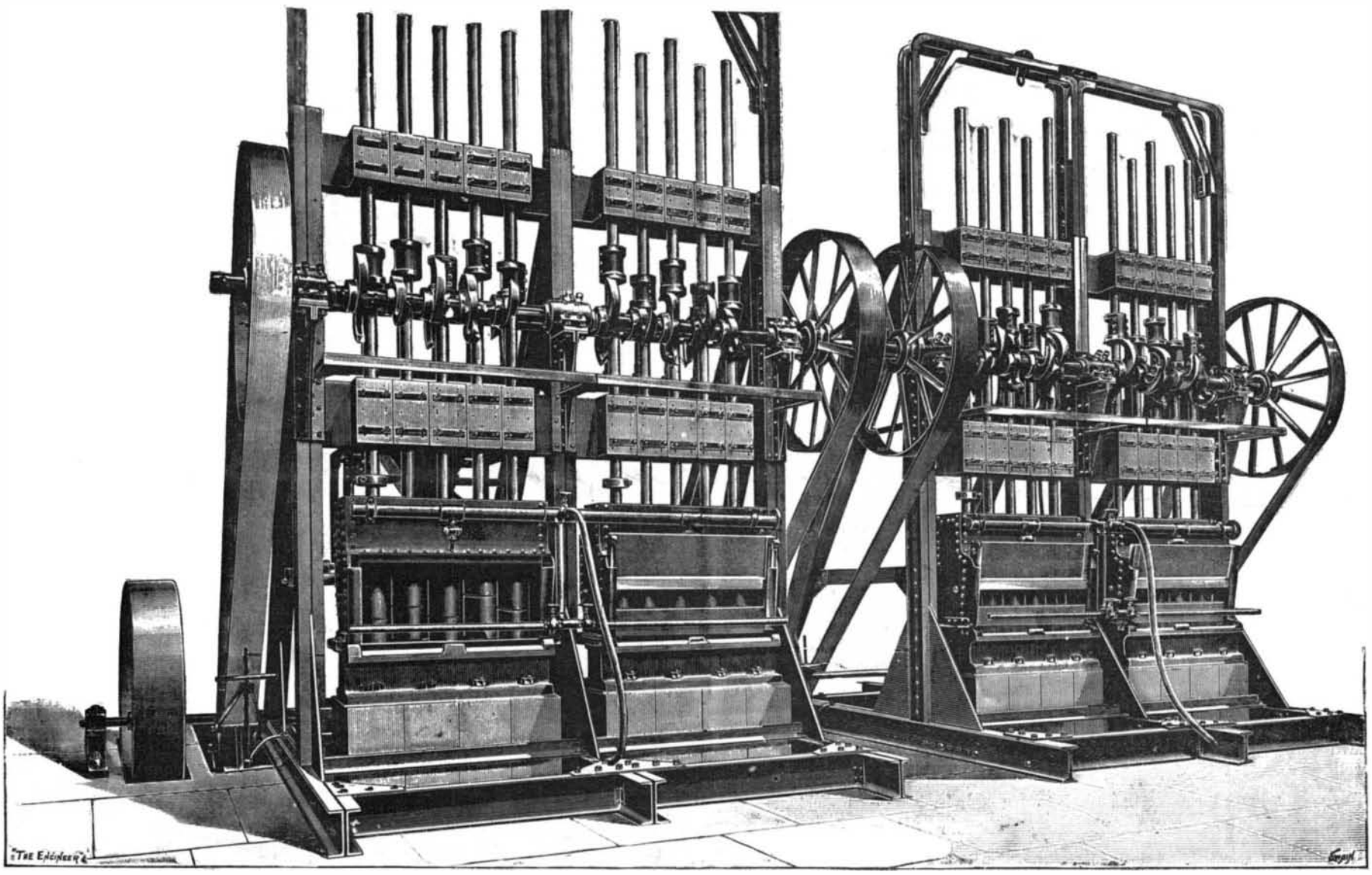
IMPROVED STEEL FRAME STAMP BATTERY.

The illustration is taken from a photograph of a twenty-head stamp battery recently supplied for the Gold Coast of Africa, in a district where it is impossible to have wood, owing to the climate and ravages of insects. In this battery all joints are planed and fitted, with the holes drilled in position. The battery was first erected complete at the works, and all the parts carefully marked and photographed, rendering the re-erection at the mine a simple matter. It is built up in sections of 250 lb. where transport is difficult and costly, or in sections of 30 cwt., as desired. All the parts are so constructed that they are not easily damaged in transport. All the bolts are fitted with lock nuts, and rivets are supplied for riveting up at the mine when required. The battery is arranged in sections of two of ten heads each, having five heads in one motor box, each five heads being driven by an independent steel pulley, so that any section can be stopped without the others.

