15. For *Cooking Stoves*; Garrettson Smith and Henry Brown, Assignors to Leibbrandt, McDowell & Co., Philadelphia, Pennsylvania; dated October 20, 1857.
16. For *Parlor Stoves*; Garrettson Smith and Henry Brown, Assignors to Leibbrandt, McDowell & Co., Philadelphia, Pennsylvania; dated October 20, 1857.
17. For *Stoves*; Garrettson Smith and Henry Brown, Assignors to Leibbrandt, McDowell & Co., Philadelphia, Pennsylvania; dated October 20, 1857.

The claims on the foregoing, are for the several shapes, forms, ornaments, and configurations.

MECHANICS, PHYSICS, AND CHEMISTRY.

Phosphorescence and Fluorescence shown by means of Photography.

By M. NIEPCE DE SAINT-VICTOR.

The importance and singularity of the following results must be our apology to the readers (if any is needed), for translating the article without abridgment.

ED. JOUR. FRANK. INST.

Does a body, after being submitted to the action of light, preserve in the dark any impression of this light? This is the question which I have endeavored to solve by photography.

The phosphorescence and fluorescence of bodies are known; but the experiments which I am about to describe, have never been made, to my knowledge.

An engraving which has been kept in the dark for several days, is exposed to the direct rays of the sun for at least a quarter of an hour; one half of it being covered by an opaque screen; this engraving is then laid upon a very sensitive photographic paper; and after twenty-four hours of contact in the dark, there is obtained in black, the reproduction of the whites of that part of the engraving which during the exposure was not covered by the screen.

When the engraving has remained for several days in profound darkness, and it is applied upon the sensitive paper without first exposing it to the light, it does not reproduce itself.

Certain engravings after exposure to the light, reproduce themselves better than others, according to the nature of the paper; but all papers, even Berzelius' filtering paper, with or without drawings, whether photographic or otherwise, reproduce themselves more or less after a preliminary exposure to the light. Wood, ivory, gold beaters' skin, parchment, even living skin, reproduce themselves perfectly under the same circumstances; but the metals, glass, and enamels do not.

By leaving an engraving exposed for a very long time to the sun's rays, it will, if I may thus express myself, saturate itself with light. In this case it will produce a maximum effect, provided it be left for two or three days in contact with the sensitive paper. I have thus attained an intensity of impression which leads me to hope that by operating upon very sensitive papers, and developing the image by gallic or pyrogallie acid, we may obtain proofs sufficiently strong to permit the formation of a *cliché*; this would be a new means of reproducing engravings.

If a strip of glass is interposed between the engraving and the sensitive paper, the whites no longer impress the paper. The same results are found, by interposing a plate of mica, or rock-crystal, or a plate of glass colored yellow by oxide of uranium.

It will be seen further on, that the interposition of these same substances arrests also the impression of phosphorescent lights placed directly in front of the sensitive paper.

An engraving coated with collodion or gelatine is reproduced; but one coated with picture-varnish, or gum, is not reproduced.

An engraving placed at a distance of 0.1 inch from the sensitive paper, reproduces itself very well; if it is a drawing in strong lines, it will be reproduced even at a distance of 0.4 inches: the impression is therefore not the effect of lateral or of a chemical action.

An engraving colored with several colors is reproduced very unequally, that is, the colors reproduce themselves with different intensities, varying with their chemical natures. Some leave a very visible impression, while others scarcely if at all color the sensitive paper.

The same is true of characters printed in different inks; the fat ink, for printing in relief, or for mezzotint, and common ink formed by a solution of nut-galls and sulphate of iron, give no images, while certain English inks give very definite ones.

Vitrified characters, traced upon a plate of glazed porcelain, are impressed on the sensitive paper, while the porcelain bears no trace of its presence; but unglazed porcelain, such as biscuit ware, produces a slight impression.

If after exposing an engraving to the light for an hour, it is laid upon a white card-board, which has been kept for some days in the dark; and if after leaving the engraving in contact with the card-board for at least twenty-four hours, the card-board is, in its turn, brought into contact with a sheet of sensitive paper, we shall have, after twenty-four hours of this new contact, a reproduction of the engraving less visible, yet still distinct. When a slab of black marble, sprinkled with white spots, is exposed to the light, and then applied upon the sensitive paper, the white spots alone are impressed upon the paper. Under the same conditions, a tablet of white chalk leaves an impression, while one of charcoal produces no sensible effect.

When a black and white feather is similarly treated, the whites only impress their image.

A parrot feather, red, green, blue, and white, produced scarcely any image, as if the feather had been black, certain colors, however, produced a very feeble action.

I made some experiments with stuffs of different nature and various colors, and I will give you briefly the results which I obtained.

Cotton.—White impresses the sensitive paper.

“ Brown (madder and alumina,) gives no effect.

