

V.—*Observations on the History and Progress of the Art of Watchmaking, from the earliest Period to modern Times : in a Letter from OCTAVIUS MORGAN, Esq., M.P., F.S.A., to Sir HENRY ELLIS, K.H., Secretary.*

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Read June 8, 1848.

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MY DEAR SIR HENRY,

Pall Mall, June 1, 1848.

ON Thursday evening last I took the liberty of laying on the table of the Society, for exhibition, a few ancient Watches which I had collected, and I availed myself of that opportunity of doing so, because, on the same evening, the valuable paper by our excellent Director, on the curious ancient Bohemian clock in the Society's collection, was to be read, to which I thought the subject of Watches might well form a sequel, and at the same time bring a new matter under the Society's consideration. I also undertook to throw together a few Observations on them in the shape of a paper, which I now take the liberty of sending you, and in which I hope to be able, in some degree, to exhibit the progress of the art of watchmaking from the earliest period to modern times. I can scarcely expect to communicate to the Society any knowledge of which its members are not already in possession ; but I rather hope to elicit from those of our Fellows who are more learned in these matters that information which I should desire to obtain, and which they are always so kindly ready to impart. Besides this, I also hope to direct some attention to a subject hitherto but little heeded.

It is evident that, in order to construct portable clocks, a new moving power was required as a substitute for the weights which set in motion the wheelwork of the fixed clocks, which, it is known, had become common, even in private dwelling-houses, towards the close of the fifteenth century, and which, as we see in some ancient paintings, much resembled, in form and construction, with the exception of the pendulum, the small gilt Dutch clock now upon the table of the Society. It was necessary that this power should act of itself, independently of external forces, and irrespective of position, and that the source of it should be compact. Such a

power is found in the expansive force of a coiled spring. The precise period when this power was discovered, or first applied, as well as the individual and the country to whom the merit of the discovery is due, is, as far as I have been able to learn, not certainly known. It seems, however, to have been employed in the construction of portable clocks, or watches, as we call them, at the earliest towards the end of the fifteenth century. Sassi, or, as his name is Latinised, Saxius, in his "*Historia Typographica Mediolanensis*," printed at Milan in 1745, amongst other Milanese poets, mentions Gaspar Visconti, a member of the noble family of that name, and as illustrious by his learning as by his birth. In his selection from the works of this poet he gives a sonnet written in 1494, on account of the allusion to portable clocks or watches which it contains, as well as the distinct mention of them in its title. Sassi's work is written in Latin; the sonnet, however, is in Italian, and he gives, in a note, the title of it between double inverted commas, as if it were a literal transcript of the original manuscript of the poem:—"Si fanno certi orologii piccioli e portativi, che con poco di artificio sempre lavorano, mostrando le ore e molti corsi de pianeti, e le feste, sonando quando il tempo ricerca. Questo sonetto è fatto in persona di uno innamorato, che guardando uno dei predetti orologii compara se stesso a quello;"—and which, when translated, would run thus:—"Certain small and portable clocks are made, which, with little ingenuity, are continually going, shewing the hours, many courses of the planets, and the festivals, and striking when the time requires it. The sonnet is, as it were, composed by a person in love, who compares himself to one of these clocks." This is a very close description of certain astronomical striking watches which were made in the latter end of the sixteenth and beginning of the seventeenth centuries, and inclines me to think, that the title may have been written some time after the sonnet. The sonnet in question makes allusion to a certain hidden force working day and night within the heart, as well as to the sound of the little bell; but these allusions are hardly of themselves sufficiently clear, without the aid of the title, to identify them with the portable clocks. Gaspar Visconti died in 1499, and is said to have left, among his other works, his collection of sonnets, in a beautifully illuminated MS., in the library of Saint Barnabas at Milan, and it would be interesting to ascertain if the title to the sonnet here given is found there. I have been thus minute, because, on the authenticity of this title to the sonnet rests the evidence that these portable clocks had been made before 1494, and were known in Italy at that time. Sassi goes on to say that Domenico Manni, in his "*Commentarium de Florentinis Inventis*," attributes the invention of them to Lorenzo de Vulpariâ. Domenico Manni was a celebrated printer, writer, and antiquary of Florence, born 1690. In this work, which is

in Latin, and was published at Ferrara in 1731, in cap. 29, “*De horologiorum aliorumque instrumentorum perpetui motus inventionibus,*” it is stated, on the authority of various persons, among whom is Benvenuto Cellini, that Laurentius de Vulpariâ, a most excellent workmen in the manufacture of clocks, and very good astronomer, of Florence, constructed a most remarkable clock, and that he was the first who reduced into a material sphere the movements of the heavenly bodies and planets, to the wonder of all who saw it; and he adds a Latin letter, dated Fiesole, August 1484, from one Angelus Politianus to his friend Franciscus Casa, containing a detailed account of this clock, wherein he describes it as a square pillar, nearly three cubits high, tapering like a pyramid to the top, and ending in a point surmounted by a brazen sphere nearly one cubit in diameter, on which were exhibited the courses of all the planets and heavenly bodies, moved by small toothed wheels within. This machine was therefore a planetarium, or orrery, and evidently not portable. Nothing is said of the moving power, which might easily have been a weight within the square pillar on which the sphere rested. I do not find in the work any allusion to portable clocks, nor can the invention of them be upon this authority attributed to Lorenzo de Vulpariâ or the Florentines.