The belt from the countershaft to the stamp is of leather, of ample width and section, and an improved belt-tightening gear is fitted to each belt. The countershaft is of steel, turned and polished all over, fitted with bearings, having gun metal steps of large surface, lubricators, pulleys for driving the stamps, couplings, and loose collars fitted with steel set screws, and main driving pulley for receiving power from the engine or turbine, constructed of steel, turned up and bored perfectly true and fitted with key and keyway. The cam shafts are constructed of the best mild steel, turned and polished all over, and each fitted with five steel cams of massive design, bored and trimmed up true on the outer face, and having lifts from 6 inches to 12 inches as required. The cam shaft bearings are of massive design, and fitted with oil catchers, gun metal steps and improved lubricators. The stems are of tough wrought iron, turned all over, and each tapered to enable them to be reversed. Each stem is fitted with a hard chrome steel tappet fitted with three keys. They are faced on the top and bottom sides, so as to be reversed when worn. The shoes are of chrome steel, with heads of wrought mild steel bored out so that either end will fit the stem and the shank of the shoe, suitable slot holes being provided so that the stem and shoe can be removed; the whole design gives a falling weight of 850 lb. Each head of stamps is fitted with fingers for propping up.

The motor boxes are of the Homestake pattern, of massive design and construction, and are either made whole or in two parts, or in sections of 250 lb. as required. The boxes shown in the illustration are in two parts, the lower parts being of cast iron and the upper part of wrought steel, fitted together with planed joints, and through bolt holes and lock nuts. Each box is fitted with five dies of Messrs. Robey's special chrome steel, fitted with hexagons on the lower edge to prevent turning in the box. If desired, the top part of the motor box can be made of steel plates, having an internal lining, and fitted complete with water-distributing pipes, and arranged to receive amalgamated copper plates when required. The grate frames are of an improved design, fitted with chock blocks and thick amalgamated copper plate, whereby the depth of discharge can be altered at will. Hose pipes and cocks are supplied for washing out and cleaning the launders. The launders are supplied complete with arrangements for altering the angle of the launders, and each set of five heads has an independent amalgamated copper plate surface of large area, and fitted with a frame for supporting the launders clear of the battery framing.

Australian mercury wells are fitted at the end of each launder, and the outlets arranged to convey the tailings over blankets or settlers as may be required. The automatic feeders can be constructed of wood or wrought iron framing. A runner and hook with framing are provided to lift the stamps, etc. The sizes of battery usually supplied are 650, 760, 850, 900, and 1,000 pounds, having a maximum fall of twelve inches at ninety blows per minute.



IMPROVED STEEL FRAME STAMP BATTERY.

We are indebted to the Engineer, London, for our illustration and the foregoing particulars.

The Perfect Fender.

The commission appointed by the city of Providence, R. I., to examine and report on the fender question, reported in part as follows:

"Having examined the reports of the various commissions appointed in Baltimore, New York, Brooklyn and Philadelphia, your commission proceeded to examine into the merits of various patented and other devices, some with and some without working models, that were exhibited before them by various persons. Of these contrivances, only four were regarded with favor by your commission. But your commission do not consider that these fenders are perfect. No fender should be adopted without a wheel guard, which, in the opinion of the commission, should extend entirely around the car.

"Your commission are convinced that the most successful device for saving life on street railways is a light projecting fender which shall readily pass over without injuring the human form which it may fail to trip and catch, or which may be already prostrate; and which is supplemented by a wheel guard close as possible to the wheel, to be brought into action automatically, rather than by the foot of the motorman, and provided with powerful springs to bring the guard into contact with the rail and street surface, but it is the opinion of your commission that there is not any fender that is always sure to save life. A good, intelligent motorman is the best preventive of accidents on street railways, and to that fact, perhaps, is largely due the immunity we have had in Providence from frequent accidents during the three years the electric cars have been in operation.

"The managers of the railroad company have afforded the commission every assistance in the consideration of this subject, and have provided cars at all times upon which to test the various fenders submitted for trial. They have agreed to equip their cars with suitable wheel guards and with one of the fenders selected by your commission just as rapidly as it is possible to build them."

A New Photographic Paper.

Within recent years the large consumption of ready prepared printing-out papers has demonstrated their superiority in cheapness and convenience to the regular albumen paper, which has to be freshly prepared every time prints are to be made. Thus there are prepared papers made of varying degrees of sensitiveness. The gelatino-bromide paper has the highest, and one time was used extensively in the camera for the making of paper negatives.

