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EDITED BY

FREDERICK J. CROWEST.

THE
STORY OF THE ORGAN

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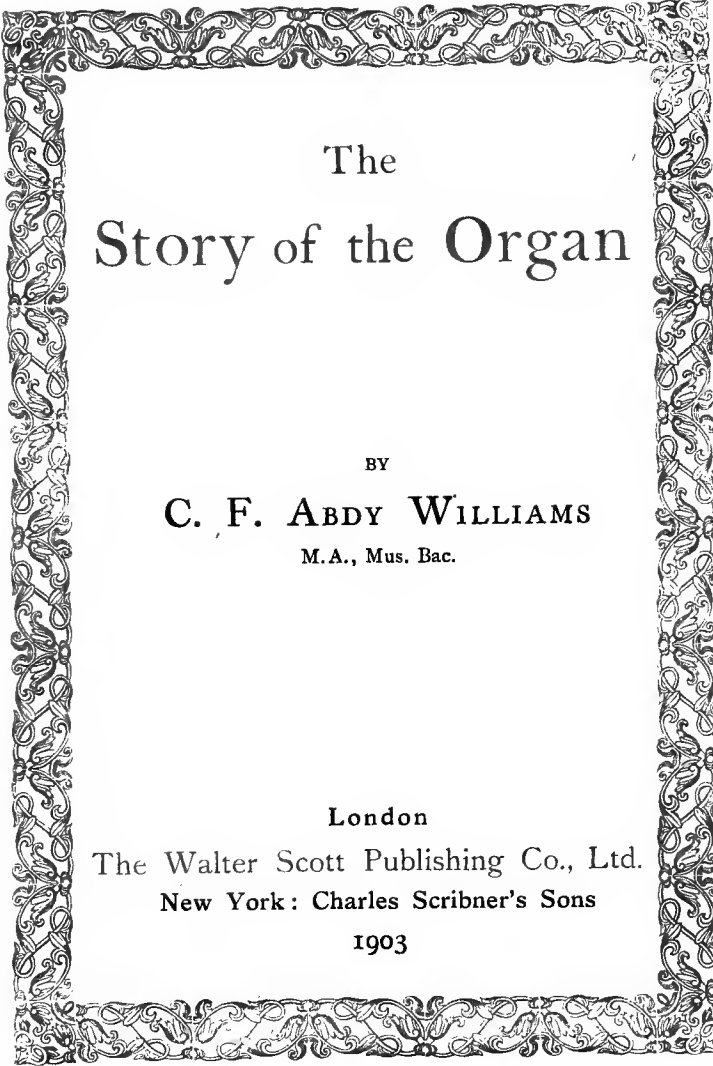
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WILLIAMS, M.A., Mus. Bac. With Illustrations.

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The Music Lesson
after the painting by Titian
National Gallery



The
Story of the Organ

BY

C. F. ABDY WILLIAMS

M.A., Mus. Bac.

London

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Preface.



THE object of this little work is to give an outline of the history of that wonderful outcome of human ingenuity and skill known as the organ, from documentary evidence, apart from the vague speculations of Kircher and others. The known history of the organ begins with the machine of Ctesibius, of Alexandria, in which air was forced into a trumpet by the efforts of water to "rise to its own level." In mediæval times the force of gravity replaced that of water, weights being placed on a bellows, from which the air was thus driven into the pipes with the requisite strength. Speculations as to the nature of the organs mentioned in Genesis and elsewhere in the Scriptures have no bearing on the history of the instrument, for when, during the Reformation, the Bible was translated into various modern languages, the translators, knowing nothing of the instruments there mentioned, simply made use of musical terms familiar to them. Thus, in the French translation, David is represented as playing

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on the violin, an instrument totally unknown until mediæval times, and in the German version, Jubal is the father of fiddlers and pipers, not of "such as handle the harp and organ," as in our version.

As it is difficult, or impossible, to write a history of the organ without the use of a few technical terms which may not be familiar to the general reader, I have given a rough outline of the simplest mechanism of a modern instrument in Chapter I., and have added Appendices, which can be referred to, if necessary, by the reader, should he have a doubt as to the meaning of technical words. Appendix C is intended more as a sort of summary of the progress of the art of organ-building than a complete list of organ-builders, which it in no way pretends to be. It is arranged alphabetically for convenience of reference.

C. F. ABDY WILLIAMS.

MILFORD-ON-SEA,
October 1903.

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CHAPTER I.

The mechanically blown trumpet of Ctesibius of Alexandria—Hero causes a row of musical pipes to be blown by mechanical means—The hydraulic organ of Vitruvius—Popularity of this instrument—Its representation on contorniates, gems, in pottery, and in a poem—The Roman emperors and the hydraulus—References by writers—The compass of the hydraulus—Discovery of two instruments at Pompeii which are probably portative organs—The state of music in ancient Rome—Greek slaves as performers—Gigantic instruments constructed—The Emperor Julian—The hydraulus used at weddings—Cassiodorus's description of the organ—Abolition of theatres—Object of the water in the hydraulus—The "Pneumatic" organ—The word organ in Scripture—The meaning of the Greek word *ὄργανον* and the Latin *organum*—The principle of the modern organ explained—Explanation of the expressions "Equal and unequal temperament."

ABOUT B.C. 284 to 246 there lived at Alexandria, under Ptolemy Euergetes, a man named Ctesibius, who followed his father's trade of barber. Being of a mechanical turn of mind, he observed that the counter-

Story of the Organ

weight of a movable mirror, used for the purposes of his trade, produced a musical sound by the force with which it drove the air out of the tube in which it moved. Experimenting with the principle thus noticed, he succeeded in making a machine consisting of a hollow vase inverted, with an opening on the top, to which was attached a trumpet, and, on water being pumped into the vase the air was driven forcibly through the trumpet, producing a very powerful sound; and the machine caused so much admiration that it was consecrated in the temple of Venus. An illustration of the principle involved may perhaps be taken from the modern fire-engine, which is practically the Ctesibian "vase" reversed. In the ancient instrument water was used to force air in a steady flow through an opening in the top of a hemisphere; in the modern fire-engine, air confined in the top of a hemisphere forces the water in a steady stream through an opening in the bottom.

The idea of supplying a forced current of air to a single trumpet was enlarged by Ctesibius's pupil, Hero, an engineer, whose work, *De Pneumaticis*, contains descriptions of many mechanical applications of steam, water, and air. That part of it which interests us here is the description of a musical instrument, developed from Ctesibius's trumpet, in which the air was conveyed from the vase to a row of pipes, arranged in the order of a musical scale, any one of which could

The
earliest
known
Wind
Instrument
not blown
by the
human
lungs

The
invention
of the
Water
Organ

Hydraulus

be caused to sound at will. Since the water was the motive power, Hero or others named the instrument the Hydraulos, or in Latin the Hydraulus; and this was the predecessor of our organ. Hero describes perforated metal sliders under each pipe, which must be kept well oiled, and which, on being pushed in by the finger, admit the air to the respective pipes. The slider is returned to its place by a horn spring on the removal of the finger. A century and a half later Vitruvius, a famous Roman engineer, gave a further description of this instrument, showing that by this time it had a keyboard, and that the horn springs were replaced by metal ones; that it had several rows of pipes answering to the modern "stops"; that each row stood over a separate channel, to which wind was admitted by a valve which could be opened or closed at the will of the performer.

**Vitruvius's
description
of the
Hydraulus**

The instrument which began in this humble manner not only became exceedingly popular, but was for centuries a source of admiration and astonishment to the unlearned. The powerful sound, the rapidity of execution, the mysterious bubbling of the water, the exertions of the slaves, who were obliged to pump with all their might to supply the air in sufficient quantity, all combined to attract attention to it. It was used for contests in the public games; it formed part of the entertainment at feasts; it found its way into private houses; and in one instance,

**Popularity
of the
Hydraulus**

**Widespread
use of the
Hydraulus**

Story of the Organ

at least, took the place of the trumpet in giving the signal for the commencement of the brutal Naumachiæ, or sea-fights, which were the delight of the Roman populace.¹

The hydraulus is figured on a great number of contorniates. A victor in a contest is usually depicted standing by the hydraulus holding a flabellum or fan, or there are one or more fans beside the instrument. The connection between the fans and the instrument is not known, though Sabatier, in his *Description Général des Medallons Contorniates*, suggests that they may be emblematical of the wind that caused the pipes to sound, and was controlled by the player.

A contorniate in the British Museum shows the victory of one Laurentius in the games, the inscription being "Laurentius Nica." He stands on the right-hand side of his hydraulus, holding a flabellum. On the other side is a representation of Nero, with the inscription, "Imp. Niro Cæsar Aug. P. Max." The instrument consists of a lower part, of about the height of the man's shoulder, evidently containing the water apparatus within it, and a sound-board, surmounted by a row of ten pipes. On the left of the hydraulus are

¹ The Naumachiæ took place in amphitheatres, the arenas of which were filled with water for the purpose. The ships were manned by condemned criminals and prisoners of war, who fought till the whole of one side was killed; and the waste of life was greater than in the gladiatorial combats.

Hydraulus

two more flabelli. There is no indication of levers for blowing, which perhaps are out of sight behind the body of the instrument.



CAST OF CONTORNIATE, SHOWING HYDRAULUS. (BRITISH MUSEUM.)

On a gem in the British Museum there is the figure of an altar-shaped vase, surmounted by graduated pipes in a semicircle, behind which a nude performer is standing on the vase, the pipes reaching just above his waist. Two nude blowers are working hard, one on each side of the instrument.

On another contorniate of Nero is an organist with a horn, and the blower standing by his side.

The obelisk of Theodosius at Constantinople has a representation of a hydraulus of eight pipes played by two players, and with two men standing on the bellows, which are shaped like ordinary blacksmiths' bellows.

A piece of pottery recently found at Carthage represents a performer standing between the two cylinders described by Vitruvius,



CAST OF CONTORNIATE OF NERO, SHOWING HYDRAULUS. (BRITISH MUSEUM.)

Story of the Organ

while in front of him is a graduated row of nineteen pipes.

There is a remarkable poem by Publilius Optatianus, about A.D. 324, consisting of twenty-six lines, each of which is one letter shorter than the next. The lines are placed perpendicularly on the page, in such a position as to represent a row of twenty-six organ pipes; below them, horizontally, are the words in large capitals,

AUGUSTO VICTORE JUVAT RATA REDDERE VOTA,

occupying the "wind-chest" portion of the instrument; and below these again is another poem, with lines placed perpendicularly and of equal length, representing the "altar" or pedestal, which contained the blowing arrangements.

The emperor Nero, who had a mania for exhibiting himself as an actor and singer in the public games, appears, towards the end of his short life, to have been attracted by the hydraulus; for Suetonius tells us that when he was being hunted to death by his enemies, he vowed that if he escaped them he would enter the public contests as a player on the hydraulus, the choriaula, and the bagpipes.

Heliogabalus (A.D. 219-222), one of the greatest scoundrels among the emperors, was a performer on the trumpet, the Asiatic pandoura, and the organ¹—*i.e.*, the hydraulus. His

¹ Gevaert, *La Mus. de l'Antiquité*, vol. ii. p. 618.

Hydraulus

successor, Alexander Severus, a good man in an age of great depravity, was a performer on the lyre, aulos, and hydraulus, and an encourager of public musical performances.

Alexander
Severus

The popularity of the hydraulus continued for many centuries. Claudian, a poet of Alexandria, who flourished about A.D. 379, praises the organist, who, with his light touch, sends forth powerful rolling sounds, and, by his wandering fingers, causes the innumerable voices which spring from the multitude of bronze pipes to sound; and who, with a beam-like lever, can rouse the struggling waters to song.¹ The reference to the multitude of pipes and the lever, or bellows handle, as large as a beam, points to a very elaborate instrument.

References
to the
Instrument

Tertullian, speaking of Ctesibius as the inventor, and Archimedes as the improver of the hydraulus, says: "Observe the extraordinary genius of Archimedes. I speak of the hydraulus. What members, what parts, what joinings, what rows of pipes, what a compendium of sounds, what an intercourse of modes, what troops of tibiæ, and all composing one great whole! That spirit, which breathes from the trouble of the waters, is administered through the parts, is solid in substance, divided in operation."²

The compass of the hydraulus must have embraced about three octaves in the first century of our era, if we

¹ Chappell, *History of Music*, p. 330.

² Hopkins and Rimbault, *History of the Organ*, p. 13.

Story of the Organ

accept the view adopted by Gevaert,¹ that one instrument was capable of "performing all the modes mentioned by *Anonymus*." The six modes are the Phrygian (C minor), Hypophrygian and Hyperlydian (G minor), Lydian (D minor), Hydraulus Hypolydian (A minor), and Hyperian (E minor). The Rev. F. W. Galpin has succeeded in constructing a half-size working model of the hydraulus, with three rows of pipes and eighteen keys, which can perform in the above six modes in the diatonic genus. A description of it will be found in Appendix B, page 210.

Two little instruments of bronze have been discovered at Pompeii bearing a strong resemblance to a diminutive organ, though they are generally classed among the Syringes or Pan pipes. They have a "case" similar to the lower part of the hydraulus shown on contorniates, on which is mounted a graduated row of pipes, nine in number in one case, eleven in the other. The blowing arrangements having been of wood and leather have entirely perished, as have the "feet" of the pipes. "*Anonymus*" mentions a wind instrument called *πτερόν*,² *i.e.*, having the form of a wing, which these instruments have; and the mathematical proportions of the pipes of one of them produce the Iastian mode, as given by Aristides.³ The *Hagiopolite*, quoted by Vincent,⁴

¹ Gevaert, *La Musique de l'Antiquité*, tom. i. pp. 229, 352, tom. ii. p. 304.

² *Anonymus*, *Scriptio de Musica*, edited by Bellermand, p. 28.

³ Aristides Quintilianus (Meibom.), p. 21.

⁴ Vincent, *MSS. du Bibliothèque du roi*, p. 264.

Roman Music

says that the Iastian mode suits the *πεπερόν*; and it seems not unlikely that these little instruments are specimens of the *πεπερόν*, and that this was a form of organ blown without the help of water. (See Appendix A.)

We have frequent allusions to musical performances under the Roman Emperors, several of whom were themselves no mean performers. Music, however, was not indigenous to Rome. The Romans, having no eminent composers or performers, imported Greek musicians to amuse them, just as England in the eighteenth century imported Italian opera composers and singers: for Greece was to the then known world, in all matters of art, especially of music, what Italy was to the civilised world two centuries ago. Greek musicians performed in the Theatre, the Odeum,¹ at Feasts, and in the Public Games; but the regulation music of the Temple,² the Entr'actes, and Funerals, seems to have been done by Roman performers. The imported performers were not usually highly paid, as were the Italian singers imported into England; on the contrary, they were slaves, and were often treated very badly. Burney shows the distinction between the Roman and the Greek attitude towards music: in the palmy days of Greece, music,

Condition
of Music
under the
Roman
Empire

¹ The Odeum was a building specially devoted to music and poetry, as distinct from the theatre, which was used for acting, and the amphitheatre, which was used for the gladiatorial combats.

² Roman temple ritual required the presence of one or more flute-players at all sacrifices.

Story of the Organ

being a liberal art, was only allowed to be cultivated by free men and by persons of birth and rank, slaves being forbidden to use it; while the Roman, having no sympathy with art, looked upon it merely as a means of amusement or aggrandisement, and treated its representatives with contempt, while he boasted of possessing them as his slaves. "Amongst the armies of slaves in the great Roman houses, slaves who were for the most part natives of countries arrived at a high civilisation, there ought never to have been a want of persons endowed with a gift for music . . . Chrysogonos, the wealthy freedman of Sylla, had so many musicians amongst his slaves that their instruments were heard from morning to night. Mæcenas had himself lulled to sleep by the soft accents of symphonies played at a short distance."¹

Such, then, was the condition of music at the time when the hydraulus flourished. Its chief charm with the Romans seems to have been its power; and for many centuries hydraulic organs appear to have been judged by the amount of noise they were capable of producing, for the Romans admired noise. At an entertainment in A.D. 284 one hundred trumpets were blown together, followed by one hundred auloi.

In A.D. 330 the seat of government was transferred to Constantinople, and the emperors formally

¹ Friedländer, *Mœurs Rom.*, quoted by Gevaert, *La Mus. de l'Antiquité*, vol. ii. p. 608.

Epigram on the Hydraulus

embraced Christianity. The public games and spectacles, however, could not be given up, for the people were not as yet ripe for so great a change; and the Christians enjoyed them as much as the pagans. Women began to act on the stage towards the end of the century, having been hitherto rigorously excluded; and the bishops inveighed against the theatre in vain. Julian endeavoured to improve the music of his time, and established schools to raise its tone. His historian complains of the existing state of things. "Libraries are buried as if in tombs. Art occupies its talents only in constructing gigantic instruments, such as hydraulic organs, lyres as big as carts, auloi, and other theatrical instruments of unusual size."¹ Julian himself is supposed to have composed an epigram, "I see reeds of a new species, the growth of another and brazen soil; such as are not agitated by our winds, but by a blast that rushes from a leathern cavern beneath their roots; while a robust mortal running with swift fingers over the concordant rulers of the pipes (*i.e.*, keys or slides) makes them, as they smoothly dance, emit melodious sounds."²

Christianity
becomes
the
Religion
of the
Roman
Emperors

Julian's
Epigram
on the
Hydraulus

¹ Gevaert, *La Mus. de l'Antiquité*, vol. ii. p. 620.

² Burney, vol. ii. p. 65. This has been taken for a pneumatic organ by some writers on account of the allusion to leathern bellows; but the hydraulus could be supplied by ordinary bellows instead of metal cylinders, as appears from a succeeding quotation.

Story of the Organ

Christianity became the state religion at Rome in A.D. 395. Paganism was officially abolished, but the public games were as much in favour as at Constantinople, and in them the hydraulus continued to take

part. "At weddings one heard drums, strings, flutes, cymbals, flageolets, the sistrum, and that instrument whose song is inspired by a brazen throat, the hydraulic organ, noisily emits sounds engendered by a bellows."¹

In the fifth century the incursions of barbarians effected what the bishops and clergy, in spite of all

their thunderings and exhortations, could not do. The Theatres and Odeons were for the most part destroyed or allowed to fall to ruin, and the performers dispersed, though at Rome and Ravenna, such was the passion of the people for entertainments, one theatre remained standing in each of these towns. That at Rome was restored in the sixth century by Theodoric, the Ostrogoth, who gave performances in it, accompanied by choruses and many instruments. His minister, Cassiodorus, describes

the hydraulus as "a tower composed of various pipes which, by the compression 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 being pressed down by the fingers of masters, produce the most pleasing and brilliant

¹ *Epithalamium Laurentii*, quoted by Gevaert, *Mus. de l'Antiquité*, vol. ii. p. 621.

Object of Water in the Hydraulus

tones.”¹ The word translated hydraulus here is *organum*.

After the death of Theodoric, in A.D. 526, the theatres at Rome and Ravenna, and any others still existing, were closed, and the players, musicians, and singers were reduced to earning their living by itinerant performances. Their descendants were the delight of the common people all through the Middle Ages, and have continued to be so to the present day, in which they are represented by the travelling circus and the street musician.

Public
Perform-
ances
abolished

The use of the water in the hydraulus was to steady the pressure of wind. It is well known that an organ pipe will rise in pitch if the pressure is slightly increased; and if the wind is forced into it, will “overblow”—that is to say, will sound an octave above its fundamental note, while still further pressure will cause the pipe to sound a twelfth or even two octaves above. It has been the object of organ-builders in all ages to find means of supplying the wind to the pipes at a constant pressure; and we shall see in the course of this history what immense difficulties they have had to overcome. The modern organ, in which water is not used, is sometimes called in historical works the

Reason
for using
Water
in the
Hydraulus

Difficulty
of regu-
lating the
supply of
Wind

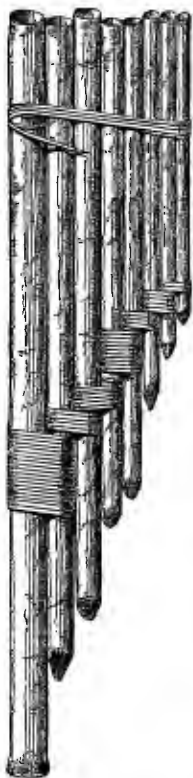
¹ Burney, vol. ii. p. 66. Sidonius Apollinaris states that Theodoric was wont to be entertained with the music of the hydraulus while he dined. (Hawkins, *History*, vol. i. p. 341.)

Story of the Organ

“Pneumatic” organ to distinguish it from the hydraulus. It is in reality a huge combination of the primitive Panpipe and Bagpipe. In the former the wind goes immediately from the lungs of the performer into the pipe; in the latter an increased supply is obtained by means of a “bag” or reservoir, and the pressure is controlled by the arm of the player; in the organ the supply of wind and the amount of pressure are enormously increased by mechanical means. When the pneumatic organ appeared is not known; and since most of the ancient allusions to the instrument called organ are found in the works of theologians, who had little or no knowledge of the subject, we are often at a loss to know whether they refer to the hydraulus or the organ proper.

It is customary in histories of the organ to allude to the references to the instrument in the Old Testament in Genesis, Job, the Psalms, etc. The word translated as “organ” in the English version is Ugab, which means any wind instrument. The German version more properly trans-

The word
Organ in
Scripture



A PANPIPE, OR SYRINX.

Derivation of the Word Organ

lates it as "Pfeife" pipe, and the performers are "Pfeifer" pipers. The instruments referred to were undoubtedly the shepherd's pipes and the bag-pipes.

The Greek word ὄργανον means a "tool, implement, instrument, for making or doing a thing."¹ Plato calls the stars the "organs of time." Æschines speaks of dice as the "organs of dice-playing." Sophocles refers to a certain wicked person as "the organ of every evil." Plato again speaks of "the organs of sense." The hand is the "organ of organs." We, like the Greeks, use the expressions, digestive organs, respiratory organs. We also speak of a newspaper as an organ, and we organise an expedition, entertainment, etc. The ancients used the word in a musical sense, speaking of the pipe as an organ, and referring to the harp as an "organ of many strings." We also use the word both for wind and stringed instruments, for we talk of an inverted harmonium, as an "American organ," and the mendicant's mechanical stringed instrument as a "piano-organ." The Latin word *Organum* means the same as the Greek. In military matters it refers to an "engine" as opposed to a "machine," which was of larger size and more complicated construction. Prudentius speaks of the tongue as the "organ of the mouth." When the Latin word was applied in the Middle Ages to the musical instrument, it was almost invariably used in

The original meaning of ὄργανον

Organum

¹ Liddell and Scott's Lexicon.

Story of the Organ

the plural, *organa*; and the player was called the *pulsator organorum*. This custom was continued in France and Spain until comparatively recently, where *Les orgues* and *Los organos* were equivalent to the expression, "Pair of organs," so frequently met with down to the end of the seventeenth century in England.¹ The word *organum* is by St. Augustine applied to any musical instrument, but particularly to that which was blown by bellows, in which connection he uses the word in the plural.

The expression "Pair of organs"

In the early Middle Ages the word *organum* was applied to a certain kind of elementary part-singing, which undoubtedly arose from the pleasure experienced by those who sounded two or more notes together on the organ, which had begun to take an important place amongst wind instruments. The mediæval meaning of the word *organum* in the singular is continued to this day in Spain, where *Canto de organo* means harmonised church music, as opposed to plainsong sung in unison; and it is curious to find that Cerone de Bergamo, a learned musical writer, in his *El Melopeo*, published in A.D. 1613, says: "Many writers have tried to find a definition of *Canto de organo*, but no one understands it." He quite forgot the ancient use of the word *organum*.

¹ Some writers have endeavoured to connect the expression, "Pair of organs," with a two-manual instrument. It is, however, a direct outcome of the mediæval custom of speaking of *organa* for the instrument, *organum* for the thing sung.

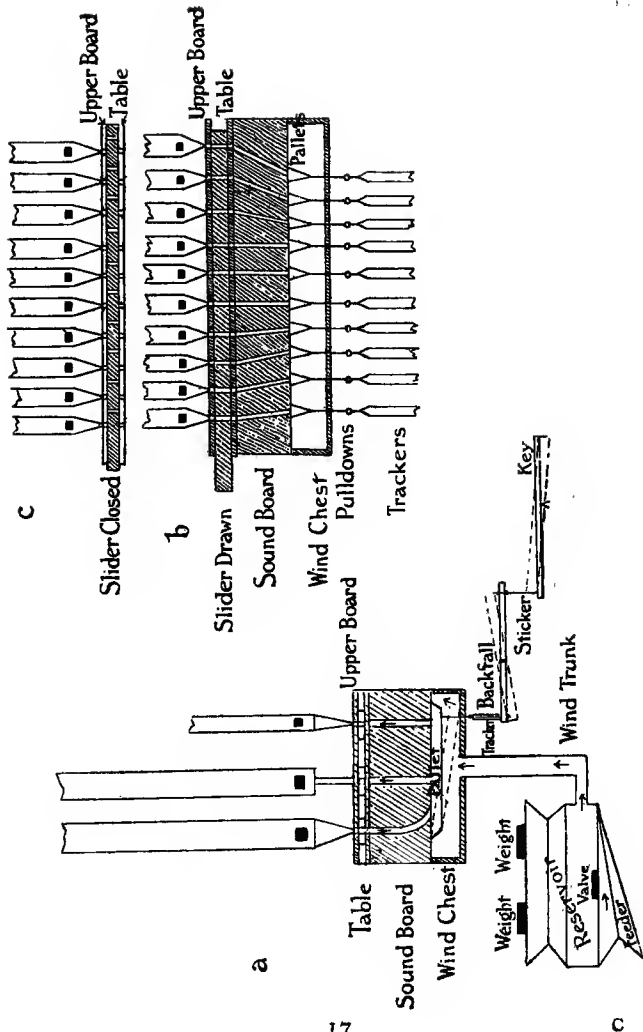


FIG. 1.—THE ESSENTIAL PARTS OF A MODERN ORGAN.

Story of the Organ

The organ is simply a series of musical pipes which are caused to sound by wind derived from bellows instead of the human lungs. As the means of blowing and controlling of the wind given off by the bellows are somewhat complicated, we give a diagram which may be of assistance to the general reader in understanding the principles involved, as well as explaining the few technical terms that must inevitably be used in the course of the book. The diagram shows only the outline of the simplest possible mechanism; descriptions of the complicated details of modern organ construction must be left to technical books, such as Hopkins and Rimbault's masterly work, *The Organ: its History and Construction*. Fig. 1 (a) shows the method of conveying the wind to the pipes by means of the organ keys. On the feeder being raised by the organ-blower, wind is forced through a valve into the reservoir, on the top of which are placed weights to ensure a proper pressure of wind. From the reservoir the wind passes by way of the wind-trunk to the wind-chest, where it is held until required. The key and the backfall rest on pivots near their centres. On the organist pressing down a key its further end is raised and causes the backfall to work on its pivot, whereby the pallet is opened and the wind rushes from the wind-chest through the canals in the sound-board to the pipes, which immediately sound, or, to use the technical expression, "speak." But since each key causes many pipes to speak at once, something

The
Principle
of the
Modern
Organ

Mechanism of the Organ

further is required to enable the organist to select the particular pipe or pipes he requires. In the Middle Ages he was unable to do this, and since often forty or more pipes were acted on by each key, the sound of a large organ was overpowering, and could not be reduced. Hence

**The
Drawstop
Action**

arose the invention of the drawstop action. Fig. 1 (b) shows a front section of part of the sound-board. On the top of the sound-board is the table, containing a slider, pierced with holes exactly corresponding with the canals in the wind-chest. By drawing one of the numerous stops on each side of the key-board, the organist causes the slider to be drawn out to such a position that the wind rushes from the open pallet through the slider to the pipe. By pushing in the stop he causes the slider to take the position shown in Fig. 1 (c), in which its holes no longer correspond with the canals and the holes in the top of the table. The wind is therefore cut off, and the pipes of that particular "stop" are silenced. Each stop is labelled with the name of its row of pipes, and usually has, in addition, the figure 16, or 8, or 4, etc. These figures refer to the pitch of the pipes, and have been used for about three centuries. It was found that the lowest pipe of a stop of the proper pitch for accompanying singing was about eight feet in length. Hence such a stop was called an eight-feet stop.

**The Pitch
of the
Stops
indicated
by figures**

It is a well-known acoustical law that any pipe of exactly half the length of a given pipe produces a

Story of the Organ

sound an octave above that of the given pipe. Hence, by adding a second row, of which the lowest pipe is four feet in length, we obtain a stop an octave higher than the first. Such a row of pipes is called a four-foot stop, and there are also two-foot stops, two octaves above the first. Again, in order to obtain depth of tone, organ-builders add sixteen-foot stops to produce the octave below, and thirty-two feet stops, which are two octaves below the chorus pitch. So that on drawing stops of 32, 16, 8, 4, and 2 feet, the organist, when playing a single chord of three notes in the middle of the instrument, causes the following enormous chord to sound:—

Ex. 1.

(a) Foundation.

Chord played.

(b) Mutation.

(Sounding with the chord played on drawing a mixture stop.)

But it was discovered very early that the sound of the organ was much improved by the introduction of pipes giving the harmonics of the fundamental notes. Hence there were added “Mutation” pipes, which changed the pitch of the sound, so that when the note C was pressed the sound G was heard in addition to C; and carrying this

Mixtures and Reeds

principle still further, the notes E and C were added above. The original pipes of 2, 4, 8, 16, 32 feet came to be called "Foundation" pipes as opposed to the "Mutation" pipes, and when a stop consisted of more than one pipe to each key it was called a "Mixture" stop.

In Example 1 (b) we give the sounds that are added by a mixture stop of three ranks of pipes, from which the lay reader will understand something of the resources at the command of the organist. It is a remarkable fact that the g^\sharp and b of the Mixture cause no unpleasantness, but simply add brilliancy to the sound.

Two classes of organ pipe are used. The ordinary pipes, which appear on the front of the organ, from their construction and tone, are called Flute or Flue pipes; the second class, in which the sound

is produced by means of a little metal tongue, are called "Reed" pipes. Their sound imitates the clarionet, oboe, trumpet, etc. They were introduced into the organ during the

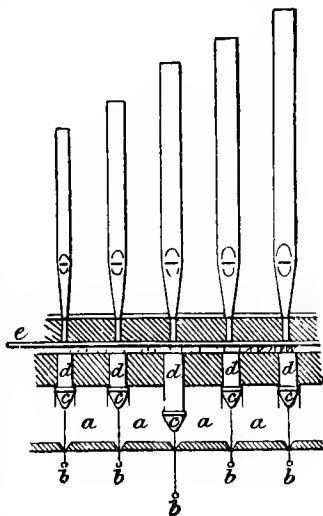


FIG. 2.—SECTION OF A SOUND-BOARD. (a) WIND-CHEST; (b) PULL-DOWNS; (c) PALLET, SHOWING PALLET PINS; (d) WIND CANALS; (e) SLIDER.

Flue and
Reed Pipes

Story of the Organ

sixteenth century, and have always held an important place in it since. They are usually placed out of sight in English organs, and their chief drawback is their liability to get out of tune with every change of temperature, and with the smallest particle of dust getting on the delicate reed.

We shall have to refer to the method of tuning in the course of the work, and this requires a few words of explanation.

**Difficulties
in tuning
an Organ**

A difficulty which has been met with in all ages, is that if fifths and thirds are made perfectly in tune the octave will be very much out of tune. All nations

have agreed that whatever may happen, the octave

must be absolutely in tune; and hence has arisen a question of what to do with the fifths and thirds, since they must be out of tune. Two systems have been used: the first, in which certain selected fifths and thirds were tuned perfectly, the rest being horribly out of tune.

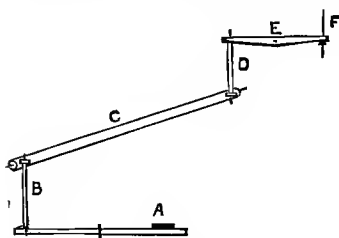


FIG. 3.—ROLLER ACTION FOR CARRYING THE MOVEMENT OF A KEY TO A DISTANT PIPE.

The Key A on being depressed raises the sticker B, which turns the roller C on its axis, and raises the second sticker D, whose motion is communicated by the backfall E to the tracker F.

This was called unequal

temperament, and only allowed of the use of a few keys, while transposition into keys with many sharps or flats was out of the question. It was proposed, therefore, while tuning the octaves perfectly, to throw

Temperament

all the other notes equally out of tune. By this means the error, being distributed over the whole scale, instead of being concentrated on part of it, is imperceptible, and all the keys are available. This system of tuning was called "equal temperament," and is universal at the present day. It was opposed for many centuries, partly through prejudice, but chiefly perhaps because of its extreme difficulty of attainment; in fact, we have good authority for saying that perfect equal temperament has never yet been, and never will be, attained; and the best tuner is he who can bring all the intervals of the organ or piano except the octaves as nearly as possible *equally out of tune*.

With these few words of explanation we return to the history of the organ.

CHAPTER II.

The Christians and Pagans in the fourth and fifth centuries—Ambrose, Bishop of Milan, objects to instrumental music—The *Hydraulus* objected to—Loss of documents relating to music—The Christians introduce Roman secular music into the ritual—Hymns accompanied by the lyre—The *Pneumatic Organ* probably first used at Constantinople—Its introduction to the west of Europe—Pepin's organ—Anglo-Saxon organs—Mention of organs by various writers—Vitalian—The vocal *organum*—Introduction of the mixture or *locatio* into the organ—A gigantic organ at Winchester—The organ introduced into the churches of Italy—Mediæval organ-builders—Dunstan—Wheels with bells in churches—Pope Sylvester II. as an organ-builder—Chaucer's references to the organ—Legend of St. Cecilia—References to organs in mediæval poetry—Portative and Positive organs—Origin of the term Keyboard—Small organs placed on pillars—The compass of the earliest keyboards—Introduction of Stops or Registers—The invention of the Pedal—Increase in the number of clavier, and their compass—The “coarse roar and deep growling” of mediæval organs—Gradual reduction in the size of the keys—The organ did not always accompany the voices.

THE fourth century of our era saw a notable decline in the cultivation of music. The Greek language began to cease being used at Rome, and the Christians, who at first seem to have employed it for their liturgy, now confined themselves to Latin, retaining only one Greek expression, *Kyrie eleison*, in the

Objections to the Hydraulus

ritual.¹ In the fifth century Christianity had become the religion of the State, and at this time Christians and pagans were living peacefully together; the former had not begun their austerities, were tolerant, and still held to their old ways of living, and their own pleasures.

Ambrose, Bishop of Milan, at the end of the fourth century, began to object to too much music—especially to concerts of wind instruments, since these were used in pagan rites; while he allowed the use of the kithara as long as it was not connected with licentious poetry.

**Ambrose
objects to
the use of
Instru-
ments**

About A.D. 454 there arose a prejudice against the hydraulic organ, the singing of choruses under professional direction, exhibitions of instrumental display. Sidonius Apollinaris, afterwards Bishop of Clermont, praises Theodoric II. that he has banished these things from his palace, while he allowed the delightful and simple music of song, accompanied by stringed instruments, which raises the mind at the same time that it charms the ear.² Under the Gothic domination, Rome possessed capable kitharædists, and Boethius left many pieces of verse in his *Consolations of Philosophy* intended to be sung to the kithara.

**The
Hydraulus
objected to**

After the middle of the sixth century we have no records of secular music for five centuries, owing to the

¹ Gevaert, *La Mus. de l'Ant.*, vol. iii. p. 55.

² *Ibid.*, p. 59.

Story of the Organ

loss of documents; but there seems little doubt that professional musicians continued all through this time to cultivate the kithara, the dance,¹ and the aulos; for an anonymous writer of the tenth century, edited by Gerbert (*Scriptores*, vol. i. p. 213), endeavours to shame the church singers by drawing their attention to the rules of art, which professional performers observed merely in order to please their audience; asking whether it is right to sing the words of God, the sacred melodies, without art, without trouble?

The games and worship of Paganism had completely disappeared by the end of the sixth century, and the leaders of the Christians were busily occupied in making rules of conduct, in settling theological questions, and in constructing their ritual, in which music occupied a large place, as it has done in nearly all forms of worship. Since it had been found impossible to invent a new form of music to take a place in the service, adaptations were made of sacred words to the melodies in popular use amongst the Romans: by this means the propaganda was carried on, and music was obtained for ritual purposes.²

The hymns were undoubtedly at first accompanied by the lyre and kithara. Clemens Alexandrinus says: "Though we no longer worship God with the clamour of military instruments, such as the trumpet, drum,

¹ Gevaert, *La Mus. de l'Ant.*, vol. iii. pp. 60, 61.

² Gevaert, *La Melopée antique*, p. 63.

Pneumatic Organ

and fife, but with peaceful words, this is our most delightful festivity; and if you are able to accompany your voices with the lyre or kithara, you shall incur no censure.”¹

Cassiodorus asks Boethius to appoint a competent kitharædist for Clovis. Eusebius says: “They sing to His name, not only with the voice, but upon an instrument of ten strings, and upon the kithara.”²

Constantinople now became the nursery of such remains of art as were left after barbaric incursions, and the Pneumatic Organ seems to have been first used there. That it accompanied the singing of the church services, however, was scarcely probable: it seems at first to have been looked upon as a curiosity, and may have been sounded before and after service like the bells, as a means of attracting the congregation. Or it may be that the church, being the largest building in a town, now that theatres were destroyed, was the only place that contained space for so large an instrument.

The
Pneumatic
Organ

That the pneumatic organ was not unknown in the West in the fifth century is probable from a passage in Augustine’s commentary on Psalm lvi., where he says: “All musical instruments are called organs. Not only that is called organ which is blown by bellows, but also whatever is fit for music and has a bodily form” (*i.e.*, is not the human voice).

The Emperor Copronymus VI. of Constantinople sent an organ as a present to Pepin, the father of Charle-

¹ Burney, *History of Music*, vol. ii. p. 26.

² *Ibid.*

Story of the Organ

magne, in A.D. 757, which was placed in the church of St. Corneille at Compiègne, there being no organs in France at the time. No one mentions how it was employed, whether to accompany the singing, or merely played as a curiosity to attract the congregation. Aldhelm, who died in 709, refers to the gilding of organ cases by the Anglo-Saxons.¹ The passage is:—

“Maxima millenis auscultans organa flabris,
Mulceat auditum ventosis follibus iste
Quamlibet auratis fulgescant cœtera capsis.”

“Hearing the enormous organs with a thousand blasts, the ear is soothed by the windy bellows, while the other portions (of the organ) shine in the golden cases.”

The organ seems to have penetrated to Ireland at a very early period in its history, under the name of “oircin.” According to the Annals of Ulster, the organ in the Church of Clooncruff, Co. Roscommon, was destroyed by fire in A.D. 814.²

Organs early became very large and unwieldy, noise being their chief characteristic. The writer of an epistle to Dardanus (ascribed to St. Jerome, but of doubtful authenticity) describes an organ having twelve pairs of bellows, fifteen pipes, a wind reservoir of two elephant hides, yielding a sound as loud as thunder, which might be heard at a thousand paces. But since he goes on to make theological deductions from this instrument, it was probably imaginary. He sees in the two elephant

¹ Sharon Turner, *History of the Anglo-Saxons*, vol. iii. p. 457. †

² Communicated by Mr. W. H. Grattan Flood, M.R.I.A.

Pope Vitalian

hides the Old and New Testaments, in the fifteen pipes the patriarchs and prophets, and in the twelve bellows the twelve apostles.

Jerome describes an organ, said to have existed at Jerusalem, which could be heard at the Mount of Olives; but these old writers cannot be trusted, for they took every traveller's tale as authentic. It is possible that such instruments existed, but the descriptions are too vague and too mixed with theological dreamings to be entirely accepted.

As to the introduction of the organ into the church, Platina remarks: "But Vitalianus, being intent upon sacred things, composed ecclesiastical canons, and regulated singing in the church, introducing organs to be used with the vocal music."¹ Vitalian reigned from about A.D. 683 to 697. Pretorius thinks that he only approved and confirmed the use of organs.

The Organ introduced into the Church by Vitalian

The possibility of sounding two or even three notes at once gave rise, as we have seen, to a combination of melodies called, from the instrument which suggested it, *organum*, the instrument itself being usually described in the plural (though not always) *organa*. The organum consisted of the singing of the melody of the Plainsong in fourths, fifths, and octaves; it was the precursor of modern harmony. Ortiqve therefore calls the organ the "Creator of Harmony."²

The Vocal Organum

¹ Platina, *Lives of the Popes*, translated by Rycault.

² G. Marcuzzi, *Cenni Storico-artistici sull' organo*, p. 15.

Story of the Organ

The vocal organum gave in its turn a new development to the instrument. If it was possible to play two melodies at once with the two hands, always at an interval of a fourth or fifth, it was equally possible to give two pipes to each key, one at a fourth or fifth above the other; or three pipes, one at a fifth, the other at an octave above the first; and the number could be increased *ad libitum*. The new invention was called *locatio*, or mixture, from the mixing of sounds, and it still remains in the mixture stop of the modern organ, in which two or more pipes of different lengths are given to each key.

The invention of the mixture seems to have pleased the congregation immensely, and organs having a great number of pipes to each key were built. Thus we read that in A.D. 951 Bishop Elphege caused to be built in Winchester Abbey a gigantic organ, which is described in a Latin poem by Wolstan, a Benedictine monk and singer in that church. From him we gather that it had four hundred pipes, twenty-six bellows, of which twelve were above and fourteen below; that it required seventy strong men to blow it, who sweated uncommonly, and encouraged each other to fortitude and endurance while they ceaselessly raised their arms. The organ required two organists, each of whom managed his own "alphabet." The word alphabet in this connection comes from the monochord, which was provided with alphabetical letters to show the various positions at

Gigantic Organ at Winchester

which the movable bridge must be placed to produce the required sounds. Hence notes became named by letters in place of the clumsy old Greek nomenclature; and the keys of the organ, as sounding these notes, were named by letters of the alphabet, as they are to this day. There were either two separate keyboards or a continuous keyboard, containing two octaves of notes. We are told that the instrument contained the seven degrees of the scale; mixed with the lyric semitone, our B flat. There were forty tongues or keys, each of which controlled ten pipes, and were opened or closed as required by the organists. Stops were not invented till many centuries later, so that all the ten pipes spoke at once; in technical language, nothing less than the "full organ" could be used. "Like thunder the iron tones batter the ear, so that it may receive no sound but that alone. To such an amount does it reverberate, echoing in every direction, that every one stops with his hand his gaping ears, being in nowise able to draw near and bear the sound, which so many combinations produce. The music is heard throughout the town, and the flying fame thereof is gone out over the whole country. This honourable church has your care, dedicated to the Ruler of the Thunder, and built in honour of the key-bearing St. Peter."¹ Such an organ could scarcely be used to accompany the singing.

In the ninth century the best organs were made by French and German builders. Pope John VIII., who

¹ The poem, with an excellent translation, is given in Hopkins and Rimbault, *History of the Organ*, pp. 20, 21.

Story of the Organ

reigned from A.D. 872 to 882, asked Anno, Bishop of Friesingen, in Bavaria, to send him the best possible organ, with a builder who should also be able to perform everything required, and teach the Romans how to perform.¹ This was probably the first organ used in the churches of Rome; but from this time the art of organ-building spread from Rome through Italy, the monks becoming clever builders.

**French
and
German
builders**

The organ-builder was, as a rule, also the organ-player in the Middle Ages; and this, while it caused considerable variety in methods of building, had the advantage of giving rise to various improvements suggested by the experience derived from the combination of player and builder in one man. The custom was continued all through the Middle Ages.

**Organ
builders
and
players**

In A.D. 826, Ludwig the Pious caused a hydraulic organ to be built in his palace at Aix-la-Chapelle by a Venetian priest named George. The instrument is said by Eginhard to have been constructed with "wonderful art," and it is elsewhere said that it was made in the Greek manner; it was therefore a copy of hydraulis which were still in use at Constantinople. This organ was so ravishing that a woman lost her life from the transports of delight it caused; it could imitate thunder, the lyre, and the cymbal, for the hydraulus, like the modern organ, had different

**A hydraulus
built
at Aix-la-
Chapelle**

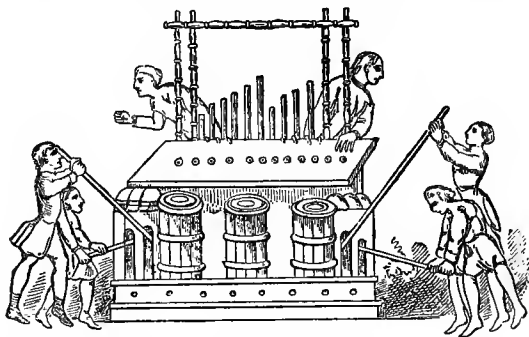
¹ Bedos de Celles, *L'art du Facteur d'orgues*, p. x.

British Organs

“stops,”¹ though the knowledge of them was lost when it had disappeared, and the early pneumatic organs had no means of shutting off the various ranks of pipes at will.

Britain was not behind-hand in organ-building in the tenth century. We read that St. Dunstan, who died in A.D. 988, built and gave an organ with brass pipes to the Church of Malmesbury. William of Malmesbury relates that Dunstan made many great bells and organs for churches in the west of Britain. These instruments seem to have all

**British
Organs**



A MEDIÆVAL HYDRAULUS.

From the MS. Psalter of Edwin at Trinity College, Cambridge, showing three water-tanks, and two sets of pipes, to which wind was probably admitted by some kind of sliding key.

had brass pipes “through which the troubled bellows poured forth music into the receptive ears.”

Dunstan could also draw and paint patterns for a

¹ See Appendix B.

Story of the Organ

lady's dress, besides being a smith and metal worker. It was exacted by law that the clergy should pursue occupations of this kind; and Dunstan's friend, Bishop Ethelwolf, made wheels full of small bells, **Belled wheels in churches** to be turned round on feast-days. These wheels were frequently found in churches, and are depicted and described by Kircher in his *Musurgia*; for mediæval congregations seem to have been easily pleased by any kind of noise. About the same time Count Elwin presented to the Convent of Ramsey an organ of spiral form, the copper pipes of which cost £30, and which "on feast-days emitted a sweet melody, and a clangour resounding a long way."

Sharon Turner¹ relates a graceful anecdote of King Canute, which is worth referring to, though the organ is not mentioned. The king was approaching Ely by water while the monks were at their devotions, and so pleased was he with the melody they sang, that he ordered the rowers to move more gently through the water that he might hear the music. He afterwards wrote a poem on the occasion, of which unfortunately only the first stanza has come down to us.

For several centuries the art of organ building and playing was almost entirely in the hands of monks and priests. Gerbertus Latro, afterwards Pope Sylvester II., who died in A.D. 1003, was an organ-builder. During the time that he was Abbot of Bobbio, Gerald, Abbot of Aurillac,

¹ *History of England*, vol. iii. p. 460.

Early Organs

begged of him an organ, which Gerbertus was to send as soon as the war was over. But by this time Gerald was no longer Abbot of Aurillac, and his successor was unable to receive the organ "and the monk belonging to it," since he had to accompany his empress to Saxony.

Sylvester made an organ that was played by "warm water";¹ this was of course the hydraulus, the bubbling of whose water is often referred to as "boiling," "agitated," etc., though Ritter suggests that it may have been a steam whistle organ. Baldrik, Archbishop of Dol (died A.D. 1131), writes: "I have seen at Fécamp a musical instrument of brazen pipes, which, when blown with smiths' bellows, produces agreeable melody. They call it an organ, and it is played at certain times."² In a missal of the tenth or eleventh century, seen by Burney in the Barberini Collection at Rome,³ there is a note in the Song of the Three Children, *Hic canere incipit clericus cum organis* (Here the priest begins to sing with the organ).

An organ was used at the dedication of the Monastic Church of La Cava, near Naples, between A.D. 1088 and 1099; and there was an organ at the Church of Meaux in 1221.⁴ There was an organ in Canterbury Cathedral in 1114. Burney⁵ quotes the following passages from Chaucer, as showing the general use of the organ in his day:—

References
to the
Organ
in the
writings of
Chaucer

¹ Hawkins, *History of Music*, vol. i. p. 403.

² *Ambrosi Gesch.*, ii.

³ Burney, *History of Music*, vol. ii. p. 67.

⁴ Bedos de Celles, p. 18.

⁵ *Hist.*, vol. ii. p. 376.

Story of the Organ

“His vois was merrier than the mery orgon
On masse days that in the churches gon.”

Again, in the Second Nonne's tale, he says, referring to St. Cecilia—

“And while that organs maden melody
To God alone thus in hire hert song she.”

How the tradition which refers to St. Cecilia as the inventress or patroness of the organ arose is not known. In the story of her life there is no reference to music. She is said to have been the wife of one Valerian, whom she converted to Christianity, and who was baptised by Pope Urban (A.D. 223-230). By preaching she converted four hundred others, and was then condemned to be suffocated in the baths. She was shut up in them for a night and a day, and the fires were heated to the utmost degree, but through miraculous agency she continued alive and well. The executioner was then sent to cut off her head, which he was unable to do after three attempts, though he left her bleeding, and she lived for three days in this condition, during which she preached to, and prayed with, the crowds that came to collect her blood. On her death she was buried by Pope Urban and his deacons. The Rev. S. Baring-Gould, from whose *Lives of the Saints* the above account is taken, shows from historical sources that the story of St. Cecilia's persecution is very improbable, and makes the remark that she is regarded as the patroness

St. Cecilia

of music, and is represented in art with an organ or organ pipes in her hand, though he says nothing as to the origin of the tradition.

The Church of St. Cecilia, which stands in the Trastevere quarter at Rome, is said to have been originally her house and to have been consecrated as a church by Urban. One of the chapels, which contains remains of heating apparatus and lead pipes, is an ancient bathroom, and is said to have been the bathroom of the saint; and it is possible that the existence of this bath in her reputed house gave rise



A PORTATIVE AND LUTE.

to the legend of the effort to suffocate her. Curiously enough, though the church is rich in fine mosaics, statues and pictures, there is no representation of the saint in connection with the organ or music.

It would seem that the use of the organ was, in mediæval times, confined to certain seasons; and when we take into consideration the army of blowers, and the two organists required, it is quite comprehensible that the instrument was not used for ordinary services.

In the poems of the King of Navarre, written about A.D. 1220, there are given lists of instruments used in

Story of the Organ

the orchestra of that day, amongst which are *orgues*; and in a poem by the archpriest of Hita, Juan Ruiz, about A.D. 1350, the expression, "Los organos, que dicen canzonetas y motete," shows that the Spanish organs at any rate were sufficiently advanced in construction to play motets and canzonets. This was not universally the case. As a rule, their rôle was confined to playing the Plainsong melody in unison with the congregation or the body of priests; or, when the organum was invented, two organists were employed to play the melody and its accompanying fifths or octaves.

References to the use of Organs

The function of the Organ in mediæval times

The organ appears to have been at first placed in the neighbourhood of the choir, but when increased in size, it was removed to the west end of the church.¹ But when the main organ, or, as we should say, great organ, was enlarged, a new invention came into use, called in Italian *Ninfale*, in other languages *Portative*.

Portative Organs

This was a small organ, of which representations are found in many ancient manuscripts; it was hung round the player's neck, who worked the bellows with one hand and played on the keys with the fingers of the other—for the keys were small enough to be played with the fingers. Sometimes it is represented as resting on the knees of a sitting figure; at other times the player is standing or kneeling; the instrument was occasionally placed in a cart and blown by a second person. *Portatives* were

¹ Ambros, *Geschichte der Musik*, ii. 207.

Portatives

used in processions, and appear in pictures and statuary as members of the orchestra. Representations of them are found in Beverley Minster, in Melrose Abbey, in Exeter Cathedral,

in many mediæval paintings. In the Minstrels' Gallery at Exeter Cathedral, which dates from the thirteenth century, the eighth figure from the left is playing on a portative. In some manuscripts the portative has the form of a little organ with a series of pipes, concluding with two or more considerably longer than the rest enclosed in a little tower with a cross at the top, like a church tower. These were probably "drones" giving a perpetual bass note, as in the bagpipe. The small length of the pipes caused the pitch to be very high. The well-known picture of St. Cecilia by Raphael represents the saint with a portative in her hands. No



A PORTATIVE, OR NINFALE. (BRITISH MUSEUM
ADD. MSS. 18,192, F. 19.)

more are known. These were probably "drones" giving a perpetual bass note, as in the bagpipe. The small length of the pipes caused the pitch to be very high. The well-known picture of St. Cecilia by Raphael represents the saint with a portative in her hands. No

Story of the Organ

example of the portative is known to exist, though reproductions of it are found in some museums.¹

Another form of organ which became universal in the Middle Ages was the Positive, so called because it was "placed" in a certain position to be played, though it could be moved when required. This was larger than the portative, but smaller than the church instrument called *organa*.

Positive
Organs

The positive is also figured in paintings, and many examples still exist. It was sometimes of circular form, and is thus depicted in the picture of the Madonna and Child by Cosimo Tura in the National Gallery. The positive is still used in Italian churches, where it is generally on wheels, and can be moved to any required position. In course of time it became incorporated into the organ proper, and provided with



A PORTATIVE.

its own keyboard; in England it took the name of Choir organ, while retaining its name Positiv and

¹ "Item, I will that my payre of Portatives being in my chapel in the Palace of London, mine organs, also being and standing in my chapels within my three manors of Fulham, Hadham, and Wykeham, shall there stand still and remain to my successor, next Bishop of London, that they may be used there to the honour and glory of God." —From the will of Richard Fitz James, Bishop of London, proved in 1522. Quoted in Dr. Hopkins's paper on "The English Medieval Church Organ," *Arch. Journal*, 1888.

Mediæval Organs

Positif in Germany and France respectively. By the thirteenth century, then, there were three kinds of wind instruments in use of the same nature—one, which was large and clumsy, called the Organ, and two, more manageable, called Positive and Portative. The positive was also adapted for the cells of monasteries and the castles of the great, and in this connection is called by Ritter¹ the house organ.

The organ proper, used to accompany the congregation, continued for many centuries in a very primitive condition. It required a large number of men to blow, was always getting out of order, and was played with the clenched fist or the elbows. The keys were six inches broad, and required great force on the part of the *pulsator organorum* ("striker of the organs").²

¹ *Geschichte des Orgelspiels*. Leipsic, 1884.

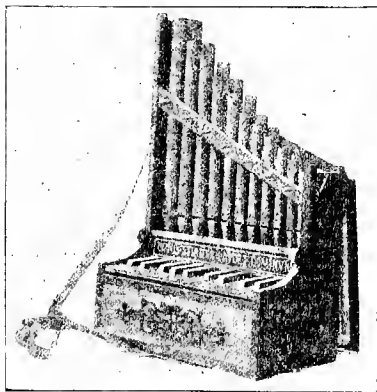
² In Buræy's *Present State of Music in Germany*, 1773, vol. i. p. 14, there is a description of a performance on the carillon at Ghent, which must have been much like mediæval organ-playing. "The carillonneur was literally *at work*, and *hard work* indeed it must be; he was in his shirt, with the collar unbuttoned, and in a violent sweat. There are pedals communicating with the great bells, upon which with his feet he played the bass to several sprightly and rather difficult airs, performed with the two hands upon the upper species of keys. These keys are projecting sticks, wide enough asunder to be struck with violence and velocity by either of the two hands edgeways, without the danger of hitting the neighbouring keys. The player has a thick leather covering for the little finger of each hand, otherwise it would be impossible for him to support the pain which the violence of the stroke necessary to be given to each key, in order to its being distinctly heard throughout a very large town, requires."

Story of the Organ

Zarlino, in his *Istitutioni armoniche*, published in A.D. 1558, gives the following interesting account of the origin of the terms key and keyboard:—"The word key, key-board, clavier, is derived from the alphabetical letters, which were introduced in the ninth and tenth centuries, and definitely settled by Guido Aretino in the eleventh century, to take the place of the old Greek names of notes. When the musical staff or stave, consisting of

Origin of
the terms
Key, Key-
board

lines and spaces, was invented, it became necessary to place one or more alphabetical letters at its beginning, to show what notes were intended to be represented. These letters were called by the old writers *claves*, French *clefs*, English *keys*, since they unlocked the secrets of the stave, and gave, as it were, a key to all its notes."



PORTATIVE (GALPIN COLLECTION).

"In like manner the letters were written on the projecting tongues of the organ, thus becoming 'keys' by which the knowledge of the particular note of each tongue was known to the organist. The key letter being written on the tongue, it became convenient to

Clavier

call the tongue itself a key, *clavis*, and the row of tongues a *clavier*."

