A Vacuum a Good Conductor.

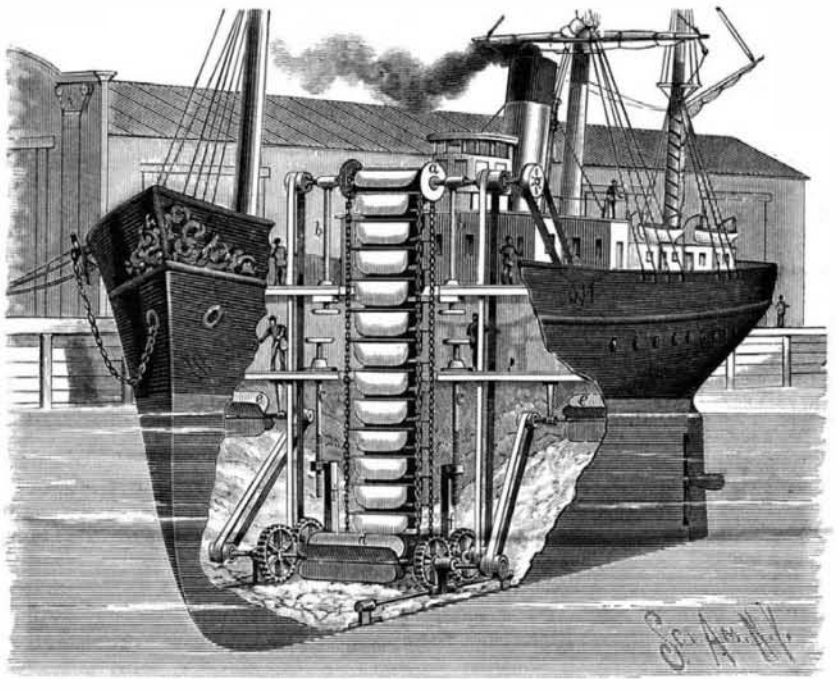
Professor Edland has communicated an important paper to the Royal Academy of Science, Sweden, in which he adduces further proof of his discovery that a perfect vacuum is a good conductor of electricity. This result is directly opposed to the current doctrine that a vacuum is a perfect insulator. The reason why a Torricellian vacuum is not traversed by an electric current is due to the fact that there exists at the points of the electrodes an obstacle to the discharge of the current, and this obstacle is augmented as the air is rarefied. If the current could be introduced into the vacuum without electrodes, it would be able to pass through the void without difficulty. The conclusion he arrives at from his recent elaborate experiments is that the maximum attained by the current intensity at a certain pressure of the air when a curent traverses a rarefied air space is not due in any way, as generally assumed, to the resistance between the electrodes by the air having its minimum at that pressure, and afterward increasing in amount with the increase of rarefaction, but to the fact that the sum of the electromotive of the spark and this resistance then possesses its minimum value. With the continuation of the rarefaction the resistance of the column of gas diminishes; but the electromotive force increases. Without employing electrodes at all, M. Edland can by induction easily excite luminous effects in a gas sufficiently rarefied to stop the passage of a powerful current from electrodes. But this would in his opinion be impossible if a highly rarefied gas were an insulator.

Imitation Stained Glass.

Among the many uses of the printing press none is more novel than the production of imitation stained glass. Designs for any pattern desired are engraved on wood. The blocks of wood are placed on an old fashioned hand press, and then are inked with oil colors compounded with special reference to the use for which they are intended. Then a sheet of very thin hand-made porous paper is laid on, and a prolonged impression given, in order that the color may thoroughly permeate the paper. Each color is, of course, printed at a separate impression. Having completed the printing process, the different pieces of paper which compose the design are soaked in warm water half an hour, taken out, the water sponged off, and then coated on one side with a thin cement. A similar coat of cement is given the glass to which the paper is to be applied, and then the paper is laid on in place, and varnished over. The plain glass window becomes at once, to all appearances, a window of stained glass. The effects of the lead lines, the irregular pieces of colored glass, the heads of saints and soldiers, the antique, or the modern Japanese designs are all to be had as brilliant in color as any imitation can be expected to be of the genuine glass. The glass thus prepared costs about one-tenth as much as genuine stained glass, and can, when it requires it, be washed without fear of injuring the surface.

IMPROVED GRAIN ELEVATOR.

