



L. An account of a new method of increasing the charging capacity of coated electrical jars

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To cite this article: John Wingfield Esq. (1810) L. An account of a new method of increasing the charging capacity of coated electrical jars , Philosophical Magazine Series 1, 36:150, 259-262, DOI: [10.1080/14786441008563187](https://doi.org/10.1080/14786441008563187)

To link to this article: <http://dx.doi.org/10.1080/14786441008563187>



Published online: 18 May 2009.



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cross *m*; and having thus removed the obstruction, the two frames *e e f g* are closed together by the springs *p p*, so that the bars *f g* inclose his leg, and the clicks in the locks prevent the bars being opened without the screws *S*. In some of the machines which Mr. Salmon has made since the model was deposited with the Society, the locks are made like figure 2, *L*, where a common key is to be introduced, and, when turned round, catches the tail of the click; it may have wards to prevent the using of a false key, though no wards are shown in the plate. Part of the screw *D* for securing the trap from being carried away by depredators, is shown on a larger scale at *N*, in order that the peculiar form of its threads may be better seen, which fix it firmly in the earth. Such screws would be very serviceable in fastening horses at grass, &c.

L. An Account of a New Method of increasing the charging Capacity of coated Electrical Jars, discovered by JOHN WINGFIELD, Esq. of Shrewsbury. Communicated by Mr. JOHN CUTHBERTSON, Philosophical Instrument-Maker, Poland Street, Soho; with some Experiments by himself on that Subject.*

IN my treatise entitled *Practical Electricity and Galvanism*, page 103, I have said that breathing into coated electrical jars increased their charging capacity to such an astonishing degree, that their discharge would fuse four times the length of wire more than they could in ordinary circumstances; which I proved by experiments 147 and 156. Since that publication, large electrical batteries are become more general, and the number of jars increased; so that batteries containing thirty, sixty, and even a hundred jars are frequently met with; and, when so numerous, breathing into each jar is very disagreeable; and not only that, but in very dry states of the atmosphere, when most wanted, is even ineffectual, as those jars first breathed into lose that property which was produced in them by breathing, before the last can have obtained it: so that various other means have been tried; such as wetting the inside of the jars, and putting wet sponges into them, or by greasing and oiling the uncoated part in the inside; all of which gave very uncertain results, till John Wingfield, esq. communicated to me,

* A gentleman who has lately very much distinguished himself, not only in the electrical science, but in all other branches of experimental philosophy.

he had discovered, that pasting of paper on the inside and outside of the jars above the coating, had the effect of preventing the jars from exploding to the outside coating, and believed that their charging capacity would be increased thereby.

I embraced the first opportunity to try the effect of that discovery with single jars.

Experiment I.—I took a very thick jar (which had been used to show the phenomena of voluntary explosions without breaking) twelve inches high, and the coating nine inches, containing in the whole about 171 square inches; it was applied to the conductor of a plate electrical machine, and six turns of the plate caused a voluntary explosion to the coating: the state of the atmosphere not being very dry, it required eight and twelve turns to produce a second and a third explosion: a fourth could not be produced; but when cleaned and dried as before, six turns caused a voluntary discharge.

Experiment II.—A slip of paper one inch broad was taken, of sufficient length to fit round the outside of the jar when the two ends were pasted together: this was slipped on to its outside to about one inch from the coating: the uncoated part being rubbed clean and dry, and applied to the machine, eleven turns of the plate produced a voluntary discharge to the outside coating.

Experiment III.—The paper ring was then slipped down to touch the coating, and then applied to the conductor: no voluntary discharge could be produced; and when discharged in the common way, its power did not seem to be increased,—to prove which,

Experiment IV.—The common discharging electrometer (which is always fixed to the basement of my machines) was used, to try to what distance the discharge could be made to pass from the knob of the conductor to the ball of the electrometer; which was found to be one inch and five-eighths.

Experiment V.—A piece of iron wire, $\frac{1}{16}$ th part of an inch in diameter and one inch in length, was hung to the electrometer, through which a second discharge was made to pass, and the wire was blued.

