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THE CHURCH ORGAN- ITS EVOLUTION-
SOME FAMOUS INSTRUMENTS.

There is probably no instrument which has so engrossed the public attention, as well as Musicians generally, as the organ, embodying in its completeness almost all the principal effects obtained from band or orchestra in solo as well as ensemble playing, even surpassing these in some respects, and as capable of the most delicate pianissimo as the thundering forte.

"The Ancient Organ, Anterior to the Invention
of the Key-board."

It is of much importance to the history of an art that the origin, etymology, and primitive acceptance of its terms should be minutely traced. The extended use of the word ORGANUM throughout the middle ages, has given rise to much confusion. It is, however, perfectly clear, to those who have investigated the subject, that the Greeks understood by the word ORGANON, and the Romans by their ORGANUM, not an Organ in our sense of the term, but an instrument of any kind; applying the expression, however, more particularly to musical instruments.

The Organ (ougab) mentioned in Genesis (chap. IV, V.21) certainly little resembled the modern instrument of that name, although it may be regarded as furnishing the first hint. It was probably a series of reeds, of unequal length and thickness, joined together; being similar to the pipe of Pan among the Greeks, or that simple instrument called a "MOUTH-ORGAN", which is still in common use in the Island of New Amsterdam, in the South Seas, and also in different parts of Asia. The classical ancients ascribe its invention to Pan, the great sylvan god; and, accordingly, he was usually figured with the instrument in his hands. The fable states that he formed it of reeds that grew by the river, and

caused it to produce agreeable sounds, while his goats were skipping around him, and feeding on the banks. This shows that it was regarded as properly a sylvan and pastoral instrument; and so it seems to be mentioned by Job (chap. XXI, v. 11, 12)

The Greek and Latin shepherds made this primitive instrument of strong reeds, or some other suitable material. It originally consisted of seven or eight reeds of progressive lengths fastened together with wax. This number was afterwards extended to ten or twelve, and was so described by Virgil, and the use of it by Lucretius, lib. V. The syrinx, or pipe of Pan, by its form and arrangement, may be regarded as the first kind of Organ building; for it consisted of a number of pipes placed together in ranks, according to their succession of tones, and sounded by wind.

Among the Cilician antiquities discovered in Syria is the portion of a figure playing upon a musical instrument of singular interest, as, it forms a connecting link between the pipes of Pan and the organ. This instrument consists of a vertical row of pipes inserted into a small air-chest, which appears inflated in the middle part. The right hand is operating upon it with a kind of cushion or compress, by which the performer forces the air into the pipes, and which he seems to apply to different parts of the instrument at will. The left hand was employed in playing it, but we are ignorant as to the exact manner of admitting the air to the different pipes. This curious relic may be looked upon as the earliest attempt to combine the pneumatic chest with the Pandean Organ, which still retains its place on the breast of the player, though he no longer operates upon it with his mouth.

Another step was the invention of a wooden box, the top of which was bored with just so many holes as there were pipes to stand on it. In these they now placed the pipes in the same order as they occupied in the Pan-pipes. From the chest (the modern

"wind chest") proceeded a small reed (now the "wind-trunk"), into which they blew with the mouth. Now, in order to prevent the simultaneous intonation of all the pipes, a slider (now called the "valve") was placed under the aperture of each pipe, which either opened or stopped the entrance of the wind into the pipes. The slides stood in an inclined position, and, in order to open them, levers were added, which were connected with the slides by cords or strings (the origin of the "pull downs"). A further increase of the number of pipes at length caused an enlargement of the pipe-chest (the modern wind-chest); consequently human breath was no longer sufficient to supply the instrument, and then a more suitable contrivance for the production of wind was devised. Thus we have a new class of instrument called by the Romans "Tibia Utricularis". Virgil has an elegant passage, in which he describes the shepherd Tonus playing upon the "Tibia Utricularis". This instrument appears to be nothing more than the origin of the bagpipe. It consists of pipes pierced with lateral holes, and an inflating pipe, which the performer applied to his mouth to fill the leathern bag with wind. The application of the inflated tube, it is evident, related only to the smaller instruments, the larger ones were supplied with wind by the compression of the leathern bag or bellows. This contrivance proved of so much advantage to the improving instrument, that, in order to obtain a more powerful tone, a second row of pipes of the same pitch was added to the former.