Though the Portative and Positive soon obtained a more or less complete chromatic keyboard, of a size and touch convenient to be played by the fingers, the organ, being used only as an accompaniment to plain-song, had for centuries only the notes of the monochord; and its keyboard was of very limited compass.

We must here digress for a moment to explain that the alphabetical systems of naming the keys of the organ in vogue at present are many and various. **Alphabetical** English, German, and French organ-builders **cal No-** all use different systems, so that only by **menclature** the context can the reader learn exactly to **of Organ** which octave the letters refer. **Keys**

For convenience we shall use in this work the lettering described in Stainer and Barrett's *Dictionary of Musical Terms*, as that now generally adopted,¹ though it is not the method of English organ-builders.

C, D, E, F, G, A, B, C D E F G A B c d e f g a b
Great Octave. Small Octave.

c' d' e' f' g' a' b' c'' d'' e'' f'' g'' a'' b'' c''' d''' e''' f''' g''' a''' b'''
Once-accented Octave. Twice-accented Octave. Thrice-accented Octave.

¹ Page 355, Art. "Pitch."

Story of the Organ

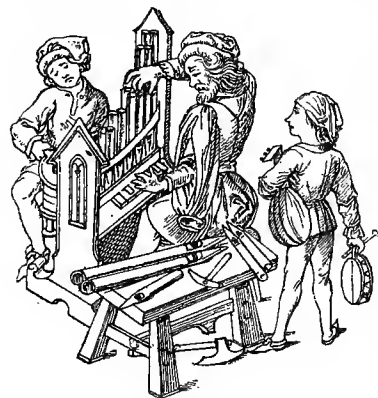
The monochord contained *b* flat in addition to *b* natural; all other "black" keys were called *Musica ficta* or *Musica falsa*, and as such were not admitted on the early organs. Pretorius¹ says that E flat was undoubtedly

Small Church Organs

the first semitone added. He describes some of the earliest church organs as very small, being placed on a pillar, or high above the choir, like swallows' nests. These were probably positives: their compass was very limited, though their tone was sharp, powerful, and screaming.

The "swallow's nest" organs are still to be seen in

Italy. In the large church of San Antonio at Padua there are four little organs on the four corner pillars of the choir, and between the pillars are four choir lofts. In 1892 the writer, in passing through Padua, happened to find a service going on in this church. One of the organs was being used to accom-



TUNING A POSITIVE.

pany a double choir of men's voices, the two choirs being placed in two of the choir lofts, opposite the instrument that accompanied them.

¹ *Synlagma*, vol. ii. p. 108.



AN EARLY POSITIVE, SHOWING BROAD KEYS WITHOUT SEMITONES. BRITISH MUSEUM ADD. MSS. 29,902, F. 6.

Locatio

Taking the Greek tetrachords as a guide, the builders made their keyboard to consist of *B, c, d, e, f, g, a, bb, b, c', d', e', f', g', a'*, but in some cases the lowest B was omitted. Others consisted of *B, c, d, e, f, g, a, bb, b, c', d', e'*. In the great organs the disposition of the keys seems to have been much the same, the semitones being only added by degrees. Stops were not introduced till the end of the fifteenth century, and the organs were increased in size by adding innumerable pipes behind the chief row, which was in front and answered to our Open Diapason. This row of pipes was called in Germany Prestant, since it stood before the others, and in French Montre, for the same reason (see this word in Appendix D); behind it was the Locatio or Mixture, called in Germany Nachsatz, a name preserved in the stop now called Nasat or Nasard. What the tone of these instruments was like any organist can imagine from their description by Pretorius. The largest diapason pipe, sounding B natural, was 31 feet long and $1\frac{3}{4}$ ell in circumference, being therefore of 32 feet tone. To this was joined a diapason of 16 feet tone, behind which were

Compass
of
Keyboards

Increase in
the size of
Organs

Two pipes of 8 feet tone.

Three or four of 4 ,, ,,

Four or five of 3 ,, ,, giving a 5th above
the 4 feet pipes.

Six of 2 ,, ,,

Seven of $1\frac{1}{2}$,, ,, (a 5th above the 2 feet).

Eight of 1 ,, ,,

Ten of $\frac{1}{2}$,, ,,

Story of the Organ

making an enormous mixture of some forty ranks of pipes. The blowing arrangements of this fearful engine being very imperfect, the intonation must have been equally defective; and by constant renovations and tunings, their pitch was gradually raised, till it became sometimes as much as a fourth higher than the ordinary pitch of other instruments. Pretorius says that these old organs were good for chorales and for bawling.

During the early years of the fifteenth century the "Spring box" was invented in the Netherlands. By

Stops

Invented

this means the wind could be cut off from any row of pipes at will, and the series of spring boxes under the pipes were opened and closed by an iron lever in the side of the organ, called a register, which was pushed to the right or left, raised or lowered. The organist was at once placed in control of his instrument, and could reduce or increase its power at will by admitting the wind to as many series of pipes as he required. The "Spring-lade" continued to be used in Germany and the Netherlands for centuries, and, as far as we know, is still in use on some organs in Holland.

Shortly afterwards the slider action was invented, or rather rediscovered, for it had been used in the hydraulic organs, and is fully described by Hero and Vitruvius, but the secret seems to have been lost. Its principle has been explained in Chapter I. The advantage of the spring box was that if any single portion got out of order it affected its own pipe alone and not the whole series, and it could easily be got at

Improvements in the Organ

for repair. The disadvantage, however, was that unless it was made with the utmost nicety, which was seldom the case, it gave a great deal of trouble, since it easily got out of order. The advantage of the slider (which was also controlled by an iron lever) was that it was far easier to make, but it was impossible (and is so to-day) to make it absolutely air-tight; the wind could find its way from one pipe to another, the weight of the pipe pressing on it frequently made it hard to draw in and out, and in damp weather the wood was liable to swell, in which case it would be unworkable. Moreover, if it was out of order, a whole row of pipes would be thrown out of gear. But since it is far less liable to derangement than the delicate spring box, it has been adopted for all modern organs, and the spring-box system has practically disappeared.

The fifteenth century was prolific in improvements in the organ. In addition to the invention of registers, the series of pipes called Principal, or Prestant, or in English Open diapason, was given a separate keyboard, the locatio or mixture being acted on by a second clavier; and in addition a third clavier was added for the feet, called Pedal clavier or Pedale, the other keyboards being now called Manual claviers, or simply manuals. A fourth clavier was sometimes added, which seems at first to have been played by the knees. Thus chords of four notes could be played: two notes with the right and left fists, one with the knees, and one with the foot; but the labour of playing must have been very great.

**Separate
Keyboards
introduced**

Story of the Organ

The pedal clavier seems to have been sometimes attached to the principal clavier by ropes or wires ;
The Pedal but in many cases it had its own set of pipes, and in repairing the ancient organ of Beeskow, near Frankfort, two pipes bearing the date A.D. 1438 were discovered, of such a size and tone as could only have been used with pedals.

R. Schlecte¹ quotes a passage from a Flemish chronicle of A.D. 1319 to 1350, which seems to indicate that pedals were invented by Ludwig van Vaelbeke, of Brabant, who died in A.D. 1312. “Van Vaelbeke in Brabant. Hy was d'eerste die wan, van stampien die manieren die men noch hoet antieren” (Van Vaelbeke in Brabant. He was the first who mentions treading in the manner that men nowadays practise).

The leather of the bellows took its own folds, and the friction of opening and closing in the same places caused it to be constantly out of repair, and as the amount of leather required was very great, the cost of the bellows alone must have been a heavy charge on churches. Dr. Rimbault, in his History,² quotes from several ancient church account books. At Ely the precentor's account for making the organ in A.D. 1407 has the following items :—“4 white horses' hides for 4 pairs of bellows, 7s. 8d. ; the carpenter, 8 days making the bellows, 2s. 8d.” In A.D. 1399 the authorities of York Minster paid 46s. 8d. for constructing two pairs of bellows, and

¹ *Geschichte der Kirchen Musik*, 1871, p. 103.

² Hopkins and Rimbault, *The Organ*, pp. 48, etc.

Pedals

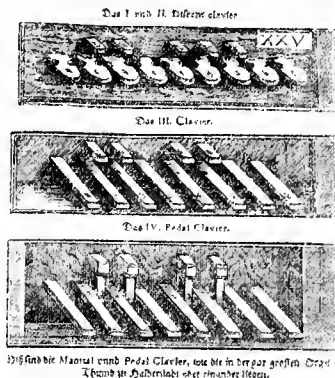
in 1419 12d. for ribs for the same. In 1457 a new pair of bellows was required, and in 1469 two new pairs.

The organ at Halberstadt, built in 1361, had a pedal board with its own pipes. In 1419 the organ of St. Salvator at Venice had

a pedal board of twelve keys, beginning on B natural. Heinrich Traxdorf built an organ with a pedal of fourteen keys, beginning on A, at St. Sebald, Nuremberg, in 1470, and another in the Liebfrauenkirche, which is distinguished as having no pedals. It is curious that Pre-

torius, in spite of having given particulars of several of the above organs, relates

that the pedal was "invented" by Bernhard the German, organist of St. Mark's at Venice, who in 1470 added pedals to his organ, which pulled down the keys of the manual clavier by means of ropes or wires, and that the credit of their invention has been given to Bernhard by succeeding historians, who have overlooked Pretorius's error.



MANUAL AND PEDAL KEYBOARDS OF THE HALBERSTADT ORGAN, 1361. (FROM PRETORIUS.)

The middle keyboard was probably played with the knees. Observe the alphabetical letters called "claves," which were the "keys" to unlock sounds required for use.

Story of the Organ

By 1470 the pedal, so far from being a new invention, was almost a necessary department of German and Dutch organs, its absence being specially noticed when it occurred; and the use of two claviers, one for the fists, the other for the feet, had suggested the addition of a second manual clavier. Each manual had its own arrangement of keys, and the playing must have been complicated and nearly impossible to the stranger; but as the builder and player were frequently the same person, the first organist would have no difficulty with

the keyboards he himself invented. Pretorius gives interesting engravings and descriptions of the great organ still existing at Halberstadt in his day. The first or Discant keyboard, which acted on the front open diapason and its mixture, consisted of these notes, arranged as in our keyboard, but intended for the fists:—

$c^{\sharp} \ d^{\sharp} \ f^{\sharp} \ g^{\sharp} \ a^{\sharp} \ c' \ d' \ e' \ f' \ g' \ a''$
B c d e f g a b c' d' e' f' g' a''

The second clavier, also called Discant, was similar to the first. It acted on one row of pipes alone, an open diapason.

The third was a bass clavier, and was placed below the other two in such a position that it could, if necessary, be played with the knees. It acted on the largest bass pipes, placed in Side Towers,¹ and consisted of

¹ The face of an organ is called the Front, in German, *Prospekt*; if its pipes are arranged in semicircular groups by the sides or on the Front, the groups are called Side, or Central, Towers. Groups of

Halberstadt Organ

c# d# f# g# a#
B c d e f g a b c

The fourth and lowest was the pedal clavier, consisting of

C# D# F# G#
B C D E F G A B

It will be observed that it had no B flat (A#). Pretorius says that the pedal was used with the full magnificence of the first discant clavier, so that it probably pulled down the notes of the first manual. The use of these four keyboards, our author says, is to make differences in the tone produced, so that the right fist can play the melody on the second manual, the left fist (or knee) the bass on the third; this produces a soft effect. But for powerful effects the right fist can be used on the first manual, the accompaniment being played with the feet; or a trio can be played.

The upper portion of the first discant manual had as many as 56 pipes to each key, decreasing to 43 and 32 as the scale descended; while the part acted on by the pedal had 24, 20, and 16 pipes; "but all was of coarse mixture. This is evident from the size of the prestant pipes, and from the small compass of their clavier, which did not extend high enough for beauty, but produced a deep, coarse roar, and fearful growling,

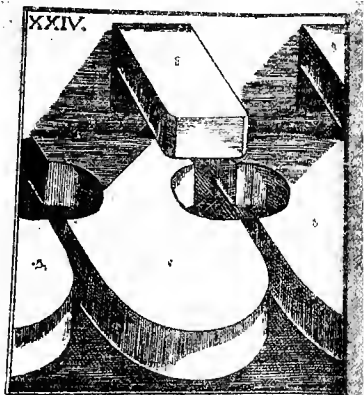
**Pretorius's
 Opinion of
 the Tone of
 Ancient
 Organs**

pipes distributed not in circular, but flat, forms are called Flats. The front pipes of an organ do not stand as a rule on the sound-board, but the wind is conveyed to them from the sound-board by concealed tubes, somewhat like gas-pipes, called "Conveyances."

Story of the Organ

to which the mixture pipes added an extremely loud noise, a terrible scream."

The keys of organs gradually became smaller, until a fifth could be struck with the thumb and little finger, and the clavier became more like those of modern organs. Fig. 4, p. 66, shows their form, and they were to be found on the organs of the churches of St. Ægidius,



Original-Clavier des Alten Orgel im 2. St. im Halberstadt.

DISCANT KEYS OF THE ORGAN AT HALBERSTADT,
1361. (ENLARGED.)

Brunswick, built in 1456; St. Salvador, Venice, built about 1418; and the cathedral at Minden. All these keyboards commenced at B natural, but their upwards compass was extended to c'' , making two octaves and one note. Their pedal clavier contained one octave, B to b , but b flat was omitted. In the church of St. Sebald, Nürnberg, the organ

built by Heinrich Traxdorff about 1470, had its pedal extended a tone downwards; its compass was A to b flat, with all the semitones, while its discant clavier had the large compass for those days of B natural to d'' , with all the semitones. There appears to have been only one manual on this organ. Traxdorff's organ in the Church

Mediæval Keyboards

of the Virgin at Nürnberg had no pedal, and a manual compass from B natural to *a'*, with the omission of *a#*, thus returning to the older method. The tone of this organ was like that of the Chalumeau, the precursor of the clarionet; and since he called the præstant pipes of his organ at St. Sebald "Flutes," it is possible that the last-mentioned organ contained reed pipes. Improvements seem to have now come rapidly. Two organ-builders of the fifteenth century, Friedrich Krebs and Nicolaus Mülner, made their pedal clavier from A to *a''* with all semitones, and their discant clavier from B natural to *f''*, two octaves and four notes. The next improvement we read of is the "modernising," in 1493, of two organs built by Rotenburger, of Nürnberg, in 1473, by carrying both discant and pedal down to F. The compass then was—

Increase of
the Com-
pass of the
Claviers

			<i>Bb</i>	<i>c#</i>	<i>d#</i>	<i>f#</i>	<i>g#</i>	<i>bb</i>		
Pedal	<i>F</i>	<i>G</i>	<i>A</i>	<i>B</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>a</i>
			<i>Bb</i>	<i>c#</i>	<i>d#</i>			<i>f''#</i>		
Discant	<i>F</i>	<i>G</i>	<i>A</i>	<i>B</i>	<i>c</i>	<i>d</i>	, etc., to	<i>f</i>	<i>g''</i>	<i>a''</i>

It will be noticed that in these claviers the lowest keys are not provided with their semitones, and that *g''#* is omitted on the discant.¹

By 1499 Heinrich Crantz had erected an organ in Brunswick with keys so reduced in size that an octave was only larger by one key than the present octave;

¹ See description of "Short Octaves," p. 169.

Story of the Organ

and the semitones, instead of forming a separate keyboard of their own, as in the Halberstadt organ, were placed between the naturals, and coloured black. We may take it, then, that our organ keyboard took its present dimensions and form, after many experiments, about the beginning of the sixteenth century; while the keyboards of positives had for centuries been assimilated to those of the clavichord and spinet.

With regard to the practice of commencing the clavier with B \sharp instead of C or of A, Pretorius's friend Calvisius writes:—"The reason that the keyboard begins at B natural seems to be derived from the tetrachords of the ancients of which Hypate hypaton, the principal tetrachord, began on B natural. The clavis A is called Proslambanomenos, that is, the added key, for in antiquity B natural was the lowest." The mediæval monks, steeped in the teaching of Boethius, could not tear themselves away from ancient Greek methods until they were forced to do so by the increase of knowledge, and its more practical application amongst the laity.

The church organ was not always used to support the voices of the choir or congregation. It seems to have been at first confined to giving the priest the right pitch by playing the melody over before he sang; and as the instrument improved it played a Præambulam, or Præcentio, or Præludium to the piece about

Organ and Voices

to be sung.¹ This Prelude is still continued in Germany and Holland; for the organist, instead of playing through the bare notes of the chorale about to be sung, as in England, is expected to extemporise an artistic Choral-Vorspiel in something of the same form as, though less elaborate than, those of which J. S. Bach has left such fine examples. It seems almost impossible that the mediæval organs, with their enormous locatio, could have accompanied the singing of the priests, though it might have been played with the rough singing of the congregation. It is not improbable that the positive organ, placed on pillars, would be used to play with the priest, and that this is the instrument referred to in the passage quoted by Burney, "Here the clergy begin with the organ."

In A.D. 951 it appears that bells were used to accompany the singing, and a suggestion was made that the organ might do it better. A decree of Göttingen in 1486 says that at a certain place in the mass the bells shall be rung; but if there are none, the organ shall be played. In 1377 we find that the Te Deum was sung "with the organs," which seems to imply that other portions of the service were sung without. It is a mistake, therefore, to conclude that the organ was introduced into the church solely to support the singing. It could not in its ancient form be anything but a hindrance to the singing; and we shall see later that it was afterwards frequently used in place of the singing.

¹ G. Rietschl, *Die Aufgabe der Orgel im Gottesdienste*.

Story of the Organ

That important part of the organ, the bellows, was a source of great trouble, but also of great pride, in mediæval times. The bellows were constantly getting out of repair; but the greater the number in any particular organ, the more famous was the instrument. As the reservoir (see Fig. 1) was not invented till comparatively lately, the wind went directly from what we call the feeder to the wind-chest. Hence the supply was irregular, and the irregularity was increased with the number of bellows; and the number could not be reduced, because a very large feeder would be beyond the powers of the blowers to manipulate.

**The
Bellows of
Mediæval
Organs**

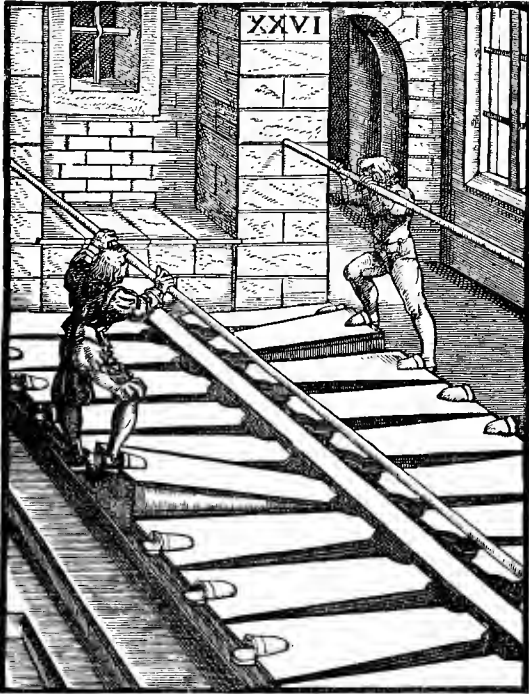
CHAPTER III.

The bellows of mediæval organs—Frequent repairs required—Improvements in the sixteenth century—Stop-handles—The positive joined to the great organ—Invention of reed stops—Pretorius's description of organs existing in his days—Unequal temperament found unsatisfactory—The black keys divided—Curious arrangements of keyboards—Unequal temperament used for organs in A. D. 1879—The organs at Ulm and Danzig—The tremulant—The downward compass of German organs fixed at C—Manual couplers introduced—Extraordinary features in organ cases—The foxtail stop—Pretorius's suggestion for a cheap three-manual organ—The Regal.

THE lever, now universally used, not having been thought of, the bellows had to be raised by means of an iron shoe, into which the blower inserted his foot. It is evident, therefore, that one man's strength was not equal to raising a very large feeder; hence when much wind was required, it necessitated a number of feeders, and almost a regiment of men to work them. The allusion to the seventy strong men required to blow the tenth century Winchester organ may be a poetic licence, or it may become comprehensible, if we imagine that there were a number of men in reserve to take the place of those exhausted by the labour at the twenty-six feeders. Pretorius says that in his day

Story of the Organ

the old organs at Halberstadt and at Magdeburg, described by him, had respectively twenty and twenty-



BELLOWS OF THE HALBERSTADT ORGAN, 1361, SHOWING THE IRON SHOES BY WHICH THE BLOWERS RAISED THE UPPER PLATES.

four bellows, requiring ten and twelve blowers; they were quite small, and in shape very much like those

Bellows-treader

used by the blacksmiths.¹ They were not, he says, weighted with stone or lead, but each blower manipulated two, one of which he pressed down while raising the other. The result was that a heavy man would give more pressure than a light one, and would to some extent disturb the intonation of the pipes. Moreover, the labour of constantly raising a heavy plank with the foot must have been very painful, and the iron shoe must have caused considerable friction on the tender skin of the upper part of the foot.

The Bellows
at Halber-
stadt and
Magdeburg

In large modern organs the feeders are lifted by levers worked by a small engine. In smaller Continental instruments pairs of levers are *pressed down*, not raised, by the feet of the organ-blower, who is called *Calcante*, *Bälgentreter*—*i.e.*, trampler; and the labour is considerably less than that of the English system of blowing by hand with a single lever, which has to be both raised and depressed by the blower.²

¹ Blacksmiths of the present day use a reservoir to steady the supply of wind differing in form, but not in principle, from that of the organ.

² The bellows of the great organ of the Nicolaï Church in Leipsic had up to about 1890 ten long levers, which required four active men to manipulate. Each man ran up a little staircase of three steps and jumped on to one of the levers, which slowly fell with his weight, thus raising the upper plate of the bellows. On reaching the ground, he ran up the stairs and jumped on to the next, and repeated the operation with a third or fourth. The labour was very great; the men took their coats off, and were in profuse perspiration whenever the full organ was in use. The bellows, which occupied a considerable space, were placed in the tower of the church.

Story of the Organ

At St. Mary's, Sandwich, "a payre of orgonys" seems to have been erected in 1444, and in the same year 12d. was paid to Sir John¹ for mending the bellows. In 1462, 13d. was paid to "a preyst" for mending them again, and 4d. to a "preist that playeth at organys." In 1496, 1502, and 1521, payments were made for mending the "grete and lytell organyse." Many other instances of payments for repairs to the bellows are given by Dr. Rimbault.

In the beginning of the sixteenth century Hans Lob-singer of Nuremberg invented wooden frames, such as one sees in the common house bellows, which brought the folds of the leather under control, and thus did away with an immense amount of the wear and tear to which they were previously subject; and not only was their durability increased, but a steadier wind pressure resulted from the new invention.

A further improvement was made by which the wind pressure no longer depended on the variable weight of human beings, for the bellows were provided with lead or stone weights. The blower had then only to lift them, and allow them to fall automatically. Stone was, however, soon discarded as it was found to absorb moisture from the atmosphere, and therefore to vary its weight. Adlung describes an organ at Weissenfels which had three bellows, raised by chains working round three wheels, and weighted with bricks. When all three bellows

**Wooden
Frames
applied to
Bellows**

**Weights
introduced**

¹ The lower orders of the clergy were called "Sir."

Invention of Stops

were raised they supplied wind enough for the whole of the Creed, with a moderate number of stops. The regulated folds and the weights can be seen in the positive and regal, of which we give illustrations on page 73.

What we have said about the keys and bellows of German organs applies to those of England, France, Italy, and the Netherlands, with the exception of a few unimportant differences of detail. All the great church organs were clumsy, noisy, and unmanageable instruments, only capable of being used for the uneducated singing of the congregation.

For the trained singers it would seem that the little organs placed on pillars would be used; the "grete and lytell organyse" have been referred to on page 60; or compositions, such as motets, would be sung unaccompanied, except on festivals when there would be a full orchestra, containing portatives, bagpipes, shawms (a kind of primitive clarionet), flutes, psalteries (our dulcimer), a set of bells, trumpets, tambourines, cymbals, small harps, bowed instruments, guitars, all of which are figured in reliefs and pictures of the thirteenth and fourteenth centuries.

The invention of "stops" for closing any row of pipes at will came into use, as we have seen, about 1400-20; the stop-handles consisted of iron arms, standing horizontally by the sides of the keyboards. The arms were pushed backwards and latched when a stop

Organs on
pillars

Primitive
Stop-
handles

Story of the Organ

was to be sounded. For the "back positive" the iron arms projected from the case behind the player, and were moved sideways. They were fixed immediately to the sliders.¹ In the separate positives or house organs there were no stop-handles at all; the player simply pushed the slider in or out with his hand.

The Positive allied with the great Organ About the same time the positive was joined to the great organ, in such a way that the same player could manipulate both instruments. The keys of both were reduced to dimensions that could be managed by the fingers

instead of the fist; reed stops had been invented, and we may consider that during the sixteenth century the organ took the form now familiar to us. Pretorius

Organs described by Pretorius gives the "dispositions"—*i.e.*, the list of stops—of some thirty important organs in Germany existing in his day. He divides the pipes into flutes and reeds, and the flutes into open and stopped. The open flue pipes, he says, vary, some being long and of small diameter, others short and of large diameter, by which considerable varieties of tone and power are produced.

Other flue pipes are wider at the bottom than at the top. These are called conical: such are the Gemshorn, Spitzflöte, etc. They were invented about 1520-30. Others again are wider at the top than the bottom, such as the Dulcian. Covered or stopped flue pipes, which were invented during the early part of the sixteenth century, are either entirely or half covered. Reed pipes

¹ Ritter, *Geschichte des Orgelspiels*, p. 87.

Increased Requirements

were invented about 1500; they also can be stopped or open. The bellows having been improved by the use of weights, the intonation was far more satisfactory than formerly; the Tremulant had been invented about 1570, and it will be seen that the organs of the early seventeenth century were as much in advance of those of the early sixteenth as the express train of 1903 is in advance of the stage-coach of 1803.

But as civilisation advances, requirements increase, and with the increased requirements comes greater difficulty of supplying them. The art of music was advancing by leaps and bounds; it was freeing itself of the old restrictions placed on it by dreamy monks in their cells, who, influenced by Boethius and the Greek modes, looked askance at the freedom enjoyed by worldly musicians. The great uprising of intelligence, the desire for freedom of thought which had its outcome in the Reformation pervaded all fields of learning and of art. In painting it led to the Renaissance; in science it produced a Galileo and a Newton; in church music it brought about a complete change of form, such as can be seen by comparing the sixteenth century compositions of a Palestrina with the seventeenth century compositions of a Stradella or Alessandro Scarlatti or our own church musicians.

Ritter¹ considers that the Reformation had no influence on the condition of organs or organ-playing; that the reformers seem to have forgotten the existence

Geschichte des Orgelspiels.

Story of the Organ

of the instrument until reminded that it could be used to accompany the congregational singing. But though the Reformation itself may have had no influence, the causes which led to it certainly had; and the desire for greater freedom led not only to improvements in the mechanism, but to an unforeseen difficulty.

We have already (p. 22) alluded to the acoustical fact that if we tune thirds, fourths, and fifths perfectly, we shall find our octave out of tune; and *vice versâ*, if we tune our octaves perfectly, the notes contained between them will necessarily be thrown out of tune. As long as the organ was only used for unison plain-song there was no difficulty, for we can tune the white notes of a keyboard sufficiently for this purpose; it is the black notes and the use of harmony that cause the trouble. Composers, freeing themselves from the ancient trammels, now began to require to play in any and every key. In the Fitzwilliam virginal book, date about 1630, there will be found an interesting passage in six flats; and chords are sometimes found in other compositions which must have sounded fearfully harsh under the old system of unequal temperament. The idea of equal temperament, though it had been attempted by individuals, was not accepted; and a way

out of the difficulty was found by doubling the black keys, one being used for G \sharp , another for A \flat : one for F \sharp , another for G \flat , and so on throughout the scale. This custom never, however, became universal; it was only used in a few organs, and experiments were con-

Efforts after Greater Freedom

tinued for nearly two centuries, as we shall see in due course!

At Bückeberg an organ of three manuals was built in 1615 with this arrangement, and very troublesome it must have been to the player. Pretorius gives the arrangement of its three manuals thus, the extra keys being placed above the usual semitones—

	D^\sharp	F^\sharp	G^\sharp	A^\flat	B^\flat	c^\sharp	d^\sharp	e^\flat	f^\sharp	g^\sharp	a^\flat
C	D	E	F	G	A	c	d	e	f	g	, etc., to f''' .

Its pedal clavier was terribly complicated—

	F^\sharp	G^\sharp							A^\flat		
$D,$	$E,$	B^\flat	C^\sharp	D^\sharp	E^\flat	F^\sharp	G^\sharp	B^\flat			
$C,$	$F,$	$G,$	$A,$	$B,$	C	D	E	F	G	A	$B,$ etc.

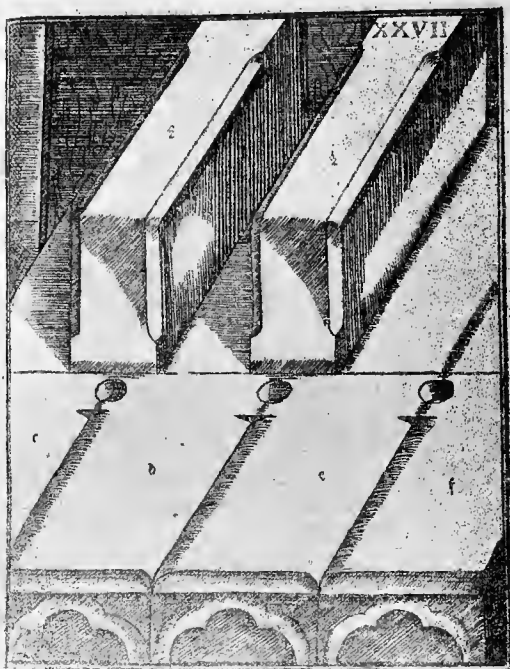
This curious arrangement or disarrangement of the lowest octave of the pedal is not uncommon in the organs described by Pretorius. It will be observed that though the lowest C^\sharp is missing from both manual and pedal, the downward compass is the same as that of modern organs.

The black key between G and A is divided, the lower portion sounding G^\sharp , the upper A^\flat . This is where the "wolf" fell, the technical term for the most out-of-tune note. Another and lesser wolf is got rid of at D^\sharp by the same means. Mersennus¹ gives engravings of several ways of disposing the extra keys,

¹ *Harmonicorum*, 1648, Liber ix. p. 118.

Story of the Organ

above or alongside the ordinary ones. The difficulty of playing rapid passages on these claviers must have been very great; but if the difficulty of playing



Die Orgel im Herzoglichen Orgelhaus zu Eisleben bei Suhl. (From Pretorius.)

KEYS OF THE ORGAN AT BRUNSWICK, 1456. (FROM PRETORIUS.)

These keys allowed the interval of a fifth to be played by the thumb and little finger.

Keyboard and Pedals

the manuals was great, what must it have been with the pedals?

A curious arrangement of the lowest octave is found in a two-manual organ, built at Dresden in 1614; but here there are no semitones until the second octave; thus recalling instruments of the theorbo, lute, and zither tribe, in which the bass strings gave an octave of diatonic notes. The Dresden manuals are—

				<i>e^b</i>		<i>a^b</i>	
<i>D</i>	<i>E</i>	<i>B^b</i>	<i>c[#]</i>	<i>d[#]</i>	<i>f[#]</i>	<i>g[#]</i>	
<i>C</i>	<i>F</i>	<i>G</i>	<i>A</i>	<i>B</i>	<i>c</i>	<i>d</i>	<i>e f g</i> , etc.

The keyboard of yet another organ shows, if possible, a still more extraordinary arrangement of its lowest octave—

	<i>F[#]</i>	<i>G[#]</i>			<i>e^b</i>	
	<i>D</i>	<i>E</i>	<i>B^b</i>		<i>d[#]</i>	
<i>C</i>	<i>F</i>	<i>G</i>	<i>A</i>	<i>B</i>	<i>c</i>	<i>d e f</i> , etc.;

while its pedal is arranged in alphabetical order, C[#] being omitted. These and many other experiments show how hard our ancestors worked in their efforts to find a solution for the problem of tuning the organ.¹ We reap the benefit of their labours; yet so strong is

¹ These curious arrangements of the pedal keys long survived in Germany, for Mozart, writing from Augsburg in 1777, says:—"At first the pedal was a little awkward for me, as it was without the breaks, beginning with C, then D, E in one row, whereas with us D and E are above, just where E flat and F sharp are here; but I quickly mastered it."—Lady Wallace, *Letters of W. A. Mozart*, vol. i. p. 99.

Story of the Organ

the conservative instinct in human nature, that though equal temperament has been in use on the organ for nearly two centuries, and the whole range of tonality has been opened to organists and pianists, there were quite recently old-fashioned tuners who wished to return to the unequal temperament. The writer in 1879 had occasion in New Zealand to trans- pose a hymn-tune to the key of D flat: the harshness was intolerable, and the choir was quite thrown out; on inquiring the reason of the harshness, he found that the only organ-tuner in that part of the colony was a very old man, who actually altered the lengths of the pipes of all organs sent out from England in order to bring them to the obsolete unequal temperament tuning!

The list of stops given by Pretorius would not interest the reader, but some of the details give an idea of German instruments of that day. The Positive was placed behind the player's back, as one sees in English cathedral organs, its keyboard being in front of him, and the trackers carried under the floor. Its stops were also behind his back, as we have seen. The second keyboard was called, from the position of its organ, the "Rück positiv," back positive; and if there was a third keyboard, it acted on a set of pipes in the front part of the chief structure, and was called the Breast or front positiv. The

Tremulant

Great Organ (Italian Grand Organ) was called the Oberwerk, or upperwork.

The largest pipe of the organ at Ulm, built about 1590, could contain 315 Ulm measures of wine. Alterations of the instrument in 1606, probably to modernise it, cost 7000 "good gulden." The organ at Danzig, built in 1585, had 55 stops

**Large
Pipes**

—a great number for those days. Its repairs in 1597 required 70 cowhides for the 21 bellows.¹ Its mixture stop had 24 pipes to each key—a remnant of the old barbaric "locatio." The "great sub-bass" of the pedal was of 32 feet tone, and there was a 16 feet trombone, a powerful reed stop. The pedals acted on

no less than 16 stops, amongst which were mixtures and stops of 2 feet pitch; and the organ had three tremulants and a drum.

**A large
Pedal
Organ**

The tremulant was a sixteenth century invention. It consisted of a spring valve in the wind-trunk through which the air, escaping in puffs, caused an alternate very slight raising and lowering of the pitch of the pipes. The

**The
Tremulant**

old tremulants were, however, noisy machines, and often asserted themselves to the detriment of the music they were intended to improve.

The lowest note of the German church organs had been settled as C by this time; but in England, until nearly the end of the nineteenth century, manuals were found extending to F, or G, while the pedals were of C compass.

**F and G
Organs**

¹ Ritter, *Gesch.*, p. 85.

Story of the Organ

Such organs were called "F" organs or "G" organs, as opposed to the "C" organ which had been in use for centuries on the Continent. However, exceptions were found in Germany, for in 1606 an F organ was built in the cathedral at Lübeck, having C pedals.

With increase of stops and bellows there came in all kinds of accessories. We have mentioned the tremulant and the drum. To these was added in the cathedral at Magdeburg a Vogelgesang, to imitate the song of a bird; and in the Church of St. Catherine in the same town a Vogelgeschrei, a bird's scream and a cuckoo; and in other organs there were revolving stars covered with little bells.

The Coupler frequently occurs in Pretorius's lists. This was an invention by which a keyboard could be "coupled" to another, so that on pressing down the keys of the first, the keys of the second were pulled down; both departments of the organ being acted on at once, fresh variety was thus given to the performance. The first idea of a coupler was in the ropes or wires by which the bass keys were pulled down by the feet. This idea was afterwards applied to the various manuals. In later times a super-octave coupler and double coupler were introduced, acting on keys an octave above or below those struck. The super-octave coupler has always been much favoured in Italy, where it is called "Terza Mano."

Care was taken in the sixteenth century that the

Mediæval Organ Cases

Organ Cases

exterior of the organ should be attractive to the eye. Pretorius mentions several instances of gilt pipes. They were also frequently covered with ornamental carved metal work, such as can be seen in some Italian organs of to-day. Arnold Schlick¹ says: "The organ must be an ornament to the church and a help to godly singers. It must have suitable figures upon it, not trivial and ridiculous tricks, such as was made a few years ago in a Capuchin monastery, in which a large figure of a monk looked out of a window, rising as far as his girdle, and then suddenly disappeared, so that young and old, man and woman, were startled, and some began to laugh, others to curse.

"Monkey faces, and priests with monkey faces, with wide mouths, which open and shut, and with long beards, and that rattle money in their pockets, are things to be avoided. Also, revolving stars with bells are things that belong not to the church but to the devil, who tries under the cloak of good works to fascinate people to do evil." This quotation gives a curious picture of the tricks that were wont to be played with organs.

Ritter mentions that the case of the organ built at Magdeburg Cathedral, in A.D. 1604, cost as much as the instrument itself. It had forty-two figures, twelve of which moved, and a crowing cock.²

¹ "Spiegel der Orgel-macher," 1511. Edited by R. Eitner in *Monatshefte für Musik Geschichte*, 1869.

² *Geschichte des Orgelspiels*, p. 89.

Story of the Organ

At Bion, in Gascony, there was in 1535 an organ ornamented with giants' heads, which wagged and moved their jaws and eyes as the organist played.¹ In Spain and France it was customary to decorate cases with grotesque heads, which protruded their tongues when wind was put into the organ.

In the Garrison Church organ at Berlin there were two suns, towards which two eagles flew; and two angels which flew upwards and placed trumpets to their lips during the flight, and put down the trumpets during their descent, while other angels played the drums, etc.²

In an organ at Erfurt there was a "foxtail" stop, by which a fox's tail brushed the face of any over-curious person who drew it out. These trivialities and other abuses caused much opposition to the use of organs, as we shall see in a later chapter.

Pretorius suggests a cheap organ of three manuals with sixteen stops on each manual. There were in reality to be only sixteen ranks of pipes of six octaves, and the various stops and manuals were to act on different lengths of pipe—16 feet, 8 feet, 4 feet, etc. Such an inartistic plan was of course never carried out; if it had been, the result would have been miserable. But Pretorius makes up for the poverty of effect by adding "various beautiful things,"

The Fox-tail Stop

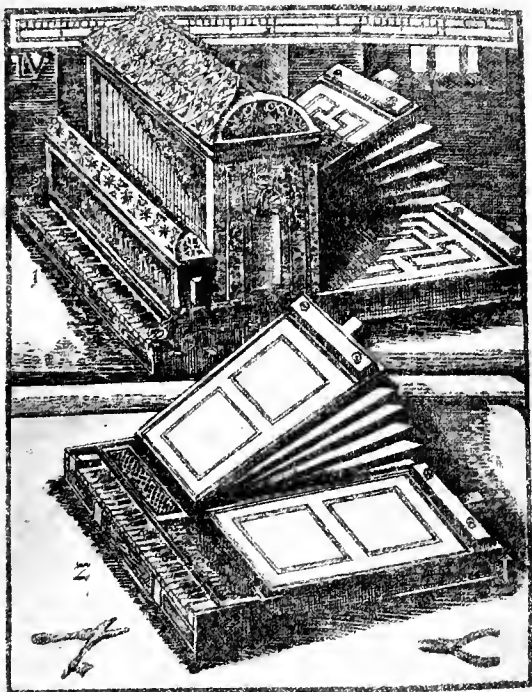
Pretorius's suggestion for a Cheap Organ

¹ A. G. Hill, *Organ Cases of the Middle Ages*, 1883, p. 9.

² Adlung, *Musica Mechanica Organædi*, 1768.

Various Beautiful Things

such as a tremulant, a revolving star with cymbals, a cuckoo, bird's whistle, bagpipe, goat's bleat, and drum.



1. Positive. 2. Regal.

A POSITIVE AND REGAL IN 1618. (AFTER PRETORIUS.)

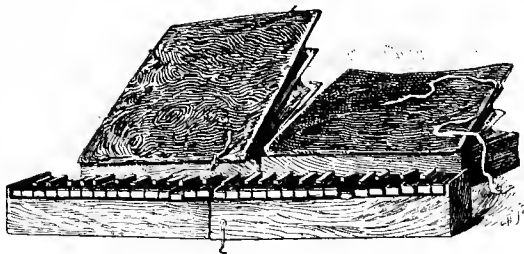
The bellows were raised alternately, and made to fall by the weight of the block of lead, which can be observed, screwed to the upper portion.

Story of the Organ

“What more can one require?” says Ritter.¹ Pretorius's idea was resuscitated by Seidel in *Die Orgel und ihr Bau*, 1854.

Some time during the fifteenth century there was invented a substitute for the organ called the regal.

It was used in conjunction with other instruments, and for choir training, and figured in all old books dealing with music. Its sound was produced by free reeds² in diminutive



A BIBLE REGAL.

pipes, the longest not being more than a few inches in length; it was the prototype of the harmonium. The regal, from the smallness of its pipes, was very portable. It was blown by hand. Its pipes lay horizontally, just behind the keys, and were enclosed in a box. The

¹ Page 89.

² Free reeds are those which work freely in their slot, as in the harmonium, the concertina, accordion, etc. Beating reeds are those which at each vibration strike against the edges of their slot, such as the clarinet reed. Most organ reeds are of the beating variety.

Regal

instrument was sometimes so small that it could be folded into the size of a large book, and its bellows, being covered with leather, had the appearance of the binding of a book. In this case it was called the "Bible regal." Virdung¹ gives an engraving of a regal with three bellows. Neither its pipes nor its keyboard are visible. Pretorius shows a much more handsome instrument, with part of the covering of its diminutive pipes removed. The regal took a large place in the music of the sixteenth and seventeenth centuries. The Court band of Henry VIII., for example, contained thirteen pairs of single regals and five pairs of double regals.

The Court had its tuner and maker of regals. Burney² gives the list of Edward VI.'s musicians and players, in which occurs the item—"William Beton, organ maker, fee £20; William Tesorer, regal maker, fee £10." In the reign of Elizabeth the fee of the regal maker was increased to £20. The office of "Tuner of the Regals in the King's Household" was not abolished until 1773: it had long been a sinecure. A stop called Regal in the old German organs, which afterwards became the Vox humana, is said by Bedos de Celles to have been the first reed stop invented. It was the custom in Germany to carry the regal in processions, and whenever the procession stopped to set it on a stool and play it. The Italian name is *regale*, which has been derived from the Latin *regale*

Makers
of
Instru-
ments

¹ *Musica getuscht*, 1511.

² *History of Music*, vol. iii. p. 5.

Story of the Organ

opus, as being an instrument worthy of a king. We have seen that English kings had a strong liking for it. The description by Hawkins, vol. ii. p. 448, is hopelessly wrong. The engravings he gives as from Luscinius are found in Virdung, and what he calls an entire regal is a positive organ. The pipes not only run in the wrong order, the long ones being on the right instead of the left, but they are not the least like regal pipes, which are not flue but reed pipes, and are contained in a box no more than three inches broad.¹ It is evident that Hawkins had never seen the instrument. As a matter of fact, the free reed does not require a pipe at all, since its vibrations are strong enough to produce a powerful sound. The short pipes of the regal to some extent control the superfluity of harmonics, which make the tone of a harmonium so disagreeable; but to modern ears it is harsh in spite of this, and requires very skilled blowing. Few examples exist, but such as there are, are in playable condition, so that we can get an idea of the sound that delighted King Henry VIII. so much.

The regal was used on the Continent, especially in Germany, till comparatively recent times. The orchestra of Peri's *Eurydice*, the earliest opera, contained "un regale" and "duoi organi di legno," probably portatives with wooden pipes.

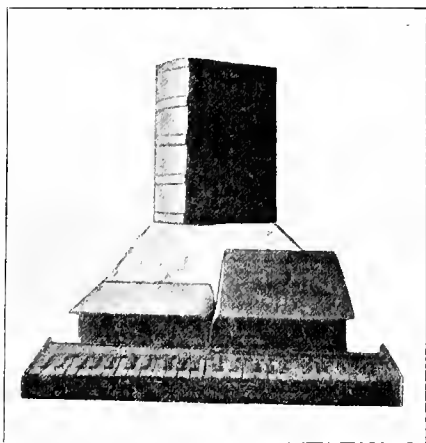
In a memorial addressed to the Town Council of

¹ The fault in the arrangement of the pipes is due to the engraver of the plate in Virdung's work, which was printed in 1511.

Bible Regal

Leipzig by Kuhnau in 1709, he says that the regal belonging to St. Thomas's Church is much out of repair, and suggests looking out for the chance of one being offered for sale at a low price.¹ A "Bible" regal in the collection of the Rev. F. W. Galpin was in use in a German village for choir practice until late in the nineteenth century.

¹ Spitta, *Life of Bach* (Novello), vol. iii. p. 304.



BIBLE REGAL. (GALPIN COLLECTION.)

Closed, as a book, and opened, as a regal. The keyboard is hinged in the middle and folds into the cover.

CHAPTER IV.

The keyboards of portatives and positives—The invention of the clavichord—Landino, the first famous organist—Sguarcialupo—The Ricercare—Spanish organ-playing and organs—Italian organ-builders—English cathedral statutes—English organists—Anecdote of Christopher Tye—Marbeck escapes the stake owing to his musical excellence—Epitaphs on organists—A German opinion of the English organists of the sixteenth century—Objections to the organ—Efforts to regulate its use—Luther's dislike to it—Destruction of organs in Switzerland and Belgium.

THOUGH the keyboards of mediæval church organs were clumsy and unmanageable, and only adapted for playing in unison with the plainsong, this was not the case with positives and portatives. We know from pictures and statuary that these not only had more practicable bellows, but a keyboard playable with the fingers, and more or less completely chromatic, for centuries before such a keyboard was applied to the church organ. It is true that some of the early paintings show that the keys were very short, projecting only about an inch from the case; but they seem to have soon developed to a more practicable condition. Such instruments became a necessary part of the furni-



A FIFTEENTH CENTURY POSITIVE, SHOWING SHORT KEYS.

Francesco Landino

ture of the castle and country house, before the time of the earliest recorded organ-players.¹

The clavichord, an adaptation of the finger keyboard to the strings of several monochords contained in one case,² came into use about A.D. 1350 to 1400; and every organ-player was a skilled clavichordist.

Organists made their reputation as musicians by means of the house organ and clavichord; as church organists, they merely had to thump out the plainsong with their fists. The earliest organist of whom anything is known is Francesco Landino, called *Il Cieco*, since he was born blind (in 1325), and *Degli Organi*, from his skill on the organ. He is said to have come of a good Italian family, and his father was a painter, for in those days the pursuit of art was an aristocratic profession in Italy.

The
Clavichord

Francesco
Landino

¹ Ritter, *Geschichte des Orgelspiels*, p. 2.

² The monochord had originally a single string, which was plucked by a quill. The string was divided by a movable bridge, which could be placed at certain points, indicated by alphabetical letters. The clavichord, in its most elementary stage, consisted of several such strings, each of which was struck at various points by brass "tangents," which pressed against the string as long as the fingers remained on the keys. The tangents divided the strings according to the divisions of the monochord. One end of each string was damped with felt, so that only the free portion sounded. In course of time each key had its own string. The tone, though weak, was capable of a good deal of expression, hence the instrument was much favoured by J. S. Bach, who wrote his famous Forty-eight Preludes and Fugues for it. Clavichords were sometimes provided with two manuals and pedals; a good example is preserved in the De Witt Museum at Leipsic.

Story of the Organ

besides being the first organist of his time, was famous as a philosopher and a poet. A miniature in the Lorenzo Library at Florence shows him playing on a Ninfale, or portative organ, which rests on his knees.

Landino
crowned
by the
Doge

During the festivities incident to the visit of Petrarch to Venice, in 1364, Landino was crowned by the Doge, perhaps on account of his success in a contest with Pesaro, organist of St. Mark's Church. He died in A.D. 1390, and was buried in the Church of St. Laurence at Florence.

Sguarcia-
lupo

The next organist of repute in Italy was Antonio Sguarcialupo, the first organist appointed to the Church of St. Maria di Novella in Florence, which was consecrated in 1435. He also was of noble family, and famous for his learning, as well as his remarkable skill on the organ. He lived as a friend in the house of Lorenzo the Magnificent, where the fame of his performances attracted hearers from distant lands. Some of his compositions are preserved in the Lorenzo Library at Florence, and a canzona is published by Kiesewetter in *Schicksale und Beschaffenheit des Welt Gesanges*, Leipsic, 1841.

Landino and Sguarcialupo were both house and church performers. It would appear that the Italian church organs were at this time in advance of those of the rest of Europe in the matter of touch, and that they were capable of some artistic use.¹ Sguarcialupo was contemporary with Dufay, Binchois, Busnois, Oken-

¹ Ritter, *Geschichte des Orgelspiels*.

Ricercare

heim, Hobrecht, Des Prez, and Dunstable, whose works he must have been acquainted with, and who would certainly have an influence on the quality of his playing. He died about A.D. 1475, and with him Italian organ-playing seems to have lapsed, until revived a century later by the Netherlanders, who settled in Italy; for no organ compositions by Italians have reached us, and we have no information on the subject during this time.

In the middle of the sixteenth century the Netherland organists invaded Italy. Their favourite art-form was the *Ricercare*, which is described by Pre-
torius as a composition in which all the
resources of fugue and counterpoint are
diligently used and worked in every con-
ceivable way into an artistic whole. The word *ricercare*
means "sought out": its English equivalent was
Fantasia, while the Germans and Belgians
called this kind of composition a Fugue.
If such a piece became popular, words were
added to it, in which case it was "to be played on all
kinds of instruments, and to sing." The latest example
of the *ricercare* is J. S. Bach's "Musical Offering."

The
Nether-
landers

The
Ricercae

The Spanish organists at first treated all their compositions in this manner, but in course of time they developed several different styles of which Hilarion Eslava gives an account.¹ "In the sixteenth century," he says, "there were several styles in use in Spain: the sublime, in which 'imitations' occurred between

¹ *Museo organico Español*, pp. 14 et seq.

Story of the Organ

the various parts, or simple harmonies were played above a slowly moving bass called *llano*. Sometimes a canto fermo in the tenor was accompanied by simple harmony, in which case the music was called *Fabordon*, and to any of the above styles the organist added ornamental passages called *glosas* with his right hand.”

Spanish
Organ-
playing

A form of composition said by Eslava to be peculiar to the Spanish school arose in the sixteenth century, and has continued in favour till the present day. It requires that all the stops of the organ should be divided, each separate stop only acting on half the keyboard. Organs arranged in this way are called “organos partidos.” The stops on the right-hand side act on the treble half, those on the left acting on the bass half; and a Spanish cathedral organ, showing an enormous array of perhaps one hundred and twenty stops, contains in reality only sixty sets of pipes.¹ The compositions for which Spanish organs were thus arranged are called *partidas*. One hand plays on the full organ with all or nearly all the reeds, in which Spanish organs abound, the other hand using only the flue stops. The part on the full organ is always “glosada,” that is, full of brilliant passages, the other part merely accompanying. Eslava says that the *partidas* and their *glosas* caused organists to improve their technique enormously, and that many of these compositions show real merit and considerable genius.

The
Partida

¹ Half-stops are occasionally met with in old English organs.

Antegnati Family

The first celebrated Spanish organ-player was Don Felix Antonio Cabezon, born in 1510. At this time Spanish music was much in advance of German, and many famous organists are mentioned, such as the three sons of Cabezon, and Fray Thomas de Sancta Maria, Don Diego di Castillo, and Bernardo Clavigo, who was Professor of Music in the University of Salamanca.

**Spanish
Organ
Composers**

There lived in the sixteenth century a famous family of Italian church organ-players, most of the members of which were also organ-builders. The family name was Antegnati. The first member mentioned in connection with the organ is Giovanni, who in A.D. 1460 took a Doctor's degree at the University of Brescia. His son Bartolomeo not only built the cathedral organ in that city in A.D. 1480, of which he was organist, but also those of Milan, Como, Mantua, and Lodi. Bartolomeo's sons Giovanni Giacomo and Giovanni Batista were also organists and organ-builders; the former made a choir organ for Brescia cathedral which had the reputation of being the best in Italy.

**Italian
Organists**

Batista's son Gratiado built a new organ at Brescia in A.D. 1580, to replace the one built by his grandfather one hundred years before; and the improvements which had during the past century come into the art of organ-building probably necessitated the erection of many new instruments.

Costanzo, another son of Batista, organist of the cathedral at Brescia, was also famous as an organ-

Story of the Organ

builder, and was the author of a book on organ-playing and organ-building. At this time Italian organs still had only one clavier, and it became the custom to divide the stops, as in the Spanish organs.

The Germans appear to have been the first to do away with this necessity by the use of a second and third manual.¹ The earliest German organist of repute was Paumann, who, like the earliest Italian organist, Landino, was a blind man; he was also famous as a lute-player. The style of German organ-playing was that of the early Italians; but in later periods, while other countries advanced, Germany for a long time stood still.

The old English cathedral statutes provided salaries for organ-blowers, but none for organists; the position of organist was not recognised, and it would appear that each of the lay vicars or vicars-choral took it in turn to play the organ by the week. In the regulations of the household of the Earl of Northumberland, 1512, a person is appointed to play on the orgaynes; but in addition to him, of the choir-men, "every man that is a player shall keepe his cours weikely."²

The statutes of St. Paul's Cathedral lay down as the duties of the Gartiones (*i.e.*, grooms from *Garcio*, a boy servant) that they are to "sweep out the church, ring the bells, blow the organs, and exercise any other humble office in the church at the command of the

¹ Ritter, *Geschichte des Orgelspiels*, pp. 14, 15.

² Burney, *History of Music*, vol. ii. p. 570.

Cathedral Statutes

vergers." Though it is ordered that the service be sung every day, no provision is made for a person to play the organ. A small salary seems to have been given to an organist in the eighteenth century, which, on the appointment of Dr. Greene, was increased by the revenue of a lay vicar's place;¹ and we believe that this custom still continues.

Most of the records of cathedrals and abbeys were lost or destroyed at the time of the dissolution of the monasteries; a few only remain. The Cathedral of Hereford, rebuilt in the time of William the Conqueror, was endowed to maintain a bishop, dean, two archdeacons, a chancellor, treasurer, lay clerks, choristers; and there was added by Richard II. an endowment for vicars-choral: but no mention is made of an organist. In none of the existing ancient cathedral and collegiate statutes do we find any reference to organists; but among the duties of the precentor was that of repairing the organ. At Eton, however, an exception was made; here provision was made for "one organist." The statutes of Canterbury provided for players on sackbuts and cornets, but not on the organ; those of Dulwich College, founded by Alleyne the actor in the reign of James I., required that one of the Fellows should be a skilful organist; but this was after the improvements in the organs. It required no skill to thump the plain-song for the congregation on the few keys of the

Loss of Documents

Sackbuts and Cornets

¹ Hawkins, *History of Music*, vol. iii. p. 261.

Story of the Organ

ancient keyboard, but it required considerable skill to play a motet or a voluntary on the finger keyboard; and there is no doubt that during the time of the Reformation in England there were famous English organists. However this may be, it is very certain that both before and after the Reformation every cathedral and college chapel had its special organist, who was always a musician of eminence. Henry Habyngton, or Abyngton, who was admitted to the degree of English Bachelor in Music at Cambridge in A.D. Organists 1463, is described in his epitaph, written by Sir Thomas More, as "the best singer amongst thousands; and, besides this, he was the best organist." Robert Fairfax, who was admitted Mus. Doc. of Oxford in 1501, was organist at St. Alban's Abbey, which at that time contained the finest organ in England, built in 1438, and therefore probably one of the "fist" organs, without separate registers. His being described as organist of St. Alban's Abbey seems a contradiction of what is said above, that no statutes of abbeys or cathedrals contain provision for organists on their staff; but though there was no recognised office of organist, there was no reason why any one of the vicars-choral who excelled the others should not be called "the organist" of the society. Thus, Richard Parker was organist of Magdalen College, Oxford, in 1500; and during the course of the sixteenth century, when the technical requirements gradually demanded more skill, it became the custom for every cathedral and college to employ a regular organist, possibly one

Christopher Tye

of the vicars-choral more skilled than the rest being given this title.

Foreign cathedrals usually employ two regularly appointed musicians, who are called the First and Second Organists; and this custom has not been unknown at the English Court. Tallis and Bird, in the dedication of their *Cantiones* to Queen Elizabeth, describe themselves as organists of her private chapel. Hawkins¹ says that Dr. Bull became "chief organist" to James I. on the death of Elizabeth; and in 1661, on the Restoration, three organists, Edward Low, Dr. William Child, and Dr. Christopher Gibbons, were appointed to the Chapel Royal.

