have all the benefit?'[31] Indeed, as commentators beyond the profession argued, the granting of patent privileges offered an incentive and reward to inventive minds.[32] Patents also sat alongside other types of government-controlled incentives during the nineteenth century which were geared towards encouraging invention, such as prizes and publicity.[33] 'H. M' and other fellow practitioners saw patenting as important for the advancement of medical science rather than restrictive, because it protected the intellectual property of members of the profession whilst at the same time allowing disclosure of registered information on the design via the Patent Office.[34] As some pointed out, the patenting of scientific instruments was doing no harm to the analogous profession of the physical sciences and it therefore would be beneficial to the future of the medical profession if professional codes against patenting were lifted. 'H. M' pointed out that: 'One of the most noted scientific men of our day, who has lately been raised to the peerage patents his apparatus.'[35] Presumably, 'H. M' was referring to Lord Kelvin (1824-1907), who, between 1854 and 1907, successfully filed more than seventy patents for various types of scientific instruments, including electrical conductors for telegraphs and instruments for measuring electric current, without compromising his status as one of the leading figures of British science.[36]

As secretary of the British Medical Association, Robert Saundby was undoubtedly aware of the increasingly vocal support patenting was receiving from practitioners within the medical press in 1890s and this seemingly led to his revision of the code on patenting within his 1902 Medical Ethics. The publication of Saundby's less stringent code on patenting, however, did not lead to a reduction in contradictory content within

the medical press. In 1903, while the British Medical Journal stated that 'Medical men, like other citizens, can of course take advantage of the patent laws for the protection of their inventions', the Lancet maintained that the potential to create a trade monopoly under a patent made the process objectionable.[37] The British Medical Journal responded to a request from 'R. N.' in 1908 for information on how to patent an invention by publishing detailed instructions, including ways in which to draw up a provisional specification, a complete specification and the importance of employing a patent agent to assist with the process and in 1910, published a review by A. A. Thornton, a patent agent, stating that the book was 'useful to those who have made some invention and desire, before putting themselves in the hands of a patent agent, to see what steps are necessary to obtain a patent.'[38] The issue of whether a patent encouraged or restricted the spirit of invention within medicine continued into the 1920s. In 1920, Walter Gawen King, a retired Colonel who had spent much of his career in colonial Madras and was thus of similar professional status as 'Surgeon-Captain', argued that it must be possible for leading men of the profession to 'permit the taking of patents by research workers, under circumstances not calculated to injure the honour of the profession.'[39]

From the 1890s then, a number of practitioners questioned de Styrap's claim that patenting restricted the inventive spirit of medicine. Far from hampering the development of the profession, these practitioners argued that patenting encouraged inventive spirit because it justly rewarded individual inventors, both financially and through an enhanced reputation, while allowing information to be disclosed via the Patent Office. It is telling, however, that only two of these practitioners – Francis W. Clark and Walter Gawen King – were willing to be identified through their journal correspondence. Neither Clark nor King were a member of the elite London based

physicians who most commonly upheld professional orthodoxy; Clark was an inexperienced medical officer in the North East of England, while King was a respected retired army medical officer who had spent much of his career abroad. Both saw invention as a key way of advancing medicine, and did not see their public announcement of such as potentially damaging to their careers. As a retiree, King clearly had less to fear. The fact that other kinds of supporters of this argument only used initials and pseudonyms, however, suggests that fear of professional reprisal for contravening professional orthodoxy was widespread.

In Pursuit of Profit

Related to the question of whether patenting encouraged or restricted medical tool design was the concept of profit making. Those who upheld professional orthodoxy maintained that practitioners who patented their inventions were doing so to procure a profit, a pursuit they severely condemned. Of course practitioners were expected to exchange their medical services for fees in order to make a reasonable living, but the pursuit of profit through patenting was viewed as an activity for tradesmen, and one in which professional medical men should not be involved. Professional orthodoxy stated that practitioners benefited financially from patents because they not only derived profits through the sale of products they patented, but were also able to increase their income for as long as the patent was valid; the patent itself created an exclusionary right. Conversely, the profession sanctioned eponymy because it meant that no monopoly was created and almost certainly meant that practitioners would procure no profit. Any profits from product sales would instead go to the instrument maker enlisted to produce the design. Geoffrey Searle has suggested that the formulation of professional codes of conducts across all Victorian middle-class professions were to

ensure that professionals did not practise a trade from which they expected to profit but rather offered the community a service.[40]

