Fall 1968

Organ Pipes

Donna June Pike
Ouachita Baptist University

ORGAN PIPES

Honors Special Studies
Miss Evelyn Bowden

Donna June Pike

Ouachita Baptist University
Arkadelphia, Arkansas
Fall, 1968

TABLE OF CONTENTS

ORGAN PIPES

CHAPTER I - HISTORY OF ORGAN PIPES

Pipes actually came into existance at the creation of the earth. We do not know how much time elapsed before man became observant and discovered that when the wind blew over the end of a bullrush or a bamboo joint it made a sound. Man tried blowing like the wind and discovered he could blow this small natural pipe better than the wind. From there it was only a matter of time before man became ingenious and discovered that tubes of different lengths gave different sounds. Two kinds of flutes developed: the traverse flute held sideways, the player directs the wind into the hole, and the end-blown flute or recorder, which has a mouthpiece to direct the air across the lip of the pipe. After learning to play one flute man discovered he could put a recorder in each side of his mouth and play a duet, that is if his left hand was as flexible as his right one.

The "simple and rude ancestors of the organ were made before the dawn of recorded history."[1] The flute is pictured on the walls of early Egyptian tombs, specimens of flutes, still in playable condition, have been found by archeologists and can be seen in museums. The Syrinx or Pipes of Pan figure in mythology and are often considered to be the original source of the organ. The Bible mentions the word <u>ugab</u> several times and this probably referred to a large Syrinx but no one is sure of this. (See figure 1). The Cheng or Sheng has been used in China for more than five thousand years and it shows some of the features of a primitive organ. (See figure 2). The Cheng is formed of hollow reeds that are arranged

---

[1]William Leslie Sumner, <u>The Organ</u> (New York: Philosophical Library, Inc., 1953), p. 15. All the information in this chapter has been taken from the first fifty pages of this book, unless it is otherwise footnoted.

on a wind-chest in the form of a bowl. Air is blown into this by means of a mouthpiece. The pipes will only sound when a hole at the base is stopped with a finger.

About 263 B.C. a Greek barber by the name of Ctesibius discovered that a counterweight that held mirrors in various positions produced a rush of wind when the weight moved up and down in its tubular housing. This motion produced a musical sound by the force with which it drove the air out of the tube. By experimenting he invented the Hydraulus. (See figure 3). The Hydraulus was a crude organ whose wind supply was kept steady by piston-pumped air that was captured in what looks like an inverted vase or pot, the hole in the small end distributed the wind to the wind-chest and the wide lower end was submerged in water. The water level changed as the pipes were played and the wind supply was reduced. Archimedes is said to have helped perfect the Hydraulus. We do know that it was very much improved between the time of Ctesibius and his pupil Hero or Heron, who was an engineer. Hero wrote a work called "De Pneumaticis" in which he describes an instrument with a keyboard and springs for returning the sliders which open the wind holes. He also described many mechanical applications of steam, water and air. This Hydraulus appears to have been the predecessor of our organ.

The Hydraulus became very popular and for centuries was a source of admiration and astonishment to the unlearned. This relatively new instrument was used for contests, public games, feasts, and even in homes of the wealthy. In the British Museum there are ancient Roman coins of the time of Nero that depict the Hydraulus quite clearly. The Emperor Nero was very much attracted to the Hydraulus and was a very good performer on it. Recently a piece of pottery was found at Carthage and it represents a performer seated between two cylinders.[2] Also the oldest known pipes have been dug up around the ruins of Carthage and they date from sometime before the birth of Christ.

---

[2] William Harrison Barnes, The Contemporary American Organ (New York: J. Fischer and Bro., 1956), p. 11.

At about 100 A.D. the Hydraulus was made up of three octaves. The pipes were tuned to the ancient Greek modes. Immense difficulties have had to be overcome to finally supply wind to the pipes at an even pressure. Organs began being built with regular bellows and these were called "Pneumatic Organs" to distinguish them from the Hydraulus. Water was no longer used to steady the wind pressure in the Pneumatic organs.

Sir John Stainer says,

> The large pipes of every key of the old organ stood in the front. The whole instrument sounded and shrieked in a harsh, loud manner. The keyboard had eleven to thirteen keys in a diatonic succession without semitones. It was impossible to get anything except a choral melody for one voice on such an organ. The width of a single key amounted to three inches and even as much as five to six inches. The valves to the keys and the whole mechanism being clumsy, playing with the fingers was not to be thought of, but the organist was obliged to strike with the clenched fist and the organist was often called an "organ beater".[3]

After the decay of the great Roman Empire the arts and sciences were kept alive and developed in Arabia. The Greek and Roman works were lost but the translations made into Arabic have survived. The Muristus treatise, traslated by H. G. Farmer, describes an organ which seems to have been fully automatic.[4]

Cassiodorus, who was consul of Rome under King Vitigas the Goth in 541, describes the organ of the time as an instrument composed of divers pipes formed into a kind of tower which by means of bellows is made to produce a loud sound. In spite of Christian and Judaic opposition, the organ was popular until the fifth or sixth century. Ultimately the Christian religion had the arts and sciences put aside and fatally music was left alone for several centuries. Through the ninth century all music had been in unison or octaves but about the tenth century contrapuntal music began its rise. This experimentation in combining voices finally led to the great eras of polyphonic and harmonic writing.

---

[3] Ibid., p. 11.

[4] Sumner, op. cit., p. 22.

A large organ was built in the Winchester Cathedral, England, in the tenth century which caused widespread attention and adverse comment from the medieval writers. In the twelfth century the organ was used in the mass with public approval and by the thirteenth century Johannes Aegidius says that the organ had diplaced all other instruments in the music of the mass. The Positiv organ was developed also in the thirteenth century. By then, organ builders knew how to make a wind-chest with as many as thirty two to thirty six notes of 4ft. pitch and with five to six pipes for each note.

In the fourteenth century a second set of keys was added to the large organs. And the organ grew to a considerable size in the fifteenth century. Gradually the size of the keys reduced and semitones were added. Before the year 1500 the keys had reached approximately their present normal size. Also the invention of the pedal keyboard came along about this time. It is credited to the German Bernhard, a skillful musician of Venice.