Organists
of the
Chapel
Royal

Dr. Christopher Tye, the musical instructor of Edward VI., became organist to Queen Elizabeth in 1561, having previously acted in that capacity at Ely Cathedral. There is no doubt that he was a fine organist; but, according to Anthony Wood, he was a "peevish and humoursome man, especially in his latter days; and sometimes playing on the organ in the Chapel of Queen Elizabeth, which contained much music, but little delight to the ear, she would send the verger to tell him that he played out of tune; whereupon he sent word that her ears were out of tune."² Thomas Tallis, William Bird, Dr. John Bull, and many others were famous organists. Tallis held his post as organist to the Crown through four reigns—Henry VIII., Edward VI., Mary,

Dr. Tye

Tallis

¹ *History of Music*, vol. iii. p. 320. ² *Ibid.*, vol. iii. p. 258.

Story of the Organ

and Elizabeth. It has been suggested that, like the Vicar of Bray, he changed his religion with the times; but it is more probable that his skill as a musician enabled him to escape persecution. John Marbeck, organist of St. George's Chapel, Windsor, who adapted the plainsong to the Protestant service, was condemned to the stake, and was actually being led to execution, in company with three others, when Bishop Gardiner, seeing him, and being sorry to lose so good a musician, and, moreover, being his personal friend, rescued him.

England possessed a very large number of famous organists in the sixteenth and seventeenth centuries.

Epitaphs on Organists Hawkins quotes several curious epitaphs as showing the esteem in which they were held. One in York Cathedral, on a musician and logician, says :—

*“Musicus et logicus Wyrnal hic jacet ecce Johannes,
Organa namque quasi fecerat ille loqui.”*

“Behold, here lies Johannes Wyrnal, musician and logician, who caused the organs to, as it were, speak.”¹

Another epitaph in Old St. Paul's, describes John Tomkins, Bachelor of Music, as the most celebrated organist of his time, who, after he had served the Chapel Royal for twelve years and St. Paul's Church for nineteen, migrated to the celestial choir in 1638, at the age of fifty-two. He was one of a large family

¹ Hawkins, *History of Music*, vol. iii. p. 348.

Epitaphs on Organists

of organists and composers. An epitaph on Robert Parsons, or Persons, organist of Westminster Abbey, is quoted by Hawkins :—¹

“ Death, passing by and hearing Parsons play,
Stood much amazéd at his depth of skill,
And said, ‘ This artist must with me away,’
For death bereaves us of the better still ;
But let the quire, while he keeps time, sing on,
For Parsons rests, his service being done.”

The following epitaph on William Blitheman, one of Queen Elizabeth’s organists, was destroyed in the fire of London :—²

“ Here Blitheman lies, a worthy wight
Who feared God above,
A friend to all, a foe to none,
Whom rich and poor did love.
Of princes chappell gentleman
Unto his dying day,
Whom all tooke great delight to hear
Him on the organs play,” etc.

He was the master of John Bull, who succeeded him as one of the organists of the Chapel Royal in 1591. After having travelled much for his health, Bull was recalled by Queen Elizabeth ; and at her death he became, as we have seen, organist to James I. An account is given by Dr. Ward, in his *Lives of the Gresham Professors*, of an occasion on which the King dined in the Merchant Tailors’

¹ *History of Music*, vol. iii. p. 279.

² *Ibid.*, vol. iii. p. 317.

Story of the Organ

Hall. "And while the King sat at dinner, Dr. Bull, who (as Stow says) was free of that company, being in a citizen's gowne, cappe, and hood, played most excellent melodie uppon a small payre of organs placed there for that purpose onely."¹

There is no doubt that these men carried the art of organ-playing to a high degree of perfection, and that organ-building made great advances under them; for improvements in instruments go hand-in-hand with increase of skill in their treatment. The one art encourages the other; as the skill of performers increases, they make increasing demands on the inventive genius of instrument-makers; while, on the other hand, better instruments give greater opportunities for skill in performance. Dr. Ritter, who has no high opinion of English musicians in general, says²:—"In England almost all those great masters whose names belong to the most famous art-epoch of their fatherland, were organists in the church of God or in the King's chapel. In the fulfilment of this office we may take it for granted that they had no less zeal and capacity than in church music generally. The spirit of the true artist is strong enough to prevent him from acting unworthily, even if he makes use of a means of expression other than that for which God specially created him. With regard to the use and

**Improve-
ment of
Organs
keeps pace
with
advance of
the art of
playing**

**A German
view of
English
Organists**

¹ Hawkins, *History of Music*, vol. iii. p. 320.

² *Geschichte des Orgelspiels*, p. 46.

English Organists

treatment of the organ, the so-called Virginal books give a distinct picture. If we may form a general opinion from Bird's variations on the 'Carman's Whistle,' written between 1565 and 1570, it was not the Virginals, but the organ that influenced the style, for these variations are entirely suited for the organ; the style of composition is founded on the development and connection of the various parts, as in organ music.

"If in these secular pieces, intended for entertainment, the more earnest organ style prevails, we may well turn our eyes to the nobility of the sacred songs that flowed from the same pens, in which the same peculiarity is found, though somewhat differently treated, as in the 'Carman's Whistle'; it is manifest here in equal strength, and not in Bird alone, but in all the other artists, in whose works are found certain traits in common." Ritter mentions amongst famous English organists of that time Robert Fairfax (1460-1529), "who, with the simplest means, produced good expression and fine-sounding music;" John Taverner (sixteenth century), organist of Christ Church Cathedral, Oxford, "who produced artistic but dry work;" Robert White (15—?-1574), "who was the first Englishman to produce Ricerceri, which he called Fantasias;" J. Shepard (Mus. Doc. Oxon, 1554), whose music is full and clear; Thomas Tallis, the first lay organist in the Royal Chapel, for previously only clerics were admitted; W. Bird, or Byrd (1538?-1623), "an artist whose earnestness and rare technique raised him to the highest steps of his art;" Thomas Morley (1557?-1604); Elway

Story of the Organ

Bevin (1570?-1640), organist of Bristol Cathedral in 1589. These are only a few of the eminent English organists of those days.

The organ was not universally looked upon with favour ; on the contrary, during its whole history, from the earliest times to almost the present day, **Opposition to Organs** there have been persons who have disliked the instrument, and would be glad to see it banished from the church. Sometimes this opposition has been shown in fierce invective, sometimes in a grudging toleration of the organ, because of the weakness of some of the faithful ; at other times it has broken out in a violent attack on and destruction of organs by a rabid and ignorant mob. Aelred, abbot of Riedval, who died in A.D. 1166, finds in the organs a noise more like thunder than beauty of sound.¹ He laughs at the voices “ which sing now high, now low, divide and cut the notes, now strain, now break. Sometimes the singing sounds like the neighing of horses ; and all this noise is ridiculous and damnable vanity.”

Thomas Aquinas objected to the use of instruments, which served more to please the ear than to lead to piety. The church of Lyons has always **A curious Custom** excluded the use of organs, but they seem to have been introduced in spite of ecclesiastical decrees, for we find that there was a mediæval custom by which, whenever the priests thought they had been wronged, they caused the organ to be silent

¹ Mignè, *Patrol*, vol. cxcv., p. 571.

Mediæval Use of the Organ

until the real or imaginary wrong was redressed. This curious custom is referred to in a letter of the Bishop of Meaux to his Chapter in 1221, and again in an Act of the Chapter of Lyons in 1374, thus proving that organs were used in the latter church.¹ The Sistine Chapel has never had an organ.

Many efforts were made to regulate the use of the organ. The Synod of Roermund ordered in 1570 that no organist or cantor should interrupt or shorten the Epistle or Preface or Lord's Prayer in order to interpolate music; for it was the custom at that time to play the organ between the sentences of the liturgy, and even in some parts to play the whole of the Creed and the middle part of the Kyrie, while the congregation stood silent. In the sixteenth century we find many decrees of Councils and Synods directed against this misuse of the organ; and as early as 1407 certain parts of the mass were sung, *unless the organ played*, in which case the time that would be occupied by the words was filled up by the organ; while in village churches a band took the place of the organ for this purpose. An ecclesiastical writer, Martianus Navarrus, in 1570, blames the habit of talking and joking by the singers in the choir during the alternate verses of the Psalms, when the organ played alone; and he complains of the custom which obtained in many places in which the Creed and Gloria were not sung, but the organist showed his skill in their

Efforts to
regulate
the use of
Organs

Behaviour
of
Choristers

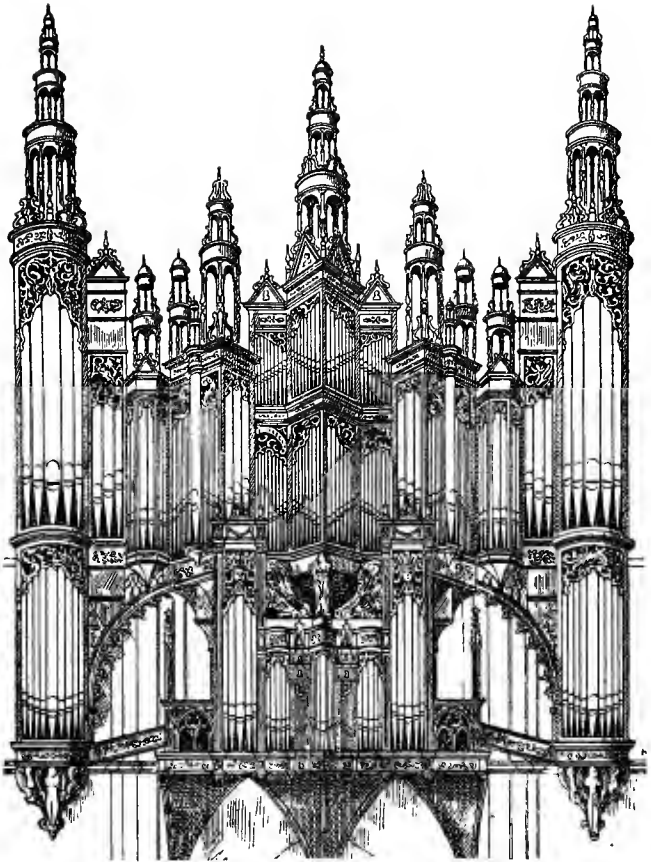
¹ Bedos de Celles, p. xix.

Story of the Organ

place. Moreover, this practice became a means of shortening the Mass, for the organist could play through the music of the Gloria, Hallelujah, Creed, Offertory, Sanctus, Agnus, etc., far quicker than they could be sung. The argument used in favour of the custom was that the organ could, by its melody, awake the piety of the people better than the singing; and if some of the accounts of the singing are to be trusted, this argument would probably be much to the point.

In 1525 the Council of Sens, after having declared that the Church had received from the Fathers the use of the organ, forbids lascivious airs to be played on it, and anything that is not worthy of divine psalmody. The Council of Cologne, in 1536, blames the custom prevalent in certain churches of entirely or partly omitting certain parts of the Liturgy, under pretext of using the organ in their place; and the Council of Trent, held in 1562, recommends the church authorities to banish from the church all music, whether of organ or song, that intermingled anything contrary to decency and purity of manners.

In 1565 the Synod of Cambray ordered that what the choir sang must be sung aloud, and not secretly, and it must not be vicariously done by the organ. It is evident that the custom of using the organ in place of the singing was well recognised, for as late as 1600 it was ordered by the Pope that the verses of the Te Deum and Magnificat should be sung by the choir and played by the organ alternatively. In the Kyrie the organ was to perform the *Christe eleison* alone; in the Versicles



ORGAN OF CHARTRES. (FROM HILL'S "ORGAN CASES AND ORGANS OF THE MIDDLE AGES.")

Story of the Organ

and Gloria the organ was to be silent, the choir to sing; and the final verses of hymns were to be sung without the organ. When, however, a singer had a loud voice, he might be accompanied by the organ; and many of these customs found their way into the Lutheran ritual.

But opposition to the organ was strong and violent. A sixteenth century writer complains that “Cantus Gregorianus, as it is now performed, is a violent noise of organs, nothing else.” “We would relegate the organs and trumpets and flutes to the dancing theatres and the halls of princes; for the house of God is not to be a house of noise, but of love. If, therefore, singing is to be used in the church it should only be in unison, that as there is one God, one baptism, one faith, so there should be one song.”¹

“We admonish you in the name of God that the organs are never or only most rarely heard, lest we relapse into our former errors,” says another writer.

Bellarmino, a writer on church affairs, says: “The use of the organ may be continued in the churches, but other instruments may not easily be allowed.” Cardinal Cajetan says: “Although the use of the organ is new, and in the presence of the Pope is not tolerated, yet custom allows it on account of the weakness of some of the emotional believers.” Cardinal Bona says: “The moderate use of the organs cannot be condemned. The sound of the organ encourages the troubled senses, anticipates the joy of the higher kingdom, encourages

¹ Carlstadt's Propositions, 1522.

Luther and the Organ

the industrious, moves the righteous to love, and calls sinners to repentance." Persicus says that the general use of the organ and other instruments in divine service is praiseworthy in itself, and very useful in raising the mind to the contemplation of God.

The root of the approval or disapproval of organs and church music generally, does not rest on arguments for or against, but on personal predilections. If a church dignitary happens to be "musical," he will find reasons in favour of music; if he is so constituted, as many learned men are, that music does not appeal to him, he is likely, in unenlightened ages, to strongly object to the enjoyment by other people of an art which he cannot appreciate. The wholesale destruction of English organs by a fanatical soldiery was far more due to jealousy of an art of which they were ignorant than to any considerations of religion or expedience.

Luther, who encouraged the singing of hymns in four parts, looked with disfavour on the organ. "You see papistical work in organs, singers, vestments," etc. "Organs may only be used on Sunday in the Te Deum and in German hymns; they must not be used in the mass."

Luther
objects to
the Organ

But though Luther objected, the organ continued to be used in the mass in certain places. At Eisenach and Wittenberg it gave the key for the Introit, Agnus, Lord's Prayer, and Creed, while the hymn was performed by choir and organ alternately; but it does not appear that the choir ever sang with the organ.

Story of the Organ

We find, indeed, in the whole of the sixteenth century no evidence that the organ ever accompanied the singing in Germany, and the custom was probably the same elsewhere; the organ merely gave the key, played alternate verses, or took the place of the singing. The famous Lutheran hymns seem to have been intended for home use in place of the frivolous songs of the day, and only after they had become familiar were they introduced into the church.

A Brunswick Church Council in 1520 considered that organ-playing was not unchristian as long as it is not used for profane songs, and that the organist should have a salary given him. At Strasburg, in 1598, organ-playing and florid music were allowed as long as they did not interfere with the prayers and sermon.

The dislike to organs broke out into violence at Zurich in 1527, in which year the cathedral organ was destroyed, and all sacred song was silenced till 1598, when congregational singing was introduced. The movement spread to the Netherlands, where the rabble occasionally broke loose, and, in the name of reformation, destroyed most of the valuable church furniture. Hawkins quotes the following passage from Strada's *De Bello Gallico* :—

“ On the 21st of August, 1566, the heretics (*i. e.*, the Protestant mob) came to the great church at Antwerp with concealed weapons, as if they resolved, after some light skirmishes for a few days past, to come now to battle. . . . And though Johannes Immersellius, prætor of the town, with some apparitors, came and com-

Destruction of Organs

manded them to keep the peace, yet he could not help it, but the people running away to get out of the tumult, the heretics shut the doors after them, and as conquerors possessed themselves of the church. Now, when they saw all was theirs, hearing the clock strike the last hour of the day, and darkness giving them confidence, one of them, lest their wickedness should want formality, began to sing a Geneva psalm, and then, as if the trumpet had sounded a charge, the spirit moving them altogether, they fell upon the effigies of the mother of God, and upon the pictures of Christ and His saints; some tumbled down and trod upon them, others thrust swords into their sides or chopped off their heads with axes . . . part setting up ladders, shattered the goodly organs, broke the windows . . .”¹

This gives a picture of what went on in some parts of the Continent; the same things were repeated in the following century in England, and with such effect that very few organs survived the general destruction. Yet this putting down of organs was useless destruction. No religious rites, however refined or however vulgar, can long subsist without music; and no sooner were the organs destroyed by the reforming zealots than new ones had to be set up to support the singing in the reformed service. “Alas, gossip!” an old woman is made to say in one of the homilies, “what shall we now do at church, since all the goodly sights we were wont to have are gone; since we cannot hear the like piping, singing, chanting, and playing upon the organs that we

¹ Hawkins, *History of Music*, vol. iii. p. 451.

Story of the Organ

could before?" Upon which the preacher interposes, saying, "But, dearly beloved, we ought greatly to rejoice, and give God thanks, that our churches are delivered out of all those things which displeased God so sore, and filthily defiled His holy house and His place of prayer."¹

The old woman was right; the preacher showed a great lack of insight into human nature. No religious services can continue to attract without the help of music. By the uneducated, common music is required, such as general hymn-singing; the more refined the congregation is, the better music it will demand; hence the origin of trained choirs and fine church compositions, which institutions, like congregational singing and every other church ceremony, have from time to time been abused, and required reformation, but not abolition.

¹ Homily of the Place and Time of Prayer, quoted by Hawkins, *History of Music*, vol. iii. p. 460.

CHAPTER V.

The organ in the Church of England during the arrangements for a reformed ritual—English organs in 1634—General destruction of organs ordered under Oliver Cromwell—Escape of the organ at York Cathedral—Quaint allusion to it by Mace—Destruction of the organs of Westminster Abbey, Chichester, Peterborough, and other cathedrals—Restoration of the cathedral service under Charles II.—English organ-builders—Father Smith comes to England—Arrival of Thomas and Renatus Harris—The contest between Father Smith and Renatus Harris at the Temple Church—Description of Smith's organ—English organs unsatisfactory on account of having no pedals—Smith's organ at Durham—He is engaged to build an organ for St. Paul's—Sir Christopher Wren and the organ—Rivalry between Smith and Harris—History of the organ erected by Harris in the Temple Church—Organ-builders who succeeded Smith and Harris.

UNDER Edward VI. Marbeck arranged the reformed church service to be sung to the ancient plainsong. Mary swept this away, and re-established the Latin service. Elizabeth, who came to the throne in 1558, authorised a uniform order of common service and prayer, which restored the second liturgy of Edward VI.

**Changes
in the
Church
Services**

Elizabeth was not at all inclined to abolish the perfectly innocent "ornaments" which did so much to make the service of the church attractive. Though

Story of the Organ

Queen Elizabeth and the Ornaments
in public she was wise enough to be guided to some extent by the wishes of her people, in her private chapel "the altar was furnished with rich plate, with two gilt candlesticks, with lighted candles and a massy crucifix in the midst; and the service was sung not only with organs, but with the artificial music of cornets and sackbuts on solemn festivals . . . in short, the service performed in the queen's chapel, and in sundry cathedrals, was so splendid and showy, that foreigners could not distinguish it from the Roman, except that it was performed in the English tongue."¹

Elizabeth's views on Church Music
She was anxious to retain all that was best in the music of the church. To this end she ordained that "there be a modest and distinct song so used in all parts of the common prayers in the church, that the same may be as plainly understood as if it were read without singing. And yet nevertheless for the comforting of such as delight in music, it may be permitted that at the beginning and the end of common prayers, there may be sung an hymn, or such-like song, to the praise of Almighty God, in the best sort of melody and music that may be conveniently devised, having respect that the sentence of the hymn may be understood and perceived."

Yet her efforts failed to please the large number of more zealous or more bigoted reformers. Six Articles, suggesting further reformation of the liturgy, were pre-

¹ Hawkins, *History of Music*, vol. iii. p. 484.

Objections to the Organ

sented to the House of Convocation, the last of which required that the use of organs be removed from the churches. These articles were only rejected by a single vote, by proxy of an absent member; and another proposal was made, that organs and curious singing should be removed, which, however, was lost.

**The Six
Articles**

One of the leaders of the fanatical objectors to church music was Thomas Cartwright, a Bachelor of Divinity, Fellow of Trinity College, Cambridge, and Lady Margaret Professor. Being expelled the University, and deprived of his Fellowship, on account of having preached and lectured against the doctrine and discipline of the newly-established church, he went to Antwerp and Middleburg, where he became minister to the English merchants. On his return to England he fomented schism, and objected to the cathedral service and "the tossing of psalms from one side to the other, with the intermingling of organs." But earlier than this, the "Protestation of the Clergie of the Lower House," presented to King Henry VIII. in 1536, declared that "synging and saying of mass, matins, or evensong, is but roryng, howling, whisteling, mummyng, conjuryng, and jogelyng, and the playing at the organys a foolish vanitie."¹

**Thomas
Cartwright**

**A Protes-
tation
against
Organs**

In the second year of Elizabeth's reign she issued a proclamation against defacing the monuments in churches, for "the destructive zeal was at work in

¹ Burney, *Hist. of Music*, vol. iii. p. 3.

Story of the Organ

ruining whatever was sufficiently elegant and venerable to distinguish us from barbarians.”¹

In 1562 a paper was presented to the House of Convocation, praying “That the Psalms may be sung distinctly by the whole congregation; and that organs may be laid aside.”²

“A Request of all True Christians to the House of Parliament” was the title of a pamphlet, dispersed in 1586, praying “That all cathedral churches may be put down, where the service of God is grievously abused by piping with organs, singing, ringing and trowling of Psalms from one side of the church to another, with the squeaking of chanting choristers, disguised in white surplices.”³

But the reformers were quite ready to make use of the organ for the vociferating of metrical psalms, in which, as Burney remarks, there was little sense, less poetry, and no music. Though organs and the use of instruments, even for recreation, were forbidden by Calvin on the Continent, the dislike to them was, in England, kept within bounds for some time, and they were thus preserved from general destruction until the time of Oliver Cromwell’s supremacy. In the Lansdowne MSS.⁴

¹ Burney, *Hist. of Music*, p. 20.

² Neal, *Hist. of the Puritans*, vol. i. p. 162. ³ *Ibid.*, vol. i. p. 419.

⁴ A Relation of a Short Survey of twenty-six Counties, describing their Citties and their Scytuations in 1634, by a Captain, a Lieutenant, and an Ancient. Lansdowne MSS., No. 213, Fol. 315.

Organs in England in 1634

there are several references to the organs in English churches and cathedrals shortly before their destruction. Speaking of the church of Newark-on-Trent, the travellers found "In her sweet organs, some queristers and singing boys."

Organs
mentioned
by Travel-
lers in
English
Counties

At York Minster "We saw and heard a fair, large, high organ, newly built, richly gilt, carved, and painted." This was the organ given by Charles I. to the church.¹

At Durham—"Away then were wee call'd to Prayers, where we were wrapt with the sweet sound and richnesse of a fayre organ, which cost £1000, and the orderly, devout, and melodious harmony of the quiristers."

At Carlisle "We repayred to the Cathedral, where is nothing so fayre and stately as those wee had seene, but more like a great wild country church. The organs and voices did well agree, the one being like a shrill bagpipe, the other like the Scottish tone."

At Chester—"In the interim we all marcht to her organist's pallace, and their heard his domesticke organs, vyalls, with the voyces of this civill merry company sweetly consorted."

At Worcester—"After we had heard their voyces and organs at Prayer, viewed their stately rich glazed cloyster . . . we marched into the town."

At Hereford—"There we heard a most sweet organ and voyces of all parts: tenor, counter-tenor, treble,

¹ See p. 108.

Story of the Organ

and bass, and, amongst that orderly snowy crew of queristers, our landlord-guide did act his part in a deep and sweet diapason."

At Gloucester—"Heere were we admiring and whispering till the Cathedrall voyces whispered us away to prayers, and so soon as we heard those voyces and organs, and had viewed their fayrely glassed and carved-work cloyster, we hastened away to Berkeley Castle."

At Bristow "we found eight churches . . . and in the major part of them are neat, rich, and melodious organs, that are constantly played on."

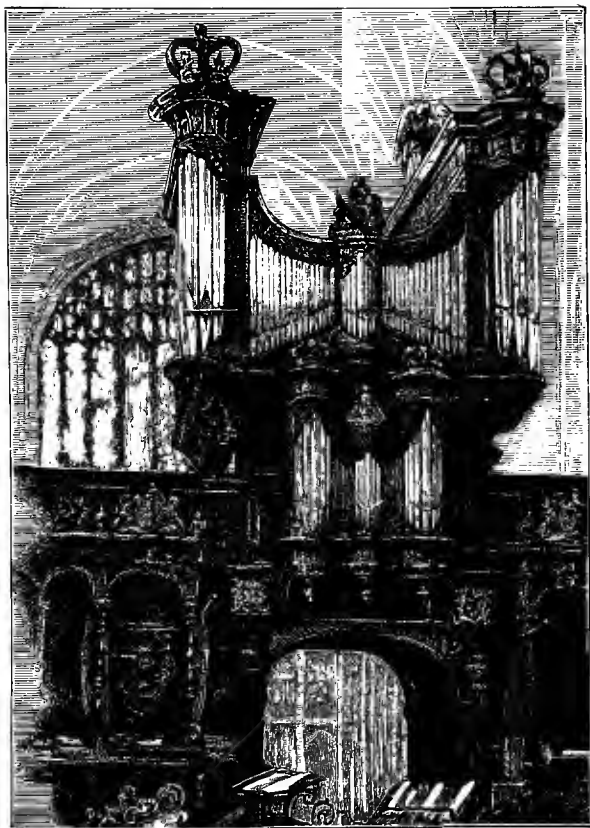
At Wells—"Curious monuments, rich organs, a strange and unusual clock. . . . We wer much satisfied in hearing and seeing a whole messe of so fayre, rich, neat, and sweet organs as the compass of this fayre fabricke afforded."

At Bath—The church "is adorned with a reasonable rich organ."

After the death of Charles I. all this was changed. The rulers of the land considered it necessary to true religion that no organs should be allowed to remain in the churches; that choral books and coloured windows should be destroyed; that the cathedral service should be abolished. It was enacted in 1644 that "all organs, and the frames or cases wherein they stand, in all churches and chappels shall be taken away and utterly defaced, and none other hereafter set up in their places."¹ The

**Destruction
of Organs
ordered**

¹ Hawkins, *History of Music*, vol. iv. p. 347.



CASE OF THE ORGAN OF KING'S COLLEGE, CAMBRIDGE,
MADE BY CHAPMAN AND HARTOP IN 1606. THE
CHOIR ORGAN WAS ADDED IN 1661.

Organ of Magdalen College

cathedrals were given over to the ravages of Cromwell's soldiery; horses were stabled in them, monuments destroyed, brasses stripped from the walls, the pipes of the organs pawned for pots of beer. Organ-builders had to subsist by carpentering; and organists and choirmen had to make a miserable living by becoming soldiers, or by teaching the lute and virginal in the houses of patrons. The organ of St. Paul's Cathedral was one of the few that escaped destruction: a brick wall was built, dividing the choir from the nave; a new door was made through one of the windows to give access to the choir, which was turned into a preaching place, the nave being turned into cavalry stables.¹

**The Organ
of St.
Paul's
escapes**

Oliver Cromwell was himself a lover of music, and a tradition says that he had the organ of Magdalen College, Oxford, removed to Hampton Court, where it was placed in the gallery for the amusement of the Protector during his leisure hours. On the restoration it was returned to its original owners.² This tradition has, however, been dissipated by Rimbault,³ who discovered an entry in Evelyn's diary to the effect that in 1654 he was at Oxford, where he visited Magdalen College and "saw the library and chapel which was likewise in pontifical order, the altar only I think turned tablewise; and there was still the double organ,

**A tradition
of Oliver
Cromwell**

¹ Hawkins, *History of Music*, vol. iv. p. 43.

² *Ibid.*, p. 45.

³ *History of the Organ*, p. 96.

Story of the Organ

which abominations (as now esteemed) were almost universally abolished: Mr. Gibbon, that famous musician, giving us a taste of his skill on that instrument."

Amongst other organs known to have escaped destruction were those of York, Durham, and Lincoln Cathedrals, St. John's College, Oxford, and Christ's College, Cambridge.

The organ at York Cathedral presented by Charles I. was built by Robert Dallam, citizen and blacksmith, of London. Every stop contained 51 pipes, so we may conclude that the semitones were divided; it had a great organ of nine stops and choir organ of five, and three pairs of bellows, but no pedals, for pedals seem to have been unknown in England until the last decade of the eighteenth century. Mace gives a description of the music in this cathedral during his day (1676) which is too quaint to be omitted:—

“There is a custom in the Cathedral of York (which I hear not of in any other cathedral which was) that always before the sermon the whole congregation sang a psalm, together with the quire and the organ; and you must also know that there was then a most excellent large, plump, full-speaking organ, which cost a thousand pounds.¹ This organ, I say, being let out

¹ A fine of £1000 inflicted on a gentleman for incest had been given by the King to the Dean and Chapter for repairing the Church, setting up a new organ, furnishing the altar and maintaining a librarian. The contract price for the organ was £297, with £5 more for Dallam's journey from London to York.

Destruction of Organs

into all its fulness of stops, together with the quire, began the Psalm.

“But when that vast-conchording unity of the whole congregational chorus came (as I may say) thundering in even so, as it made the very ground shake under us: (oh, the unutterable ravishing soul’s delight!) in the which I was so transported and wrapt up into high contemplation that there was no room left in my whole man, viz. body and spirit, for any thing below divine and heavenly raptures.”

Some organs were sold to private persons, others were only partially destroyed, and the clergy managed to save some by taking them down. Others shared the fate of that at Westminster Abbey, where two companies of soldiers were quartered, who broke down the altar rail and burned it in the place it had stood, broke down the organ and pawned the pipes at ale-houses for pots of ale. They put on the surplices, and ran up and down the church playing hare and hounds, he that wore the surplice being the hare.¹

West-
minster
Abbey

At Chichester the soldiers broke down the organ, and dashing the pipes with their poleaxes, scoffingly said, “Harke how the organs go!”² At Peterborough there were two “pairs of organs,” one of which stood in a high loft over the choir. A regiment of horse under Colonel Cromwell broke into the church and threw this organ to the ground, “where they stamped

Chichester

Peter-
borough

¹ *Mercurius Rusticus.*

² *Ibid.*, p. 225.

Story of the Organ

and trampled it to pieces in a strange, furious and frantic zeal.”¹ “When their unhallowed toylings had made them out of wind, they took breath afresh on two pair of organs, piping with the very same about the market-place lascivious jigs, whilst their comrades danced after them, some in the coaps, others in the surplices, and down they brake the bellows to blow the coals for their further mischief. And lest any should ring auke for the fire they had made, they left the bells speechless, taking out their clappers, which they sold with the brass they flaid from the grave-stones.”²

Exeter At Exeter they took several hundreds of the pipes into the streets, where they went up and down piping on them. At **Canterbury** Canterbury they spoyled the organs; at **Winchester** Winchester a body of horsemen rode into the cathedral with drums beating and colours flying and threw down the organ, burned the altar rail and choir books, and demolished the ancient carved work.

A destroying party of soldiers seems to have been sent through Kent in 1642 under Colonel Sandys and **Rochester** Sir John Seaton. At Rochester, hearing that the Dean was to preach on Sunday morning, they sent to command him to forbear the wearing of the surplice and hood, to which the Dean stoutly answered that if they expected any sermon from him, they must permit him to appear in such ornaments

¹ Gunton, *History of Church of Peterborough*, p. 333.

² *Mercurius Rusticus*, p. 248.

Destruction of Organs

as the church and his degree required. Hearing the organs on approaching the cathedral, Seaton started back, crying, "A devil on those bagpipes." Entering during the morning service, they marched up to the altar, but finding that this did not stop the service, they endeavoured to insult the congregation by asking why they knelt; receiving no answer, they returned to the altar, which they removed with the rail, and gave the latter to the rabble to burn, leaving the organ to be destroyed when they came again; but the people of Rochester removed it in the meantime. They then went to Maidstone, Faversham, and other places, working similar destruction. The inhabitants of Maidstone, however, were spirited enough to make the place too hot for them on a second visit, and they were forced to retire from it.

Maidstone

Norwich Cathedral was filled with soldiers, who, after tearing down the organs, and burning the books and vestments in the marketplace, treated the building like a common ale-house. At Little Gidding, in Huntingdonshire, they broke the organ to pieces and made a bonfire of it, at which they roasted several sheep.

Norwich

**Little
Gidding**

Similar destruction took place in Ireland. In 1650 a fine organ in Waterford Cathedral was taken down by the Cromwellians, and its pipes, which were of lead, were sold by auction in the following year by Colonel Sadleir. In

Ireland

Story of the Organ

1652 Lieut.-Colonel Puckle, Governor of New Ross, Co. Wexford, "took away the fayre payre of organs and a ring of five bells from St. Mary's Church, New Ross."¹

Upon the restoration of Charles II. to the throne in 1660, great efforts were made to restore the cathedral service as soon as possible. But during the twenty-one years of interregnum, the organists and singers had been dispersed, many had died, and few persons were left capable of organising the music. Organ-builders could scarcely be found; there were only Dallam of London, Hayward of Bath, Loosemore of Exeter, Thamar of Peterborough, Preston of York, and Thomas Harris of Salisbury, who had contrived to keep their hand in by repairing organs in private houses, and thus had preserved something of their skill. Dallam was employed to build organs at St. George's Chapel, Windsor, the music school at Oxford, and the parish churches at Rugby, Hackney, and Lynn Regis. The organ at St. George's does not seem to have been successful: either he built it in too much haste or was out of practice, and it was soon removed. Hayward was employed to build an organ for the minster of Wimborne, which was finished in 1664 at a cost of £180. Loosemore built a new organ in the cathedral of Exeter, which had a double diapason, the lowest pipe of which was 20 feet 6 inches in length, and could contain three hogsheads eight gallons

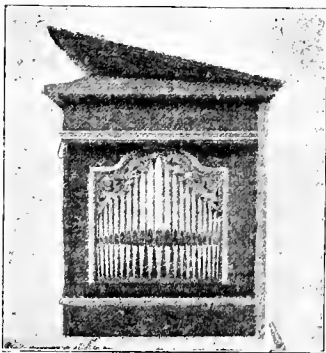
¹ Communicated by Mr. W. H. Grattan Flood, M.R.I.A.

Loosemore's Exeter Organ

of water. The pipes stood in two side-towers; and, according to the anonymous author of *A Short Account of Organs built in England from the reign of King Charles II. to the present time* (1847), they were not a success, probably owing to the bellows being too small. The author, who had a prejudice against large organs and bass pipes, says, "The great pipes, after standing in silent show for more than a century and a half, have now been made to speak by the assistance of modern bellows: the effect of which exploit is to make the hearer sincerely wish that the trouble had been spared, and that the pipes had been left in their original harmlessness."

Loosemore also made an organ of three stops, all of wood, for the singing school of the cathedral; and in 1665 he built an organ of eight stops for Sir George Trevilyan at a cost of £100, one of the stops being "a shaking stopp."

It was evident that so few builders could not comply with the sudden demands made all over England for new organs, and the field was open for foreign competition. The first builder to come over was Bernard



POSITIVE. GALPIN COLLECTION.)

The bellows, seen on the top, are raised by a rope over a pulley.

Story of the Organ

Schmidt, who arrived in 1660, bringing with him two nephews, Gerard and Bernard: to distinguish him from the latter he was called Father Smith.

**Father
Smith
comes to
England**

He was at once employed to build an organ for the royal chapel at Whitehall, but it proved unsatisfactory, owing to hasty workmanship. Smith, after this experience, never built an organ on short notice, or for a low price; and owing to the care and labour he spent on every pipe, his work became famous for sweetness of tone. Some of his stops are still in use, having been incorporated into modern organs on account of their excellent qualities. Smith's machinery, or as it is technically termed "action," was, on the contrary, notorious for noisy movements and inconvenient interior arrangements, and he was careless about the aspect of his instruments. "I do not care," he said to a friend who had found fault with the look of his pipes, "if the pipe look like a devil; I will make it speak like an angel." The touch of his organs is described as feeling as if cotton-wool were placed under each key; and the bellows, in common with those of all organs built anterior to the nineteenth century, supplied the wind in a very irregular manner, and caused the organ to sound tremulous.¹ Some of his keyboards, following a fashion of that day, had black naturals and white sharps.

¹ *A Short Account of Organs from the reign of Charles II. to 1847.*

Smith and Harris

Immediately the Whitehall organ was completed, Father Smith was engaged to build one for Westminster Abbey, at a cost of £120, and in course of time he built organs at Wells Cathedral, St. Martin's-in-the-Fields, St. Giles's - in - the - Fields, and many other churches. He became organist of St. Margaret's, Westminster, in 1676, with a salary of £20 a year, and was appointed organ-maker to the king, with a residence in Whitehall. He died in 1708.

A new
Organ at
West-
minster
Abbey

Shortly after Smith's arrival in 1660 he was followed by John Harris, a son of Thomas Harris of Salisbury. John Harris had been carrying on his trade of organ-builder in France during the interregnum, and had trained to the same calling a son named Renatus, whom he brought with him as his assistant on his return to his native land. He seems not to have obtained much work until after the death of Dallam in 1672. Renatus, who was a far better builder than his father, became very famous, and was engaged to build organs at the Cathedrals of Salisbury, Gloucester, Worcester, Chichester, Bristol, Winchester, Hereford, St. Patrick's Cathedral, Dublin, and at many parish churches.

Arrival of
Harris and
his Son

Renatus
Harris

In 1682 a new organ was required for the Temple Church, and the Benchers, anxious to obtain the very best possible instrument, invited the two most famous builders in England, Smith and Renatus Harris, to

Story of the Organ

compete for its construction, suggesting that if they would each set up an organ in one of the halls of the Temple the Benchers would select that which pleased them best. But Father Smith was not at all satisfied with this proposal, and he had good ground for complaint, because he believed that he had been given the order for the organ, and that Harris's name had been brought in afterwards. He therefore presented a memorial to the Benchers, signed by five tradesmen employed in the Temple, stating that they were witnesses of the two Treasurers having discussed the matter of building an organ with Smith in the church, and of their having definitely ordered him to build an organ, and that no mention was made of Rhenatus Harris being in competition with him. The Benchers took no notice of the memorandum, but ordered both builders to set to work, and in about fourteen months' time each had his instrument ready. The two organs were accordingly set up on opposite sides of the church, and the competition began. Father Smith obtained the services of Dr. Blow and Henry Purcell to play on his organ on certain days, when audiences were invited to hear it, and every one thought that it was sure to win the contest. Harris obtained the services of Draghi, organist to Queen Catherine, and his organ was much admired. The contest continued for about a year, and no decision was arrived at. Harris then challenged Smith to make within a given time new reed stops, the Vox humana, Cremona, Double courtel or

The Temple Contest

double bassoon, and some others. This was done, and the crowds who attended were delighted; but still the Benchers could come to no decision as to which was the best. The supporters of each builder became more and more hostile against the opposite party, and it is said that Harris's friends even went to the length of cutting the bellows of Smith's organ the night before the last trial of the new reed stops. The competition became tedious and tiresome, and the barristers pressed for a decision. The Masters of the Bench of the Middle Temple called a meeting on June 2nd, 1685, at which they decided in favour of Smith's organ, considering that it was of sweeter and fuller tone than that of Harris, and had quarter-notes and extraordinary stops and other rarities; and not only was Harris's organ not powerful enough for the church, but Smith had been first treated with, and Harris was brought in as an after-thought. But the Benchers of the Inner Temple were dissatisfied with the verdict, and proposed to count the pipes of Smith's organ! To this the others answered that such a proposal suggested such a fraud on the part of the artist as was inconsistent with the credit of his profession. The date of the termination of the controversy is not known, but Smith's organ was paid for in the sum of £500 on June 21st, 1688.¹ The organ, which was of FF compass, consisted of three manuals. The great organ contained ten stops, the choir six, the "ecchos" seven.

**The
Benchers
decide in
favour of
Smith**

¹ Hopkins and Rimbault, *History of the Organ*, pp. 104 *et seq.*

Story of the Organ

The sharps were divided as explained on page 65, and there were no pedals.

The organs built by Smith, Harris, and the other English builders of the seventeenth century were excellent as regards tone; but the absence of pedals must have not only detracted from their fulness of sound, but must have given the unfortunate player a great deal of trouble. One of its results is seen in the varying downward compass of keyboards; for while the Continental builders agreed in making C their lowest note, English organ-builders were obliged to extend the compass of the manuals downwards to G or F in order to obtain depth of tone; and their left hand was occupied in playing the bass only, while it might have been better employed with the harmony.

Smith now contracted to build an organ for Durham Cathedral, of two manuals and seventeen stops, with two oak fronts, one facing the choir, the other the nave. In these were to be placed the pipes of the two open diapasons. The cost was to be £700, and the old organ, which had escaped destruction, was to be given in part payment; but it was agreed that Smith was not to carry it away until the new one was ready to set up. In addition to the price agreed upon, a further sum of £50 was to be paid for gilding and painting the front pipes of the Great and Choir organs.

Smith's reputation became so great by this and other

St. Paul's Cathedral

instruments that he was chosen by the Dean and Chapter of St. Paul's to make an organ for their cathedral, the rebuilding of which, after the Great Fire of London, was completed in 1694. But Sir Christopher Wren, in planning the church, seems to have completely forgotten the necessity of providing space for the organ; and when it was brought to his notice, he proposed that it should be placed over the choir, in the position it had held in the old cathedral. By this means the extent and beauty of the view from the west end would not be interfered with; and there was certainly much to be said for this position of the organ. But the Dean thought otherwise, and wished to place it on a screen at the west end of the choir. Sir Christopher was a man of hot temper, who did not readily yield a point, but in the end he found himself obliged to yield to the Dean, much to his disgust. The controversy was a long one, and Smith, who was given a workshop in the cathedral, could not begin his work until it was settled.

An Organ
required
for
St. Paul's
Cathedral

The case was designed by Sir Christopher, and carved by Grinling Gibbons. Sir Christopher went to work very unwillingly, saying that his architectural proportions were spoiled by the d—d box of whistles; and when Smith put his open diapason pipes in, it was found that they projected nearly a foot above the top of the case and destroyed its appearance. Moreover, the case was too small in other ways, and three of the

Wren's
dislike to
the Organ

Story of the Organ

stops were obliged to be omitted, the pipes of which lay in the vestry for many years.

The Case is found to be too small Wren had objected to placing any ornaments on the top of the case; but he was now obliged to add several feet of extra height, part of the addition consisting of angels blowing trumpets; and as no more wood of the same colour as the case seems to have been obtainable, the addition is noticeable to this day in the slightly lighter colour of its wood. The case is now divided, half standing on the north and the other on the south side of the choir.

Rivalry between Smith and Harris The contest at the Temple had caused a bitter rivalry to spring up between the partisans of Smith and Harris. There exists in the British Museum a broadside, quoted by Hopkins and Rim-bault,¹ in which twelve queries are asked, tending to discredit the St. Paul's organ; suggesting that it might have been divided on two sides of the gallery or organ loft; that the pipes spoke badly, and should be more properly called Mutes than pipes; that the instrument was not powerful enough for the church (some of the more powerful stops had been discarded, as we have seen); that the bellows were too small; that an organ built by Harris for a city church was much better. Harris had been a candidate for building St. Paul's organ, and the broadsheet was evidently the work of his friends. But the organ was finally completed in spite of difficulties and

¹ *History of the Organ*, p. 114.

Successors of Smith and Harris

hostile criticism, and was opened at the thanksgiving for the peace of Ryswick, December 2, 1697, by Jeremiah Clark. The contract price was £2000.

The organ built by Harris for the Temple Church was taken to the cathedral of Christ Church, Dublin, where it remained until about 1750, when it was replaced by a new one, built by Byfield. Byfield took Harris's organ in part payment, and endeavoured to sell it to the parishioners of Lynn; but they refusing the offer, it remained on his hands until his death, when his widow sold it to the parish of Wolverhampton for £500,¹ where it was much admired.

Harris's
Temple
Organ

Harris is said to have built two organs to Smith's one,² but they were evidently less lasting than those of his rival, for Dr. Rimbault gives a list of forty-five instruments known to have been built by Smith, and only mentions thirty-nine built by Harris.

Smith was succeeded in his profession by his nephews, and Rénatus Harris by his sons. John Harris seems to have entered into partnership with Byfield, who married his daughter, and they built several important instruments together. One of Smith's workmen, Christopher Schrider or Schreider, married his daughter, and built organs for the Chapel Royal, St. James's, St. Mary Abbott's, St. Martin's-in-the-Fields, and Westminster Abbey. Another German builder was Thomas Schwarbrook, one

Successors
to Smith
and Harris

¹ Hawkins, *History of Music*, vol. iv. p. 355.

² *Ibid.*, vol. iv. p. 355.

Story of the Organ

of Renatus Harris's workmen, who set up a business at Warwick, and built several organs in the Midlands.

But Englishmen were not idle. Besides the builders mentioned on page 112, others became famous, such as the Jordans (father and son), Richard Bridge (who went into partnership with the Jordans), and Byfield. Other names in the eighteenth century are Glyn and Parker, Thomas Griffin, Crang and Hancock, Samuel Green, John Avery, G. P. England.

Two other German builders came to England—John Snetzler, born 1710, and Paul Micheau, who came here about 1780; and many hundreds of organs were built, not only in cathedrals and parish churches, but in the halls of City companies, in private houses, and in theatres. Organ-playing was more general in the eighteenth than in the latter part of the nineteenth century, when the instrument has given way in private houses to the grand piano, which is more portable than the smallest and more capable of expression than the largest organ.

CHAPTER VI.

German and Dutch organs in the seventeenth and eighteenth centuries—Examination of candidates for organistships—Organs at Haarlem, Antwerp, Cologne, Strasburg, and other towns—Bach and the Hamburg organs—Arnold Schlick's rules for organ-building—A transposing keyboard—Large organs required by Lutheran congregations—Difficulties with the sound-boards—Ventils—Tricks of dishonest builders—The organ at Gröningen—Examined by fifty-three organists, who fail to discover its defects—French organs—English organs after the Restoration—English inventions: the swell, concussion bellows, wind-gauge, composition pedals, horizontal bellows, and Cumming's improvement in their construction, hydraulic and gas engines for blowing—The pedal in England—English improvements in pedals—The old German pedals: their position with relation to the manuals fixed by Imperial decree—Prejudice against pedals—English inventions for avoiding heavy touch—The pneumatic action—Electric action—Couplers—English improvements in their mechanism—German and Italian builders adopt English improvements.

DURING the seventeenth and eighteenth centuries Germany and Holland took the lead in the art of organ-building, many very large instruments being erected in those countries, some of which are still in existence. Like the German organs of the present day, they were always provided with a powerful pedal organ, which sometimes contained more stops than either of the

German
and Dutch
Organs

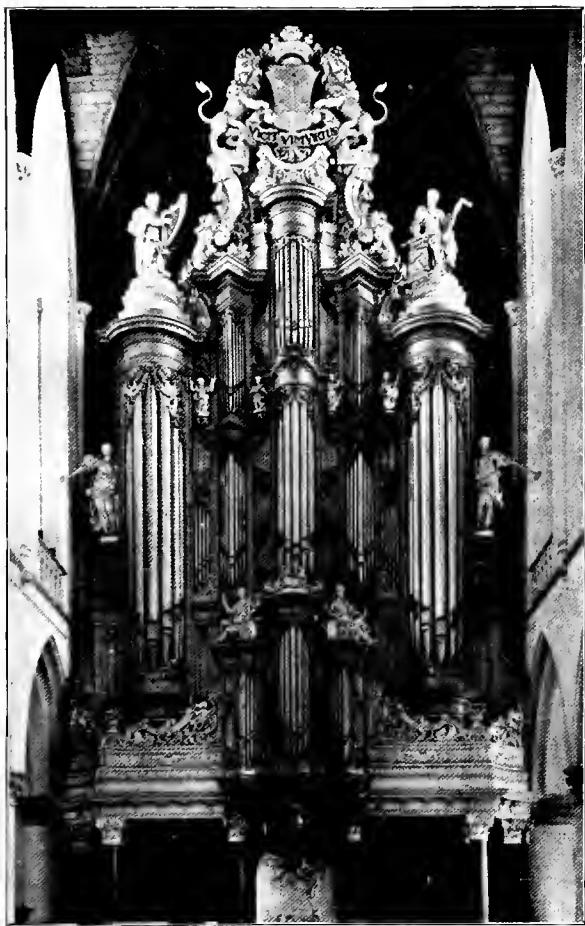
Story of the Organ

manuals ; they occupied several years in building, and when completed were dedicated by a solemn service, with a sermon, which was sometimes published.

The appointment of the organist was an important function. The candidates were first examined as to their skill in organ-playing, which included an extempore fugue on a given subject. The selected candidate was then questioned as to his religious views, and was required to sign a deed, pledging himself to lead a respectable and sober life, to obey the Church authorities in all things, to be diligent in the fulfilment of the duties of his office, to treat the choir-boys with humanity, to instruct them in music, and to make no journeys without the consent of the authorities. The appointment then took place with formalities, including musical performances and an exhortation from the pastor.¹

The famous organ in the cathedral at Haarlem was built by Christian Müller in 1735-38. It contains sixty sounding stops, of which sixteen are on the Great, fourteen on the Positive, fifteen on the Echo, and fifteen on the Pedals. The "Prospect" or front, over one hundred feet in height, has a magnificent effect. Two side towers contain the thirty-two feet pipes; three central towers placed one above the other are formed of sixteen feet pipes, while the spaces between the side and central towers are occupied by smaller towers and flats, formed of an immense number of the lesser pipes. The tone is excellent; the full

¹ Spitta, *Life of Bach* (Novello), vol. ii. p. 188.



HAARLEM CATHEDRAL ORGAN. FROM A PHOTOGRAPH.

German Organs

organ is well balanced, and not overpowering, while the solo stops are of peculiarly beautiful quality. Antwerp possesses a fine old organ in the Church of St. Paul, built by Terbrugen in 1670, containing three manuals and fifty-one stops, of which seven are on the pedal. At the Church of the Minorets at Cologne there is a good organ of thirty-three stops (six of which are on the pedal), said to have been built at the end of the sixteenth century; and there are several other old organs of considerable size at Cologne. Strasburg possesses several three-manual organs built by the famous Silbermann, who was contemporary with Sebastian Bach. One of its best Silbermann organs, famous for the beauty of its diapasons and flutes, was destroyed, together with the church in which it stood, during the Franco-Prussian war.¹ A fine organ was built at Waltershausen, 1726 to 1730, by G. H. Trost, of three manuals and fifty sounding stops, of which the pedal organ contained fourteen. Hamburg was famous for its organs in the eighteenth century: we read that "Bach was perfectly happy with the organ at St. Catherine's, with its four manuals and pedal."² This organ contained a large number of reeds, to which class of stop Bach was particularly partial. It was built in the sixteenth century, but had been renovated in 1670 by Besser. Hamburg also possessed another

Antwerp

Cologne

Strasburg

**Walters-
hausen**

Hamburg

¹ Hopkins and Rimbault, *The Organ*, p. 360.

² Spitta, *Life of Bach*, vol. ii. p. 18.

Story of the Organ

four-manual organ, built in 1688-93, by Arp Schnitker for the Church of St. James. Its Pedal contained fourteen stops, its Great twelve, its Choir thirteen, its Echo thirteen, and the fourth manual eight. Dr. Hopkins calls the fourth manual a "swell"; if he is correct, the swell must be a later addition, for it was not invented until the beginning of the eighteenth century. Bach became a candidate for the position of organist in this church, but was rejected in favour of an amateur, of mediocre ability, who made the Council a gift of money in return for his election. The organ of the Marienkirche at Lübeck, built in 1518, has four manuals, and, according to Hopkins and Rimbault, "two pedals"; but it is probable that a single pedal board acts on the "Great Pedal organ" or the "Choir Pedal organ" at the will of the player, by means of ventils, of which we shall speak later. This large instrument, of which Buxtehude was the organist in the early part of the eighteenth century, has eighty-two stops, of which twenty-one are on the Great, and an equal number on the two Pedal organs. Bach travelled two hundred miles on foot to hear Buxtehude play, and so much was he attracted by the musical performances in this church that he outstayed his leave of absence from Arnstadt, and in consequence became involved in difficulties with the Consistory. There is also a smaller organ in this church of three manuals and pedal, and there is an organ of four manuals and pedal in another church at Lübeck. In 1702 an organ of no less than five manuals and pedal was

Arnold Schlick's Instructions

completed at Merseburg, by Zacharias Theusner, and about the same time a five-manual organ was erected at Halberstadt by Heinrich Herbst. Large organs are to be found in all important towns in Germany, and in some cases the various churches seem to have vied with each other as to which should possess the finest instrument.

**Five-
Manual
Organs**

Arnold Schlick (born 1462), Court organist of the Elector Palatine in Bohemia, seems to have been one of the builder-organists, for in his *Spiegel der Orgelmacher und Organisten*, published about 1511, instructions are given for making an organ, and a complete system of tuning is described. His suggestions and rules are worth referring to, for the insight they give into the state of organ building and playing in his day. In Chapter I. he says that the organ should not be placed too far from the choir, as is the case in some large churches. The choir should be able to hear when the organist plays on one stop alone, and the organist must hear the priest at the altar.

**Arnold
Schlick**

**Position
of the
Organ**

It would seem from this that even in those days an organ in the west end was used to accompany the choir and clergy in the chancel. The organ must be in a place that is free from damp, and where things will not fall from the roof into it, as happened a short time ago, when an organ was ruined by this means. What must have been the condition of the roof to allow "things" to fall into the organ! The bellows must

Story of the Organ

be neither in the sun nor under the roof, or they will get hard and will break. Where there is no room, a special bellows chamber should be built.

The organ must be pitched to suit the choir, otherwise it will be necessary to often use the semitones.

Pitch Here we see the difficulty caused by the unequal tuning cropping up: the semitones must be avoided if possible. What the pitch should be our author cannot settle, for in some places people sing high, in others low. He suggests as a good chorus pitch that the lowest pedal F should be a pipe of sixteen feet; and for a high pitch, the lowest C should be a pipe of sixteen feet; but if the organ is to be very large, this C must be a thirty-two feet pipe.

An organist should be able to play the Plainsong in the keys of C, D, E, F. The Plainsong was always played in unison; therefore the "semitones" required for the keys mentioned by Schlick would not hurt the ear, for when no harmony was used, unequal temperament was not very offensive.

He complains that the trumpet and krumhorn stops always seem to be a little too high or too low; the earliest reed stops were not well made, and were probably often out of tune.

Early Reed Stops It is interesting to find that he mentions a transposing keyboard, "a rare thing, but one that I use daily." It could play one tone higher or one tone lower than the normal pitch.

A Transposing Keyboard He says that the compass of the manuals is to be three octaves and a third, namely, from F, to *a'*.

Size of the Keys

The keys are not to be so wide as the old ones, or so narrow as in some new organs, which were only fit for children. The width of the keys is to be such that the organist can easily grip an octave with one hand. They are also to be long enough; for if they are too short the fingers will collide with the board at their back, and will be sorely hindered. The semitone keys must not be too thin or too low, or they will go below the naturals when pressed down; nor must they be on a level with the naturals. All the keys must be easy to press down.

The
Manuals

It is evident from the above passage that the measure of the keys was not settled in 1511, and that experiments were being made to find a convenient size and shape. At first sight it appears surprising that organ-builders did not adopt the clavichord keyboard as their model for that of the church organ; but they were probably troubled by the complicated machinery of the organ, and the difficulty of inventing a method of admitting sufficient wind to the large pipes by means of small keys. A simple way would have been to place the pivot of the backfall near the key, and so cause the part acting on the pallet to work at a larger angle than that at the key end (see Fig. 1, page 17); but this would increase the weight of the touch to such an extent as to make it impossible to press down with the finger. Another way, suggested by Schlick, would be to place the pull-down far back on the pallet; but, he says, the farther back it is placed, the heavier will be the touch.

Story of the Organ

Regarding the pedals, he says they must not be too thin or they will break; and they must not be too long or too short, but of good average length, whatever that may mean. Again, the manual clavier must be of such a height above the pedals that the organist does not knock his knees against it.¹ The seat, he says, must not be screwed down, but must be movable so that each player can adjust it to his liking.

Our author then gives directions for tuning, and casually mentions that twelve years ago (that is to say, before the end of the fifteenth century) an organ was built with double semitones; an interesting piece of information, as showing the time at which men began to be dissatisfied with the tuning in use. Another remark he makes must be referred to. He says that the roughness of the thirds is mostly heard in closes; the organist must therefore seek to hide it by florid passages, by shakes, and by all manner of ornaments.