Professional opposition to practitioners' pursuit of profit was intrinsically linked to the sustainability of good intra-professional relationships and aimed to prevent any unnecessary competition between what was already an overcrowded profession, particularly among general practitioners.[41] Indeed patenting, as a regulatory micro-economic system, distorted the laissez faire dynamics of the market and provided patentees with an unfair economic advantage over those who chose not to patent. From this perspective, patents were conceived as a form of advertising or branding, but their impact was considered far worse than any advertisement contained within public prints because of their exclusionary nature. Through advertising, practitioners with similar products could at least compete in the same market with the same product. Just as practitioner support for patenting on the grounds that it positively encouraged professional invention was becoming more prominent in the medical press during the 1890s, issues around professional advertising were discussed in detail at the section of medical ethics at the Sixty-Third Annual Meeting of the British Medical Association in London in 1895. Emphasising the importance of intra-professional ethics, Cardiff-based practitioner and stalwart of medical ethics Thomas Garrett Horder made a plea in his meeting address: 'Let us discard as much as possible everything that tends to degrade our calling into a mere money-making concern, and then we shall probably set up a high standard of morality in our dealings with each other.'[42] Following on from Horder, George W. Potter, a physician based in the well-to-do Kent town of Tunbridge Wells, argued that any practitioner who advertised his services or any product could only be doing so 'for fame or gain' and that this equalled serious professional misconduct.[43]

Yet, like those who rejected claims that patenting restricted medical innovation, some practitioners also rejected professional orthodoxy on patents and profit procurement. While some practitioners disputed the fact that advertising was unprofessional following Potter's address at the British Medical Association address, others argued that there was nothing unprofessional from procuring financial benefit from patenting.[44] In 1903, a year after the publication of Saundby's Medical Ethics, which stated that it was better for practitioners not to maintain any commercial interest in inventions, a Lancet correspondent only willing to be identified as 'Patentee' pointed out that 'a search through a file of the Official Journal of Patents will serve to show that your opinions regarding the patenting of medical and surgical apparatus are not shared by many in the profession.' He went on to say 'medical men do patent such apparatus and receive royalties on their sale and there is no just and valid reason why they should not.'[45] Indeed, medical instrument makers were not alone in investing in the production of new designs and should share profits with practitioners accordingly. This argument was similar to those put forward by supporters of the English patenting system in general, including Scottish economist Henry Dunning Macleod, who stated in 1858 that: 'the productions of a man's mind are now recognized to be as truly his own property and the fruits of his industry as the production of material wealth.'[46] The Lancet strongly disagreed with 'Patentee's' claim that many medical men patented their inventions and, in an effort to uphold professional rhetoric, assured readers that patenting activity was restricted to only a few.[47] Similarly, elite practitioners, like George H. Colt, senior resident anaesthetist and late house surgeon at St Bartholomew's Hospital, London, maintained that instruments makers should be the true profiteers of any new design. Colt, a prolific inventor of all manner of medical apparatus including mouth gags and a portable operating theatre, suggested in 1910

that it was reasonable for instrument makers to expect a return from the amount of time, skill, patience and money they had invested in developing such appliances, but argued that medical practitioners should give their inventions freely to their profession.[48] It is interesting to note that Colt patented several of his non-medical inventions both in Britain and the USA, including an agricultural machine in 1909 and a squash racket court in 1935, signalling that his opposition to patenting only applied to professional medicine.[49]

It is of course difficult to ascertain levels of profit procured from patenting by either medical instrument makers or by individual practitioners during this period. Even among practitioners that we know patented their devices, few accounts, when they exist, reveal such information. Estimating how much profit practitioners procured from their activities was no easy task for the General Medical Council either, as Horder and Potter made clear in their addresses to the British Medical Association in 1895.[50] While few practitioners who patented their designs seem to have risen in the ranks of the profession or came to hold prominent positions in the British Medical Association or Royal Colleges, there is no evidence to suggest that any practitioner who did patent an appliance meant for the profession's sole use was ever struck off the medical register, the most serious consequence for being involved in trade activity. In contrast, well-known cases of practitioners struck off the medical register for attempting to procure profits from goods patented and promoted to the general public were viewed as justified. Indeed, the General Medical Council stuck off Henry Arthur Allbutt in 1889 and Thomas Allinson in 1895 for developing, patenting and promoting contraceptive appliances and food products respectively, both of which were aimed at general consumers.[51] While professional orthodoxy maintained then that patenting was unethical because it resulted in profit, individual practitioners increasingly disputed

such claims from the early 1900s arguing that practitioners did receive profit from patenting but that it was not unethical for them to do so. Profit merely rewarded the time and labour they had invested in their inventions and was therefore in the interests of their profession.