During the Renaissance and Baroque periods there does not appear to have been any great improvement made in organ building, except for a gradual improvement in pipe work. In 1710 an attempt was made at stop control in the Salisbury Cathedral but this was not very successful. Organ builders did multiply the manuals and stop handles until they had four sets of keys or manuals, fifty stops and eleven echoes. Also many big organs were built early in the eighteenth century in France, Germany and England.

The organ was from very early time used in connection with church music, although it met with opposition from every religion at one time of another and was considered "scandalous and profane".[5] In spite of this the use of the organ became general in great churches, monasteries and convents. Some of the greatest early organ builders were ecclesiastics who had a mechanical turn of mind. Only in the fifteenth century did organ building become a profession. And until early in the nineteenth century each of the more important countries in Europe had its own distinct school of organ building.

---

[5] Barnes, <u>op. cit.</u>, p. 13.

The building of large organs, until the invention of the pneumatic lever, had many problems. The keys, for one, became more and more resistant and this put a practical limit on the size of the organ. The only measures then known to combat this problem were: to retain a moderate wind pressure, but make the wind-chest pallets small, only capable of supplying a few stops at one time (this allowed every stop to be used individually but it made it impossible to play "full" organ); and to reduce the wind pressure somewhat, spoiling the effectiveness of the reed stops and the upper partials of the flue work.

Some of the inventions that greatly improved the organ were: Jordan's Swell, making the organ capable of expression, the invention by Flight of inverted irbs in the bellows reservoir, making much steadier the wind pressure, and Barker's pneumatic lever which permits organs to be built of any size and still be capable of being played "full" organ. The two greatest organ builders of the nineteenth century in England and France were "Father" Willis and Aristide Cavaille-Coll, respectively.

Presently there are three classes of pipes. The two main ones are Flue pipes and Reed pipes and these will be discussed in detail in the next two chapters. The third kind is of little importance, as compared with the other two, and not very well known, but I feel I must mention it. It is the Diaphone. There are two forms of Diaphone pipes. One is typical of the large-scaled Diaphonic Bass. The other represents the smaller Diaphonic Bass and has not been too successful. These were probably invented by Robert Hope-Jones and they are of great value especially in the bass register.[6]

It appears evident that the organ is in truth one of the most ancient musical instruments and that is has had continuous evolution bringing it to its present state of high musical effectiveness. Although it is ancient there have been as many improvements made in the organ both tonally and mechanically in the past fifty years as in the many, many centuries before now.

---

[6] Ibid., pp. 13-14.

CHAPTER II - FLUE PIPES

Flue pipes are by far the most important pipes of the organ. They make up more than three fourths of the tonal equipment of an average organ.[7] There are definitely three general classes or classifications of the Flue type.[8] They are: Diapasons, Flutes, Open Flutes and Gedeckts or Stopped Flutes, and Strings. Some builders believe there is a fourth class known as Echoes, or miniatures of the first three groups. Really it seems like a logical way to classify the softer organ tones.

The tone quality does not depend on the materials used in pipes but on the shapes of pipes. The shape of the pipe filters out certain groups of harmonics or permits all of them to develop. A stopped pipe filters out the even harmonics and leaves only the odd series c, g, e, b-flat, etc. Pipes may be round or rectangular, long or short, broad or narrow, according to circumstances. Today pipes are made of tin, lead, mixture of the two with antimony metal, zinc, and wood of various kinds. In the past other materials have been used, such as iron, copper, glass, brass, silver, paper, and even sized fabrics. Johann Julius Seidel says that even gold, alabaster and clay were used for this purpose. Dom François Bédos de Celles says that Flue pipes have even been made of ivory.[9]

For many centuries now tin-lead alloys and wood have been the chief materials for pipes less than 4ft. long. Hard rolled zinc has fast become a favorite by manufacturers today for large open Flue pipes and string-toned basses, larger than 4ft. Pure tin ranks first in the construction of organ pipes. It produces a keen string-toned stop. For duller toned pipes a very large percentage of lead is introduced. Ordinary pipe metal, such as is used for Diapasons, contains about twenty percent tin and eighty percent lead with

---

[7] E. Harold Geer, Organ Registration in Theory and Practice (Glen Rock, New Jersey: J. Fischer and Bro., 1957), p. 34.

[8] Barnes, op. cit., p. 43. Unless otherwise footnoted all the information contained in this chapter has been taken from the first sixty pages of this book.

[9] Sumner, op. cit., p. 256.

possibly some antimony from time to time to stiffen the pipe. Twenty percent of tin is the minimum possible to use in the making of pipes.

Flue pipes are made up of three parts—the body, the foot and the languid. The larger pipes have two other parts in addition to these that are soldered on separately—the upper and lower lips. (See figure 4).

The body is that part that begins at the mouth and extends to the top of the pipe. It is formed by rolling a sheet of metal of the required size around a smooth cylindrical column called a mandrel. The edges are united with solder and the joint which is called a seam occurs on the back of the pipe. On the opposite side of the seam, near the lower end, is a flattened portion which is called the upper lip.

The foot is that part of the pipe in the shape of an inverted cone which extends from the mouth downward. It has a seam down the back and an indentation in the front. The upper part of the foot is flattened, corresponding with that of the body, and forms the lower lip. The foot serves as a wind conductor from the wind-chest to the mouth of the pipe. It also supports the body and usually is made of zinc.

The languid is that part of the pipe that lies horizontally on the top of the foot just inside the mouth, and is in the shape of a flat metal plate. (See figure 5). It is made of much thicker material than any other part of the pipe so it will not sag for it is entirely unsupported except at the sides and the back.

The mouth is that part of the pipe that is found at the joint of the body with the foot of the pipe and is a hollow cut or opening.

The wood pipes have a more limited tone range than the metal pipes. The characteristic tone of nearly all wood pipes is some type of Flute tone. Wood pipes are made from almost any wood but the preferred types are maple, mahogany and oak. The most commom ones, however, are of spruce or white pine. No matter which type is used for pipe building the wood should be "well seasoned and dry, and free from knots, sap and shakes."[10]

---

[10] Barnes, op. cit., p. 40.

Some of the differences between metal pipe building and wood pipe building are: in wood you must first make the block which forms the equivalent of the languid in the metal pipe; there is an opening at the bottom of the block, a round hole, which is bored after the pipe is put together and the foot is inserted in this opening; caps are also found in wood pipes and these are pieces of wood which cover the gaps in the front of the blocks, and these caps are usually made of mahogany or other hard woods; also a windway is cut in the top of the cap before it is attached to the block.

