

OBSERVATIONS ON THE CLASSIFICATION AND ARRANGEMENT
OF A COLLECTION OF WATCHES.

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Most people now carry a watch, and the small cost at which these wonderful machines are produced enables persons of the smallest means to provide themselves with what was, not many years ago, an extravagant and expensive luxury. Few persons, however, know anything of the mechanism of these very curious and useful articles, which are their constant companions, and regulate their movements, and still fewer have taken any interest in the rise and progress of the art and mystery of their construction. Collectors will frequently purchase an ancient watch as a curious and ornamental object, without knowing anything about it, and ladies will sometimes purchase them as pretty ornaments to wear, and finding that they will not go, have them fitted with new works, which, perhaps, not being well made (for it is easier to get a new watch than to have a new movement made for an old case if its form is at all peculiar), do not keep time well, and thus the original old watch is spoiled both as an article of use as well as of curiosity; for the ancient watches, fine as was their work in some cases, though wonderful in their day, did not keep time as well as those of modern make, owing to the absence of the later inventions and improvements in the mechanism which have been introduced at various periods.

The watches made during the last century by the best artists, were exquisite pieces of work, and very enduring, and though of larger size than has been found convenient in later times, were most excellent and invaluable instruments as time-keepers. Very many of these, however, have of late years been despoiled of their fine ornamental gold and silver cases, and their movements have been fitted into cases of common metal, and sent off to supply the wants of distant colonies and countries in times gone by. But the amazing

cheapness and more compact form of the modern Swiss watches, have superseded them altogether in that application, and the world is now, to a very great extent, supplied with watches made by machinery (instead of cut by hand), at very small cost, from Switzerland and from America, so that the watch-making trade of England is in a fair way of being supplanted, and our watchmakers will soon become mere watch-fitters of the Swiss and American movements, which are supplied so abundantly and so cheaply. During the last century, English watches were very greatly esteemed on the Continent, and fetched large prices, but I fear that is no longer the case, and as marine chronometers of the best quality were generally supplied by England, it is to be feared that the chronometer trade may pass from us. That was the opinion of the late Mr. Vulliamy, who told me that they always selected the most skilful workmen from the watchmaking artizans to make the fine chronometers, and if the watchmaking trade is driven away by the introduction of foreign watches, we shall have no school of good workmen fit for the execution of the fine and delicate works of the marine chronometers.

In the year 1837, I purchased at Ratisbon, from a watchmaker who had a few ancient watches, one which was the counterpart of a watch which I had always been accustomed to see in a portrait of one of my ancestors, who carried it in her hand, the picture being dated 1620. In another portrait of the same date (both by Jansen), the same lady wore at her side another watch of a different form. Thus was my attention turned to ancient watches, and I began to study their history and peculiarities, and to form a collection. Having taken up clocks and watches as a new antiquarian subject, in 1848, I prepared for the Society of Antiquaries two papers "On the History and Progress of the Art of Watchmaking," and these were published in the "Archæologia" of that year. My collection went on increasing, and now consists of upwards of one hundred and twenty-five watches, and between forty and fifty clocks, illustrative of the art from the earliest watches to those of the present century. It therefore became necessary to classify and arrange them chronologically, to show in proper order the various changes which took place in their construction and character, both internally and externally, and I now propose to give a brief

statement of this classification, which may be of service to any one who might be disposed to endeavour to make a similar collection (though I think he would now have some difficulty, for I see at this time very few watches "come into the market"), and it will also be of service to those who may have any ancient watches in their possession, to enable them to form some opinion of their ages and dates, for I am frequently applied to for information on that head.

I am not aware of any one besides myself who has made a regular collection of watches, except the late Sir Charles Fellows, and this collection his widow, on her decease last year, munificently bequeathed to the British Museum, where they may now be seen, and much information on the subject gained from them. On the Continent there are collections of ancient clocks and watches in many museums, as at Dresden, Brunswick, and especially at Hesse Cassell, where the collection is large, but I do not know if they are arranged, not having been able to examine them. There is also a large collection in the South Kensington Museum, but they are not arranged chronologically, being considered more as works of art-jewelry than horology, and therefore but little instruction or information is to be obtained. It may be remembered that my collection, as well as that of Sir C. Fellows, was, in 1862, exhibited at the South Kensington Loan Collection, but my watches, though chronologically arranged, were not individually enumerated in the catalogue like those of Sir Charles Fellows.