The ancient city of Nuremberg, so famous for the ingenuity of its mechanics, as well as the ability of its astronomers, has always laid claim to the merit of the invention of watches, or pocket clocks, as they are called by the Germans; and the fact of the early watches having been called proverbially Nuremberg eggs, seems to favour their claim. It is certainly the earliest place at which we have any authentic information of their having been made, and we have also the name of the artist who first made them there. John Gabriel Doppelmayr, born at Nuremberg in 1677, and professor of mathematics in that city, and in 1733 elected F.R.S., published at Nuremberg in that year his “*Historical Account of the Mathematicians and Artists of Nuremberg;*” and in his account of the famous mechanics will be found as follows:—

“Peter Hele, a clockmaker, was everywhere held to be a great artist on account of the pocket clocks which, soon after the year 1500, he first made in Nuremberg, with small wheels of steel. The invention, which may with great justice be ascribed to him, being something quite new, was praised by almost every one, even by the mathematicians of the time, with great admiration; he died 1540.” He adds, in a note,—“On this subject Johannes Cocclæus, in his *Commentary on the Cosmographia of Pomponius Mela*, published in 4to, at Nuremberg, in the year 1511, makes the following announcement: ‘*Inveniuntur in dies subtiliora, etenim Petrus Hele, juvenis adhuc admodum, opera fecit, quæ vel doctissimi admirantur mathe-*

matici, nam ex ferro parva fabricat horologia, plurimis digesta rotulis, quæ quocunque vertantur, absque ullo pondere, et monstrant et pulsant XL horas. Etiam si in sinu marsupiove contineantur.' This, already so written by Coccleus in 1511, shews, in the clearest way, that pocket clocks were made in Nuremberg 219 years ago, and he has fairly attributed the invention of them to this artist, since it was the most deserving of admiration, and the newest of his time, and which will be considered as a Nuremberg invention; whence also clocks of this kind were, for a long time, called Nuremberg living eggs, because they, at first, used to make them in the form of small eggs; which name is even to be found in the German translation of a strange book which F. Rabelais has left behind him, in chapter 26. Hence it is evident how erroneous it is to ascribe, as many do, the invention of small striking clocks, as of these pocket clocks, to Isaac Habrecht, a well-known mathematician, who lived about the beginning of the last century, and dwelt at Strasburg, whereas our Peter Hele had made them in Nuremberg 100 years before."

Coccleus, who was born in 1479, accurately describes a striking watch, and seems to speak of it as a remarkable novelty, which excited the admiration of the mathematicians at the time at which he wrote, viz. 1511, and, laying much stress upon its going without any weight, even in the pocket, attributes the invention of it to Peter Hele, his fellow townsman and contemporary; it is therefore difficult to reconcile the facts that such machines as watches could be well known in Milan in 1494, and yet remain unknown in Nuremberg, so celebrated for its clockmakers and mechanics, till fifteen or sixteen years afterwards, when they seem to have appeared as a new discovery. The earliest portable clocks or watches appear, if Gaspar Visconti's authority is correct, to have been very complex machines, and to have struck the hours, as well as shown them on the dial. There are on the table watches of somewhat similar construction, though made a century later. To some alarms, which had long been usefully applied to clocks, were added. In Germany they were originally called pocket clocks, which name they still preserve. In Latin *horologium* is used without regard to size. In Italian, *orologio* and *oriuolo* were used indifferently for the large and small machines. Our English word *watch*, derived, it is said, from its being an instrument by which one could watch the progress of time, has usually been applied to those portable machines which do not sound the hours; whilst the term *clock* has, in conformity with the meaning of the word, been properly confined to those which strike on a bell. Again, the French word *montre* seems also to apply to an instrument *quod monstrat*, as being distinct from one which marks the time by sounding the hours.