The pipes having been thus increased and enlarged, and the box widened, the next improvement was the enlargement of the wind-tube (trunk). The leathern bag being insufficient to supply the proper quantity of wind required for the enlarged organ, this was remedied by the invention of "bellows", yielding a continuous supply to the leathern bag, which, from this time, served the office of our modern "wind-chest".

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From the progressive inventions here recorded, it will be observed that many portions of the modern organ were already to be met with in the instruments of the ancients, in a more or less complete state. The invention of the organ may be assigned to this period, though no precise date can be given; thus much can be stated with certainty, that all these inventions date from a period before the birth of Christ.

Vitruvius, in his celebrated work on Architecture, has left us a curious chapter on the "hydraulic" or "water organ", which, from its complicated character, has much puzzled investigators. The bellows of the first organs were very small, and so imperfectly constructed, that they could not supply a steady wind; the organ in consequence did not produce a uniform tone. Thus, the improvement of the wind apparatus, was not seriously thought of, and the result was the invention of the "water-organ", the water being used in such a manner as to counter-balance the hitherto variable pressure. From the description given by Vitruvius, it seems that the water which forced the air into the pipes was pumped by men. Indeed, it has been much disputed whether the instrument was played with "fingers", by means of levers or "Keys". The latter was impossible as they were not invented until about one thousand years afterwards. Yet, the description of the "hydraulicon" by Claudian seems such a one as would suit a modern organ, only blown by the aid of water. The English translation by Dr. Busby being:-

"With flying fingers, as they lightsome bound,
From brazen tubes he draws the pealing sound.
Unnumbered notes the captive ear surprise,
And swell and thunder as his art he plies:
The beamy bar he heaves; the waters wake!
And liquid lapses liquid music make."

Athenaeus, who flourished in the third century, has left

us an account of the "hydraulic-organ", which is probably the most ancient and authentic extant. He tells us that it was invented, in the time of the second Ptolemy Euergetes, by Ctesibius, a native of Alexandria (B. C. 200), and by profession a barber; or rather that it was improved by him, for Plato furnished the first idea of the "hydraulic-organ", by inventing a night clock, which was a "clepsydra", or water-clock, that played upon flutes the hours of the night at a time when they could not be seen on the index.

Hitherto we have been obliged to rely on Vitruvius for our knowledge of the ancient organ, but we have now an independent authority in one, Hero of Alexandria, supposed to have been a pupil of Ctesibius, whose interesting treatise on pneumatics has been lately discovered. The work of Hero was unknown to Vitruvius, and both describe, with considerable differences, the construction of the hydraulic and of the pneumatic organ.

The mechanical operation of the "water-organ", as we have said, is scarcely intelligible; this much, however, is certain, that the "hydraulicon" was provided with pipes and a wind-chest, and registered like the wind-organ. The water gave the wind, by means of its counter-pressure, equality and power. Ctesibius' object was "to employ a row of pipes of great size, and capable of emitting the most fanciful, as well as the softest sounds". He is also said to have invented, or perfected, the perforated slide, by which means he was enabled to open and shut the mouths of the pipes with greater facility.

Instruments of the "hydraulic" kind were made of different sizes, and in different forms. Athenæus, in his chapter on musical instruments, refers to a water-organ small enough to be transported from place to place. A representation of this instrument is rudely indicated on a contorniate coin of the Emperor Nero. It is a medal of Valentinian, showing an organ of eight pipes placed

upon a round pedestal. No performer or mode of performing appears; but two figures, one on each side, are engaged in pumping the water by which it is worked.

Tertullian, the patriarch, who declares Ctesibius, of Alexandria, to be the inventor, and Archimedes the improver of the water-organ, expresses himself in the following extravagant terms of eulogy:-

"Observe the extraordinary genius of Archimedes: I mean the water-organ; so many members, so many parts, so many joinings, so many roads or passages for the voices, such a compendium of sounds, such an intercourse of modes, such troops of tibiae, and all composing one great whole! The spirit or air which is breathed out from this engine of water is administered through the parts, solid in substance, but divided in operation."