In the Library at Guildhall is now displayed the collection of watches belonging to the Clockmakers' Company. Several of these the Company kindly allowed me to exhibit at the Society of Antiquaries in 1848, when my friend Mr. B. L. Vulliamy was Master, and he permitted me to inspect the records of the Company, and make extracts of their proceedings. Previous to that time the collection had not been much thought of, but on my drawing attention to it, it received more consideration, and has been much increased. It contains, however, no very early watches, and consists for the most part of the movements of watches of more recent times; the light, however, not being very strong, their peculiarities can hardly be seen, and there is no chronological arrangement of them.

I am not about to give a lengthened and detailed history

or treatise upon watchwork, but in order to make my classification intelligible, it will, I think, be desirable to give a concise abstract of the historical part of my papers in the "Archæologia," which will set forth in order the various changes which have been made in the construction of watches, and will serve to fix the date of the periods of classification. Those papers were the result of a careful examination of all the authorities I could command.

First, as to the date of the invention. In order to construct portable clocks, such as could be carried about the person, it is evident that a new motive power was required as a substitute for the weights which set in motion the wheelwork of the fixed clocks, which had become common in private dwellings towards the close of the fifteenth century. 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. This power exists in the expansive force of a coiled spring endeavouring to regain its original condition, with which power all Nuremberg and German locksmiths must have long been familiar, such springs being used in the construction of the large complicated German chest-locks of the time.

The precise period when this power was first applied as a motive force is nowhere recorded. The Italians have sometimes claimed the invention, and some writers have considered that pocket watches were made as early as the fifteenth century. But I have carefully examined the authorities on which the statements have been made, and have shown in my papers in the "Archæologia," that the statements were the result of incorrect quotations, and errors in the dates of the periods when both the authors quoted and the persons of whom they wrote, flourished, and these errors have been perpetuated by one author copying from another, without careful examination of either the authorities or the facts. I therefore see no reason to doubt the statement made by Doppelmayer, professor of mathematics at Nuremberg, in his historical account of the mathematicians and artists of that city, which he published in 1730, and for which he was, in 1733, elected F.R.S. In his account of the famous mechanics he says, "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 everyone, even by the mathematicians of the time, with great admiration. He died 1540." He also 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 ad huc admodum, opera fecit quæ vel doctissimi admirantur mathematici, 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 marsupione contineantur.'" Thus wrote Cocclæus in 1511, and being a native of Nuremberg, and born in 1479, he must have been not only a contemporary of Peter Hele, but in all probability well known to him, and acquainted with all the circumstances of the invention; we may therefore, I think, perfectly rely on the correctness of his statement, which was made in the lifetime of Peter Hele, and of numerous other persons who must have known all the facts, and as he lays much stress on the *horologia* going without any weight, even in the pocket, we may fairly ascribe to Peter Hele the first application of the spring as a motive power, and the date of the invention about 1500. In the South Kensington Museum is a standard clock of beautiful workmanship, the movement of which is in form of a large flat watch, bearing the date 1506, and the name of the maker "Jeremias Metzger, in Augspurg." This shows that the art had extended to Augsburg as early as that date, and in the minutes of the Society of Antiquaries of 1741 is the record of the exhibition of a watch made by Niclas Planke, of Lubeck, bearing the date 1514. There were also numerous watchmakers set up in Paris, indeed so many were there that Francis I. formed them into a guild, with statutes, so rapidly did the art of watchmaking spread.

Having now got a date as a starting-point, we may proceed to the description of the changes which took place in their construction, which form the periods of the classification. The movement of a watch consists of a pair of plates held together by four pillars, a mainspring, and a train of wheels which terminate in an escapement and balance to

regulate the action of the spring. These parts are all arranged between the plates, together with the striking or alarum work, if it is a clock or alarum watch. These, with the bell are enclosed in a box or case.

