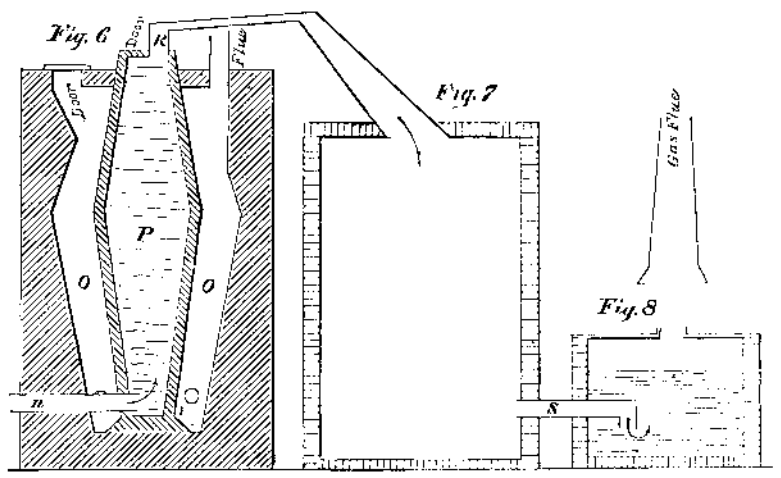
PROPOSED PROCESS FOR THE FIXATION OF ATMOSPHERIC NITROGEN.

BY JOHN BLAIR.

The first part of this process consists in freeing the air of its oxygen, and this is accomplished in the following manner: The furnace, *a*, Fig. 1, is filled with coke, and is then ignited through the door, *d*. Air is then blown through the tweers, T T, which passes up and causes the combustion of the coke. The oxygen of the air is now converted into carbonic oxide; and the latter gas, together with the nitrogen, passes up through tube, B, and into the filter, Fig. 2. The interposing layers of broken stone which are placed in the filter prevent any of the carbon dust from entering the conduit, *c*. The gases now pass into the furnace, E, Fig. 3; this furnace is filled with iron ore, which is heated by an outer furnace, D D, to a temperature of about 1,200° Fah. The carbonic oxide passing up through the heated ore reduces the latter to the spongy metallic state, and is itself converted into carbonic acid. We have now, at this stage of the process, a mixture of nitrogen and carbonic acid gas, which passes onward through tube, *g*, into the tank, Fig. 4. This last tank contains lime water, which is kept circulating through it, in order to keep it cool as well as to renew the lime solution, so that the carbonic acid may be more readily acted upon when it is brought in contact with a fresh supply.

The nitrogen gas is withdrawn through tube, *k*, by the pump, Fig. 5; an upward stroke of the piston opens the inside valve, L, and admits the gas into the cylinder, as shown by the arrow; and the downward stroke expels it through tube, *m*. This tube conducts the gas to the gas holder, where it is stored for use. (This part of the apparatus is not shown.) In the second part of this process the collected nitrogen is fixed to a metallic base. The nitrogen passes from the gas holder, through the conduit, *n*, into the furnace, P, Fig. 6. This furnace contains a mixture of potash and charcoal, which is kept in a state of fusion by the outer blast furnace, *o o*. The potash and carbon having now attained a high temperature, the potash gives up its oxygen to the carbon, and passes off as carbonic oxide. The nitrogen then combines with its equivalent of gaseous carbon, and passes to the state of cyanogen. The latter gas then absorbs its equivalent of potassium, and the cyanide of potassium is produced. The volatilized salt now passes up through the pipe, R, into the chamber, Fig. 7, where it is permitted to condense. The gases generated in the reaction pass out through the conduit, *s*, into the vessel, Fig. 8. This vessel contains an acid solution of iron, and should any of the uncondensed cyanide pass out through the conduit, *s*, into the iron solution it is immediately absorbed and forms prussian blue. The uncondensed gas now escapes through the expansion valve at *v*, and the process is complete.



BLAIR'S NITROGEN APPARATUS.

Hallucinations.