The "hydraulic-organ" was occasionally used down to a comparatively late period. In the year 323, a certain Venetian called Gregorius, constructed an hydraulic-organ for Louis the Pious, at Aix-la-Chapelle, and that after the manner of the ancients

Dom Bedos, an industrious Benedictine monk, who wrote, about the middle of the eighteenth century, a voluminous work, entitled "L'Art des Facteur des Orgues", cites a very curious passage from the Chronicle of William of Malmesbury, which is thus translated. Speaking of Pope Silvester II. (who died in 1003), he says "In the church of Rheims are still extant (A. D. 1123), as proofs of his science, a clock constructed on mechanical principles; and an hydraulic-organ, in which the air, escaping in a surprising manner, by the force of heated water, fills the cavity of the instrument, and the brazen pipes emit modulated tones through the multifarious apertures."

The various contrivances to introduce the wind into the pipes by means of water were not found to be successful, in spite

of their seeming superiorities. A return was therefore made to the ancient bellows filled by manual labor. The Emperor Julian, (who died A. D. 363) is the reputed author of a Greek enigmatical epigram the solution of which is evidently the "pneumatic-organ". The literal translation being the following:-

"I see a species of reeds: surely from another and a brazen soil have they quickly sprung-rude. Nor are they agitated by our winds, but a blast rushing forth from a cavern of bull's hide makes its way from below the root of reeds with many openings; and a highly-gifted man, with nimble fingers, handles the yielding rods of the pipes, while they, softly bounding, press out a sound."

Another curious description of the pneumatic-organ is given by Cassiodorus, who flourished under King Vitigas, the Goth, A. D. 514, in his Commentary on the 150th Psalm. "The Organ", he says, "is an instrument composed of divers pipes, former into a kind of tower, which, by means of bellows, is made to produce a loud sound; and, in order to express agreeable melodies, there are, in the inside, movements made of wood, that are pressed down by the fingers of the player, which produce the most pleasing and brilliant tones".

The "Organ" was early used in the public service of the church. According to Platina the organ was first used for religious worship by Pope Vitalian 1. A. D. 666; but Julius, a Spanish bishop A. D. 450, tells us that it was in common use in the Spanish Churches at least 200 years before Vitalian lived. The use of instruments in churches dated from a period much earlier. St. Ambrose used instruments with the public service in the cathedral of Milan and this became a general custom in other churches. If the testimony of Justin Martyr can be relied upon, we may say that instrumental music in churches was known at least 200 years before the time of St. Ambrose.

It was some time before organs became common in the churches of Europe. Pepin, the father of Charlemagne, King of the Franks, an ardent worshipper of God, was the first to introduce singing and the ceremonies of the Romish Church into France. He quickly saw that an organ was necessary, both as an aid to devotion, and as a proper support to the choir. The instrument being unknown at that time both in France and Germany, this King applied to the Emperor Constantine, requesting that he forward an instrument to France, which request was complied with in the year 757, and a great organ with leaden pipes, was placed in the church of St. Cornelle, at Compiègne.

French mechanics were eager to equal these instruments of foreign make, and so successful were they, that, in the ninth century the best organs were made in France.

The Organ came into use in England shortly after this period, they were constructed by English artists, with pipes of copper fixed in gilt frames. St. Dunstan, in the reign of Edgar, erected an organ, the pipes of which were made of brass. William of Malmesbury mentions this instrument and also had an organ erected in the abbey church of Glastonbury.

In the monastic church of Winchester was a large organ built about the close of the tenth century, by order of Bishop Elphege. The following metrical translation by Mason refers to this monster instrument, which was described by the monk Wulston.

*Twelve pair of bellows, ranged in stated row,
 Are joined above and fourteen more below;
 These the full force of seventy men require,
 Who ceaseless toil, and plenteously perspire,
 Each aiding each, till all the wind be prest
 In the close confines of the incumbent chest,
 On which four hundred pipes in order rise

To bellow forth the blast that chest supplies."

In the eleventh century, a monk named Theophilus, wrote a treatise upon "The Construction of Organs", his work is valuable in many points, but particularly so, in regard to the matter of the Key-board, - a much debated point. The organ of Theophilus was unprovided with one.

"The Mediaeval Organ, after the Invention of the Key-board."

The close of the eleventh century marks an era in the history of organ-building, when an organ is said to have been erected in the Cathedral at Magdeburg, with a Key-board consisting of sixteen Keys. The Keys of this organ were an ell long and three inches broad. They were struck down by the fist of the player, from which circumstance arose the name of organ-beater.