The earliest watches were either striking or clock watches, or alarum watches. Their form was that of a small flat circular box of gilt metal, which was usually very finely chased, and the work perforated to let out the sound of the bell. The upper lid, which covered the face, was pierced with twelve apertures, one over each hour-figure, to allow the hour and the index, which was of blue steel, to be seen. The works were all of steel, plates, pillars, wheels, and pinions. At first the coiled mainspring was not enclosed in a barrel, but was kept in its place, when it expanded by guards. There was as yet neither fusee nor cat-gut cord, but the spring was coiled or wound up from the centre. The outer end was made fast to one of the pillars, and the inner extremity attached to a central arbor or axis, on which the first or great wheel was fixed, and thus, by the uncoiling of the spring was made to revolve, and to drive the train of wheels, whose progress was controlled by the "crown wheel and verge escapement," and the balance. The earliest balance was a short bar, weighted at both ends, attached to one extremity of the verge. A hoop was subsequently added to this bar, and it thus became a balance-wheel.

As the power of the mainspring when tightly coiled up was much greater than when it was nearly uncoiled, its force was unequal, and a sort of compensating spring was applied, which tended by its pressure on an excentric or snail-shaped wheel, to retard its force when first wound up, and rather to add to its power when its force had considerably decreased. This spring was called by the Germans "stackfeder," or "stagfeder," misspelt "stackfreed." It is a technical word, and not found in any lexicon as applicable to watchwork, but probably meant a stay or retarding spring. This contrivance does not seem to have been altogether satisfactory in controlling the varying intensity of the force of the mainspring, and another and most ingenious invention was introduced, but who was the inventor, or what the precise time of the adoption, are not known. In order to equalise the power of the mainspring, and secure a regular action, the spring was enclosed in a barrel, by which its

action was inverted, for its inner end was made fast to a fixed arbor or axis, and its outer end was attached to the interior of the enclosing barrel, and it was made to act upon the main driving wheel by means of a fine cat-gut cord which was wound up upon a spiral groove round a conical wheel termed a fusee. When, therefore, the mainspring was tightly coiled up, and pulled the hardest, it acted on the smaller end or top of the fusee nearest to the arbor, and the progressive loss of force in the spring as it uncoiled, was compensated by an increased leverage as it approached the bottom of the cone, and acted at a greater distance from the central arbor. The arbor of the spring was made fast by a click and ratchet, by which the power of the spring could be increased or diminished as might be found necessary. The precise date of this clever invention is not known, but the Bohemian cylindrical clock belonging to the Society of Antiquaries, bearing the date 1525, has a fusee, and this is the earliest known instance. The conical fusee, however, is made of lead, pewter, or some such soft metal, which looks very like an early piece of work in the infancy of the invention, as they were afterwards cut in steel in larger clocks, and brass in pocket-watches.

From this time no change or improvement appears to have been made in the mechanism or construction of watches for considerably above a century, except that at the end of the sixteenth century a small wheel fixed on the arbor of the mainspring, and an endless screw to regulate its power, were frequently substituted for the click and ratchet, and had come into general use by 1625.

During that long period of over one hundred years the cases of watches were made of every variety of form and material—round, oval, octagon, oblong, and cruciform; and the forms of flowers, animals, and skulls were occasionally used, the latter, possibly for the purpose of being suspended to a rosary, and the cruciform for ecclesiastical ladies, which have obtained in France the name of "Montres d'Abbeses." The oval was, however, the most usual form for general use. The materials were gold, silver, and metal gilt, rock crystal, agate, and occasionally hollowed out precious stones, as carbuncles, &c. The gold are very scarce, the value of the metal having in later times caused their destruction. They were usually ornamented with coloured enamels and precious

stones ; but, probably, when they ceased to be useful as time-keepers and were no longer worn as ornaments they were broken up. The sides of the metal and silver watches were very frequently ornamented with silver bands delicately engraved with elegant scrollwork of flowers, with occasionally boys and animals introduced. These are believed to be from the designs of Theodore de Bry, who, as well as other artists, engraved many designs for goldsmiths and watchmakers, and some of the finest may be the work of his own hand. He was born at Liège in 1528, resided and worked chiefly at Frankfort, and died 1598. He was followed by his son, who, as well as his father, worked chiefly with the graver. These silver bands, of a certain length, were like pieces of riband, and seem to have been made purposely for watches, and were probably procured at the Frankfort fairs ; and this seems to have been a special branch of art-manufacture as a trade, for they were employed by the watchmakers of all countries. The faces of the watches were usually engraved in the same style and gilt, and the hour-figures set on a raised silver circle ; and in the early watches there was frequently a small projecting pin or stud set at the head of each figure, that at XII being higher than the rest, for the purpose of enabling any one to feel the hour in the dark. So things continued, till about 1610 the round form of watch seems to have come into fashion, although watches of the oval and fancy shapes continued to be made as late as 1620. I am disposed to think that very few were made after that time, the circular form being generally adopted.