The great size to which German organs attained has been attributed to the requirements of the Lutheran ritual. Previous to the Reformation, the congregation took little part in the music beyond singing

¹ Deficiency of space for the knees is not unknown in some old English organs. About twenty-five years ago, a choral work was being practised in a college chapel at one of our universities, when there was a sudden stop, owing to a terrible noise from the organ. The organist, a tall man, had got one of his legs jammed between the pedals and keyboard, and could not extricate it!

Tricks of Organ-builders

certain portions of the Plainsong; but when Luther's chorales had taken a hold on the people, and had been admitted into the churches, they were sung by the whole congregation, the choir being of little account, and to control such a mass of untrained voices a large and powerful instrument was necessary. Schlick, writing before the Reformation, makes no mention of the requirements of the congregation, while he is careful that the choir shall be properly supported. Post-reformation organists made the chorale their chief object of cultivation.

**The
Lutheran
Ritual**

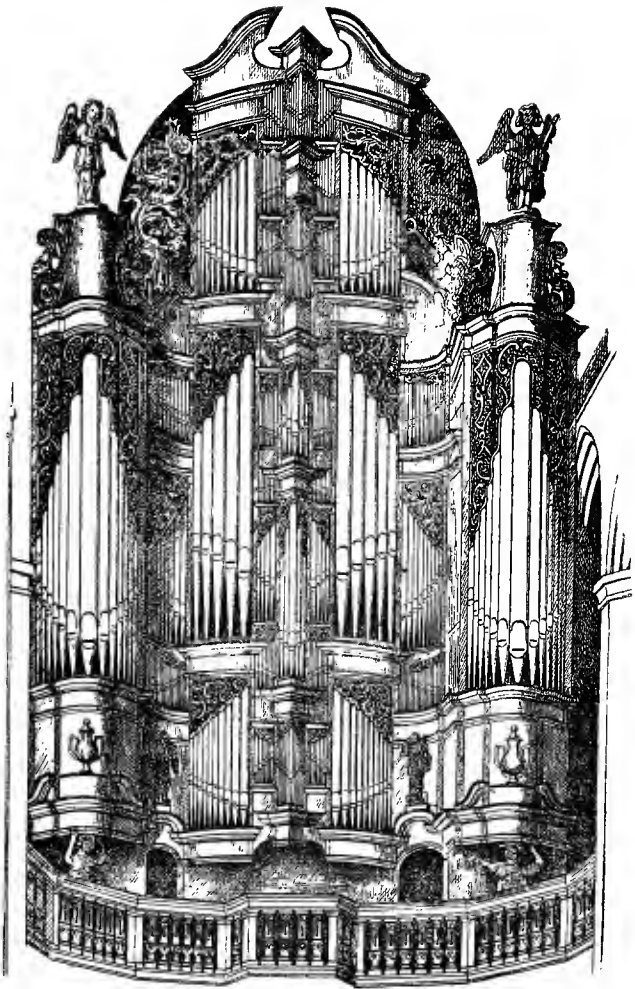
But the making of large organs was not without its drawbacks. The builders found it impossible to construct the sliders so accurately as to prevent escape of wind, and "running," that is the admission of wind to pipes for which it was not intended; and in wet weather the sliders would swell and stick.

**Difficulty
with
Sound-
boards**

Jacob Adlung, a professor and organist at Erfurt from 1727 to 1762, in his *Musica Mechanica Organædi*, describes these difficulties, and the tricks they caused dishonest builders to play. In order to obviate as far as possible the trouble with the sliders, all old German organs are provided with valves, called ventils, which shut off the wind from the wind-chests until it is required. The reservoir may be filled by the blower, and the stops drawn, but no stop will sound until the

Adlung

Ventils



ORGAN OF STRALSUND. (FROM HILL'S "ORGAN CASES AND ORGANS OF THE MIDDLE AGES.")

Tricks of Organ-builders

organist has opened the ventil and allowed the wind to pass to the wind-chest.

Some organs had a "Haupt-ventil," which shut off the wind from the whole of the organ; others had ventils called Sperr-ventil, Brust-ventil, Pedal-ventil, which shut off the wind from various sections of the organ. The organist prepared the stops he wished to use on each manual, but kept the ventils closed until he was about to begin. If he drew them beforehand there would, in many organs, be a terrible hissing and whistling, which would disturb the service. But hissing and whistling would not disturb his playing, for the wind, finding its natural outlet through the pipes, would not have sufficient pressure to cause a noise by its escape in other directions.

With the ventils dishonest builders seem to have been in the habit of playing tricks by which, unless the organist had some knowledge of organ construction, they were able to gain undeserved profit for themselves. Organ-builders, says Adlung, have introduced secret ventils, which after a time become half closed, so that no one knows why an insufficient supply of wind comes. Then the congregation (who in Germany take great interest and pride in their organ) believe that new sound-boards are necessary, and bravely subscribe and pay for them, while the builder takes away the good old ones and uses them somewhere else. Werckmeister, writing in 1705, says: "I lately discovered in a large organ a secret ventil by which half the wind was shut off from

**Secret
Ventils**

Story of the Organ

the chief manual; its object being that the builder desired to obtain the old sound-box, and to persuade the congregation that the organ required a new one. Such miserable tricks," he says, "bring the whole art of organ-building into disrepute." Werckmeister mentions the defects in the old organ at the Schlosskirche at Gröningen,¹ which he was required to report on.

The Organ at Gröningen This instrument, which was very famous in its day, had been built by David Beck in 1592-96. It had twelve stops on its

Great, fourteen on its Positive, seven on its third Clavier, called Brustwerk, and an enormous Pedal organ of twenty-six² stops, the pipes of which were placed in great and small side towers. When it was completed, no less than fifty-three organists were

Fifty-three examiners invited to inspect and examine it, amongst whom were Leo Hassler and Michael Pretorius. Three thousand thalers were divided as "dranck-geld" amongst the examiners, and the work cost 13,000 thalers "without counting the eating and drinking."

The fifty-three organists were all musicians of repute, but they appear to have had little knowledge of the building art. Amongst the defects discovered by Werckmeister, which he kindly ascribes to the carelessness of apprentices in the absence of

¹ *Organum Grünigense redivivum*, 1705.

² This is exactly the number of stops contained in the Pedal organ of the instrument built by Messrs. Hill & Son in 1886-89, for Sydney, N.S.W., the largest existing organ in the world.

Organ at Gröningen

the builder, whose reputation he wishes to shield, were—

The large pipes, not being properly secured, frequently fell back into the organ, and smashed the small ones.

Their feet were not strong enough to support their weight, so that many had sunk.

The Pipes
fall down

Some of the pedal keys were impossible to press down, and there was not enough wind, so that with many stops drawn the organ was very much out of tune. The account of further defects occupies many pages of the pamphlet, and the wonder is that if a celebrated builder, who was allowed four years to do the work, produced such a poor result, any organs held together at all.

A curious feature of this organ was its tuning, or the tuning of such stops as were in working order after the falling in and sinking down of the large pipes. The equal temperament system was by this time making good headway in Germany, and the Great organ at Gröningen had been altered to it, while the Positive stood uncorrected in what was at that time called the "Pretorian temperament"—that is the system prescribed by Pretorius, who was regarded as a great authority on organs. "One can perceive," he says, "that the new temperament is more agreeable." It is evident, however, that the two manuals could not be used together under these conditions.

Keyboards
differently
tuned

Between organists and builders there seems to have

Story of the Organ

been no love lost. Organists, says Werckmeister, can easily cure such a simple thing as a sticking ventil, or a fly or dust in a reed, but the custom is to employ the builder, who gets a ducat or half a thaler for fifteen minutes' work. "I know," he continues, "that by mentioning such things I only make enemies; for Messieurs the Organists will laugh, and say they do not trouble about such trifles; and the builders will say that I am seeking to reduce their incomes. I am only seeking the best for the congregation and church. Honourable organ-builders will do all they can in the interests of their art, and will have their due reward, and I do not wish to hinder any honourable man from making his living."

There were, however, exceptions to the careless organists who did not trouble if a fly got into a reed; for Reinken, organist of St. Catherine's Church at Hamburg from 1654 to 1722, was very proud of his instrument (see p. 125), which he was always talking of, and which he is said to have kept in excellent tune.

Germany has continued to build large organs to the present day, but until the end of the nineteenth century lagged somewhat behind other nations in adopting modern mechanical improvements, and especially in the making of good reed stops. Now, however, her organ-builders have overcome their prejudices, and use all the modern devices for easing the touch, steadying the wind, and generally simplifying the work of the player, that are to be found in English organs.

English Post-Restoration Organs

France has in the present day carried the art of organ-building to a high degree of excellence, especially in the reed department, and in fineness of mechanism. Organs are not common, however, in France, and are only to be found in the great towns, large provincial churches being content with harmoniums. The art of organ-building in France was regenerated by Aristide Cavallé-Coll, a member of a distinguished organ-building family in the south of France. Cavallé-Coll built a large organ for the Church of St. Denis in 1841, in which he used the pneumatic key action, an English invention, of which we shall have more to say later. This organ made his reputation, and he was called upon to construct many others, through which he did much to raise French organ-building to the high position it now occupies.

**French
Organ-
building**

The organs built in England after the Restoration consisted of two or three manuals and no pedals. The chief manual acted on the Great organ, which contained the most powerful and important stops. The second manual acted on the Positive, to which the name Choir, or Chair organ was given. How the name choir-organ arose is not known: perhaps the Great organ was used to accompany the congregational singing, and the Positive to accompany the choir in anthems. In mediæval times the Positive could be carried to any part of the church to accompany the singing of the service in any particular chapel, and this custom

**English
Post-
Restoration
Organs**

Story of the Organ

obtains in Italy still.¹ The word choir-organ became corrupted into chair-organ, perhaps because, being behind the organist, it supported his chair; or some one may have, by a slip of the pen, written chair for choir, and been imitated in the mistake. Organs of two manuals were sometimes called double organs. Of the expression "pair of organs" we have spoken on page 16. When there was a third manual it acted on the "Echo" organ. The pipes of this organ, which were always small, were placed in a closed box, with the result that they sounded as if they were at a distance. The echo keyboard was a half-manual, and acted on treble pipes, which were a re-duplication of some of the pipes in the choir or great organs.

In 1712 Abraham Jordan fitted the front of the echo box with a sliding shutter, which, being opened or closed by a rope attached to a pedal, gave a kind of *crescendo* and *diminuendo* effect. This invention, which marks an important epoch in the history of the organ, is advertised in the *Spectator* of February 8th, 1712, thus: "Whereas Mr. Abraham Jordan, senior and junior, have with their own hands, joinery ex-

¹ Several of the churches in Rome contain organs of considerable size mounted on wheels for facility of movement. The Church of St. John Lateran contains no less than three large organs built into choir galleries, and a fourth on the floor mounted on wheels. The Pantheon contains a platform on wheels, of a size sufficient to accommodate the choir and a small organ.

Invention of the Swell

cepted, made and erected a very large organ in St. Magnus's Church, at the foot of London Bridge, consisting of four sets of keys, one of which is adapted to the art of emitting sounds by swelling the notes, which never was in any organ before: this instrument will be publicly opened on Sunday next, the performance by Mr. John Robinson. The above said Abraham Jordan gives notice to all masters and performers that he will attend every day next week at the said church to accommodate all those gentlemen who shall have a curiosity to hear it."

The new "Swelling organ," as it was called, came rapidly into favour, and continued in use for some fifty years, entirely superseding the Echo organ. It was not adopted on the Continent, though its invention aroused curiosity, for Adlung says: "Before finishing this chapter I must refer to Matheson's *Critica Musica*, tom. ii. p. 150, relating to the swelling register of St. Magnus's Church, London, whose tone is always stronger the longer it is held on; but I do not know how it is done."

Burney complains in his *Present State of Music in France and Italy* of finding no swell organs in 1771. Handel, who admired it much, asked Snetzler for full information on its construction, that he might describe it to a friend who wished to introduce it at Berlin; but Burney, some years later, found no organ with a swell in that city. Three stops were placed in a swell-box in the organ of St. Michael's Church at Hamburg in 1764, but with so little effect that Burney

Story of the Organ

says that if he had not been told there was a swell he would not have noticed it.¹

Samuel Green soon afterwards applied a "Venetian swell" to the harpsichord. This consisted of a number

**The Swell
of the
Harpsi-
chord
applied to
Organs**

of shutters in the form of a venetian blind, which could be opened and closed at will by a pedal. About the middle of the eighteenth century he applied the same principle to the echo-box of the organ, thus introducing a great improvement on the sliding shutters of the Jordans. Henceforth all English

organs of two manuals or more contained a "swell" organ, the third manual being the "choir" organ. At first the swell organ, like its predecessor the echo, was only of half the compass of the great and choir; but it was gradually extended downwards, first to *g*, then to *c*, and, at the end of the nineteenth century, to *C*. The choir organ in cathedrals was generally placed behind the player, while in parish churches it was usually included in the general case, as was the swell organ. The swell was added to Father Smith's organ at St. Paul's by Cranz, soon after its

¹ The prejudice against the Swell long continued. In 1885 the attention of the writer was called during an organ recital in the Church of St. Nicholas at Leipsic to the fact that the player was using the "Schweller." The effect was almost imperceptible, only three weak stops out of the eighty in the organ being enclosed. In the same year an eminent musician, a friend of Mendelssohn and Schumann, who had lived long in England, remarked to the writer that she hoped that that dreadful invention, the Swell, had not been introduced into Germany.

Anemometer

invention, and Handel was very fond of playing on this instrument. In 1826 Concussion Bellows were added to it by Bishop, the inventor, this being the first organ to which they were applied.¹ This contrivance consists of a small bellows attached to the wind-trunk, and acted on by a spring. When the organ is not in use, the concussion bellows is kept closed by the spring; but immediately wind is pumped into the reservoir, its pressure counterbalances the spring and holds the concussion bellows open. If a sudden demand is made for a large supply of wind to the pipes, the pressure, under the old system, is momentarily relaxed, causing the pitch to fall and rise again. With Bishop's invention, the spring, by closing the concussion bellows, keeps the pressure absolutely even, under any sudden change of stops.

The anemometer, or wind-gauge, an English invention, consists of a glass tube, bent in the form of letter U, and containing a little water. On the wind from the bellows being admitted to one arm of the U, the water is forced up the opposite arm, and the pressure is measured by the number of inches that the water rises. This invention has enabled organ-builders to measure the wind supply with precision, and bellows are said to give a wind of so many inches. The flue pipes are usually blown with a "three-inch" or "three-and-a-half-inch wind," the reeds being given separate bellows

¹ *Short Account of Organs, etc.*

Story of the Organ

with "six," "eight," or even "twelve-inch" wind. The necessity for some means of measuring the pressure was long recognised, for as early as the middle of the seventeenth century Christian Foerner invented a gauge consisting of springs and weights.

Besides the concussion bellows, Bishop invented composition pedals, by which certain stops are drawn and others pushed in. At first they were of "single action," that is to say, on depressing a pedal with the foot a certain combination of stops was drawn, and a second pedal was required to push them in; but an improvement was soon effected by which a single pedal drew out the required combination of stops, and pushed in any others that might have been previously drawn but which did not belong to its combination. Such a pedal was called a "double-action" pedal, and it is the only kind in use at the present day. The idea of changing the stops with the foot was, however, not new, for Father Smith's smaller organs were provided with a contrivance for shutting off the more powerful stops with the foot after they had been drawn by hand.

In 1787 and 1788 Green built two organs with horizontal bellows, in which a square reservoir rose horizontally when wind was pumped in from the feeder. (See Fig. 1.) Previous to this all organs had been provided with diagonal bellows, the upper plate of which was hinged on one side. The horizontal bellows gave a steadier supply of wind than the older kind, and were soon adopted for

English Improvements

all English organs. The folds, which in mediæval times had been made of leather, had been controlled by wooden frames; they were now made of thin wooden planks, called ribs, joined by leather glued to their edges, the leather forming hinges, on which the ribs worked when opening and closing.

A further improvement was invented by a poor clock-maker, named Cummins, or Cumins, who in 1814¹ made "antisymmetric ribs"—that is to say, one set of ribs worked inwards, the other outwards; for so sensitive are the pipes to the smallest inequality of wind supply that the slight extra pressure produced by the folding in of the ribs as the top of the reservoir descended was sufficient to disturb their intonation.

By Cummins's clever invention the set of ribs which worked outwards, by enlarging the space as they closed, counteracted the effect of the decrease of space caused by the closing of the inwards working set.

The bellows of most large organs are now blown by hydraulic or gas engines. The hydraulic engine was first fitted to a large chamber organ in a house at Leeds by David Joy, of Middlesbrough. The organ at the Royal Albert Hall, London, is blown by a steam engine.

We have already mentioned that the pedal, which formed such an important department of German organs, and was well known in France, Italy, and

¹ Bony, *Une Excursion dans L'orgue*, p. 24; but Hopkins (*The Organ*, p. 14) shows that Cummings was the inventor of the horizontal bellows used by Green.

Story of the Organ

Spain, found no place in English organs until the end of the eighteenth century. Not until the fourth quarter of the nineteenth century was a satisfactory pedal organ looked upon as necessary in England. The first English pedals were small projections from the case, and could only be pressed by the toe; such pedals are still found in old Spanish and Italian organs. They had no pipes of their own, but merely pulled down the manual keys, so that their effect was practically *nil*. In course of time they took the form now familiar, and were called German pedals.¹ But for three-quarters of a century the pedal department continued unsatisfactory, though here and there an organ was built on modern principles. Not only was the pedal given few stops, and those of a character which did not balance well with the rest of the organ, but the compass of the pedal clavier was so variable that organists, in trying a strange organ, never knew what kind of pedal-board to expect.

Experiments were, however, made to improve the pedals. "It is in the temperament of the English to do nothing like other people; and in the art of constructing organs the Englishman has sought other ways than those of his predecessors."² These experiments turned

¹ Snetzler, towards the end of the eighteenth century, built an organ with "German pedals" for the German Lutheran Chapel in the Savoy (Hopkins and Rimbault, *History of the Organ*, p. 149). These pedals, however, being for a German organist, and only heard by a German congregation, could have no influence on the introduction of pedals by English builders.

² H. van Couwenbergh, *L'Orgue ancienne et moderne*, p. 119.

Pedals

chiefly on making the pedal-board more convenient for the player ; from being straight and of equal length the pedals became radiating, concave, etc., each builder making them slightly different, until their form and measurements were settled by conference at the Royal College of Organists in 1880, and the decisions arrived at have been generally adopted.

Germany has not been so fortunate in the matter of pedals. Those of Bach's early days were singularly inconvenient, according to modern notions ; and it is surprising that his music could be played on them. The compass of his Arnstadt pedals is from C to *d'*, two octaves and one note ; they are only about a foot long, so that playing with the heel was impossible ; and the " sharps " are high, and, by way of ornament, are finished off with a projection, which would certainly catch the toes of a player unaccustomed to them. This was a usual form for the sharp keys in those days, as can be seen by illustrations in old books.

German
Pedals



The position of the pedals in relation to the manuals was fixed by rule ; it was so far forward that they could rarely be played with the upper manuals : this can be seen by Bach's works. The modern German pedals are certainly of a much more convenient shape ; but their position has been fixed by *Ministerial decree*, which builders are bound to obey ! " Who can wonder," says Diemel, " that they cease to think for

Pedals
regulated
by the
Govern-
ment

Story of the Organ

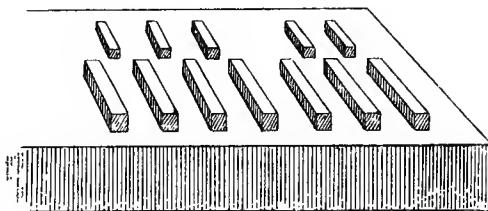
themselves, and carry on their handiwork as they learned it from their grandfathers?"¹ English organists may congratulate themselves that they live in a free country, the Government of which does not hamper progress by decrees that make improvements impossible.

The introduction of pedals into England met with some opposition, as was natural. The anonymous author of the *Short Account* complains that the modern organist keeps up a perpetual thundering with the pedals throughout the Psalms, when perhaps the choir he is accompanying consists of ten little boys and six or eight men, three or four of whom are disabled by old age or a long-continued habit of drunkenness. Again, he says, the effect of pedals in fugues is truly magnificent; but as fugue-playing is not the chief object in an English cathedral, and pedal pipes being so mischievous, it is much to be desired that they should be removed from cathedral organs." Fortunately, such retrograde notions were forced to give way before advancing knowledge and enlightenment; but in a later chapter we shall have to speak of antiquated views on two other subjects connected with organs, which obtained amongst the most prominent English players, and were the cause of considerable hindrance to the advance of the art of music in England, as opposed to the great improvements in the mechanism of instruments.

¹ Otto Dienel, *Die Moderne Orgel*, 1891, p. 45.

English Organists and Organs

A writer in *The Musical World* of 1838 is more enlightened, for he comments thus:—"Within these few years organ-building as a science has made the most satisfactory and decided advances. . . . Whilst the British organs were miserably small and deficient in tone, and displayed a total absence of the pedale, English organ-composers ceased to hold any rank of importance in Europe. The glorious confusion of the fugue in our cathedrals degenerated into the merest



PART OF THE PEDAL BOARD OF A FRENCH ORGAN IN 1766.

The pedals rise through the top of a flat chest, inside which are the springs and part of the action. (From Bedos de Celles.)

twaddle of a counterpoint; the voluntary became a thing of shreds and patches, diversified by alternate exhibitions of noise and childishness. The clergy no longer interested themselves in the musical portions of the services. Organists in high places, chapel-masters, and King's chapel directors were appointed, whose ignorance of organ music and organ effects did not long remain the laughter and scorn of the profession, since from its constant exhibition the mind naturally united

Story of the Organ

the ideas of imbecility and folly with the holders of such appointments.

“ But we rejoice to have our lot in brighter days—in a season in which our English organ-builders have manifested a generous emulation, an honourable ambition, which has raised them far beyond the character of mere artisans. Our country boasts of organists who have taken a stand from which no Continental performer can dislodge them; and if Silbermann has made his 32-foot pipes, Messrs. Elliott & Hill have raised those enormous piles whose mouths have measured 6 feet in their width; and there are other builders who would be but too happy for an opportunity afforded them of attempting the same experiments. These remarks flow from us in consequence of a recent opportunity of hearing the several new instruments constructed by Messrs. Hill & Davison, Gray & Son, and Robson & Sons; and from a comparison of the work of these artists, we are disposed to think that if the generous feeling of rivalry which now exists should happily continue, the improvements in organ-building will be so great as to throw all past efforts into the shade.”

English builders have constantly turned their attention to the invention of means of relieving the player from the great exertion caused by a heavy touch. In small organs, or in large organs, when only a few of the softer stops are drawn, the pressure on the pallets is not great; but when the wind has to be admitted to a great number of pipes, some of which are of large

English Inventions

scale, it becomes enormous, and the touch is proportionately heavier. Hill invented a box pallet in 1841, which moved sideways, by which it was calculated that the resistance to the finger was reduced to one-fourth of that required by the ordinary pallet. A little later there was introduced from America a "valve pallet," in which a very small pallet was utilised to relieve the pressure on the pallet proper. The "Relief pallet," invented by Messrs. Hill & Son, is shaped in such a way that the pressure of the air surrounds the pallet except just where it closes the channel leading to the pipes; but a more practical invention is the "Divided" pallet of Messrs. Hill & Son, which is in use now. Its principle consists of opening a small portion of the pallet before the rest, and allowing the wind to complete the opening.

Reductions
in the
weight of
touch

The clever idea of thus utilising the wind to overcome its own pressure was long in the minds of organ-builders. In 1827 Booth attached small circular bellows, which he called "puffs," below each pallet of the open diapason of an organ at Attercliffe; the pipes of this stop being mounted on a separate sound-board. The wind passed from the great organ sound-board by means of conveyances into the puffs, causing them to pull down the pallets. Hamilton of Edinburgh introduced the system at that city in 1835, and shortly afterwards explained his "pneumatic lever" at a meeting of the British Association.

Barker, who seems to have known nothing of

Story of the Organ

Hamilton's puffs; reinvented the pneumatic bellows, but failing to obtain support in England, **Barker's Pneumatic Action** took his invention to France, where its merits were at once perceived, and it was used in the large organ erected by Cavaillé-Coll at the Church of St. Denis in 1841, and in all large organs subsequently built in Paris.

Every builder now uses the pneumatic action invented by Barker in large organs; and though the methods of applying it vary, the principle is the same for all. The tracker action is dispensed with; the key does not communicate directly with the pallet, but opens a small valve which admits the wind to a bellows attached to the pull-down; and the expansion of this bellows opens the pallet. A recent improvement is the **Tubular Pneumatic Action** "Tubular Pneumatic Action" in which a pneumatic bellows near the key admits the wind into a tube, which conveys the pressure to a second bellows placed under the pallet. By this means the keyboards may be placed at a considerable distance away from the pipes.

The first organ into which the tubular pneumatic action was introduced was that of St. Paul's, built by Willis in 1874. The case was divided, the swell and choir being placed on the south side of the church, the great, solo, and pedals on the north. By means of the tubes, the action is carried under the floor from the keyboards on the north to the pipes placed on the south screen, a distance of sixty feet.



CONSOLE WITH ELECTRIC STOP ACTION, PNEUMATIC THUMB
PISTONS AND ELECTRIC KEY ACTION, THE WHOLE
BEING CONVEYED TO THE ORGAN THROUGH A
CABLE. BY PERMISSION OF MESSRS. HILL AND SON.

Electric Action

The pneumatic action has also been applied to the sliders with great advantage. In addition to the composition pedals, large organs now have pneumatic composition knobs or pistons, placed under each row of keys, and acted on by the thumb of the player. These were first used in the organ at the Royal Albert Hall, built by Willis, in which each of the four manuals has eight such pistons, which control the whole of its stops.

**Pneumatic
Drawstop
Action**

One of the latest inventions is the application of pneumatic action to the keyboard of the pianoforte, by means of a roll of paper in which air-holes take the place of the projections found on the cylinders of barrel-organs.

The wonderful powers of the electric telegraph suggested to Barker a means of carrying the communications between key and pipe to a distance, and round corners. It had been tried by others, but had failed, owing to their inability to overcome the force of the wind on the pallets; but with the pneumatic action this difficulty no longer existed. He applied electricity first to a large organ at St. Augustine's Church in Paris, and afterwards to others. He obtained an English patent in 1868, in which year his electric action was used at the Gloucester Festival, in order to allow the organist to be near the conductor.

**Electric
Action**

The principle of Barker's electric action is that the valve of the pneumatic bellows is opened by the electric

Story of the Organ

current, instead of by mechanical connection with the key. Electricity has also been applied to the draw-stops; and its action has in late years been much improved by the inventions of Mr. Hope-Jones, who by means of a cable, containing all the electric wires (as in submarine telegraphs), makes the "console" containing the keyboards movable to any part of a building.

The coupler, by which manuals can be coupled to pedals or to one another, had its origin in the wires or ropes by which the earliest pedals pulled down the keys of the manual. Manual couplers were invented in the sixteenth, or the beginning of the seventeenth century, for many of the organs described by Pretorius had them in 1618. They were esteemed a novelty, however, in Geissler's organ of 1651 at Lucerne. The claviers of most of the post-restoration organs in England could be coupled together, but the old "Tumbler Action" was very noisy and imperfect. If drawn while the organ was being played, it would throw the fingers off the keys, or disarrange its own mechanism, or even get broken.

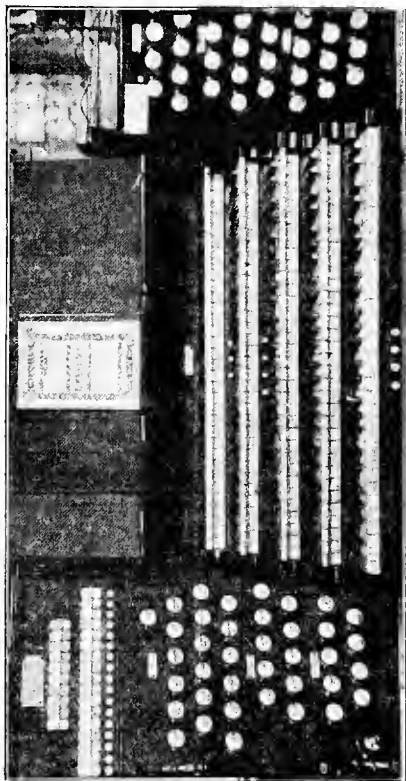
It was improved by Kirtland and Jardine of Manchester, but had to be carefully used to prevent injury.

The next improvement was the "Ram" coupler, invented by Messrs. Robson, in which the stop could be drawn while the organ was being played, without disturbing the fingers.

An octave coupler (see p. 70) was introduced in

The Sforzando Pedal

1824 by Smith at Bristol, and used again by Hill at York in 1829. This coupled the swell to the great in the octave above; it was, however, previously known in Italy. A sforzando coupler, worked by a pedal, was introduced by Lincoln in the organ at St. Olave's, Southwark, in 1844. It momentarily coupled the great to the swell; it has not, however, found general acceptance. An old way of strengthening the pedal organ was found in coupling its lower octave to the octave above, but with the addition of eight-foot stops to the



CONSOLE OF MESSRS. W. HILL AND SON'S FIVE-MANUAL ORGAN AT WESTMINSTER ABBEY.

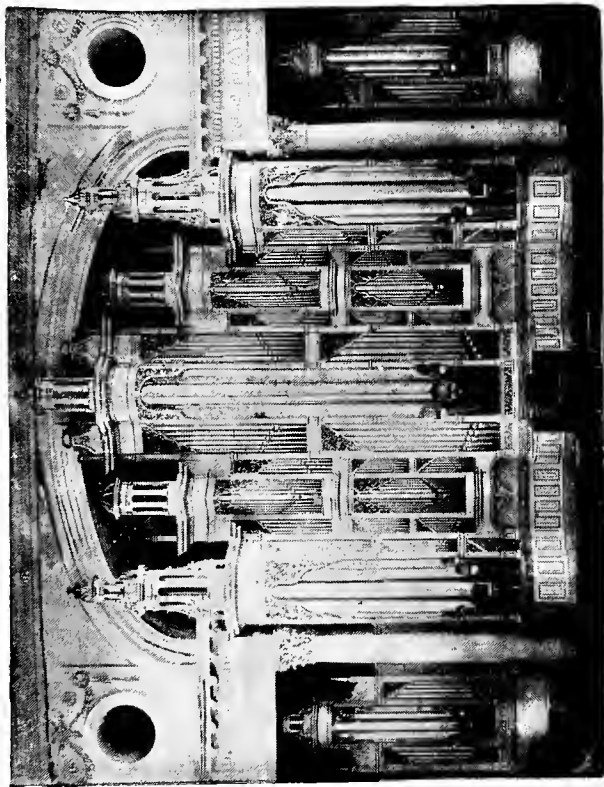
Story of the Organ

pedal organ this arrangement was no longer necessary.¹

It will be seen that during the nineteenth century English builders made great improvements in the complicated machinery of the organ, and their inventions have been adopted by other countries. France, especially, has welcomed English methods; Germany, though slow to accept them, finds herself now obliged to do so. Not only have German organ-builders improved their reed stops, a department in which France has taken the lead, but they have, in the last decades of the nineteenth century, followed the practice of French and English builders in making large and powerful swell organs, and improving the swell boxes by making the wood thicker, by which means the sound is shut in, and more contrast obtained when the shutters are opened. Their stop-handles are now placed within reach of the organist; this was not the case in their older organs.² The stop-handles are also arranged in regular groups instead of being scattered haphazard. Composition

¹ Amongst English improvements not yet generally adopted is the placing of some of the pedal pipes inside the swell box by Mr. Thomas Casson, who has also invented a stop called the "Pedal Help," which automatically brings into play a suitable bass to any group of manual stops, and follows every change of registering.

² In the old Nicolai organ at Leipsic many of the stop-handles could not be reached by the organist unless he left his seat. English organs were also deficient in this respect. At Lincoln Cathedral some of the stops were placed so near the floor that the player had to stoop low to draw them.



ORGAN AT SYDNEY TOWN HALL, N.S.W., BUILT BY
MESSRS. W. HILL AND SON, 1886-89.

English Improvements

pedals have been introduced, and German organs have been generally brought up to date.

Italy adopts, in the words of one of her organ-builders, "all the improvements invented by the most advanced nations;" these consist for the most part of English inventions, such as the tubular pneumatic action, hydraulic blowing, etc.

CHAPTER VII.

Ancient organ-pipes—Curious materials used for them—The materials and shapes of modern pipes—Mitred pipes—The compass of English organs—The persistent use of unequal temperament in England—Sketch of the history of equal temperament—Competition between Neidhardt and Bach in tuning an organ-stop—Anecdote of Bach and Silbermann—Complaints of the tuning of English organs—The use of the organ in place of and together with the orchestra discussed—Short octaves—Mutation stops removed from the organ at York Minster—The building of this organ produces a law-suit.

THE materials of organ-pipes have a somewhat interesting history. Their choice is limited by conditions of expense, weight, endurance, and appearance. The pipes of the ancient hydraulic organs were of brass or bronze, and it is curious that their makers do not seem to have discovered the secret of reducing the diameters as they ascended the scale: in the two little organs discovered at Pompeii the bronze pipes are all of the same diameter, and the representations on coins give no reason to believe that the pipes were ever graduated in this respect.

The pipes of Dunstan's organs were of brass or bronze; others were made of lead, which was, however, found unsuitable, because its weight caused the pipes

Curiosities in Organ-building

to sink on themselves. A monk named Theophilus, whose epoch has been variously placed in the tenth, twelfth, and thirteenth centuries, recommends thin copper, which is to be rolled round an iron rod of the thickness that the pipes are to be, and soldered where it meets; exactly the way in which metal pipes are made at the present day. The iron rod is called a mandril; as Theophilus only mentions one mandril for all the pipes, we must conclude that, like those of the hydraulic organs, they were all of one diameter, or scale. After the pipe has been rolled and polished, the mouth must be made and the foot soldered on, the whole process described by Theophilus being similar to that of the present day.

**Method of
making
Pipes**

Pretorius describes an organ in a church at Munich with pipes made entirely of box trees drilled through, some of them being as large as the largest metal pipes—that is to say, thirty-two feet in length. He mentions a Venetian organ of good tone made entirely of glass, and another at Naples in which the pipes and some other parts were of alabaster. Such organs seem to have been occasionally found in princely palaces.

**Pipes made
of Trees**

**A Glass
and an
Alabaster
Organ**

Pipes were made of paper, and even of playing cards. In the Museo Civico at Venice there is preserved a positive made by Laurentius Papiensis, dated 1494, of three stops, the pipes of which are of paper.

**Paper used
for Pipes**

Story of the Organ

An organ with silver pipes is said to have once existed in Milan Cathedral, and Tom Coriat mentions in his *Crudities* (1611) that he had seen two pairs of organs in the Church of St. Mark's at Venice whose pipes were of the same substance. An organ is described as built of ebony and ornamented with precious stones in the Bavarian Court Chapel; and in the Escorial, near Madrid, were eight organs, one of which was of solid silver. One of the emperors of Constantinople had an organ built of gold. Adlung says that pipes have been made of gold, silver, tin, lead, copper, iron, metal, glass, earthenware, stone, wood, feathers, horn, the bark of trees, paper, but that these materials are not all in fashion; for instance, feathers are too small, and earthenware too brittle and too difficult to tune. Brass is hard to work and very costly, but it lasts for ever.

**Silver
Pipes**

**An Organ
of Gold**

says that

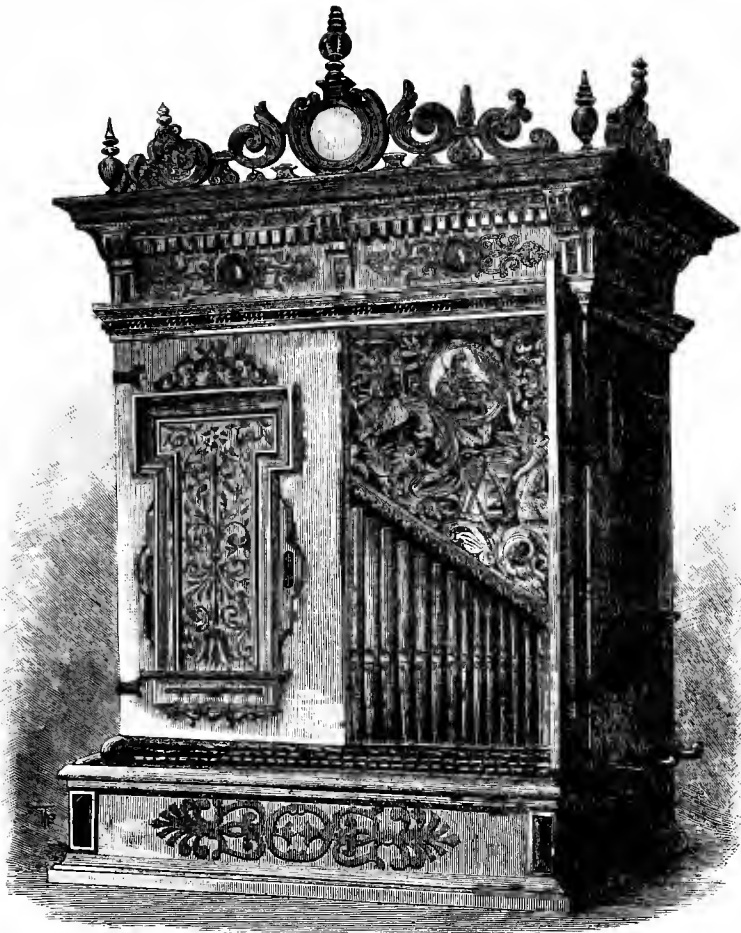
**Various
ingredients
of Pipes**

Wood pipes began to be used in the fifteenth or sixteenth century, since which they have always occupied an important place. Reed pipes were invented in Germany about 1500, but for some reason German organ-builders seem to have been soon surpassed in the quality of their reed stops by those of other nationality.

**Invention
of Reed
Pipes**

The larger number of organ pipes have in all ages been made of metal, English tin being found by experience to be the best material on account of its lightness, colour and dura-

**English
Tin**



A POSITIVE, OR HOUSE ORGAN, OF THREE STOPS, SHOWING ONE OF ITS SHUTTERS OPEN, THE OTHER CLOSED.

Story of the Organ

bility, and its insusceptibility to changes of weather. The term "metal" is applied to a mixture of tin and lead, and "spotted metal" is a similar mixture in which spots rise as it cools after casting. Zinc is also used on account of its cheapness.

Metal pipes are not all alike, for varieties of tone-quality are produced by different shapes and variations of scale or diameter. All the pipes that are

Variety in shape of Pipes —that is, are of the same diameter from the top to the mouth; but inside the organ will be found stopped pipes, half-stopped pipes having a

little tube called a chimney projecting above their cover, conical pipes whose bodies decrease in size from the mouth to the top, conical pipes surmounted by a short inverted cone called a bell, inverted conical pipes, narrow at the mouth and broad at the top; and these various shapes are found

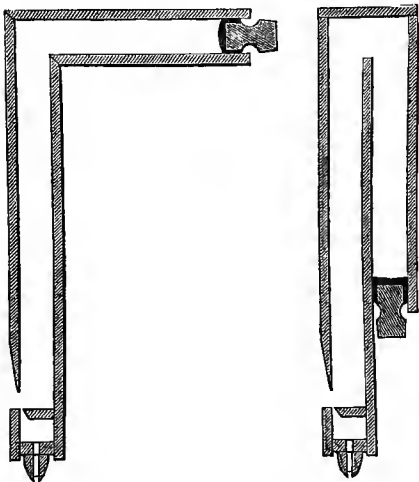


FIG. 4.—STOPPED WOODEN PIPES, MITRED.

Pipes

in reed as well as flue pipes. The wood pipes also take various shapes analogous to those of the metal ones.

The tone of metal pipes is influenced by the thickness and elasticity of the material as well as by the shape; and this is the case also with wood, hard wood giving a clearer and stronger tone than soft. Differences of scale or diameter influence the power of pipes, so that for a small church smaller scale pipes will be used than for a large building; and where there are two or more open diapasons in an organ it is usual for one to be of larger scale, and therefore more powerful than the others.

Observers will sometimes see small projections on each side of the mouths of metal pipes: these are called ears, and their use is to influence the tone by concentrating the current of air. **Pipe-ears** The builder has, in fact, almost unlimited resources at his command for the artistic part of his work, and new inventions are constantly being made. The front pipes of organs are frequently gilt, or painted, or of spotted metal, and in Italy one often sees them embossed with artistic designs.

The internal pipes are sometimes "mitred" or bent back on themselves to save space. This makes no difference in the tone; it is done on the same principle as the bending of trumpets, horns, trombones, bassoons into manageable shapes. A horn, for example, would be of the same length as a sixteen-foot pipe if it were not coiled.

**Mitred
Pipes**

Story of the Organ

On p. 146 we have referred to two features of English organs in the nineteenth century which were persisted in to the great detriment of the artistic side of organ-

**F and G
Organs** playing. The first of these was the retention of the F, and G, compass on the manuals after the pedals had been added.

It was said by its advocates that an organist would sometimes wish to play these low notes with his left hand instead of with his feet; but not only was their touch necessarily very heavy in proportion to their usefulness, but it was extremely disconcerting, for the downward compass of the manuals differed from that of the pedal. An additional drawback was the great cost of the larger pipes, which were duplicated on the pedal. The downward compass of German and French organs had been settled for centuries at C, and it is strange to find eminent English musicians holding out against this manifestly convenient arrangement.

The second feature we alluded to was of still more vital importance, namely, the temperament; for English organs remained behind all other instruments in this respect till nearly the end of the nineteenth century.

**Tempera-
ment of
English
Organs** We have several times referred to the difficulties that Nature has placed in the way of tuning a keyed instrument of thirteen sounds to the octave. Instruments of the violin tribe, and the voice, and, amongst wind instruments, the trombone, are able to adapt their intervals to every kind of

Temperament

harmony; hence the question of temperament does not trouble them.¹ The first recorded proposal to make organs and harpsichords available for all keys is found in a work entitled *De Musica Tractatio* by a Spaniard called Bartolo Ramis, published in 1482 at Bologna. The suggestion of equalising all the semitones seems, however, not to have been adopted, for many attempts were made, as we have seen, to overcome the difficulty by dividing the semitones between two keys. Werckmeister in 1691 put Ramis's proposal into practice, by spreading the "error" over all the notes of the scale, and equal temperament became an accomplished fact. But it was not generally accepted, and Gottfried Silbermann, the most famous German organ-builder of the eighteenth century, always opposed it, while the learned French writer, Dom Bedos, was equally against it. Sebastian Bach, with his freedom of modulation, absolutely required it, and wrote his forty-eight preludes and fugues to prove

**Ramis
proposes
Equal Tem-
perament
in 1482**

**Werck-
meister
carries out
Ramis's
proposition**

**Opposition
to Equal
Tempera-
ment**

¹ Cerone di Bergamo remarks in his *El Melopeo* (1613) on the difficulty of playing the organ and other keyed instruments with vihuelas, lutes, etc., in concord, "because they cannot amalgamate perfectly owing to their differences of temperament. The players of stringed instruments have to alter their strings, and flute-players have to blow softer or harder to accommodate themselves, but it can never be done to perfection."

Story of the Organ

its possibility. He used to tune his own clavichord, and so practised was he that we are told that he could do it in a quarter of an hour in such a way that he had all keys at his command.

J. S. Bach
supports it

Neidhardt, an ardent advocate of equal temperament, endeavoured to attain it by marking off a monochord in equal divisions. While an organ was being built at Jena, Neidhardt tuned a gedact with the help of his monochord, and Bach tuned a gedact on another manual by ear; and on the result being heard, Bach's gedact was found to be greatly superior to that of Neidhardt,¹ for the string was too liable to get out of tune to be a safe guide.

Anecdote of
Neidhardt
and Bach

“Fine tuning” is in fact far too subtle a thing to be attained by any agency other than the ear: a string may be measured off accurately to the thousandth part of an inch, but the smallest inequality in the thickness or temperature of any portion will be sufficient to influence its intonation. Every violinist knows by experience that his G string, owing to its metal covering, sharpens on first playing it, until its temperature is the same as that of the hand.

¹ Amongst those who fought the battle for equal temperament besides Werckmeister, Neidhardt, and Bach, were Kirnberger the composer, a disciple of Bach; Sorge, a composer and theorist; B. Fritz, an organ and harpsichord maker of Brunswick; Tempelhof, a general of artillery and mathematician; Marpurg, composer, theorist, and historian; and many others.

Bach and Silbermann

Bach and Silbermann had, as we have shown, diametrically opposite views on the matter of temperament; and tradition says that if Bach, when called upon to try one of Silbermann's organs, saw the latter among the audience, he would say, "You tune the organ in any way you like: I shall play it in any key I like;" and, starting off with a fantasia in A flat, he would force Silbermann to retire to escape the howling from his own wolf. Many organists besides Bach were "free-thinkers" on this subject. Buxtehude used all the chords that we use, yet his organ was not tuned to equal temperament till 1782, eighty years after his death.

In spite of Silbermann and other opponents, equal temperament won the day in Germany, France, and Italy, and at the beginning of the nineteenth century probably few organs were tuned on any other system; only in England did the antiquated and unpractical unequal temperament hold its own. Many were the complaints that it gave rise to; and it must have hampered the advance of organ composition to an enormous extent. A writer in *The Musical World* of 1836 says: "The organ in England is tuned according to a system of temperament different from that which prevails on the Continent, and the effect of which is that the harmony is intolerably impure in all the keys that require more than three sharps or three flats. Throughout the Continent the

Unequal
Tempera-
ment re-
tained in
England

Story of the Organ

organ is tuned in the same way as the pianoforte; and there can be no reason why the two instruments should differ."

"Why," says Neukomm, "do English organists continue to follow a barbarous system of tuning, no longer adequate to the improved state of modern music?"

In the following year there appeared several letters in *The Musical World* pressing for equal temperament: yet the old system being supported, strange to say, by some of our best organists, held its own for many years after. We live in happier times now; and the young organist of to-day knows nothing of organs on which he is tied down to a few major keys, on pain of producing harsh discords if he departs from them.

The modern concert-room organ usually differs from the church organ in being made more orchestral in its character: its solo stops are made to imitate in tone as far as possible the tone of the oboe, clarionet, bassoon, flute, etc. This leads recital-givers to play a considerable number of arrangements of symphonies, overtures, marches, and other music intended for the orchestra; and it is sometimes said that a good concert-room organ can save the expense of an orchestra. With this view we cannot agree.

The organ has been called the "King of instruments," and with good reason. It stands apart from all other instruments in its character; its peculiar tone causes it to predominate whenever it is used with other

Organ and Orchestra

instruments or with voices, while in its full strength it can easily overpower the largest orchestra. But these very features make it the worst imitator of other instruments; it stands alone, and refuses to submit to any attempt to force it to act the part of another character than its own. Thus, the stop called the "orchestral oboe" may be a perfect imitation of the tone of an oboe, but it is absolutely powerless to give the effect of an oboe solo played by human lips and lungs, directed by artistic intelligence; and the same is true of all other so-called "orchestral" stops. The beautiful oboe passages in Bach's *Christmas Oratorio*, for example, become cold and colourless on the organ, for which they were never intended; the wonderfully dramatic clarionet solo, *con molta passione*, in the overture to *Der Freischütz* is absolutely meaningless on a clarionet stop; the requisite *fortissimo*, the passion, and the *diminuendo* are impossible on the most perfect organ. The peculiar character of the stringed instruments of the orchestra is also impossible of imitation, and the *tremolando* of the bows, which can be to some extent represented on the piano, is quite ineffective on the organ. The *martelé* stroke of the bow can certainly be played *staccato* on the organ, but how different is the effect! In the one case, vigour and energy and force; in the other, a cold and somewhat meaningless shortening of the notes. That humble but

Meaning
of the
term,
"King of
Instru-
ments"

The Organ
cannot be
a satisfac-
tory sub-
stitute for
the
Orchestra

Story of the Organ

very important instrument the kettledrum can only be imitated in its softer passages by *staccato* notes on a bourdon or other pedal stop; its roll is impossible on the organ, yet it plays a part in *crescendo* and *forte* passages, the omission of which weakens the whole character of the music. The full organ, with its mixtures and double diapasons, has a totally different effect from that of the full orchestra, even without the drums. The full organ is overpowering in its grandeur and majesty when playing music that is suited to it, and the full orchestra is equally so in its own domain.

To degrade the king of instruments by causing it to humbly imitate, or rather caricature, a neighbouring and friendly potentate is an indignity to which it ought not to be submitted. There are, of course, occasions when the organ is necessarily used to replace the orchestra; for example, in accompanying an oratorio or anthem in a church, when no orchestra is available. The German churches are better off than ours in this respect, for they maintain a small orchestra in addition to the organ for the sole purpose of accompanying the anthems on Sundays and at festivals. In England, since no orchestra is available, the organist is obliged to arrange orchestral accompaniments to the best of his ability, and there is at any rate the human element of voices to give life to the work. That such accompaniments are of great value and can be made very effective is proved by the wonderful playing of the late Sir John Stainer at St. Paul's in anthems from oratorios, and by the accompaniments of oratorio choruses, etc., to be

Organ and Orchestra

heard in our cathedrals. Such arrangements are necessary: the playing of pure orchestral music on the organ is rarely a necessity, and can have no beneficial result to art. But the playing of old contrapuntal orchestral music, or even of some string quartets, comes into a different category. Here varieties of tone colour are not so important as clearness of the parts, fulness of the chords, and purity of harmony. Handel's overtures and "concerti grossi" and many movements of Haydn's and Pleyel's quartets are very effective on the organ, for in them there is no great variety of tone-character or strong dramatic feeling to be expressed, but rather contrapuntal and harmonic effects.

The organ can be used *with* the orchestra with enormous advantage, not only for mere strengthening purposes, but as an additional instrument, for which a proper part is written. It does not in this case dominate, but allies itself with the others, becoming for the time a member of the orchestral group. The overture to *St. Paul* may be taken as an instance: the organ plays the opening chorale with the orchestra *piano*, and is then silent until the key changes from minor to major, when it bursts in, together with the full orchestra, *fortissimo*, with overpowering effect; and many similar examples might be referred to of the union of organ and orchestra by the great masters.

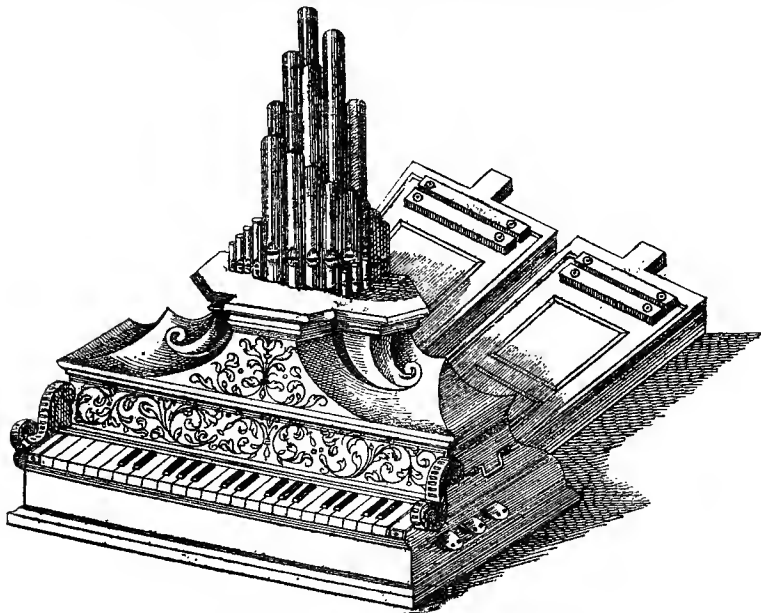
The
Organ as
a member
of the
Orchestra

A common defect of organs and harpsichords until well into the eighteenth century was what are called "short octaves." These consisted in the omission

Story of the Organ

of certain notes from the lowest octave for the sake of economy of money and space. The note most frequently omitted was C \sharp , but in spinets and other small instruments this key was sometimes made to sound the A below the lowest C, on the principle that C \sharp could never be a keynote on

Short
Octaves



POSITIVE, SHOWING SHORT OCTAVE IN THE BASS.

which to conclude a piece, while A could. The uppermost octave of a keyboard was sometimes "short,"

Short Octaves

some of its black notes being omitted on the same principle—*i.e.*, that they could never be used as the top note of a concluding chord. In the sixteenth century these defects were found in the largest and most complete organs, the introduction of “semitones” having been only gradually extended over the whole clavier. In the seventeenth and eighteenth century short octaves were, as a rule, only found in chamber organs and other instruments of the household, and before the nineteenth century they may be said to have disappeared altogether. The drawback of short octaves was not felt as much as might be expected. If one plays old music on a keyboard thus constructed, one does not require the missing notes; and if one extemporises, it is a simple matter to remember that there is no C \sharp in the lowest octave.

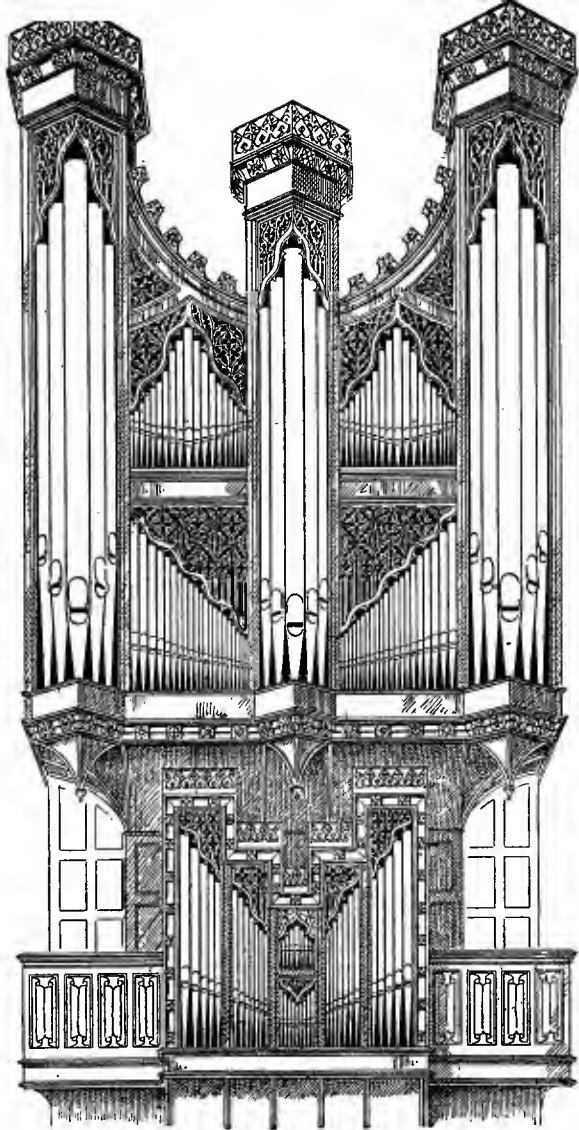
Fétis, Neukomm, and, in our own country, Dr. Camidge, organist of York Minster, held the extraordinary view that mutation stops were detrimental to organ tone, and that they ought to be abandoned; and Dr. Camidge carried his prejudice so far as to direct Messrs. Hill to remove these stops from the large organ they were erecting at York Minster about 1835, and to supply their places with additional principals, fifteenths, and twenty-seconds, thus practically ruining a fine instrument. It is true that the mutation stops are often voiced too powerfully, and produce a disagreeable screaming effect; but this fault is easily remedied without their removal. Moreover, if an organist objects to

**Dislike to
Mutation
Stops**

Story of the Organ

any particular class of stop, he is not obliged to use it. Fortunately, the views of Fétis, Neukomm, and Camidge were not popular, or we should have had many English organs spoiled.

The organ referred to had a curious history, and was the cause of a law-suit between the builder and the Dean and Chapter. “Needless and alarming expense” appears to have been created by the contradictory orders given to Hill. First the organ was to be placed out of sight, as at Canterbury; then it was to be built over the screen; then 20 inches away from the screen. The swell was now found to be too high, and was taken down and rebuilt 5 feet lower in another position; then it was replaced in its former position. The cost was raised from £2,500 to £7000 by all these changes: a verdict was given for £4000, and the loss to the builder was estimated at £1,500 to £2000 on the transaction. The organ was of excellent construction, as far as English organs went; but it had the usual defects of an unsatisfactory pedal organ, and a manual compass of six octaves, the bass of which descended to the 16-foot C, an octave lower than that of the ordinary clavier; but it was remarked that “no one in his senses would use his fingers on that part of the instrument.” The omission of the mutation stops was much criticised.



