THE ORGAN

Part One

Short Sketch of the History of the Organ

ANCIENT FLUTES

1. The history of the organ is nothing more than a narrative of the efforts made by men to bring under the control of one performer a large number of the instruments called flutes.

2. The particular sort of pipe or flute the use of which led eventually to the construction of an organ, was the *flûte à bec* or *beak-flute;* that is to say, a pipe with a mouthpiece which was placed against the lips for the purpose of receiving the breath of the player.

3. A penny whistle (tin or wood) is probably a very familiar instrument to our readers, and is a veritable specimen of a *flûte à bec.* The now almost obsolete *flageolet* is also of the same family.

How little difference there is between a penny whistle (Fig. 1) and an organ pipe (Fig. 2) can be seen by the accompanying illustrations:—

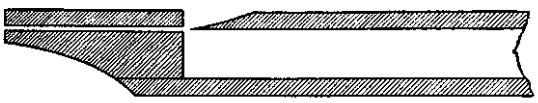


FIG. 1

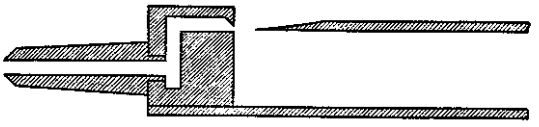


FIG. 2

When a flute was so constructed that it was blown at a hole in the side, like our modern orchestral instrument or ordinary flute, it was termed a *flauto traverso* or "flute held sideways" (Fig. 3).

It would, of course, not be possible for a performer to play more than one *flauto traverso* at a time; all the efforts of musicians were therefore concentrated on bringing several *flûtes à bec* under control.

4. It was very soon found that *two* such instruments could easily be played by one person. This seems to have been known to almost all ancient nations. Figure 4, below, is from an Egyptian monument, and Fig. 5 from an Assyrian monument.

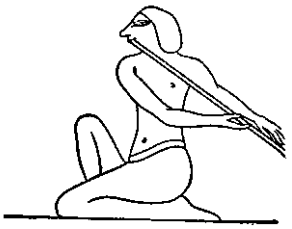


FIG. 3

FIG. 4

FIG. 5

FIG. 6

The old-fashioned *double flageolet* is a real ancient *double flute*, although the tubes are, for convenience sake, brought closer together than was the case in the older instruments. The pretty effect of the two-part harmony of the *double flute* urged men on towards the construction of an organ.

The Greek *Syrinx*, or *Pan's Pipe* (Fig. 6), was a mouth organ formed of a number of reed pipes of different lengths, stopped at one end and bound together. From this germ the modern Organ has grown.

"According to an author quoted by Athenæus, the first organist was Ctesibius of Alexandra, who lived about B.C. 200. He evidently took the idea of his Organ from the *Syrinx* or Pandean pipes, a musical instrument of the highest

antiquity among the Greeks. His object being to employ a row of pipes of great size, and capable of emitting the most powerful as well as the softest sounds, he contrived the means of adapting keys with levers, and with perforated sliders, to open and shut the mouths of the pipes, a supply of wind being obtained, without intermission, by bellows, in which the pressure of water performed the same part which is fulfilled in the modern Organ by a weight. On this account the instrument invented by Ctesibius was called the *Water-Organ*. Its pipes were partly of bronze and partly of reed. The number of its stops, and consequently of its rows of pipes, varied from one to eight, so that Tertullian describes it, with reason, as an exceedingly complicated instrument." (Yates, *Dictionary of Greek and Roman Antiquities*, 1848.)

FLUTES ON A BOX OF WIND

5. The next step in organ-building was to place several flutes on end over a *box of wind*, supplied not by human lungs, but by *bellows*. This is well illustrated by a figure copied from Father Kircher's *Musurgia*, written about the middle of the seventeenth century.

The pipes in the instrument (Fig. 7) were made to speak or be silent at the will of the player, by pulling backwards or forwards pieces of wood, the ends of which either closed up the foot of a pipe or allowed the wind to enter it.