Professional Sensibility versus Proprietary Rights

Questions regarding whether patenting encouraged or restricted invention and whether it was ethical for practitioners to profit from their inventions were certainly important to the patenting debate within the medical profession, but their relevance was incorporated into a broader concern, that of professional sensibility. The maintenance of the profession's reputation was seemingly the most significant issue of contention between those who wished to maintain professional orthodoxy and practitioner-patentees during this period of corporate capitalism.[52] According to late nineteenth and early twentieth-century professional rhetoric, patenting was considered a trade activity, not only because it resulted in profits but because it was an 'ungentlemanly' pursuit. 'Gentlemen' professionals of this period were not supposed to fight over proprietary rights and nor were they meant to attempt to procure profit from a patent. Reminiscent of de Styrap's principle that patenting was 'derogatory to professional character,' the aforementioned George Colt of St Bartholomew's Hospital pointed out in the British Medical Journal as late as 1910 that: 'the originator of any instrument in surgery does not by the etiquette of his profession patent his invention, neither does he make a penny out of it.'[53] Patenting was considered damaging to the reputation of the profession because patents filed by practitioners were not confined to the profession as were eponymous tools; patents featured in government regulated systems alongside patents from trades, including respectable trades such as

engineering and aeronautics, but also the less respectable unorthodox medical trade. In turn, the filing of patents of medical tools alongside those of disreputable medical companies resulted in the profession's fear that the public would not be able to distinguish between orthodox medicine and quackery. For example, Cornelius Bennett Harness founder of the disreputable Medical Battery Company and a medical entrepreneur most feared by the medical profession, registered nineteen British patents for an assortment of medical belts and harnesses in just four years between 1881 and 1885.[54] The profession were certain that Harness' products had no therapeutic value. The fact that these disreputable appliance makers used the word 'patent' as a way to promote their products – in newspapers and other public prints – also led the profession to reject it. The makers of such appliances were thus no better than patent medicine vendors.

However some practitioners seemingly sought to reinvent what it meant to be gentlemanly by defending their own inventive reputation through patents. Indeed, what counted as 'gentlemanly' behaviour in late nineteenth and early twentieth-century Britain was not a fixed rule, but as in other professions, was in a state of continual negotiation. While many practitioners found it unproblematic that others freely borrowed elements of their designs in a new configuration of an invention, as we saw earlier with John Fletcher Little's modification of Richardson's sphymograph, others saw it as piracy. Numerous disagreements over who had priority of different designs between practitioners ensued and the correspondence pages of the medical press presents many examples of practitioners accusing each other of copying their own unpatented designs or those of colleagues. Such disagreements were particularly prominent in the 1880s when fewer practitioners were vocally supportive of patenting practices. In a letter to the Lancet in 1882, Edward Blake, an elite London physician

with practices in Hyde Park and Hampstead, was politely critical of the failure of Hunter Mackenzie, another elite metropolitan physician, to acknowledge the many modifications that had been invented before his so-called new design of an anaesthetic inhaler. In particular, Blake pointed out that the valves Mackenzie claimed made his inhaler unique were curiously like those used by H. Murphy, an obstetrician of University College London, in his inhaler invented twenty five years earlier.[55] Similarly, in the same journal a year later in 1883, Lambert H. Ormsby, surgeon to Meath Hospital in Dublin and inventor of a number of medical appliances, claimed: 'that the new cranium holder featured in last Saturday's Lancet bears a very strong resemblance to an instrument I suggested many years ago for the same purpose.'[56] Ormsby's claim that his publication of a short description of his cranium holder four years earlier in the Medical Press and Circular and its inclusion in Henry Albert Reeves' text book Human Morphology published in 1882 was proof of his inventive priority. As we saw in the first section, publishing information on new inventions was an important way to secure proprietary recognition in a way that suited professional sensibilities. However, the lack of any formal legal protection through these publications meant that many, if not most, of these disputes remained unresolved.

As with debates surrounding the spirit of invention and profiteering, some practitioners became increasingly vocal in their opinion that patenting was not an 'ungentlemanly' practice from the 1890s. With increasing professional resentment towards eponymy and growing concerns over profit procurement and design imitations, these practitioners believed it was unrealistic to oppose patenting in the current commercial climate. The aforementioned 'Young Practitioner' from Bournemouth, 'Medico' from County Clare, and 'A Patentee but not a Practitioner' made this point central in their correspondence to the British Medical Journal in 1894 to argue that the profession

only continued to adhere to patent prohibition for practitioners because it was a clause that had been first introduced by Thomas Percival, the great physician, in 1807. As 'A Patentee but not a Practitioner' argued, the professional and commercial circumstances were clearly very different almost one hundred years later. Patents in 1807 had been very costly to register so would have enhanced the retail price of patented goods to such a level that their use was virtually inhibited. The greatly diminished cost of a patent by the late nineteenth century, in addition to the rise of corporate capitalism, meant that there was no valid reason for retaining patenting prohibition.[57] The fact that 'A Patentee but not a Practitioner', an established practitioner with an official medical appointment, argued that codes surrounding the prohibition of patenting needed updating in order to redefine 'gentility' in line with the increasing commercialisation of everyday life highlights that it was not solely the younger generation of practitioners who felt that codes were outdated. The British Medical Journal correspondence from 'A Patentee' in 1903 similarly referred to the outdated nature of the profession's stance on gentility, and in 1912, another anonymous correspondent in American Journal of Surgery stated that: 'the ethical prohibition against patenting surgical instruments is a tradition that has been handed down from one generation to another, and its transmission from one 'code' or 'principles' to the next seems to us the illogical adherence to a tradition merely as such.'[58]