We now come to a new class of watches, as far as the exterior is concerned, viz., the enamelled watches, the interior mechanism remaining the same, though the form was always round. In 1630 Jean Tontin, a goldsmith of Chateaudun, and a great master in painting in transparent enamels, applied himself to the use of thick and opaque colours of different tints, which should melt in the fire and yet retain their lustre. He succeeded in the attempt, and as he employed thin plates of gold for the foundation of his works, this style of enamel-painting became available for a variety of ornamental purposes—watch-cases being among the number of articles so ornamented. He communicated his secret to his fellow artists, and the first who distinguished himself was Dubié, a goldsmith, who worked for the King at the Louvre ;

after him came Morlière, who worked at Blois, and he applied himself chiefly to painting rings and watch-cases; but his pupil, Robert Vauquer, of Blois, excelled all in design and colour. I have, however, a watch by J. Tontin, bearing his name, of which the beauty and delicacy of the colours and minute execution surpass anything I have ever seen. He died in 1670. He had a brother, Henri Tontin, who also worked in the same way, but his colouring was characterised by a rather dead opaque whiteness. Chartres, of Blois, succeeded in flowers, and Huaud le Puisne in figures. There were many other artists, but they did not always put their names on their works. The manufacture of these beautiful cases seems to have been a trade in Blois and its neighbourhood, and watchmakers in all countries seem to have been supplied with them. Their form was always round, and they were usually what were termed "hunting watches," having a lid over the face instead of a glass or crystal. They were enamelled all over, within and without, as also on the dial-plate, with various subjects of figures and flowers, and watches of this kind continued to be made till the latter part of the century. Watch-glasses seem first to have been made about 1620, when the round form came into vogue, the coverings of the dials having previously been metal lids or cut plates of rock crystal.

In 1631 the Clockmakers' Company of London was first incorporated by Charles I., and from that time the names of the principal clockmakers of London are recorded, and will give a clue to ascertaining the dates of their watches.

In or about 1650 an ingenious Swiss, named Gruet, is said to have invented and first made the steel chain, as substitute for the catgut hitherto in use, which was always liable to break.

The early watches had been but irregular timekeepers; a new era, however, in their history commenced about the middle of the century, and, after remaining for 125 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, which in the early watches was small in diameter, usually about one-fourth that of the plate when the watch was round. In 1658 it seems that Dr. Hooke

first conceived the idea of applying a spring to regulate the movement. His first idea was a straight spring, and I have an early oval watch to which this contrivance has been added, and also a table crucifix clock, with a horizontal watch-formed movement, in which is the original spring, which consisted of a straight piece of hair-spring attached to the back of the cock, and passed through a loop on the periphery of the balance-wheel; thus its tendency was to keep the wheel at rest, like the action of a perpendicular pendulum, and so limit its oscillations only to the extent of the force of the crown wheel on the pallets of the verge. This seems not to have answered satisfactorily, and, in 1660, he had a plan for applying one of a spiral form, such as is now used. The merit of this invention was claimed also by the celebrated Huygens. One end of the spiral hair-spring was made fast to the verge or arbor of the balance-wheel, and the other secured to the plate, and the oscillations were rendered equal and regular by its elastic force. It was not, however, at once brought to perfection, and various regulations were adopted to adjust the length of the spring, and it seems to have been brought into general use in 1675, when Tompion, the celebrated watchmaker of that day, perfected the mechanism, and made a watch for Charles II., with this inscription, "Robt. Hooke, inuenit, 1658, Thos. Tompion, fecit, 1675." A spiral spring was fitted to the balance-wheels of a great many earlier watches, but though it made them more useful it destroyed their originality. The size of the balance-wheels was greatly increased, generally, to one half the diameter of the plate, and in some foreign watches, towards the close of the century, to three-fourths. The spring was frequently called the "pendulum spring," a name said to be derived from its giving the same regularity to the motion of the balance that the pendulum does to the movement of a clock.

