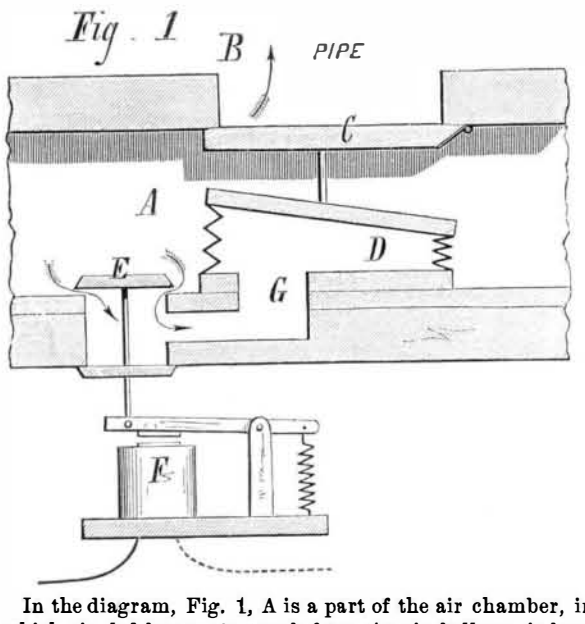
NEW APPLICATIONS OF ELECTRICITY TO ORGAN BUILDING.

A concert organ has recently been erected in Chickering Hall, corner of Eighteenth street and Fifth avenue, in this city, which is remarkable for the numerous entirely novel and ingenious electrical and pneumatic inventions which enter into its construction. The instrument is one of considerable magnitude, having three manuals, a compass of 58 notes, 29 pedal notes, 33 stops, and the necessary couplers and mechanical accessories. So far as the location of its parts is concerned, it is really three organs in one; that is to say, a portion of the pipes are on one side of the stage, a portion are some 60 feet away on the other side, while a complete though small organ, used for echo effects, is placed on the roof of the hall and about 175 feet distant from the single set of keyboards at which the entire apparatus is manipulated.

The portion of the instrument which is directly in rear of the keyboards is provided with pneumatic levers, so that the pressure on a key, instead of acting directly upon the valve of the pipe to be sounded, opens a valve which admits air into a small bellows. The latter, in its movements, actuates the pipe valve, and thus performs the heavy work, so that the merest touch is sufficient to move the key. With the exception of this ingenious pneumatic device, all the rest is directly mechanical, and, since it does not differ from the usual church organ arrangements, needs no further reference. In the other two organs, however, are found the curious electro-pneumatic inventions which have seemingly revolutionized the art of organ building, for by their aid not only can new effects be produced, but one or a dozen organs can be played at once, and all their stops perfectly controlled, and this irrespective of whether they are located within ten feet or ten miles, or in fact any distance, from the player.

We propose to explain, by the aid of the annexed diagrams, first, how the pipes are sounded through pressing the keys, and, second, how the stops are manipulated. For the benefit of those unfamiliar with organs, it may be stated in advance that, by means of stops, air is admitted from the main bellows into any desired set or sets of pipes. Each set of pipes gives a different quality of tone, and thus the performer may select just such sounds (flute-like, trumpet-like, etc.) as best suit the character of the music. Having regulated his instrument by adjusting the stops, his fingers, by pressing the proper keys, open the valves leading to the individual pipes, and thus the instrument is played. In order to apply electricity to the object first mentioned above, it will be obvious that the keys must act exactly as do the keys of an ordinary telegraph instrument, that is, on being pressed down, they must establish a current which, passing over a connecting wire, actuates mechanism at a distance. This is precisely the case, so that the organist has no power to exert beyond the very light pressure necessary to so move the keys. Each key controls its own circuit; and as the mechanism is the same for each, a description of one will suffice for all.