I will now refer to the objects which are exhibited, and endeavour to point out

how the art of watchmaking advanced, and when the successive improvements were made. The pocket clock, No. 1 of the series upon the table, seems to me to be of a very early date; I cannot pretend to say that it is the work of Peter Hele, but the material of which it is made, as well as its construction, would almost seem to refer it to that period, for it answers exactly to the description given by Coccleus of those made by that artist, it being a small clock made entirely of *iron*, set with numerous small wheels, and which, without any weights, in whatever way it may be turned, shows the hour; it does not however strike, having an alarum only. The case is of metal gilt, pierced with an ornamental pattern of early character on the sides, and at the bottom. It is two and a half inches in diameter, and nearly one inch in height, and is in shape like a box. The entire movement, with its plates, pillars, wheels, and pinions, is made of iron, and the wheels have been cut with the hand. In the alarum part however is one small brass wheel, inserted in the repairs of more modern times, and some of the pivot holes have been bushed with brass. To whomsoever may be due the invention of the coiled spring as the prime mover of a clock, this specimen seems to exhibit the application of it in its earliest form. There are here two main springs, the larger for the going part, and the smaller for the alarum. These are not inclosed in a barrel or drum, and there is therefore neither fusee nor catgut, but the outer end of the coiled spring is bent back as a hook, and clips round a strong pillar between the plates, as the support and resistance to the force which it is to exert at its inner extremity, and an iron guard is fixed to the plate to prevent the outer coil of the spring from expanding too far. The inner end of the spring is fixed to the arbor of the great wheel, and the spring is coiled or wound up from its centre, and by re-expanding sets the train in motion. There is of course a ratchet wheel and spring to enable it, when coiled up, to maintain its position, and act upon the great wheel. The square pin which receives the key for coiling up the spring of the going part, has been broken off, but that of the alarum is entire and acts well. Very many foreign watches are now made without fusee or chain, and are set in motion by coiling up the inner end of the main spring. But there is this difference: the spring is coiled up from its inner extremity, which then remains fixed, whilst the spring uncoils itself from its outer end, whereas, in this instance, the spring is both coiled up and uncoils itself from its inner extremity. I am told that some American clocks have recently come over constructed in this manner as something new. The train of wheels, which are entirely of iron, terminate in the crown wheel, which plays on the pallets of the verge; and here our ancient work ends, for a new balance, with spiral spring and cock, as the pierced plate of brass which supports and covers it is called, has at a

late period been clumsily added. The mechanism of the alarum is similar to that now in use. The dial face, round which the index revolves in twelve hours, is gilt, and on it are engraved two circles of figures, the outer from I to XII in Roman characters, and the inner in what are usually termed Arabic figures, of an early form, precisely similar to those on the Bohemian clock belonging to the Society, and Holbein's design for a clock as a new year's gift to Henry VIII. which has been exhibited. In the centre of the dial is a moveable plate marked with similar figures up to 12, for the purpose of setting the alarum, in which are four holes, by which it might be turned by means, probably, of a forked key. Beyond the outer circle of the hour-figures, twelve studs or pins, one opposite each figure, project from the face of the dial, that at the XII being much higher than the rest, to enable any one to feel in the dark to what hour the index might point, whilst the face was covered by a glass or crystal to protect the index from external motion in case it should be carried in the pocket. The bell is fixed to the case, and forms a lining to it, as in modern repeating watches. The balance which governed the movement of these early watches, was a small wheel fixed on the verge, as its axis, to which an oscillatory motion was given by the alternate impulses of the teeth of the crown wheel upon the pallets, which were fixed to the verge. This was the earliest escapement invented for clocks and watches, and continues unchanged in common use to this day. In consequence of the external motions to which portable clocks were necessarily subjected, the wheel was adopted for the balance instead of the cross bar, with weights fixed to its arms; it being necessary to distribute the weight as equally as possible round the centre of its oscillations, in order to prevent their being affected by the external movements to which the machines must be exposed; and these wheels were made heavier or lighter, larger or smaller, at the discretion of the maker, according to the power of the main spring employed. There does not appear in this watch to have been any contrivance for regulating the power of the main spring, which, when tightly coiled up, must have exerted a far greater force than when more expanded, and consequently the machine must have been a very imperfect measurer of time. The inconvenience arising from the varying power of the main spring was soon felt, and the first plan adopted to equalize its force is said to have been to make it, when coiled up, act upon a counter spring. Of this I have no example, but it seems to have been unsuccessful, and the ingenious contrivance of the fusee was soon invented, but by whom, I believe, is nowhere recorded. The order of things which we have just seen was now inverted; the coiled spring was inclosed in a barrel, its inner extremity made fast to an immoveable arbor, whilst its outer extremity was attached to the interior of the barrel, and it was coiled

up from without, by means of a catgut, wound, from the exterior of the barrel, on to a truncated cone called the fusee, which by means of its conical form caused the main spring, when most coiled, to act with least power, the force being exerted nearer to the axis of the wheel. On the arbor, to which the inner extremity of the main spring was fixed, a ratchet wheel was placed, which by means of a spring fastened to the plate, and generally made ornamental, as seen in the specimens on the table, allowed the force of the main spring to be adjusted to the balance, and this was the only way of regulating these watches. Though the action of them was still very irregular in this state, watchwork seems to have remained without further improvement for near 150 years; but, notwithstanding the imperfections, the utility of the machine was perceived, and as early as 1530 Gemma Frisius, a Dutch astronomer, is recorded to have suggested that portable clocks should be used to ascertain the longitude at sea. In the latter half of the sixteenth century, watches were abundantly made in England, Germany, and France, of various quaint forms and devices, some ornamented with much taste and elegance, as many of the specimens on the table testify.