It is of great importance to the tone of any pipe that the body be tight. One must be especially careful with wood pipes and see that the joints do not become loose or come open for if this happens the tone is usually ruined.

Flue pipe tuning is done at one point; by lengthening or shortening the pipe. Modern organ builders usually provide a sliding sleeve at the top of the pipe.[11] Stopped wood pipes are tuned by what is called a sliding stopper and stopped metal pipes are tuned by a sliding cap. Open pipes may be tuned by sliding tuning collars, or sleeves, or by peeling a narrow strip of metal down from the top to raise the pitch.

The Diapason tone has prominence over the other two general classes historically and it also is an essential factor in the tonal design of the organ. You might even call it the foundation tone of the organ as some builders do. The tone of the Diapason is perhaps more affected by good or bad acoustical conditions than any other type of tone in the organ. If acoustical conditions are good the tone can be considered beautiful but if they are bad the tone might be considered "hard, tubby and generally unsatisfactory."[12]

Hope-Jones discovered that pipes could be voiced on ten, twenty or even thirty inch wind without either hardening the tone or producing windiness by thickening and lengthening the [illegible]

---

[11] Willi Apel, Harvard Dictionary of Music (Cambridge, Massachussetts: Harvard University Press, 1964).

[12] Barnes, op. cit., p. 43.

upper lips and narrowing the mouth and increasing the height and thickness of the body of the pipe. Thus, he introduced the Phonon type Diapason and this is considered to be one of the most important discoveries in modern organ tone. However this discovery has its problems. First the two upper partials are not sufficiently developed and second it is difficult and most often impossible to build up a complete Flue chorus on the Phonon type of Diapason. There is now another even more modern type of Diapason, which evolved from the overly harmonic development of the Schulze Diapason, and has slightly less harmonic development than the Schulze Diapason.

The unison Diapason must have a rich harmonic development in its tone. The best expression of the tone quality desired is "singing tone".

A small scaled Diapason is frequently found in organs and it is developed from the upper partials without actually being a String stop. The principal ones are the Viola Diapason and Geigen Principal. (See figure 6).

The Salicional Diapason, Salicional or Viola is a very small scaled Diapason which also borders on the String tone. It creates a contrast with the other Diapasons and is considered delightful.

The Gemshorn is made of conical pipes with the diameter at the top varying between one-half and one-quarter of that at the mouth. It has an "edge" tone, which means it has the qualities of Diapason, String and Flute tone, and is often called a Hybrid.

The Pedal Diapasons are generally made of wood. Some have been made of zinc and if they are successful the tone is superior to that of wood pipes. The manual 16ft. Diapason is usually of metal.

The upper work consists of Octave, 15th and 22nd and the Mutation work. The combination of Octave and Mutation ranks is known as Mixtures. Mr. Hunt says:

> The Mutation tones enforce the high octave tones in the series. This is entirely due to the summational effect of the mutations, when combined with the lower octave ranks.[13]

---

[13] *Ibid.*, p. 69.

Mr. Harrison says:

> If mixtures are properly planned and voiced, they point up the unison tone in the more obscure parts of the compass and broaden the treble.[14]

The second general class of organ tone is that known as Flute and the tone is characterized by a deficiency of upper partial tones. This type of tone is obtained from stopped pipes and open wood pipes with square blocks, open metal pipes with very high mouths and from double length open or stopped pipes that are blown to sound their harmonics. The stopped pipes may be of wood or metal.

The main type of stopped wood pipes is known as Stopped Diapason. This later was modified into the Gedeckt by Schulze and it produces a bright and more interesting tone than the original Stopped Diapason.

The metal stopped Flute is a thick metal pipe fitted with a wooden stopper with a high mouth and upper lip pulled outwards that allows it to maintain the natural roundness of the body of the pipe. Some are: Sub Bass, Untersatz, Bourdon, Quintaton, Gedeckt, Doppelflöte, Stopped Diapason, Cor de Nuit, Nason Flute and Lieblichflöte.

The most important stopped Flute in the Pedal organ is the Bourdon which can be made on very large scales.

The timbre may be varied by the choice of material, whether wood or metal, the type of stopper or cap, and details of mouth treatment. A variety of the Hybrid Flute tones have been developed and among these are: the capped flutes with chimneys, which have an odd series of harmonics but the little open chimney provides certain even harmonics; capped harmonic flutes; cylindrical pipes with conical caps; and several others. Some of the better known pipes are: Rohrflöte, Rohrbordun, Rohrnazard, Zauberflöte, Koppelflöte and Spillflöte.

Metal open Flutes are made by cutting up the mouths of Diapasons until Flute tone is produced or all harmonic development is eliminated.

The Major Flute is simply a large scaled Clarabella and is frequently an extension of the Pedal Diapason. The Harmonic Flute usually is made with double length pipes, overblown to speak their

---

[14] *Ibid.*

octave from about middle C upwards. Its tone best resembles the Orchestral Flute.

The open Flutes are: the wood Clarabella, Hohlflöte, Waldflöte, Melodia and the wood harmonic Concert Flute, Orchestral Flute or Flauto Traversa. The metal Flutes are: Nachthorn and Flute Ouverte, the tapered Spitzflöte or Flute Conique, and Blockflöte as well as the double length Harmonic Flute and the Harmonic Spitzflöte.

The String tone is obtained from pipes that are especially scaled and voiced to give chief prominence to the upper partials, often at the expense of foundation tone. It is a complete contrast from Flute tone. Sometimes the Diapason is considered to be between the two. String toned pipes are usually of metal but may be of wood also. Bridges or rollers are applied to the mouths of the pipes to produce a viol type tone. And String pipes are nearly always slotted.

The common String tones or closely related ones are: Violone, Contra Gamba and Contra Viola, Gross Gamba, Violoncello, Viola Pomposa, Viole de Bambe, Viole d'Orchestre and Salicional. Also the border line Fugara, and more definitely Violina and Salicet. There is an additional rank known as the Céleste. This rank introduces the Gamba Céleste, Voix Céleste, Unda Maris, Flute Céleste and Gemshorn Céleste.