Hitherto watches had but one hand and pointed only the hours, but from the regularity of action acquired by the application of the spiral hair-spring they now performed with such precision that the minute wheel and hand, which made the revolution of the dial every hour, were added, thus marking the smaller subdivisions of time. This improvement is said to have been made by Daniel Quare, a famous London watchmaker, about 1686. It was not, how-

ever, a new invention, for I have in my collection a small oval table clock, in form of a large watch, standing on a foot, in which there are concentric hour and minute hands, which from its construction, there being no fusee, must have been made at latest in the first half of the sixteenth century. The seconds hand was a later introduction, probably in the second half of the last century.

In 1676, the Rev. Edward Barlow, a clergyman, invented a contrivance by which clocks could be made to strike or repeat the last hour at pleasure, by pulling a string. At first the invention was confined to the larger movements of clocks, but in the reign of James II. he adapted the contrivance to pocket clocks and watches, and employed Thomas Tompion, the chief watchmaker of his day, to make such a watch ; and he applied for a patent for the sole making of "all pulling or repeating clocks and watches." It must be remembered that every watch which strikes the hours is not a repeater, but only those which can be made at pleasure to strike or *repeat* the last hour. Daniel Quare, another skilful watchmaker, had been inventing a similar contrivance. Barlow's required two pins to be pushed in to make it strike, and Quare's only one. The Clockmakers' Company, probably at the instance of Quare, petitioned against granting the patent, and at the hearing before the King in Council, in March, 1677, the patent was refused. Quare subsequently made for King William III. a beautiful elaborate and highly-finished repeating watch, which is said still to exist in perfect preservation.

Thomas Tompion, who made the repeating watches for Mr. Barlow, in 1695, first invented the cylinder escapement, with horizontal wheel, which was subsequently perfected by his pupil, George Graham, in 1700 ; but it did not then come into general use, and the original crown wheel and verge vertical escapement, the earliest invention for clocks in the thirteenth century, and used for watches in 1500, continues in use even to the present day, though it is nearly superseded by other more recently invented escapements, and machine made watches which are now made and sold in such large numbers.

After the introduction of the hair-spring, watches assumed a different character, both in the interior and exterior. The balance-wheel was greatly enlarged in size, and was quite

covered by the cock, which, to protect it from injury, was formed as a circular plate perforated, and finely engraved with elegant designs, having, in later times, a small regulating dial by its side for adjusting the length of the hair-spring, and, as then, frequently called the "pendulum spring." Some makers had a conceit to make the balance-wheel have the appearance of a small pendulum: this was effected by covering with a solid plate half the wheel and its hoop, allowing only one ray to be seen moving backwards and forwards, and on this a small star or ornament was fixed, to give it the appearance of a minute pendulum—a poor conceit, for a horizontal pendulum is an impossibility. Occasionally the cock was covered with a small circular enamel portrait of a lady, and a small diamond attached to the hoop of the wheel was made to vibrate over her head. In some foreign watches the size of the balance-wheel is so large as to cover more than three-fourths of the plate.

Externally watches were made very thick and bulky, at times almost spherical. They were generally enclosed in an ornamental case of metal, covered with some substance, as tortoiseshell, shagreen, and piqué, with silver or gold studs, the works being contained in a smooth metal box within, which in repeaters was perforated as well as the outer case. The faces of these watches were usually of silver, the hour figure being in Roman numbers and the minutes in ordinary figures in an outer circle, both being raised above the ground, having been stamped up.

The very bulky form of watch prevailed till after the reign of Queen Anne, when the size was gradually reduced, and white enamelled dial-plates were introduced, and in some foreign watches the hours were shown on small enamel plaques let into the face. At the end of the seventeenth century, and during the first half of the following, the outer cases of many watches were beautifully embossed and chased in gold and silver: some were the works of first-rate artists and finely wrought and chiselled, but others, not in such high relief, were made by stamping thin plates of metal into steel moulds or dies with leaden punches, whereby much handsome effect was produced without great expense or artistic skill, except in the first sinking the die. Michael Moser, a famous chaser of silver in the time of Queen Anne, and H. Manby, during the first half of the century, chased

many cases. The latter was a beautiful artist, and used to get two guineas for chasing a watch case. Some of his cases went abroad, for I have a beautiful watch of which the outer case is chased by him, with his name, the inner case of very fine French enamel, and the movement by a watchmaker at Amsterdam; shewing that watch-case making was a trade of itself exercised in various places, the products being probably exhibited at the great Continental fairs, and so purchased by the watch or movement makers.