No. 2 of the series has been the case or box of a small portable clock, much in the form of our Bohemian, and, judging from the figures on the face, as well as the engraved pattern, may probably be nearly of the same age. The engraving of the Crucifixion on the bottom may lead to the supposition of its having been made for some ecclesiastical person.

No. 3 is an oval watch of gilt metal, ornamented with chasing and engraving; round it runs a band of silver, chased in an elegant flowered pattern, in the style of the works of Theodore De Bry, an engraver of the sixteenth century. In the centre of each side a Tudor rose is engraved, which, together with the name of the maker, Ferdinando Garret, renders it probable that it is an English watch; and coupled with the style of ornament, would, I think, refer its date to the beginning of the reign of Elizabeth. In the Antiquities of Nithsdale, a MS. in the possession of the Society, written in 1787, and now upon the table, is a drawing of a watch very similar to this, which belonged to an ancestor of the writer, Robert Riddell, six generations back, which, supposing the original owner to have been thirty years of age when he became possessed of the watch, would fix its date about 1560. The dial face is very elegantly engraved and gilt, whilst the hours are marked in black upon a circle of silver. The works, however, with the exception of crown wheel and balance, are wanting; but, from the absence of ornament on the cock, I am inclined to think it as early as I have stated.

In Warner's History of Glastonbury Abbey is an engraving of the watch said to

have belonged to Richard Whiting, the last abbat, who was put to death in 1536. Inside the lid which covers the face appears to be engraved, "Richard Whiting, 1536." In the account of the watch its authenticity is attempted to be traced, but no description of the watch is given, nor is any mention made of the inscription, which, if genuine and original, would prove it to be one of the earliest extant of which the exact date is authenticated. Derham, in his "Artificial Clockmaker," mentions having seen a watch which belonged to Henry VIII. in 1541; and watches of the time of Elizabeth are not uncommon.

Among the jewels given to Queen Elizabeth on New Year's Day, in the 14th year of her reign, I find

"First, one armelet or shakell of golde, all over fairely garnishedd with rubies and dyamonds, haveing in the closing thearof a clocke, and in the foreparte of the same a faire lozengie dyamond without a foyle, hanging thearat a rounde juell fully garnished with dyamondes and a perle pendaunt, weying xj oz. qr<sup>t</sup> dim. and farthing golde weight. In a case of purple vellat, allover embroderid with Venise golde, and lyned with greene vellat. Geven by therle of Leyceto".—Harl. MS. 4698, p. 2.

In the library of the Royal Institution is preserved a watch, which is also traced to have belonged to her. The works are inclosed in crystal, set in gold, which, together with the dial, is very elegantly enamelled.

In the Ashmolean Museum at Oxford is a very elegant specimen. It is what is termed a hunting watch, in the form of a melon; it is of gold, and the sections or quarterings are studded with large and fine torquoises. It is usually called Queen Elizabeth's watch, but Edward East is the maker, and it can hardly have been made much before 1620. There is also another good watch in the same Museum, which passes for Oliver Cromwell's watch; but, if all the watches which pass for Queen Elizabeth's and Oliver Cromwell's belonged to them, they had both large collections.

To Mary Queen of Scots was given a watch in the form of a death's head, of which a drawing and description is in the possession of the Society.

No. 4 is a watch in form and construction resembling No. 3. The movement is in perfect condition, and, with its original catgut, goes well for sixteen hours. The case is silver, partially gilt, and very elegantly chased; and on one side is a figure of Hope, on the other of Faith, both finely engraved. The dial face is similar to the last, and on both are the small studs for finding the hour in the dark. In these watches is seen the fusee, and the contrivance for regulating the power of the main spring. The maker's name, John Limpard, as well as the ornaments, seems to prove it an English watch.

Nos. 5 and 6 are watches of similar form and construction, though less orna-



mented; they are in excellent preservation, and, with their original catgut, go for sixteen hours. Their date is probably about the end of the sixteenth or beginning of the following century.

Nos. 7, 8, and 9, are pretty specimens of ornamental ladies' watches of the latter part of the sixteenth century. In No. 7 the face resembles those of the two first specimens described; and in the centre of the dials of this and also No. 3 and 4, are engraved views of cities. The back is of silver, whilst the face is covered by a prettily cut rock crystal. In No. 8 the works are inclosed in an octagonal box, cut out of solid rock crystal; and in No. 9 the case is formed with tablets of crystal set in a silver gilt frame. The catgut here has been removed, and a modern chain substituted. It is, however, a pretty ornament, and is inclosed in its original stamped and gilt leather case, which has an opening in front to show the face of the watch.