While both young and more established practitioners criticised others for design piracy and for adhering to outdated ethical codes on patenting, it was seemingly only young, ambitious and non-elite practitioners who were willing to defend their inventive reputation by putting their name to patented appliances. This defensive measure reflected a wider concern among practitioners about imitations and counterfeits of their

intellectual property. While the historical literature has commonly equated counterfeit concerns with quacks and patent medicine vendors, it is clear that these concerns also apply to appliances and other practitioners too. The most striking and detailed evidence of a practitioner-patentee from this period aiming to defend his inventive reputation with a patent appears in the business correspondence of the archive of Allen & Hanburys, a well-respected appliance maker and pharmaceutical company established in 1715. The correspondence between the company and John Duncan Menzies, a young and newly-qualified surgeon on board the HMS Halcyon, a torpedo gun boat used by the British Royal Navy until 1919, and son of the surgeon-general Duncan Menzies famed for his service in the Crimean War, reveals that Menzies planned to patent his design for a new stretcher for specific use on Naval ships in July 1895. This decision to patent his stretcher followed news that the design had already been 'filched' by W. G. Hayward, surgeon on HMS Sharpernation, before Menzies had been able to publish notice of his invention in the pages of the medical press. Menzies was certain that Hayward had been tipped off by a carpenter he had enlisted to help build models of his stretcher because Hayward had registered his patent for a naval stretcher soon after Menzies had made his model in April 1895. **[Figures 3 and 4. The abridgement of the patent specification for Menzies' naval stretcher, May 1895]**. Yet despite Hayward's patent, Menzies stated in correspondence to Allen & Hanburys 'I think I can afford to ignore this Hayward' and outlined six main points that were novel about his design, including support and prop for broken ribs and the option of incorporating a first aid bag and pannier into the stretcher. With the inclusion of these novel design features and a prototype produced by Allen & Hanburys, Menzies registered his patent for his 'improvements in field and ambulance stretcher' (patent no. 9450), which was accepted in March 1896.[59] While it is not possible to estimate

with any accuracy the relative commercial success of stretcher designs by Menzies and Hayward, it is clear that other companies began to produce, promote and sell similar designs. Menzies' patent, of course, protected his six points of novelty. **[Figure 5. Arnold & Sons' design of a naval stretcher, 1904. Figure 6. Down Brothers' design of a naval stretcher, 1906].** It is also not possible to determine whether Menzies would have faced any repercussions from the General Medical Council for registering his stretcher patent - the British Medical Journal reported his death as 12 November 1895 at the age of only 34.[60] However, it is unlikely Menzies would have faced any serious professional consequences, given that other practitioners who patented their designs faced very few.

The concern over imitations and counterfeits that led Menzies to patent his stretcher design was not solely limited to the professional brethren either, but by the twentieth century, practitioners expressed concerns that their unpatented designs were being copied by instrument makers too. Indeed, Colt, who defended eponymy ahead of patenting, accused at least two instrument makers of 'pirating' his mouth gag from Down Brothers, its original makers based in London, between 1907 and 1910. According to Colt, the first of these, a large and respected firm, sent travelling representatives around the West of England promoting an inferior imitation of his gag at 30 per cent less than the price of his own design. The second produced another imitation, which they sold at half the price of Colt's original pattern.[61] Practitioner concern about imitation was as much to do with damage to their own reputations as it was with patient safety. This final point of debate on professional patenting then centred on questions of proprietary recognition and whether claiming ownership for inventions aligned with what it meant to be a 'gentlemanly' practitioner in late nineteenth and early twentieth century Britain. Some practitioners argued that codes

of conduct based on early nineteenth century conceptions of gentility were outdated and did not reflect the professional or commercial climate of the late nineteenth and early twentieth century, while others patented their tools as a defensive measure against practitioners and instrument makers, who sought to profit from imitating their eponymous designs.

Conclusion

Despite the general increase in patenting activity across the UK between 1870 and 1920, the number of patents registered by medical practitioners for designs of medical tools and appliances remained low. Medical entrepreneurs and pharmaceutical companies increasingly began to patent new designs for appliances and new drug formulas during this period, but there was no corresponding rapid increase in medical practitioner involvement in patenting during this period. Patenting failed to have the effect on professional medicine it did in other trades with a high level of inventive activity because medical practitioners were, for the most part, adhering to professional orthodoxy on the prohibition against patenting, the most obvious statement on which is contained within de Styrap's 1878 ethical guide. Of course, patenting figures are not in themselves an accurate indicator of inventive activity and not every medical practitioner was an inventor.[62] Nonetheless, it is clear from examining a combination of the patent record, business correspondence and the medical press that the attitudes and behaviours of some practitioners towards patenting their own inventions were changing, particularly from the 1890s. The supporters of patenting challenged the professional premise that patenting restricted innovation and therefore medical progress; they questioned whether it was ethical to procure profit on the time and money they had devoted to their own inventions; and argued that the patent system was one way they could receive formal priority credit for their designs. Some argued