Fig. 1

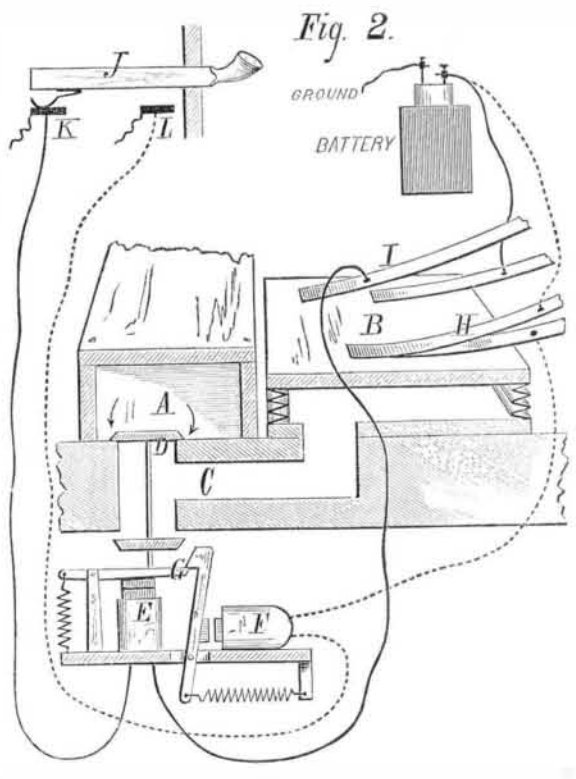


In the diagram, Fig. 1, A is a part of the air chamber, in which air, led by an air trunk from the air bellows, is kept compressed. B is the pipe corresponding to the key whose operation we are considering. There is an opening between the air chamber and pipe, closed as shown by the valve, C. Attached to this valve is a small bellows, D. Through the bottom of the air chamber is another orifice in which plays the double valve, E, the stem of which is continued downward and is attached to the pivoted armature of the electro-magnet, F. Said armature is provided with a spiral spring, the effect of which is to hold it away from the magnet and so to shut the lower part of valve, E, while holding the upper part open. This being the case, a portion of the compressed air in A will pass under the valve, but, being unable to escape at the orifice below, will enter the channel, G, and so ascend into the bellows, D. There will therefore be a constant equilibrium of pressure about the bellows, and thus the valve, C, will be pressed tightly shut against its seat.

When, however, the key is pressed, then the circuit is established, and the magnet, F, becoming excited, draws down its armature, thus shutting the upper part of valve, E, and closing the lower part. The air in the bellows, then being free to escape through the passage, G, cannot equilibrate the pressure in the air chamber, and hence the bellows closes, and at the same time pulls down and opens the valve, C. A blast of air is then free to enter and so sound the pipe. This state of affairs holds as long as the key is held down; but the instant it is released, the circuit is broken, and the various parts regain their normal position. The apparatus is extremely sensitive, and in its prompt action even surpasses the damper movement of a fine pianoforte; so that, in fact, the quickest passages and shortest notes can be played with a clearness, crispness, and brilliancy hardly otherwise attainable. Of course the intervening distance between this mechanism and the keyboard is practically immaterial so long as there is sufficient battery power. In the echo organ, previously referred to as located in the roof of the building, six Leclanché cells are found amply sufficient, although there are some two miles of connecting wires. This very light battery power required, in fact, is characteristic of the whole instrument.

Having seen how each key is worked, we now pass to the means whereby the whole set of 58 keys is caused to control any desired set of pipes. In Fig. 2, A is an air chamber or wind box, fed as before from the main bellows. The small bellows, B, in this case is located outside of the chamber but communicates with it by the passage, C, in which is a double valve, D, similar to valve, E, in the preceding diagram. When the upper part of valve, D, is raised and its lower part closed, there is a free passage for the air to pass from the wind box and into the bellows. When the valve is lowered, as represented, there is a clear passage from the bellows to the outside air. The stem of valve, D, is connected with an electro-magnet, E, arranged as previously described. There is, besides, another magnet at F, which controls a moving armature, G, one end of which forms a latch and engages with the armature of magnet, E. On top of the bellows are two pairs of springs, one pair, H, being in control only when the bellows is down, the other, I, being in like condition only when the bellows is inflated. J is the stop in the organ, on the lower side of which is a switch which comes in contact with one or the other of the metal plates, K and L, according as the stop is pushed in or drawn out. The lead of the circuits is first from plate, K, to magnet, E, thence to the upper spring of pair, I: from the lower spring of same pair to the battery. The second circuit passes from plate, L, to magnet, F, to lower spring of pair, H: from the upper spring of same pair to battery. The object is to move the bellows, and this last moves a series of switches oscillating on a horizontal axis so as to establish connection in 58 key circuits at once. When the stop is pushed in as shown, there is obviously no connection with the battery, because of the pair of springs, I, being separated. Supposing, however, the stop to be drawn out, then the switch on its lower side comes in contact with plate, L, the current passes and excites the magnet, F, which draws back its armature, G, and so releases the armature of magnet, E, the current of course continuing through the pair of springs, H, and so to battery. But the effect of releasing the armature of magnet, E, is to raise the valve, D, so that, as before stated, the air from the wind box is allowed to pass through the passage and into the bellows. The latter then rises, throwing over the 58 switches and so establishing the connection of the keys. But as this rising continues, the springs, H, separate. The circuit is thus broken. At the same time the pair of springs, I, come in contact. The bellows remains, however, inflated, because the position of valve, D, remains unchanged, no circuit being complete through the springs, I, and magnet, E, until the stop pushed in establishes connection with plate, K. Consequently the bellows will stand full and thus push the switches into action as long as the stop beside the keyboard is drawn out. When that stop is pushed in, the circuit closes, magnet, is, E excited, and valve, D, drawn down, cutting off any further supply of air to the bellows, and opening an escape for its contents. As valve, D, falls, the catch on armature, G, slips over the armature of magnet, E; and as the bellows descends, springs, I, once more separate, and thus the parts are again brought to the condition shown in the diagram.