Some builders, as I have already pointed out, believe in a fourth class of Flue pipes as suggested by Mr. Hunt in his work "Church Organ". I will mention a few of the main ones to satisfy those who also believe in this theory. In the Diapason group we find the Echo Diapason or Principal tones found in the Dulciana, Dolce, Dolcan and Dulcet. In the Flute group are the Flauto Amabile, Flûte d'Amour and Flauto Dolce. In the String group are the Echo Viole, Echo Gamba, Aeoline, Viole Sourdine or Muted Viole and several others of less importance.

CHAPTER III - REED PIPES

The Reed tone can be the most interesting and characteristic tone of any tone in the organ. It gives character, variety and distinction to the over all sound. There are two classes of Reed pipes. One is known as the Classic and the other as the Romantic.[15] On the manual one can find 16ft., 8ft., 4ft., and 2ft. though most of the time names are given to these. On the pedal may be found 32ft., 16ft., 8ft., 4ft., and 2ft. but they are rarely used since most of the time a foundation tone is the desired in the pedals.

Reed pipes may be tuned at two points. First by lengthening or shortening the resonator at its upper end, and second by means of a tuning wire which can be adjusted to control the free vibrating length of the tone.[16] The following are the vibrations per second of all the Cs of the organ:[17]

CCCC	32'	-	16 cycles
CCC	16'	-	32 cycles
CC	8'	-	64 cycles
TC	4'	-	128 cycles
c1 (Middle)	2'	-	256 cycles
c2	1'	-	512 cycles
c3	1/2'	-	1024 cycles
c4	1/4'	-	2048 cycles top note of 8' open stop
c5	1/8'	-	4096 cycles top note of 4' open stop
c6	1/16'	-	8192 cycles top note of 2' open stop
c7	1/32'	-	16384 cycles top note of 1' open stop

The Classic Reeds comprise all the chorus reeds and many organ builders believe that this Reed chorus is a new trend in organs today. The Classic Reed should take precedence over the Romantic since the chorus builder is the more important. There are two classes of Classic Reeds, the normal and the abnormal. (See figure 7).

---

[15] Noel A. Bonavia-Hunt, H. W. Homer, The Organ Reed (New York: J. Fischer and Bro.), p. 1. Unless otherwise footnoted, the information in this chapter has been taken from this book.

[16] Apel, loc. cit.

[17] A personal letter from Charles W. McManis.

The normal Classic Reeds comprise: Trumpet, Posaune, Tuba, Fagotto, Trompette, Cornopean, Tromba, Echo Trumpet. This type helps to build up the tonal scheme in the following ways: the Trumpet has a harmonic development that prevents too much acidity, or fiery tone, and too much dullness; the Posaune has a larger and broader tone than the Trumpet and helps bridge the gap between the normal Trumpet and the Tuba; the Tuba is the most powerful of the Reeds and according to its treatment it may be a very large Trumpet but not a horn; the Trompette is a very free-toned Trumpet; the Cornopean is a close-toned Trumpet and is different from the Tromba by having its tubes capped at the top with slots cut out just below the cap; and the Fagotto has a moderately loud tone and is often capped at the top of its tube.

The abnormal comprises: Rohrschalmei, Appelregal, Barpfeife, Krummhorn, Rankett, Dulzian, Flügelhorn, Waldhorn, and Euphone. This type is largely used in the performance of Baroque music. The characteristics of these Reeds are: restricted power output, low pressure voicing, lesser fundamental harmonics, and need to be carefully placed to produce the appropriate tone. Their use is confined to the programmes of polyphonic compositions.

The Swell is fundamentally a Reed organ and should always have priority in the placement of Reed tones. The opening of the Swell shuters should produce a thrilling change of tonal effect by setting free the semi-imprisoned harmonics of the normal Classic Reeds, especially the Trumpets and Trompettes.

The Romantic Reeds are Oboe, Bassoon, Clarinet, Musette, Kinura, French Horn, Cor Anglais and Voix Humana. The Romantic type is chiefly intended for the modern Romantic school of composition, with its solo passages and special tone effects. The Reed pipes are supposed to imitate their orchestral prototypes, though their makers are not always true copyists. They all can be supplied in 16ft. and 8ft.. Some can be found in 4ft. and 2ft. pitches but they are rare. Only the Oboe and Clarinet are true duplicates. (See figure 8).

There are two kinds of Oboe stops. One is designed for the Swell organ and has a small horn sound, the other is for the Solo organ and is the imitative type. The modern bass of the Oboe is the Bassoon and it has no bells fitted to the top of the pipe. The Musette is rather useless since it is thin in scale and in tone. The Kinura is also thin in scale and in tone. The Cor Anglais possesses a unique quality and is most attractive as a solo voice. The French Horn is voiced with extra large shallots to curb the overtones and emphasize the fundamentals.

A Reed pipe is made up of the following parts: shallot, tongue or vibrator, weight or load on the tongue, wedge, tuning spring or wire, block, block hole, boot, socket, tube or resonator, headpiece, slot and tuning tongue. (See figure 9).

The shallot is a small tubular resonator of brass, open at one end and closed at the other, with an orifice or mouth cut out from its side. Usually this orifice is triangular. It is covered by the vibrating tongue and is varied in size according to the type of tone produced. The larger the orifice is the greater the harmonics and louder the tone becomes. The different varieties are: Trumpet, Clarinet, Orchestral Oboe, Trompette 1, Trompette 2, Tromba and Horn.

The tongue is a vibrating thin plate of suitable material that fits over the face of the shallot. It is usually made of brass but can be of other pliable material. The harder the material the more close-toned the chorus Reeds become. Soft brass is more suitable in the production of free-toned chorus Reeds.

The weight is only applied to the larger and longer tongues in order to control their vibration. It may be of brass or "lead-felted", felt between the tongue and the lead weight. (See figure 10).

The wedge is used for clamping the tongue to the shallot tip and block. It is usually of hard wood but some firms use brass.

The tuning spring is fitted on the surface of the tongue so it can be shifted along it to adjust the vibrating length. It is usually made of phosphor bronze and is threaded through a small hole in the block. This tuning spring has a right-angled crook at the upper end for the tuner to tap up or down with his reed-knife.

The block is the part which separates the shallot from the resonator. It is usually cylindrical and made of lead, although it can be made of hard wood.

The block-hole is bored through the center of the block. To the upper end is soldered the tube or resonator (in the larger pipes also it is soldered to the socket tip), and in the lower end is fitted the shallot, wedge and tongue. (See figure 11).