The bellows for centuries had remained in the most imperfect state and were of such small capacity that twenty-four were necessary for the wind supply of the Magdeburg Organ. They were fashioned in folds, and were not provided with weights as in our modern organs. With such bellows, the organ could never have been in ~~time~~ beacuse of the unequal wind pressure, which depended solely on the strength of the bellows-blowers.

During the thirteenth century, the use of organs, and even other instruments, became almost universal, not only in the great cathedrals, but in those of monastaries, convents and small towns. Historians of this period celebrate several monks, distinguished for their organ playing. The first monastic organs were very small, being merely used to play the melody of the plain-song.

The monks and friars not only took great interest in the building and adornments of their churches, but devoted themselves to improving the art of organ building.

During the fourteenth century, the keys were made neater, their number being increased both upwards and downwards, to the extent of nearly three octaves, and their depth so reduced, that the keys were capable of being pressed down by the fingers.

The earliest authentic account of an organ provided with semitones of the scale is given us by Praetorius, who describes an instrument, built in the cathedral at Halberstadt, about the year 1360, by a priest, Nicholas Faber. The great B. stood in front, and was thirty two feet long. This organ had four claviers, one being pedals for the feet, and twenty bellows, requiring ten men to supply the wind.

In England, as we have seen, a large organ existed at Winchester in the tenth century, and long before the close of the fourteenth century all abbeys and churches were supplied with instruments.

Whethamstede, abbot of St. Albans, about the year 1450, gave to his church a pair of organs; for which, and their erection, he expended the then large sum of fifty pounds. No organ in any monastery in England was comparable to this instrument, for its size, tone, and workmanship.

"The First Organ-Builders by Profession."

There is no doubt that many of the early organ builders were ecclesiastics, and even down to a comparatively late period, they have exercised a considerable influence over the art.

Albert Van Os, called "Albert the Great", the earliest known organ-builder, was a priest. Erhart Smid, of Pessyenberg, in Bavaria, and Andre' were certainly lay-builders, who constructed organs about the latter half of the fifteenth century.

One of the earliest organ builders was one, William Wotton, who, in 1487, made a pair of organs for the chapel of St.

Mary Magdalen College, Oxford, for the sum of twenty eight pounds.

In the list of Henry the Eighth's Musical Establishment we find under the year 1526, the name of "John de John, organ-maker". This person, who was a priest, was succeeded by William Estun, an organ builder of considerable merit, as he constructed the organ for the old cathedral of St. Paul, destroyed in the great fire of 1666.

James VI., on his visit to Scotland in 1617, re-introduced the use of the organ, into the services of the chapel at Holyrood Palace. This must have been a magnificent instrument, as its cost exceeded four hundred pounds.

During the sixteenth century, according to Praetorius, the Germans invented "registers", by which alone a ~~maxima~~ variety of stops could be formed. Improvements at this period were also made in the pipes, particularly the invention of the "stopped" pipe, whereby expense was saved, and that soft, pleasing tone obtained, which open pipes are unable to yield.

By employing a "small scale", the number of registers with a penetrating, yet pleasing tone were obtained, in imitation of the violin and other soft orchestral imitations. By the "large scale", on the contrary, was preserved that full, round tone which is always characteristic as the foundation tone of organ construction. Besides these, certain pipes were made to "taper upwards", whereby some other registers, such as spitz-flute, and gemshorn, were added.

"Reed Registers" were invented during the course of the sixteenth century, with which it was sought to imitate the tone of other instruments, and even the voices of men and animals- for instance, the posaune, trumpet, vox-humana, bears-pipe, and etc. The keyboard was also extended during this period to four octaves.

In 1576 Hans Lobsinger, of Nuremberg, invented the bellows with one fold, which is still to be found in old organs. In 1576

an organ with sixty practicable registers was erected at Bernan, in the province of Brandenburg, Prussia. This organ, which is still in existence, has forty-eight keys on the manual, and sixteen on the pedal. It has four bellows, each of which is twelve feet long, and six feet wide. The workmanship is said to be masterly, the whole mechanism bearing evidence of the great progress in organ-building at this period.