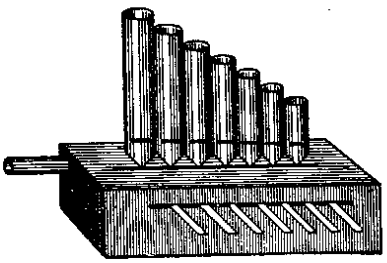


FIG. 7

6. As the number of pipes increased, the number of blowers necessarily became larger. The following illustration (Fig. 8) from an eleventh century manuscript, known as the "*Psalter of Eadwine*," exhibits this:—

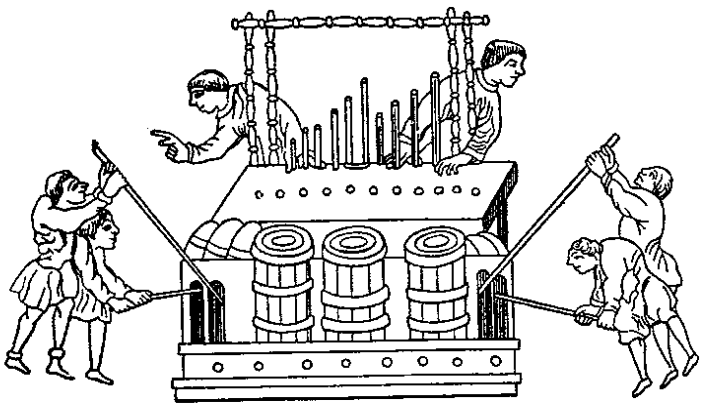


FIG. 8

Regarding this drawing Engel remarks:—

"The instrument has ten pipes, — or perhaps fourteen, as four of them appear to be double pipes. It requires four men exerting all their power to produce the necessary wind, and two men to play the instrument. Moreover, both players are depicted as busily engaged in directing the blowers about the proper supply of wind. Six men and only fourteen pipes! It must be admitted that since the eleventh century some progress has been made in the construction of the Organ."

7. Bellows in those times were of very primitive form, in fact not in any way superior to a common blacksmith's bellows as used to this day in the forge.

Men soon discovered that the weight of the body might with advantage relieve the muscles of the arm of the laborious duty of constant pumping. They constructed bellows of such form that men could stand on them. The following was found on the obelisk erected at Constantinople by Theodosius the Great (A.D. 346–395):—

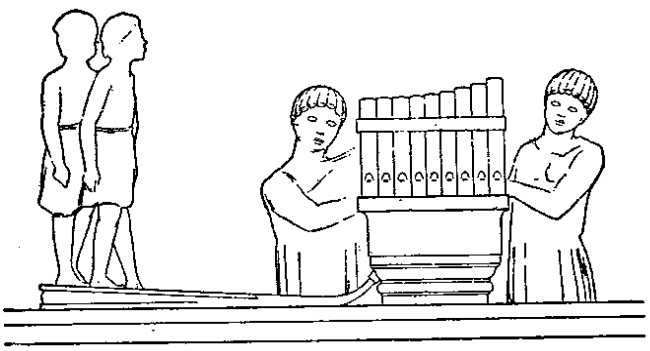


FIG. 9

FIG. 10

Bellows of the Halberstadt Organ (1361)

According to Prætorius, the Halberstadt Organ had twenty bellows, requiring ten blowers. Each blower manipulated two bellows, pressing down one while he raised the other. Figure 10 illustrates this, and shows the iron shoes by which the bellows-treaders raised the upper plates of the bellows.

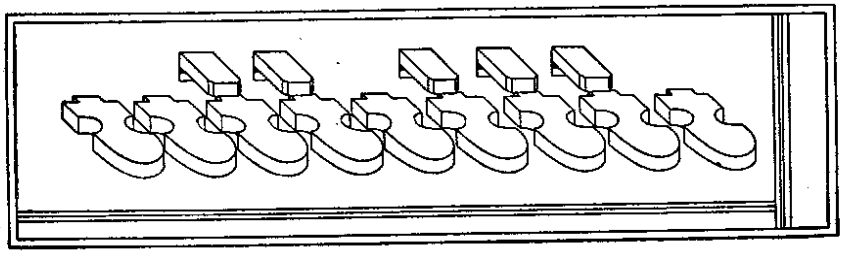
Hence, the blower was often called the "bellows-treader" (*Balgentreter*). This system of blowing has lasted up to the present time, and those who have any curiosity on this subject will still find in many continental churches, in some dark corner, a man busily engaged in mounting on first one and then another of several sets of feeders, and forcing the air into the bellows by his weight, as if he were undergoing punishment at a musical tread-mill.

REED AND FLUE PIPES

8. The flutes hitherto spoken of have been those in which the tone is produced by forcing air against a sharp edge of wood or metal called the *lip*, and by this means setting the column of air inside into vibration. But the word flute or pipe anciently included a pipe of very different construction, namely, a *reed pipe* — that is, a pipe in which a tongue of metal or wood is so placed that, as air is blown into the tube, the tongue, partly barring its passage, beats backwards and forwards, and by its vibration sets the column of air inside the tube into synchronous vibration. The examination of an oboe or bassoon will make the action of a reed quite clear. Thus it has come to pass that to this day these two classes of *flutes* or pipes are found in organs; those corresponding to the common whistle family being called *flue* pipes, while those of the oboe type are called *reed* pipes.