CHICHESTER CATHEDRAL ORGAN. BUILT BY W. HILL AND SON.

CHAPTER VIII.

Curiosities and anecdotes—Mace's table organ—The Apollonicon—Barrel-organs—The mendicant's organ—The barrel-organ much used in private houses and village churches—Hydraulic barrel-organs—Modern barrel-organs—Dutch clock organs—Anecdotes of Snetzler and Herschel—Curious organs made for use on railways—Miss Stirling as an organist—The Freiburg organ—Anecdotes of Mendelssohn's organ-playing—Vogler's orchestration—Anecdote of M. Gevaert—Adlung's advice to organists—Pretorius on organs of his day—Incompetent organists of the sixteenth century—Curious methods of blowing—Seven organs played together at Venice.

AMONGST curious organs must be mentioned that constructed by Mace, and described by him in his *Music's Monument*. In his day, and until comparatively recently, chamber organs were common in large houses; they usually had one manual, from three to ten stops, and could be blown by the foot or by hand; while many of them, when not in use, could be completely shut up, and had the appearance of a cabinet or closed bookcase. By means of stopped and mitred pipes a tone of 8 feet could be obtained in a small space, especially as they often did not descend below G or F. Such organs can be seen in most museums and private collections, and many are still in playing condition. The passage from

Mace's Table Organ

Mace has been so often quoted that we must apologise for reproducing it here ; but it can hardly be omitted in a history of the organ.

“ Now, as to the description of this Table Organ, I cannot more conveniently do it, than first, in giving you a view of it, by this figure here drawn, and then by telling you all the dimensions, and the whole order of it (I mean my Second and the Largest and Best), and take as here followeth. Two of such organs only (I believe) are but as yet in Being in the World ; they being of my own contrivance : and which I caused to be made in my own House, and for my own Use, as to the maintaining of Publick Consorts.¹

Mace's
Table
Organ

“ It is in its Bulk and Height of a very Convenient, Handsom, and Compleat Table Seize ; (which may Become and Adorn a Noble-man's Dining Room) all of the Best sort of Wainscot. The Length of the leaf 7 foot and 5 inches ; the breadth 4 foot and 3 inches ; the Height 3 foot, Inch, and better.

“ Beneath the Leaf, quite round, is Handsom Carv'd and Cut-Work, about 10 Inches Deep to let out the Sound. And beneath the Cut-Work Broad Pannels, so contriv'd, that they may be taken down at any time, for the amending of such faults as may happen : with 2 shelv'd cubbords at the end behind to lock up your Musick Books. The Leaf is to be taken in 2 pieces at any time for Conveniency of Tuning, or the like, neatly Joyn'd in the midst.

¹ Concerts.

Story of the Organ

“The Keys, at the Upper End, being of Ebony and Ivory, all cover’d with a Slipping Clampe, (answerable **The Keys** at the other End of the Table) which is to take off at any time, when the Organ is to be us’d, and again put on, and Lock’d up; so that none can know it is an Organ by sight, but a Compleat New-Fashion’d Table.

“The Leaf has in it 8 Desks, cut quite through very neatly (answerable to that Upstanding One, in the Figure) with Springs under the Edge of the Leaf, so contriv’d that they may Open and Shut at pleasure; which (when shut down) Joyn closely with the Table Leaf: But (upon occasion) may be Opened and so set up (with a spring) in the manner of a Desk, as your Books may be set against them.

“Now the Intent of those Desks is of far more Excellent use, than for mere Desks: For without those **Power Increased and Diminished** Openings, your Organ would be but of very slender use, as to Consort, by Reason of the Closeness of the Leaf: but by the help of them, each Desk opened, is as the putting in of another quick’ning or enliv’ning stop; so, that when all the 8 Desks stand open, the Table is like a Little Church Organ, so sprightly lusty, and strong, that it is too loud for any ordinary private use; but you may moderate that, by opening only so many of those Desks as you see fit for your present use.

“There are in this Table Six Stops: the first is an Open Diapason; the second, a Principal; the third, a Fifteenth; the fourth, a Twelfth; the fifth, a Two and

Mace's Table Organ

Twentieth;¹ and the sixth a Regal. There is likewise (for pleasure and light content) a Hooboy Stop, which comes in at any time with the Foot: which stop (together with the Regal) makes the Voice Humane.

“The bellows is laid next the ground, and is made very large, and driven either by the foot of the player, or by a cord at the far end.”

If Mace had foreseen the importance that the swell organ was destined to take in the future, he would undoubtedly have contrived some means of gradually opening and closing his eight desks during the performance, instead of regulating the power before commencing. The Rev. F. W. Galpin has in his collection a little chamber organ, built by Avery in 1792, something like that described by Mace, but in the form of a cabinet, about 5 feet high; the keys fold up, and the instrument contains three stops, a Stopped Diapason, Principal, and Fifteenth. There is a swell pedal which raises a portion of the lid, on the same principle as Mace's desks; the compass is four and a half octaves, C to *f*''', but the lowest C# is omitted. The organ is blown by a lever, acted on by the right foot of the player.

In 1817 an immense organ was built by Flight and Robson in their rooms at St. Martin's Lane, at a cost of £10,000. The instrument, which was called the Apollonicon, could be played on by six organists at once, and its six keyboards were so arranged that the players faced the

The
Apolloni-
con

¹ Three octaves above the open diapason.

Story of the Organ

audience. Fétis, who heard Samuel Wesley play it in 1829, describes it as the best organ he had heard in England, and says that the builders had used in it certain mechanical contrivances unknown before. Besides the keyboards, it was provided with barrels, which played overtures, quartets, and symphonies, the barrels changing the stops where necessary. Failing, however, to attract the public, it was taken down in 1840, and its materials used for other organs.

Organs played by barrels instead of by fingers were at one time very popular. The idea was probably taken from the Vielle or Hurdygurdy, or Lyra Mendicorum, consisting of a kind of violin played by a rosined wheel instead of a bow, a very ancient instrument, which is frequently seen sculptured in churches. Its English name, Hurdygurdy, has been wrongly applied to the small barrel-organ carried about by mendicants and supported on a stick, which preceded the terrible modern machine misnamed "Piano-organ."

The Mendicant's Barrel-organ
The mendicant's organ seems to have appeared in the streets before 1702, as a means of producing music without the necessity for talent, or the trouble of learning to play; and a French author recommends it because it observes the rules of time, a point in which the ordinary musician is apt to fail.¹ It was called in French "Orgue de Barberie," either from a maker named Barberi, or because of its

¹ Paulucci di Cabboldi, *I Girovaghi Italiani*, p. 25.

Barrel-organ

disagreeable sound. But long before its appearance as a means of mendicancy, the barrel-organ had attained a considerable size and importance in large houses, and was used in village churches to accompany the congregation. Kircher¹ gives a number of diagrams, and devotes many pages to the construction of these organs, showing how to transfer musical notation to the barrels, how to work the bellows, and how to cause the whole instrument to be played by a water-wheel, or a hollow screw through which water fell. When thus played they were called water-organs or hydraulicons, and several examples are known to have existed in Italy during the seventeenth and eighteenth centuries. Grassineau² says of them that several kinds were used in his day in the grottoes of Italian vineyards; and a century earlier Dr. Powell,³ mistaking the use of the water, says that it was forced up into the pipes, which is of course impossible. He says that among the water-works in the garden of the Duke of Florence was a hydraulic organ, which was set in motion by the mere turning of a tap.

Barrel-
organs
driven by
water

Dom Bedos, a century after Kircher, gives full directions for making barrel-organs, and for transferring notation to the barrel, which appears to be the chief difficulty in connection with them; and in our own day many such instruments are built, of great size and

¹ *Musurgia*, 1650, vol. ii. pp. 308 *et seq.*

² *Dictionary of Music*, 1740, p. 171.

³ *De Aquaticis Machinis*, p. 38.

Story of the Organ

power, by Imhof and Mukle, near Leipsic. These instruments are as artistic as it is possible for a machine to be; they have the power of *crescendo* and *diminuendo*, *ritardando* and *accelerando*, and of changing stops; they are driven by a weight, on the same principle as that of a church clock; and amongst the advantages that their advocates claim are their precision of *tempo* and execution of the most difficult passages. Yet the most perfect of them leaves the hearer cold and emotionless; the human element, with its imperfections, is wanting, and the most perfect barrel-organ cannot give an artistic rendering of music;¹ it can only mechanically repeat notes whose emotional significance it cannot feel.

**Modern
Barrel-
organs**

There are still to be found in out-of-the-way corners of England specimens of the old church hand-organs. These were usually of the size of the old positives, having from three to six stops, which could be changed by the person who turned the handle; they were, however, portable, for they could be carried out of

**Old
church
Barrel-
organs**

¹ Many years ago one of the finest of these organs was in the possession of a musical amateur in Hampshire, who kept it in his dining-room, and, having a large assortment of barrels, was in the habit of asking his guests to select from among them during dinner. The first piece we heard was Weber's overture to *Oberon*, with its solos and rapid violin passages, in which the "bowing" is so important. The effect of all these things coming from inside a machine was so ludicrous that it was only by the utmost effort that we could refrain from laughing; in course of time we became accustomed to it, and, far from enjoying it, we considered it merely as a hindrance to conversation.

Snetzler at Lynn

the churches, and used for dance music. Dom Bedos specially recommends them for village churches, where no organist can be found.¹

In Dutch houses one frequently finds large clocks, containing mechanical organs, which play tunes at the hours instead of chiming. It was for a clock of this kind at Vienna that Mozart, in 1790 and 1791, composed his two well-known fantasias in F minor, one of which has such a fine effect when played on the church organ.

**Dutch
Clocks**

The organ of the church at King's Lynn in Norfolk having fallen into decay about 1754, the churchwardens, on the recommendation of Dr. Burney, called in Snetzler to report on it, with a view to repairing it. On being asked what it would be worth after reparation, Snetzler told them that "If they would lay out one hundred pounds on it, perhaps it would then be worth fifty." The result was that a new and fine instrument was ordered to be built by Snetzler, at a cost of £700.

**Snetzler at
Lynn**

Snetzler's pipes were of good tone; but in those days rapidity of speech was not sought for in England, though it must have been a feature of German organs,

¹ The difficulty of finding competent organists for village churches, though now gradually disappearing with the spread of education and musical knowledge, has led to an ingenious invention (by Mr. Thomas Casson) of a means by which the lowest note played in any chord on 8-foot stops is duplicated by a 16-foot stop, the rest of the chord sounding only 8 feet. By this means a pedal effect is produced without the use of the feet.

Story of the Organ

or the compositions of Buxtehude and Bach would have been very ineffective. When Snetzler had built a new organ at Halifax in 1766 several organists were candidates for the vacant post, amongst them being Dr. Wainwright; Snetzler, who was present at the competition, paced the church, greatly annoyed at the rapidity of Wainwright's playing, exclaiming, "He do run over the keys like one cat, and do not give my pipes time to speak."

Another candidate on this occasion was a young German named Friedrich Herschel. Being accustomed to pedals, and finding none on the organ, he used a piece of lead to hold down the bass keys of the manuals, and the effects he thus produced were so novel and pleasing to the churchwardens that they at once elected him.¹ Herschel afterwards became organist of the Octagon Chapel at Bath, where, in the intervals of his professional work, he began the astronomical studies through which he became famous.

From *The Musical World* of 1836 we learn that Messrs. Robson made a little instrument for the Emperor of Russia of brass pipes, and of amazing brilliancy of tone, the upper notes possessing the quality of the *cornet à pistons*, the lower that of the French horn and trombone. At the same time Messrs. Hill made an organ without wood or leather, the whole being of iron and brass.

¹ Chrysander says that Handel sometimes made use of this device.

Freiburg Organ

The bellows, made of iron, was blown by steam; and the pipes being of brass, the tone was of tremendous power. The reader will be astonished to hear the object of these two instruments: they were for use on the railways at St. Petersburg and Birmingham, probably as signalling instruments.

There seems to have been a good pedal organ at St. Catherine's Church, Regent's Park, in 1836; for on it we read in *The Musical World* that "Miss Stirling, only eighteen years of age, played for three hours from the most difficult pedal fugues of Bach, with almost unrivalled degree of precision and mastery." This Miss Stirling (Mrs. F. A. Bridge) was the composer of the popular glee, "All among the Barley."

A Pedal
Organ in
1836

About 1830 there was built at Freiburg, in Switzerland, a remarkable organ of four manuals, pedals, and sixty-eight stops, the handles of which, instead of drawing out in the usual manner, move to the right and left, thus reminding us of the old levers that projected from the cases to push the sliders in and out. The acoustical properties of the church probably aid the peculiar effects of which the organ is capable, amongst them being an exact imitation of voices in four vocal parts. But the effect for which this instrument is most famous is that of a storm, which, though a trick of no artistic value, creates an immense impression on the general public. "By a little help of the imagination," a writer who heard it soon after it was built says, "the elements

The Organ
at Freiburg

Story of the Organ

appear to rage, the lightnings to flash, the thunder to roar, the rain to descend in torrents, the very pillars of the minster to shake. It grew dark and wet and cold. We hastened out of the tempestuous cathedral into the warm sunshine and clear sky." But on a second hearing all these effects were lost on the listener, who, after the first surprise was over, merely observed them with cold and critical attention.¹ The organ was built by Moser, an old man, who declined to build a similar one for the King of France, as he wished his native city to have the honour of possessing the only one in the world.

The effect of the double stopped-diapason enclosed in the swell at Christ Church, Newgate Street, struck

Mendelssohn at Christ Church, Newgate Street Mendelssohn, who was particularly pleased with the humming effect which organists have probably often observed. When Wesley heard it for the first time he was annoyed, and asked who it was that hummed everything he played behind his back: "I will soon prevent it," said the builder as he pushed in the stop.

When Mendelssohn was "playing the people out" at St. Paul's Cathedral, on September 10th, 1837, the vergers, finding that the congregation would not disperse, in spite of their being repeatedly informed that "the service was over," took the blower away just as Mendelssohn had come to the climax of Bach's

¹ *Musical World*, vol. vii. p. 19.

Vogler's Orchestrion

A minor fugue. Mendelssohn's magnificent playing had no attraction for vergers who, it is said, were anxious to get home to their tea. Fortunately, we have changed all that kind of Philistinism now, and a fine voluntary at St. Paul's can be heard to its end without disturbance.

A somewhat similar story is told of Handel, who, on visiting a country church, offered to play the people out after the service. But the people were so charmed that they refused to go, where-
upon the country organist, saying, "You cannot play them out," pushed Handel off the seat, and by his playing soon dismissed the congregation.

Anecdote
of Handel

In 1789, the Abbé Vogler, at that time Chapel-master to the King of Sweden, exhibited at Amsterdam an organ on a new principle, the invention of which had occupied him for many years. It had the power of *crescendo* and *diminuendo*, by means of swell shutters, and though its size was so small that it could easily be carried from place to place, it had four keyboards of more than five octaves, and a pedal clavier of thirty-nine notes. He gave it the name of "Orchestrion," and after exhibiting it at Amsterdam, brought it to London in 1790, where he was engaged to build an organ for the Pantheon on his new system.

Vogler's
Orchestrion

The instrument had stops of sixteen-foot tone, produced by a combination well known to builders, in which a pipe of a given length, sounded together with one giving the interval of a fifth above, produces a tone an octave below that of the former pipe; this device is some-

Story of the Organ

times used to produce a thirty-two feet tone by a conjunction of a sixteen-foot and twelve-foot pipe on the pedals. (See Appendix D, "Quint.") Vogler further reduced space by eliminating all mutation stops, by disposing his pipes in regular scale series, like the string of the pianoforte, and by simplifying the connection between key and pipe in some manner of his own. His system, which was afterwards adopted in large organs at Copenhagen and elsewhere, failed however, since it was found that the proximity of the pipes to one another caused them to project their vibrations into each other; for a pipe requires a certain amount of free space around it in order to speak properly.

M. F. A. Gevaert, the learned Director of the Brussels Conservatoire of Music, tells an interesting anecdote of his childhood.¹ The number of mutation stops in old French organs was incredible. The instrument which served M. Gevaert for his earliest musical education had no less than six out of a total of thirteen registers, the only foundation stops being a bourdon of 8 feet, a flute of 4 feet, and a principal. To complete this beautiful *ensemble* there were a trumpet, a Cromorne, a clarionet, and a doublette, besides a nightingale and tremulant. The Sacristan, his master, severely prohibited the use of the twelfth, larigot and cymbal, except on one day of the year only, namely, on Holy Saturday, in the Gloria, when all the stops were drawn!

¹ *Traité d'Instrumentation*, p. 205, note.

Adlung, Pretorius, and Finck

Adlung recommends the organist to study his congregation; if he has to play in a place where the congregation is accustomed to loud playing, he should frequently use the full organ, or he will be considered as lacking in boldness; if, on the other hand, he finds, after due inquiry, that the congregation prefer the soft stops, he should not shock their ears by powerful playing. Variety, however, he says, is the soul of playing, and the stops should be frequently changed; he has lived in places where for years the full organ has never been heard, and the cost of the louder stops might just as well have been saved.

Adlung's
advice to
Organists

“From year to year the art of organ-building improves in an astonishing manner, and we cannot sufficiently thank Almighty God that He has deigned to vouchsafe so great a mercy and gift to man, so *perfectum*—yes, almost *perfectissimum* musical instrument as the organ now is; and that He enables us to control with hands and feet such a structure, so that it sounds His praise, adorns His service, and moves mankind to Christian contemplation.” Thus writes Pretorius in 1618. What would he have said could he have seen the magnificent structures of the present day?

Pretorius's
admiration
of Organs

Hermann Finck, a composer and writer of the middle of the sixteenth century, complains of the incompetence of many organists of his day. “When they are required to give proof of their skill, they find an excuse in the laws of art to make an empty and disagreeable

Story of the Organ

noise. But in order to flatter the ears of unlearned listeners, and to excite admiration for their abilities, they sometimes run their fingers up and down the clavier for half-an-hour at a time, and hope in this manner, with the help of God, to put a climax to the former noise. But nothing of value comes to light: a ridiculous mouse instead of a mountain.

Incompetent Organists “Do not ask where Meister Mensura, Meister Tactus (rhythm), Meister Tonus (key), and especially Meister Free fantasia are; for after they have run over the keyboard with one hand, they begin a two-part fugue, and then, getting to work with both feet on the pedal, they add the remaining parts. Such music is to the ear, I will not say of experts, but of ordinarily sound and respectable critics, just as agreeable as the braying of an ass.”¹ Similar playing is not an unknown art at the present day.

Anecdote of Dr. Gauntlett Electricity began to be applied to the key action of organs by Dr. Gauntlett in 1850. In the following year he proposed to the Committee of the Crystal Palace that facsimiles of eight of the most celebrated organs of Europe should be erected, and played from keyboards in the centre of the building, connected with the organs by electricity. His proposal was negatived with the words: “Dr. Gauntlett, you will never hear a note of music in the Crystal Palace. The Exhibition is intended for far higher purposes. We do not want

¹ Quoted by Wasielewski, *Geschichte der Instrumental Musik*, p. 121.



HANDEL FESTIVAL ORGAN AT THE CRYSTAL PALACE,
BUILT BY MESSRS. GRAY AND DAVISON.

From a Photograph by]

[Negretti & Zambra, Crystal Palace.

Curious Blowing Arrangements

music, and we shall never have it." Dr. Gauntlett, replying that without music the whole affair would become bankrupt, left. He was right: and the Crystal Palace has since 1855 been famous for the excellence of its music.

Adlung says that the blower of an organ used to be called "*Sine me potestis nihil facere*," but that the preachers objected to this name as a misuse of the words of Christ. He describes a method of blowing an organ at Naumburg, in which the blower had to climb a ladder and step on to a piece of wood projecting from between two guides. This was attached to the bellows-lever, which descended with his weight, and raised the bellows. The same method was formerly employed for the ten bellows of the Nicolai Church at Leipsic. In the chief organ of Seville Cathedral (one of the largest in Spain) the blower until quite recently walked from end to end of a plank, fifteen feet long, which was balanced on a pivot in its centre, on the principle of the "see-saw" used by children. As each end was alternately depressed it raised the feeders, and so large was the reservoir that when the blower had traversed the plank ten times there was sufficient wind for the full organ for fifteen minutes. The small organ in the old Gewandhaus used by the pupils of the Leipsic Conservatorium for lessons and practice was blown by pressing with the feet alternately on two levers suspended from the ends of an iron beam, acting on a pivot over the blower's head, and corre-

Curious
Methods
of Blowing

Story of the Organ

sponding to the "see-saw" of the Seville organ just described. The same method was employed in the organ of the English Church at Ostend in 1870, and is probably not uncommon in small Continental organs.

The Positive or House organ was at one time very much cultivated. Coriat mentions that in 1608, being at Venice, he went to the Feast of St. Roche. "This feast consisted principally of musicke, which was both vocall and instrumentall, so good, so delectable, so rare, so admirable, so super-excellent, that it did even ravish and stupifie all those strangers that never heard the like. . . . at every time that every severall musicke played, the organs, whereof there are *seven faire paire* in that room, standing all in a rowe together, plaid with them. . . ." ¹

Organ-building is making rapid strides in America at the present day; and it is said that some firms employ so large a number of workmen that they can execute an order in four or five days—a wonderful feat when we consider the immense amount of delicate machinery that has to be carefully fitted into a modern instrument. America, England, Germany, and France have brought organ-building to a wonderful degree of perfection, and there is every sign that the art so gloriously represented by these nations will continue to progress, and to achieve yet greater marvels in the future.

¹ Hawkins, *History of Music*, vol. iv. p. 68.

CHAPTER IX.

SOME REFLECTIONS ON THE METHOD OF PLAYING THE ORGAN.

THE modern organ offers equal opportunities for elevating, artistic playing, or for sickly sentimentality and feeble wandering of the fingers over the keys. We have seen the sixteenth century musician Finck complaining of the incompetence of organists in his day; but with increase of facility in the mechanism, increased opportunities arise for displays of incompetence, for, with the resources now at his command, the feeblest dilettante can, with the greatest ease, produce what he calls "effects." These are chiefly obtained by the use of the solo stops, in a way that was introduced by Dr. Greene, organist of St. Paul's, and a contemporary of Handel. Dr. Greene was an able contrapuntist, but he found that the playing of solos on one manual, and accompanying them on another, was a novelty which charmed the listeners more than his really excellent fugues. Unfortunately this perfectly legitimate use of the organ

Story of the Organ

soon became hackneyed and abused to an extent that has proved very detrimental to English organ-playing and composition. A performer draws some solo stop that he fancies ; then, on a second manual, he draws accompanying stops, and proceeds to run his fingers over the first keyboard, without any attempt at rhythm, phrasing, or musical form, accompanying the vagaries of the solo hand with a few fatuous chords on the second manual, and a tonic and dominant bass in the pedals. Or, what is worse, he repeats his chords in quavers, thus :



a style of accompaniment that is so unsuited to the organ that it can rarely be made to sound otherwise than vapid and undignified. This kind of playing is so easy, so delightful to the player, and sounds so "effective" to admiring and uncritical listeners that it is indulged in even by some who are capable of playing good solid written compositions. But the true art of solo playing is by no means easy of acquirement, and it makes considerable demands on technical skill and the intellectual faculties.

The style that is best suited to the instrument is to be found in the works of the great organ composers ;

Solo-playing

for instance, in the middle movement of J. S. Bach's Toccata in C major:

SOLO. Adagio.

1st Man.

2nd Man.

Ped.

pp staccato.

&c.

and in his Choral-vorspiele: in Mendelssohn's fourth sonata:

ACCOMPANIMENT.

ACCOMPANIMENT.

SOLO.

Ped.

&c.

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in Rheinberger's Pastoral Sonata, op. 88:

SOLO. *p*

pp

Ped. *pp*

The score is in 3/4 time with a key signature of two flats (B-flat and E-flat). The Solo part is in the treble clef, the Accompaniment in the middle clef, and the Pedal in the bass clef. The Solo part begins with a half note G4, followed by quarter notes A4, Bb4, C5, D5, E5, F5, and G5. The Accompaniment part starts with a whole rest, then a half note G3, followed by quarter notes A3, Bb3, C4, D4, E4, F4, and G4. The Pedal part also starts with a whole rest, then a half note G2, followed by quarter notes A2, Bb2, C3, D3, E3, F3, and G3. Dynamics include *p* for the Solo and *pp* for the Accompaniment and Pedal.

in Harford Lloyd's D Minor Sonata:

SOLO.

ACCOMPANIMENT.

Ped.

The score is in common time (C) with a key signature of one flat (B-flat). The Solo part is in the treble clef, the Accompaniment in the middle clef, and the Pedal in the bass clef. The Solo part begins with a half note D4, followed by quarter notes E4, F4, G4, A4, Bb4, C5, and D5. The Accompaniment part starts with a half note D3, followed by quarter notes E3, F3, G3, A3, Bb3, C4, and D4. The Pedal part also starts with a half note D2, followed by quarter notes E2, F2, G2, A2, Bb2, C3, and D3.

In the above examples, and in hundreds of others which will occur to those who are versed in the best class of organ music, it will be found that each part, the solo, the accompaniment, and the bass, have some-

Faults in Organ-playing

thing to say for themselves: the ear is not merely tickled by the pretty noise of a fancy stop, to the accompaniment of a background of meaningless chords, but the intellectual faculties are called upon, and the thing becomes a work of art in which the powers of the composer, the player, the organ-builder, as well as those of the listener, are engaged. The result is artistic enjoyment for all concerned, as opposed to childish pleasure in a pretty noise on the part of the performer, and irritation on that of the critical listener. The organ is so majestic, so dignified, that it, least of all instruments, can bear being trifled with; it absolutely demands intelligence and a high standard of performance, or it becomes an intolerable nuisance.

A very frequent fault with organists, especially with those who have not devoted themselves to branches of music beyond their own instrument, is that of yielding to the temptation of holding out notes or chords beyond their proper value while changing stops. This habit is not only destructive to rhythm and form, but is exceedingly detrimental to the player, whose ear soon becomes demoralised, so that he loses all sense of rhythm. Now rhythm is the backbone of all instrumental music; not only of the march and dance, but of the prelude and fugue, of the solo, of harmonic progressions. Without it the finest progressions become feeble and meaningless. It is true that the organist has no power of accenting his notes, as has the violinist or pianist; but he has the power of phrasing, and of regarding the relative values of the notes; and if this has to be done

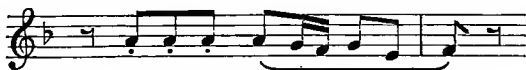
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on other instruments, how much more important is it on the organ! It is our opinion, which we give with all due reserve, that an intelligent marking of the wonderful rhythmical properties of Bach's fugues by phrasing would greatly conduce to their popularity; not a cold pedantic legato rendering, as if they were learned, abstruse compositions, only suited for doctors of music, but a playing that is full of life and enthusiasm: they must be made living things, not dry exercises; the player must feel the music as well as play it, and he will never do this if he has allowed his rhythmical sense to deteriorate by the fault alluded to. As suggestions we offer the following quotations from the works of J. S. Bach in explanation of our meaning, in order that organists who are interested in the matter may try experiments for themselves.

TOCCATA IN F.



FUGUE IN D MINOR.



Phrasing

FUGUE IN A MINOR.

Two staves of musical notation in 6/8 time, A minor. The first staff begins with a treble clef and a key signature of one flat. The melody consists of eighth and sixteenth notes, with phrasing slurs over the first two measures and the last two measures. The second staff continues the melody, also with phrasing slurs, and ends with the notation "&c."

FUGUE IN G MINOR.

Two staves of musical notation in 3/4 time, G minor. The first staff begins with a treble clef and a key signature of two flats. It features a melodic line with phrasing slurs and an alternative phrasing marked "or—" with a slur over the final two notes. The second staff continues the melody with phrasing slurs and ends with "&c."

FUGUE IN F MINOR.

A single staff of musical notation in 3/4 time, F minor. The melody is written in a treble clef with a key signature of three flats. It includes phrasing slurs and ends with "&c."

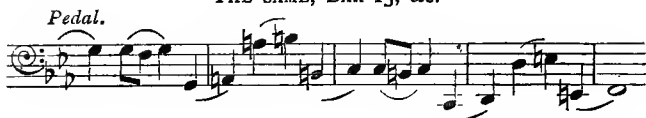
PRELUDE IN C MINOR.

Grand staff musical notation in 3/4 time, C minor. The upper staff (treble clef) contains chords and melodic fragments with phrasing slurs. The lower staff (bass clef) features a bass line with phrasing slurs and a "Ped." (pedal) marking. The piece concludes with a long horizontal brace under the final notes of both staves.

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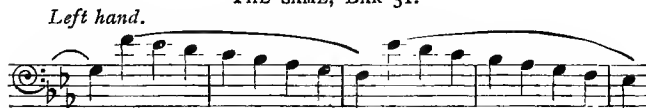
THE SAME, BAR 13, &c.



THE SAME, BAR 21.



THE SAME, BAR 31.



FUGUE IN C MINOR.



Phrasing

DORIAN TOCCATA.



Musical notation for the Dorian Toccata, consisting of two staves. The first staff begins with a treble clef and a common time signature (C). The music features a series of eighth-note patterns, with some notes marked with staccato dots. The second staff continues the piece, ending with a double bar line and the notation "&c.".

FUGUE IN D MINOR.



Musical notation for the Fugue in D Minor, consisting of two systems of grand staff notation. The first system shows the beginning of the piece with a treble clef and a key signature of one flat (B-flat). The second system continues the piece, featuring complex rhythmic patterns and phrasing.

Some of the above staccato and legato signs are given by Bach himself, thus showing that he wished

Story of the Organ

his works to be phrased, and not played through in a dreary legato, or a perpetual staccato, from beginning to end. But the player must suit his phrasing to the instrument and to the building; for staccato notes on a small instrument of poor tone, or even on a large instrument in a building with no reverberation, only sound ridiculous; and if obliged to play one of these works under such circumstances, it would probably be best to reduce the staccato passages to a minimum, and play more legato than one would under more favourable conditions.

It will be observed that we have given in the C Minor Prelude the sign $>$. Theoretically this effect is impossible on the organ, but practically it can be produced in a building with favourable acoustic properties by momentarily raising the hand from the previous chord in the manner shown.

An important principle of organ phrasing is, as frequently as possible or convenient, to make the phrase end on the first note of a bar, or half or quarter bar; never, if it can be avoided, to end it on the last note of a bar or half bar. Thus, the phrasing given by Mendelssohn or his publisher to the opening chords of the finale of his B flat sonata has always seemed to us weak.



We can scarcely believe that the composer played it

Phrasing

in this way himself. Surely he would have played something like this :



or this:—



or even *legato* throughout. If he had not dotted, and thereby accented the first notes of the bass, the published phrasing would have been satisfactory.



The ending of the phrases with quavers, forming feminine cæsuras, is what appears to us to weaken an otherwise energetic and powerful subject, for the quavers seem to belong to the beginnings, not the ends of the phrases.¹ Students of the organ would be well advised to make a point of learning the violin sufficiently to take part in simple orchestral music,

¹ This is not the place to enter into the reasons for the suggestions given; the whole matter of rhythmical phrasing has been treated in a masterly manner by R. Westphal, *Allgemeine Theorie der Musikalischen Rhythmik*, and by H. Riemann in *Dynamik und Agogik*.

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for the important element of "bowing" trains the ear to observe the phrasing of a composition, and counteracts the tendency of the organ to produce carelessness and loss of rhythmical feeling.

There was at one time an idea, and probably there is still in some quarters, for false ideas die hard, that playing the organ ruins the touch of a pianist. This is not really the case, but there is this much ground for it, that a person who cultivates the organ to the exclusion of the piano becomes one-sided in mind as well as muscle. Hence his touch, reflecting a mind unaccustomed to the delicate shades of expression possible on the piano, becomes hard and heavy on that instrument. But this need not be the case. The imaginative and cultured musician will instinctively adapt his touch to the instrument he handles, and will be in the position of a practised linguist who can adapt his language to his company, whether French, German, or Italian, without mixing the phrases of one country with those of another. Similarly, a violinist who cultivates the viola, intuitively adapts his fingering to the slightly larger intervals of the latter, and his bowing to the slightly heavier bow. Many organists have a touch on the piano as refined and delicate as if they had only cultivated that instrument; and, on the other hand, many famous pianists have been equally at home on the organ. The thing lies in the mental attitude and cultivation, far more than in the mechanical action of the muscles.

The power of mixing the various sound qualities of

Registering

the stops comes through cultivation of the ear, and discovering the most appropriate registering of each instrument, and the acoustic features of the building. Rules are out of place; the ear and experience are the best guides. Mendelssohn, who was equally great on the organ and piano, was delighted when he could obtain a good combination of stops. Readers of his letters will recall the pleasure with which he describes the organ at Munich to his sister: "I also play the organ for an hour every day, but unfortunately I cannot practise the pedal as much as I wish because it is wanting in the five uppermost keys, so that it is impossible to play any passage of J. S. Bach on it. But this organ possesses some wonderful stops, on which one can play figured chorales; and in this respect I am edified by the heavenly flowing tone of the instrument. I have, Fanny, found exactly the registers with which one must play Bach's 'Schmücke dich o liebe Seele.' It seems as if they were made for this special purpose, and it sounds so affecting that it sends a thrill through me whenever I play it. For the 'figured' part I have an 8-foot flute, and a very soft 4-foot flute which seems to hover over the chorale; you have heard the kind of thing in Berlin. But for the melody itself there is a clavier which contains only reed stops, so I draw a soft oboe, a very soft clarion of 4 feet, and a viola. The chorale comes out so quietly and yet so penetratingly that it seems like distant human voices singing from the bottom of the heart."

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The art of accompanying is one which requires careful study and experience, and adaptation to circumstances. If the choir is weak and uncertain, it will naturally require more support and encouragement than if it is well trained and confident. In the latter case the organist can confine his efforts to enhancing the beauty of the voices by every legitimate means, by varying the tone colour, by playing an independent accompaniment. The vulgar habit of "illustrating the psalms" by causing the birds to sing, the lions and the thunder to roar, is, we hope, dying out, as is, probably, the accompanying of Gregorian chants by chromatic successions of diminished sevenths. Good organ accompaniment is best learned by observing the practice of eminent cathedral organists, and by cultivating as wide a knowledge as possible of good music outside that of the church. In fact, our advice to a young organist would be, obtain as wide a knowledge of music as you possibly can outside the range of your special instrument, and if, in addition to this, you can find time to read great poetry and literature, it will all help you in becoming a worthy exponent of the vast and many-sided powers of the king of instruments.

Appendices.



- A. TWO INSTRUMENTS FOUND AT POMPEII.
- B. THE REV. F. W. GALPIN'S HYDRAULUS.
- C. ORGAN-BUILDERS.
- D. ORGAN STOPS.
- E. TECHNICAL TERMS.
- F. BIBLIOGRAPHY.
- G. SPECIFICATIONS OF ORGANS OF VARIOUS DATES AND COUNTRIES IN CHRONOLOGICAL ORDER.

Appendix A.

TWO small bronze instruments have been found at Pompeii (which was destroyed by the eruption of Vesuvius in A.D. 79) somewhat similar in appearance to the portative organs of the Middle Ages. They are now in the Naples Museum. The cases and pipes only remain, together with some fragments of bronze which may have had to do with regulating the supply of wind to the pipes. The blowing arrangements have disappeared entirely, as have the feet of the pipes, which were probably of wood. The cases are in three portions, the middle being ornamented with designs of three temples. The smaller instrument contains nine pipes; the larger, of which we give a diagram, eleven. The mathematical proportions of the pipes of the larger instrument give the following series of intervals:—

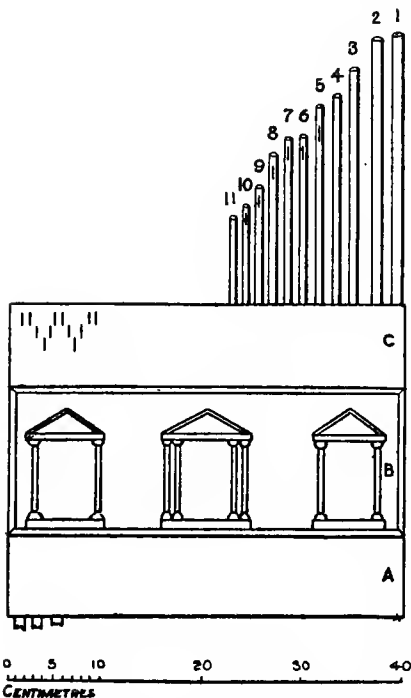


of which, if Nos. 6 and 7 form an enharmonic diesis, the series 6, 7, 8, 9, 10, 11 gives the lastian mode described by Aristides Quintilianus. A writer of the twelfth or thirteenth century, called the Hagiopolite, whose tract is published by A. J. H. Vincent in his *Notices des MSS. du Bibliothèque du Roi*, 1847, says that the lastian mode suits the pteron, which would appear to be a wing-shaped instrument from its name—for

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πτερόν means any wing-shaped thing. (The Germans call the

grand piano Flügel —i.e., “wing,” from its shape.) The *pteron* is enumerated with the auloi and hydraulai amongst wind instruments by Bellermann’s “Anonymus,”¹ but he makes no further reference to it. It is possible that the two fragments in the Naples Museum are *ptera*, and that the *pteron* was a portative organ; it seems to be a connecting link between the bag-pipe and the organ. Whether it was blown by the lungs or by some mechanical bellows cannot be ascertained; but it is not impossible that the excavations in progress at Pompeii, which have



INSTRUMENT FOUND AT POMPEII.

A, B, C, the case, divided into three portions, of which C contains oblong holes as shown.

In this instrument the bass pipes are on the right; in the other, they are on the left. Below the left-hand end of A there are fragments of three square pipes which seem to have been connected with the lost blowing arrangement.

¹ *Anonymi de Musica*, published by F. Bellermann, 1847.

Appendix A

been rich in results of late, may in the near future throw more light on the matter.

Nero, just before his death, was much interested in a new kind of syrinx that had lately been invented, and wished to appear in public as a performer upon it. It may be this instrument that he had in view.

Appendix B.

The Rev. F. W. Galpin's Hydraulus.

AFTER a careful study of all known representations of the Hydraulus on contorniates, pictures in ancient manuscripts, and a well-preserved model in pottery found at Carthage in 1885, the Rev. F. W. Galpin has succeeded in constructing a complete working model of this instrument, by following in every detail the instructions given by Hero of Alexandria and Vitruvius. Two wooden levers are attached to two brass cylinders, the raising of which pumps air into a wind-chest. From the wind-chest a large pipe leads the wind to the top of a dome immersed in water, contained in the central vessel shown in the photograph, and in this lies the whole secret of the application of water. The principle is, as explained in Chapter I., the reverse of that of the fire-engine, in which the pressure of air confined in a dome causes water to flow in a continuous stream from the nozzle. In the hydraulus, the water endeavouring to rise in the dome (after being pressed down by the air which is pumped in) compresses the wind, and causes a fairly steady supply to reach the pipes. The "wind pressure" in Mr. Galpin's model is of the weight of 3 to $3\frac{1}{2}$ inches, being about that of the ordinary modern organ. By increasing the size of the tank, the depth of the water, and the height of the dome, this pressure could be increased *ad libitum*, and the powerful sounds mentioned by ancient writers could be easily obtained by this means.

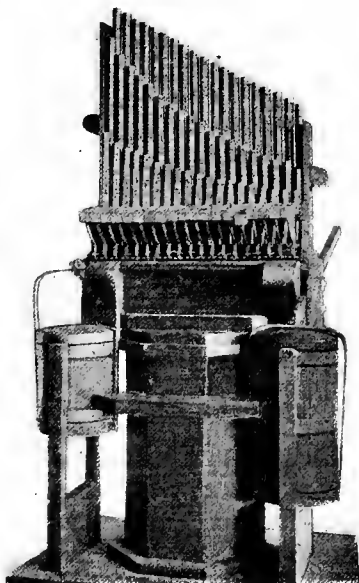
Above the wind-chest there are three channels running the length of the instrument, to which the wind is admitted by taps constructed on the ancient model, one of which can be seen

Appendix B

in the photograph on page 212. Above the three channels are placed the three ranks of pipes, sounding the unison, octave, and superoctave, and the organ has therefore, in modern parlance, three "stops." To cause the pipes to sound, one or more of the taps are turned to admit wind to the required channel, and the keys, called by Vitruvius *pinnæ*, are pressed by the fingers, as in the modern organ.

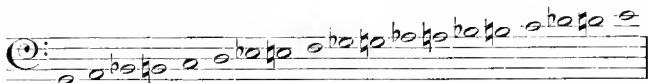
The keys, however, do not act on pallets, but push in *regulæ*, or metal sliders, which have holes pierced in them, through which the wind passes to the pipes, on the same principle as in the sliders of modern organs. Vitruvius lays stress on the necessity of keeping the *regulæ* well oiled, probably to relieve the touch and to help to prevent escape of wind. On removing the finger from a key the *regulæ* is brought back to its place by means of a spring, thus shutting off the wind from the pipes. Hero says that the springs should be of horn, but Vitruvius describes them as of metal, and Mr. Galpin has used metal springs similar to those found on ancient Roman brooches.

The nineteen keys give the following notes, but as the model is half-size, they must be read an octave higher :—

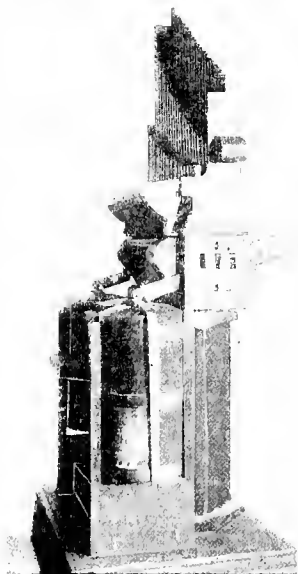


FRONT VIEW OF REV. F. W. GALPIN'S HYDRAULUS, SHOWING KEYBOARD, WITH ONE KEY DEPRESSED, AND THE TWO WIND-PUMPS.

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which embrace the six modes mentioned by "Anonymus" as those used by players of the hydraulus, namely, the Hyperlydian, Hyper-Iastian, Lydian, Phrygian, Hypolydian, and Hypophrygian; the first, being an octave above the last, is played by using the octave "stop."



SIDE VIEW OF HYDRAULUS.

Mr. Galpin is to be congratulated on his success in having constructed the first working model of this interesting instrument. When one runs one's fingers at random over the keys, one is struck by the old-world effect produced by their modal arrangement and the slight unsteadiness of the wind, owing to the impossibility of keeping the water absolutely at a fixed point. This little unsteadiness, which would ruin modern harmonic music, gives a peculiar piquancy to unison passages in the old modes, and seems to go far to account not only for the immense popularity enjoyed by the instrument before the

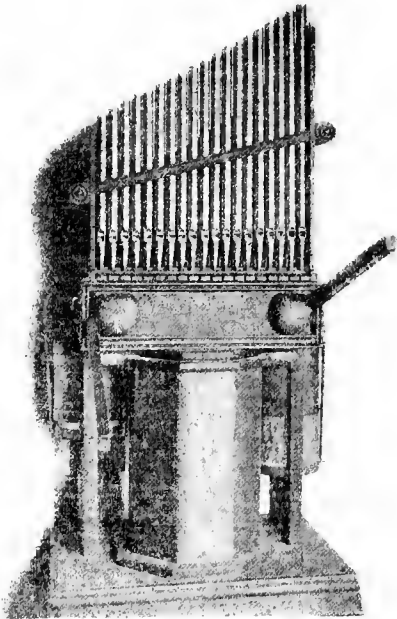
advent of harmony, but also for its gradual disappearance when the growing use of harmonic progressions demanded some means of producing a more decided steadiness in the wind supply.

The labour of pumping wind into a large hydraulus must have been very great. It could never cease for a moment; the blower could not, as now, fill his bellows and rest for a little

Appendix B

while till the "tell-tale" lets him know that he must resume his labours. Hence in the MS. pictures of hydraulis the players seem to be spending half their energies in urging the weary blowers, whose backs are bent double, to fresh exertions.

The instrument excited the keenest interest and admiration amongst the ancients on account of its ingenuity; while the bubbling of the hidden water (caused by over-blowing) is frequently alluded to, and was probably a great mystery to the uninitiated.



BACK VIEW OF HYDRAULIS, SHOWING TANK
CONTAINING WATER.

Appendix C.

Organ-builders.

THE names of many early organ-builders are lost in the obscurity of time ; of others the names only, without details of their life and works, have come down to us. Moreover, organ-building did not become a distinct branch of art till the sixteenth century. Any monk of a mechanical turn of mind, or a clever blacksmith or other artisan, would be employed for this purpose.

With improvements in detail, both artistic and mechanical, the building of organs naturally developed into a science requiring the utmost skill, and the greatest artistic appreciation on the part of its exponents; it was no longer exercised by priests and artisans, but by persons regularly trained through a long apprenticeship.

At present the three leading nations in organ-building are England, Germany, and France, each of which has its particular excellence; but it is not impossible that future historians may consider that at the latter end of the nineteenth century, and beginning of the twentieth, English builders were on the whole the best in the world. That the art of organ-building is being highly cultivated by Englishmen may be seen from the following catalogue (in which the names of living builders are given without comment). Not only has London its famous exponents of the art, but every large town and nearly every county can boast of one or more builders, of whom some have a local reputation, while others are famous throughout the civilised world; and the gigantic structures like those of the Royal Albert Hall, Sydney Town Hall, or Westminster Abbey,

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are not clumsy noise-making machines, requiring superhuman strength to manipulate, but are marvels of excellence of tone and mechanism.

Abbey, John, born in 1785 at Wilton (Wilts). In 1826 he went to France, where he introduced English mechanism and the bellows of Cummings. He made or restored over fifty organs in that country, his work being distinguished for beauty of tone.¹

Abbott & Smith, Leeds.

Agricola, Rodolph the Elder, a learned priest, born 1443 at Baffen, a village in Friesland, assisted in building an organ at St. Martin's Church, Gröningen, in North Holland, the tone of which is much praised by Burney, who heard it. He died in 1485 at Heidelberg, having three years previously been appointed to a Professorship in that University. He was not an organ-builder by profession, but a painter, poet, musician, and philosopher.

Ainscough, H., Preston, Lancashire.

Andre, —, built an organ at St. Ægidea, in Brunswick, in 1456.

Andrews, J., Bradford, Yorkshire.

Antegnati, Costanzo, cathedral organist and organ-builder of Brescia, born 1557, was one of a family whose members for several generations were almost without exception both builders and organists. In his *L'Arte Organica*, 1608, he gives a list of one hundred and thirty-five organs constructed by members of his family.

Antegnati, Bartolomeo, built an organ in the cathedral at Brescia in 1480, of which he was organist, and also made organs for the cathedrals of Milan, Mantua, Como, and Lodi.

Antegnati, Giovanni Battista, a son of Bartolomeo, was an organist and a famous musician.

Antegnati, Giovanni Giacomo, brother of the above, was organist of Milan Cathedral, and built an organ for the choir of Brescia Cathedral, described by Constanzo as one of the most famous in Italy.

Antegnati, Gratiado, son of Giovanni Battista, was an organist

¹ Hamel, *Nouveau Manuel du Facteur d'Orgues*.

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and builder. In 1580 he replaced the organ built by his grandfather at Brescia Cathedral by a new one, in which the many improvements which had been invented were introduced. He was the father of Constanzo, to whom we are indebted for the account of this interesting family.

Antonio, Julius, the builder of a large organ at Dantzic in 1585.

Argall, Sir William, a priest, was paid ten shillings "for the organs" at Lambeth in 1517.

Atterton, Samuel, Leighton Buzzard, Bedfordshire.

Avery, John, an excellent builder, but much given to drink. He built organs between 1775 and 1808 for St. Stephen's, Colman Street, City; Croydon Church; Winchester Cathedral; Christ Church, Bath; St. Margaret's, Westminster; King's College Chapel (in place of that of Harris, but retaining the original case, made by Chapman and Hartop in 1606); Sevenoaks, Kent (this organ was opened by Wesley on October 28th, 1798, and a collection was made for the widows and orphans of the sailors who fell in the battle of the Nile); Carlisle Cathedral. He added toe pedals and small pedal pipes to the organs of Trinity College and St. Mary's Church, Cambridge.

Banfield, J. C., Birmingham.

Barbye, —, repaired the "little orgayns" in the chapel of Magdalen College, Oxford.

Barett, —, in 1619 added a diapason stop to Gibb's organ at Dulwich College Chapel.

Bartold, —, about 1610 built an organ of forty-six stops, three manuals, pedal and pedal coupler, in the Liebfrauenkirche, at Lübeck.

Batti, —, completed in 1761 a large organ in the Old Kerk at Amsterdam, which had been begun in 1725, taken down in 1738, and "attempted to be finished by several bunglers" (Burney, *Present State of Music in Germany*, vol. ii. p. 287).

Beale & Thynne, London.

Beales, W., Croydon.

Beck, David, of Halberstadt, in 1592 to 1596 constructed a great organ at the Castle Church of Gröningen (see page 134). About the same time he built an organ at Halberstadt in the Martini Church, with thirty-nine stops,

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three manuals, pedal, and tremulant. The specification of his Gröningen organ is given by Pretorius.

Bedwell & Son, Cambridge.

Bellamy, J., Denbigh.

Beton (or Betun), William, was organ-maker to Henry VIII., Edward VI., and Mary, as well as being an organ-player. He built the organ of the Cathedral of St. Paul, which escaped Cromwell's iconoclasts, but was destroyed with the cathedral in the Great Fire of 1666.

Bevington & Sons, London.

Beynton, Richard, was an organ-builder in the middle of the sixteenth century.

Binns, J. J., Leeds.

Bishop, James C., established an organ-factory in London towards the end of the eighteenth century. He and his descendants have invented several very important improvements, particularly the clarabella stop, the percussion bellows, and the double-action composition pedals.

Bishop & Son, London and Ipswich.

Borton, Robert, of Stowmarket, an organ-maker, was paid 7s. in 1482 for mending the organ at that place.

Bridge, Richard, is supposed to have been trained under Renatus Harris. All that is known of him is that he probably lived in Hand Court, Holborn, under the name Bridges, in 1748, and that he died before 1776. He built organs for St. Paul's, Deptford, in 1730, and Christ Church, Spitalfields, in the same year; and from 1731 to 1757 he built organs for St. George's in the East, Cuper's Gardens, Lambeth; St. Anne's, Limehouse, Enfield, Middlesex; Faversham, Kent; St. Leonard's, Shoreditch; Eltham, Spa Fields Chapel, St. James's, Clerkenwell; and Paddington Parish Church. He combined with Byfield and Jordan to build good organs at a moderate price for the numerous churches that were springing up in the eighteenth century.

Bridges, C., & Sons, Taunton, Somersetshire.

Brindley & Foster, Sheffield.

Broughe, —, was paid £8 in 1590 by the churchwardens of St. Margaret's, Westminster, "for changing our organs for a payre of his."

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Brown, R., & Son, Hampton Wick.

Browne, Deal.

Browne, Thomas, received in 1508 34s. 4d., in part payment of the £8 due to him for building the great organs at King's College Chapel, Cambridge.

Bryceson Brothers, London.

Bullen, John, Ipswich.

Burckart, Gottschaldt, a Netherlander, built an organ about A.D. 1610, of forty-five stops, three manuals, pedal, and both manual and pedal couplers.

Burton, W. J., Winchester.

Byfield, John (see John Harris), combined with the Jordans and Bridge to build good organs at a moderate price. They erected organs at Great Yarmouth Church, Norfolk, in 1733, and St. George's Chapel, in the same town, in 1740.

Byfield, John, junior, of whose biography the only thing known is that he died in 1774, built organs at Christ Church Cathedral, Dublin; St. John's College, Oxford; Drury Lane Theatre; Magdalen College Hall, Oxford; The Theatre, Oxford; and several London and Provincial parish churches. Some of his organs were built conjointly with Green.

Bylton, an organ-maker of King's Lynn, who built an organ at Ely in the beginning of the sixteenth century, and another at Louth in 1531, for the sum of £22.¹

Callido, of Venice, an eighteenth century builder, is said to have constructed three hundred organs.

Caspariné, Eugenius, together with his son, Adam Horatius, in 1703 built an organ at Görlitz, in the church of St. Peter and St. Paul, of eighty-seven stops.

Castendorfer, Stephen, of Breslau, built organs in 1483 for the cathedral of Bamberg, and in 1490 for St. Ulrich's Church, Augsburg.

Cavaillé, the name of a family of distinguished French organ-builders, the founder of which in 1762 went to Barcelona and married Marie F. Coll, after which he and his descendants took the name Cavaillé-Coll.

¹ *Arch. Jour.*, No. 180, p. 435.

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Cavaillé-Coll, Paris.

Chamberlayne (or Chamberlyn), John, a London builder, enlarged or rebuilt the organ at Magdalen College, Cambridge, in 1509.

Chappington, John. Built an organ for Westminster Abbey about 1596, and for Magdalen College, Oxford, in 1597.

Clark, J. B., Huddersfield.

Cliquard, —. Built organs for the churches of St. Rocque and St. Gervais, Paris, about 1750. Burney found the tone of the full organ at St. Gervais rich, full, and pleasing; and the pedal had a compass of no less than three octaves. The organ at St. Rocque had four manuals and pedal, but the key action was intolerably noisy. (Burney, *State of Music in France and Italy*, 1773, pp. 37, etc.)

Columbi, Vincenzo. Built a magnificent organ for St. John Lateran at Rome in 1549.

Compenco, Heinrich. About 1610 built an organ in the cathedral of Magdeburg of forty-two stops, two manuals, pedal, twelve bellows, two tremulants, vogelgesang, and drum. Two years later he built an organ for the castle of Hesse, which in 1616 was removed to the church of Friedrichsburg. This instrument had two manuals with coupler, twenty-seven stops, of which nine were on the pedal, tremulant, bagpipe, goat's bleat, and kleinhümlein (little buzzer), whatever that might be.

Conacher, P., Dublin.

Conacher, P. & Co., Huddersfield.

Cope, Richard, London.

Cornwell, William, of Dublin, was paid £3 8s. 3d. in 1746 "for his trouble in erecting the organ of Navan Parish Church."

Corps & Son, London.

Couper, John, a carpenter, constructor or repairer of the organ at York Minster in 1419. He is said by Burney to have invented ribs to control the folds of bellows.

Crang & Hancock. There were two Hancocks, John and James. One of the Hancocks was a good reed voicer, and Crang was employed to alter the old echos into swells. Amongst those which he thus changed was that of Father Smith's organ at St. Paul's. This firm built organs at St.

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John's, Horsleydown, in 1770; Barnstaple Church, Chelmsford; St. George the Martyr, Queen's Square; St. Margaret's, Leicester; St. Mary's, Scarborough; St. Mary's, Cray, Kent. John Hancock died in 1792 while repairing and enlarging the organ at Maidstone Church; James Hancock died some time after 1820.

Cummins, an organ-builder of Pentonville, mentioned in the *Musical Directory* of 1794.

Dalham, George, in 1672 lived in "Purple Lane, next door to the Crooked Billet, where such as desire to have new organs, or old mended, may be well accommodated," according to an advertisement in the sixth edition of Playford's *Introduction to the Skill of Music*. He added a chaire organ to the instrument at Hereford Cathedral in 1686.

Dallam (or Dalham), Ralph. Built an organ at St. George's Chapel, Windsor, at the Restoration, and others at Rugby Parish Church, Hackney, and Lynn Regis. He died in 1672 while building an organ at Greenwich Church, the instrument being completed by his partner, James White.

Dallam (or Dalham), Robert, citizen and blacksmith of London (born at Lancaster 1602, died at Oxford 1665, and buried in the cloisters of New College), was employed to build a large organ at York Minster in 1632 at a cost of £297, with £5 more for his journey to York. This organ, so much admired by Mace (see p. 108), was placed on pillars on the north side of the choir. In 1635 Dallam did some work on an organ belonging to the Archbishop of Canterbury, and in 1661 he built a "fair new organ" for New College Chapel, Oxford. The authorities wished its pitch to be a semitone lower than that of the organ at Christ Church; but Dallam, perhaps to save expense, said he thought a quarter of a note would be sufficient. He also built organs for the Music School at Oxford, the cathedrals of St. Paul and Durham. Of the Durham organ, the diapasons and principal, as well as the case, now form part of the organ at St. Michael-le-Belfry, York, whither they were removed by Father Smith in 1687.