Some of the curiosities of organ-building merit a passing notice. The organs of Theophilus, the renowned patron of music, who reigned from 829 to 841, is said to have had "two great gilded organs, embellished with precious stones and golden trees, on which a variety of little birds sat and sung, the wind being conveyed to them by concealed tubes."

In the course of the seventeenth and early part of the eighteenth centuries great industry was bestowed upon the external decoration of the organ. Amongst these ornaments the figure of angels played a very conspicuous part; trumpets were placed in their hands, which by means of mechanism could be moved to and from the mouth. Carillons, too, and Kettle-drums, were performed upon by the moveable arms of angels, and, in the midst of all, a large angel would be seen beating time with his baton as conductor. These absurdities were abolished probably in compliance with a canon issued for their suppression.

An Ordinance being passed in the House of Lords, dated January 4th, 1644, establishing a new form of divine worship, in which no music was allowed but plain psalm-singing, it was thought necessary for the promotion of true religion, no organs should be suffered to remain in the churches. In consequence of this ordinance all churches were stripped of their organs and ornaments; some of the instruments were sold, others were destroyed, and some few were allowed to remain.

The devastation committed upon organs by those misguided ruffians, the soldiers and commanders of the Parliamentary army, was not easily remedied. It was not until some time after the restoration of monarchy that these instruments could be reinstated. The difficulty of procuring organs at this time was very great, so it was thought expedient to invite foreign builders of ability to England. This movement resulted in several good organ-builders leaving the continent to settle in Britain, among whom were Smith and Harris.

"The Founders of Modern Organ-Building."

In the middle of the seventeenth century Germany and Holland possessed many organ-builders whose fame had gone forth beyond their own countries: Christian Former, of Wettin, Schnitker, of Hamburg, and Eugene Casperini, were foremost in the ranks; and under the able tuition of one of these builders Bernard Schmidt, known as Father Smith, most likely learned his art.

Father Smith was certainly in England in the year of the restoration of King Charles the second; and his first organ, that of the Royal Chapel at Whitehall, was built before the 8th of July 1660. Smith rapidly acquired fame, and was high in favor with the King, who appointed him his "organ maker in ordinary", and allotted to him apartments in Whitehall. He had, however, to contend with a formidable rival in Renatus Harris, who arrived in England from France, shortly after Smith came from Germany.

The origin of the quarrel between Father Smith and Renatus Harris arose, probably through the famous contest, or "battle of the organs", as it was termed, at the Temple Church, in which, as is well known, the former gained the day. This enmity between these two celebrated organ-builders existed during their time and even their successors were not free from it. In consequence of the reputation which Father Smith had acquired, he was made choice of

to build an organ for St. Paul's Cathedral, then in the course of erection. This organ was opened with Divine Service, at the thanksgiving for the Peace of Ryswick, December 2, 1697; but the Cathedral was not entirely finished till 1715. Father Smith died in the year 1708, in England, having constructed during his lifetime in England about 45 organs, many of the stops of which organs are in use at the present time, having been incorporated into modern instruments.

Renatus Harris seems also to have been kept very busy, and to have been Smith's rival on all occasions, even rivalling his opponent in Court patronage during the time of James II. He died about the year 1715 having constructed about 39 organs.

"The Modern Organ".

The organ, as it is usually met with in cathedrals and large churches, is divided interiorly into five principal parts. The chief of these divisions, or departments, is that styled the Great Organ; the others are the Pedal Organ, the choir organ, the Swell organ, and the Solo Organ. Some instruments of the first magnitude have, in addition to the foregoing, a fifth Manual organ, which is usually an Echo Organ, or a Celestial Organ, however, four manuals is the most frequently met with arrangement, and from one or more of these manuals the Echo and Celestial Organs is played, thus lessening to some extent the multiplication of Key-boards.

The several departments enumerated are, in one sense, so many separate and distinct organs. This is the case so far, that each has usually its own sound-board, stops, clavier, and Etc.; but the whole of them being generally enclosed in one case, with the different claviers so arranged as to be under the control of one performer, they are thus made to assume the appearance of one vast and comprehensive instrument. During the last few years, however, there is a strong and growing tendency to have the organ bracketed

in different portions of the Church so that by coupling the different sections together the edifice is flooded with sound which is equally distributed as to power. These improvements have been made possible by the great advance made in organ actions.

