A BEAUTIFUL DYE FROM COAL TAR.

The attention of calico-printers and of woolen and cotton manufacturers throughout the world having been for some time directed to a new, beautiful, and permanent violet dye which is obtained from coal tar, we presume many of our readers will be interested in the following article which we translate from *Le Gaz*, of Nov. 15, 1859, and which contains a brief description from the largest French manufacturers of their mode of producing this new and valuable dye. Is there not an opening for a profitable enterprise in its manufacture from the refuse of our own coal oil and gas-works?

Among the sub-products which are obtained in the manufacture of illuminating gas, there is one, coal tar, which enjoys the privilege of endowing, from time to time, the industrial world with some new substance which signalizes its advent by a marked step in the progress of the arts. We borrow from our colleague, Doctor Quesneville, an article full of interesting details, which he has just published, on the application of nitro-benzine to the dyeing of cloths.

The attention of the industrial world has been for sometime fixed on benzine and nitro-benzine, and on the numerous applications which aniline has received in the printing of fabrics, and in the dyeing of silk, woolen, and cotton.

The violet tints have generally been made with archil, but in consequence of the small stability of that coloring principle, violets thus made change under the influence of light alone, and they are altered by the feeblest acids. Aniline is now replacing archil; it constitutes the base of a fast violet color, which does not fade in the light, and which is acted upon by neither acids nor alkalies. It is to this great stability that it owes all its importance. It gives every variety of shade from the most delicate lilac to the deepest violet. The apparition of this fixed violet has produced a veritable revolution in dyeing, but its introduction has been obstructed to the present time, by the difficulty of procuring it. Messrs. F. Laurent and Casthelaz, manufacturers of chemical products, of Paris, have for some time been endeavoring to overcome these difficulties, and having succeeded in making important improvements in the mode of manufacture, they have erected apparatus at their works at Aubervilliers for the production of benzine, nitro-benzine, and aniline on a large scale, and will be able henceforth to furnish a supply of these articles. We have the pleasure of publishing the following account, which Messrs. Laurent & Casthelaz have addressed to us on their method of manufacture.

Charcoal has not yet been transformed into diamond, but we have succeeded in extracting from mineral coal a product equal in value to that of gold, of a magnificent tint, and of an extraordinary power of coloration; it is called aniline violet. This substance is designated, by persons who do not keep themselves informed in regard to the progress of science, as the violet of coal or of charcoal. Coal is indeed the primary source of it, but it is only after a long series of operations that this precious color is reached.

1. *Distillation of Coal.*—Coal must be submitted to distillation; this operation is the base of the manufacture of illuminating gas, and the products to which it gives birth are: First, Coke, a fixed product, which remains in the retort. Second, Coal tar, a semi-liquid product, which passes over in distillation. Third, Ammonical waters, and the sal-ammoniacs. Fourth, Illuminating gas. Gas and coke are the principal, ammonia and coal tar the secondary products; during a long time, indeed, coal tar was of scarcely any use, and was burned under the retorts; now it is gathered with care and distilled, and it is this product which particularly interests us in relation to aniline.

2. *Distillation of Coal Tar.*—The presence of aniline has been discovered in coal-tar, but in so small quantities and mingled with so many foreign substances, ammonia, benzine, taluine, phenic-acid, bucoline, naphthaline, brai, &c., that to directly extract it a treatment would be required too long and too expensive. The coal tar is therefore submitted to distillation, and furnishes the following products: First, Dry brai, a product not fixed, which remains in the retort. Second, The volatile oils of coal. We shall occupy ourselves only with these latter.

3. *The Distillation of Coal Oils.*—The volatile oils of coal are very complex products; they contain, in fact, nearly all the products which we have mentioned as constituent parts of coal tar, with the exception of the brai. Submitted to distillation they pass over at divers temperatures, and are thus separated, giving us oils of various densities and properties. First, Heavy oils. Second, Light oils. The heavy coal oils are but little employed. In consequence of the property which they possess of preserving wood from the attacks of insects, they are used for injecting railroad ties. The light coal oils are mixtures in variable proportions of benzine, toluine, phenic acid, and other substances of less interest. According to their density they serve for the manufacture of phenic acid, of picric acid or of benzine.

4. *Distillation of Light Coal Oils.*—This operation is the base of the preparation of benzine. It is necessary to submit the oils employed to either two or three distillations, according to their purity; bringing them to a density of 27° or 28° Beaumé. The benzines vary much according to the nature of the coals from which they are made, and according to the temperatures at which they are distilled. These differences aresceen both in their odor and volatility, and according to their quality they are applied to various purposes. First, Benzine serves for the dissolving of caoutchouc and gutta-percha. Second, It enters into the composition of certain varnishes in consequence of its dissolving action on resinous gums. Third, It dissolves fatty substances. and therefore serves for removing grease-spots from cloths. Fourth, It is employed for lighting, in which case it is burned in lamps specially adapted to it, either pure, or mixed with other liquids less carbonized. Fifth, It is employed as an agent for carbonizing illuminating gas. By passing gas through benzine it takes up the particles of carbon, and thus acquires a much more considerable illuminating power. Sixth, It is used in the preparation of nitro-benzine. We have cited only the principal uses of benzine, but these will suffice to show the importance of this product.

5. *Transformation of Benzine into Nitro-Benzine.*—Benzine submitted to the action of concentrated nitric acid, or to a mixture of nitric and sulphuric acids, and distilled, gives a reddish liquid which is the crude nitro-benzine. Submitting this product to one or two distillations, we obtain a pale yellow liquid, of an agreeable odor, resembling that of bitter almonds, of a density much superior to that of water, marking 20° to 22° of the hydrometer. This is distilled nitro-benzine.