Dallam, Thomas? of London, was employed in 1605 and 1606 to build a large organ at King's College, Cambridge, for which purpose he moved his whole establishment to Cam-

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bridge, where he and his men lived in the town, but were boarded in the College Hall. The total cost was £370, the handsome case, which still adorns the chapel, costing £156. The pipes were taken out and sold by order of the Long Parliament. In 1613 a Thomas Dalham (probably the same) made a "new double organ" for Worcester Cathedral at a cost of £211.

Dempsey, James, an organ-maker of Doncaster, died 1567.

Dicker, Exeter.

Driver & Hay, Bradford.

Dresser, J., Birmingham.

Duddington, Anthony, citizen of London, in 1519 built a pair of organs for the church of Allhallows, Barking, "of double Ce-fa-ut, that is to say of 27 playne keys (*i.e.*, naturals), with basses called Diapason of 10 foot or more length." The bellows were in a loft above the choir, and the wind is said to have been "conveyed with a pype" to the sound-board. The lowest note was an 8-foot pipe, and corresponded in this respect with modern English organs, and with those of its own date in Germany.

Dunstan, Saint. Fabricated several organs with brass pipes in the West of England in the tenth century.

Egan, Eugene Nicholas, a native of Ireland, built an organ for the cathedral at Lisbon about 1740. He was one of eight famous builders whom the King of Portugal had invited to come from Italy, Germany, and other countries to compete for the erection of this organ, and for the post of Royal organ-builder, which he obtained.

Elliott, Thomas. In 1803 joined in partnership with W. Nutt in the firm of organ-building originally founded in 1755 by Snetzler. He afterwards worked alone until joined by W. Hill (see Hill). He is mentioned in the *Musical Directory* for 1794 as of 10 Sutton Street, Soho. He died in 1832.

Engelbrecht, Ulric, a priest, built the organ at Strasburg Cathedral in 1260.

England, A., Bristol.

England, George. An eminent builder between 1740 and 1788. Rimbault enumerates eleven of his organs, amongst them being that of Dulwich College Chapel.

England, George Pike, son of the above. His account book

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shows the names of twenty-two churches and chapels, chiefly in the provinces, for which he built organs between 1788 and 1812.

Engler, Michael, of Silesia, and his son and grandson, were famous organ-builders from 1688 to 1822.

Faber, Nicholas, a priest, built the organ at Halberstadt Cathedral in 1359 to 1361, which still existed in 1618, and is fully described by Pretorius. It had "fist keys," three manuals, one octave of pedals (BB to B), and no stops. The upper manual was a huge mixture of fifty-six ranks, the second an open diapason, to which the third formed a bass, and the pedal a mixture of twenty-four ranks.

Fincham, H., London, N.W.

Fincham, Thomas, London.

Fisher, W., Oxford.

Flight, Benjamin, an eminent London builder, who was in partnership with Kelly at Exeter Change in 1794.

Flight, Benjamin, born about 1767, son of the above, studied under his father and Kelly, and in 1800 went into partnership with Joseph Robson, with whom he constructed the Apollonicon (see p. 177). In 1832 he dissolved partnership and commenced business with his son, with the title of "Flight & Son," under which name the business is still carried on. He made many improvements in the mechanism of organs, particularly in connection with the wind pressure. He died in 1847.

Flight & Son, London.

Forster & Andrews, Hull.

Forster, Robert, London.

Fritz, Gottfried, built in 1614 an organ of two manuals, thirty-three stops, couplers for manuals and pedal, military drums in E and F, and a revolving star hung with bells, for the Castle Church at Dresden. At Schöningen he built an organ whose exterior pipes were of wood inlaid with gold. At Baireuth he built an organ after the fashion of those previously mentioned, containing, in addition, cuckoo and nightingale stops.

Gabler, Johann, of Ulm, built a great organ in the Benedictine Abbey of Weingarten (see p. 69).

Gaunte, George, repaired the organ of York Minster in 1470.

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- George**, a Venetian priest, built a hydraulus for Ludwig the Pious at Aix-la-Chapelle in 826.
- Gern**, A., London.
- Gibbs**, —, who lived near St. Paul's Cathedral, sold a pair of organs to Alleyn, the founder of Dulwich College, which were put up in the College Chapel, 1618.
- Gibson**, William, of Dublin, mentioned in the Dublin Directory of 1771.
- Gildersleeve**, R., Bury St. Edmunds.
- Glancets**, Mighell, in 1475 built an organ for St. Michael's Church, Cornhill, and received the old organ in part payment, the balance being £9.¹
- Glovatz**, Heinrich, a bürger of Rostock, built in that town an organ of thirty-nine stops, three manuals, fourteen bellows, no pedals, in 1593.
- Glyn & Parker**, of Salford, near Manchester, in the eighteenth century, built organs in Manchester and in churches in the counties of Lancashire, Derbyshire, Gloucestershire. For London they built the organ for All Hallows the Great, Thames Street, and the Foundling Hospital. Contradictory accounts are given of the Foundling organ. Burney says that Handel gave it to the Charity; that having been pleased with an organ by Glyn & Parker at Poynton Church, Handel ordered Parker to build one for the Foundling Hospital; but the *European Magazine*, February, 1799, says: "Handel did not give the organ to the Foundling Hospital. It was built at the expense of the Charity, under the direction of Dr. Smith, the learned master of Trinity College, Cambridge, who added demitones and some niceties not occurring in other organs." The "demitones," more usually called quarter-tones, remained to worry the player till 1854, when a new organ was built, tuned, let us hope, in equal temperament.
- Godhall**, J. W., Ipswich.
- Gray**, the name of an English organ-building family, the founder of whom, Robert, established a factory in London in 1774. About 1837 John Gray took Frederic Davison into partnership, and with him built many fine organs,

¹ Article by the late Dr. Hopkins in *Arch. Jour.*, No. 180, p. 434.

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amongst which are the Handel orchestra organ at the Crystal Palace, those of Leeds Town Hall and Magdalen College, Oxford. John Gray died in 1849.

Gray & Davison, London, Chester, Leeds, and Liverpool.

Green, Samuel, born 1740, and probably trained under Byfield, Bridge, and Jordan, with the first of whom he began his career in partnership. In the newspaper notices of his death in 1796 he is described as "organ-builder to the King." George the Third seems to have patronised him a great deal. He is said by Dr. Rimbault to have been probably never excelled in the peculiar sweetness and delicacy of his tone, which was entirely original. His account book shows that he built no less than twelve cathedral and college chapel organs, ten in London churches, halls, and the Opera House, and twenty-six elsewhere, including one at St. Petersburg.

Greenwood, of Leeds, about 1840 rebuilt the organ at Leeds Parish Church, originally built by Snetzler.

Griffin, Thomas, barber, and Gresham professor of music, built an organ for St. Helen's, Bishopgate, in 1741, and several others; the whereabouts are unknown. He combined shaving, lecturing, and organ-building with organ-playing, being organist of St. Helen's Church. He had a curious system of contracting with a parish to pay for his organs by an annuity for an agreed term of years, instead of a lump sum, he providing a person to play on them as long as the annuity was payable.

Griffin & Stroud, Bath.

Grolach, of Lyps, in 1385 built an organ in Strasburg Cathedral.

Gunzelin, of Frankfort, built an organ in 1292 for the Cathedral of Strasburg.

Hallett, John Gillingham, Dorsetshire.

Halmshaw & Sons, Birmingham.

Hamilton, C. & F., Edinburgh.

Hanson, John, occurs in connection with repairs to the organ at Magdalen College Chapel, Oxford, in the sixteenth century.

Hardy & Son, Stockport.

Harris, John, son of Renatus, in 1740 built an organ for the Parish Church of Doncaster at a cost of £525. This was

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a G Organ. It contained Great, Choir, and Echo claviers, the Echo being arranged to "swell to express passion in degrees of loudness and softness, as if inspired by human breath." The "Echo and Swell" manual was incomplete, according to the custom of the day, its lowest note being middle C. John Harris was in partnership with John Byfield, with whom he erected organs at St. Mary's, Shrewsbury, in 1729, Grantham Church in 1736, Doncaster Parish Church in 1740, and several churches in Bristol and elsewhere.

Harris, Joseph, London.

Harris, Renatus, son of Thomas Harris, who had gone to France during the Interregnum. Renatus returned in 1660 with his father, after whose death he became the most famous builder in England next to Father Smith, with whom he was in great rivalry. He built organs for the cathedrals of Salisbury, Gloucester, Worcester, Chichester, Hereford, Winchester, Bristol, St. Patrick's, Dublin, Ely, Norwich, and Cork; for the college chapels of King's and Jesus (Cambridge), Winchester, and for many parish churches. His competition with Smith for the Temple organ is described on p. 115. He retired to Bristol in his later life, where he built organs for the surrounding churches; and died, according to Mattheson, in 1724.¹

Harris, Renatus, junior, a son of Renatus, built an organ at St. Dionis, Backchurch, in 1724.

Harrison & Harrison, Durham.

Hayter, A., London.

Haywood, Robert, of Bath, built an organ for Wimborne Minster in 1664 at a cost of £180, which was defrayed by a rate.

Haywood, W. J., London.

Hele & Co., Plymouth.

Hennig, of Hildesheim, a carpenter who changed his trade. About 1600 he built an organ at Hildesheim and another at Brunswick, the latter with thirty-five stops, two manuals and pedal (of fourteen stops), manual but no pedal coupler.

¹ Rimbault gives the date of his death as in or about 1715.

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The stops were spring-boxes; each pedal stop had its own sound-board, and there were eight bellows of his own invention, each nine feet long with a single fold, and so constructed that the leather could not be destroyed by mice.

Herbst, Heinrich, and his son, built at Halberstadt in 1718 an organ of seventy-four stops, five manuals, and pedal. Of the manuals three were in the usual position, and two at the sides.

Hermann, a Jesuit, built organs for San Ambrogio, Genoa, in 1648, for the Carignano Church, Genoa, in 1649, and for the cathedral of Como in 1650.

Heslop, R., London.

Hewe, John, repaired the organ at the altar of the Blessed Virgin Mary at York Cathedral, and carried it to the House of the Minorite Brethren and back for 13s. 9d. in 1485.

Hewins, T. & H., Stratford-on-Avon.

Hewitt, H. W., Leicester.

Hildebrand, Johann Gottfried, son of Zacharie, built an organ at St. Michael's Church, Hamburg, in 1762 at a cost of £4000. It had four manuals, sixty-four stops, and a thirty-two feet pedal. Its keys were faced with mother-of-pearl and tortoise-shell, and the case richly ornamented. The flute stop is specially praised by Burney, who adds that the "chorus" is the most noble that can be imagined. It had also a diminutive swell-box, enclosing three stops (see p. 139).

Hildebrand, Zacharie, who flourished between 1680 and 1743, was a famous German builder.

Hill, William, a native of Lincolnshire, in 1825 joined Thomas Elliott in the business founded by Snetzler, which now was carried on under the title of Elliott & Hill. This firm built the large organ at York Minster (p. 172), the organs of Ely, Worcester, and Manchester cathedrals, and many other famous instruments. William Hill, in conjunction with Dr. Gauntlett, was instrumental in doing away with the unpractical F and G compass of organs in England. He died in 1870, and was succeeded by his son, also named William. The latter built the fine organs at

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- Westminster Abbey in 1884, and Sydney Town Hall in 1887. He died in 1893, and was succeeded by his sons.
Hill, W., & Son, London.
Holditch, London.
Holland, Henry, of Little Chelsea. Mentioned in the *Musical Directory*, 1794.
Hollister, William Castles, of Dublin, mentioned in the *Dublin Directory of 1771.*
Hope-Jones, R., Birkenhead.
Hopkins, Thomas, & Son, York.
Hopkinson, Joseph, Birstal, Yorkshire.
Howe, Father, organ-maker, was paid for "keeping the organs" of Lambeth for one year 1s. in 1568, and for the same service at St. Helen's, Bishopsgate, 2s. He was examined on a suspicion of Popery before Sir William Chester, Lord Mayor of London, but seems to have escaped punishment.
Hunter, A., & Son, Clapham.
Ingram & Co., Edinburgh and Hereford.
Ingram, Eustace, London.
Jackson, John W., Oldham, Lancashire.
Jacob, —, in 1608 built an organ of thirty stops, two manuals, and pedal in the cathedral of Lübeck.
Jardine & Co., Manchester.
John the Orgoner repaired an organ which King John of France, while a prisoner in England, took with him from Hertford to Somerton Castle in 1359.¹ This must have been a portative or house organ.
John de John, or Sir John, a priest, was organ-maker to Henry VIII. from about 1526 to 1531.
Johnson, G. J., Bristol.
Jones, H., & Sons, London.
Jones, T. S., & Son, London.
Jordan, Abraham, a distiller, of Maidstone, who took to organ-building about the year 1700, and instructed his son Abraham in the business. He holds an important place in the list of organ-builders from having invented the Swell (see page 138). He and Wilson also forestalled modern

¹ *Archæological Journal*, vol. 178, p. 149.

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practice by placing the keyboard in such a position that the player faced the audience instead of sitting with his back to them ; and a further invention was some kind of combination pedals by which the trumpet, sesquialtera, and cornet could be drawn and shut off by the feet of the performer. These two inventions are advertised in the *London Journal* of February 7th, 1729-30, when Jordan invited "all masters, gentlemen, and ladies" to come and hear the performance at his "work-house" against St. George's, Southwark. One of the Jordans became organist at St. Giles's, Cripplegate, in 1726. They built organs for St. Michael's, Paternoster Row, in 1700 ; Fulham Church, 1701 ; St. Antholin's, Watling Street, and St. Saviour's, Southwark, 1703 ; St. Magnus the Martyr, London Bridge, 1712 (the first organ in which the Swell was used) ; Chelsea College, 1715 ; Southampton Parish Church, 1731 ; St. Luke's, Old Street, 1733 ; Maidstone Parish Church, 1746 ; St. Bennet Fink, and others. In 1720 he built an organ for the chapel of the Duke of Chandos at Canons (now Little Stanmore Parish Church), of whose establishment Handel was "chapel-master" ; and it is not impossible that Handel, who greatly admired Jordan's invention of the Swell, may have recommended him to the notice of the Duke. On the sale of Canons in 1747 this organ was bought by the churchwardens of Trinity Church, Gosport, where it still stands, though it has been added to and modernised. The present organ of Little Stanmore, the case of which is by Grinling Gibbons (died 1721), must have been placed in the church after 1747. The Jordans built some organs in conjunction with Byfield and Bridge (see those names).

Keates, A., Sheffield.

King, H., Edinburgh.

Kirkland, A., London, and Wakefield, Yorkshire.

Kranz or **Crantius, Heinrich,** built an organ for St. Blasius's Church at Brunswick in 1499. He is mentioned by Pretorius as having reduced the size of the keys to nearly their present dimensions, and having made his "semitones" black, or some other colour, to distinguish them from the "keys."

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- Krebs, Friedrich**, of Mildenburg, is mentioned by Pretorius as having extended his pedal clavier down to A.
- Lawless, John**, a famous organ-builder of Kilkenny, flourished about 1460.
- Laycock & Bannister**, Keighley, Yorkshire.
- Lee, J. C.**, Coventry.
- Lefevre, Jean Baptiste Nicolas**, a famous organ-builder of Rouen in the second half of the eighteenth century. He built organs at St. Martin de Tours (of four manuals and pedal), Honfleur, Havre, and in 1769 an instrument of five manuals, pedals, and eleven bellows at St. Etienne in Caen.
- Leslie, George**, a Scotchman, built an organ in the Church of St. Godard, Rouen, in 1640.
- Lewes, William**, organ-maker, was appointed in 1514 keeper and tuner of the King's instruments at a salary of one hundred shillings per annum.
- Lewis & Co.**, London.
- Liddiatt & Sons**, Stonehouse, Devonshire.
- Lincoln, H. C.**, organ-builder to William IV., was in 1837 called as an expert witness in the dispute between Hill and the Dean of York on the completion of the large organ at York Minster. He proved that he had carefully gone over the instrument; that its machinery and construction were admirable and not possible to be improved on, and that the builder had certainly spared no expense or exertion to make his work perfect. In the same year he added pedals with a set of open diapason pipes to the organ of Christ Church, Newgate Street, the instrument on which Mendelssohn afterwards played.
- Lloyd, Charles & Co.**, Nottingham.
- Lobsinger, Hans**, of Nuremberg, invented bellows with one fold only in 1570.
- Loosemore, John**, of Exeter, built an organ in the cathedral of that town in 1665 to replace the one destroyed by Cromwell's soldiery. It was remarkable for its double diapason, the lowest pipe of which was twenty feet in length. He also built a small instrument for the singing school of the cathedral, and an organ of eight stops for Sir G. Trevilyan in 1665. He died in 1681 at the age of sixty-eight, and was buried in the cathedral transept.

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- Maas, Nicolaus**, built an organ of forty-three stops, three manuals and pedal at Stralsund, Denmark, about 1610.
- Magahy, T. W.**, Cork.
- Maher**, of Lower Lambeth Marsh. Mentioned in the *Musical Directory*, 1794.
- Marshall Brothers**, Wakefield, Yorkshire.
- Martin & Coate**, Oxford.
- Meacock & Son**, Doncaster.
- Melchior, Caspar**, and Michael, his son, assisted Steffan of Breslau to build an organ at Erfurt in 1483.
- Merilees, J. & A.**, Glasgow.
- Merklin, Schulze, et Cie.**, of Brussels, built an organ of four manuals and pedals, with composition pedals (called in Spanish *Pisas*), for the Cathedral of Murcia, Spain, in 1857. It had pneumatic action throughout and concussion bellows. It is described in a pamphlet by H. Hilarion Eslava, Chapelmaster to the Queen of Spain.
- Meyer**, —, built an organ at Frankfort-am-Main in the early part of the eighteenth century with a transposing keyboard.
- Michael, A.**, a monk, one of several organ-builders who, before the invention of registers, placed his diapasons and mixtures on separate sound-boards, from which the wind could be cut off at will. Pretorius praises this method, and it has been re-introduced in modern organs in connection with reeds and different wind pressures.
- Micheau, Paul**, a German who settled in Exeter in 1780, in the neighbourhood of which he built several organs. He also had the charge of Loosemore's organ at Exeter Cathedral, and that of Tiverton Parish Church.
- Millar, Henry**, of Dublin, about 1767 built an organ for St. Warburgh's Church in that city.
- Miller, A. H., & Son**, Cambridge.
- Miller, J. R.**, Dundee, N.B.
- Morgan & Smith**, Brighton.
- Morse**, —, of Barnet, an apothecary by profession, in the first half of the eighteenth century built organs for St. Matthew, Friday Street, and St. James', Clerkenwell, but both were such wretched instruments that they were soon taken down. (Hawkins, vol. iv. p. 357.)

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Moser or **Mooser**, Aloys, born at Freiburg, Switzerland, in 1770, was equally distinguished as a piano-maker and organ-builder. He endeavoured to combine the piano and organ in the same instrument in 1810, an experiment which was bound to fail, owing to the different effects of change of weather on strings and pipes. His most famous work was the organ at Freiburg (see p. 183). He died in 1839.

Mozart & Co., London.

Muller, Christian, of Amsterdam, built the famous organ at Haarlem. Burney was disappointed with it, or perhaps with the high fees he had to pay for hearing it. He found that the variety of tone was not what might be expected, and that the *Vox humana* reminded him of the cracked voice of an old woman of ninety, or Punch singing through a comb. Recitals are now given at certain times in each week, and the fee for admission is very moderate.

Mulner, Nicolaus, of Mildenburg, is mentioned by Pretorius with F. Krebs as having extended his pedal-board down to A.

Nargenhof, —, of Hartzogenbusch in Brabant, added in 1548 two manuals to the existing two of an ancient organ in St. Peter's Church, Hamburg. Some of his stops, especially the *Vox humana*, are described by Burney as excellent.

Nicholson, F. W., Bradford, Yorkshire.

Nicholson & Co., Worcester.

Nicholson & Lord, Walsall, Staffordshire.

Nicholson, F. C., Newcastle-on-Tyne.

Noble, A., & Co., Derby.

Norman & Beard, London and Norwich.

Northcott, W. J., London.

Os, Albert van, called "Albert the Good." A seventeenth century builder, who, in reconstructing the old organ at St. Nicholas', Utrecht, found on the wind-chest the date A.D. 1120. The wind-chest had neither draw-stop nor sliders, but twelve ranks of pipes to each key, which all spoke at once. This organ had a pedal clavier, which, since it acted on a row of trumpet pipes, must have been added in the fifteenth or sixteenth century, for reed pipes were not invented before that, though Hamel seems to consider that it was coeval with the organ.

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Pease, A. E., London.

Pease, Mr., built a new organ for St. Andrew's Church, Dublin, in 1681, at a cost of £110.

Perugino, Luca Blasi, enlarged Columbi's organ at St. John Lateran in 1600, and built organs for the cathedrals of Orvieto and Trent, and the Church of Constantine at Rome.

Peters, Fabian, of Schneck, a Dutch builder, mentioned by Pretorius for the excellence of his workmanship in connection with the sliders.

Petigham, Van, the builder of a "noble" organ in 1768 at St. Martin's, Alost, of fifty-three stops, three manuals, and pedal. Burney, in his *Present State of Music in Germany*, vol. i. p. 20, says that the touch was not so heavy as might be expected, and praises the tone of the reeds and diapasons.

Philpott, J., Exeter.

Pister, E. & J., of Leadenhall Street. Mentioned in the *Musical Directory*, 1794.

Positive Organ Co., London.

Preston, an organ-builder of York, mentioned by Burney amongst the few organ-builders living in England after the Interregnum. Nothing is known of him.

Rayson, —, Ipswich.

Richardson, W. E., Preston, Lancashire.

Robartt, an organ-maker of Crewkerne, let out organs to churches by the year; he was paid 10s. by the Mayor of Lyme Regis for the hire of an organ during the year 1551.

Robson (see Benjamin Flight).

Roder, Johann Michael, of Berlin, built a great organ in the Church of St. Mary Magdalen, at Breslau, in 1725.

Roose, or Rouse, John, a preaching friar, who repaired and restored the organ at the altar of the B.V.M. in York Cathedral, in 1457, for which, and for a pair of bellows, he was paid 36s. 8d. In 1450 he built an organ for Kilkenny, Ireland.

Rosenburger (or Rothenburger), Conrad, built an organ in the Barfuss Church, at Nuremberg, in 1475, and a larger one in the Cathedral of Bamberg in 1493. The claviers were extended by him down to F.

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- Rother**, Henry William, of Dublin, mentioned in the *Dublin Directory* of 1771.
- Rothwell**, F., London.
- Rushworth**, W., & Sons, Leeds.
- Russell**, Hugh, of Theobald's Road, London. Mentioned in the *Musical Directory*, 1794.
- Sagar**, Leeds.
- Scheibe**, Johann, an organ-builder of Leipsic, who in 1747 engaged in a contract to repair and clean the organ at St. Thomas' Church in that town, under the supervision of J. S. Bach and others.
- Scherer**, Hans, in 1576 and 1580 built two organs exactly alike at Bernau and Stendal, of twenty-nine stops, two manuals, pedal, couplers to both manuals, and pedal. The compass of the manuals was four complete octaves, of the pedals two octaves and a tone, and there was a tremulant in each organ.
- Schmahl**, —, built an organ which was celebrated in its day, at the Cathedral of Ulm in 1735. Burney says that the German Flute was the best of the solo stops, the reed work pretty good, but he complains that there was no swell.
- Schowt**, John, repaired the organ at Magdalen College Chapel in the sixteenth century.
- Schrider** (or Schreider), one of Father Smith's workmen, and afterwards his son-in-law, succeeded to his business on the death of Smith in 1708. He received the appointment of organ-builder to the Chapels Royal in 1710. He built organs at the Chapel Royal, St. James, St. Mary Abbots, Kensington, St. Martin's in the Fields, Westminster Abbey (in which he was associated with Jordan), and elsewhere.
- Schwarbrook**, Thomas, a German, was one of Renatus Harris's workmen, who started business on his own account at Warwick. He built organs at Shrewsbury, Warwick, Coventry, Magdalen College, Oxford; Lichfield Cathedral, and elsewhere. In 1720 he was appointed repairer to the organ of Worcester Cathedral at a salary of £8 a year. His masterpiece was an organ he built at St. Michael's, Coventry, in 1733, at a cost of £1400. It contained stops

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acting on strings, called harp, lute, and dulcimer; but in consequence of the difficulty of keeping the strings in tune, they were removed in 1763. A similar experiment was tried by Moser in 1810.

Schulze, Edmund, Paulinzelle, near Erfurt.

Serassi of Bergamo, like Callido of Venice, is said to have built no less than three hundred organs during the eighteenth century. In one of his organs at Bergamo, built in 1782, he carried the key action 185 feet underground, from the clavier to the Great organ.

Silbermann, Andreas. The name of Silbermann is one of the most famous amongst German organ-builders, at a period when German organs were the finest in the world, and German organ-playing was in advance of that of all other nations. Andreas Silbermann, who was born in 1678 at Frauenstein, Saxony, was the first of several celebrated builders of the same name. Nothing is known of his life; but he built twenty-nine important organs at Strasburg, Basle, Colmar, Rosheim, and elsewhere. He died in 1733.

Silbermann, Gottfried, a brother of Andreas, was born in 1684 at Frauenstein, but after working some years with his brother, studied for a time in France, where he learned several improvements in organ-building, which he applied on his return. He invented the clavecin d'amour, and introduced Cristofori's invention, the pianoforte, into Germany, where it was shown to Sebastian Bach by Frederick the Great at Potsdam. He built, amongst others, organs at Freiberg Cathedral, St. Pierre, Freiberg; the Royal Church of the Evangelists at Dresden; St. Sophia, Dresden; Notre Dame, Dresden; Poenitz, and the Royal Catholic Church, Dresden; during the building of the last of which he died in 1754, and the organ was completed by his nephew, John Andreas Silbermann. The pipes of this organ were so highly burnished that they shone like silver. The "chorus" is said by Burney to have been amazingly rich and powerful, a merit possessed by most German organs at that time. Of his organ in the Frauenkirche at Dresden, Burney says that there was a 32-foot stop on the pedal, and that it was one of the best

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instruments of this celebrated maker. It had three keyboards of the unusual compass of D to *d*^{'''} four octaves, with two octaves on the pedal. There was also a "spring of communication" (*i.e.*, coupler) by which the three manuals could be played together; but when coupled the touch became so heavy that each key required the force of a foot instead of a finger to press it down.

Silbermann, John Andreas, son of Andreas, was born at Strasburg in 1712, where he died in 1783 as a member of the council. He built fifty-four organs.

Silbermann, Johann Daniel, the second son of Andreas, was born in 1717 at Strasburg, and studied under his uncle Gottfried at Dresden, where he succeeded to his uncle's business. He died at Leipsic in 1766.

Slater, R., & Son, London.

Smallwood, Henry, Wrexham.

Smid, Erhart, of Peyssenberg in Bavaria, was exempted in 1433 from all taxes on account of his skill in organ-building.

Smith or Schmidt, Bernhard, called Father Smith to distinguish him from his two nephews, came from Germany to England at the Restoration, and built many organs (see p. 114). He was one of the numerous band of organ-builders for which Germany and Holland were famous in the seventeenth century. He was born about 1630, and died in 1708.

Smith, Bernard or Christian, a nephew of the above, came to England as assistant to his uncle. Nothing further is known of him, except that he is said to have built several fine organs, amongst them being those of Tiverton Church in Devonshire, in 1696, and Boston Church in Lincolnshire in 1717.

Smith, Gerard, another nephew of Father Smith, came over with his uncle, and built good organs at the parish church, Bedford, 1715; All Hallows, Bread Street, 1717; Finedon Church, Northamptonshire, 1717; and St. George's, Hanover Square, 1725. He is said to have built an organ at Little Stanmore Church. Perhaps this is the existing organ, and it may have been placed there after the removal of Jordan's organ to Gosport.

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- Smith, Gerard**, probably a grandnephew of Father Smith, was organ-repairer to Chelsea Hospital in 1755.
- Smith**, of Bristol, introduced or invented the octave coupler, and applied it to the organ of St. James's Church in that city in 1824.
- Smith, Edwin**, Blackburn.
- Smith, R.**, London.
- Smyth, Thomas**, an orgone-maker, was paid 40s. for mending the "grete orgones," and vs. for the "small orgones" of St. Margaret's, Westminster, in 1514.
- Snetzler, John**, to whom Burney refers as "this truly eminent builder," was born at Passau in 1710, and obtained a reputation by building several organs, and restoring that of the cathedral of his native place. He came over to England before 1741, in which year he built an organ for Chesterfield Church in Derbyshire. His fame gradually extended, and Dr. Burney recommended him to the churchwardens of Lynn Regis, Norfolk (see p. 181). The organ he erected there was remarkable for a metal stop of 16-foot tone called *Borduun*, which Burney says sounded like a double bass, and the *Dulciana*, then new to England. Dr. Rimbault enumerates no less than thirty-five organs built by Snetzler in various provincial churches and chapels and in Ireland. Concerning his organ at the German Lutheran Chapel in the Savoy, see p. 144, *note*. He was famous for the excellent quality of his pipes. In 1755 he founded a London business, which on his death passed to his workmen, Orhmann and Nutt, then to Elliott & Hill, and is now carried on under the title of William Hill & Son (see Hill).
- Sowerby, Richard**, mended the organ at York Minster in 1473.
- Speechly, H., & Sons**, London.
- Splitger**, —, at the end of the seventeenth century built organs with 32-foot pipes for the churches of St. James, St. Nicholas, and St. John, at Hamburg.
- Stacey, John**, Derby.
- Steele & Keay**, Burslem, Staffordshire.
- Steffan**, of Breslau, built a large organ in the cathedral of Erfurt in 1483.
- Sterzing, Adam**, built an organ of fifty-eight stops, four

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- manuals, and pedal for the Court Church at Eisenach in 1707.
- Stumm**, Heinrich, of Rauhen-Sulzbach, with his son, built organs at Bockenheim in 1768, Frankfort, 1779. Walther, writing in 1732, attributes to him the invention of the *Vox angelica*.
- Sturgeon**, E., Bury St. Edmunds.
- Sweetland**, William, Bath.
- Sylvester II.**, Pope, whose name was Gerbertus Latro, built an organ (probably hydraulic) for the abbey of Bobbio before 1003 (see page 34).
- Taylor**, **Stephen**, & Sons, Leicester.
- Telford & Telford**, Dublin.
- Terbrugen**, of Antwerp, built the organ in the Church of St. Paul in that city in 1670.
- Thamar**, of Peterborough. Nothing is known of him except that he is mentioned by Burney as one of the organ-builders living in England at the Restoration.
- Theophilus**, a monk of unknown date, wrote a treatise on organ-building, quoted by Dr. Rimbault in his *History of the Organ*, p. 24, etc.
- Theusner**, Zacharias, built an organ of five manuals and pedal, with sixty-eight stops, for the cathedral of Merseberg in 1702.
- Thurston**, J. H., Ipswich.
- Topp**, W. R., & Sons, Bedworth, Warwick.
- Trazdorf**, Heinrich. Built organs at Nuremberg in 1455 and St. Mary Magdalen, Breslau, in 1466.
- Trudgian**, J., & Son, St. Austell, Cornwall.
- Trustam**, J. & A., Bedford.
- Turner**, —, a Cambridge builder, mentioned by Hawkins, vol. iv. p. 356, as having been chiefly employed in repairing old organs.
- Vaucks**, John, organ-master, set up in 1533 a new "pair of organs" in the rood loft of Wimborne Minster. This organ was destroyed in the Great Rebellion.
- Vincent**, H. S., & Sons, Sunderland.
- Vogel**, Gregorius, who flourished about 1560, is mentioned by Pretorius as one of the first who studied beauty of tone and contrasts, and who had a special knowledge and insight

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into the *Mensur fundamentaliter*, i.e., the proper scaling of pipes.

Vowles, W. G., Bristol.

Wadsworth & Brother, Aberdeen, N.B., and Manchester.

Wagner, Joachim, built in 1725 the large organ in the Garrison Church at Berlin. In this instrument were revived some of the mediæval curiosities of organ-building, there being two kettledrums beaten by figures of angels, figures of Fame, which spread their wings, suns, eagles, etc. (See page 72.)

Walcker, Eberhardt Friedrich, established himself at Cannstadt, Stuttgart, during the eighteenth century, and removed to Ludwigsburg in 1820. His son became one of the most famous builders in Germany. Amongst his organs are those of Ulm Cathedral, 1856, and the Music Hall, Boston, America, in 1863.

Walcker, E. F., & Co., Ludwigsburg.

Walker, Joseph, established a factory in London in 1819, where he built many important organs, including those of Exeter Hall and the concert room of the Crystal Palace. He died in 1870.

Walker, J. W., & Sons, London.

"**Walter the Orgoner**" in 1344 made a clock for St. Paul's Cathedral.¹

Welby, Charles, Edinburgh.

Welby & Sons, Edinburgh.

Wheeler, W. R. C., Grantham.

White, or Wyght, called Magister, and therefore a person of some consequence, *factor organorum*, was paid various sums from 1531 to 1545 for work done to the organ at Magdalen College Chapel, Oxford. He seems also to have built "great orgaynes" at St. Andrew's, Holborn, about 1553.

White, John, Dublin.

White, W. D., Leamington Spa.

Whiteley, Charles & J., Chester.

Whiteley, H. & H., Chester.

Whitehead, H., Waterford, Ireland.

¹ *Archæological Journal*, No. 178, p. 149.

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Willis, Henry, the builder of many famous English organs, who was born in 1821, and died in 1901, was the inventor of several important improvements in mechanism, especially with regard to the pneumatic action. His pneumatic thumb pistons were first used in the Royal Albert Hall organ in 1871. He was a pupil of John Gray, on leaving whose workshop he rebuilt the organ of Gloucester Cathedral in 1847. His Exhibition organ of 1851 brought him into notice, and he was engaged to build organs at St. George's Hall, Liverpool; the Royal Albert Hall, London; St. Paul's, and many other cathedrals. To distinguish him from his son Henry, with whom he was in partnership, and who succeeded him in the business, he is sometimes called "Father Willis."

Willis, Henry, & Sons, London.

Winnigsteten, Elias, of Nuremberg, about 1600 built an organ of two manuals and pedal, twenty-seven stops, tremulant, and eight bellows, in the church of the Barefooted Friars. The cost was 700 thaler, without ornamental work, about £105 of our money.

Wotton, William, built a pair of organs for Merton College, Oxford, in 1489, like the organs built by him at Magdalen Chapel, for the sum of £28.

Wordsworth & Co., Leeds.

Yorston, E. O., London.

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Organ Stops.

Baarpfeife, a reed-stop found in old German organs, the pipes of which were formed by three cones superposed, the lower one being upright, the middle inverted, and the uppermost upright. It was supposed to imitate the growling of a bear, hence its name.

Baryton, a soft 16-foot reed stop.

Bass Flute, a stopped flute of 8-foot tone on the pedal.

Bassoon, **Fagotto**, a soft reed stop of 8 or 16 feet on the manuals or pedal, with wood or metal pipes. As a 16-foot stop on the choir organ, it has a particularly fine effect. In France it is sometimes a half-stop, forming the bass of the clarinet or oboe.

Bauerflöte, or **Paurflöte**, *i.e.* peasant's flute, a stop on the pedal of 2 or 1-foot tone, used when giving out the chorale melody on the pedal organ. Pretorius says that the Germans thought a great deal of this stop, but the Italians despised such small bass stops as "mere empty octaves."

Bifara, 8 feet, the pipes of which have two mouths, producing an undulation of tone like the *Unda Maris* and *Voix Céleste*.

Blockflute, an open metal stop of 2 feet on the manual or 4 feet on the pedal, with pipes of much larger scale than those of the diapason work, and with a full broad tone. It was much used by Father Smith.

Bombarde, **Bombardon**, or **Tubason**, a 16 or 32-foot pedal stop of the trumpet species found in French organs.

Bourdon, a stop consisting of stopped pipes of 16 or 32 feet. It is frequently the only pedal stop in small English organs,

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- but in large organs it is found on the manuals as well as the pedals, especially on the Continent. It is of softer and more muffled or indefinite tone than the 16 or 32-foot open diapason, and is useful as a bass to the softer manual stops. It is of the nature of a stopped diapason.
- Buzain**, a corruption of Posaune. See Trombone.
- Calcante**, a stop by which the organist can give the blower a sign to begin or cease blowing.
- Carillon**, see Glockenspiel.
- Celestina**, a delicate-toned 4-foot wooden stop, found in the swell of some organs.
- Cink**, see Zink.
- Clarabella**, a useful flue stop, invented by Bishop, of 8 feet, of full and powerful fluty tone. It usually extends only from tenor C upwards, and is formed of wooden open pipes of large scale.
- Claribel**, another name for stops of the Clarabella kind.
- Clarion**, a trumpet of 4 feet, the upper octave of which is, however, frequently formed of flue pipes, since reeds of such small size are ineffective.
- Clarionet**, an 8-foot solo stop of brilliant effect, imitating the orchestral instrument in tone. Its pipes are narrow and cylindrical. In Switzerland and Germany its reeds are nearly always free; in France and England they are beating reeds. The clarionet is also called Cremona, Cormorne, Cromorne, Krummhorn, and Corno de bassetto.
- Clarionet Flute**, a flue stop of the nature of the stopped diapason, but the perforations of its stoppers are much larger, and it has a somewhat reedy tone.
- Claveoline**, a very soft, free reed of 8 feet in bell-shaped pipes.
- Clear Flute**, a form of Waldflöte, invented by Kirtland and Jardine. A 4-foot open wood flute with inverted mouth and other peculiarities, and full-winded. It has a firm, clear, and full tone.
- Cor Anglais**, an 8-foot reed imitating the instrument of that name.
- Cormorne, Cormorna**, see Clarionet.
- Cornet**, (*a*) a powerful five-rank compound stop, consisting of an Open or Stop Diapason, Principal, Twelfth, Fifteenth, and Tierce. It is a half-stop only, occupying the treble

Story of the Organ

portion of the keyboard, though abroad it sometimes descends to *c*. Its pipes are considerably larger in scale than those of the open diapason, are strongly voiced, and there are no "breaks." The Mounted Cornet is placed on a separate sound-board, raised four or five feet above that of the great organ group, its tone being by this means given prominence over that of the other stops. The Echo Cornet is sometimes mounted, but its pipes are of Dulciana scale. In old organs cornets of three ranks only are found, the Twelfth, Fifteenth and Seventeenth, and it sometimes formed the treble portion of a bass Sesquialtera. (b) A Pedal reed stop of 4 or 2 feet in German organs. (c) A Pedal reed of 16 feet on Spanish organs.

Corneta, a reed of 16-foot tone on Spanish organs.

Corno di Bassetto, see Clarinet.

Corno dolce, a soft 4-foot horn in Cavallé-Coll's Sheffield organ.

Corno-flute, a reed 8-foot stop, with wooden tubes and a soft tone, invented by Mr. Herbert Norman.

Cornopean, a manual reed stop of 8 feet of tin or metal pipes, softer than the Horn, but somewhat resembling it in tone.

Cremona, see Clarinet.

Cromorne, see Clarinet.

Cymbel, a 1-foot stop of very small scale and bright tone.

Diapason. It is not known when or how this word came to be applied to the chief foundation stops of English organs. Its real signification is Octave, that interval being the largest used by the Greeks; diatessaron, meaning a fourth, and diapente a fifth, and diapason "through all (the sounds of the scale)." The diapasons are the most important of the Foundation stops, and the builder regulates his other work by them. The word came into use before 1519, for in the contract between the churchwardens of All Hallows, Barking, and Anthony Duddington, in that year there is to be "a pryncipale to conteyn the length of v foote, so folowing with Bassys called *Diapason* to the same, conteyning length of x foot or more." The open diapason is called Principal in Germany and Italy; but in England the 4-foot diapason is called Principal. From the All Hallows' contract it would appear that the principal

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was in English organs of that date a half-stop, of which the diapason was the bass. It is interesting to read in the same contract that there were also to be "dowble principalls thoroweout the said instrument"—that is to say, there was to be an 8-feet (or in this case 10-feet) diapason, not divided, but embracing the whole compass of the clavier. It is not impossible that the "Bassys called Diapason" was the lowest octave of the Principal, and that when the two were combined in one stop the name Diapason was given to the whole.

Diapason Phonon, a metal Open Diapason of 16 and 8-feet tone, of great power, invented by Mr. Hope-Jones.

Diaphone, a stop of 8, 16, or 32 feet, invented by Mr. Hope-Jones. Its pipes are of iron or wood, its tone is more powerful than the loudest reeds, and it has the remarkable peculiarity of allowing of variations of power by change of wind pressure without alteration of pitch.

Diocton, a name for the octave coupler.

Dolcan, an open 8-feet stop, the pipes of which are inverted cones. It is little known in England.

Double. This word is used in English organs to denote any stop an octave below the ordinary pitch; that is to say, a stop of 16 feet instead of 8 feet. The lowest pipe of a "double," may be either open, in which case it will be 16 feet in actual length, or stopped, when it will be 8 feet in length, and is said to be of 16-feet tone. A double double stop is of 32-feet tone; that is to say, two octaves below the normal pitch.

Doublette, (*a*) a foundation stop of two ranks, an octave apart sounding a Fifteenth and Twenty-second above the normal pitch; (*b*) the French name for the Fifteenth.

Dulcet, or **Dulciana Principal**, a 4-feet flue stop of metal of delicate tone, introduced by Green in his swells. It is to the dulciana what the principal is to the diapason.

Dulcian, a very soft reed of 8 or 16 feet.

Dulciana, a stop introduced into England by Snetzler in his organ at Lynn in 1754. It is a flue stop of 16 or 8 feet of wood or metal, or sometimes the lowest octave is of wood and the rest of metal. Its tone is peculiarly soft and pleasant, as its name implies.

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Euphone, 16 feet, a reed stop.

Fagotto, see Bassoon.

Feldpfeiffe, see Schweitzerpfeiffe.

Fifteenth, Superoctave, the open diapason of 2 feet on the manual and 4 feet on the pedal. In Germany it is usually called simply "octave 2," since it is the double octave above the German "principal" of 8 feet.

Flachflöt, a stop in old German organs of 8, 4, or 2 feet, slightly conical, of quiet tone.

Flageolet, a 2-foot flute, of softer tone than that of the piccolo, though, like the latter, its pipes are of wood, and open.

Flauto dolce, a soft-toned flute.

Flauto Traverso, German flute, Querpfeiffe, an 8-foot flute of cylindrical pipes made of pear tree, sounding their octave, therefore of 4-foot tone.

Flute, a 4-foot open flue stop on the manual, or a covered stop of 4-foot tone, of metal or wood. A pedal flute is of 8-foot tone, and is sometimes called bass flute. Where an organ has flutes on two manuals it is usual for one to be of wood and the other of metal, to produce different tone qualities. The tone of the flute is something like that of the orchestral instrument. In modern organs its place is frequently taken by the more brilliant harmonic flute.

Flute-a-bec, the old English flute, a 4-foot stop.

Flute a Cheminée, see Rohrflöte.

Flute Allemande, Flute traversiere, Querflöte, names of the Flauto traverso.

Flute douce, a soft flute.

Flute Octaviente Harmonique, the harmonic flute.

Fugara, a small scale gamba of bright tone but slow speech.

Furniture, a compound stop of two to five ranks of open metal pipes, an octave above the mixture, and with "breaks" in every octave in consequence of the smallness of the pipes.

Gamba, Viol da Gamba, an important flue stop with a reedy tone quality of 16, 8, or 4 feet. Its pipes are in England conical, surmounted by a bell, but in Germany generally cylindrical, and pierced by a slot near the top. It is much used in foreign organs; the gambas in the Haarlem organ, for example, are very fine. The conical, or "cone gamba,"

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was introduced into England by Mr. W. Hill. **String Gamba**, a gamba whose tone is intended to imitate that of stringed instruments. **Bell Gamba**, a reedy gamba of quicker speech than that of the German gambas, though not so powerful.

Gambette, a gamba of 4 feet.

Gedact, Gedect, Gedackt, see Stop Diapason.

Geigen Principal, see Violin Diapason.

Gemshorn, a stop of flute quality of 8, 4, or 2 feet. The pipes are conical, the top being one-third the diameter of the bottom, and the tone is light and clear.

Gemshorn Quint, a Gemshorn of $5\frac{1}{3}$ feet, sounding an interval of a fifth above the Gemshorn of 8 feet.

German Flute, see Flauto Traverso.

Glockenspiel or Carillon, steel bars struck by hammers and giving the effect of bells. This stop was held much in favour by J. S. Bach, who devised some special arrangement for it.

Grand Cornet, a reed of 16 feet.

Harmonica, an 8-foot open wood stop, smaller in the treble and larger in the bass than the Hohlflöte.

Harmonic Flute, an invention of Cavallé-Coll. It is a cylindrical open metal flue stop of 16-foot length, but "overblown" so as to produce an 8-foot tone; and the pipes have a hole pierced in them half-way between the foot and the top. Its wave length is therefore divided in half, as when a violin string is made to sound its octave "harmonic" by a slight touch of the finger at the middle node. The tone of the harmonic flute is full and powerful, and of great value. It has been introduced into many English organs.

Hautbois, see Oboe.

Hedeiaphon, *i.e.* "sweet sound," an 8-foot stop, the invention of Mr. Hope-Jones, in which gongs are softly sounded by means of a current of air.

Hoboy, see Oboe.

Hohlflöte, a stop much used in German organs, and introduced into England by Father Smith. It is of metal or wood, of larger scale than that of the open diapason, producing a powerful and "hollow" tone. Its pipes were made three-sided by Schulze.

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- Horn**, probably invented by Bridge. It is an 8-foot reed stop of larger scale and fuller tone than the trumpet.
- Horn Diapason**, a flue stop of 8 feet of the diapason order, but with a tendency to a horn quality of tone.
- Hornlein**, a little horn of 4 feet.
- Kalliope**, a metal stop invented by Mr. Hope-Jones of 8 and 4 feet pitch.
- Keraulophon**, a reedy-toned metal flue stop of 8 feet, invented by Messrs. Gray & Davison in 1843. Its peculiar tone is produced by a small hole bored near the top of the pipe. It was first used in the organ of St. Paul's, Wilton Place, London.
- Kinura** (named from an ancient Asiatic harp of ten strings, Hebrew kinnor), a reed stop of 8 feet with brass pipes and very delicate tone, invented by Mr. Hope-Jones.
- Klein Gedact**, a small stopped flute of 4-feet tone.
- Koppel**, (*a*) an 8-foot stop of the Stopped Diapason class, intended to be "coupled" with some other stop; (*b*) a coupler.
- Krummhorn**, see Clarionet.
- Larigot, Nineteenth, Octave-Twelfth**, part of the Sesquialtera, but occasionally found as a separate stop. It belongs to the diapason work, is of metal $1\frac{1}{3}$ or $2\frac{2}{3}$ feet, and is a fifth above the Fifteenth or 2 octaves and a fifth above the normal pitch.
- Lieblich**. This word is used in Germany and England to indicate that the stop is of "lovely," *i.e.* softer quality than the normal, as Lieblich Gedact, Lieblich Flute, Lieblich Gamba, etc.
- Lieblich Geschallt**, of 8-foot tone, metal pipes, a soft Lieblich Gedact, invented by Mr. Hope-Jones.
- Mixture**. In mediæval organs, before the invention of stops, the sound of the diapason pipes was increased by a number of smaller pipes sounding octaves, fifths, etc., with them; each key acted on from 10 to 50, or even more such pipes, and the whole was called *Locatio*, *Hintersatz* (since they were massed behind the diapason pipes) or *Mixture*. On the introduction of sliders and valves for enabling the player to control the various ranks of pipes, a certain number were still placed over a single slider, and this "stop" retained the name of *Mixture*, as it does to the present day.

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In very old organs mixtures of as many as twenty-four ranks were found, consisting of thirds, fifths, and octaves above the open diapason, and voiced less powerfully than the Sesquialtera; but in more modern organs the number of ranks does not usually exceed five, and is more frequently of three or two only. Concerning "breaks," see Sesquialtera.

The laws of acoustics teach us that every string or pipe, when sounded, produces not only its fundamental tone, but also its harmonic series, consisting of octaves, fifths, thirds, and (out-of-tune) minor sevenths. Professor Helmholtz has shown that tone quality depends on the strength of the various harmonics; thus the clarinet is said to be rich in them, while the tone of the harmonium owes its disagreeable effect to their overpowering, to some extent, the fundamental tone.

The ordinary open and stopped flue pipes of the organ do not give a rich series of harmonics; hence the tone of a number of foundation stops played together is greatly improved by the addition of pipes tuned in such a way as to reinforce their harmonics, and organ-builders very early discovered by experiment what later theorists have shown to be a natural law. Reed stops do not require this augmentation, since their harmonics are sufficiently prominent; neither do stringed instruments for the same reason, and some purists have objected, on purely theoretical reasons, to the presence of Mixtures and Sesquialteras in organs. But it is easy enough to prove by experiment on any large organ, and especially in a large and well-proportioned building, that they are absolutely necessary if the full organ is to sound bright and fresh instead of dull and characterless.

On the other hand, if a mixture is voiced too powerfully on a small organ its effect is to make the tone "screamy" and disagreeable; and this is more especially the case where a small organ is placed in a building with bad acoustic properties. The theorists who object have good reason for their views in this case, and it would be best to either avoid mixtures, or voice them so weakly as to be only just perceptible, where circumstances are against their having a proper effect.

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- Montre.** The French term for Open Diapason, from *montrer*, to exhibit, since its pipes usually form the most important feature in the front of the case.
- Musette**, a soft free reed, after the bagpipe instrument of that name.
- Nacht Horn, Night Horn**, a stop of the Quintatön order, but of larger scale and more hornlike quality than the latter.
- Nason**, one of the flute family of 4-feet pitch, found in old organs, with a very quiet and sweet tone.
- Nazard, Nasard, Nassat, Nasat, Nasspfeife**, of $5\frac{1}{2}$ -feet, the same as the Quint. Pretorius says that the small Gemshorn Quint of $1\frac{1}{2}$ foot tone is called Nasath, because its tone is of a nasal quality; but Nazard is probably a corruption of Nachsatz, the mass of pipes behind the "Principal" or Prestant in mediæval organs before the invention of stops.
- Oboe, Hautbois, Hoboy**, a reed stop of 8 and (very rarely) 4 feet, or 16 feet in the swell, much used for solo playing. Its pipes are conical, and surmounted by a bell, and its tone is soft and pastoral. The orchestral oboe, in some concert-room organs, on the solo or swell manual is intended, as its name implies, to imitate the orchestral instrument. Free reed oboes are found in some Continental organs.
- Oboe Flute**, a 4-feet flue stop of wood pipes of small scale, of delicate and ready tone, not so powerful as that of the gamba.
- Octave**, the German equivalent of the English principal of 4 feet, and fifteenth of 2 feet. The term octave used in conjunction with another word signifies that the stop in question is an octave above the normal 8-feet pitch of the manual, or 16 feet of the pedal.
- Octave Clarion**, a trumpet of 2 feet, the smallest reed stop used.
- Octave Fifteenth, Twenty-second**, part of the Sesquialtera, of 1 or 2 feet, sometimes found as a separate stop in old organs (see pp. 176, 177). It is three octaves above the normal pitch, or one octave above the fifteenth.
- Octave Oboe**, an oboe of 4 feet, rarely met with. See Oboe.
- Octavina Harmonique**, the harmonic piccolo.

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Open Diapason—in German principal, prestant, in French montre, in Italian principale—the most important of the flue work. It is of wood or metal, and of 32, 16, 8, 4, and 2 feet, though when of less than 8 feet it is called by other names. Its pipes usually appear on the front, being arranged in flats or towers. The mediæval organs consisted of an open diapason backed by a number of similar pipes of different octaves. Large organs have two or more open diapasons of different scale and in different positions; if two of the same scale are used they are found to “sympathise” and spoil each other’s tone. For the meaning of the name, see “Diapason.” The 16 and 32-foot open diapasons are in English organs usually of wood; but on the Continent they are more frequently of metal, and form a striking feature in the prospect or front. See description of Haarlem organ, page 124.

Ophicleide, see Tuba.

Phisarmonica, a free reed stop of 16-foot tone, with tubes of half-length.

Phoneuma, “sound sign,” a voix celeste, invented by Mr. Hope-Jones; of so soft a tone that it produces only the “sign of a sound” (?).

Physharmonica, a reed stop without pipes, as in the harmonium.

Piccolo, a wood stop of 2 feet, of bright and clear tone, suitable for rapid staccato passages.

Pierced Gamba, see Gamba.

Pifaro. Literally a pipe, perhaps so called from its tone. It is found of two ranks in Walcker’s organ at Boston, U.S.A.

Portunalflöte, an open wood 8-foot stop, the pipes of which are larger at the top than the bottom, and have a clarinet quality of tone.

Posaune, see Trombone.

Prestant, from *præstare*, to stand in front, see Open Diapason Montre.

Principal (in German, octave), the 4-foot open diapason on the manuals, and 8 feet on the pedals. It is usually of metal. The word principal is used in Germany and Italy for the open diapason of 8, 16, or 32 feet.

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Pyramidon, a pedal stop of 16 or 32-foot tone, invented by the Rev. Sir F. Gore Ouseley. Its tone is something like that of the stopped diapason; its pipes are more than four times the size at the top that they are at the bottom; and a pipe of only 2 feet 9 inches long produces a 16-foot tone.

Querpfiffe, see Flauto Traverso.

Quint, Double Twelfth, Diapente. The German organist Sorge discovered in 1740 that two powerful pipes sounded together at any interval less than an octave produced a third sound below the lower of the two pipes. Tartini made further experiments in this direction on the violin, and published the result of his investigations, calling the low sounds thus produced *Térzituoni*. They are only perceptible when carefully listened for, and have been called combinational tones, differential tones, resultant tones, and grave harmonics. The law discovered by Sorge and Tartini has been used on the organ to produce deep sounds by means of combinational tones on the pedals or manuals, the Quint being a powerful flue stop of diapason quality a fifth above the normal pitch. Quints are, therefore, of $10\frac{2}{3}$ feet, or $5\frac{1}{3}$ feet, and Schulze made one of $21\frac{1}{3}$ feet in the cathedral organ at Bremen. A 16-foot C with a $10\frac{2}{3}$ -foot Quint will produce a combinational tone an octave below the 16-foot C, therefore a 32-foot C. Similarly, an 8-foot C with a $5\frac{1}{3}$ -foot Quint will produce a combinational tone of 16-foot C. The Abbé Vogler endeavoured to carry out this law on a large scale in order to save expense and space, but his ideas met with no encouragement; as a matter of fact the combinational tone is so weak that it is a poor substitute for a true stop of 16 or 32-foot tone.

Quinta, the larigot or nineteenth, an open diapason of $1\frac{1}{3}$ foot.

Quintadecima, of 2 feet, the English fifteenth.

Quintadena came into use about 1560. It consists of stopped pipes of 16, 8, or 4-foot tone, of the same scale as the open diapason, in which the fifth as well as the fundamental tone is heard. Pretorius calls it a "lovely stop," and derives its name from *Quinta ad una*.

Quintatōn, a small scale-stopped diapason, in which, by overblowing, the twelfth is heard as well as the fundamental sound.

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- Quint de Nasard**, another name for the sedecima, or fifteenth.
- Rancket**, a very soft reed of 16 or 8 feet with stopped pipes, in old German organs.
- Rausch-pfeife, Rausch-quinta**, a compound stop consisting of a twelfth and fifteenth.
- Regal**, said by Dom Bedos de Celles to have been the first reed stop invented. It is found in many old German organs, and takes its name from an instrument much used in the sixteenth century in which reeds of 8-foot tone are combined with tubes only a few inches long. The regal stop at first consisted of reeds without pipes, as in the modern harmonium, but afterwards small conical pipes were added, which improved the tone; but on the invention of other reed stops it became more rarely used.
- Rohrflöte**, a stopped diapason of 16 or 8 feet, the pipes of which are surmounted by "chimneys" or little tubes projecting above the stoppers.
- Rohr Quint**, a stopped quint of metal pipes with chimneys (see Rohrflöte) of $5\frac{1}{3}$ -foot tone.
- Salcional, Salcional, Salicet**, an 8 feet open-flue stop of small scale, soft and reedy tone and slow speech.
- Schalmei**, a name for the clarinet.
- Scharf, Scherp, Sharp Mixture**, a small scale mixture of very high harmonics.
- Schweitzerpfeife**, an old Dutch name for a stop with pipes of the Diapason nature but of very narrow scale, with a sharp, beautiful, and violin-like tone. They had ears and beards, as otherwise their narrow scale would cause a difficulty of speech. They were of 8 and 4-foot tone, and were named Schweitzerpfeife or Feldpfeife from their resemblance to the fife in form.
- Sedecima**, the English fifteenth, an open diapason of 2 feet, or the octave above, of 1 foot.
- Sesquialtera**, a compound stop of 5, 4, 3, or 2 ranks of open metal pipes, giving thirds, fifths, and octaves above the open diapason, of more powerful tone than that of the mixture. As in the mixture, the pipes of the sesquialtera, if carried through the whole compass of the keyboard, would become too small to produce an effective sound; hence the necessity for "breaks" in which the pitch is

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brought an octave lower, and the pipes of the rank thus broken are continued in unison with those of which they form the octave in the lower part of the scale. See *Mixtura*, *Larigot*, *Tierce*, *Octave fifteenth*. The word *sesquialtera* means one and a half, or the ratio 2 : 3, and probably refers to the prominence of the interval of the fifth above the unison, which is voiced more powerfully than that of the third, the mathematical proportion of the fifth to the unison being as 3 is to 2.