KEYS FOR THE HANDS

9. The next step in organ making was the invention of the *clavier* or *keyboard*, about the close of the eleventh century. At first keys were of the most clumsy description (Fig. 11), so large and broad that nothing short of a blow from the clenched fist could act upon the leverage. Hence, in these early times the player was called an organ-beater (*pulsator organorum*). It is recorded that the interval of a fifth occupied about the same space as an octave in our modern instruments.



From Prætorius. The upper Clavier of the great Organ at Halberstadt, constructed by the priest Nicolaus Faber, in 1361, and renovated by Gregorius Kleng in 1495. These keys, apparently, were between 2½ and 3 inches in width, amply wide enough to be struck by the fist.

FIG. 11

10. Little by little the keys were improved in shape until they became much like our modern keys the only difference between them being that the old sets were much shorter (from back to front), and the sharp keys were *white* and the natural keys were *black*, the reverse of our modern colors.

KEYS FOR THE FEET

11. The invention of *pedals* or keys for the feet, early in the fifteenth century, was probably the most important step ever made in organ building. It is unnecessary to say here how grand and thrilling is the effect of the tone of those enormous pipes thus placed under the command of the performer, or how the independent use of the pedals gives the organist a source of harmony not possessed by any other instrument.

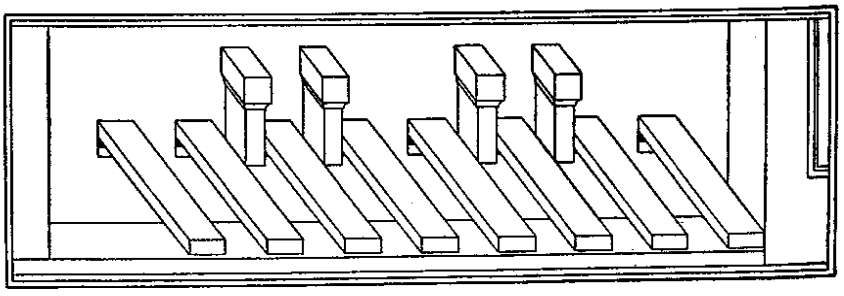


FIG. 12

Pedal Clavier of the Great Halberstadt Organ, as known to Prætorius

"I believe the deep third keyboard pipes were originally used for drones, and to keep such notes continually sounding was how pedals first came into use. We call a drone now a *pedal point.*" — A. J. HIPKINS.

Pedal keys seem to have been very quickly brought to a considerable degree of perfection in Germany, where their compass soon reached or even exceeded two octaves. But in England the introduction of pedal boards of full compass was extremely tardy; indeed, it may be said not to have commenced until fifty years ago.

The invention of the *Pedal* is ascribed to Bernhard, a German, who, as organist to the Doge of Venice, added pedals to the organ of St. Mark's, in 1470. There can be little doubt that pedals were known long before this, and some authorities attribute their invention to Ludwig van Vaelbeke of Brabant, who died in 1312. Pedals were not introduced into England until near the close of the eighteenth century. The first organ known with certainty to have them was that of St. James's, Clerkenwell, built in 1790 by G. P. England. These pedals had a compass of one octave.

SLIDERS

12. When only one row of pipes was placed over the box of wind the mechanism of an organ was simple enough, because each key pulled down a sort of pallet or piece of wood covered with leather placed under the foot of each pipe. As long as the key was held *down* the air rushed through the hole into the pipe and made it speak, but as soon as the key was allowed to return to its position the pallet returned by means of a spring to *its* place below the pipe and shut off the supply of wind.

But it was discovered that if a thin slip of wood be placed (running from *right* to *left*) under the row of pipes, having perforations corresponding to the holes in which the pipes stand, the *whole row* of pipes could be made silent by shifting this sliding piece of wood either to the right or left so far that the perforations no longer corresponded with the holes in which the pipes stood. Even when the keys are pressed down, no sound will be produced until this sliding-slip, or slider, is moved into such a position that its perforations are exactly under the feet of the pipes.

13. These sliders are now acted upon by levers called *stops*, and it is by their means that several rows of pipes of different qualities of tone, and also of pitch, can be placed over the same box of wind and yet be selected at will by the performer.

