The whole instrument takes to pieces & is placed in a long narrow box.
It will also find Mom.ts of inertia round a line in plane of curve — with aid of another groove. It easily finds the centre of gravity of the area; also the sum of moments of any no. of coplanar forces about a point — obviously.
I suppose there may be a letter from you at Coopers Hill.
Adieu.

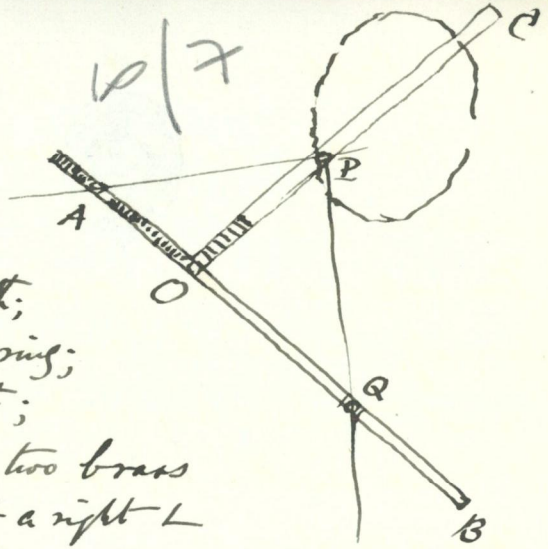
M.

10/7

Friday.

Φ,

Came in here yesterday. Have seen the Momento-planimeter. It works smoothly. The difficulty of producing smooth motion along a groove has been got over. Hence my modification of Amsler's instrument comes Wallso.
The principle of my instrument is simplicity itself.



AOB is a bar, grooved from O to B; OC a bar grooved in most of its length; at A is a swivel ring; $OA = \underline{a} =$ constant; AP and PQ are two brass bars fixed at a right ∠ at P, where there is a tracing pencil that can be carried over any curve; at Q, the pt. given by PQ & OB there is a little carriage carrying a swivel ring thro' wh. PQ passes, & also a stylographic pen; this carriage has been made to travel very smoothly along the groove, when any motion of PQ takes place.

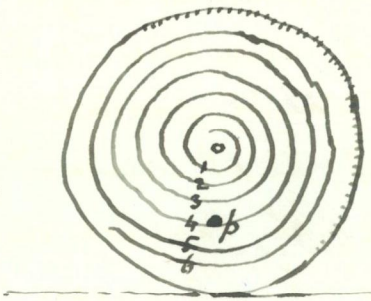
If $OP = r$, $OQ = \frac{1}{a} r^2$, & Q will trace out a curve whose area $= \frac{1}{2a^2} \int r^4 d\theta$

$= (\text{Mt. of inertia of given curve about } O) \frac{2}{a^2}$.

Also $\int OQ\, d\theta = \frac{1}{a} \int r^2 d\theta = \frac{2}{a} (\text{area of given curve})$;

and $\int OQ\, d\theta$ is read by a roller whose plane is fixed $\perp^{\text{r}}$ to OQ.

This roller is rather ingenious, I flatter myself. To read the number of complete revol$^{\text{ns}}$ wh. it has made, I don't make it drive another, as Amsler does. I



carve a spiral of 10 or 12 turns in it, put a glass face bit, & number the successive grooves 1, 2, 3, ... A smooth platinum shot, p, is initially placed in any groove (4); this shot always keeps the lowest point of the groove, so that as the roller rotates, p drops after a revol$^{\text{n}}$ into the spiral marked 5, or if rotation is the other way, p ascends into 3. The fraction of a revolution over & above is read by graduation on the circumf. of roller.