“ Violet (madder, alumina, and salt of iron,) scarcely anything.

“ Red (cochineal) nothing.

“ Red Turkey (madder and alumina,) nothing.

Cotton.—Prussian blue on a white ground. The blue produced the deepest impression.

“ Blue, by the indigo bath—nothing.

“ Chamois (peroxide of iron,) made an impression.

Stuffs of linen, silk, and wool, also gave different impressions according to the chemical nature of the colors.

I call attention particularly to the following experiment, which seems to me curious and important: Take a metal tube (tin for instance,) or any other opaque substance, closed at one end, and covered inside with paper or white card-board; expose it, the open end in front, to the direct solar rays for an hour; after this exposure, apply the open end to a sensitive paper, and it will be found after twenty-four hours, that the circumference of the tube has formed its image. What is more, an engraving on Chinese paper interposed between the tube and the sensitive paper will be found also reproduced. If the tube be hermetically closed as soon as the exposure to light has ceased, it will preserve for an indefinite time the faculty of radiation which the exposure has given it, and this faculty will be demonstrated by the formation of the impression, whenever the tube is applied to the sensitive paper, after removing the cover.

I repeated, with the luminous images formed in the camera obscura, the experiments which I at first made with direct light. A card-board is taken from the dark, and exposed for about three hours in the camera, into which a bright image of the sun is thrown; the card-board is then laid upon the sensitive paper, and by twenty-four hours contact there is obtained a quite visible reproduction of the primitive image. A long exposure is necessary to obtain an appreciable result, and this is probably the reason why I obtained nothing by receiving the image of a solar spectrum upon a sheet of white card-board for an hour and a half only. I am, nevertheless, convinced that an exposure of several hours with a sheet of very absorbing paper or card-board would give an impression of the spectrum; and this fact, which is not without its importance, may be considered as established. I have not yet had an opportunity to experiment either upon the light of the electric lamp, or the discharge in vacuo, but I purpose to do it as soon as possible.

In some experiments, but as yet very few, I thought I remarked that the light absorbed and kept in a vessel, exercised also an action upon plants, among other things upon flowers, which open by day and close at night.

It remains for me to speak of the experiments which I have made upon phosphorescent and fluorescent substances.

A drawing traced upon a sheet of white paper, with a solution of sulphate of quinine, one of the most fluorescent bodies known, exposed to the sun and applied upon sensitive paper, reproduces itself in a much more intense black, than the white paper forming the ground. A plate of glass interposed between the drawing and the paper, prevents the impression. A plate of glass, colored yellow by oxide of uranium, produces the same effect. If the drawing in sulphate of quinine has not been exposed to the light, it produces no effect on the paper.

A luminous drawing traced with phosphorus upon a sheet of white paper, without exposure to the light, will impress the sensitive paper very rapidly, but if a plate of glass is interposed, there is no action.

The same effects are produced by fluoride of calcium (fluor-spar,) rendered phosphorescent by heat.

These are the principal facts which I have observed. Space is wanting to enumerate all the experiments that I have made; there remain still many more to make, and I therefore publish this note without waiting to make it more complete. I think, that I may be permitted to hope that my new mode of exhibiting properties of light heretofore scarcely suspected or imperfectly established, will attract the attention of physicists, and lead to important researches.—*Cosmos*.

Electric Currents from Zinc and Carbon in Water.

We take from the *Cosmos* the results of some interesting experiments on this subject, by a M. Pelagi. Unfortunately the editor has not told us where the experiments were tried, or where and when the memoir was read.

M. Pelagi began his experiments by plunging two plates of the same copper into wells 33 yards distant from each other, and connecting the plates by a copper wire 186 yards in length. A current was established, but variable in its direction; nor could three months of constant observation, four times a day, determine any law for this change. Atmospheric phenomena did not appear to influence it.

The experiment was varied by using zinc and copper; the results were the same; the same irregularity of the current; the same variability of direction, whether the plates were immersed in water, or buried in the earth.

Carbon being substituted for the copper, a current of constant intensity was established, passing through the wire from the carbon to the zinc.

The following singular results are recorded:

1. A piece of carbon or of zinc of certain dimensions, gives but little more intensity than a smaller piece.
2. The current increases with the number of carbons, united one to the other, in the form of a chain; also, with the number of zincs composing a second chain.
3. The pieces of the same carbon united in the form of a chain by copper wires, give a greater intensity than that given by the carbon before it was broken; and this increase does not depend on the augmentation of the surface, since the new surfaces obtained by the division may be varnished without changing the result.
4. If the pieces of zinc touch the earth, the current ceases entirely, or becomes very feeble and changes its direction. On the contrary, the carbons may touch the earth without any change in the current; it tends rather to increase. But if one of the wires uniting the carbons touch the ground, the intensity becomes the same as if all the carbons below that wire were removed.