The accompanying illustration represents a grain elevator designed to take all the grain out of the hold of a vessel without the aid of men. Journaled horizontally in standards, *b*, on the deck is a shaft provided with a central pulley, *a*, and a pulley at either end. Another shaft arranged with a central and end pulleys is journaled beneath the deck in arms, *f*, connected at their upper ends with vertically arranged screws, *c*, which work in corresponding nuts in the deck. An endless belt provided with buckets passes around the central pulleys working through openings in the deck. On the outer end of the lower shaft is a pulley, and a third shaft carrying a rotary shovel is also provided with a pulley, the two pulleys being connected by a belt. Cog wheels may take the place of the pulleys, as shown in the engraving. Upon power being applied to the upper shaft the endless belt will move, elevating the grain from the hold. The object of the rotary shovel is to bring the grain into such a position as to be readily taken up by the buckets. Other rotary shovels may be placed at suitable points, as *e e*. The standards, *b*, are provided with screws beneath the deck which work in threaded holes in the interior of the standards. These screws are provided with fixed collars secured to the deck in order to prevent the screws from slipping vertically; the standards are by this means raised or depressed. By means of the screws, *c*, and those just described, the elevator may be adjusted to any height.



BARDEEN'S IMPROVED GRAIN ELEVATOR.

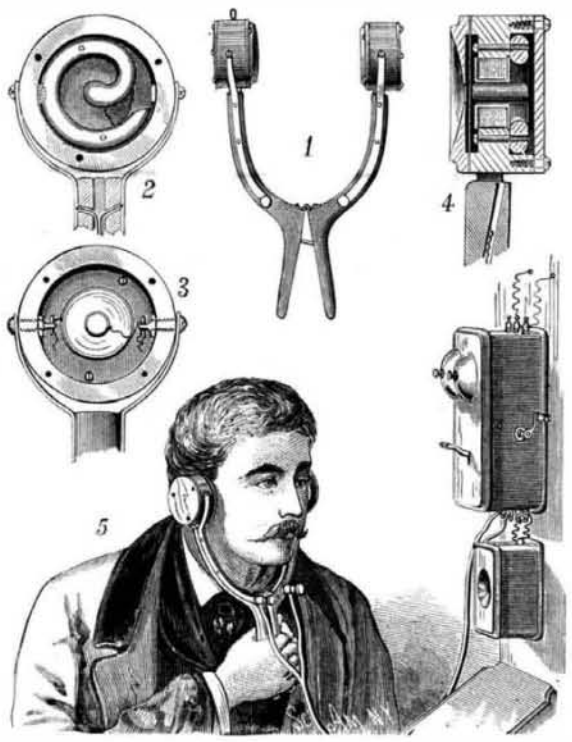
This invention has been patented by Amy Bardeen, of Blackstone, Mass.

Preserving Autumn Leaves.

The leaves may be pressed between sheets of blotting paper, which are changed at intervals, until the leaves are thoroughly dried, in order to prevent rotting. The colors then look dull, but may be brought out by either oil, a thin white varnish, or wax. The leaves may be rubbed with wax and carefully pressed with a warm, not hot, flatiron, and by carefully rubbing with the edge of the iron they may be made to curl most naturally.

ADJUSTABLE TELEPHONE RECEIVER.

In the telephone herewith illustrated, two curved rods are hinged to each other at the upper ends of the handle pieces, so that when the handles are pressed together the upper ends of the rods will be separated, as shown in Fig. 1. A spring attached to one handle piece rests against the other and presses them apart; a hook prevents the handles from moving too far from each other. To the upper end of each rod is attached a fork formed of two insulated metal bands, and in each fork is pivoted a cup in such a manner that the diaphragms face each other. The cups each contain a coil surrounding a magnet. Fig. 2 is a rear view of the



BARNARD'S ADJUSTABLE TELEPHONE RECEIVER.

cup, showing the magnet: Fig. 3 is a front view, with the diaphragm removed; and Fig. 4 is a vertical section. One end of the wire of the coil is connected with one of the strips forming the fork and the other end with the other strip. By means of a wire one strip is connected with the corresponding half of the hinge, and the other strip is connected with a binding screw on the rod. The line wires are attached to these binding screws.

The connecting wires pass through channels in the rods. To use the instrument (Fig. 5) the handle pieces are pressed together, thus separating the cups, when the head is passed between the rods; and upon the handles being slightly released the spring holds the cups closely against the ears. The current passes from one binding post through the corresponding wire to the coil, back to the hinge, through the wire to the other coil, and thence to the second binding post. The advantage of placing a receiver to both ears is apparent. The construction insures a fit against the ears of heads of all sizes. We have tried this receiver with most satisfactory results, the sounds being clear and loud, and entirely free from annoyances arising from local noises.