Sexte, a compound stop consisting of a twelfth and tierce, sounding the interval of a sixth with one another.

Sifflote, **Suiflot**, **Siflitt**, **Siflot**, **Ziflot**, a kind of *Hohlflöte*.

Spillpfeife, **Spillflöte**, a name for *Gemshorn* from the similarity of its pipes to what sailors call a *handspike*, in German *Handspill*.

Spitz-flöte, the pointed flute of German organs; the pipe is conical, the top being $\frac{1}{4}$ less in diameter than the mouth. This stop, which is of 8, 4, or 2 feet, has a softer tone than that of the cylindrical flute usually found in old English organs.

Stentorphone, a powerful French reed stop.

Still Gedact, a soft stopped diapason.

Stop, or **Stopped Diapason** (in German *Gedact*, in French *Bourdon*). This most important stop is of 16 or 8-foot tone, and forms the soft companion to the open diapason. As its name implies, it is a covered or stopped pipe. It is most frequently of wood, but sometimes of metal in the upper part and oak or deal below. Concerning its effect when enclosed in the swell, see page 184.

Suabe Flute, invented by Mr. W. Hill. A 4-foot stop of wood pipes with inverted mouths, not so powerful in tone as the *waldflöte*.

Tenth, **Double Tierce**, **Decima**, a metal open or stopped cylindrical mutation stop of $6\frac{2}{3}$ or $3\frac{1}{3}$ feet, sounding a tenth above the open diapason of 6 or 8 feet, and a third above the principal. It was first used in England at Doncaster on the pedal.

Terpodion, a kind of *gamba*.

Tertian, a compound stop consisting of a tierce and *larigot*.

Terz, see *Tierce*.

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Tibia Clausa, "closed pipe," a wood stopped diapason invented by Mr. Hope-Jones.

Tibia Dura, a wood stop of 8 and 4-foot tone, invented by Mr. Hope-Jones.

Tibia Major, a stopped diapason of 16-foot tone.

Tibia Mollis, a soft 4-foot wood stop, invented by Mr. Hope-Jones.

Tibia Plena, a kind of flute stop of 8-foot tone, with wood pipes, invented by Mr. Hope-Jones.

Tibia Profunda and Profundissima, 16 and 32-foot stops of open diapason tone quality, invented by Mr. Hope-Jones.

Tierce, Seventeenth, Terz, part of the Sesquialtera, but in old organs it sometimes forms a separate stop. It belongs to the diapason family, is of $1\frac{2}{3}$ feet, being a major third above the fifteenth, or two octaves and a third above the normal pitch.

Tirasse, the French term for Coupler.

Tromba, Italian for Trumpet.

Trombone, Posaune, a powerful reed stop of 16 and sometimes 32 feet, usually on the pedal. Messrs. Hill's famous Sydney (N.S.W.) organ contains a 64-foot contra trombone, having only eight vibrations a second in its lowest note. This stop aroused considerable interest amongst scientists. Helmholtz considered the experiment as risky. The vibration of the reed is started by a tap from a diminutive hammer enclosed in the boot, and the stop has proved a great success. The trombone frequently has its own separate sound-board, with a heavier wind than the rest of the organ.

Trompette Harmonique, the French equivalent of the Tuba.

Trumpet, Tromba. This stop has been called the diapason of reeds from its being the most important of them. It is usually of 8 feet, but sometimes of 16, in which case it is called Tuba Mirabilis; of 32, when it is called Bombard; or of 4 feet, called Clarion. Its pipe is an inverted cone. It is the most powerful of the reed stops; and in Spain, to increase its effect, its pipes project in fan design horizontally from the case.

Tubason, see Bombarde.

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Tuba, or **Tuba Mirabilis**, a reed stop of 8 or 16 feet, the most powerful known, invented by Mr. Hill. It is placed on a separate sound-board, and has its own bellows, with a wind pressure three or four times greater than that of the rest of the organ.

Twelfth, Octave Quint, Duodecima. This important mutation stop is of the diapason species, of $5\frac{1}{3}$ or $2\frac{2}{3}$ feet, sounding a twelfth above the diapason, and a fifth above the principal.

Unda Maris, see **Voix Céleste**.

Untersatz, stop diapason of 32 feet.

Viola, an 8-foot stop of the violin diapason quality.

Viol d'Amour, a soft stop of 8 feet of the violin diapason quality, imitating the *viol d'amore*, an instrument now obsolete.

Violin Diapason (in German, *Geigen principal*), an 8-foot open diapason, with a gamba-like tone and very quick speech.

Violoncello, a pedal stop of 8 feet, the octave of the violone, which see.

Violone, of 16 feet, a pedal stop with open wood pipes of much smaller scale than the open diapason, and wider at the top than the bottom. The mouths are furnished with ears and beard at the mouth; the speech is slow, resonant; and there is sometimes a slight hissing at the beginning of the speech, which has been compared to the grip of the bow on the string of the double bass, which this stop, as its name implies, imitates.

Voix Céleste, a French invention, or more probably an imitation, under a French name, of the ancient German stop called *Unda Maris*. Two very soft flue stops of different quality of tone, such as *gamba* and *dulciana*, are tuned in unison, and then one of them slightly raised in pitch, so as to produce a wavy effect by means of slow "beats." The chief drawback to the *voix céleste* seems to be the difficulty of keeping the rate of beats equal in all the notes, some of which frequently have a wave so slow as to be almost imperceptible, while in others it is so rapid as to give the impression that the stop is merely out of tune.

Vox Angelica, a similar stop to the *voix céleste*, but one of its ranks is tuned slightly flatter than the pitch of the organ instead of slightly sharper.

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- Vox Humana**, a reed of 8 feet, with short and broad tubes, intended to produce a sound like a human voice, in which it is rarely successful. Its chief attraction seems to be its name.
- Waldflöte**, *i.e.* "Forestflute." On English organs a stop with pipes of large scale, inverted mouths, and 4-foot pitch, the octave of the clarabella, whose tone it resembles. It was introduced by Hill in 1841, and is always made of wood in England, but in Germany of tin, metal, or wood.
- Woudfluit**, the Dutch name for waldflöte.
- Zink, Cink**, a stop with very small pipes or whistles made from deer's horns.

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Technical Terms.

- Accessories**, a general term applied to the numerous appliances used in playing the organ other than the keys and stops, such as swell and composition pedals, ventils, tremulants, etc.
- Anemometer**, an instrument consisting of a bent glass tube containing water, by which the pressure of the wind on any particular sound-board is measured (see page 141).
- Backfall**, a small wooden bar moving up and down on its centre, part of the connection between the key and the pallet (see Fig. 1, page 17).
- Bars** are strips of wood glued to the inside of the sound-board to separate the pallets and direct the wind to the pipes.
- Beard**, a small piece of metal or wood fixed below the mouth of a pipe to modify the tone.
- Bearers**, wooden laths which divide the sliders; part of the sound-board.
- Bearings**. To "lay the bearings" is a technical term used by tuners to indicate the tuning of the first octave of semi-tones on the principal or open diapason, from which the other octaves and the rest of the stops are afterwards tuned.
- Beat**. When two pipes or strings of slightly different pitch are sounded together, the waves of air, coming into collision at certain definite intervals of time, cause a kind of throb in the sound called a beat, which disappears as soon as the pipes or strings are brought to a perfect unison. The phenomenon of beats is made use of in such stops as the *unda maris*, *voix céleste*, etc.

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- Bell.** Trumpets, horns, clarionets, oboes, and some other orchestral instruments are enlarged at the end farthest from the player's mouth, such enlargement being called a bell. A similar bell is applied to certain organ pipes in order to modify their tone.
- Bellows,** the wind-producing portion of the organ (see page 18).
- Bleeding,** see Running.
- Block,** see Languid.
- Blowing Action,** the mechanism by which the bellows are set in motion.
- Body,** the portion of a pipe from the mouth to the top; in reed stops it is generally called tube.
- Boot,** the lower portion of a reed-pipe enclosing the vibrating metal tongue, and corresponding to the foot of a flue pipe.
- Borrowing.** Where a stop is not of full compass its bass or other portion is sometimes "borrowed" from another stop in order to complete its compass. Borrowing can easily be discovered by running the fingers over the keys, when a change of tone will show where it commences. It is used to save space, or for economy, and sometimes for more artistic reasons.
- Break.** In compound stops the pipes would become too small to be effective if carried to the top of the range of keys; hence at certain places "breaks" in the scale occur, by which one or other of the ranks discontinues its upward scale, and recommences at the lower octave. The position of the breaks cannot be fixed by rule, but depends on a variety of circumstances, and requires considerable judgment and experience to determine.
- Breasted.** When the middle front pipes of an organ are arranged in such a way as to form a slightly convex figure the case is said to be breasted. See the Stralsund organ case, page 132.
- C in alt,** an old organ-building term for the C on the second line above the treble stave, called on the Continent *c2*.
- Calcante,** literally treader, the Italian for organ-blower, since foreign organs are generally blown by treading on the levers.
- Case.** The blowing arrangements of Roman hydraulic organs appear to have been usually concealed by an outer cover-

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ing, the pipes and keyboard only being seen. The bronze cases of the two little organs, or syringes, found at Pompeii are ornamented with figures of temples; but when the organ was introduced into the Church there seems to have been no case: not only the pipes, but the bellows and mechanism were exposed to view. As time advanced it became customary to cover these portions and most of the pipes with ornamental woodwork, the making and carving of which were entrusted to eminent artists, and many handsome designs of organ cases have come down to us. The larger pipes are disposed on the front, or prospect, and are frequently gilt, painted, carved, and otherwise ornamented. Fine examples are to be seen in most countries on the Continent, and the few examples that have survived the Cromwellian raid are sufficient to show that English organ cases were not at all inferior to those of other nations. Cambridge possesses three seventeenth century cases, at Pembroke, Emmanuel, and Christ's. The case is usually designed to be in keeping with the architectural and other features of the church: good examples may be seen at King's College Chapel, Cambridge, York Minster, St. Paul's Cathedral, and elsewhere. The subject of organ cases, which belongs rather to the domain of architecture and wood-carving than organ-building, has been specially treated by Mr. Arthur G. Hill in two profusely illustrated volumes. The large pipes are arranged at each end of the case (and the same arrangement is found inside it) rather than in a chromatic series in order to distribute their weight, instead of allowing it to be concentrated on one side. In Germany, France, and Spain it was customary in the fifteenth and sixteenth centuries to decorate organ cases with grotesque heads, which protruded their tongues when wind was put into the organ. English organ cases differed considerably in this and other particulars from those of the Continent. Old organ cases frequently contained large shutters, which were closed when the instrument was not in use to keep dust out. The oldest existing case in Europe, at St. Catherine's Convent, Sion Valais, Switzerland, is thus enclosed. It dates from about 1390; its stops (which must

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be a later addition) are drawn by iron levers 6 inches long projecting through slits; they are raised, and kept in position by notches.

Centre-pin, a pin or axis upon which any part of the mechanism moves, as, for example, the backfall.

Chimney, a small tube fixed into the stopper of a covered pipe.

Choir Organ, a department of the organ consisting of smaller scale stops than those of the great, and therefore of a softer character. It is really a "positive" organ added to the great, and is known by this name in Germany. In cathedrals it frequently stands apart from the general case, behind the player, projecting over the edge of the screen. It was formerly sometimes called chair organ, probably because it supported the seat of the player, and its stops were behind the player, an awkward arrangement still found in Spain.

Chorus, an old-fashioned term applied to the tone of the full organ. At present the mutation stops are sometimes called the "chorus-work."

Cipher, one of the most frequent and, at the same time, most annoying defects in an organ. It consists of the unbidden sounding of a note, and is due to a variety of causes, such as dust or grit in the mechanism, weak pallet spring, swelling of the woodwork by damp, rusting of the ironwork, damage to the pallet, loose or tight pins, etc.

Clavier. In the early mediæval organs the keyboard was called the alphabet (see page 30). Later on, from the alphabetical letters called *claves*, which were written on each key, the name clavier arose, and was applied equally to the manual and pedal keyboards.

Comma. If twelve perfect fifths are tuned in succession, starting from a given low note, say C, the C that is produced by the last fifth will be found sharper than the octave of the lower C by a ratio of about 81:80. This small interval is called a comma, and has to be distributed equally between all the semitones (see page 22). Other commas are produced by different methods of tuning.

Composition or Combination Pedals, iron pedals placed above the pedal clavier to manipulate the stops. The same

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result is obtained in some large modern organs by means of pneumatic buttons placed between the keyboards, sometimes called thumb pistons.

Compound Stops, stops having two or more ranks of pipes tuned in fifths and other intervals with the diapasons (see Appendix D, Sesquialtera, Mixture, Furniture).

Concussion bellows, a small bellows placed on the wind-trunk to prevent disturbance when the player suddenly changes from a small to a large number of stops, or *vice versa*.

Cone, see Tuning-Horn.

Conical Pipes are those whose bodies are larger at one end than the other. When the larger end is at the bottom they are said to be inverted cones.

Console, one of the improvements in modern organs consists of placing the keyboards at a distance from the organ, and in such a position that the player faces the choir or conductor, the connection being made by long trackers, by tubular-pneumatic, or electric action. In such a case it is said that the "console" is placed away from the organ.

Conveyance. The larger pipes of an organ, and especially those which are arranged in various positions on the case, do not always stand over their wind supply, hence the necessity for small metal tubes, called conveyances, to "convey" the wind from the sound-board to the foot of the pipe.

Coupler, or Copula, a stop or pedal by which two clavier can be coupled together in order to produce variety or greater fullness of tone (see page 70). In some old Spanish organs the upper keyboards were drawn out over those below, in such a position as to act upon them in the manner of a coupler. Couplers are either unison, acting on a second manual at the same pitch as the first; super-octave, acting on the same or another manual an octave above; or suboctave, acting on an octave below the keys played. In some modern Italian organs the couplers are put in action by the feet only, not the hands, a most inconvenient arrangement.

Crescendo and Diminuendo Pedal is one by which all the stops are drawn or closed successively.

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Cuckoo-feeder, see Feeder.

Cylindrical Pipes, those pipes, whether of metal or wood, whose bodies are of the same diameter from end to end.

Diapered, a term used of front pipes when painted in various colours; found in some organs by Smith and Harris.

Direction Pin, perpendicular pins placed on each side of the pallets to keep them in position; also called pallet pins or steadying pins. See Fig. 2, p. 21.

Discant, the name given to the manual clavier after the invention of pedals.

Double Organ, an old name for an organ of which the choir or positive was placed in a separate case in front of the main case.

Double Feeder, see Feeder.

Drawstop Action, the mechanism by which the drawstop knob is connected with the slider.

Ears, small projections placed at the sides of the mouth of a pipe to influence the tone.

Echo Organ, an organ enclosed in a box of thick wood, the predecessor of the swell. It was usually only of the treble half of the compass of the clavier.

Eight-foot Pitch. It was found in the sixteenth century that the most suitable pitch for accompanying voices was given by a range of pipes whose lowest C was about 8 feet in length, and the term 8-foot pitch, or 8-foot stops, was adopted to indicate the normal foundation pitch of the manuals, stops an octave below the normal being named 16-foot stops, and those an octave above 4-feet. In old German organs the foundation stops of the positive were sometimes of 4-foot pitch, and the clavier was hence called a 4-foot manual. The normal pitch of all pedal organs is 16 feet. In Spain the words or numbers 8 and 16 are represented on the stop knobs by xiii. and xxvi. respectively.

Electric Action, the mechanism whereby keys are connected with pallets, drawstop knobs with sliders, and composition pedals with stops, by means of electricity. The same agency has been employed of late in blowing organs.

Fan-frame Movement. In the pianoforte and similar instruments the strings are placed parallel to one another directly over their keys. With the organ this is impossible, owing

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to the disparity of size between keys and pipes; hence the necessity for spreading out the backfalls in the form of a fan, the smaller portion of the fan being over the keys, the larger under the pallets. The same result is obtained by the roller-board action.

Feeder, that portion of the bellows which, by moving up and down, supplies the reservoir is in reality simply a large wind-pump containing leather valves, which open and close as the feeder rises and falls. A double feeder consists of two such pumps supplying a single reservoir, and worked by a single lever, one pump rising while the other falls. When the double feeder is shaped like the little bellows of a cuckoo toy, it is called cuckoo feeder. In the early bellows there was no reservoir; the feeder was opened by raising its upper plate, and allowed to close by its own weight, or by the weight of the blower (see page 58). Various forms of feeder are in use, the most common being wedge-shaped, as shown in Fig. 1, page 17.

Fiddle G, a term used by organ-builders to indicate the G on the fourth space of the bass clef, called on the Continent *g*.

Flat, those portions of the front in which the pipes are arranged in a straight line are called flats. They occur in all organs.

Flue or Flute Stops, all stops which are not reeds.

F Organ, an organ of which the lowest note is F; now fortunately obsolete in England, though still used in Italy.

Foot, the portion of a flue pipe below its mouth. The foot has a double duty, that of supporting the weight of the pipe and of carrying the wind from the sound-board to the mouth. If the foot is too weak, the pipe will in course of time crush it (see page 135). The foot of a wooden pipe is usually a short wooden tube of considerably smaller diameter than the pipe, while that of a metal pipe is invariably in the form of an inverted cone.

Foundation Stop. Flue stops of 32, 16, 8, 4, 2, and 1 foot are called foundation stops, as forming the foundation of the tone of the whole organ, the reeds, mutation, and compound stops being regarded as additions to the foundation tone.

Four-feet Pitch, see 8-feet pitch.

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Free Reed, see Reed.

Full Organ, a term used when all the flue stops of any particular clavier are sounded; when reeds are added the expression "Full with reeds" is used. In old music one sometimes sees such expressions as "Full to fifteenth," "Full to mixtures," indicating that all the stops up to those mentioned are to be drawn, the rest to be silent.

G Organ, an organ now obsolete, of which the lowest note was G.

Gamut G, the lowest G of a manual.

Great Organ, the name given to that department of an organ of two or more manuals that contains the most powerful stops. The manual acting on the great organ is the lower one if there are two, the middle if three, and the second from the lowest of a four or five-manual instrument.

Grooves, channels between the bars of the sound-board, by which the wind is conducted to the pipes when the pallets are opened. When a portion of a stop is "borrowed" from another stop, it is said to be "grooved to" the stop in question (see "Borrowing").

Half Organ, see Whole Organ.

Half Stop, a stop containing pipes of only the treble or the bass half of the keyboard. All Spanish and many Italian organs contain only half-stops, and they are frequently met with in English organs, though very rarely without being accompanied by whole stops.

Harmonium, see Orgue Expressive.

Horseshoe or T Pedal, a pedal sometimes applied to the great to pedal coupler, having two arms, the depression of one of which draws and the other closes the coupler (see also Reversing Pedal).

Languid, or Language, a thick plate of metal soldered to the top of the foot of a metal pipe to direct the wind against the "lip," by which means it is set in vibration, and causes the pipe to speak. In wooden pipes this office is performed by the "block."

Lever. The sliders of nearly all organs are drawn and closed by means of a lever concealed by the case. In ancient times the lever projected from the case, and was not attached to any "drawstop action," as in modern organs.

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- Lip**, the upper edge of the mouth of a pipe, by which the current of air is divided and set in vibration.
- Louvres**, the shutters of the swell-box.
- Manual**, a clavier used by the hands as distinguished from that used by the feet.
- Metal**, a mixture of equal portions of tin and lead used for pipes. Spotted metal is a mixture of one-third of tin to two-thirds of lead, showing large spots on the surface, and frequently seen in front pipes. Tin slightly alloyed with lead is also used, and the word metal is frequently applied generally to all pipes not of wood.
- Middle C**, the C on the first leger line below and the first leger line above the treble and bass staves respectively.
- Mitre**. To save space the bodies of pipes are frequently bent back on their own length. When this is done by a joint instead of a bend the pipe is said to be "mitred."
- Mop**, a small mop used to silence the pipes of mixtures in tuning.
- Mutation Stop**, a stop the pitch of which is at some interval other than the octave above that of the foundation stops. The word mutation is used because the note sounded is changed in pitch, though not in name, the key struck being C, for example, will cause the sound G to be heard.
- Niche**, part of an organ case, in which the pipes are so disposed as to form a semicircular depression towards the interior of the case.
- Nickings**. The lips and languids of pipes are frequently notched to influence their tone, the notches being called nickings.
- Ogee**, a term used to describe a curvilinear disposal of the front pipes of an organ.
- Open Pipes**, pipes which are open at the top. See also Stopped or Covered Pipes.
- Organ Loft**, the space occupied by the player, whether raised above the floor of the church or not. Many organ lofts, especially on the Continent, are large enough to accommodate the choir and orchestra, in which case they are sometimes called organ galleries.
- Orgue Expressive**, an instrument of free reeds without pipes to control their quality, invented in 1804 by Alexandre of

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Paris, and called in English seraphine, and afterwards harmonium. It can produce *crescendo* and *diminuendo* effects by varying the wind pressure, which the organ cannot.

Overblowing. If a pipe, whether flue or reed, is blown beyond its proper weight of wind, it sounds its octave, or even its twelfth, and is said to be overblown. Overblowing is either accidental or is purposely resorted to in order to produce certain varieties of tone. See Quintatōn, Appendix D.

Overlength. The metal pipes on the front of an organ are rarely of their true sounding length, but for the sake of symmetry are made longer, and are tuned by means of an incision at the back and out of sight. The non-effective portion is called the overlength, the part between it and the foot the speaking length.

Pair of Organs, the English equivalent of the mediæval Latin plural *organa*, usually applied to the instrument, while the singular *organum* was generally used of a certain form of vocal music.

Pallet, the valve within the wind-chest which admits air to the pipes, and is closed by a spring. The greater the number of pipes the pallet is required to act on, the greater is the wind pressure, or suction on it. Hence arises heaviness of touch, which has to be overcome by numerous devices, many of which give evidence of the greatest ingenuity.

Passageboard, a board inside the organ upon which the tuner stands. In small English organs the space allowed is sometimes so narrow that the warmth of the tuner's body may affect the pitch of the pipes near him: in German organs considerable importance is laid upon there being plenty of room inside an organ.

Pipe. The number of pipes in an organ is frequently given in modern specifications. The usual number is fifty-six to each complete stop, with two, three, four, or five times fifty-six in the compound stops, according to the number of ranks they contain. The pedal clavier has, as a rule, thirty pipes to each stop.

Pipe Rack, a board placed diagonally behind the front pipes to support them.

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- Pneumatic Action**, an English invention of great ingenuity, whereby the wind is utilised to overcome its own pressure on the pallets. See p. 149.
- Pointed Tower**, see Tower. A tower projecting to a point. See p. 173.
- Puff**, the name given to the little bellows which preceded the pneumatic action. See p. 149.
- Pulldown**, the wire which connects the tracker with the pallet. See Fig. 1, p. 17.
- Quarter Organ**, see Whole Organ.
- Quarter Tones**, a name improperly given to the divided semitones found in some organs from about 1500 to 1750, by which it was endeavoured to obviate the difficulty of unequal temperament.
- Rackboards**. The pipes of an organ rest on the sound-board, as shown in Fig. 1, p. 17; but they are further supported to prevent them falling sideways by rackboards placed above the sound-board through which they pass. The front pipes, however, are supported by planks placed behind them, to which they are hooked.
- Rack Pillars**, wooden pillars supporting the rackboards over the sound-board.
- Ram**, the name given to a modern form of Coupler mechanism.
- Rank**, the series of pipes belonging to any particular stop, but generally used of compound stops, which are said to be of two, three, etc., Ranks.
- Ratchet**, a toothed piece of metal, by means of which a movable mechanism can be fixed at any desired point.
- Recitativ**, the French term for the Swell organ.
- Reed**, properly speaking the little brass tube containing the vibrating tongue of brass, or wood, which is enclosed in the Boot of a reed pipe; but it is usual to speak of any reed stop as a Reed. Reeds are of two kinds, Beating and Free. The Beating reed, which is almost universal in England, produces its sound by striking against the edges of the slot over which it is placed, thus alternately closing and opening it. In the Free reed, which is more used on the Continent than in England, the tongue vibrates freely in the reed, without striking its edges; its tone is not usually so powerful as that of a beating reed. The reed is tuned by

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means of a piece of steel wire, which presses strongly against the tongue, passes up through the block, and at a few inches above the block is bent at a right angle before it is cut off. To sharpen the reed the wire is gently tapped downwards, thereby shortening the vibrating length of the tongue; to flatten it it is tapped upwards with the tuning iron, thereby increasing the vibrating length of the tongue. The sound of harmoniums, American organs, and similar instruments, besides a great number of musical toys, is produced by Free reeds, the tone of which is uncontrolled by tubes.

The Free reed is said by Couwenbergh to have been invented by Seidel in 1787; but it was applied to organ stops about 1780 by a Copenhagen organ-builder named Kirsnick, and it had been known and utilised for centuries by the Chinese in their instrument called Shêng, or reed mouth organ.

Register, the term used in Germany, and frequently in England, for a stop. The word is derived, according to Skeat (*Etymological Dictionary*), from *Regerere*, to bring back. Before the invention of sliders all the ranks of pipes sounded at once; afterwards, they were all cut off, and "brought back" into action at the will of the player by means of "Registers." The term "Stop," which seems to arise from the stopping of the sound of the pipes at pleasure by means of the sliders, is nearly if not quite as old in this connection as Register, for it occurs in the Churchwardens' book of St. Lawrence, Reading¹:

1513. It. payd for ii lokks to the same (new) organs; one
for the stopps and the other for the keyes - xi

1526. Item, p'd for one of the yrons of the stoppys of the
organs.

Also in Duddington's contract for the organ at All Hallows', Barking, in 1519.

The placing of names on the stop-knobs was introduced in the sixteenth century. In England, however, the pitch of the stops was rarely indicated on the knobs until the middle of the nineteenth century.

The stop-knobs were frequently beyond the reach of the

¹ *Arch. Journal*, No. 180, p. 436.

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player ; at Strasburg, for example, in Silbermann's organ the choir registers were six feet to the rear of the organist. In the large Nicolai organ at Leipsic, in 1885, many of the stops could not be reached unless the player left his seat.

Register, To, the act of arranging or changing the stops for performance.

Reservoir, the upper part of the bellows into which the wind is pumped by means of the feeder, and held in pressure by heavy weights until required to enter the pipes. See Fig. 1, p. 17.

Return Pedal Pipes. During the nineteenth century, before English organists and builders had recognised the importance of a satisfactory pedal organ, one of the makeshifts employed was to attach the lower pedal keys to the pallets of the pipes an octave above them, or to give them separate pipes sounding an octave above, the result being in either case that if a scale succession were played on the pedal keys there would at one point be a "return" to the higher or lower octave, according to whether the player ascended or descended.

The Return Pedal was one of the disadvantages connected with the G and F compass of manuals, now fortunately obsolete. It entirely destroyed many fugue subjects and important bass passages.

Reversing Pedal, a pedal acting on the Great to Pedal coupler, which draws and closes the latter with alternate depressions.

Ribs. Wooden frames applied to the leather of bellows in order to control their folds, thereby not only preventing unnecessary wear and tear, but helping to steady the wind. Ribs were introduced into the organ at York Minster by John Couper in 1419, and improved upon by Hans Lobsinger of Nuremberg in 1570.

Rob, a pipe which accidentally takes part of the wind of its neighbour is said to rob it.

Rollerboard, a board on which are mounted a series of iron or wooden rollers of varying length, having arms projecting at right angles about an inch long at each end. To one arm is attached the tracker, and to the other the pulldown ; on depressing a key the roller turns on its axle and conveys

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its motion to the pulldown and thereby to the pallet. For the object of the rollerboard, see Fan Frame Movement.

Running, a term applied to the escape of wind through a pallet into the wrong pipe, owing to imperfect fitting of the slider. Running is one of the most troublesome difficulties with which the organ-builder has to contend; in old German organs it caused a whistling and hissing directly the stops were drawn, which could only be silenced by cutting off the wind from the sound-boards by means of pentils. Running can be cured by "bleeding" or boring a hole in the table, but this is an unsatisfactory method which is only resorted to to save the expense of refitting the slider.

Scale of Pipes. Pipes vary considerably as to their interior diameter, and each stop has its "scale" of diameters regulated according to certain fixed rules arrived at by experience. A stop with pipes of large diameter is said to be of "large scale"; while soft stops such as the Dulciana are of "small scale" pipes.

Septave, a hybrid word of recent invention, meaning septenary, and applied to the seven notes of the C major scale by those who use it.

Sforzando Coupler, a pedal by which (*a*) the swell is momentarily united to the great, or (*b*) the sub- and super-octave couplers of the swell are brought on, and released by means of a spring.

Shade, a piece of flat metal or wood at the top of a flue pipe for tuning purposes, or of a reed pipe to regulate its tone.

Show Pipes. Pipes standing on the front of an organ which do not speak, but complete the design of the case, when for any reason speaking pipes cannot be used for this purpose.

Sixteen-foot Pitch, see Eight-foot Pitch.

Slider, the perforated board inserted in the table, which cuts off or admits the wind from the pallets to the pipes. The slider in ancient positive organs projected a few inches from the table and was simply drawn by the fingers; in large organs it required an iron lever, which was locked back when drawn. In all modern organs the slider is drawn by the drawstop mechanism, to which pneumatic and electric action are frequently applied. In damp weather the slider would formerly become so swelled that

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it required great force to draw a stop; and in dry weather it would shrink sufficiently to allow escape of wind. The accurate fitting of sliders requires great skill.

Solo Organ, a department of a four-manual organ containing stops intended for use as "solo" stops—*i.e.*, to be used for melody and accompanied on another keyboard. The solo organ is usually acted on by the uppermost of the four manuals.

Solo Stop, a stop intended to be used chiefly in melody, and accompanied by softer stops on another manual. Solo stop playing is amongst the easiest and most abused forms of organ music, especially in extempore performance; it seems to have been introduced into England by Dr. Maurice Greene, at one time a friend of Handel, and one of the most skilful contrapuntists of his day.

Sound-board, a structure consisting of grooves, channels, upper-board, table, and sliders placed above the wind-chest. See Fig. 1, p. 17.

Speaking Length, see Overlength.

Speaking Room. In order to produce their full effect, organ pipes require to have a free space around and above them, technically termed speaking room.

Specification, a list of the stops and accessories of an organ. In treating for a new organ a specification is drawn up by the organist or builder, or by both, and the price and other details are arranged for.

Splay, used of any portion of the organ which is at an angle other than a right angle.

Square, a wood or metal triangle or square similar in principle to those used to conduct the wires of ordinary household bells round corners. Squares are used in organs for conducting the drawstop movement to the slider, or, when necessary, conducting the tracker action round corners or under the floor, as for example when the choir organ is placed behind the player.

Stop, see Register.

Sticker, the wire or wooden upright by which the key is connected with the backfall (see Fig. 1, p. 17). In some small chamber organs the stickers are of wood, and are held in position by a "guide," in which case the keys can

Appendix E

be drawn in and out as in a grand pianoforte, or folded back into the case as in a yacht piano.

Stopped or Covered Pipes. Pipes having a stopper in their upper end, by which the wave length is caused to return to the mouth of the pipe and thus double itself in length, producing a sound an octave lower than if the pipe were open. The stopper is usually perforated by a small hole, which is sometimes surmounted by a hollow "chimney."

Suckers, the valves in the lower plate of the feeder.

Swell (German *Schwellerwerk*, French *Récitativ*, Italian *Espressivo*), that portion of the organ which is enclosed in a box, the sides of which can be opened or closed by means of a pedal, producing a "swelling" or *crescendo* and *diminuendo* effect. For its invention, see p. 138. The swell manual is usually the uppermost clavier of a three-manual organ, and the second from the top where there are four manuals.

Swell Pedal. One of the chief drawbacks of the swell pedal is that it can only be fixed, as a rule, at two points, one of which holds the swell completely open, producing a *fortissimo*, while the other gives a *pianissimo* effect. It cannot be used for medium power if the right foot is required for the pedal clavier, hence many contrivances have been invented, such as the balanced swell pedal, which is opened by the heel and closed by the toe, remaining at any point at which it is left; the ratchet swell pedal, in which a ratchet fixes it at any point, and is released by a sideway pressure of the foot, etc. None of these contrivances have yet found universal acceptance; the bad English habit of skipping about with the left foot on the pedals, while the right foot actuates the swell pedal, is still prevalent, and is so ingrained in organists that where an improved swell pedal makes more artistic playing possible, they will sometimes have it altered to the old two-point pedal. A universally accepted "any point" pedal is much to be desired, and no doubt will come in the near future.

Table, the board placed above the sound-board, perforated with holes corresponding to the grooves, and supporting the sliders. See Fig. 1, p. 17.

Tell-tale, a small leaden weight attached to a string, which

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leads over a sheave in the organ case, and is fastened to the top of the reservoir. By the upward or downward movement of the tell-tale the blower knows whether the reservoir is full or nearly empty. The panel is frequently found defaced with pencil marks, cuts, etc., in the neighbourhood of the tell-tale, owing to the blower constantly making fresh marks to indicate the extent to which the tell-tale should be allowed to rise and fall, he being ignorant that the length of the string changes with every change of weather.

Tenor C, the lowest C but one of a manual, so called from its being the lowest note of the viola, or tenor violin.

Terzo Mano, the Italian term for superoctave coupler.

Thirty-two feet Pitch, see Eight feet Pitch.

Thumb Piston, a small button placed between the manuals, acted on by the thumb of the performer, and changing the stops by pneumatic agency. See Composition Pedals.^b

Thumper, a piece of lead or leaded wood felted on the underside, placed above the keys to prevent their rising too high.

Tone, a pipe is said to be of so many feet tone when it sounds a different note from that indicated by its length. See Stopped Pipes.

Tongue, see Reed.

Touch, the term applied to the key action, such as a heavy touch, a light touch, a deep or shallow touch, etc. In French the word *touche* means a single key of a clavier.

Tower, groups of large pipes, when arranged in semicircles or square forms at the sides or elsewhere of the organ case, are said to form towers. "The organ is a tower composed of various pipes through which, by the compression of bellows, a very loud sound is produced" (from an ancient Latin commentary attributed to the Venerable Bede).

T Pedal, see Horseshoe Pedal.

Trace, a wooden rod, part of the connection between drawstop and slider.

Trackers, thin strips of wood of varying length, having a wire hook at one end and a wire tapped like a screw at the other, connecting the backfall or the roller with the pull-down. See Fig. 1, p. 17.

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- Treble C**, the third space of the treble clef, called on the Continent *C'*.
- Tremulant**, mechanism consisting of a weighted spring, whereby the wind is allowed to escape in puffs from the wind-trunk, producing a tremulous effect in the tone. The tremulant was an early invention, and has rarely been absent from large organs in Germany; but until the nineteenth century it was a clumsy and noisy contrivance. It is set in motion by a stop or a pedal, or a slip of hard wood placed between the keyboards and acted on by the thumb of either hand.
- Trundle**, part of the drawstop mechanism, consisting of an upright wooden roller with two projecting arms.
- Tube**, the portion of a reed-pipe above the block. The shape and length of the tube has considerable effect on the tone. Pneumatic tubes are those which convey the wind from the keys to the wind-chest when these are widely separated.
- Tubular Pneumatic Action**, a comparatively recent invention, by which the movement of a pneumatic bellows, placed near the keys, is conveyed to a distance by means of a column of air enclosed in a tube, to a second pneumatic bellows acting on the pallet.
- Tumbler**, a form of Coupler action now obsolete, in which a certain portion "tumbled" in and out of position. If the stop was drawn while the organ was being played, it would jerk the fingers off the keys, or break the mechanism.
- Tuning Horn**, a hollow cone used for slightly enlarging or diminishing the diameter of the top of small metal pipes. Enlarging sharpens, and diminishing flattens them.
- Tuning Knife**, the tool with which the tuning wire of reed pipes is tapped into position.
- Tuning Wire**, the strong steel wire by which the vibrating portion of the tongue of a reed pipe is lengthened or curtailed. See Reed.
- Upper Board**, the uppermost plank of the Sound-board, on which the pipes stand. See Fig. 1, p. 17.
- Venetian Swell**, the modern form of the opening and closing portion of a Swell-box, so called from its similarity to the Venetian blind, the original Swell-box having been opened by a sliding shutter. See p. 140.

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- Ventil**, a valve much used in old German organs to cut off the wind from the various sound-boards. It was acted on by a pedal or stop. See p. 131.
- Voicing**, an important branch of the artistic side of the organ-builder's work is the "voicing" of pipes—*i.e.*, the adjustment of their tone. The person employed on this work is called a "voicer."
- Waste Pallet or Valve**, a safety valve in the wind reservoir, to prevent it being over-strained by the blower. Waste pallets are constructed in various ways.
- Whole Organ**. In early mediæval times, before the invention of registers, an organ such as that built at Halberstadt in 1361, whose Diapasons were of 32 feet, was called a "Whole organ." Similarly, one with Diapasons of 16 feet was a Half organ, while the 8-foot Diapason made a Quarter organ.
- Wind-chest or Wind-box**, the portion of the organ below the sound-board, which contains the pallets. See Fig. 1, p. 17.
- Wind-hole**, the wind passage through the foot of a pipe.
- Wind-trunk**, the wooden or metal channel through which the wind passes from the reservoir to the wind-chest. See Fig. 1, p. 17.
- Wind-way**, the slit in a pipe which admits the wind from the foot to the mouth.

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Appendix G.

Specifications of Organs of various Dates and Countries in Chrono- logical Order.

Halberstadt Cathedral, 1361.

The organ built by Nicholas Faber in A.D. 1361, and renovated by Gregory Kleng in 1495, had the following disposition¹:—

First Discant Manual.

Compass two octaves, minus one key, B \flat to A, with all semitones except the highest g \sharp .

{ Præstant (Open Diapason)
 { Hintersatz (32 to 56 ranks of Mixture) } in one.

Second Discant Manual.

The same compass as the first.

Principal (Open Diapason).

Third, or Bass Manual.

One octave and a semitone, B \flat to C, probably played with the knees.

Principal (the pipes of which were in side towers).

¹ Pretorius, *Syntagma*, vol. ii.

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Pedal.

One octave, B \natural to b \natural .
 { Principal
 { Hintersatz, 16 to 24 ranks } in one.

Twenty bellows, requiring ten blowers, supplied this organ, pressure being obtained by the weight of the blowers alone. The longest pipes were 31 feet from the mouth to the top, and therefore of 32-foot pitch; and each Principal seems to have been of this pitch, the Hintersatz containing pipes of 16, 8, 4, 3, 2, 1 $\frac{1}{2}$, 1, and $\frac{1}{2}$ -foot pitch. The noise produced was terrible. What the intonation was like it is hard to imagine; yet this instrument is typical of the organs in most cathedrals in the fourteenth century.

Halle, 1500.

The organ in the Liebfrauenkirche was built about 1500, and lasted till 1712, when it was replaced by a large one of sixty-three stops. It is interesting as having been the worn-out and worm-eaten instrument on which the youthful Handel learned when a pupil of Zachau; while its successor was examined and reported on by J. S. Bach. Its stops were¹:—

Oberwerk (Great).

- | | |
|---|--------|
| 1. Principal, sounding 8 feet on the manual and
16 feet on the pedal | 8 feet |
| 2. Octava (manual alone) | 4 „ |
| 3. Mixture (manual and pedal) | — |
| 4. Zimbel (manual and pedal) | — |
| 5. Nachthorn | 4 „ |
| 6. Querpfeiff (manual alone) | 8 „ |

On the same Manual, but in front.

- | | |
|-------------------------------|-------------------------------|
| 1. Principal 2 feet | 4. Regal 8 feet |
| 2. Mixture — | 5. Waldflötgen 1 „ |
| 3. Zimbel — | 6. Flachflötgen 4 „ |

¹ Pretorius, *Syntagma*.

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Rückpositiv (Back Choir).

1. Principal	4 feet	7. Gedactes	4 feet
2. Mixture	—	8. Kleingedactes	2 „
3. Zimbel	—	9. Spitzflöte	2 „
4. Octava	2 „	10. Siffflöte	2 „
5. Quinta	9 „	11. Trommeten	8 „
6. Quintadeen	8 „	12. Singend Regal	4 „

Pedal.

1. Principal, the bass of Oberwerk, No. 1	16 feet	
2. Mixture, borrowed from Oberwerk	—	
3. Zimbel, borrowed from Oberwerk	—	
4. Trommeten Bass	8 „	
5. Schallmeyer Bass	4 „	
6. Zimbel Bass	—	
7. Quintflöte Bass	3 „	
8. Grober Posaunen Untersatz	16 „	} added about 1600
9. Quintadehn Bass	8 „	
10. Nachthorn	4 „	

The practice of borrowing pedal stops from the manual, whose pipes were sometimes carried an octave below the manual compass for this purpose, was not uncommon in Germany and Italy at this time. See Brescia Cathedral, p. 283.

Lüneberg, St. Johannes, 1550.

This organ was built about 1550, had spring valves instead of sliders as its stop action, a tremulant, vents for the Great and Back Choir manuals, and an extra octave of keys. The pedals were permanently coupled to the chief clavier, having no pipes of their own. The following is its list of stops¹:—

Great Organ.

1. Prästant (Open Diapason)	} These pipes stood at the sides of the case
2. Octava	
3. Nachthorn Bass	
4. Mixtur	
5. Scharp	
6. Trommeten Bass	
7. Bauerflöten	
8. Untersatz (added about 1580)	

¹ Pretorius, *Syntagma*.

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Upper Positiv.

- | | | |
|----------------|--|------------------------|
| 1. Superoctava | | 5. Præstant |
| 2. Nasatt | | 6. Zimbel |
| 3. Flöte | | 7. Holpipe (Hohlflöte) |
| 4. Gemshorn | \| | 8. Trommette |

Rückpositiv.

- | | | |
|------------------|--|--------------------------|
| 1. Præstant | \| | 7. Schallmey |
| 2. Scharp | \| | 8. Regal |
| 3. Klein Holpipe | \| | 9. Sifflöte |
| 4. Quintadehna | \| | 10. Koppeldone or Octava |
| 5. Bauerpipe | \| | 11. Rauschpfeife |
| 6. Mixtur | \| |  |

Brescia, 1580.

The organ in the Cathedral, built in 1580 by Bartolomeo Antegnati, had the following stops¹:—

Manual.

- | | |
|--|-------------------|
| 1. Principale | 16 feet |
| 2. Principale spezzato ("divided" between manual and pedal) | 16 " |
| 3. l'Ottava | 8 " |
| 4. la Quinta decima | 4 " |
| 5. la Decima nona (twelfth) | 2 $\frac{2}{3}$ " |
| 6. la Vigesima seconda | 2 " |
| 7. la Vigesima sexta (twenty-sixth) | 1 $\frac{1}{3}$ " |
| 8. la Vigesima nona | 1 " |
| 9. la Trigesima terza (thirty-third) | $\frac{2}{3}$ " |
| 10. Vigesima seconda to use with Flauto, Ottava and Decima nona, to form a cornet effect | — |
| 11. Flauto in quinta decima | 4 " |
| 12. Flauto in ottavo | 8 " |

Pedal.

- Principale acting on the lower pipes of No. 2, the manual acting only on its upper pipes 16 "

¹ Ritter, *Geschichte des Orgelspiels*, p. 14.

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Dantzic, S. Maria, 1585.

Built in 1585 by Julius Antonio, containing 55 stops.¹

Oberwerk (Great).

Compass 48 notes, probably from C.

1. Principal 16 feet	8. Spillpfeiffe 4 feet
2. Hohlflöte 16 „	9. Viol 4 „
3. Quintadehna 16 „	10. Sedecima 2 „
4. Spillpfeiffe 8 „	11. Rauschquint 3 and 2 ranks
5. Octava 8 „	12. Zimbel 3 ranks
6. Quintadehna 8 „	13. Mixture 24 ranks
7. Offenflöte or Viol (Twelfth) 3 „	

Brust oder Vorpositiv (Breast or Front Choir).

1. Gedact 8 feet	5. Zimbel — feet
2. Gedact 4 „	6. Dunecken 2 „
3. Principal (Open Dia- pason) 4 „	7. Regal singend 8 „
4. Quintadehna 4 „	8. Zincken 4 „

Rückpositiv (Back Choir).

1. Principal 8 feet	10. Waldflöte ? feet
2. Hohlflöte 8 „	11. Rauschquint 3 and 2 ranks
3. Spillpfeiffe oder Blockpfeiffe 8 „	12. Nasatt ? feet
4. Octava 4 „	13. Zimbel 3 ranks
5. Offenflot oder Viol 4 „	14. Mixture 4 and 5 ranks
6. Kleine Blockflöte 4 „	15. Trommet (Trumpet) 8 feet
7. Gemshorn ? —	16. Krumbhorn 8 „
8. Sedecima ? —	17. Zinken 4 „
9. Flöte ? —	18. Schalmeyen 4 „

¹ Pretorius, *Syntagma*.

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Pedal.

Compass 43 notes, therefore larger than the modern English compass by an octave.

1. Gross Unter Bass . 32 feet	|	3. Posaunen Bass . 16 feet
2. Unter Bass . . 16 ,,	|	4. Trommete . . 8 ,,

The above accompanied the Oberwerk or Great Organ.

Pedal pipes placed on either side.

1. Flöten or Octava . 8 feet	|	8. Zimbel . . . 3 ranks
2. Gedact . . . 8 ,,	|	9. Mixture . 5 and 6 ranks
3. Quintadehna . . 4 ,,	|	10. Spitz oder Cornett —
4. Superoctav . . 2 ,,	|	11. Trommeten oder Schalmeyen . —
5. Nachthorn . . ? ,,	|	12. Krumbhörner . —
6. Rauschpfeiffe 6 and 4 ranks	|	
7. Bauerpfeiffe . . —	|	

Accessories.

Three Tremulants, one Bass Drum.

It will be observed that the Principal of the Great Organ is of 16 feet, that of the Back Choir 8 feet, and of the Front Choir 4 feet. The first was classed as a "Gross Principal Werk," or a "Grand Organ," the second as an "Equal Organ," or "Chorus Organ," the pitch of the Principal being that of the voices, and the third a "Klein Principal werk," or "Little Organ." This classification of the manuals was common in Germany for several centuries.

Rostock, 1593.

An organ built by Heinrich Glovatz, a bürger of that town, in 1593, at a cost of 5000 gülden, had 39 stops, 3 manuals, and 14 bellows. The following is the disposition of its stops¹:—

Oberwerk (Great Organ).

1. Weit Principal . 16 feet	|	4. Gedact . . . 16 feet
2. Mixture . . . — ,,	|	5. Octav . . . 8 ,,
3. Zimbel . . . — ,,	|	6. Superoctav . . 4 ,,

¹ Pretorius, *Syntagma*.

Story of the Organ

Brustwerk (Front Choir).

1. Geigen Regal	4 feet	7. Regal	8 feet
2. Krumbhorn	8 „	8. Zimbel	— „
3. Sedetz (Sedecima).	1 „	9. Waldflot	1 „
4. Sifflöte	— „	10. Spillpfeiffe	— „
5. Superoctav	2 „	11. Nasspfeiffe	1 „
6. Blockflot	? „	12. Gedact	8 „

Rückpositiv (Back Choir).

1. Principal	8 feet	7. Gedact	
2. Quintadehna	8 „	8. Offenflot	
3. Octav	4 „	9. Gemshorn	
4. Waldflot		10. Superoctav	
5. Mixtur		11. Zimbel	
6. Trommet		12. Pommert (oboe)	

There does not appear to have been a Pedal clavier in this organ, but in place of it, 9 extra stops were available for the left hand only.

1. Posaune		5. Gedact	
2. Schallmey		6. Octave	
3. Cornett		7. Superoctave	
4. Barem (à very quiet stopped Diapason)		8. Bauerflöten	
		9. Regal	

Lübeck, Marienkirche, 1600.

This organ, built by Bartold at the end of the sixteenth or beginning of the seventeenth century, had 3 manuals, of which the two uppermost (Great and Back Choir) had the unusual compass of D to A³, while the lowest note of the third manual and pedal was C, as in most other German organs of that period. Its pedal had two octaves and one note, and there was a Great to Pedal Coupler.

Oberwerk.

1. Principal, with its own Sound-board and Ventil	16 feet	4. Ruschquint (Rausch- quint)	
2. Gross Octava	8 „	5. Scharf Zimbel	
3. Kleinoctava	4 „	6. Superoctava	
		7. Mixtur	

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Rückpositiv.

1. Gemshorner . . . — feet	12. Gedact 8 feet
2. Blockpfeiffe . . . 4 „	13. Dulcian or Fagott . 8 „
3. Principal 8? „	14. Querpfeiffe (Flauto- traverso) 4 „
4. Zimbel —	15. Offenflöte 4 „
5. Mixtur —	16. Octava 2? „
6. Superoctava . . . 2? „	17. Superoctav 1? „
7. Principale ? „	18. Mixtur —
8. Feldpfeiffe —	19. Dulcian or Fagott . 16 „
9. Octava 4? „	20. Trommeten —
10. Borduna (Bourdon) —	
11. Offenflöt (Open flute) 8 „	

Brustpositiv.

1. Regal	4. Baarpfeiffe
2. Zink or Cornett	5. Gedact
3. Krumbhorn	

Pedal.

1. Gross Principal Un- ter Bass 32? feet	7. Schallmeyen
2. Doppelt Unter Bass, with special ventil	8. Feldpfeiffen
3. Unter Bass, with special ven- tils to all its pipes	9. Klein Octava
4. Mixtur	10. Dulcian
5. Trommeten, with special ventil	11. Cornett
6. Bassunen (Posaune?), with special ventil	12. Gross Octaven
	13. Decem Bass (Tierce?)
	14. Quintadehna

Bückeburg.

An organ was built to the order of the Duke of Holstein and completed in 1615 by Esaia Compenio, organ-maker and organist to the Duke of Brunswick.¹

¹ Pretorius, *Synlagma*.

Story of the Organ

Oberwerk.

1. Gross-Principal . . .	16 feet	7. Querpfeiffe . . .	4 feet
2. Gross-Quintadehn . . .	16 "	8. Octava . . .	4 "
3. Gross-Octava . . .	8 "	9. Klein Gedact, Blockpfeiffe . . .	4 "
4. Gemshorn . . .	8 "	10. Gemshorn Quinta . . .	3 "
5. Gedacte Block- pfeiffe . . .	8 "	11. Klein Flachflöt . . .	2 "
6. Viol de Gamba . . .	8 "	12. Mixtur, 8, 10, 12, and 14 ranks	

Brustpositiv.

1. Rohrflöten . . .	8 feet	5. Holquintlein (Little Quint) . . .	1½ feet
2. Nachthorn . . .	4 "	6. Kleine Zimbel . . .	2 ranks
3. Offenflöt (the pipes of this stop were of ebony) . . .	4 "	7. Regal . . .	8 feet
4. Klein Gemshorn . . .	2 "	8. Geigend Regal (of wood) . . .	4 "

Rückpositiv.

1. Principal . . .	8 feet	6. Klein Rohrflöte . . .	4 feet
2. Gross Nachthorn . . .	8 "	7. Klein Octava . . .	2 "
3. Gedactflöte (of wood) . . .	4 "	8. Klein Gedact . . .	2 "
4. Nasattpfeiffe (of wood) . . .	4 "	9. Sifflöte . . .	1 "
5. Spillpfeiffe . . .	4 "	10. Klingend Zimbel . . .	3 ranks
		11. Rancket (of wood) . . .	16 feet
		12. Krumbhorn . . .	8 "

Pedal.

1. Sub-Principal . . .	32 feet	10. Posaune or Bom- barda . . .	16 feet
2. Gross Rohrflöt . . .	16 "	11. Hornbässlein . . .	2 "
3. Gross Gemshorn . . .	16 "	12. Bauerpfeifflein . . .	1 "
4. Holpfeiffen . . .	8 "	13. Zimbel . . .	3 ranks
5. Gross Nachthorn . . .	8 "	14. Sordun Bass (of wood) . . .	16 feet
6. Querfloten (of wood) . . .	8 "	15. Dulcian (of wood) . . .	8 "
7. Octaven Bass . . .	4 "	16. Cornett Bass . . .	2 "
8. Klein Gemshorn Bass . . .	4 "		
9. Trommeten Bass . . .	8 "		

Appendix G

Accessories.

Coupler Oberwerk to Brustclavier, Tremulants to Oberwerk, Rückpositiv and Pedal, nine bellows placed in the roof of the church above the organ, and a stop called *Calcant*, by which they were made inoperative, so that the blower could not "tread" them. This was a necessary precaution in so large an organ of those days, owing to the difficulty of preventing escape of wind when the stops were being drawn previous to playing. See p. 133.

No expense seems to have been spared to make this instrument complete. It had a pedal organ of larger range than any of its manuals, and its keys, both manual and pedal, were provided with divided semitones, the A flat and E flat being placed above the G sharp and D sharp. Its manual compass was four complete octaves, while that of the pedals was two octaves and a third. Its lowest and highest were, however, "short" octaves.

Leipsic, 1618.

The organ of St. Thomas's Church had in 1618 the following twenty-five stops. It had two manuals only, one of which acted on the Oberwerk and Brust, the other on the Rückpositiv:—

Oberwerk.

1. Principal	16 feet	6. Offenflöt	4 feet
2. Octava	8 "	7. Zimbeln	3 ranks
3. Superoctava	4 "	8. Mixture	6 "
4. Sedetz (Sedecima).	2 "	9. Quinta	—
5. Gedact	8 "		

Brustwerk.

10. Regal	8 feet	11. Regal	4 feet
---------------------	--------	---------------------	--------

Rückpositiv.

1. Principal	8 feet	7. Krumbhörner	8 feet
2. Quintadeena	8 "	8. Nachthorn	4 "
3. Ein linde Gedact (soft stopped diapason)	8 "	9. Sedetz (Sedecima).	—
4. Holflöte	4 "	10. Quintflötgen	—
5. Spillpfeife	4 "	11. Gemshorn	?
6. Trommet	8 "	12. Klingend Zimbel	—

¹ Pretorius, *Syntagma*.

Story of the Organ

Pedal.

- | | | |
|--|--|--------------------------------|
| 1. Principal 16 feet | \| | 2. Posaunen Bass . . . 16 feet |
| (For this stop the pedals acted
on the Great Principal pipes) | | 3. Schallmay 4 " |

Accessories.

Coupler to the two manuals.
Coupler Rückpositiv to Pedal.

York Minster, 1632.

The organ built in 1632 by Robert Dallam, of London, blacksmith, contained the following stops, each stop carrying fifty-one pipes¹ :—

Great Organ.

- | | | |
|----------------------------|--|-------------------------------|
| 1. Open Diapason | \| | 6. Twelfth |
| 2. Open Diapason | | 7. Principal (2 feet ?) |
| 3. Stopped Diapason (wood) | | 8. Recorder (flute, 2 feet ?) |
| 4. Principal | | 9. Two-and-twentieth |
| 5. Principal | | |

Chaire Organ (Choir).

- | | | |
|--------------------|--|---|
| 1. Diapason (wood) | | 5. Recorder (probably an 8-foot
flute) |
| 2. Principal | | Three bellows |
| 3. Flute (wood) | | |
| 4. Small Principal | | |

Arnstadt, 1703.

An organ was erected at the new church in 1703 by Wender, of Mühlhausen, of two manuals and pedal, which is interesting as being the object of J. S. Bach's first official appointment. Its "console" is preserved in the Rathaus Museum at Arnstadt, from which we took the following list of stops in 1899 :—

¹ *A Short Account of Organs built in England from Charles II. to 1847.*

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Oberwerk.