In 1700 Facio, a native of Geneva, invented the art of piercing rubies to receive the pivots of the balance. He was partner of De Baufré, a French watchmaker, established in London, and in 1704 applied for a patent to confirm to him the sole right of making jewelled watches, but the Clock-makers' Company producing an earlier watch in which an amethyst was set in the cock, he did not get his patent; but jewelled watches date from that time, though they were rare till of later years.

As the century advanced the size of watches greatly decreased, but they presented no particular characteristic features till, at the close of the century, many flat and small French watches were introduced, and the well-known English hunter became the fashion for gentlemen.

In 1776, Lepine, of Swiss family, introduced great improvements, and made important changes in the construction of watches by doing away with one plate, viz., the pillar plate, the fusee, and chain, and one of the supports of the barrel-arbor. This simplified the works, and enabled watches to be made very flat. The famous Breguet adopted this form of construction, and was followed by most French and Swiss watch-makers, and modern watches are now mostly constructed in this manner.

I have now given a brief outline of the progressive changes which were from time to time made in the mechanism, form and character of watches from the time of their first invention to the end of the last century. It is, however, very imperfect, and very many particulars are omitted which might have been described; but they would have swelled my observations to the size of a volume instead of a paper. I think, however, that what I have said will enable any one to understand my classification, and also to form some idea as to the age of a watch which he may chance to possess.

The names of watchmakers and their countries and dates is a branch of the subject of much importance and interest, but it is too large a branch to be introduced here.

CLASSIFICATION.

I have grouped my watches into four classes, which enables me to arrange them chronologically according to the peculiarities of their construction. These classes will, however, necessarily somewhat overlap one another, as no change in construction was universally adopted at the same moment, and many early watches have had more recent improvements fitted to them, but a practised eye soon detects the alteration. The great changes and alterations in old watches were made in the last half of the seventeenth century.

CLASS I. ranges from 1500 to 1530 or 40, and includes all watches made before the invention and general adoption of the fusee with the catgut cord for winding up the main spring, which was then enclosed in a barrel. This was certainly invented and used in a large table-clock as early as 1525, but whether it was then used in all pocket-clocks is uncertain, but there is no doubt that watches continued to be made without it for some time. This class is divided into three periods:—1st, when watches were made *entirely of steel*; 2nd, when the plates were of brass, the wheels still continuing of polished steel; 3rd, when the wheels were made of brass, the pinions continuing of steel as at the present time. All the earliest watches of this class were clock-watches, sounding the hours regularly on a bell as a clock, or alarums. They were in the form of small round flat boxes; the faces were of gilt metal with two circles of hour figures, the outer being in Roman numerals, from I. to XII., and the inner circle, from 13 to 24, in the ordinary quaint numerals of the time, and at the head of each hour-figure was a small pin or stud. The face was covered by a lid perforated with an aperture over each hour, and the lid as well as the bottom and sides were formed with finely-chiselled, perforated scroll-work. The angular edges of the boxes soon became rounded off in a more convenient shape for carrying, and the cases were made in round, oval and octagon shapes in which Gothic patterns are frequently found. Some later watches of very small size were made for ladies, and there was one

in the Bernal Collection so small that the movement might well have been mounted in a ring of no very great size; and I have exhibited a large watch, or rather travelling-clock, more than five inches diameter and weighing six pounds. The later dials were of silver, sometimes ornamented with transparent enamels, and where there was no lid the hand, which was flat and of blue steel, was protected by a raised rim.

CLASS II. will range from 1530 to 1620—a long period, and will include all the early watches having the fusee and catgut cord. The watches during this period were in form round, oval, octagon, cruciform, and in fact of every conceivable fantastic shape and of every variety of material—gold, silver, metal, crystal, agate, &c., which could be made available. The faces and sides were very frequently ornamented with engraving of delicate scroll-work of flowers, the hours being on a raised circle of silver, and round the sides was often a band of silver scroll-work similarly engraved, being either the work of, or after the designs of Theodore de Bry, a Flemish engraver, who flourished from about 1550 to 1596. Many of these watches were clock-watches and alarums. The smaller watches for ladies were pieces of exquisite and beautiful work, and many of the movements were contained in boxes hollowed out of rock crystal. Towards the close of the century and beginning of the next many watches were made with astronomical dials showing the days of week and month, the age and phases of the moon, and signs of the Zodiac, and the oval seems to have been the most usual form. I know of a round watch with the date 1599, but the fantastic shapes and materials continued till 1620, when they went out of fashion. The balance-wheels were very small, and the tension of the mainspring was retained by a click and ratchet, which were highly ornamented.