Lately a new paper called "Velox," prepared by the Nepera Chemical Company, has been introduced, which appears to be a combination of a chloride and bromide. When exposed to the same light, it prints 500 times as quick as albumen paper. In diffused daylight an exposure of a few seconds only is required; prints also may be made quickly if it is exposed to the Welsbach gas light or the electric arc light.

After exposure, the paper is placed in a developing solution, the image coming out slowly and certainly. It is then toned and fixed in a combined hypo and alum solution, and washed in the usual way.

The photographer is able to make prints with this paper independent of the condition of the weather, and thus fill orders promptly; a case in point being cited of 2,500 prints being finished in two days, from one negative.

The prints are permanent and resist humidity and heat to a remarkable degree, making the paper well adapted for use in warm climates.

Another valuable feature of the paper is that the manipulations can be carried on under a bright yellow light, lamplight, or weak diffused daylight. We have tried the paper, obtaining very satisfactory results.

FRANCE has furnished fewer immigrants to the United States than any other nation in Europe. During the ten years preceding 1890 only about 50,000 persons left France for America.

Stains and Their Removal.

It is, perhaps, hardly necessary to say that stains should be treated as speedily as possible after their first appearance. When once dry they are more difficult to remove, requiring both time and perseverance. Paint should be instantly wiped off; grease on wood, stone or carpet should be congealed before it has time to penetrate, by throwing cold water over it. Tea, coffee, ink, wine, and fruit stains will disappear in a quarter of the time if they can be attended to while wet. Spots on colored material must not be rubbed, but dabbed over and over again until they disappear. Rubbing roughens the surface and often leaves a whitened circle almost as unsightly as the original stain. The dabbing is best done by covering a finger with an old handkerchief frequently changed, and great care should be taken to confine the operation to the area of the stain itself, and not to extend the damage by damping and dabbing the surrounding material. In the treatment of stains, to know what you mean to do, and to do it quickly and neatly, is more than half the battle. We will take stains on white washing materials first.

For acids, tie up a bit of washing soda in the stained part, make a lather of soap and cold soft water, immerse the linen, and boil until the spot disappears.

For anilines, wet with acetic acid, apply diluted chloride of lime, and wash out carefully.

Apple and pear stains may be removed by soaking in paraffine for a few hours before washing.

Blood, if fresh, is removed by soaking for twelve hours in cold water, then washing in tepid water. If the mark still remains, cover it with a paste made of cold water and starch, and expose to the sun for a day or two. Old stains require iodide of potassium diluted with four times its weight of water.

For coffee and chocolate, pour soft boiling water through the stains, and while wet hold in the fumes of burning sulphur.

Fruit stains can be treated in the same way if fresh, but if old rub them on both sides with yellow soap, cover thickly with cold water starch, well rub in, and expose to sun and air for three or four days. Then rub off the mixture and repeat the process if necessary.

Grass stains are removed by alcohol.

Ink requires milk for its removal; the spot should be soaked and gently rubbed. A fresh stain will disappear quickly, but an old one may need soaking in milk for twelve hours.

For iron mould, spread the stained part on a pewter plate set over a basin of boiling water, and rub the spots with bruised sorrel leaves, then wash the article in soft warm suds. Or, cover the spots with a paste made of lemon juice, salt, powdered starch, and soft soap, and expose to the sunlight.

Mildew can be removed by the above paste, or by simply wetting the spots, covering them with powdered chalk, and bleaching on the grass.

Paints must disappear before turpentine and perseverance.

Scorched linen can be restored if the threads are not injured. Peel, slice and extract the juice from two onions, add half a pint of vinegar, half an ounce of curd soap, two ounces of fuller's earth, boil these well, and, when cool, spread over the scorch, let it dry on, and then wash out the garment.

Tar can be taken off with petroleum.

Tea stains yield to the action of boiling water poured through them from a height, or to glycerine.

Wine stains, if old, treat like old fruit stains; if fresh, table salt spread over the spots while wet will neutralize the damage.

Stains of which the cause is unknown will frequently disappear if held in a pan of milk boiling on the fire, or by dipping them in sour buttermilk and drying them in the sun. The articles should then be washed in cold water, dried, and the process repeated several times in the day. The following bleaching liquid will effectually remove any trace that may still remain after the garments have been through the laundry. It may be called an instantaneous ink and stain extractor, but requires to be used with care lest the fabric suffer. Put a quarter of a pound of chloride of lime and a quart of soft water in a wide-mouthed bottle and shake it well. Cork tightly for twenty-four hours, then strain through cotton and add one teaspoonful of acetic acid to every ounce of the mixture. Damp the stain, apply the extractor, and wash well in clear, soft water.