No. 10 is a curious specimen, in the shape of an egg or acorn, of metal gilt; it is suspended by a ring at the larger apex, round which are wrought seven leaves. Whether this was made as a quaint toy, or for the purpose of an alarum, I cannot determine. The egg opens in half with a hinge; in the upper part is contained a small watch, and in the lower part attached to a moveable plate is a minute wheel-lock pistol. When shut up, the face of the watch is parallel with this plate; and when the index of the watch arrives at the hour of one, it touches the trigger, which protrudes above the plate, and discharges the pistol. At the lesser apex of the egg is a small hole cut with the thread of a screw, through which the barrel of the pistol, which is scarcely three-eighths of an inch long, would discharge itself. It has been suggested, that a tube charged with powder might have been screwed into this hole, which being ignited by the pistol, would, if applied to the touch-hole of a larger gun, discharge it, and so give a signal as an alarum at any required time. The watch is furnished with a chain, which seems to be part of the original work, instead of a catgut, and it is the earliest specimen of a chain that I know, and it cannot I think be older than the seventeenth century. It goes for twenty-four hours, and bears the name of Hans John, Königsberg.

In the year 1631 the Clockmakers' Company of London was incorporated by royal charter; but, as I shall give the history of this Company in an Appendix to this paper, I shall say no more of it at present. But I cannot mention the Company without here tendering my thanks to my friend Benjamin Lewis Vulliamy, esq. the present Master, not only for his obliging assistance and permission to examine the records and books of the Company, but also for his kindness in allowing me to inspect the treasure of ancient watches in its possession, and to make a selection from them for exhibition on the table of the Society this evening.

The small round watch, No. 11, bears the name of John Midnall, one of the first incorporated Assistants; and, from the altered shape and plan of the case, as well as the character of the face, was probably made about 1650. It still has a catgut. In the British Museum is preserved a small plain oval gold watch, with a crystal over the face; it has an outer case of gold, quite plain, and when inclosed looks not unlike a small egg. It is said to have belonged to Oliver Cromwell, and was made by Robert Grinkin of London, one of the Clockmakers' Company in 1640.

Hitherto watches had been but irregular time-keepers. A new era, however, in their history is about to commence; and, after remaining for 150 years without any improvement in their construction, they in a very short time became the most wonderful, beautiful, and useful instances of human ingenuity. The cause of their imperfection was the irregular action of the balance wheel. In the year 1658, it seems that Dr. Hooke first conceived the idea of applying a spring to regulate its movement. His first idea is thought to have been a straight spring, but in 1660 he had a plan for applying one of a spiral form, such as is now used. From certain circumstances, not important here to detail, it was not brought into use till the year 1675, when Tompion, a celebrated watchmaker of that time, made, under his superintendence, a watch with a spiral balance or pendulum spring for Charles II. with this inscription: "Robt Hooke, invenit. 1658. Thos. Tompion, fecit. 1675." One end of the spring was made fast to the arbor of the balance wheel, whilst the other was secured to the plate, and the oscillations were rendered equal and regular by its elastic force. The celebrated Huygens, however, claimed for himself the merit of the invention, and his claim was again disputed by the Abbé Hautefeuille, who in 1674 made a verbal communication to the Academie des Sciences of a plan for the employment of a straight spring for the regulation of the action of the balance wheel, one end of which was made fast to the watch plate, and the other being at liberty governed the oscillations of the balance. In the specimen No. 5 this contrivance has been added to a watch of earlier make. The steel spring is lost, but I have substituted a small bristle, which shows its action well.

The balance wheels of the early watches were small, and their diameter was usually about one-fourth that of the plate when the watch was round. After the application of the pendulum spring, their size was in many instances greatly enlarged, and they sometimes covered three-fourths of the plate. They are now usually made about one-half the diameter of the plate, or something less.

Hitherto watches had but one hand, and pointed only the hours; but from the application of the spiral-pendulum spring to the balance, and the means thereby afforded of regulating the oscillations to the greatest nicety, they now performed

