

once the plates B, and C; when the gold leaves of the electrometer diverge to a distance dependent on the number of contacts.

The cage which incloses the gold leaves is formed of parallel glass plates, and is placed on a screw tripod, furnished, on one side, with a vertical plate, pierced with a small hole, and on the other with a portion of a divided vertical circle, whose centre is at the same height as the hole of the plate and the upper extremity of the gold leaves: in looking through the hole of the plate we observe the deviation.

To give an idea of the power of this apparatus, I will mention two series of experiments. By touching the upper plate with an iron wire after 1, 2, 3, 4, 5, and 10 contacts, the leaves separated $9\frac{1}{2}$, 20, 25, 31, 41, and 88° . By touching the upper plate with a platina wire, a single contact produced but a feeble deviation, which increased to 15° after three contacts, and to 53° after 20. The experiments with platina were made by using a platina wire which had just been reddened in the flame of alcohol, after washing the hands in distilled water. I had previously assured myself, by a great number of successive contacts in which I touched the upper plate with a finger, that the plates did not contain any electricity.

The new fact of the development of electricity by the contact of gold and of platina, was also directly proved by means of a simple condenser of extreme sensibility obtained by giving to the coats of varnish a suitable thickness, and rendering their surfaces perfectly plane.

By means of the double and common condenser, I have ascertained that all the metals on which I have operated were positive with respect to gold, and that arranged in the order of their electromotive faculty, in this respect, were ranked as follows:

Zinc—lead—tin—bismuth—antimony—iron—copper—silver—platina.

The effects produced by bismuth, antimony, and iron, are with difficulty distinguishable.

It is evident, from the disposition of the apparatus, that the quantity of electricity set at liberty, which causes the divergence of the leaves, is proportionate to the number of contacts; now it results from numerous experiments, that as far as about 20° the deviation is proportionate to the number of contacts, hence to this extent the deviation is proportionate to the quantity of electricity. It would be easy to make a table which would give the quantity of electricity corresponding to the deviations which exceed 20° , since these quantities are proportionate to the number of contacts.

Simple condensers, or multipliers, cannot, however, serve to determine the relation of the effects produced by the contact of gold and of different metals, since their relations vary with the thickness of the coats of varnish, as I have satisfied myself by a comparison of experiments with different apparatus.

The instrument which I have the honour to present to the Academy, possessing a sensibility in some sort indefinite, presents to physics a new means of investigation, which I hope may contribute to throw light upon the singular phenomena produced by the contact of bodies.

Idem. Aout, 1838.

On the Temperature of the Earth in Siberia.—Extract of a Letter from M. ERMAN to M. ARAGO.

I venture to flatter myself that you will take some interest in the passages of my journal which relate to the climatology of Northern Asia. I

resumed my researches at the town of Jakoutzk. The bottom of a hole, which M. Scherguin, a merchant of that place, had dug to the depth of 50 ft. English, (with the hope of reaching an unfrozen stratum, whence water might be obtained, maintained the temperature, during the whole of my trials of it, of -6° Reaumur ($= +18^{\circ} 5'$ Fahr.) The temperature of the surface could not have surpassed that degree; though the place of observation was in lat. $62^{\circ} 1' 29''$. This result appeared to me very paradoxical, but I have since proved it by observations on the temperature of the air in the same town, during several consecutive years, with thermometers which I have carefully compared with my own. The following are some of the results:

Temperature of the air in the town of Jakoutzk, during the year 1827,* in degrees of Fahrenheit.

Mean Temp.	6 A. M.	2 P. M.	9 P. M.
January,	-33°	-31°	-32°
February,	$-44\frac{1}{2}$	-36	-42
March,	-17	$+1.6$	-8
April,	$+8$	$+30\frac{1}{2}$	$+17$
May,	$+36$	$+47$	$+38$
June,	$+59$	$+68$	$+54$
July,	$+64$	$+80$	$+62$
August,	$+57$	$+73$	$+58$
September,	$+39$	$+50$	$+40\frac{1}{2}$
October,	$+11$	$+21$	$+13$
November,	-13	-9	-18
December,	-43	-40	-42