TWO OR MORE ROWS OF KEYS

14. The admirable capabilities of the organ for supporting vocal music, and the solemn dignity of its character, have always led to its association with divine worship. But the broad and strong qualities of tone found useful for sustaining the voices of a large congregation were not found delicate enough for the accompaniment of a highly trained choir, either when singing individually or in a body. Hence the construction of an independent organ of soft and delicate tone called the *Choir* Organ, the keys of which were placed either immediately above or below the louder organ, to which last was given the name *Great* Organ. The keys of the Choir Organ are more often below those of the Great Organ than above, and the pipes of the former are often, especially in cathedrals, placed on brackets projecting over the screen behind the player's back. In such cases the mechanism connecting the keys with the pallets and pipes had to pass below the organist's feet, under the pedal keys, and it was therefore called in German a *Rückpositiv.*

FIG. 13
Early Positive, Showing Broad Keys Without Semitones

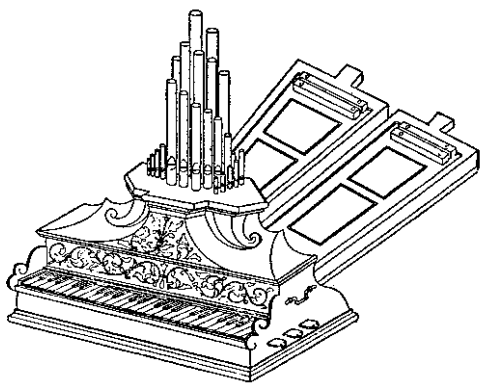


FIG. 14
XVI Century Positive of Three Stops

FIG. 15
Portative Organ

Two sorts of small organs had been in public and private use, namely, the *Portative* or "portable organ" (Fig. 15), so called because it could be carried about in processions, and the *Positive* or "organ in position," so named in contradistinction, under the impression that it was *not* portable (Figs. 13 and 14). But, as a matter of fact, these *positives* or "organs in position" were sufficiently portable to be moved from place to place with comparative ease (Fig. 14), although they were really larger than the *portatives*.

Organ builders found in these soft, sweet-toned *positives* an excellent model for the organ required for choir accompaniment. Hence, *Choir Organs* were not only built with the same sort of tone and of much the same dimensions as *positives*, but were actually called *positifs*, a name which they bear to this day in France and Germany.

15. The *Echo Organ* was a small organ, often of limited compass, the pipes of which were shut up in a box and placed at a distance from the rest of the instrument. *Echo Organs* are sometimes made now. In most instruments their place is taken by the *Swell*. The gradual alteration of an *Echo* into a *Swell* organ was, like many other vast improvements in organ building, due to English workers. Abraham Jordan, in the year 1712, made the front of an Echo-organ box to move up and down in grooves at the side like a window-sash. The mechanism for raising the front board or shutter was of a very unwieldy character, and the pedal which set it in motion offered great resistance to the foot. It also happened frequently that, on permitting the shutter to return to its place (by raising the pedal), this heavy panel of wood ran down with an unpleasantly loud bang. This old form was called a *nag's-head* swell. But this method of obtaining a *swelling organ*, as it was called, was in time superseded by a set of overlapping shutters known as the *Venetian* swell, so called because of its similarity to a common outdoor blind.

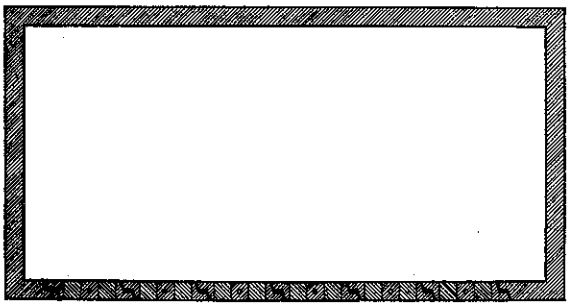


FIG. 16. CLOSED SWELL

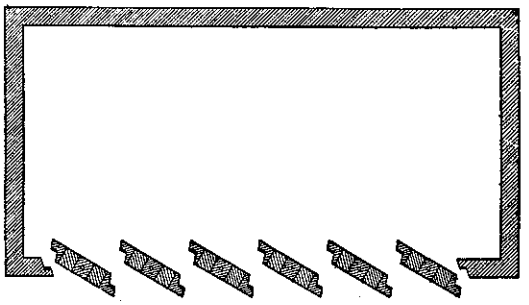


FIG. 17. PARTLY OPEN SWELL

It is quite impossible to arrange an account of all the improvements in organ-building in chronological order. Progress and inventions overlapped each other, and very often the results of successful experiments were not generally known and utilized till long after their first discovery.