The socket is a short conical tube at the top of the block of a large Reed pipe and is soldered to the block. Inside this tube is fitted the larger and longer resonators of bass pipes.

The tube or resonator is the most showy part of a Reed pipe and biggest, except in the case of the very high pitched pipes and the Vox Humana pipes. It varies in shape according to the kind of Reed tone required and its length determines both tone and pitch. Its shape can be conical, which reinforces all the harmonic series, odd or even; or cylindrical, which favours the odd series only. There are a few things we need to consider about the length of the tube. First, the wider the scale desired is the longer the tube must be to give the right note at the required pitch and vice versa. Second, the tube is of full length when it is reinforcing the fundamental note at the right wave length frequency. Third, the same pitch can be obtained from a tube measuring half, quarter or eighth of the full length, though it is at the expense of a change of quality, according to the length chosen. Fourth, the tube can be of double, triple or quadruple length and the Reed note can be tuned to speak the fundamental pitch with a definite increase of purity. This is sometimes called a harmonic pipe.

The headpiece is for the purpose of changing or modifying the sound or quality of tone of a Reed pipe. (See figure 12). The most used ones are: the bell which is used in the Oboe tube and it gives this pipe its characteristic tone; the double bell is used for the Cor Anglais pipe; the cowl converts a Trumpet pipe into a small Tuba; the sleeve converts a Trumpet pipe into a horn or horn-like tone; the hood or bonnet is merely a right angled turn given to the top end of the tube for the purpose of preventing dust from falling down the pipe and into the shallot, also it has a directional effect on the sound; the cap is a flat cover usually soldered to the top of the tube, with a slot hole cut immediately bellow to keep the tone open and its effect is to smooth out the higher harmonics.

The slot is introduced in a capped tube to enable it to remain open at the top and to the correct temperature degree. The open tube (uncapped) may be slotted for the purpose of regulating the length of the tube to suit the vibrating length of the tongue. It also serves the purpose of re-adjusting to temperatures along with the tongue and the tuning spring.

