## XX. *An Account of the Effect of Electricity in ſhortening Wires.* *By Mr.* Edward Nairne, *F. R. S.*

Read May 11, 1780.

EVERY new fact in a ſcience being an acquiſition to it, I beg leave to lay before this Society the following diſcovery, which I made ſome time ago, relative to electricity ſhortening wire by its paſſage through it. The following experiment I hope will clearly illuſtrate it.

### EXPERIMENT.

I took a piece of hard-drawn iron wire, ten inches long, and one hundredth of an inch in diameter. This wire was held in a perpendicular poſition between two braſs pinchers, the upper one of which was connected with a glaſs pillar, in order that the whole charge of an electrical battery might paſs only through the wire faſtened between them. Theſe upper pinchers were moveable, for the ſake of ſlackening the wire occaſionally; and, in the experiment, they were fixed with a ſcrew,

a ſcrew, ſo that the wire hung ſomewhat looſe between them and the lower ones. I then charged a battery, containing twenty-ſix feet of coated ſurface, till the index of the electrometer was raiſed to fifty degrees: it was then diſcharged through the wire, and, immediately after, the wire was ſeen to ſhorten by its drawing nearer to a ſtraight line between the fixed pinchers. If the wire was put ſo looſe that the moving of the upper pinchers three quarters of a tenth of an inch, or ſeventy-five thouſandths, would draw it juſt ſtraight, one diſcharge of the battery through it would then draw it to a ſtraight line. I diſcharged the ſame battery nine times through a piece of the ſame wire, which was alſo of the ſame length, which was ſlackened each time before the diſcharge went through it. There were preſent Sir JOHN PRINGLE, the hon. Mr. CAVENDISH, Mr. SMEATON, the Rev. Mr. MICHEL, Mr. RUSSEL, and Mr. WHITEHURST. After the ſixth and ninth time Mr. SMEATON meaſured the wire, and found it to have ſhortened in the proportion of three quarters of a tenth of an inch each time.

I afterwards diſcharged the battery ſix times more through the ſame piece of wire, which made fifteen times in the whole, and found it had continued ſhortening nearly in the ſame proportion, the wire having been ſhortened by the fifteen ſtrokes full one inch and one tenth,

tenth, *viz.* its whole length being now barely eight inches and nine tenths inſtead of ten inches that it was at firſt. I then weighed it in a pair of ſcales that would turn with leſs than the eighth part of a grain; but could not perceive, that there was any ſenſible difference in the weight. I tried it with a pair of callipers, and it ſeemed to be rather thicker.

I intended to have paſſed ſeveral more diſcharges of the battery through the wire, but the ſixteenth melted it.

I have likewiſe ſhewn this extraordinary effect of electricity to Dr. PRIESTLEY, Mr. MAGELLAN, and ſeveral other gentlemen, in whoſe preſence I paſſed ſix diſcharges of the ſame battery through a piece of the ſame wire, exactly ten inches in length; and on meaſuring it, it was found to be ſhortened four tenths and a half of an inch, which is juſt three quarters of a tenth for each diſcharge. Dr. PRIESTLEY then took a piece of the ſame wire, of exactly the ſame length, and heated it red-hot in the common culinary fire. This wire being afterwards meaſured was found to continue of its original length of ten inches, not being in the leaſt ſhortened.

I have generally found, that if the iron wire was firſt annealed in the culinary fire, the ſame ſtrength of charge melted it.

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