6. *Transformation of Nitro-Benzine into Aniline.*—Nitro-benzine, pure and distilled, being submitted to the action of nascent hydrogen, transforms itself into aniline, which in its turn may be purified by one or two distillations. It presents itself, then, under the form of an oleaginous liquid, white when first obtained, but soon becoming yellow, rose tinted, and then red. It constitutes a volatile salifiable base.

7. *Transformation of Aniline into Aniline Violet.*—Finally, the white aniline, under the influence of oxydizing agents, is transformed into aniline violet. This substance is sold in several states, as a liquid more or less concentrated, as a paste and as a powder. The following are the comparative prices of the products of which we have spoken:—Coal, ¼c. per lb.; coal tar, ¾c. do.; heavy coal oil, 2½c. a 3¾c. do.; light coal oil, 6¾c. a 10¼c.; benzine, 10½c. a 13c.; crude nitro-benzine, 57c. a 61c.; rectified nitro-benzine, 82c. a 96c.; ordinary aniline, $3.27 a $4.90; liquid aniline violet, 28c. a 41c.; carmine aniline violet, 32c. a $1.92; pure aniline violet in powder, $245 a $326.88.

The price of aniline is certainly high, but a small quantity suffices to give much coloration; the value of the violet anilines is always proportioned to the quantity of coloring matter which they contain. The importance of this dye is now generally recognized; this importance is due to the fixity, the unalterability, and the beauty of all the violet tints which it produces.

A PERSONAL EXPLANATION.—We are almost daily in receipt of letters from parties in the South and West, inquiring about the responsibility of J. C. Cary, of No. 81 Nassau-street, this city, who has sent out a circular about a patent cap and breast lantern. In this circular, Mr. Cary, it seems, has taken the unwarrantable liberty of referring parties to us as to his responsibility. This he had no right to do; and we take this method of stating that we know nothing whatever about him in this respect.

THE EMPTY PLACE.

A scientific lecture was recently delivered at Canandaigua, N. Y., by the Hon. Henry W. Taylor, of that place, in which he gave a new and quite a scientific interpretation to Job xxvi. 17: "He stretcheth out the north over the empty place, and hangeth the earth upon nothing." He said that the "empty place" had awakened considerable curiosity in the public mind, and after speaking generally of the progress of science and the wonders of nature, gave a detailed account of discoveries in the polar regions—mentioning the open polar sea and the fact that the temperature increases as we advance north from a certain parallel of latitude, and that trees and bodies of animals—natives of temperate, and even torrid regions—float from the North on to the desolate shores of the Arctic ocean. He then read the above passage from the Bible, and remarked that his theory of the "empty place," of which Job speaks, is that it is the great basin or open Polar Sea at the north pole which, as he thought, is about 2,000 miles in diameter and surrounded on all sides by lofty mountains of ice, that would reflect the rays of the sun and raise the temperature of the place to well nigh, if not quite, that within the tropics. The land, if any there be in that ice-bound retreat, might be covered with life—vegetable and animal—and in the long half year of night who knows but that the Lord, in his never-failing providence, has created the aurora borealis to supply to those isolated regions as cheerful light and heat as that of the noonday sun?

AGRICULTURAL FAIR AT BATON ROUGE.

On the second Monday in March next an agricultural fair is to be held at Baton Rouge, in Louisiana. The president of the managing association, J. A. Dougherty, Esq., in forwarding us a prospectus, makes the following remarks which will doubtless be interesting to large numbers of our readers:—

MESSRS. EDITORS:—We are much in need of labor-saving implements in our farming, and we have found that we do need them. A paragraph or two in the SCIENTIFIC AMERICAN might strike the right man in the right place, and make his fortune and help us exceedingly. This is the country for the steam plow, the ditching machine, the horse hoe, the horse corn-planter, and many other implements as yet not invented. Many of us have read of such implements, but having no opportunity to see them in operation we fail to realize their importance; and men of enterprise could not do better than afford us such an opportunity, as, when once introduced, they would speedily go into general use. No better opportunity can occur than will be offered at the approaching fair, which takes place while our legislature will be in session. Good premiums will be offered, and you may assure all who will visit us that they will receive a cordial welcome and the probability of satisfactory sales. Baton Rouge is on the Mississippi river, 130 miles above New Orleans, and the first high land above the mouth of the river, high and healthy. J. A. D.

The Corresponding Secretary is John H. New, Esq., and communications should be addressed to him at Baton Rouge, La.

ECONOMY OF FUEL IN ENGINES.

MESSRS. EDITORS:—Last April, I gave youan account of fuel consumed at my dye-wood and grain mill for the year ending Dec. 31, 1858. For 1859 I have a much better account to give:—From Jan. 1st to May 31st, engine run 128 days; coal bills, $725.48 or $5.66 per day; work done, 50 horse power. On June 1st, I introduced a J. & J. Aldridge's "hot-air blast;" have run 172 days; coal bills, $735.70 or $4.27 per day, doing the same amount of work with much less fuel, and about one-third less work for the engineer. The steam can be kept at any point with Aldridge's arrangement, and the capacity of the boiler greatly increased; besides an inferior quality of coal can be used. The first mention of this hot-air blast I saw was in the columns of the SCIENTIFIC AMERICAN, during the month of November, 1857; since then I find a large number in operation. The wonder is that every person using steam does not supply himself with the "Corliss" engine and "Aldridge" hot-air blast.

W. B. R.

Providence, R. I., Jan. 10, 1860.