that de Styrap's professional code was outdated and that patenting did not contravene the values and ethics of the profession in the current economic climate; after all, the instrument and pharmaceutical trades and the profession increasingly had to work together during this age of technological medicine and expanding global capitalism. The increasingly vocal and active opposition to restrictions on patenting based on these three main arguments from the 1890s seemingly led to the revision of the code in Saundby's 1902 guide. Saundby's ambiguous statement about patenting within this guide thus reflected professional circumstances at this time. It neither endorsed patenting, nor condemned it. While evidence is still wanting, his nonchalance may have also encouraged others to register patents following the guide's publication. Indeed, the British Medical Journal certainly increased the amount of advice on patenting for its readership following Saundby's guide.

The anonymization of much journal correspondence throughout the period makes it difficult to identify practitioner supporters of patenting and correlate their experiences. Their use of only initials or pseudonyms is in itself a good indication of the fear of professional reprisal for being vocal in their support. Yet, from existing information, it is clear that these supporters shared certain characteristics: they were often young and therefore inexperienced enough not to know about or be willing to maintain professional orthodoxy surrounding patenting; they practiced outside the important medical centre of London and were thus somewhat removed from the reaches of the British Medical Association; and/or were medical officers within the British army or navy. The young naval-surgeon John Duncan Menzies, for example, was a practitioner who felt that patenting was a suitable way to protect his designs from imitations, from both practitioners and appliance makers. He saw patenting as a benefit rather than a

hindrance to the profession and thus, attempted to reshape ethical codes with his pursuit of a patent accordingly. Unlike those that defended professional orthodoxy, such as George Colt, Thomas Horder and George Potter, supporters of patenting were not generally considered among the elite of the profession. That is not to say that elite practitioners were always against patenting. Indeed, the British Medical Journal pointed out the elite professional status of 'A Patentee not a Practitioner'. But it was generally the more established elite physicians and surgeons, who had trained, practised and thrived in an earlier time when patenting had been doggedly condemned, that most vocally condemned rising support for patenting. The patent system was becoming an important part of the new commercial world in which medicine functioned, one which elite practitioners did not recognise.

Certainly, more research needs to be conducted on professional and personal identities of practitioner supporters of patenting in this period, especially those within the armed services who appeared to be among the most active patentees. Nonetheless, this case study of the patent debate over medical tools and appliances thus uncovers an important aspect of the moral economy of professional medicine. While medical practitioners were expected to adhere to a set of professional ideals and social values under this rubric of 'moral economy,' it serves as a helpful reminder that this did not always match the reality of individual practice. Practitioners were committed to their profession, or at least were expected to be, and shared a collective adherence to professional norms. Yet they also clearly had their own individual motivations too and patented their inventions, or wished to, for any number of reasons, including those not covered in this short article. This case study thus reminds us as historians to pay closer attention to individual practice and deviations to collective

discourse over mandates dictated by professional bodies. Having conducted a closer analysis of individual experiences here, it is clear that some were willing to disagree with professional etiquette and push for a much closer relationship between professional medicine and commerce than historians have recognised. Practitioners' patenting tool designs was an important manifestation of medicine's involvement in commerce during this period.

Robert Saundby died in 1918, but his guide to professional conduct remained influential long after his death. Certainly no subsequent guide contained as much information on conduct regarding patenting. Indeed, W. G. Aitchison Robertson's Medical Conduct and Practice, A Guide to the Ethics of Medicine published in 1921 made no mention at all of patenting and focused instead on doctor-patient relationships.[63] The Central Ethical Committee of the British Medical Association held a position as ambiguous as Saundby's in 1930 when it adopted a resolution stating it was 'ethically undesirable' for a practitioner to hold a patent.[64] With no further guidance, practitioners remained divided into the twentieth century on whether to patent their appliances. Many continued to abstain from the practice, giving their intellectual property freely to their profession allowing others to improve on their designs and sacrificing any potential profit. Some expressed some regret in abstaining, the most well-known example being John Charnley, orthopaedic surgeon at Wrightington Hospital in Wigan, who developed new design of the artificial hip with Leeds-based instrument maker in 1960. Charnley's lack of patenting led to the commercial release and availability of a range of imitations and allowed Johnson & Johnson Plc to monopolise the market with the patents that they did take out.[65] The British Medical Journal also continued to promote the latest information regarding

patenting.[66] Of course, late twentieth century medical practice looked very different from that of the early twentieth century, not least because the way in which new medical technologies were developed to include collaborations with bio-scientists, medical researchers, medical device technologists, pharmaceutical companies, universities, hospitals and so on. Yet nonetheless, it is clear that codes of professional conduct remain crucial to the image of medicine and that it is necessary for these codes to adapt to recent commercial developments.[67] By 1950, medical patenting was positively encouraged as long as the patents were assigned to the National Research Development Corporation and not to individual practitioners.[68] No codes have yet been developed which sanction patenting and in the meantime, practitioners continue to face the tension between the professional ideal and the commercial reality of the ways in which medical technologies are developed today.