APPENDIX

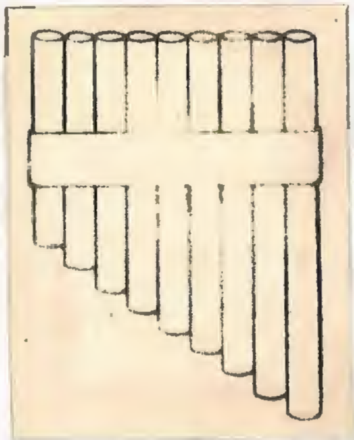


Figure 1
Pan Pipes or Syrinx

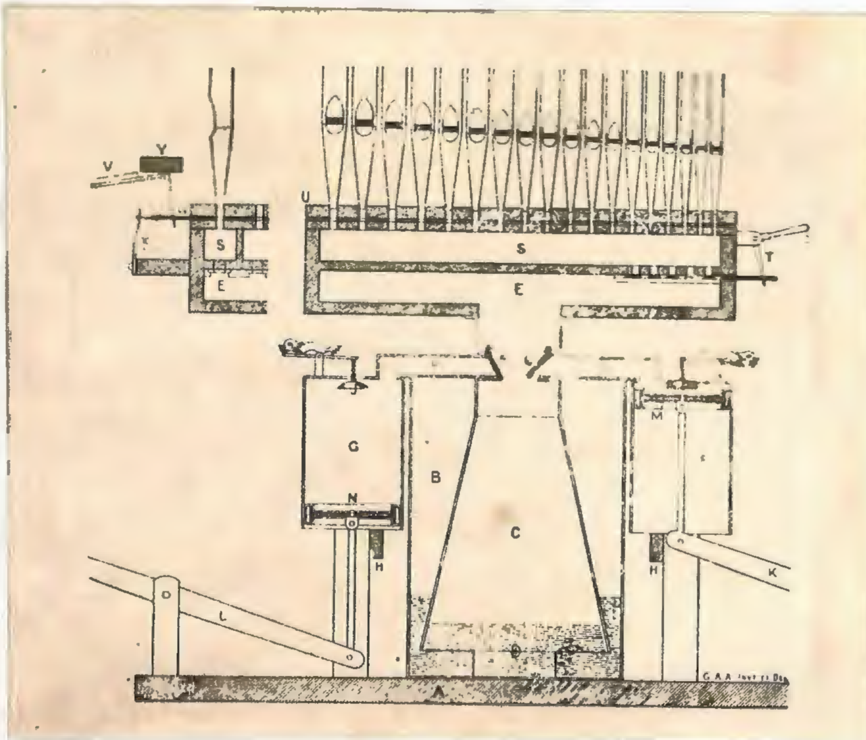


Figure 3
Hydraulus by Ctesibius

Figure 2
Cheng

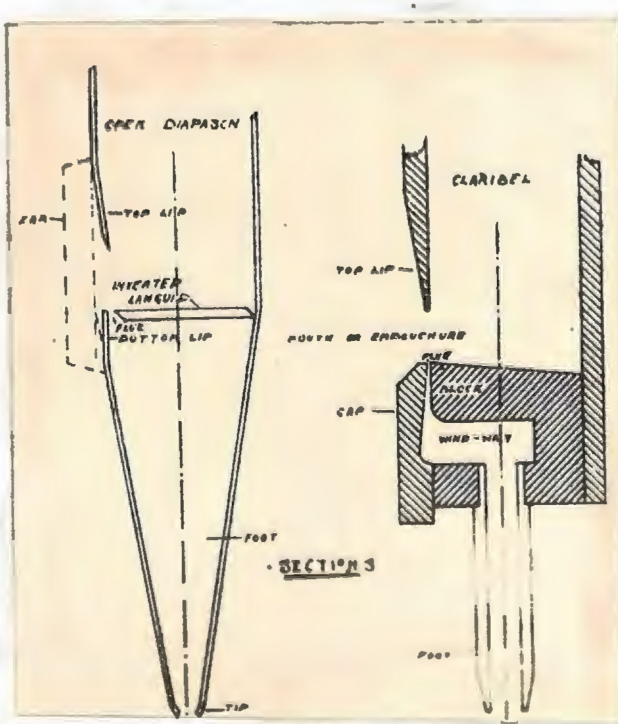


Figure 4
a. Metal pipe b. Wood pipe

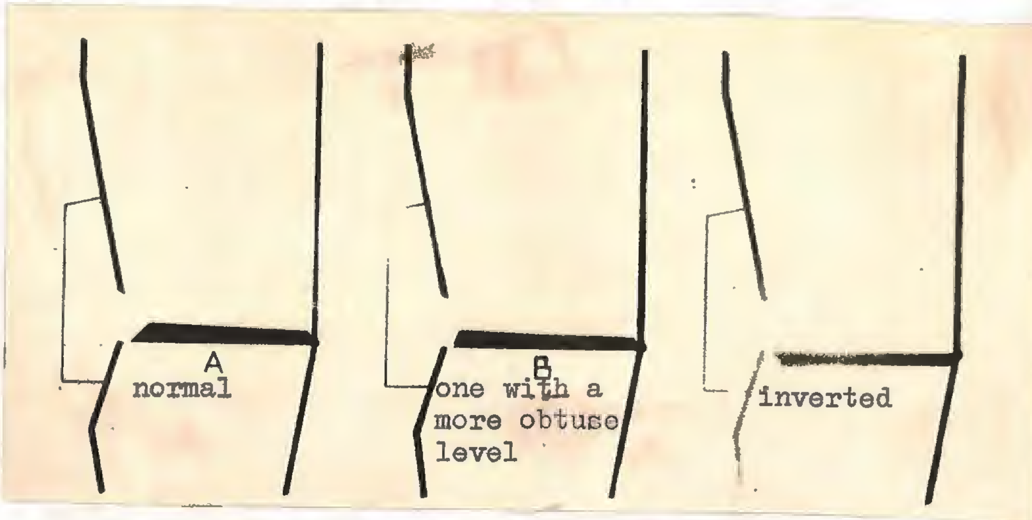
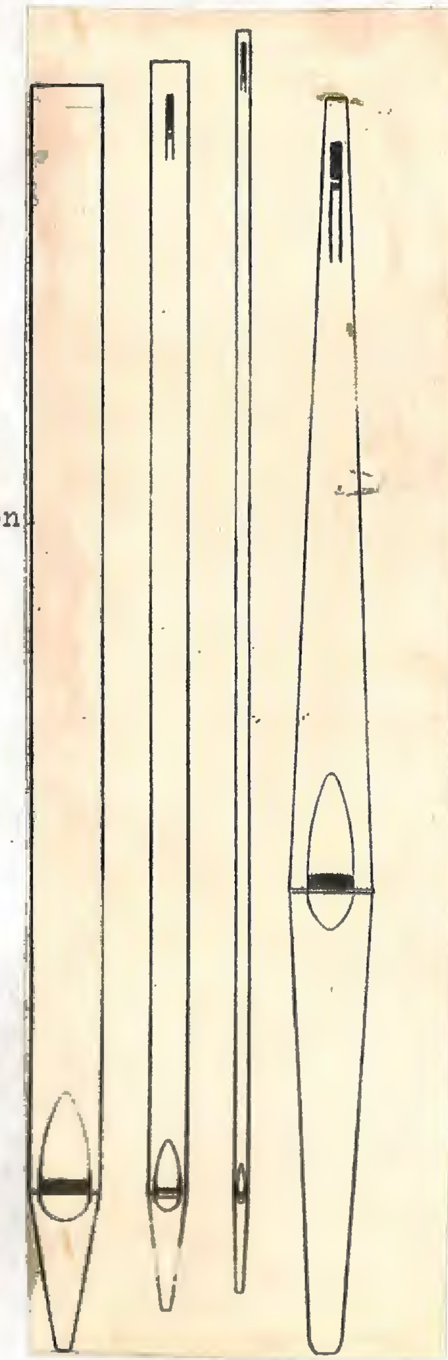


Figure 5
Languid

a. the parts of a Diapason or Flue pipes in general.



b. From left to right, the pipes are Diapason, Dulciana, Viole d'Orchestre and Spitzflote.