Experiment VI.—The paper ring was then taken off and breathed into twice; the discharge was then produced at the distance of two inches, and the wire was fused into balls.

Experiment VII.—The jar was then rubbed clean and dry, and a piece of the same sort of wire and the same length was hung to the electrometer in the same manner

as

as before, and it appeared that the greatest charge it could take had not the least effect upon the wire: thus it appears that a paper ring so applied does not increase the charging capacity of jars in the same degree as breathing.

Experiment VIII.—The jar was highly charged, and examined in the dark: the paper ring appeared luminous all round the uppermost edge.

Experiment IX.—The ring was taken off, and pasted on in the inside close to the coating: 23 turns caused a voluntary explosion through the ring to the outside coating.

Experiment X.—A second ring three quarters of an inch broad was pasted on close to the other: the same number of turns produced a voluntary explosion, and the paper was torn by the discharge, which was repaired and left to dry.

Experiment XI.—When dry, no voluntary explosion could be obtained.

Experiment XII.—Its greatest power was then tried, and was found to be exactly the same as in Experiment VI. (when it was breathed into): it discharged at two inches distance, and the same length of wire was fused into balls.

Experiment XIII.—A second jar was taken of a larger size, being 13 inches high, and its coating seven inches; in the whole it contained about 190 square inches: after being rubbed clean and dry, it was applied to the conductor of the machine: twelve turns of the plate produced a voluntary explosion to the outside coating.

Experiment XIV.—A paper ring was put round the uncoated part on the outside at about $1\frac{1}{4}$ inch distant from the coating: eleven turns of the plate produced a voluntary explosion to the outside coating: the paper ring was then pushed down to the coating, after which no voluntary explosion to the coating could be obtained; but it discharged itself to the electrometer ball standing at the distance of $2\frac{1}{8}$ inches from the knob of the conductor.

Experiment XV.—The same sort of wire, two inches long, as used in Experiment VI, was hung to the electrometer, and the discharge made it blue with several bendings,—a proof that it had been nearly red hot.

Experiment XVI.—A ring of common writing-paper one inch broad was pasted on the inside close to the coating, and when dry no voluntary explosion to the coating could be obtained; but it discharged itself to the electrometer ball standing at the distance of $2\frac{1}{8}$ inches, and the wire was fused into balls.

Experiment XVII.—The paper rings were now taken off, and the uncoated part made clean and dry: 19 turns produce

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duced a discharge to the electrometer ball at the same distance, and the same length of wire was slightly blued.

Experiment XVIII.—The jar was then breathed into, and a discharge was produced at the same distance, but the wire was not fused.

Experiment XIX.—The same jar was breathed into a second time, and a discharge was caused at the same distance, and the wire was fused into balls exactly the same as when the paper rings were on.

Experiment XX.—A third jar nine inches high and four inches diameter, the whole containing about 64 square inches, when rubbed clean and dry, two turns of the plate caused a voluntary discharge to the outside coating.

Experiment XXI.—A paper ring was pasted on both sides close to the coating, and one inch from the top, after which no voluntary explosion could be obtained, but the electric fluid was seen to run over the brim of the glass to the outside coating as quick as the machine could give it: the discharging distance was seven-eighths of an inch: it had not power sufficient to make any impression on one inch of wire.

Experiment XXII.—The paper rings were then cut narrower at different times, and tried, which increased the discharging distance, when there remained only one quarter of an inch which seemed to be the most favourable above the coating: the discharging distance was $1\frac{3}{4}$ inch, and the wire was fused, and dispersed in balls.

Experiment XXIII.—The paper rings were taken off, and the jar carefully breathed into: six turns of the plate caused a discharge to the electrometer standing at the distance of $1\frac{1}{4}$ inch, and one inch of wire was fused, and dispersed in balls, equal with the last experiment.

The above experiments are sufficient to prove that paper rings pasted on to electrical jars in the manner explained, do hinder voluntary explosions, and increase the charging capacity of coated jars, in the same degree as breathing into them.

Further experiments and observations, setting forth the advantages that electricians are likely to obtain from the above discovery, will be the subject of a future paper.