HORIZONTAL BELLOWS

16. It is, however, quite certain that no great advance in the construction of the instrument was possible until the bellows were improved. This portion of the mechanism is of as vital importance to an organ as are lungs to a human being; as long, therefore, as no better means of supplying an organ with wind than the simple forge-bellows was known, progress was completely barred. The faults of such old bellows must be known to all. As the handle is pressed down and the bellows is made to fill, all the pressure which the top of the bellows exerted is negatived. If *one* such bellows supplied an organ, the player would be compelled to take his hands off the keys on each occasion on which it was being filled. If the reader cannot quite understand this account of defects of the old forge or "diagonal" bellows, he can easily make an experiment which will fully explain what has been said; let him take a common kitchen fire-bellows and insert the mouthpiece of a penny whistle into its orifice, and bind both round with leather so that the air passing from the bellows must enter the whistle, and then let him ask a friend to blow while he plays tunes. The defects of diagonal bellows will no longer be doubted.

Nor were these faults remedied by having a large number of such bellows and then supplying the organ only from those which were full; because, when a bellows of this kind is full, the weight of the top and sides is spread over the whole atmospheric contents, but as the air becomes exhausted this weight remains equal while the contents grow less; the *pressure* of the outgoing air is therefore increased.

Two improvements made towards the close of the last century, by Green, remedied all these shortcomings. The old diagonal bellows was made into a feeder, and had another bellows placed over it, so that the two together formed a *feeder* and sort of *reservoir*. A peep at the bellows of a modern organ will show that the pressure of wind, for obvious reasons, does not vary with the movement of the feeder. The modern bellows are termed *horizontal* to distinguish them from their forerunners; and notwithstanding the fact that no "diagonal" bellows have for a considerable period been made in this country, organ-builders still promise that they will supply their customers with "horizontal" bellows.

One other improvement only was needed to make bellows perfect. It was necessary to remedy the defect before alluded to, namely, the inequality of the pressure as the top fell. This was ingeniously done by making one fold of the bellows turn *outwards* while the other turned *inwards*. This arrangement of the folds can be clearly seen in Fig. 18.

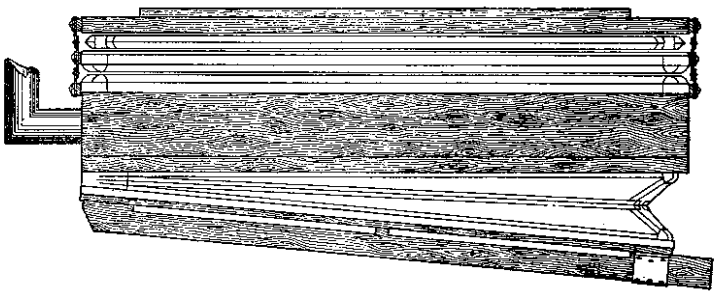


FIG. 18

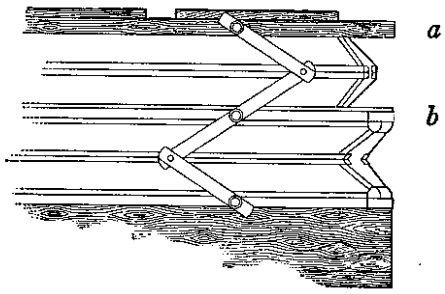


FIG. 19

17. The *regulators* (sometimes called "counterbalances") are pieces of soft steel attached to the upper, middle, and bottom boards of bellows for the purpose of making *a* and *b* (Fig. 19) open equally. Their use is a marked improvement in organ construction.

CONCUSSION BELLOWS

18. In old organs it was found that the simultaneous sounding of several of the large pipes on the manuals caused a "jumpy" and unsteady effect—a sure sign that the equality of pressure was disturbed, first by the sudden demand on the resources of the wind-chest, next by the rush of air to take the place of that already used. The accompanying ingenious invention of Bishop, the organ-builder, about fifty years ago, entirely removed this. He placed a small single bellows (*a b*) against the wind-trunk near the soundboard, the outer side of which was balanced by a spring (*c*). When a sudden demand is made upon the wind and the pressure is consequently reduced, this spring (*c*) by proportionately forcing in the side of the bellows (*d*) counteracts the defect. These little bellows are called *Concussion bellows*.