with such precision, that the minute wheel and hands which made the revolution of the dial every hour were soon added, thus marking the smaller subdivisions of time. This improvement is said to have been made by Daniel Quare, a famous watchmaker of London at that period. Many old watches were altered to receive the spiral spring; and those now made by Tompion and others assumed a new character, both in their form, the accuracy and beauty of their construction, and the labour and taste bestowed in ornamenting the various parts of the movement, as well as their exterior. No. 12 is a striking watch or pocket clock, made about 1680, by Markwick of London, and exhibits all the improvements up to this time; and No. 13 is an old French alarum watch, of the same date, which, though it has the improvement of the pendulum spring, still retains the old contrivance for screwing up the main spring. In 1676 Daniel Quare invented the repeating movement in watches, by which they were made to strike at pleasure. A clergyman named Barlow had also invented a similar contrivance. The two inventions were, it is said, to have been submitted by the King to the Privy Council for decision, according to Derham, as to their respective merits, when Quare's watch was approved. The real fact, however, was that Mr. Edward Barlow, a clergyman, had applied for a patent for the sole making and managing all pulling or repeating clocks and watches. The Watchmakers' Company petitioned the King against the granting the patent; whereon the King appointed the 2d March 1687 for hearing the reasons against granting the said patent before the Privy Council, and, upon their being so heard, it was ordered that no patent be granted to the said Edward Barlow. Neither Mr. Quare's watch or his name are mentioned in the record of the proceedings; but Mr. Quare made subsequently for King William III. a very beautiful, elaborate, and highly finished repeating watch, which, together with its case, still exists in perfect preservation.

In the year 1695 Thomas Tompion first invented a Cylinder Escapement, with horizontal wheel. This invention was not brought into use till the following century, when it underwent various modifications. It has had, however, the most remarkable effect on the construction of watches; for, by dispensing with the vertical crown wheel, it admits of their being made of the flat and compact form and size we now see, instead of the cumbrous and ponderous bulk of the earlier periods.

With the various modifications of the escapement, and its mechanical improvements, it is not the province of this Society to concern itself, and these I shall not notice. But I shall bring to a close my series of watches and observations, with the mention of the last great improvement, viz. the application of jewels to diminish the friction of the pivots, which, notwithstanding the beauty of the workmanship with which watches were now made, still existed. Facio, a native of Geneva, and partner

of De Baufré, a French watchmaker established in London, is said to have first invented the application of jewels to watchwork for this purpose. There is, however, a watch made by Huggerford of London, before the application of the pendulum spring, belonging to the Clockmakers' Company, and now on the table, where a large amethyst is mounted on the cock, which shows that the experiment had been made at a much earlier period; and in 1704, when Facio applied to Parliament for an Act to confirm to him the sole right to make jewelled watches, as being his invention, the Clockmakers' Company opposed him, and, producing this very watch, convinced the Committee that the invention was not originally his, and threw out his bill. Facio, however, invented the art of piercing rubies to receive the pivots of the balance, which he made known about 1700. And here the repeating and jewelled gold watch, made in the year 1718, and having all the improvements up to that period, completes the series, showing the various gradations of the progress of the art of watchmaking through two centuries.

I remain, dear Sir Henry,

Yours faithfully,

OCTAVIUS MORGAN.

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## HISTORY OF THE CLOCKMAKERS' COMPANY OF LONDON.

The Clockmakers' Company of London was established and incorporated at the petition of the clockmakers, as well freemen of London as foreigners residing there, by a Royal Charter from King Charles I., in the year 1631, by the name of "The Master, Wardens, and Fellowship of the Art and Mystery of Clockmaking of the City of London." The Company consists of a Master, three Wardens, and ten or more Assistants, chosen out of the Fellowship, who have power by their charter to make bye-laws for the government of all persons using the trade in London, or within ten miles thereof, and for the regulation of the manner in which the trade shall be carried on throughout the realm. And in order to prevent the public being injured by persons "making, buying, selling, transporting, and importing any bad, deceitful, or insufficient clocks, watches, larums, sun-dials, boxes, or cases for the said trade," very great powers are given them by the charter "to enter, with a constable or other officer, any ships, vessels, warehouses, shops, or other places where they shall suspect such bad and deceitful works to be made or kept, for the

purpose of searching for them ;” and if entrance be denied, “ to break open any locks, doors, bolts, latches, chests, boxes, &c. where they shall suspect such works to be,” and if any such be found, they are directed to be seized in the King’s name ; and upon proof of such insufficiency of the work before the Lord Mayor, or, if he cannot judge, before the Master, Wardens, and Court of Assistants, to be broken, reserving, however, a right of appeal to the Lord Mayor.

This power of search was constantly exercised to the end of the century. The town was divided into districts, and periodical searches made ; and many instances are recorded of “ deceitful works” being found, as also of their being broken and destroyed. Power was also given to the Court to inflict and levy fines on parties offending against the bye-laws.