CLASS III. will range from 1610, when round watches began to supersede the oval and fantastic shapes, to 1660, when the hair or pendulum-spring was added to the balance; and it may be said that round watches were rare before 1610, and that few oval or fantastic watches were made after 1620. The only change in construction was the adoption of the endless screw and wheel to regulate the power of the main-spring instead of the click and ratchet. Alarums and clock-watches were still made. The cases were very

often of silver, and frequently ornamented with a bold, flowery scroll pattern, perforated and engraved; the faces were either silver engraved or opaque enamel. In 1630 Jean Tontin invented the art of miniature painting in opaque enamels, and from this time date all the exquisitely-painted French enamel watch-cases. Many of the watches of this time were enclosed in outer cases covered with black leather, and ornamented with silver piqué-work; watch-glasses were made and used about 1620, when round watches came into fashion.

CLASS IV. extends from 1660, when the spiral spring was added to the balance-wheel, which made watches assume a more important character by greatly increasing the regularity of their action, and includes all verge watches after that time. This spring was the last great important general change in their construction, except the various forms of the escapement which were invented from time to time in the last century, but they were not in general use, and my observations are confined to verge watches, which continued to be the general form of watch till the present century. This hair-spring, first invented in 1658, was originally a straight spring, but watches having such a spring are most rare, if any exist; that not being satisfactory, the spiral spring was invented about 1660, and this, after various modifications of the regulator, was eventually brought to perfection by Tompion in 1675, and in consequence of the improved action Daniel Quare is said to have invented the minute-wheel, and so placed the minute-hand concentric with the hour-hand; watches with minute-hands may therefore be considered as after that date. The earliest regulator was a long endless screw, on which was moved a slide by which the hair-spring was made longer or shorter. Repeaters were invented in 1676. Watches after 1660 were usually double-cased watches, that is, the movement was contained in a plain inner box, and the outer cases were frequently much ornamented. The cases of repeaters were perforated.

Towards the end of the century the bulk and thickness of watches were greatly increased, and the balance-wheels of some foreign watches were frequently made very large. Tompion's horizontal escapement is not met with, and Graham's is most probably very rare. In 1704 the art of drilling and using precious stones for pivot-holes was in-

vented ; all jewelled watches must therefore be after that time. Painted enamels were still occasionally used for the ornamentation of watch-cases, but the work was not so fine as during the former century. At the Battersea Enamel-Works many watch-cases were made, and also in Paris, where Bouvier was a fine artist. Porcelain watch-cases were made at Dresden and Chelsea. The early dial-faces were of silver, the figures raised, and the name of the maker frequently appears in the middle, but white enamel dial-plates came in early in the eighteenth century. The form of the figures as well as the maker's name will generally give a clue to the age of the watch. The bulkiness of watches diminished as the century advanced, and ladies' watches, ornamented with agates and other stones and attached to châtelaines, were much in vogue in the middle of the century, as well as those chased by Manby and others. All these watches will, of course, find their place in the fourth and last class, which comprises a very long period, there being no very distinctive character universally adopted by which it can well be divided. Towards the end of the century transparent enamels were employed by the French and Swiss to ornament watches, and occasionally small diamond sparks were used, and many such watches were then brought into this country. Their form was usually flatter than the English, and many had horizontal escapements ; their peculiar style and ornamentation will determine their age. At this time silver and gold English so called hunting-watches were much used by gentlemen, and at one time some gentlemen used to carry two watches, one on each side. Ladies then wore their watches at their waist, the chain forming a festoon, having at one end the watch and at the other a bunch of seals and key, or a corresponding ornament called a *fausse-montre*, which occasionally contained a miniature.

There are many other particulars which might be stated, but it would extend my paper, which is very imperfect, to too great a length ; I shall therefore close it by stating the number of watches in my collection. In Class I. I have 18 watches ; in Class II. 40 ; in Class III. 30, and in Class IV. 40, making a total number of 128.