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[1] Robert Saundby, Medical Ethics: A Guide to Professional Conduct, London: Charles Griffin & Co Ltd, 1902.

[2] The Royal Colleges of Physicians and of Surgeons had ethical statues for their members, and the American Medical Association adopted a formal code of ethics in 1847, but the British Medical Association only adopted certain resolutions.

[3] Jukes De Styrap, A Code of Medical Ethics: With Remarks on the Duties of Practitioners to their Patients, and the Obligations of Patients to their Medical Advisers; also on the Duties of the Profession to the Public, and the Obligations of the Public to the Faculty, London: J. & A. Churchill, 1878; 2nd ed 1886; 3rd ed London: H K Lewis, 1890; 4th ed 1895. Prior to De Styrap's publication, the profession relied on the famous inaugural work on medical ethics, Thomas Percival's Medical Ethics; or A Code of Institutes and Precepts Adapted by the Professional Conduct of Physicians and

Surgeons, orig. pub. 1803, reprinted in Chauncey D. Leake's *Percival's Medical* Ethics, Baltimore: William & Wilkins Co., 1927, pp. 61-205.

[4] Saundby, op. cit. (1), p. 9.

[5] De Styrap, op. cit. (3), p. 50.

[6] Here I extend Lorraine Daston's definition of the 'moral economy' of science to the web of collective social values that shaped and functioned in the organized system of medicine. Medicine's moral economy also included collective social values regarding the economic market. Lorraine Daston, 'The Moral Economy of Science', Osiris (1995) 10, pp. 2-24. For moral economy in plant breeding, see Berris Charnley, 'Seeds Without Patents: Science and Morality in British Plant Breeding in the Long Nineteenth-Century', Revue économique (2013) 64, pp. 69-87.

[7] Robert Baker, Dorothy Porter and Roy Porter, The Codification of Medical Morality, Historical and Philosophical Studies of the Formalization of Western Medical Morality in the Eighteenth and Nineteenth Centuries, Vol 1: Medical Ethics and Etiquette in the Eighteenth Century, Dordrecht: Kluwer, 1993, p.16.

[8] Among studies on the medical profession are Eliot Freidson, Profession of Medicine: A Study of the Sociology of Applied Knowledge: with a new afterword by the author, Chicago: Chicago University Press, 1988; Irvine. Loudon, Medical Care and the General Practitioner, 1750-1850, Oxford: Clarendon Press, 1986; Harold Perkin, The Rise of Professional Society: England since 1880, London: Routledge, 1989; William J. Reader, Professional Men: The Rise of Professional Classes in Nineteenth-century England, London: Basic Books, 1966; Ivan Waddington, 'The Development of Medical Ethics: A Sociological Analysis', Medical History (1975) 19, pp. 36-51; Ivan Waddington, The Medical Profession in the Industrial Revolution, Dublin: Gill & Macmillan, 1984.

[9] Anne Digby, Making a Medical Living: Doctors and Patients in the English Market for Medicine, 1720–1911, Cambridge: Cambridge University Press, 1994; Marguerite Dupree, 'Other than healing: Medical practitioners and the business of life assurance during the nineteenth and early twentieth centuries', Social History of Medicine (1997) 10:1, pp. 79-103.

[10] Lori Loeb, 'Doctors and Patent Medicines in Modern Britain: Professionalism and Consumerism', Albion (2001) 33, pp. 404-425; Peter Bartrip, 'Secret Remedies, Medical Ethics, and the Finances of the British Medical Journal', in Baker, Porter and Porter (eds), op. cit. (7). As has been extensively outlined elsewhere, patent medicines were rarely patented but were a legacy of the "letters patent" first issued by King Charles I.

[11] Joseph M. Gabriel, Medical Monopoly: Intellectual Property Rights and the Origins of the Modern Pharmaceutical Industry, Chicago: University of Chicago Press, 2014.

[12] Gabriel, op. cit. (11) p. 113, p. 153.

[13] My recent monograph is among the first publications to address the patenting of medical tools: Claire L. Jones, The Medical Trade Catalogue in Britain, 1870-1914, London: Pickering & Chatto, 2013, particularly chapter seven.

[14] For example, Roy Church and E. M. Tansey, Burroughs Wellcome & Co.: Knowledge, Trust and Profit and the Transformation of the British Pharmaceutical Industry 1880–1940, Lancaster: Crucible, 2007.

[15] Evidence obtained from Abridgements to Patents, 1888-1909 (London: HMSO 1888-1909).

[16] Fritz Machlup and Edith Penrose famously discussed general nineteenth century debates over patent systems as long ago as 1950. See, Fritz Machlup and Edith

Penrose, ‘The Patent Controversy in the Nineteenth Century’, The Journal of Economic History (1950) 10, pp. 1-20.