The "Great" organ is in a certain sense, however, the principal part of the instrument. It may be regarded as formed by a completely developed series of those massive fundamental stops which constitute the solid tonal basis of the instrument. These consist of diapasons, double-diapasons, flutes, octaves, and trumpets.

The "Swell" organ comes next in importance to the "Great". In this department of the organ the whole of the pipes are enclosed in a box, faced on one or more sides with a set of balanced shutters. When these are closed the tone is in a great measure muffled. When they are gradually opened by means of the balanced swell pedal, the sound bursts forth in a grand crescendo. The "Swell" is of English origin, and its chief characteristic is the rich and powerful volume of reed tone of a peculiar character which it contains, as well as some beautifully voiced solo stops where the organ is just a three manual instrument.

The "Choir" organ contains many of the fundamental stops as found on the "Great" organ, but they are more softly voiced and of a brighter character. Some solo stops are usually placed on the "Choir" and when chimes are present they are usually manipulated from this organ.

The "Solo" organ is comparatively modern in its present form. It arose with Hill, Hope-Jones, Willis, and other leading English builders as a vehicle for the very powerful reed stops which are placed on a heavy wind pressure.

The "Echo organ" is made up of the softest stops known to the organ builder, and it is frequently placed in the triforium or

in other remote portions of the church. The pipes are usually enclosed in a swell box.

The "Celestial Organ" as placed in Westminster Abbey, constitutes an unique feature among the cathedral instruments of England. It is placed in the triforium of the south transept, at the extreme end, above the tomb of Handel, and is not visible from the church below. Though in all respects a separate organ, and complete in itself, it nevertheless forms part of the grand instrument standing in the choir, inasmuch as it is controlled from the same console, and can be used in conjunction with the latter. The "Celestial Organ" consists of two sections, part belonging to a fifth row of keys, and part under control of the fourth or solo keyboard of the console; while, by means of various couplers, all the stops can be played from either manual as desired. The action is electric throughout, the connection being established between the console and the organ by means of a small cable, 200 feet in length. All the stops in the celestial organ are enclosed in a swell box, and are voiced to appropriate softness.

The "Pedal Organ" is operated on by the feet, and constitutes the general bass of the whole instrument. The longest and most powerful pipes are to be found in this portion of the instrument. The length of these in the average instrument does not exceed 16 feet, but in larger instruments an open pipe of 32 feet is commonly found. In the big organ in the Sidney, Australia, Town Hall, the largest pipe is 64 feet in length, but it has never been duplicated in any other organ. The 32 feet open diapason is usually made of large scale, and produces true musical tones throughout. This, however, cannot be said of the 64 feet pipe.

Within the last twenty five years great changes have taken place in the construction of the "King of instruments", as the organ is sometimes called, and today the old tracker action, which

formerly figured prominently in the make up of every instrument, is rapidly becoming a relic of the past, having been replaced by the pneumatic, or electric actions, or by a combination of these called the electro-pneumatic system. Dr. Gauntlett first applied electro-magnets to organ actions in 1845, and, since that time the modern console has been evolved. It cannot be denied that for large instruments, and in particular where they are divided, and where the different sections are placed widely apart, no means of placing these under the control of one performer can at all approach the electric action.

The electro-pneumatic action may be said to have been the joint invention of Mons Peschard and Barker, of Paris, France, although the idea of applying electricity to the pneumatic action was first conceived by M. Peschard. M. Barker was the inventor of the pneumatic action, and in 1861 these inventors joined hands and installed the electro pneumatic action in the organ in the Church of St. Augustine. The installation was a complete success. The manner of applying the electricity in modern organs is unique, inasmuch as the electric current is only used as a transmitting medium, controlling extremely small valves in response to the action of the keys. These valves then call into play pneumatic power on which alone rests the heavier labor of overcoming the resistance of the pallet in the wind chest. The valve has but a movement of a fraction of an inch, and an extremely slight impulse is sufficient to effect it. A small battery will supply all the power needed for several months. A flexible cable about an inch in diameter is all that connects the console with the organ, this cable can be of any length, allowing the console to be moved freely and while the several sections of the organ may be bracketed in different portions of the auditorium, yet when they are coupled together the speech is perfectly concurrent.