For the removal of stains and spots from colored materials and carpets, ammonia takes the first place. Almost any mark, new or old, will yield to its persevering use, and if dabbed on (not rubbed) it will itself leave no trace of its use. It can be applied to woolens, cottons, and silks. It will remove ink spots from marble, paper, and wood. Grease flies before its application; and when diluted with water, spots caused by orange or lemon juice or vinegar are removed by it from the most delicate materials. For very nice fabrics some people like to use the old-fashioned javelle water, to be obtained from the chemist, but ammonia, delicately applied, does quite as well. From carpets, curtains, and suits of clothing it will remove almost every stain, including that caused by whitewash. Ink spots are always the most difficult to efface. Take up as much of the ink as possible with a spoon and blotting paper, and then use milk or clear water until it disappears, being careful not to extend the area of damage done by rubbing the ink into the adjacent material. Benzine will remove paint from delicate fabrics; if it fails, turpentine must be used, and the mark which it leaves effaced by alcohol. If in the process of removing stains the color departs from the material, it can generally be restored by dabbing with chloroform. —Dyer and Calico Printer.

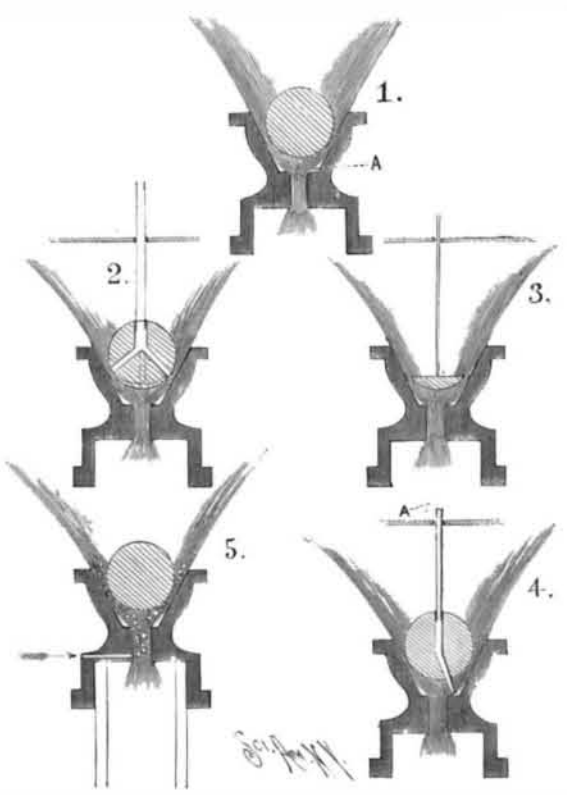
Correspondence.

THE BALL NOZZLE.

To the Editor of the SCIENTIFIC AMERICAN:

Not being entirely satisfied with your explanation of the phenomenon of the ball nozzle, we procured one, and find that the vacuum is located at A, Fig. 1, instead of at the point where the water is tangent to the ball. The following experiments, we think, will prove it: We drilled a hole in the ball, Fig. 2, about ⅛ inch in diameter, and half way through the ball from that we drilled three others to the point where the water is tangent to the ball. In the larger hole we inserted a stiff tube and passed it through a hole in the cross piece above the nozzle; that held the ball in the position shown in the figure, but left it free to be thrown out. If the vacuum was at the point of tangency, the air passing down the tube and out at the side would fill it and the ball would be blown out, but the ball remained in the nozzle.

We then cut the ball down, Fig. 3, until there was



THE BALL NOZZLE.

but a small disk or button left, $\frac{2}{16}$ of an inch in diameter and $\frac{2}{16}$ thick; this was supported by a wire as shown in the figure; the pressure was not great enough to carry it out.

The only place then remaining that a vacuum could be formed was below the water above the shoulder of the nozzle. To prove that the vacuum was at that point, we drilled a ball as shown in Fig. 4, and in the lower opening inserted a tube $\frac{1}{16}$ of an inch in diameter, letting it project beyond the ball about ⅛ of an inch, just enough to carry it below the water; the upper tube was passed up through a cross piece as shown in the figure.

We found that the air passed down the tube, filled the vacuum; and the ball was thrown out.

The opening in the tube at A, Fig. 4, was then closed so that the air could not pass down the tube to the vacuum; the ball would then remain in the nozzle.

We think that the above experiments prove that the vacuum is at A, Fig. 1, and not at the point where the water is tangent to the ball. N. W. GREEN.

Albert Lea, Minn., September 6, 1895.

