

SIZING DESTROYED BY SUNLIGHT AFTER AN EXPOSURE OF TWO YEARS.



ON A PREVIOUS occasion, in the reports of the Royal Technical Testing Institutes of Berlin for 1889, Mr. W. Herzberg, superintendent of the Department for Testing Paper, had stated that of five different papers which had been exposed to the light (morning sun) for four months, those composed of rags had either had their sizing impaired or completely destroyed, while only one of them, composed of wood pulp and wood fibre, had retained its impermeability; three of the papers experimented with, all record papers of bleached linen and cotton, had turned quite yellow, another

sample of record paper, made of unbleached linen, had preserved its original appearance, and the above-mentioned paper of wood fibre, which had retained its sizing unimpaired, had been turned a dark brown color by the exposure.

Mr. Herzberg has since then made other experiments with six samples of paper, exposing them to the light for two years, and he has just reported the results of these tests, from which we give the following extracts:

1. Paper of wood and straw fibre, 18.8 per cent. of ashes, resin sized. At the beginning of the exposure the writing was clear and well defined, showing slightly on the reverse; at the end of the test the writing was blurred, showing plainly on the reverse, the heavy lines partly sunk. In appearance it was slightly brown.

2. Paper of cotton, linen, wood and straw fibre, 16.8 per cent. of ashes, sized with free resin. At the beginning, writing clear and sharp, the heavy lines showing plainly on the reverse. At the end, writing badly blurred, all lines showing plainly on the reverse, heavy lines sunk. Appearance, very brown.

3. Cotton with small proportion of linen, 1.3 per cent. of ashes, sized with resin and animal size. At the beginning, writing clear and well defined, not showing on reverse. At the end, writing badly blurred, but no trace of it on reverse; appearance of paper, yellow.

4. Paper composed like sample 2, with 18.5 per cent. of ashes, sized with resin and animal size. At the beginning, writing clear and sharp, not showing on reverse. At the end, writing badly spread, showing plainly on reverse and heavy lines blurred. Appearance, slightly yellow.

5. Paper of linen with an addition of cotton, 3.5 per cent. of ashes, animal sized. At the beginning, writing clear and sharp, showing slightly on reverse. At the end, writing badly spread, the fine and middling lines showing on reverse, the heavy lines badly blurred and sunk. Appearance, slightly yellow.

6. Paper of cotton and linen, 1.5 per cent. of ashes, animal sized. At the beginning, writing clear and well defined, showing plainly on reverse. At the end, writing badly spread, the fine lines plainly visible on reverse, the middling and heavy lines badly blurred and sunk. Appearance, slightly yellow.

The sizing had, it will be seen, been destroyed in all these papers.

The sample No. 2, a copper plate paper, had been sized with a solution of colophony in ether, and contained, therefore, free resin as sizing substance. In this paper the sizing, according to the detailed table published by Herzberg, had been destroyed after one month of exposure to the light, while the papers which

had been sized with resin and animal size stood the exposure from two to four months before their sizing showed any appreciable signs of deterioration.

We learn, therefore, that even animal sizing is unable to withstand two years exposure to light, and Herzberg says that papers containing wood pulp had also lost their impermeability after two years time.

Some experiments were made exposing the paper only partly to the sunlight, but the entire surface to the action of the atmosphere, and it was found that resin sized papers had become unsized only where they had been exposed to the light, but the animal sized papers all over, also where the light had not struck them. This proves that there are other factors besides light which contribute to the destruction of animal sizing. The peculiar jagged appearance of the ink lines on the affected animal sized paper indicates that the coating of animal size is probably cracked or broken by the changes in the temperature and humidity of the air, forming rents and cracks in the surface of the paper, which allow the ink to penetrate.

Heat, it was shown by other experiments, does not influence the sizing. Herzberg heated some papers eight hours daily for several months to a temperature of 98 degrees C until the finally crumbled when touched, but their sizing had not been destroyed.

Herzberg speaks in his report of the explanations given by other investigators as to the causes of the destruction of the sizing, and whether they are due to chemical or physical influences, and he differs with them in some particulars. He states that the resin which had been soluble in the freshly sized papers had become insoluble after long exposure to light.

He concludes his interesting work with the report of a peculiar observation he made with some standard paper No. 2. A sheet of this paper which had been exposed was still well sized in some places, while in others the sizing had been completely destroyed.

SEA WATER FOR STEAM BOILERS.

For some time past experiments have been made by engineering experts at Poplar, England, to ascertain the effect of feeding one of the well-known Yarrow boilers with salt water. This boiler, as is familiar to all engineers, is of the express or small tube type, having tubes about one and one-eighth inch diameter, as compared to the four and one-half or five inch tubes of the type of water tube boilers now being introduced for battle ships and large cruisers. It has been considered, it seems, that the smaller tubes of the express boiler would be quickly stopped up in case salt water should gain access to them through a leaky condenser, or other contingencies which must be provided against. Now, the important point of information has been gained by these experiments which disproves such a theory; that is, the successful running of a boiler of this description for some time, using only sea water with a greater density; that is, a large proportion of salt and other mineral constituents—than would have been considered suitable even with the ordinary shell boilers. In other similar experiments favorable results are reported; the boiler was continuously blown off, the adjustment being such as to maintain the water in the boiler at a density of 3.32, or three times the density of sea-water. The difficulty anticipated in using such water was not only from incrustation of tubes, but from priming; no difficulty, however, arose from either of these.