Fig. 2.



It will be observed that this is all done with an open circuit: that the circuit, in fact, is always open, except just when changes are taking place, so that, with a battery like the Leclanché, which stands out of operation when there is no circuit, the exhaustion of the same is very slow and the cost consequently light.

There are various other ingenious attachments of less importance than the foregoing, which are hardly necessary to be described. The credit of the inventions belongs to the builder of the organ, Mr. Hilborne L. Roosevelt, of New York city, and at some future time we shall probably recur to them again.

Beware of Him.

A correspondent writes from Chatham, Ont., that a man, representing himself to be an agent for the SCIENTIFIC AMERICAN, had obtained a number of subscribers in that place and its vicinity. To make the deception more complete, the fellow pretends to be an artist, and represents himself to be authorized by us to make sketches of machinery, public buildings, manufactories, etc.; and he has probably received some money besides for his artistic services, but concerning this the writer does not speak.

If our friends would bear in mind what we so often repeat, that no traveling agents are employed to solicit subscriptions for the SCIENTIFIC AMERICAN, they will save their money and preserve their tempers. We frequently get letters from persons complaining impatiently that they do not get their papers, and adding, after relating the circumstances of their paying their money to some itinerating scamp, that, if he was not authorized to receive their money, it is our duty to follow him up and have him arrested for swindling. Such persons seem to forget that, if they had used the slightest precaution, they would have avoided being swindled. We ask the public to remember that we do not employ traveling agents; and if persons pay their money to irresponsible parties, they should not blame us or expect that we can make their losses good.

Business Prospects for 1876.

Now that everybody has balanced his books and has determined his profits for the year gone by, the future, in place of the past, has become the object of general concern, and questions as to the condition of trade and business prospects for the next twelve months are in every one's mouth. While we note no especially great activity in business circles generally, in our own case we certainly find much cause for self congratulation. Subscriptions to the SCIENTIFIC AMERICAN for 1876 are literally pouring in, in numbers in excess of all previous years; and our new paper, the SCIENTIFIC AMERICAN SUPPLEMENT, has met with a reception exceeding our most sanguine anticipations, placing its success beyond a shadow of doubt. Than these facts no more gratifying evidence of the constantly increasing taste and demand for scientific information could be found; nor could those, who, like ourselves, believe in the advancement of the country's prosperity through the diffusion of useful knowledge, receive more flattering proof that efforts in that direction are by our industrial classes fully appreciated and rewarded.

We would ask all our friends who have not as yet renewed their subscriptions, and all who are engaged in forming clubs to send in their names as rapidly as possible. We continue to forward back numbers, dating from January 1, to all new subscribers, unless specially ordered to the contrary. Those who can conveniently patronize local news dealers, we advise to do so, since they then receive their papers free from the creases necessitated by the folding for the mail; and at the same time they patronize a useful home enterprise, which deserves their encouragement.

A Remarkable War Ship.

In illustration of engineering progress, we give in this week's SCIENTIFIC AMERICAN SUPPLEMENT (No. 8) an interesting article descriptive of the new British man-of-war Inflexible, with diagrams, showing the dimensions and made of operating her enormous guns. This ship is now in course of construction at Portsmouth. Her iron armor is to be two feet thick. The ship is 320 feet long and 75 feet wide, and is to carry two 81-tun guns. These guns will have an exterior diameter of 6 feet, 24 feet length, and 16 inches caliber. The projectile weighs 1,650 lbs., and over a barrel of powder (300 lbs.) is the firing charge. The vessel's engines will be of 7,000 horse power, operating on twin screws. The hull will have 127 watertight compartments. Altogether the Inflexible is the most wonderful specimen of naval architecture ever undertaken.

Useful Recipes for the Shop, the Household, and the Farm.

Dried potatoes, which may be kept any length of time, and which, when boiled with a little salt, are not distinguishable in taste from the fresh vegetable, are prepared as follows: After being peeled and cut into disks, they are treated with cold water to which has been added 1 per cent of sulphuric, or 1 to 2 per cent of muriatic acid. Washing in pure water follows, and the pieces are then placed on wire frames and dried in an oven. When done, the disks are of a slightly yellowish tint, and are transparent, like gum.

Dry earth treatment for ulcers has been found very successful. Large, sloughy ulcers, after being washed, were covered with a thick layer of earth, over which a piece of wet paper was placed as a support, the whole being neatly bandaged. In a few days the ulcers began to clear, and when the surfaces looked healthy and granulating, a dressing made as follows was used: A piece of muslin the size of the ulcer was immersed in carbolic oil (in the proportion of 1 part acid to 10 parts cocoanut oil); with this the sore was covered, and over that dry earth was placed, and then moistened earth and a bandage. In a short time the healing process manifested itself satisfactorily, while all odor was entirely removed.