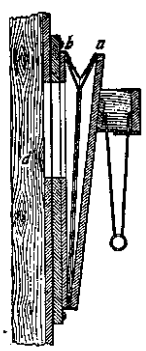


FIG. 20

COMPOSITION PEDALS AND COMBINATION PISTONS

19. The player had still to contend with the serious inconvenience of being compelled to make any alterations in the arrangement of the stops by drawing them in or out *with his hands*. A great boon was therefore conferred upon organists by the introduction of small iron pedals placed within easy reach of the feet, which by a system of leverage could draw out certain groups of stops. This method of changing stops has been vastly improved upon by Mr. Henry Willis, who, after many years of patient study, has perfected a system of *combination pistons*. They are small round ivory or brass buttons placed on the flat strips of wood between the manuals. When pressed with the thumb or any available finger of the performer, these pistons act upon little bellows of compressed air which, as they expand, push groups of stops in or out by appropriate leverage. The convenience of this clever mechanical contrivance cannot be overrated.

The system of arranging sets of stops on different soundboards and giving the organist little pedals, by the forcing down of which the air is cut off from the different sets of stops, is known as the *ventil system*.

Those who are best competent to judge of its worth are convinced that it is inferior both to *composition pedals* and *combination pistons*, and it is to be regretted that in certain quarters an attempt is being made to reintroduce it under the false notion that because it is still in existence in some parts of the Continent it is therefore superior to the latest inventions of English builders.

PNEUMATIC LEVER

20. Perhaps nothing tended to prevent the organ from being a popular or generally attractive instrument to students so much as the extreme weight or "stiffness" of the touch. For the remarkable invention which removed this disagreeable part of an organist's labor, an Englishman also has to be credited. Mr. Charles Spackman Barker, about the year 1832, made a small bellows for each manual key, so arranged and constructed that when a key was pressed down the compressed air raised the top of the bellows. To the top of this bellows was attached the weight of the whole action to the pallet. When the manual key was allowed to rise, the little bellows was emptied through a waste valve and fell into its position of rest. The fingers of organists have, therefore, in these days only to move the small pallet or valve which admits compressed air into the pneumatic bellows, and thus are able to throw on to these active little supporters the labor of working all those numerous portions of mechanism which reach up to the pallet in the wind-chest. One of the most important advantages of the *pneumatic lever* is that ciphering is much less frequent. This fact is thus accounted for: when no *pneumatic lever* is used, the organ-builder strives to render his touch light by reducing the strength of his springs to a minimum; any change in the weather or other disturbing influence is liable, therefore, to make the springs unable to do their duty, and a cipher is the result. Whereas, when the *pneumatic lever* is attached to an organ, the builder, having no scruples as to the work he is giving to his compressed air, strengthens his springs and thus prevents accidents. The electric communication between manuals and pallets is receiving great attention from several builders who are striving to bring it to perfection. (See page 15.)

IMPROVEMENTS IN ORGAN PIPES

21. The variety of tone produced by modern organ-builders is extraordinary. The discovery by the French builders that organ pipes, made twice their proper length and perforated with a small hole in the middle of the tube, produced a fine rich tone, has led to the universal adoption of *harmonic* stops as they are called; simultaneously with this a high pressure of wind has been applied to many important stops, both *reed* and *flue* (and especially to *harmonic* stops), thereby adding largely not only to the varieties of tone of which the instrument is capable, but also to the grandeur and sublimity of its full power.

22. Enough has been said to give the reader a fair notion of the progressive improvements in organ-building from the earliest time to the present day. There are those, however, who claim great antiquity not only for a simply constructed instrument, but also for organs of a complicated structure. Thus the *magrepha*, though not mentioned in the Bible, is described in the Talmud as an organ with ten keys and ten pipes to each key, of very powerful tone, used in the Temple of Jerusalem.* Other authors assert that organs with four, six, or eight stops were in use before the Christian era.† But the word *organ* is so very generally applicable in its meaning of *an appliance* or *mechanical contrivance* that it cannot be a matter for surprise that it has, from time to time, been given to musical instruments differing from each other not only in capabilities but in structure. The word *organ* as used in the Bible for a translation of *ugab* or *huggab* must not be thought to imply any complicated or large instrument.‡

The expression a "pair of organs" found in old writers merely signifies a complete set of pipes, just as we still say "a pair of stairs," etc.

*See Engel's *Music of the Most Ancient Nations*. †See Chappell's *History of Music*.
‡See articles in Cassell's *Bible Educator*.