Figure 6

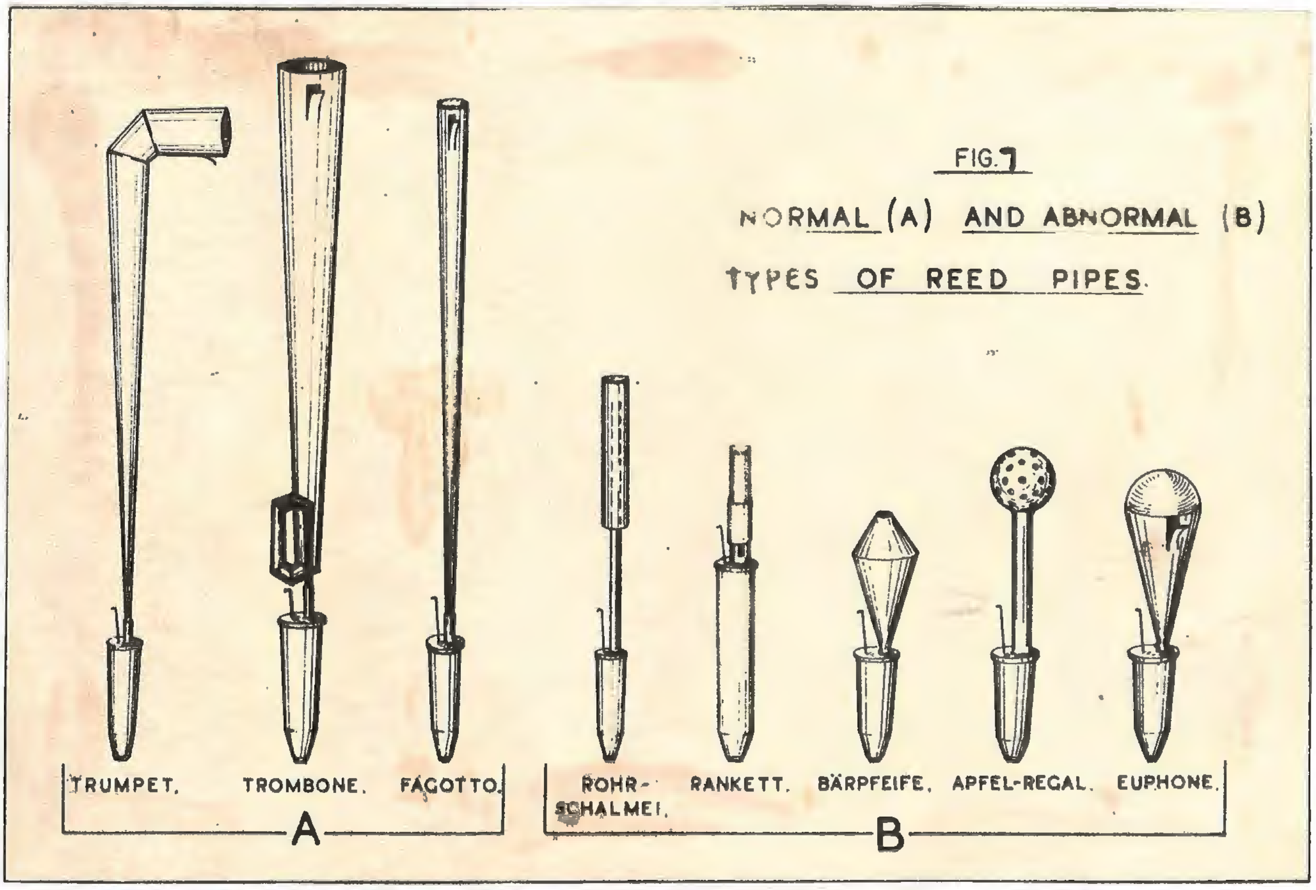
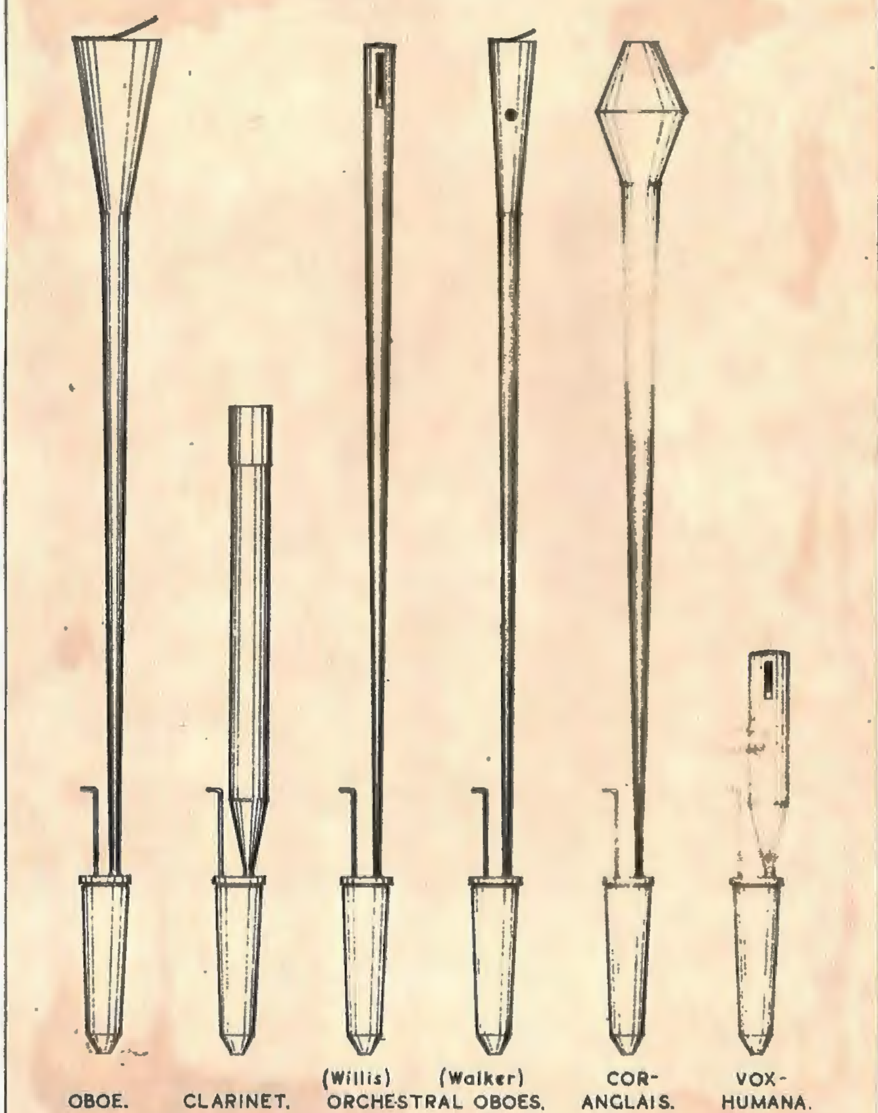


FIG. 7
NORMAL (A) AND ABNORMAL (B) TYPES OF REED PIPES.



ROMANTIC TYPES OF REED PIPES.