This invention has been patented by Mr. Daniel G. Barnard, of Winslow, N. J.

THE official returns show that the healthiest class of people in Great Britain are the inmates of prisons, where simple diet, regular hours, and exercise are compulsory. But the cases of insanity among the convicts are out of proportion to the number of other ailments. To commit a crime a man must be more or less mad.

The Armor Plated Ship not a Modern Invention.

An old book entitled "A Universal History," published by J. Coote, London, 1759, contains the following:

"The invention of ships is very ancient, since God himself gave the first model thereof to Noah, for the building of his ark, to save the human race from the waters of the deluge.

"The first celebrated ships of antiquity, besides this ark, are that of Ptolemy Philopater, which was 280 cubits long, 38 broad, and 48 high; it carried 400 rowers, 400 sailors, and 3,000 soldiers. That which the same prince made to sail on the Nile, we are told, was half a stadium long. Yet these were nothing in comparison with Hiero's ship, built under the direction of Archimedes; on the structure whereof Moschion, as we are told by Snellius, wrote a whole volume. There was wood enough employed in it to make fifty galleys; it had all the variety of apartments of a palace, banqueting rooms, galleries, gardens, fish ponds, stables, mills, baths, a temple of Venus, etc.

"It was encompassed with an iron rampart, eight towers, with walls and bulwarks, furnished with machines of war; particularly one, which threw a stone of 300 pounds or a dart 12 cubits long, the space of half a mile; with many other particulars related by Athenæus."

One of the above original books is now or lately was in the possession of James E. Serrell, C. E., of this city.

The United States Foreign Mail Service.

The annual report of the Superintendent of Foreign Mail states that the letter mail dispatched during the year increased 77 per cent over the amount sent in 1880, and the printed matter increased 74 per cent. The number of letters sent to countries not in the Postal Union, excluding Canada, was 410,600. The sum paid for sea transportation of mails was $316,322; of this amount $263,621 were paid for trans-Atlantic service; $19,251 for trans-Pacific, and $33,649 for West Indies, the Isthmus, and other routes. The estimated amount of postage collected in the United States on foreign mail matter was $2,078,913.

Death from Cold in Mammals.

The behavior of protoplasm under the influence of different degrees of temperature is still unsufficiently known. We are familiar with the general facts that excessive heat or cold brings about death, and that fever is attended with increased tissue changes; and in some measure we understand the kind of way in which this happens; but that is all. MM. Richet and Rondeau have studied the influence of cold on some mammals. They have adopted a method by which the temperature of animals has been gradually lowered. Dogs resist cold so well that no experiments were made on them. Rabbits were chiefly employed in these investigations.

These animals were shaved and surrounded with flexible pewter tubes, through which cold water was made to circulate. When the temperature of the body was lowered to 25° C., respiration began to be ineffectual. The rhythm was not modified; but the amplitude of the inspirations was chiefly diminished. The functions of the nervous system were much abated when the temperature fell to 17° C.; they were not, however, abolished. Reflex movements were obtained, even when the temperature sank to 15° or 14° C.; and the observers believe that the excitability of the nervous system disappeared not directly on account of the cold, but probably from arrest of the circulation. Spontaneous movements disappear before the reflex acts. The reflex from the cornea went before those from the lower limbs. At 16° C. the reflexes were remarkably slow and like those in animals with a cold circulation. Sensibility to pain was not abolished even at the temperature of 16° C. Cold gradually slowed the cardiac action.

The form of the contraction at 17° C. was like that of the heart of the tortoise. Systole commenced at the auricles, and by a slow vermicular movement passed on to the ventricles. Even although death had been apparent for half an hour, the animal could be restored to life; so that vitality can be recalled half an hour after the cessation of respiration and circulation. When the temperature was 19° C., it took more than ten minutes to asphyxiate the rabbit by blocking the trachea. We may conclude from this that tissue metabolism is correspondingly slow. The same animal was suffocated in four minutes at a temperature of 32° C.

MM. Richet and Rondeau commented on the similarity between the vital processes of hibernating animals and those of rabbits thus experimented upon, in which a condition, so to speak, of artificial hibernation may be induced.—*Lancet.*

Perosmic Acid

Is a new remedy employed by Professor Winiwarter in cancerous and scrofulous swellings. It is used by injecting daily three drops of a one per cent solution of the acid, which treatment causes the tumor to soften and decrease in size; the dead tissue is thrown off, and disappears in about a month. No curative effects upon cancer itself have been observed from the remedy.—*Rundschau, Leitm.*