By these laws, in order to prevent persons of ill behaviour resorting to London, it is ordered that no clockmaker within ten miles of London shall employ any one without first presenting him, together with a certificate of his name and birth, for the Company’s approval. No clockmaker was allowed to take more than one apprentice without leave of the Court. Every apprentice who had served his time and was admitted a freeman, was to serve his master, or some other of the fellowship, two years as a journeyman, and then to produce, if required, before the Master, Wardens, and Assistants, his masterpiece, such as he shall be appointed to make, before he be admitted a workmaster. No person was allowed to use the trade unless he had served seven years as an apprentice, nor to teach any other than his apprentice. And it was “ ordained that every master should teach or instruct his apprentice in the making of cases or boxes of silver or brass, and likewise the several springs belonging to a watch, clock, or larum, and all other particular things belonging to such watches, clocks, or larums, mathematical instruments, or sundials, to the end that he may make up his masterpiece with sufficiency of credit, and understand both the beginning and ending of his work from time to time which he shall take in hand.” By this it should appear that, as every master watchmaker was to teach his apprentice, so he must himself have learned, and been able to make an entire watch and all its component parts ; a matter requiring vast knowledge as well as vast practical skill, when it is considered that a plate lever watch, as now usually made, consists of one hundred and thirty-eight pieces, exclusive of the chain ; that the metals employed in its construction are gold, silver, copper, brass, and steel, and to these must be added the glass, enamel dial, and jewels. Such a mechanism now requires the manipulation of thirty-eight distinct persons. No foreigner was to be employed except with the approval of the Court. Every freeman using the art, when warned, was to attend the Quarter Courts which the Com-

pany held, and, on refusing, to be fined. All clocks, watches, cases, mathematical instruments, were ordered to be brought to the Court to be inspected, approved, and marked, under penalty for neglect; and any alien working within ten miles of the city of London, and not yielding obedience to the Company, was ordered to have his tools and works seized till he yield such obedience.

This Company has no hall, but its meetings have, from its first establishment, been regularly held at some tavern in the city. The journals or minutes of the proceedings have been regularly kept from the period of its first incorporation, and are preserved in excellent condition. From several entries in the journals, it appears that some sort of rivalry at times existed between the Companies of the Clockmakers and the Blacksmiths. Though this may at first seem strange, it will cease to be so when it is considered that the blacksmiths were in some sort clockmakers, or rather makers of clocks, since the early clocks, both large and small, were constructed almost entirely of iron, and that in making the wheels, &c. of the larger clocks, the hammer and forge of the blacksmith was necessarily called into active operation.

In the journals no mention is made of the troublous times of the Rebellion, the death of the King who had so recently given them their charter, the Restoration, or the Great Fire of London, which does not seem to have interrupted their proceedings, but only caused them to change their place of meeting from one tavern to another; and, which is somewhat extraordinary, there is no mention made either of the application of the pendulum to clocks as a substitute for the ancient balance, which took place in 1657, or of the pendulum spring to watches, which was first made public in 1676, the two most important improvements in the whole history of horology. From this it may be inferred that the disputes as to the merits and originators of the inventions never came officially before the Court. Notice, however, was taken by the Court both of the invention of repeaters and the application of jewels to watches, as will hereafter appear.

The following entries in the journals of the Company are of interest, some as shewing the price of watches at that period, and others the exercise of the powers conferred on the Company by their charter; and I think that we may infer that the judicious administration of those powers by the masters, wardens, and assistants, and the control thereby exercised over the trade, tended in no small degree so to advance the art of clock and watch making in this country, and to raise its character and credit, that the watchmakers in foreign countries sought to imitate and counterfeit the English work, which had at that period attained that acknowledged superiority which it has since maintained.

1635.—Mr. Warden Midnall hath a brass watch which he had from Mr. Warden Harris, for which Mr. Warden Harris was to pay 40s.

1636.—In the accounts of a Translation of Mr. Masterson to the Clothworkers' Company are the following items :

	<i>£.</i>	<i>s.</i>
Given the Clothworkers a silver cup . . . . .	1	10
Item, a watch . . . . .	4	0
Item, a clock . . . . .	3	0

1661.—The movement of Mr. Marston, which was seized at the late Court for deceitful work, was condemned, and by his not appearing on being warned, he is by the Court fined 40s.—Searches were made eastward and westward.

1666, Aug. 20.—The last meeting of the Company before the Great Fire was held at the Castle Tavern, Fleet-street; and on October 8th, the first meeting after, it was held at the Crown Tavern, Smithfield, but no mention is made of the fire.

1667.—Mathematical instrument makers were first admitted members of the Company, and searches for the examination of measures of length were now first made.

1668.—At a search of the Clockmakers and three mathematical instrument makers, who were Assistants, in the shop of Samuel Morris, ironmonger, at the sign of the Dripping Pan, near Charing Cross, three yards and two jointed two-foot rules were seized.—Also in the shop of Byfield, ironmonger, near the Chequers in Holborn, one plain joint rule; in the shop of Baggs, ironmonger, Holborn Bridge, three plain joint rules and one brass joint rule were seized, not being agreeable to the standard.—At a subsequent Court, the several parties appeared, the measures were broken and returned to them, on promise of being corrected before they were again exposed to sale.