Figure 8

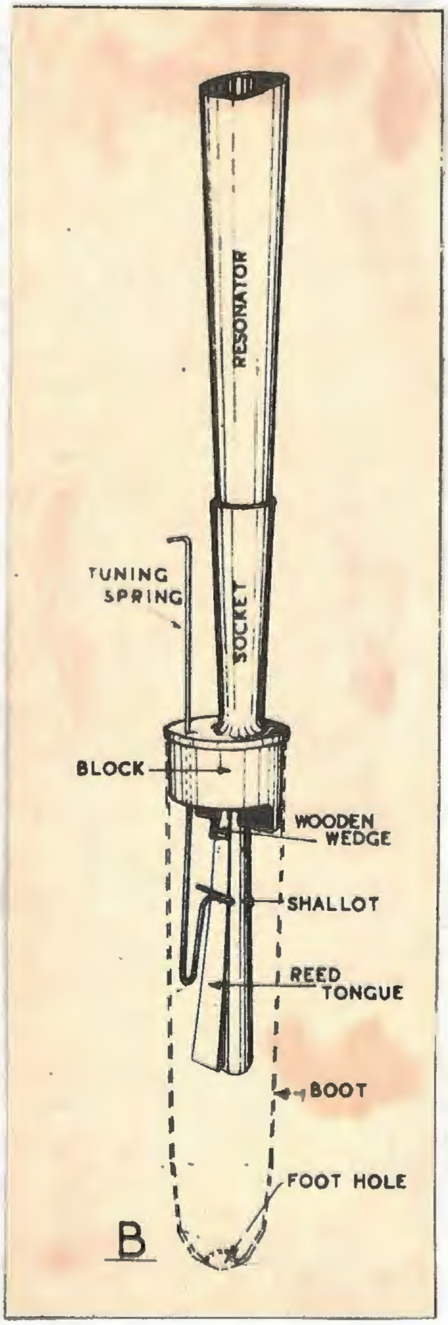
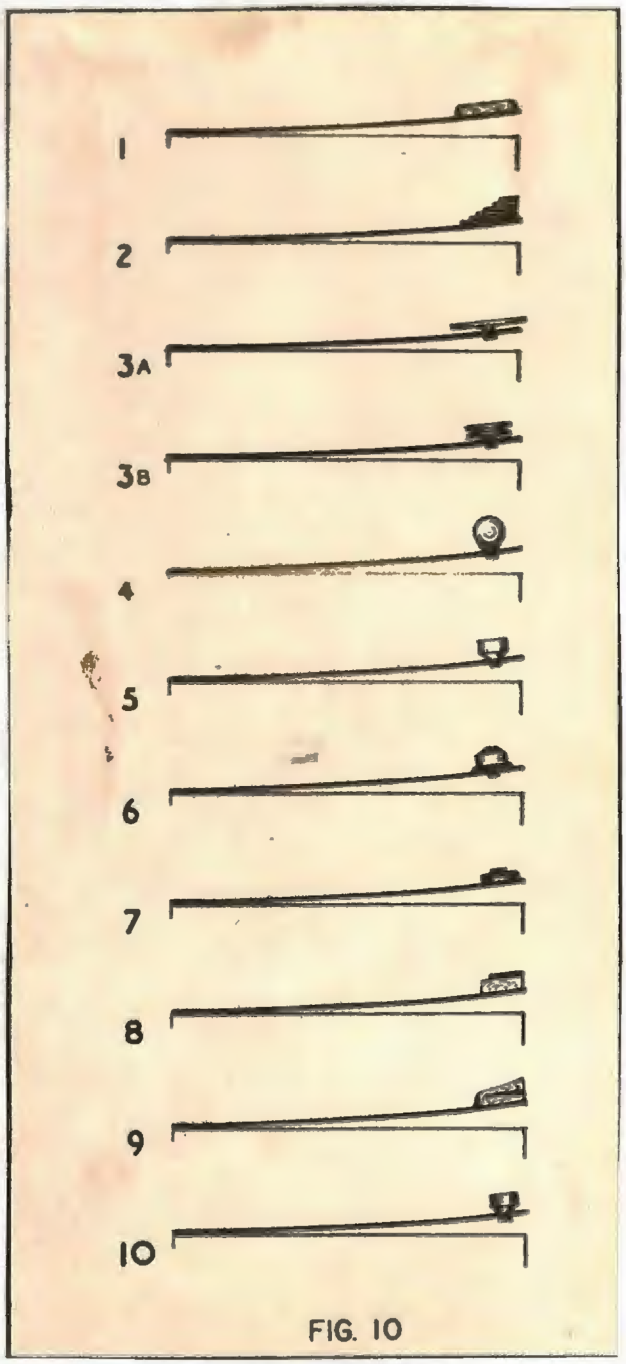
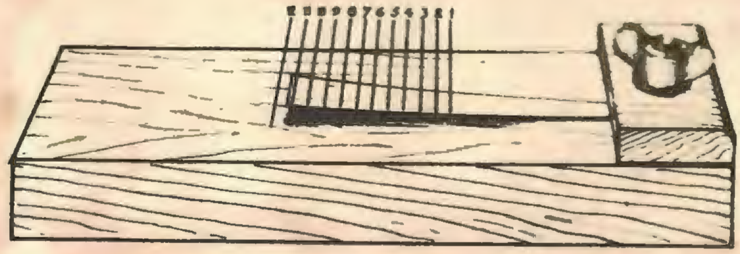


Figure 9
Parts of a Reed pipe

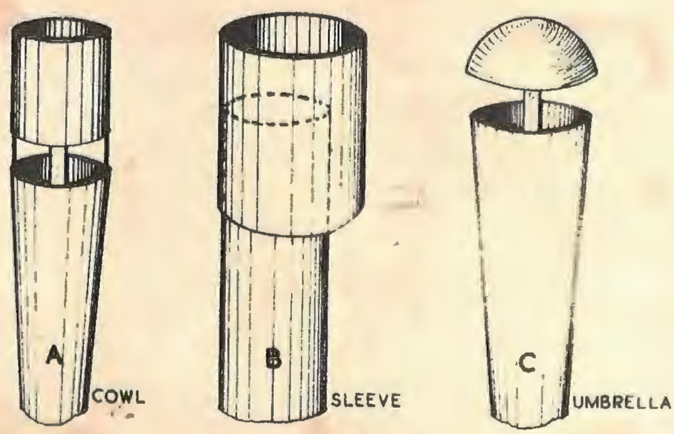


Weights



REED BURNISHING BLOCK AND TONGUE.

Figure 11



HEADPIECES

Figure 12

BIBLIOGRAPHY

Apel, Willi. Harvard Dictionary of Music. Cambridge, Massachussetts: Harvard University Press, 1964.

Audsley, George Ashdown. The Art of Organ Building. New York: Dover Publications, Inc., 1965.

_______. The Temple of Tone. New York: J. Fischer and Bro., 1925.

Barnes, William Harrison. The Contemporary American Organ. New York: J. Fischer and Bro., 1956.

Blanton, Joseph Edwin. The Organ in Church Design. Albany, Texas: Venture Press, 1957.

Bonavia, Noel A. and Hunt, H. W. Homer. The Organ Reed. New York: J. Fischer and Bro..

Fesperman, John. The Organ as Musical Medium. New York: Coleman-Ross Co., Inc., 1962.

Geer, E. Harold. Organ Registration in Theory and Practice. Glen Rock, New Jersey: J. Fischer and Bro., 1957.

Goode, Jack C. Pipe Organ Registration. New York: Abingdon Press, 1964.

Irwin, Stevens. A Dictionary of Pipe Organ Stops. New York: G. Schirmer, Inc., 1962.

Squire, Russell N. Church Music. St. Louis, Missouri: Bethany Press, 1962.

Sumner, William Leslie. The Organ. New York: Philosophical Library, Inc., 1953.

Whitworth, Reginald. Organ Stops and Their Use. London: Sir Isaac Pitman and Sons, Ltd., 1956.