

$$(x^1, x^2 \dots x^7), [\cos]$$

$$(x^0, x^1, x^2 \dots x^7) \frac{\cos}{\sin} jf, j=1 \text{ to } j=7, [\cos], [\sin], [\cos \pm \sin]$$

$$\left(\left(\frac{r}{a}\right)^{+4} \dots \left(\frac{r}{a}\right)^{+1}, \log \frac{r}{a}, \left(\frac{r}{a}\right)^{-1} \dots \left(\frac{r}{a}\right)^{-5}\right), [\cos]$$

$$\left(\left(\frac{r}{a}\right)^{+4} \dots \left(\frac{r}{a}\right)^{+1} \left(\frac{r}{a}\right)^{-1} \dots \left(\frac{r}{a}\right)^{-5}\right) \frac{\cos}{\sin} jf, j=1 \text{ to } j=5, [\cos], [\sin], [\cos \pm \sin]$$

all the developments being carried up to e^7 , the limit of the formulæ from which they are deduced.

IV. "On the Application of Electrical Discharges from the Induction Coil to the purposes of Illumination." By J. P. GASSIOT, Esq., F.R.S. Received March 29, 1860.

The subjoined figure represents a carbonic acid vacuum-tube of about $\frac{1}{16}$ of an inch internal diameter, wound in the form of a flattened spiral. The wider ends of the tube, in which the platinum wires are sealed, are 2 inches in length and about $\frac{1}{2}$ an inch in diameter, and are shown by the dotted lines; they are enclosed in a wooden case (indicated by the surrounding entire line), so as to permit only the spiral to be exposed.

When the discharge from a Ruhmkorff's induction apparatus is passed through the vacuum-tube, the spiral becomes intensely luminous, exhibiting a brilliant white light. Mr. Gassiot, who exhibited the experiment at the meeting of the Society, caused the discharge from the induction coil to pass through two miles of copper wire; with the same coil excited so as to give a spark through air of one inch in length, he ascertained that the luminosity in the spiral was not reduced when the discharge passed through 14 miles of No. 32 copper wire.