In a recent lecture, Dr. H. Maudsley says that one striking feature observed by medical men who have had cases of hallucinations under their charge is that the patients cannot be convinced that the objects they see, the sounds they hear, and the smells they perceive, have no real existence, and that the sensations they receive are the result of their excited nerves. It frequently happens that a person who suffers from hallucination in respect of one sense has the others unaffected, and is on all other matters perfectly sane. Hearing is most frequently affected, and sight next. Several interesting cases were referred to: one of a gentleman actively engaged in business, who believed his body continually gave an unpleasant odor, and consequently kept away from everybody as much as he could, and when he was assured that people did not perceive it, always replied that they were too polite. Hallucination may arise either from an idea on which the mind has dwelt, appearing as something exterior, or from excitement of the sensory ganglia. It is said that Newton, Hunter, and others could, at will, picture forms to themselves till they appeared to be realities. A successor of Sir J. Reynolds, Dr. Wigan records, had the power of painting portraits after seeing his sitters but for a short time at one visit only, and was able at will to reproduce them to himself as exterior realities. As years advanced, he found he could not dismiss these forms as he could recall them, and he began to fancy himself haunted, and was for many years in an asylum.

THE honorary degree of Doctor of Philosophy has been conferred on Mr. Edison by Union College.

Perils of Base Ball Playing.

The actuary of a life insurance company has prepared a table of statistics full of matter, deep and dangerous, regarding the mortality and casualties resulting from too assiduous attention to mastering the national game. His figures show that during the ball season in this country the monthly death rate from ball playing is 0·04; the number of cases of concussion of the brain is 4·7; incipient heart disease, 5·103; dislocation of the hip, 0·01; fracture of the shoulder-blade, 1·01; compound fracture of the sternum, 0·0002; broken ribs, 25·012; dislocation of the spinal column resulting in permanent disability, 0·00001; fracture of the arm, including forearm and above the elbow, 19·3; dislocation of the elbow, 7·05; sprained wrist, 47·07; broken fingers, 352·02; fracture of the hip, 0·03; dislocation of the knee, 1·006; sprained ankle, 15·03; injuries to the foot and toes, necessitating surgical aid, but not causing permanent injury, 225·09. In addition to the above rather suggestive array which recounts injuries resulting in death or the fracture of bones, including dislocation, he demonstrates that there are 197·01 noses broken and 473·05 teeth knocked out.—*Utica Herald.*

Music Boxes.

Musical boxes are made either in Sainte-Croix or Geneva, excepting a few unimportant factories elsewhere. The greater part of those made in Sainte-Croix are sold under the name of Geneva boxes, trusting to the name to give greater prestige, as Sainte-Croix is seldom visited by travelers, although fully equaling Geneva in the manufacture. Sainte-Croix is also noted for the manufacture of fine gold and silver watches, and many of them are sold in Geneva under the name of Geneva watches. An erroneous impression exists that Geneva musical boxes are superior to all others; the truth is that both good and bad are made in Geneva, and the same may be said of Sainte-Croix; but a fact in favor of the latter place is that the cost of living being less than in Geneva, wages in Sainte-Croix are less in proportion, and equally excellent instruments can be manufactured there at less cost.

The most important factory at Sainte-Croix is that of C. Paillard & Co., who make as many boxes as all the other manufacturers combined, and of superior quality. In this factory there are now employed about 800 expert artisans, aided by all modern improvements in special tools and machinery. Were it not for the advantages they derive from a division of labor—the firm employing a separate set of workmen exclusively in the production of each part of the mechanism—it would be impossible to have these instruments made so perfectly at prices so moderate; for the prices cannot justly be termed high when the immense amount of carefully executed and intricate work is taken into consideration.

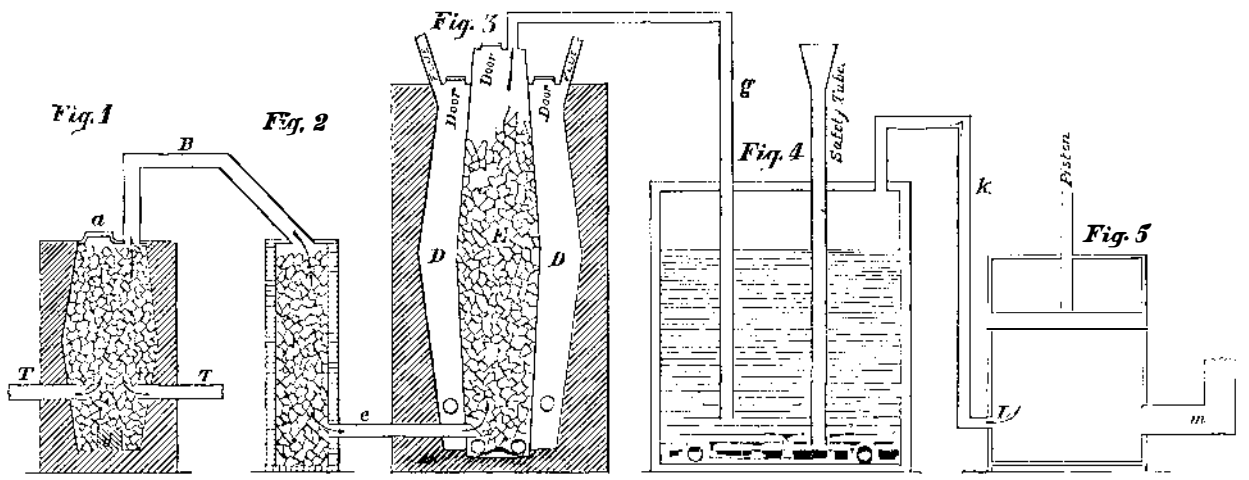
One great expense in this business is the changing of airs in the boxes, discarding such as have become tiresome, and substituting the latest and most popular as fast as they appear. However, the standard airs, which are always popular, such as "Home, Sweet Home," "The Last Rose of Summer," etc., are always retained. They now send these instruments throughout the entire world, their greatest markets ranking in the following order: England, the United States, France, Germany, Russia. The instruments play the favorite airs of each country to which they are sent.