1. Principal	8 feet	7. Mixture	4 ranks
2. Viola da Gamba	8 „	8. Gemshorn	8 feet
3. Quintatön	8 „	9. Cymbal	3 ranks
4. Gedact	8 „	10. Trumpet	8 feet
5. Quint	6 „	11. Tremulant	—
6. Octava	4 „	12. Glocken accord (chimes)	

Brustpositiv.

1. Principal	4 feet	6. Nachthorn	4 feet
2. Still gedact	8 „	7. Mixture	4 ranks
3. Spitzflöte	4 „	8. Octava	2 feet
4. Quint	3 „	9. Glocken accord	—
5. Sesquialtera	—		

Pedal.

1. Principal	8 feet	4. Violon bass	16 feet
2. Sub-bass	16 „	5. Octava	2 „
3. Posaune	16 „		

Accessories.

Couplers for manuals and pedals.

The Great organ comes into the category of an “equal principal organ,” as described on page 285, and that the Choir is a “little organ,” since its principal is of four feet.

Lübeck, 1705.

The large organ in the Marienkirche, which J. S. Bach travelled many miles to hear Buxtehude play on in 1705, had the following disposition¹:—

Hauptwerk (Great).

1. Principal	16 feet	8. Octave	4 feet
2. Quintadena	16 „	9. Hohlflöte	4 „
3. Trommete	16 „	10. Nasat	3 ranks
4. Octave	8 „	11. Rauschquint	4 feet
5. Spitzflöte	8 „	12. Scharf	4 „
6. Trommete	8 „	13. Mixture	15 ranks
7. Zink	8 „		

¹ Ritter, *Gesch. des Orgelspiels*, p. 179.

Story of the Organ

Brustwerk (Front Choir).

1. Principal	8 feet	7. Feldpfeife	2 feet
2. Gedact	8 „	8. Gemshorn	2 „
3. Krummhorn	8 „	9. Sifflöte	1½ „
4. Regal	8 „	10. Sesquialtera	2 ranks
5. Octave	4 „	11. Mixture	8 „
6. Hohlflöte	4 „	12. Cimbel	3 „

Rückpositiv (Back Choir).

1. Bordun	16 feet	8. Hohlflöte	8 feet
2. Dulcian	16 „	9. Vox humana	8 „
3. Principal	8 „	10. Octave	4 „
4. Blockflöte	8 „	11. Spielflöte	2 „
5. Quintadena	8 „	12. Sesquialtera	2 ranks
6. Baarpfeife	8 „	13. Mixture	5 „
7. Trichter regal (funnel-shaped)	8 „	14. Scharff	4 and 5 „

Pedal.

1. Principal	32 feet	9. Trompete	8 feet
2. Gross posaune	32 „	10. Krummhorn	8 „
3. Sub-bass	16 „	11. Octave	4 „
4. Principal	16 „	12. Bauernflöte	2 „
5. Dulcian	16 „	13. Nachthorn	2 „
6. Posaune	16 „	14. Cornet	2 „
7. Octave	8 „	15. Mixtur	6 ranks
8. Gedact	8 „		

Weimar, 1708.

The instrument in the Castle at Weimar, to which J. S. Bach was appointed organist in 1708, had the following stops¹ :—

Oberwerk (Great).

1. Quintatön	16 feet	6. Octav	4 feet
2. Principal	8 „	7. Mixtur	6 ranks
3. Gemshorn	8 „	8. Cymbel	3 „
4. Gedact	8 „	9. Glockenspiel	—
5. Quintatön	4 „		

¹ Spitta, *J. S. Bach*, Eng. ed., vol. i. p. 380.

Appendix G

Rückpositiv.

1. Principal	8 feet	5. Kleingedact	4 feet
2. Viol di gamba	8 „	6. Octav	4 „
3. Gedact	8 „	7. Waldflöte	2 „
4. Trumpet	8 „	8. Sesquialtera	4 ranks

Pedal.

1. Untersatz	32 feet	5. Principal Bass	8 feet
2. Sub-bass	16 „	6. Trumpet Bass	8 „
3. Posaune	16 „	7. Cornett Bass	4 ranks
4. Geigen Bass	16 „		

Haarlem Cathedral, 1738.

This famous organ was built by Müller, of Amsterdam, from 1735 to 1738, and was at one time the largest and most famous in the world. Its Gambas are of particularly excellent quality, and the "chorus" of its pedal is very striking: full and powerful, mixing well with that of the Great, without any obtrusiveness. Its external appearance is particularly fine (see page 124). There is no Swell¹ :—

Great Organ.

1. Prestant (2 pipes to each key in the treble)	16 feet	7. Octaav	4 feet
2. Bourdon	16 „	8. Gemshorn	4 „
3. Octaav (2 pipes to each key in the treble)	8 „	9. Quint prestant	2 $\frac{2}{3}$ „
4. Roerfluit	8 „	10. Woodfluit (Waldflöte)	2 „
5. Viol di gamba	8 „	11. Tertian	2 ranks
6. Roerquint	5 $\frac{1}{2}$ „	12. Mixture 6, 8, and 10	„
		13. Trompet	16 feet
		14. Trompet	8 „
		15. Hautbois	8 „
		16. Trompet	4 „

¹ Hopkins and Rimbault, *History of the Organ*, and personal observation.

Story of the Organ

Front Choir.

1. Prestant (2 pipes to each key in the treble)	8 feet	7. Superoctaav	2 feet
2. Quintadena	8 "	8. Sesquialtera 2, 3, and 4 ranks	
3. Hohlfluit	8 "	9. Mixture 6, 7, and 8 "	
4. Octaav	4 "	10. Cimbél	2 "
5. Fluitdoux	4 "	11. Cornet	5 "
6. Speelfluit (Spillflöte) 2 $\frac{2}{3}$ "		12. Fagot	16 feet
		13. Trompet	8 "
		14. Regal	8 "

Echo.

1. Quintadena	16 feet	8. Nachthorn	2 feet
2. Prestant (2 pipes to each key in the treble)	8 "	9. Flageolet	1 $\frac{1}{3}$ "
3. Baarpyp	8 "	10. Sesquialtera	2 ranks
4. Quintadena	8 "	11. Mixture 4, 5, and 6 "	
5. Octaav	4 "	12. Cimbél	4 "
6. Flagfluit (Flute-à-bec) 4 "		13. Schalmey	8 feet
7. Nassat	2 $\frac{2}{3}$ "	14. Dulcian	8 "
		15. Vox humana	8 "

Pedal.

1. Sub-principal (the lowest pipe is 40 feet long, and stands in one of the towers)	32 feet	7. Quint	5 $\frac{1}{3}$ feet
2. Prestant	16 "	8. Octaav	4 "
3. Sub-bass	16 "	9. Hohlfluit	2 "
4. Roerquint	10 $\frac{2}{3}$ "	10. Ruisquint (Rauschquint)	5 ranks
5. Octaav	8 "	11. Buzain	32 feet
6. Hohlfluit	8 "	12. Buzain	16 "
		13. Trompet	8 "
		14. Trompet	4 "
		15. Cinq (Zink)	2 "

Accessories.

Couplers, Choir to Great, and Echo to Great. Two Tremulants. Ventil to all the organs. Twelve bellows. Compass of manuals CC to d^3 , 51 notes. Pedals CC to d , 27 notes.

Appendix G

Doncaster, 1740.

The organ erected by John Harris in the Parish Church in 1739-40 had the following stops¹ :—

Great.

1. Open Diapason (front) 8 feet	|	7. Tierce —
2. Open Diapason (back) 8 „		8. Sesquialtera 5 ranks
3. Stopped Diapason . 8 „		9. Mounted Cornet 5 „
4. Principal 4 „		10. Trumpet (front) 8 feet
5. Twelfth 3 „		11. Trumpet (back) 8 „
6. Fifteenth 2 „		12. Clarion 4 „

Swell.

1. Open Diapason 8 feet	|	4. Cornet 3 ranks
2. Stopped Diapason 8 „		5. Trumpet 8 feet
3. Principal 4 „		6. Hautboy 8 „

Choir.

1. Stopped Diapason 8 feet	|	4. Bassoon —
2. Flute 4 „		5. Vox humana —
3. Fifteenth 2 „		

This organ was gradually enlarged during the nineteenth century, until in 1852 it had fifty-nine stops and an adequate pedal organ. In the following year the church and organ were destroyed by fire.

Lynn Regis, 1754.

The organ in the Parish Church was built by Snetzler in 1754, under the direction of Dr. Burney. It originally had the following stops² :—

Great.

1. Open Diapason 8 feet	|	7. Sesquialtera 4 ranks
2. Stopped Diapason 8 „		8. Tierce —
3. Principal 4 „		9. Bourdon 16 feet
4. Twelfth 3 „		10. Cornet (treble) 5 ranks
5. Fifteenth 2 „		11. Trumpet 8 feet
6. Furniture 3 ranks		12. Clarion 4 „

¹ From a pamphlet entitled “The Organ in Doncaster Parish Church.”

² Hopkins and Rimbault, *Hist. of the Organ*.

Story of the Organ

Swell.

1. Open Diapason	8 feet	5. Cornet	4 ranks
2. Stopped Diapason	8 ,,	6. Trumpet	8 feet
3. Principal	4 ,,	7. Hautboy	8 ,,
4. German Flute	4 ,,	8. French Horn	8 ,,

Choir.

1. Dulciana (the first introduced into an English organ)	8 feet	4. Principal	4 feet
2. Stopped Diapason	8 ,,	5. Flute	4 ,,
3. Vox humana	8 ,,	6. Fifteenth	2 ,,
		7. Bassoon (bass half)	—

This was a G organ. The Swell stops were minus their lowest octave, but the Swell clavier was of full compass, its bass acting on some of the choir stops.

Tours, 1761.

The organ at St. Martin's Cathedral was built by J. B. U. Lefevre in 1761, and destroyed during the Revolution; its specification is however preserved, and is printed in Hopkins and Rimbault's *The Organ*, which authority says that it had thirteen bellows, but Fétis says eleven. It had four manuals and pedal.

Great Organ.

1. Grosse Principal (to F)	32 feet	12. Tierce	3 $\frac{1}{2}$ feet
2. Sub-bourdon	32 ,,	13. Quint	3 ,,
3. Prestant	16 ,,	14. Doublette	2 ,,
4. Bourdon	16 ,,	15. Tierce	1 $\frac{3}{8}$,,
5. Montre	8 ,,	16. Quint	1 $\frac{1}{2}$,,
6. Prestant	8 ,,	17. Mixture	15 ranks
7. Principal	8 ,,	18. Cornet	5 ,,
8. Bourdon	8 ,,	19. First Trompette	8 feet
9. Quint	6 ,,	20. Second Trompette	8 ,,
10. Octave	4 ,,	21. Third Trompette	8 ,,
11. Octave	4 ,,	22. First Clarion	4 ,,
		23. Second Clarion	4 ,,

Appendix G

Positif.

1. Bourdon	16 feet	9. Tierce	1 $\frac{3}{8}$ feet
2. Principal	8 "	10. Quint	1 $\frac{3}{8}$ "
3. Prestant	8 "	11. Mixture	9 ranks
4. Bourdon	8 "	12. Cornet	5 "
5. Octave	4 "	13. Trompette	8 feet
6. Quint	3 "	14. Clarion	4 "
7. Octave	2 "	15. Cromorne	8 "
8. Doublette	2 "	16. Voix humaine	8 "

Bombarde.

1. Bourdon	8 feet	4. Bombarde	16 feet
2. Octave	4 "	5. Trompette	8 "
3. Cornet	5 ranks	6. Clarion	4 "

Echo.

The stops of the Great organ repeated, and enclosed in an Echo box; probably, as was usual, only the treble portion of the stops was thus enclosed, the bass half being omitted from the clavier and the pipes.

1. Grosse Principal	16 feet	9. Octave	2 feet
2. Octave	8 "	10. Tierce	1 $\frac{3}{8}$ "
3. Prestant	8 "	11. Bombarde	32 "
4. Quint	6 "	12. Trompette	16 "
5. Octave	4 "	13. Trompette	8 "
6. Flute	4 "	14. Clarion	4 "
7. Tierce	3 $\frac{1}{8}$ "	15. Clarion	2 "
8. Quint	3 "		

This organ was equal in size to many of the famous German organs of its day, and it was only one of many large French organs. The features peculiar to France are seen in the number of its reed and mutation stops.

Malaga Cathedral, Spain, 1781.

This organ was built in 1781 by order of the Bishop of Malaga, who was determined to spare no expense to have the finest possible instrument in his cathedral. There are three keyboards acting on five different organs, to which the wind is admitted or cut off by means of ventils. As in all Spanish

Story of the Organ

organs, the stops, with one exception, are "half-stops" acting on the treble or bass portion of the manual, each half-stop on the bass side having as a rule a corresponding half-stop on the treble side, though not necessarily on the same level. The following is the list of stops in their order on the jambs¹ :—

Organo de la Espalda (Back Choir Organ).

Bass Half-stops.

Trompeta de batalla (military trumpet)	. . .	8 feet
Trompeta real (Royal trumpet)	. . .	16 "
Clarín de quincera (trumpet of 2 feet tone)		
Dulzian		
Nasardos		
Bajoncillo (contrabass, a reed)	. . .	16 "
Flautado de xiii (flute, 12th)	. . .	3 "
Octava abierta (principal)	. . .	4 "
Tapada violon (stop diapason)	. . .	8 "
Temblor fuerte (strong tremulant)		

Treble Half-stops.

Trompeta real	. . . . .	16 feet
Clarín segundo (second trumpet)		
Dulzian		
Trompeta magna exterior (external great trumpet)		
Clarín primo (first trumpet)		
Trompeta universal		
Corneta	. . . . .	4 "
Tapada violon	. . . . .	8 "
Octava abierta	. . . . .	4 "
Flautado de xiii	. . . . .	3 "
Temblor suave (soft tremulant)		

Organo Principale (Great Organ).

Bass Half-Stops.

Chirimia interior (mixture)		
Trompeta real		
Dulzian, a powerful reed	. . . . .	8 feet

¹ Taken down by the author, by permission of the organist, Señor Don José Pelaez.

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Trompeta de batalla	
Trompeta de batalla segundo	
Bajoncillo (small bassoon)	
Clarín in 15 (trumpet)	2 feet
Chirimía alta (reed)	
Cimbala	3 ranks
Nasardos	4 "
Diez y novena (19th)	
Lleno (mixture)	4 "
Docena (12th)	
(Two) Quincenas (15ths)	
Octava abierta (principal)	4 feet
Octava tapada (stopped 2 feet)	
Tapada violón (stopped diapason)	
Flautado de xxvi (open diapason)	16 "
Flautado de xiii (open diapason)	8 "
Flautado violón	

Treble Half-Stops.

Trompeta real	
Trompeta magna interior	
Dulzian	8 feet
Trompeta imperial	4 "
Trompeta magna exterior	8 "
Clarín primero	
Clarín segundo	
Chirimía alta	
Flauta traversa (of wood, two pipes to each key)	
Corneta	7 ranks
Corneta en eco (a cornet of 6 ranks, a complete stop enclosed in a swell box. There is no swell organ)	
Nasardos (mixture)	4 "
Cimbala	3 "
(Two) Quincenas (15th)	
Diez y novena (19th)	
Octava abierta (principal)	4 feet
Docena (12th)	
Tapada violón (stopped diapason)	8 "
Octava tapada (stopped)	4 "
Flautado de xxvi	16 "
Flautado de xiii	8 "
Flautado violón	

Story of the Organ

Cadereta Interior (Choir Organ under the Wind-chest of the Great Organ).

Bass.	Treble.
Trompeta real	Trompeta real
Vox humana	Vox humana
Lleno (4 ranks)	Tapado violon en eco (in swell box)
Diez y novena	Lleno (4 ranks)
Octava tapada	Cornetta en eco, 5 ranks (in swell box)
Flautado violon	Docena
	Diez y novena
	Imitation de violines (Voix céleste)
	Violon

Cadereta de Espalda (Back Choir Organ, overhanging the side aisle, detached from the Chief case).

Bass.	Treble.
Fagot	Cromorne
Lleno (3 ranks)	Pifaro (Flageolet)
Diez y novena	Lleno (3 ranks)
Quincena	Diez y novena
Violon	Quincena
Flautada	Violon
	Corneta (5 ranks)
	Flauta alemana (Flauto traverso of two pipes to each note)

Cadereta Exterior, sobre el coro (Choir Organ, overhanging the Cathedral choir. Its stops are behind the back of the organist).

Bass.	Treble.
Flautado de seis y media en sus castillos (4-ft. Flute, placed in the side towers)	Flautado de seis y media en sus Castillos
Tapadillo (small stopped pipes)	Tapada violon
Docena tapada (stopped 12th)	Tapadillo
Quincena	Docena
Decimo novena (19th)	Quincena
Lleno de tres por punto (3 rank mixture)	Lleno de tres por punto
Bajon (Bassoon)	Flauto traversero de madera (of wood)
	Flauto dulce de metal
	Corneta (5 ranks)
	Bajon

Appendix G

Contras (Pedals).

Compass 12 semitones of toe pedals of equal length, the sharps being painted black.

A stop of 16 and 8 feet pipes (open diapason). Three powerful reeds of 16 feet unnamed.

Accessories.

A Timbal (kettledrum), sounding the note A.

A Tambor (drum), sounding D.

Number of pipes, 4485.

Many of the more powerful reed-pipes project horizontally from the case.

Six bellows.

When this organ, which is placed on the south side of the choir, was completed, the Bishop ordered another, exactly similar in every respect, to be built in the corresponding position on the north side of the choir. Malaga Cathedral therefore possesses two large organs, which are played on alternate days.

Bolton, Lancashire, 1795.

The organ erected in the Parish Church by S. Green in 1795 was one of the largest in England at that time. The following is the list of its stops given by J. C. Scholes¹:—

Great.

1. Open Diapason . . . 16 feet	8. Fifteenth . . . 2 feet
2. Open Diapason . . . 8 ,,	9. Piccolo . . . 2 ,,
3. Open Diapason . . . 8 ,,	10. Sesquialtera . . . 3 ranks
4. Stopped Diapason . . . 8 ,,	11. Mixture . . . 3 ,,
5. Principal . . . 4 ,,	12. Posaune . . . 8 feet
6. Flute . . . 4 ,,	13. Clarion . . . 4 ,,
7. Twelfth . . . 3 ,,	

Choir.

1. Dulciana . . . 8 feet	5. Flute . . . 4 feet
2. Keraulophon (a later addition) . . . 8 ,,	6. Gemshorn . . . 2 ,,
3. Stopped Diapason . . . 8 ,,	7. Fifteenth . . . 2 ,,
4. Principal . . . 4 ,,	8. Piccolo . . . 2 ,,
	9. Clarionet . . . 8 ,,

¹ "Memorials of the Bolton Parish Church Organs." 1882.

Story of the Organ

Swell.

1. Bourdon . . . 16 feet	6. Sesquialtera . . . 3 ranks
2. Open Diapason . . . 8 ,,	7. Cornopean . . . 8 feet
3. Stopped Diapason . . . 8 ,,	8. Oboe . . . 8 ,,
4. Principal . . . 4 ,,	9. Clarion . . . 4 ,,
5. Fifteenth . . . 2 ,,	

Pedals were added at some time during the nineteenth century.

York Minster, 1837.

The organ erected by Hill in 1837 had a compass of no less than six octaves on its Great and Choir keyboard. The swell descended to the 8-foot C, and the pedals had a compass of two octaves. The following specification is taken from the *Musical World*, 1837, vol. iv. p. 118.

Great.

Four Open Diapasons	Two Flutes
Two Stopped Diapasons	Two Sesquialteras
Four Principals	Two Mixtures
Four Fifteenths	Four Trumpets of 16 feet

Dr. Camidge had the twelfths removed, and counter-ordered the clarions.

Choir.

Open Diapason	Second Open Diapason to middle C
Stopped Diapason	Dulciana to GG
Principal	Trumpet to GG
Flute	Second trumpet of one octave
Fifteenth	borrowed from pedal

Swell.

Two Open Diapasons	Horn
Two Stopped Diapasons	Cremona
Three Principals	Trumpet
Sesquialtera	Dulciana to tenor C
Oboe	

Appendix G

Pedal.

Two Open Diapasons of 32 feet
Four Open Diapasons of 16 feet
Four Open Diapasons borrowed from the Great
One Open Diapason borrowed from the choir. (Other stops were also borrowed from the manuals.)
Trombone of 32 feet
Six Trumpets of 16 feet

Accessories.

Six couplers | Seven composition pedals

This extraordinary specification, which could never have met with the approval of the builder, was much criticised.

Paris, St. Denis, 1841.

This organ, built by Cavallé-Coll of Paris, is not only noteworthy as being a fine example of French workmanship, but as the first instrument in which Barker's pneumatic key action, which has taken such an important position, was used.¹

Grand Orgue.

1. Montre 32 feet	12. Grosse fourniture 4 ranks
2. Montre 16 "	13. Grosse cymbale 4 "
3. Bourdon 16 "	14. Petite fourniture 4 "
4. Montre 8 "	15. Petite cymbale 4 "
5. Bourdon 8 "	16. Première trompette harmonique 8 feet
6. Viola 8 "	17. Deuxième trompette harmonique 8 "
7. Flûte traversière harmonique 8 "	18. Basson et cor anglais 8 "
8. Prestant 4 "	19. Cornet à pavillon 8 "
9. Flûte octaviante harmonique 4 "	20. Clarion octaviant 4 "
10. Nazard 2 $\frac{2}{3}$ "	
11. Doublette 2 "	

¹ Hopkins and Rimbault.

Story of the Organ

Bombardes.

(Acted on by the clavier of the Grand Orgue.)

1. Bourdon . . .	16 feet	8. Bombarde . . .	16 feet
2. Flûte . . .	8 "	9. Trompette de Bom-	
3. Bourdon . . .	8 "	barde . . .	8 "
4. Prestant . . .	4 "	10. Trompette har-	
5. Quint . . .	2 $\frac{2}{3}$ "	monique . . .	8 "
6. Doublette . . .	2 "	11. Clarion harmonique	4 "
7. Cornet . . .	7 ranks	12. Clarion octaviant .	4 "

Récit-Echo Expressif (Swell).

1. Bourdon . . .	8 feet	6. Trompette harmon-	
2. Flûte harmonique .	8 "	ique . . .	8 feet
3. Flûte octaviante		7. Voix humaine har-	
harmonique . . .	4 "	monique . . .	8 "
4. Quint . . .	2 $\frac{2}{3}$ "	8. Clarion harmon-	
5. Octavin harmonique	2 "	ique . . .	4 "

Positif (Choir).

1. Bourdon . . .	16 feet	11. Tierce . . .	1 $\frac{2}{3}$ feet
2. Salicional . . .	8 "	12. Cymbale . . .	4 ranks
3. Flûte harmonique .	8 "	13. Fourniture . . .	4 "
4. Bourdon . . .	8 "	14. Trompette harmon-	
5. Prestant . . .	4 "	ique . . .	8 feet
6. Flute . . .	4 "	15. Clarion octaviant .	4 "
7. Flûte octaviante .	4 "	16. Cor d'harmonie et	
8. Quint . . .	2 $\frac{2}{3}$ "	hautbois . . .	8 "
9. Doublette . . .	2 "	17. Cromorne . . .	8 "
10. Flageolet harmon-			
ique . . .	2 "		

Pedale.

1. Flûte ouverte . . .	32 feet	7. Bombarde . . .	16 feet
2. Flûte ouverte . . .	16 "	8. Première trompette	8 "
3. Contre bass . . .	16 "	9. Deuxième trompette	8 "
4. Flûte ouverte . . .	8 "	10. Basson . . .	8 "
5. Grosse quint . . .	5 $\frac{1}{2}$ "	11. Première clarion .	4 "
6. Flûte ouverte . . .	4 "	12. Deuxième clarion .	4 "

Appendix G

Accessories.

- Composition Pedals—
1. Swell to Great
 2. Bombarde to Great manual
 3. Swell stops
 4. Positif to Great
 5. The treble portion of positif reed and harmonic stops to foundation stops
 6. The bass of positif reed and harmonic stops to foundation stops
 7. Bass portion of manuals to pedal
 8. Manual sub-octave coupler
 9. Tremulant to swell

The reader will notice the large number of harmonic stops in this organ; they were at that time new to Paris. A peculiarity reminding us of the English organs of that period is that the manuals were of "C" compass, the pedals being of "F" compass—the reverse of the English custom, but one which must have been equally confusing to the player.

The reed stops are on a heavier wind than the flue stops, and the upper octaves of all stops on a heavier wind than the lower octaves—a novelty at the time the organ was built.

Leeds Town Hall, 1859.

This organ was begun in 1857 and completed in 1859 by Gray & Davison. Following a practice common in Germany, its great organ is divided into two portions, acted on by the same clavier.¹

Front Great Organ.

1. Double Diapason .	16 feet	7. Twelfth . . .	3 feet
2. Open Diapason .	8 ,,	8. Fifteenth . . .	2 ,,
3. Spitz Gamba . . .	8 ,,	9. Quint Mixture .	4 ranks
4. Stopped Diapason	8 ,,	10. Tierce Mixture	5 ,,
5. Octave	4 ,,	11. Trumpet	8 feet
6. Waldflöte	4 ,,	12. Clarion	4 ,,

¹ From Elliston, *Organs and Tuning.*

Story of the Organ

Back Great Organ.

1. Bourdon	16 feet	8. Piccolo harmonique	2 feet
2. Flûte à pavillon	8 "	9. Cymbal	3 ranks
3. Viola	8 "	10. Furniture	4 "
4. Harmonic Flute	8 "	11. Contra Trombone	16 feet
5. Quint	6 "	12. Trombone	8 "
6. Octave	4 "	13. Harmonic Trumpet	8 "
7. Flûte octaviente	4 "	14. Tenor Trombone	4 "

Choir.

1. Sub-dulciana	16 feet	9. Harmonic Flute	4 feet
2. Open Diapason	8 "	10. Twelfth	3 "
3. Rohrflöte	8 "	11. Fifteenth	2 "
4. Stopped Diapason	8 "	12. Octavino	2 "
5. Salicional	8 "	13. Dulciana Mixture	5 ranks
6. Viola di Gamba	8 "	14. Euphone (free reed)	16 feet
7. Octave	4 "	15. Trumpet	8 "
8. Suabe Flute	4 "	16. Clarion	4 "

Swell.

1. Bourdon	16 feet	11. Fifteenth	2 feet
2. Open Diapason	8 "	12. Piccolo	2 "
3 } Stopped Diapason	8 "	13. Sesquialtera	4 ranks
4 }		14. Mixture	3 "
5. Keraulophon	8 "	15. Contra fagotto	16 feet
6. Harmonic Flute	8 "	16. Trumpet	8 "
7. Octave	4 "	17. Cornopean	8 "
8. Gemshorn	4 "	18. Oboe	8 "
9. Wood Flute (Wald- flöte)	4 "	19. Vox Humana	8 "
10. Twelfth	3 "	20. Clarion	4 "

Solo.

1. Bourdon	8 feet
2. Concert Flute (harmonic)	8 "
3. Piccolo (harmonic)	4 "
4. Ottavino (harmonic)	2 "
5. Clarionet	8 "
6. Oboe	8 "
7. Cor Anglais and Bassoon (free reed)	8 "
8. Tromba	8 "
9. Ophicleide	8 "

Appendix G

The following stops are combinations in octaves of some of the above:—

10. Clarionet and Flute
11. Oboe and Flute
12. Clarionet and Bassoon
13. Clarionet and Oboe
14. Oboe and Bassoon
15. Flute, Clarionet, and Bassoon, in double octaves
16. Flute, Oboe, and Bassoon, in double octaves

Echo.

(Played on Solo or Choir Clavier.)

<ol style="list-style-type: none"> 1. Bourdon . . . 16 feet 2. Dulciana . . . 8 „ 3. Liebhich gedact . . . 8 „ 4. Flauto traverso . . . 4 „ 		<ol style="list-style-type: none"> 5. Flûte d'amour . . . 4 feet 6. Dulciana Mixture . . . 4 ranks 7. Carillon . . . —
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Pedal.

<ol style="list-style-type: none"> 1. Sub-bass . . . 32 feet 2. Contra Bourdon . . . 32 „ 3. Open Diapason . . . 16 „ 4. Open Diapason . . . 16 „ 5. Violone . . . 16 „ 6. Bourdon . . . 16 „ 7. Quint . . . 12 „ 8. Octave . . . 8 „ 9. Violoncello . . . 8 „ 		<ol style="list-style-type: none"> 10. Twelfth . . . 6 feet 11. Fifteenth . . . 4 „ 12. Mixture . . . 5 ranks 13. Contra Bombard (free reed) . . . 32 feet 14. Bombard . . . 16 „ 15. Fagotto . . . 16 „ 16. Clarion . . . 8 „
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Accessories.

<p>Couplers—</p> <ol style="list-style-type: none"> 1. Solo to Great 2. Great to Solo 3. Solo super-octave 4. Solo sub-octave 5. Swell to Great super-octave 6. Swell to Great (unison) 7. Swell to Great sub-octave 		<ol style="list-style-type: none"> 8. Swell to Choir 9. Choir to Great 10. Swell to Pedal 11. Choir to Pedal 12. Great to Pedal 13. Solo to Pedal 14. Echo to Solo clavier 15. Echo to Choir clavier
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Story of the Organ

Composition Pedals, etc.

1. Full Pedal Organ
2. Tremulant to Echo
3. Tremulant to Swell
4. Ventil to Back Great
5. Pedal Coupler, Back Great to Swell
6. Crescendo Pedal
7. Diminuendo Pedal and four Composition Pedals

The manual compass is five octaves, that of the pedal thirty notes.

Hatfield Broad Oak (Essex), 1859.

A great number of English village churches have, during the latter part of the nineteenth century, been provided with organs which, though naturally of smaller dimensions than the magnificent instruments found in cathedrals and public halls, are complete, and in many respects more satisfactory from an artistic point of view than some of the cathedral organs of the earlier part of the century. Many of them are still, however, deficient in the pedal department.

The organ at Hatfield Broad Oak may be taken as a typical example of a village church organ of forty years ago, having been built in 1859 by Messrs. Gray & Davison.¹ It contains—

Great.

1. Open Diapason	8 feet	5. Principal	4 feet
2. Keraulophon	8 ,,	6. Flute (originally a 2-	
3. Stopped Diapason	8 ,,	rank mixture)	4 ,,
4. Clarionet Flute	8 ,,	7. Fifteenth	2 ,,

Swell.

(The compass was extended from tenor C to CC in 1881.)

1. Double Diapason	16 feet	4. Principal	4 feet
2. Open Diapason	8 ,,	5. Fifteenth	2 ,,
3. Stopped Diapason	8 ,,	6. Cornopean	8 ,,

Pedal.

Open Diapason 16 feet

¹ Communicated by the Rev. F. W. Galpin, Vicar of Hatfield.

Appendix G

Accessories.

Couplers: Swell to Great; Great to Pedals.
Four composition pedals.

In 1902 a "sanctuary organ" was added by Messrs. Bedwell & Sons of Cambridge, bracketed on the north wall of the sanctuary, and connected with the great keyboard by means of tubular-pneumatic action carried through the wall. It contains the following stops:—

1. Salicional	8 feet
2. Stopped Flute	8 "
3. Octave Flute	4 "

Doncaster, 1862.

On the completion of rebuilding the Parish Church after the fire of 1853, a very large organ was constructed by Schulze, of Paulinzelle,¹ and opened in 1862.

Great Organ.

1. Sub-bourdon	32 feet	11. Stopped Flute	4 feet
2. Double Open Diapason	16 "	12. Twelfth	2 $\frac{2}{3}$ "
3. Bourdon	16 "	13. Fifteenth	2 "
4. Open Diapason	8 "	14. Mixture	5 ranks
5. Octave	8 "	15. Cymbal 3, 4, and 5	"
6. Hohlflöte (triangular wooden pipes)	8 "	16. Cornet	4 "
7. Stopped Diapason	8 "	17. Double Trumpet	16 feet
8. Great Quint	5 $\frac{1}{2}$ "	18. Trumpet	8 "
9. Principal	4 "	19. Posaune	8 "
10. Gemshörn	4 "	20. Spare Slide	—
		21. Clarion	4 "

Choir Organ.

1. Lieblich gedact	16 feet	8. Lieblich Flute	4 feet
2. Geigen principal	8 "	9. Flauto traverso	4 "
3. Viol di gamba	8 "	10. Quintatön	4 "
4. Flauto traverso	8 "	11. Flautino	2 "
5. Salicional	8 "	12. Flauto gamba	8 "
6. Lieblich gedact	8 "	13. Clarionet	8 "
7. Geigen principal	4 "		

¹ From a pamphlet, "The Organ at Doncaster Parish Church."

Story of the Organ

Swell Organ.

1. Bourdon	16 feet	11. Mixture	5 ranks
2. Open Diapason	8 "	12. Scharf	3 "
3. Gemshorn	8 "	13. Cornet	4 "
4. Terpodion	8 "	14. Double Bassoon	16 "
5. Harmonic Flute	8 "	15. Hautboy	8 "
6. Rohrflöte	8 "	16. Trumpet	8 "
7. Principal	4 "	17. Horn	8 "
8. Harmonic Flute	4 "	18. Clarion	4 "
9. Stopped Flute	4 "	19. Tremulant	—
10. Viol d'amour	4 "		

Solo Organ.

1. Gemshorn	8 feet	} Borrowed from Swell
2. Harmonic Flute	8 "	
3. Rohrflöte	8 "	
4. Harmonic Flute	4 "	
5. Stopped Flute	4 "	
6. Double Bassoon	16 "	
7. Hautboy	8 "	
8. Horn	8 "	
9. Vox Humana	8 "	

Echo Organ.

1. Tibia major	16 feet	6. Celestina	4 feet
2. Vox angelica	8 "	7. Flauto dolcissimo	4 "
3. Harmonica	8 "	8. Harmonica ætherica (physarmonica)	2 ranks
4. Flauto traverso	8 "		
5. Flauto amabile	8 "		

Pedal Organ.

1. Sub-principal	32 feet	14. Fifteenth	4 feet
2. Major Bass	16 "	15. Tierce	3½ "
3. Principal Bass	16 "	16. Mixture	2 ranks
4. Sub-bass	16 "	17. Cymbal	2 "
5. Open Diapason Bass	16 "	18. Contra posaune	32 feet
6. Violone	16 "	19. Posaune	16 "
7. Minor Bass	8 "	20. Bombard	16 "
8. Octave Bass	8 "	21. Contra fagotto	16 "
9. Violoncello	8 "	22. Trumpet	8 "
10. Bass Flute	8 "	23. Horn	8 "
11. Quint	10 $\frac{2}{3}$ "	24. Fagotto	8 "
12. Quint	5 $\frac{1}{3}$ "	25. Clarion	4 "
13. Tierce	6 $\frac{2}{3}$ "		

Appendix G

Accessories.

Couplers—1, Swell to great; 2, choir to great; 3, swell to choir; 4, echo to solo; 5, great to pedal; 6, swell to pedal; 7, choir to pedal. Four composition pedals to great and pedal, three to swell. Double-acting pedal, great to pedal organ. There is also a thunder pedal. Combination pistons, composition pedals, and couplers Nos. 3, 4, 6, and 7, as well as a gas engine for blowing, were added in 1894 by Abbott & Smith, of Leeds, who also replaced Schulze's mechanism by tubular pneumatic action. There are twelve bellows arranged in three tiers, which were formerly worked by wheels, pulleys, and ropes attached to sliding panels, in which were foot-holes. The blowers placed their feet in the holes and allowed their weight to bring down the panels, which raised the bellows.

Boston (United States), 1863.

The organ in the Music Hall was built by E. F. Walcker of Ludwigsburg in 1857 to 1863.¹

Great.

1. Principal . . . 16 feet	13. Octave . . . 8 feet
2. Tibia major . . . 16 "	14. Fugara . . . 8 "
3. Viola major . . . 16 "	15. Hohlflöte . . . 4 "
4. Bassoon (free reed) 16 "	16. Flute d'amour . . . 4 "
5. Ophicleide (free reed) 8 "	17. Clarion . . . 4 "
6. Principal . . . 8 "	18. Waldflöte . . . 2 "
7. Flöte (double mouths) . . . 8 "	19. Quint . . . 5 $\frac{1}{8}$ "
8. Gemshorn . . . 8 "	20. Terz . . . 3 $\frac{1}{2}$ "
9. Viola di gamba . . . 8 "	21. Quintflöte . . . 2 $\frac{2}{3}$ "
10. Gedact . . . 8 "	22. Terz Discant . . . 1 $\frac{3}{8}$ "
11. Trombone . . . 8 "	23. Cornet . . . 5 ranks
12. Trumpet . . . 8 "	24. Mixture . . . 6 "
	25. Scharff . . . 4 "

Choir.

1. Gedact . . . 16 feet	5. Gedact . . . 8 feet
2. Principal Flute . . . 8 "	6. Clarin Bass . . . 4 "
3. Spitzflöte . . . 8 "	7. Clarin Discant . . . 4 "
4. Bifara of two ranks, one stopped an octave below the other, open 8 and 4 "	8. Viola . . . 8 "
	9. Physarmonica . . . 8 "
	10. Hohlpfeife . . . 4 "
	11. Principal Flute . . . 4 "

¹ Hopkins and Rimbault, *History of the Organ.*

Story of the Organ

12. Dolce (Dulciana)	4 feet	14. Sesquialtera	2 ranks
13. Flantino	2 ,,	15. Superoctave	1 foot

Swell.

1. Bourdon	16 feet	11. Principal Octave	4 feet
2. Principal	8 ,,	12. Rohrflöte	4 ,,
3. Salicional	8 ,,	13. Traversflöte	4 ,,
4. Dolce	8 ,,	14. Cornettino (flue pipes of trumpet quality of tones)	4 ,,
5. Quintatön	8 ,,	15. Quintflöte	5 $\frac{1}{2}$,,
6. Gedact (double months)	8 ,,	16. Nasard	2 $\frac{2}{3}$,,
7. Trombone Bass	8 ,,	17. Octave	2 ,,
8. Trombone Discant	8 ,,	18. Mixture	5 ranks
9. Bassoon Bass	8 ,,		
10. Hautbois	8 ,,		

Solo.

1. Bourdon	16 feet		closed in a swell and with a tremu- lant)	8 feet
2. Gamba Principal	8 ,,			
3. Æoline	8 ,,	7. Gemshorn		4 ,,
4. Concert Flute	8 ,,	8. Pifaro, 2 ranks, 4 and		2 ,,
5. Corno di Bassetto	8 ,,	9. Vox Angelica		4 ,,
6. Vox humana (two ranks, one a reed, the other flue en-		10. Quint		2 $\frac{2}{3}$,,
		11. Piccolo		2 ,,

Pedal.

1. Principal Bass	32 feet	9. Hohflöte	8 feet
2. Grand Bourdon (a mixture of 5 ranks so voiced as to produce a tone of 32 feet)	32 ,,	10. Violoncello	8 ,,
3. Bombardon (a powerful reed)	32 ,,	11. Trumpet	8 ,,
4. Octave Bass	16 ,,	12. Corno Basso	4 ,,
5. Sub-bass	16 ,,	13. Octave	4 ,,
6. Trombone	16 ,,	14. Cornettino	2 ,,
7. Contra Violon	16 ,,	15. Bourdon	16 ,,
8. Octave Bass	8 ,,	16. Viola	8 ,,
		17. Flute	8 ,,
		18. Flute	4 ,,
		19. Bassoon	16 ,,
		20. Waldflöte	2 ,,

Appendix G

Accessories.

Twelve composition pedals, six of which act on the pedal couplers. Composition pneumatic knobs for the thumbs acting on the manual Couplers, crescendo, and diminuendo pedal, drawing or closing the stops one by one. There are fifteen bellows driven by a hydraulic engine. The case, of black walnut, is ornamented with statues, busts, and other figures, and contains two towers of 60 feet in height.

London, The Royal Albert Hall, 1871.

This instrument, which was completed in 1871 by Henry Willis, not only ranks amongst the largest organs in the world, but it has several features which were new at the time of its erection, and which have since been adopted in other organs. Its mixtures are characterised by Couwenbergh as "entirely original, veritable types of perfection, which surpass everything hitherto made of this nature." It contains the following stops¹:—

Great.

1. Flute Conique	16 feet	14. Octave	4 feet
2. Contra Gamba	16 "	15. Quint Octaviente	3 "
3. Violone	16 "	16. Piccolo Harmonique	2 "
4. Bourdon	16 "	17. Super Octave	2 "
5. Open Diapason	8 "	18. Furniture	5 ranks
6. Open Diapason	8 "	19. Mixture	5 ranks
7. Viola da Gamba	8 "	20. Contra Posaune	16 feet
8. Claribel	8 "	21. Trompette Harmonique	16 and 8 feet
9. Flûte Harmonique	8 "	22. Tromba	8 "
10. Flûte à Pavillon	8 "	23. Clarion Harmonique	8 and 4 "
11. Quint	6 "	24. Clarion	4 "
12. Flûte Octaviente Harmonique	4 "		
13. Viola	4 "		

Swell.

1. Double Diapason	16 feet	4. Open Diapason	8 feet
2. Bourdon	16 "	5. Viola da Gamba	8 "
3. Salicional	8 "	6. Flûte à Cheminée	8 "

¹ From Elliston, *Organs and Tuning*.

Story of the Organ

7. Claribel Flute	8 feet	16. Mixture	5 ranks
8. Quint	6 "	17. Contra Posaune	16 feet
9. Flûte Harmonique	4 "	18. Contra Oboe	16 "
10. Viola	4 "	19. Baryton	16 "
11. Principal	4 "	20. Vox Humana	8 "
12. Quint Octaviente	3 "	21. Oboe	8 "
13. Super Octave	2 "	22. Cornopean	8 "
14. Piccolo Harmonique	2 feet	23. Tuba Major	8 "
15. Sesquialtera	5 ranks	24. Tuba	4 "
		25. Clarion	4 "

Choir.

1. Violone	16 feet	12. Piccolo harmonique	2 feet
2. Viola di gamba	8 "	13. Super-octave	2 "
3. Dulciana	8 "	14. Mixture	3 ranks
4. Lieblich gedact	8 "	15. Corno de bassetto	16 feet
5. Open diapason	8 "	16. Clarionet	8 "
6. Vox angelica	8 "	17. Cor Anglais	8 "
7. Principal harmonique	4 "	18. Oboe	8 "
8. Gemborn	4 "	19. Trompette Harmonique	16 and 8 "
9. Lieblich flôte	4 "	20. Clarion	4 "
10. Celestina	4 "		
11. Flageolet	2 "		

Solo.

1. Contra basso	16 feet	11. Corno di bassetto	16 feet
2. Flûte à pavillon	8 "	12. Clarionet	8 "
3. Viol d'amour	8 "	13. Bassoon	8 "
4. Flûte harmonique	8 "	14. French horn	8 "
5. Claribel flute	8 "	15. Ophicleide	8 "
6. Voix céleste	8 "	16. Trombone	8 "
7. Flûte traversière	4 "	17. Oboe	8 "
8. Concert flute	4 "	18. Bombardon	16 "
9. Piccolo harmonique	2 "	19. Tuba mirabilis	8 "
10. Cymbale	—	20. Tuba clarion	4 "

Pedal.

1. Double Open Diapason	32 feet	3. Contra Violone	32 feet
2. Double Open Diapason	32 "	4. Open Diapason	16 "
		5. Open Diapason	16 "
		6. Bourdon	16 "

Appendix G

7. Violone	16 feet	15. Contra Posaune	32 feet
8. Great Quint	12 "	16. Contra Fagotto	16 "
9. Violoncello	8 "	17. Bombarde	16 "
10. Octave	8 "	18. Ophicleide	16 "
11. Quint	6 "	19. Trombone	16 "
12. Super-octave	4 "	20. Fagotto	8 "
13. Furniture	5 ranks	21. Clarion	8 "
14. Mixture	3 "		

Accessories.

Couplers—1. Solo sub-octave	Couplers—8. Swell to choir
2. Solo super-octave	9. Solo to choir
3. Swell sub-octave	10. Solo to pedal
4. Swell super-octave	11. Swell to pedal
5. Solo to great	12. Choir to pedal
6. Swell to great	13. Great to pedal
7. Choir to great	

Six ventils governed by composition pedals, acting on the pedal organ

Sforzando pedal

Tremulant to swell

Tremulant to solo

Eight pneumatic thumb pistons under each clavier, acting like composition pedals

Two pedals which cause the six ventils to act on the great organ as well as the pedal

Six ordinary composition pedals acting on the various accessories

Two great to pedal coupler pedals

A patent atmospheric movement for opening the swell-box independently of the swell pedal

The feeders are worked by steam, air being pumped from another room into large reservoirs, whence it is distributed to numbers of smaller reservoirs near the pipes.

The compass of the manuals is five octaves, of the pedal C to G, thirty-two notes.

Of the choir organ, stops Nos. 1, 3, 6, 8, 9, 11, 14, and 17 are enclosed in an echo-box

Of the solo stops, Nos. 11, 12, 13, 14, and 17 are in a swell-box

Story of the Organ

Sydney, New South Wales, 1889.

The organ in the Town Hall was built by Messrs. W. Hill & Son in 1886 to 1889. This magnificent instrument is not only the largest ever built for an English colony, but is also, it is hoped, the grandest organ yet constructed, both as regards tone and mechanical refinements, for any building, sacred or secular.

It contains 126 speaking stops, distributed between five manuals and one pedal clavier, besides numerous accessory couplers and other movements, and is thus the largest existing organ in the world. Perhaps the most remarkable feature in the specification is the 64-foot reed on the pedal, which, it is now shown, has a magnificent effect as a bass for the full organ. It is a striking reed of true length, with wooden tubes.

The organ is constructed entirely on the pneumatic principle, of a kind specially devised by the builders, and is blown by a gas engine.

The case was designed by Mr. Arthur G. Hill, M.A., F.S.A. It is of great size, and holds in the centre the 32-foot metal pipes. The style is Northern Renaissance of the seventeenth century, strictly after the model of the finest ancient examples.¹

Great Organ, CC to C.

1. Contra Bourdon (tenor C) . . . 32 feet	14. Quint 6 feet
2. Bourdon 16 ,,	15. Harmonic Flute . . 4 ,,
3. Double Open Diapason . . . 16 ,,	16. Principal 4 ,,
4. Open Diapason, No. 1 8 ,,	17. Octave 4 ,,
5. Open Diapason, No. 2 8 ,,	18. Gemshorn 4 ,,
6. Open Diapason, No. 3 8 ,,	19. Twelfth 3 ,,
7. Open Diapason, No. 4 8 ,,	20. Fifteenth 2 ,,
8. Harmonic Flute . . . 8 ,,	21. Mixture 3 ranks
9. Viola 8 ,,	22. Cymbal 4 ,,
10. Spitz Flöte 8 ,,	23. Sharp Mixture . . 4 ,,
11. Gamba 8 ,,	24. Furniture 5 ,,
12. Hohl Flöte 8 ,,	25. Contra Posaune . . 16 feet
13. Rohr Flöte 8 ,,	26. Posaune 8 ,,
	27. Trumpet 8 ,,
	28. Clarion 4 ,,

¹ Communicated by Messrs. W. Hill & Son.

Appendix G

Swell Organ, CC to C.

29. Double Open Diapason 16 feet	41. Twelfth 3 feet
30. Bourdon 16 "	42. Fifteenth 2 "
31. Open Diapason 8 "	43. Harmonic Piccolo 2 "
32. Viola di Gamba 8 "	44. Mixture 4 ranks
33. Salicional 8 "	45. Furniture 5 "
34. Dulciana 8 "	46. Trombone 16 feet
35. Vox Angelica 8 "	47. Bassoon 16 "
36. Hohl Flöte 8 "	48. Horn 8 "
37. Octave 4 "	49. Trumpet 8 "
38. Gemshorn 4 "	50. Cornopean 8 "
39. Harmonic Flute 4 "	51. Oboe 8 "
40. Rohr Flöte 4 "	52. Clarion 4 "

Choir Organ, CC to C.

53. Contra Dulciana 16 feet	63. Lieblich Flöte 4 feet
54. Open Diapason 8 "	64. Twelfth 3 "
55. Gamba 8 "	65. Fifteenth 2 "
56. Dulciana 8 "	66. Dulcet 2 "
57. Flauto Traverso 8 "	67. Dulciana Mixture 3 ranks
58. Hohl Flöte 8 "	68. Bassoon 16 feet
59. Lieblich Gedackt 8 "	69. Vox Humana 8 "
60. Octave 4 "	70. Clarinet 8 "
61. Violino 4 "	71. Oboe 8 "
62. Celestina 4 "	72. Octave Oboe 4 "

Solo Organ, CC to C.

73. Quintatön 16 feet	83. Flauto Traverso 2 feet
74. Open Diapason 8 "	84. Contra Fagotto 16 "
75. Violin Diapason 8 "	85. Cor Anglais 8 "
76. Flauto Traverso 8 "	86. Corno di Bassetto 8 "
77. Doppel Flöte 8 "	87. Orchestral Oboe 8 "
78. Stopped Diapason 8 "	88. Harmonic Trumpet 8 "
79. Viola 3 "	89. Octave Oboe 4 "
80. Octave 4 "	90. Contra Tuba 16 "
81. Flauto Traverso 4 "	91. Tuba 8 "
82. Harmonic Flute 4 "	92. Tuba Clarion 4 "

Story of the Organ

Echo Organ, CC to C.

93. Viol d'Amour . . .	8 feet	98. Glockenspiel . . .	4 ranks
94. Unda Maris, 2 ranks	8 "	99. Echo Dulciana	
95. Lieblich Gedackt . . .	8 "	Cornet . . .	4 "
96. Viol d'Amour . . .	4 "	100. Basset Horn . . .	8 feet
97. Flageolet . . .	2 "		

Pedal Organ, CCCCC to F.

101. Double Open Diapason, wood . . .	32 feet	113. Violoncello . . .	8 feet
102. Double Open Diapason, metal . . .	32 "	114. Bass Flute . . .	8 "
103. Contra Bourdon . . .	32 "	115. Twelfth . . .	6 "
104. Open Diapason, wood . . .	16 "	116. Fifteenth . . .	4 "
105. Open Diapason, metal . . .	16 "	117. Mixture . . .	2 ranks
106. Violone . . .	16 "	118. Mixture . . .	3 "
107. Gamba . . .	16 "	119. Mixture . . .	4 "
108. Dulciana . . .	16 "	120. Contra Trombone, wood . . .	64 feet
109. Bourdon . . .	16 "	121. Contra Posaune, metal . . .	32 "
110. Quint . . .	12 "	122. Posaune . . .	16 "
111. Octave . . .	8 "	123. Trombone . . .	16 "
112. Prestant . . .	8 "	124. Bassoon . . .	16 "
		125. Trumpet . . .	8 "
		126. Clarion . . .	4 "

Couplers, etc.

127. Great to Pedal	134. Solo to Great
128. Swell to Pedal	135. Solo Octave
129. Choir to Pedal	136. Choir to Great
130. Solo to Pedal	137. Swell to Choir
131. Swell to Great	138. Solo to Choir
132. " Octave	139. Echo to Swell
133. " Sub-Octave	140. Pedal Organ to Great Pistons
8 Pneumatic Combination Studs to Great Organ	
8 " " " " Swell Organ	
7 " " " " Choir Organ	
7 " " " " Solo Organ	
3 " " " " Echo Organ	
6 Combination Pedals to Pedal Organ	
4 " " " " Great Organ	
Choir Tremulant by Pedal	
Solo " " "	
3 Pedals to Couplers, Nos. 127, 128, and 130	

Appendix G

The combination studs are placed below their respective claviers.

The draw-stop jambs are placed at a convenient angle, the knobs being of solid ivory, and so arranged that the whole come within easy reach of the performer.

The internal width of the instrument is 80 feet, with a depth of about 26 feet.

A great amount of fine "spotted" metal is used in its construction, with zinc for the larger pipes.

The builders themselves drew up the specification of stops.

Palermo (Sicily), 1898.

Italian organ-building has begun to make considerable advance within the last few years, especially in the pedal department and modern accessories. The organ in the Church of St. Domenica, which was built in 1898 by Cavaliere Pacifico Inzoli, of Crema, has two manuals of sixty-one keys, a pedal of thirty keys, and twelve composition pedals.¹

'Grand' Organo (Great).

1. Principale	16 feet	10. Clarino (trumpet)	8 feet
2. Violoncello	16 "	11. Ottava	4 "
3. Principale	8 "	12. Flauto	4 "
4. Bordone	8 "	13. Viola	4 "
5. Flauto	8 "	14. Duodecima (twelfth)	2 $\frac{3}{4}$ "
6. Viola	8 "	15. Decimaquinta (fifteenth)	2 "
7. Dulciana	8 "	16. Ripieno (mixture)	4 ranks
8. Unda maris	8 "	17. Ottavino	2 feet
9. Tromba (trumpet)	8 "		

Espressivo (Swell).

1. Principale	8 feet	6. Oboe	8 feet
2. Bordone	8 "	7. Voci umane	8 "
3. Viola	8 "	8. Voci umane	8 "
4. Salicionale	8 "	9. Flauto	4 "
5. (Voix) Céleste	8 "		

Pedal.

1. Contrabasso	16 feet	4. Basso	8 feet
2. Bordone	16 "	5. Bordone	8 "
3. Bombarda	16 "	6. Violone	8 "

¹ Communicated by the Rev. Ednardo Bottigliero, of Portici.

Story of the Organ

Composition Pedals.

1. Terzo piede (pedal octave coupler)
2. Tremolo (tremulant)
3. Great to pedal coupler
4. Swell to pedal coupler
5. Swell to great coupler
6. Mezzoforte (composition pedal) to great
7. Mezzoforte (composition pedal) to swell
8. Espressione (swell pedal)
9. Composition pedal to draw reeds of great
10. Corale
11. Full organ composition pedal
12. Timballone (great kettledrum)

Capri (Italy), 1900.

The parish church of this island possesses a small organ of excellent quality, built by Inzoli. It has two manuals, and a pedal of 27 keys from C to D; the action is tubular-pneumatic.¹

Ima Tastiera (Great).

1. Bordone	16 feet	5. Ottava	4 feet
2. Flauto	8 ,,	6. Decimava	3 ,,
3. Dulciana	8 ,,	7. Tromba	8 ,,
4. Principale	8 ,,	8. Ripieno (mixture)	4 ranks

Iida Tastiera (Swell).

1. Bordone	8 feet	4. Voci Umane	8 feet
2. Unda Maris	8 ,,	5. Oboe	8 ,,
3. Violinzoli (a kind of voix céleste in- tended to imitate violins, invented by the builder)	8 ,,	6. Flauto	4 ,,
		7. Salicet	2 ,,

¹ From personal observation, by permission of the Rev. — de Nardis, parish priest.

Appendix G

Pedal.

Bordone	16 feet	|	Violone	8 feet
Basso	8 ,,	|	Bordone	8 ,,

Composition Pedals.

1. Terzo piede (pedal octave coupler)
2. Pedal to Great
3. Pedal to Swell
4. Swell to Great
5. Tremulant
6. Timballone (Great Kettledrum)
7. Full Organ
8. Mozzoforte on Great
9. Reeds added to Great
10. Forte on Swell
11. Ripieno (mixtures) to Great
12. Forte Generale (full organ with all couplers)

It will be noticed that in this and the Palermo organ the couplers, etc., can only be put in action by the feet, a most inconvenient arrangement for northern organists, but one causing no difficulty to the Italians, who make little use of the pedal organ. The bellows of this organ are blown by means of a large wheel, which turns three cranks attached to three feeders; an excellent arrangement, which gives a perfectly steady supply of wind under all circumstances.

Winchfield, Hampshire, 1902.

The parish church of this village is so small that a difficulty was met with in finding a suitable position for the organ. The instrument was therefore bracketed on the west wall, the action (tubular pneumatic) being carried through the wall of the tower and back into the church, where it connects with the keyboards in a console on the floor of the nave. The bellows are placed in the tower. The organ, which was built by Messrs. W. Hill & Son in 1902, contains the following stops:—

Great.

1. Open diapason	8 feet	|	3. Lieblich gedact	8 feet
2. Dulciana	8 ,,	|	4. Principal	4 ,,

Story of the Organ

Swell.

Rohr Flute	8 feet	|	Voix céleste	8 feet
String Gamba	8 „	|	Lieblich Flute	4 „

Pedal.

Bourdon 16 feet

Accessories.

Couplers: Swell to great, great to pedal, pedal pipes to great.

The compass of the two manuals is C to G, 56 notes, and of the pedal C to F, 30 notes.

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