[We think the experiments of our correspondent fail to prove anything derogatory to our explanation to which reference is made; on the contrary, they seem to prove our theory correct. We admit a vacuum is formed at A in Fig. 1, as pointed out in the above letter; but this would be insufficient of itself to cause the retention of the ball in the nozzle. The admission of air at three or more points in the vacuum zone in the manner shown in Fig. 2 would only destroy the vacuum at those points. The vacuum would still be sufficient to retain the ball.

When air is admitted through the tube A to the space A, it is distributed sufficiently to reduce the vacuum at the surface of the ball and elsewhere in the nozzle, so that the ball is thrown out by the water jet. In Fig. 5, which we have added, is shown an experiment in which air is admitted to the smaller part of the nozzle. This is distributed through the water, preventing the formation of a vacuum anywhere in the nozzle, consequently the ball will not be retained in the nozzle. Air mingled in any way with the water will cause the ball to be thrown out.—ED.]

Destructive Collision of Tandem Bicycle and Carriage.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of August 3 you speak of the striking force of a wheelman at ten feet per second. I will give you something to think about. Three young men left here on the evening of September 7, to ride to Aurora, about twenty miles distant. Two rode a Rambler tandem, one a Fowler wheel; all three are expert long distance riders. When nearing Aurora, they reached the top of a sharp decline, and the temptation to race was too strong, and away they went. Coming from the other direction was a light wagon, containing a woman and two men, the wagon drawn by one horse; all reached the bottom of this hill at the same time —the horse at a slow trot, the boys at thirty miles per hour (and all the argument you could make will not make them come down a single mile).

The tandem struck the wagon somewhere about the left front wheel, none can tell how. Result, wagon wheel turned inside out, axle bent, shafts torn off and one man thrown out on his face. William Hill, first rider, thrown straight ahead about 30 feet, badly bruised and left leg injured, though able to be about on the 12th. Clare Phelps, second rider, thrown about the same distance as Hill, but at an angle of about 70°, using a right angle to the road as a base, bruised about the head and face, otherwise O K the next day. The wheel or tandem about 30° and in the ditch, the front wheel smashed, fork bent short back against the frame and the frame bent between the rear handle post and the front seat post in such a way as to force the front seat over the top of the rear handles; the seat was raised as high as it would go, for Hill is tall and the handle bars were low.

Hill's weight, 150 pounds; Phelps', 137 pounds; tandem, 48 pounds. These young men are used to the cyclometer and timing. Mr. Jarred, the other wheelman, has made his 2½ minutes time on country roads very often, and declares he never rode so fast in his life, and I believe him. A. A. WILSON.

Sandwich, Ill.

Note on Helium and Argon.

BY PROF. H. KAYSER, OF BONN.

Hitherto helium has been found only in a few minerals, and we do not know as yet in what state it exists there. It may therefore be interesting that I have found it in a free state in nature. Some time ago I received information that in the springs of Wildbad, in the Black Forest, bubbles of gas rise which —according to an old analysis of Fehling—contain about 96 per cent of nitrogen. As in all such cases it is possible that considerable quantities of argon may be found, I submitted the gas to analysis.

About 430 c. c. were mixed with oxygen, and sparks were caused to strike through it in presence of potassa lye. The excess of oxygen was then removed by means of potassium pyrogallate. After desiccation there remained 9 c. c., which were filled into Geissler tubes for a spectroscopic examination of the gas. It showed the lines of argon and helium, the latter not in a small quantity, as its lines appeared very bright and could be readily photographed. Runge and Paschen have found that the gas evolved from cleveite and broggerite is a mixture of two substances, one of which, helium, is most highly represented in the visible spectrum by the yellow line, D_3, while the other, not as yet named, is represented by the green line, $\lambda = 501{\cdot}6\ \mu\mu$. Both these elements are also represented in the Wildbad gas, though it seems to me that the second element is here in a smaller proportion than in broggerite, as the green line is relatively feebler.

In this result it seems to me especially interesting that thus for the first time a place has been discovered where the two gases included under the name "helium" are liberated and stream out into the atmosphere. Hence free helium must be found in the air along with argon. In fact, I have found in Geissler tubes which I had personally filled with the purest argon possible—and that at a time when I had not yet worked with helium, so that no admixture with it could have occurred in my laboratory—on direct comparison with helium tubes the presence of D_3 in the argon spectrum; and I have obtained photographically the strong lines at $388{\cdot}9\ \mu\mu$. The lines are certainly very faint, but I consider the presence of helium in the air of Bonn as beyond any doubt. Whether this presence of gases in the springs of Wildbad has any connection with their hygienic efficacy, and whether the gases occur in similar springs, the future must show.—Chem. News.