A musical box consists of a brass roller with projecting points; a steel comb, the teeth of which give the sounds; a spring, to give the revolving motion to the cylinder; and a flywheel or fan, to regulate the revolving motion. The rough parts, including the bed plate, the blank roller, the mainspring, the comb (tempered but not tuned), the running gear, etc., are made in large machine shops and furnished to all the box manufacturers. The music has first to be arranged for the box by thorough musical artists. The cylinder is then given to a person (generally a woman) who, with the aid of the music and a very ingenious machine, marks the places on the cylinder where the points are to be inserted. Another person then drills all the little holes, and still another inserts the points. The cylinder is then filled with molten cement, placed on a lathe, and revolved very quickly. The cement adheres to the inside surface, holding the points, and is then allowed to cool, leaving a hole in the center for the axis. On another machine the points are filed down, so as to be of equal length.

During this time the comb is given out to be tuned, the tuner having first to file the teeth, to give the proper flexibility. The tone is lowered by filing near the base, and sharpened by filing near the point. The cylinder is then set on the bed plate, and, opposite, the comb must be screwed to the bed plate. This last operation demands great accuracy, so that the points of the cylinder and the teeth of the comb will exactly meet. The instrument is now placed on another machine, which divides the bars in the same way as the original machine for marking, and a person (usually a woman) will then, according to the music, bend the points of the cylinder slightly forward, in order to secure more strength, but more especially to make the chords drop simultaneously, and cause the runs or roulades to be played evenly. All the parts are then polished, and the box is finally given to a man who regulates the dampers and revises all the parts.

There are also some fifteen to twenty minor parts, which would require too much technicality to explain to the general reader. Size increases both volume and richness of tone. A cylinder 10 inches long can be made to play 6, 8, 10, or 12 airs well, but, of course, will play 6 or 8 airs better, and with more sweetness and harmony, than a greater number. The reason of this is that more points on a cylinder and more teeth on a comb can be used for fewer airs. If a box plays 12 airs, the teeth in the comb will be twice as far apart as if it plays only 6 airs. The space between the teeth increases with the number of airs. If the diameter of the cylinder be increased, the airs will, of course, be prolonged. The manufacture of large and small musical boxes does not differ very materially in method.

At the beginning of the present century the best boxes played only one or two airs, and boxes which then sold for $25 now sell for $5. The bells, drums, and castanets have been made for musical boxes for the past forty years, but originally were placed underneath and hidden from view; they are now placed in sight, and produce a very pleasing effect. The celestial voices, which require bellows and reeds, were first placed in the musical boxes about 18 years ago. The earlier specimens of this kind were thought very remarkable, but they were very inferior to the improved boxes of the present time. Originally, musical boxes were made with only one cylinder, but about twelve years ago it was first thought possible to make them with extra cylinders, thus increasing the variety of tunes. These cylinders can easily be changed by any one, and such boxes are now in great demand. The number of cylinders is unlimited, but to be enabled to use them a different construction of the works is required. The harp-zither attachment was introduced about five years ago; it consists of paper rolled and forced to rest upon the teeth of the comb.



BLAIR'S NITROGEN APPARATUS.

Electric Light Photography.

AN architectural photograph of a large building has been taken in Dundee by means of the light from a Gramme dynamo-electric machine of a power equal to 800 candles. The view was taken by fifteen minutes' exposure in a crowded thoroughfare, during a drenching rain, and within an hour of midnight. The photograph could not have been taken so well by daylight, for the falling rain would have obscured it.