NOTES FROM THE RESEARCH LABORATORY, EASTMAN KODAK COMPANY.*

SOME QUANTITATIVE DATA ON CATHODE DEPOSITED METALS.†

By P. G. Nutting.

SOME apparatus developed for the preparation of semi-transparent platinum mirrors, eleven inches square, giving very uniform results, a number of deposits were made to determine the variation of reflecting power, transmission, density, and mass of metal deposited with current density and time of deposit. In the larger apparatus the cathode was $279 \times 279 \times 0.05$ mm., in the smaller $120 \times 120 \times 0.1$, both of platinum with 30 per cent. iridium.

With the smaller apparatus the data shown in the figure were obtained. Abscissæ are milliampère-minutes. The curve R is reflecting power at 45 degrees incidence, T transmission, and D density ($D = \log 1/T$), measured normal to the surface. The dotted line D_0 is the density corrected for losses by reflection. Density is proportional to mass of metal, and hence to quantity

* Communicated by the Director.

† Communication No. 33 from the Research Laboratory of the Eastman Kodak Company.

of electricity. Eight points on the curves were obtained at currents of 20, 30, and 60 milliampères and running for from one to twelve minutes.

Mass per unit density and per coulomb were determined on the larger apparatus. Metal was deposited at 60 milliampère current for 12 minutes, or 0.0920 amp.-min./dm.². The deposited mirror, trimmed to 7.34 dm.², had a mean density of 0.224 and weighed 0.0125 gm. The mass per square decimetre per unit density is, therefore, 7.6 milligrammes. The silver in a photographic negative has a mass of 9 to 12 mg./dm.² per unit density.

The mass of 1.71 mg./dm.² was deposited by a current of 0.72 amp.-min. over 7.78 dm.², or 0.0926 amp.-min./dm.². The deposit was, therefore, 0.0185 gm./amp.-min., or 0.00031 gm./amp.-sec., compared with 0.001118 for silver. Quadrivalent platinum, deposited according to Faraday's Law, would give 0.00050 gm/amp.-sec.

ROCHESTER, N. Y., June, 1916.

Strike-a-lights. H. BRIERLEY. (*English Mechanic and World of Science*, No. 2666, April 26, 1916.)—Only 89 years ago lucifer matches were first sold at Stockton-on-Tees in boxes containing only 50 for a shilling, and some time elapsed before it was possible to buy 25 of them for a sixpence, and at the popular price of "four a penny" they were cheap only to the well-to-do. Elderly people can tell us a good deal about the use of the flint and steel and home-made non-frictional matches. Tinder had to be prepared by burning a few old rags, but some people preferred touchwood to tinder. This consisted of decayed and pulverized wood or bark, or else of certain fungi taken from trees. Tinder-boxes known as "strike-a-lights" or "strike-a-sparks" usually carried their own flint on the lid or base. The world is indebted to one John Walker, a Stockton-on-Tees chemist, who placed on the market the first match lit by friction in 1827.

Brandon, the little Suffolk town, still supplies the world with the primitive flint strike-a-lights, which not even the excellent safety match and wax vesta have not rendered obsolete. British troops during the South African campaign were supplied with Brandon flints—the best in the world—combined with steel, fuse, and lens; while Brandon gun-flints were used at the Battle of Waterloo and during the Crimean War. Spanish and Italian peasants have always been glad to secure Brandon flints, which, in one form or another, constitute part of the outfit of soldiers, travellers, and explorers in tropical lands. The modern flint, steel, and fuse combined is cheap, quite safe, and is contained in the smallest possible space.