[17] John Kirkup, The Evolution of Surgical Instruments: An Illustrated History from Ancient Times to the Twentieth Century, Novato, CA: Norman Publishing, 2006, pp. 385-387.

[18] Sally Wilde and Geoffrey Hirst, ‘Learning from Mistakes: Early Twentieth- Century Surgical Practice’, Journal of the History of Medicine and Allied Sciences (2008) 64, pp. 39-77. Sally Frampton, ‘Patents, Priority Disputes and the Value of Credit: Towards a History (and Pre-History) of Intellectual Property in Medicine’, Medical History (2011) 55, pp. 319-324. See also her chapter in this volume.

[19] The continual process of medicine was another important form of late nineteenth century professional rhetoric. See, for example, Bert Hansen, ‘New Images of a New Medicine: Visual Evidence for the Widespread Popularity of Therapeutic Discoveries in America after 1885’, Bulletin of the History of Medicine (1999) 73, pp. 629-678.

[20] For a recent study of eponyms of medical conditions in the twentieth century, see Andrew J. Hogan, ‘Medical Eponyms: Patient Advocates, Professional Interests and the Persistence of Honorary Naming’, Social History of Medicine (2016) 29, pp. 534-556.

[21] James M. Edmonson, American Armamentarium Chirurgicum, 1889 by G. Tiemann, Novato, CA: Norman Publishing, 1989.

[22] ‘A Modification of Richardson’s Sphymograph’, British Medical Journal, 28 March 1903, pp. 738-739. Allen & Hanburys, Catalogue of Surgical Instruments and Appliances, Aseptic Hospital Furniture, London: Allen & Hanburys, 1910, p. 857.

[23] D. L. D. Sheldon, ‘Surgical Patents’, Medical and Surgical Reporter, 29 April 1871, pp. 360-362.

[24] Machlup and Penrose, op. cit. (16). A notable recent edited volume that explores the concept that intellectual property restricts invention is Laura J. Murray, S. Tina Piper and Kirsty Robertson (eds.), Putting Intellectual Property in its Place: Rights Discourses, Labor, and the Everyday, Oxford: Oxford University Press, 2014.

[25] Christine Macleod, Heroes of Invention: Technology, Liberalism and British Identity, 1750–1914, Cambridge: Cambridge University Press, 2010.

[26] Bartrip, op. cit. (10).

[27] 'Notes on books: Instructions to inventors as to obtain letters patent and registering trademarks and designs', British Medical Journal, 2 November 1889, pp. 988-989.

[28] 'Medico-Legal and Medico-Ethical: Repeated Inquiries on the Same Subject,' British Medical Journal, 12 November 1892, p. 1087; 'Medico-Legal and Medico-Ethical', British Medical Journal, 22 April 1893, pp. 872-873; 'Medico-Legal and Medico-Ethical', British Medical Journal, 27 May 1893, pp. 1136-1137; 'Medico-Legal and Medico-Ethical: Patents', British Medical Journal, 17 February 1894, pp. 383; 'Medico-Legal and Medico-Ethical: Patents', British Medical Journal, 3 March 1894, pp. 495; 'Medico-Legal and Medico-Ethical: Patents for surgical appliances', British Medical Journal, 31 August 1895, pp. 566.

[29] For more on the patent agent, see Kara W. Swanson, 'The Emergence of the Professional Patent Practitioner', Technology & Culture (2009) 50, pp. 519-548.

[30] The navy's technical ingenuity in terms of surgical instrument design can be traced back to at last the seventeenth century with Woodall's 1617 Illustrated Manual with *Equipment for the Sea Surgeon's Chest*, which also include a price list enabling readers to purchase new designs. See Kirkup, op. cit. (17), p. 66. For later instrument inventions from naval surgeons, see Harold Burrows, Surgical

Instruments and Appliances Used in Operations: An Illustrated and Classified List with Explanatory Notes, London: Scientific Press, 1910.

[31] H. M, 'The medical profession and patents', British Medical Journal, 29 September 1894, p. 732.

[32] For example, F. List, The National System of Political Economy, London, 1885, p. 307 (first published 1841).

[33] Petra Moser and Tom Nicholas, 'Prizes, Publicity and Patents: Non-Monetary Awards as a Mechanism to Encourage Innovation', Journal of Industrial Economics (2013) 61, pp. 763-788.

[34] It did, of course, inhibit diffusion and thus created a paradox. See Christine Macleod, 'The Paradoxes of Patenting: Invention and Its Diffusion in 18th and 19th-Century Britain, France and North America', Technology and Culture (1991) 32, pp. 885-910.

[35] H. M, op. cit. (30), p. 732.

[36] Paul Tunbridge, Lord Kelvin: His Influence on Electrical Measurement, London: Peter Penegrinus, 1992.

[37] 'The Patenting of Surgical Instruments', Lancet, 15 August 1903, pp. 481-482.