The tubular pneumatic action is much ahead of the old fashioned tracker action, and is not so liable to get out of order. The action of the key is to open a valve at the anterior end; this is all the labor required, the rest being accomplished by means of the pneumatic action. The opening of the key valve admits a small quantity of compressed air into the metallic tube; this, at the same time, pushes forward the column of air in the tube. A distance of less than half an inch is travelled, but this is sufficient to open the valve at the soundboard end of the pipe, and this by another piece of mechanism is made to admit full wind to the pipe. The touch is of extreme lightness, and the least depression causes full speech, but the power of repetition is not nearly the equal of the electric action.

The tracker action consists of connecting the keys with the valves by means of trackers, rockers and other mechanical devices all of which have a tendency to make the playing of the instrument a difficult undertaking. This style of action should be, and is being, abolished except in the smaller one and two-manual organs.

"Some Modern Instruments."

The Sidney, Australia, Town Hall, contains the largest organ in the world. It was built by the firm of Messrs. W. Hill and Son, London, England, in 1887. Its manufacture and erection occupied three years. The case is of great size, and holds in the centre the 32 feet metal pipes of the double-open diapason; the style is Northern Renaissance of the seventeenth century, designed after the model of the finest ancient examples. The organ now includes 128 speaking stops (this number including the new chimes of 38 bells and the 64 feet "thunder") 14 manual and 2 pedal couplers 3 balanced swell pedals, and 8,800 pipes and chimes. There are 33 pneumatic combination studs, 6 combination pedals to the pedal

organ, tremulants, and etc. The swell organ contains 26 speaking stops, of which one is the 64 feet thunder. The great organ embraces 28 speaking stops, of which number one is the 32 feet contrabourdon. The choir organ contains 19 speaking stops; the solo organ, 20, and the echo organ 8. The pedal organ embraces a 64 feet reed stop, the only one of its kind in the world. It is made up of a beating reed of true length, and conical wooden pipes ranging from 64 feet in length to 16 feet. The effect of the 64 feet pedal stop is truly marvellous, and its expression is very distinct in spite of its volume and depth. The instrument is fitted out with five manuals, and the solo organ contains 38 tubular chimes

The largest organ in Canada is to be found in the Church of Notre Dame, in Montreal, where it occupies a prominent place in the gallery. Its case is of enormous size and its front is ornamented with the 32 feet open diapason pipes. These are of actual length and are covered with silver leaf. The organ was built by Messrs. Casevant Bros. of St. Hyacinthe, Quebec, and contains 5,700 pipes and 32 speaking stops. It possesses four manuals and its action is of the electro-pneumatic variety.

In the temple of Music at Buffalo N. Y. stood a very fine concert organ of medium size, which embodied most of the latest improvements in the line of organ control and improved mechanism of the tubular pneumatic variety.

This instrument occupied a recess on one of the eight sides of the Temple, the recess being thirty-six feet wide, forty four feet high, and twenty feet deep. The manuals were four in number, separated only by two and a half inches in a vertical line, each having projecting ogee fronts. The pedal action, being only a series of small pistons near the keys, was noiseless in operation. Each manual, and the pedals, were provided with adjustable combinations of a new pattern invented by the builders, Messrs. Emmons

Howard and Son of Buffalo, N. Y. The couplings were in the form of tilting tablets over the upper keyboard and are thrown on or off with a slight touch. The Crescendo and Diminuendo Pedal controlled all of the stops, both speaking and mechanical, for the entire organ, and they could be thrown on or off, from the softest to the loudest, with any speed desired, at the will of the performer. The wind supply was provided by three large bellows, operated by water engines. Five separate wind pressures were used, adding greatly to the variety of tone. The total number of stops was 83, which were disposed in the following manner-

| | | |
|---------------------------------|-----------|------------|
| Great Organ | 14 stops | 1037 pipes |
| Swell Organ | 14 stops | 976 pipes |
| Choir Organ | 11 stops | 871 pipes |
| Solo Organ | 4 stops | 244 pipes |
| Pedal Organ | 10 stops | 300 pipes |
| Couplings | 12 stops. | |
| Combination movements 18 stops. | | |

The total number of speaking pipes as given above is 3228.

The above examples represent the matured judgement of men who stand at the head of their respective professions, and it may reasonably be expected that the art of organ construction will continue to advance with the progress of science.