You will conclude, from these observations, that the mean temperature at Jakoutzk perfectly agrees with that of the upper strata which I had observed at the depth of 50 feet. It necessarily follows, that by digging deeper they need not expect to come to unfrozen ground, until an increase of heat is obtained, arising from an approach towards the centre of the earth, and amounting to 6° of Reaumur, ($=13^{\circ} 5'$ Fahr.) The experiments hitherto made in the wells of exploration in Europe, and those made by myself in the Oural Mines, make this increase equal to 1° Reaumur for 90 to 100 French feet. I should not expect, therefore, to find unfrozen ground at Jakoutzk under a depth of 500 to 600 feet. The observations which M. Scherguin has made since my departure from Jakoutzk, and when they had extended the digging to 400 feet English, perfectly confirms my previous remarks; for they have found that

At 77 feet English, temperature	-5.5 R. $= 19.6$ Fahr.
119 " "	-4.0 $= 23^{\circ}$
382 " "	-0.5 $= 31^{\circ}$

but these trials indicate that in this country an increase of 1° R. requires a depth of about 60 feet English, which is a more rapid increase than in lower latitudes.

This is to be attributed, I apprehend, to the higher conducting power of the strata of Northern Asia than of those which we inhabit. In fact, the

* This was a temperate winter, for in 1828, the cold of January was

	6h. A. M.	2 P. M.	9 P. M.
Jan. 1828	-54 Fahr.	-48	51

excessive variations of temperature observed at Jakoutzk and other places in Eastern Siberia, during the course of a solar year, induce us to admit that the surface of the earth is there endowed with a radiating and absorbing power much superior to that of Europe.*

Idem. Sept. 1838.

Rapid Mode of Reproducing One's Thoughts.

Doctor Desrivieres points out the following process. Take a thin sheet of lead, or other ductile metal, place it on a smooth hard table, and write upon it with a fine style, with a smooth blunt point, so as to raise the letters in good relief on the under side. A paste of any kind, or plaster diluted with water, is then used to fill the hollows formed by the style. When the paste, or plaster, is hard, the plate is turned over on a hard plane surface, an inked roller is passed over the raised letters, moist paper is then laid on it, and in defect of a little press, it may be struck with a fine brush.

Rec. Soc. Polyt., July 1838.

The Artesian Well at the Abattoirs of Grenelle, Paris.

This well has now a depth of 418 metres, (= 1371 feet.) The sound, or borer, weighs 20 thousand; its height is treble that of the dome of the Invalides, and it requires two machines of immense power to put it in motion. The instrument is still in the chalk bed, the hardness of which is comparable to flint. M. Mulot, the director, states that the sound advances a foot per day.

Idem

Examination of Sea Water Collected during the Voyage of the Bonite, with Apparatus Invented by M. Biot. By M. DARONDEAU.

Five specimens of sea water, obtained at different places and depths, were brought in bottles with ground stoppers. They were only two-thirds full, because the bottles were of a greater capacity than the receiver of the apparatus. Five other specimens, taken from the surface and enclosed in like manner, filled the whole capacity of the bottles. One of these was broken on its way from Brest to Paris.

All the water taken at the surface was perfectly limpid; but that which came from beyond a certain depth contained a whitish flocculent matter held in suspension.

The experiments were all made in the laboratory of the College of France, under the eye and direction of M. Fremy. The density of the water was determined by a specific gravity bottle, comparing the weight of the sea water with an equal volume of distilled water at ascertained temperatures. The quantity of gas held in solution was made known by boiling a flask entirely full of the water, and receiving the gas over mercury. The carbonic acid was determined by potash, and the oxygen by phosphorus.

To ascertain the quantity of saline matter, Gay Lussac's process was followed by evaporating to dryness a given weight of water in a mattress of known weight, inclined at an angle of 45° to prevent loss by projection. The residuum, heated to dull redness, gives the saline matter, minus the chlorohydric acid arising from the decomposition of chloride of magnesium by the heat; but this was accounted for by determining the magnesia in the

* Journ. Frank. Inst., vol. xxii., p.p. 118, 286.