[38] 'Patents by Medical Men', British Medical Journal, 13 June 1903, pp. 1411-1412; 'The Process of Patenting', British Medical Journal, 6 June 1908, pp. 1403-1404; 'Notes on Books', British Medical Journal, 29 January 1910, p. 268.

[39] W. G. King, 'Awards for Medical Discovery', British Medical Journal, 10 April 1920, pp. 519-520.

[40] Geoffrey R. Searle, Morality and Market in Victorian Britain, Oxford: Clarendon Press, 1998.

[41] Digby, op. cit. (9).

[42] T. Garrett Horder, 'Intra-professional Etiquette: Section of Ethics, Sixty-Third Annual Meeting of the British Medical Association', British Medical Journal British Medical Journal, 14 September 1895, pp. 635-638.

[43] George W. Potter, 'Professional Advertising: Section of Ethics, Sixty-Third Annual Meeting of the British Medical Association', British Medical Journal, 14 September 1895, pp. 638-640.

[44] J. S. Owens, 'Professional Advertising', British Medical Journal, 9 November 1895, p. 1212; D. Campbell Black, 'Professional Advertising', British Medical Journal, 16 November 1895, p. 1263.

[45] Patentee, 'The Patenting of Surgical Instruments', Lancet, 162, 15 August 1903, pp. 508-509.

[46] Henry Macleod, Elements of Political Economy, London: Longman, Brown, Green, Longman & Roberts, 1858, p. 182.

[47] 'The Patenting of Surgical Instruments', Lancet, 162, 15 August 1903, pp. 481-482.

[48] G. H. Colt, 'Surgical Instruments: A Disclaimer', British Medical Journal, 7 May 1910, pp. 1147-1148.

[49] G. H. Colt, 'Agricultural machine for rolling, mowing and other similar operations,' Patent number 941309, Patented in the US 23 November 1909; 'Squash-racket Court and the Like,' Patent number US2107141A, Patented in the US 1 February 1938.

[50] Horder, op. cit. (41); Potter, op. cit. (42).

[51] William Turner, 'General Council of Medical Education and Registration, Summer Session, 1900', British Medical Journal, 2 June 1900, pp. 1346-1360; 'H. A. Allbutt v. the General Medical Council', British Medical Journal, 18 July 1889, p. 88; See also:

‘Allbutt v. General Council of Medical Education of the United Kingdom’, British Medical Journal, 2 February 1889, p. 270; ‘Report of the General Medical Council: The Case of Mr. T. R. Allinson’, British Medical Journal, 4 June 1892, pp. 1203-1205.

[52] Sensibility had been crucial for the medical profession’s consolidation since the eighteenth century, but the Medical Act set certain more formal professional standards. See: Digby, op. cit. (9); M. Jeanne Peterson, The Medical Profession in Mid-Victorian London, Berkeley, CA: University of California Press, 1978.

[53] Colt, op. cit. (47).

[54] Takahiro Ueyama, Health in the Marketplace: Professionalism, Therapeutic Desires, and Medical Commodification in Late-Victorian London, Palo Alto, CA: The Society for the Promotion of Science and Scholarship, 2010.

[55] Edward Blake, ‘Respirators and Inhalers’, Lancet, 119, 20 May 1882, pp. 845-846.

[56] Lambert Ormsby, ‘Cranium Holder’, Lancet, 121, 14 April 1883, p. 660.

[57] ‘A Patentee but not a practitioner’, British Medical Journal, 3 March 1894, pp. 495.

[58] ‘Correspondence’, American Journal of Surgery (1912) 26, pp. 280-281.

[59] ‘Correspondence to Allen & Hanburys from John Duncan Menzies’, July 1895, AH130b, Allen & Hanburys archive, Glaxo Plc, London; Abridgements for Patents: Class 81, London: H.M.S.O, 1893-1908, p. 116.

[60] ‘Dr. J. Duncan Menzies’, British Medical Journal, 14 December 1895, p. 1531.

[61] Colt, op. cit. (47).

[62] For example: Robert C. Post, ‘“Liberalizers” versus “Scientific Men” in the Antebellum Patent Office’, Technology and Culture (1976) 17, pp. 24-54.

[63] W. G. Aitchison Robertson, Medical Conduct and Practice, A Guide to the Ethics of Medicine, London: A. & C. Black, 1921.

[64] ‘Patenting of Medical Inventions’, British Medical Journal, 24 May 1930, pp. 957-960.

[65] John Charnley, Low Friction Arthroplasty of the Hip: Theory and Practice, Berlin: Springer, 1979.

[66] For example: ‘Patents and Designs,’ British Medical Journal, 11 April 1931, pp. 641-642.

[67] Royal College of Physicians, Doctors in Society: Medical Professionalism in a Changing World, London: Royal College of Physicians, 2005.

[68] ‘Medical Patenting’, British Medical Journal, 10 June 1950, pp. 1356-1357.