1671.—There is this year an entry of an indenture, being a receipt from the Exchequer for three brass standard yard measures, which had been made according to the statute 12th Henry VII. and provided, together with cases for them, by the Company, for the Exchequer.

1671.—This year, on application of the Company, a coat of arms, viz. Sable, a table clock resting on four lions, and surmounted by an imperial crown or, was granted to it by Sir Edward Walker, Garter King at Arms.

1678.—Mr. Matchett, being an Assistant, was suspended from attending, he being well known to be a Popish recusant.

1682.—John Catsworth, maker, and Francis Dennis, engraver, were brought up before the Court, and fined for making unworkmanlike and insufficient movements, and engraving false names thereon.

1687.—Mr. John Matchett his suspension taken off, and he was restored to his place in the Court.

1688, Sep. 29.—Be it remembered that in pursuance of the order of the Court of the 8th day of February 1687 $\frac{7}{8}$ , and according to the order of the Court of the 5th March 1687 $\frac{7}{8}$ , the patent endeavoured to be obtained by one Mr. Edward Barlow, a priest, and to be granted to him by the King's majesty for his sole making and managing of all pulling repeating pocket clocks and watches, he pretending to be the true and first inventor of that art and invention, was by

diligence and endeavour of the Master, Wardens, and Assistants of this Company, with great charge and expense, which was borne by and out of the stock of the Company, very successfully prevented, and upon the 2d March 1687 $\frac{7}{8}$  ordered by the King in Council not to be granted.

1703.—The Master and Mr. Quare produced letters from Patrick Cadell, of Amsterdam, stating that Cabriere, Lambe, and others, at Amsterdam, had set the names of Tompion, Windmills, and Quare on their work, and sold it for English.

1704, Decr. 11.—A Special Court was called upon the occasion of Nicholas Facio, Peter de Baufré, and Jacob de Baufré, having petitioned the House of Commons for an Act for the sole applying precious and more common stones in clocks and watches, and for the enlarging the term of their patent.—Their reasons for such an Act were read, as also reasons of several members of the Court by way of answer, and it was ordered that the Master, Wardens, and Assistants should petition Parliament and oppose the Bill.

1704, Jan. 5.—The Master reported there had been a constant diligence used in obstructing the Bill in Parliament, brought in on the petition of Nicholas Facio, Peter de Baufré, and Jacob de Baufré, for the sole applying precious and more common stones in clocks and watches, viz. That the Parliament had been petitioned against the Bill, and that the Petitioners had been heard by Counsel before the Committee on the Bill, who had made such amendments to it that they thought it best to destroy it, and had therefore struck out all parts thereof, save the words “Be it Enacted,” and reported accordingly.—The Master also acquainted the Court, that in the proofs brought against the Bill there was an old watch produced, made by Ignatius Huggefod, that had a stone fixed in the cock and balance work, that was of great use to satisfy the Committee; and it was ordered that the Renter Warden do buy the said watch, if he can, to be kept for the members of the Court.

The same was bought accordingly of Henry Magson, for £2 10s. he having bought it of Henry Seale, and it was placed in the Master’s hands.

This watch was exhibited on the table of the Society, being one of the collection of watches kindly lent by the Clockmakers’ Company for exhibition in illustration of this paper.

MEMBERS OF THE COMPANY AT ITS INCORPORATION, 7th CHARLES I. 1631.

*Master.*

David Ramsay, Esq.

*Wardens.*

Henry Archer.

John Wellowe.

Sampson Shelton.

*Assistants.*

James Vantrollyer.

Richard Morgan.

Francis Forman.

John Harris.

John Midnall.

Samuel Lynaker.

John Charlton.

Edward East.

Simon Bartram.

John Smith.



The first meeting of the Company was held the 12th Oct., 1632, and at the second meeting, held on the 16th Oct. the following persons were sworn and admitted the first freemen.

Robert Rothwood.	Onesiphorus Helden.	Francis Torrado.
John Brooke.	Oswald Durant.	Thomas Dawson.
Peter Hues.	Josias Cuper.	Simon Hackett.
Thomas Shepherd.	Ely Volant.	Richard Child.
David Bouquet.	William Petit.	Thomas Alcock.
Thomas Howse.	John Droeshont.	Robert Grinkin.
William Daniell.	John Walker.	John Burgis.
Lewis Cooke.	Thomas Ware.	Edmund Gilpin.
Thomas Okeham.	Robert Holloway.	Thomas Vecue.
George Clarke.	William Daniell.	Thomas Lambe.
John Bull.	Daniell Sanders.	John Bullby.
Richard Lord.	Nicholas Fetter.	Richard Jackson.
Richard Mason.	William Barker.	John Nicasius.
Richard Grose.		George Smith.
Frances Stephens.	1633.	John Hertford.
Matthew Browne.		William Almont.
Thomas Holland.	William Selwood.	Timothy Gray.