Some philosophical observations
in this book —

V in $\odot$ $=$ α

Curves of fourth order

gth Camera $\perp$

$\rho \propto \frac{A}{\sin \theta \cdot \cos \theta}$

S and σ meet B

in points

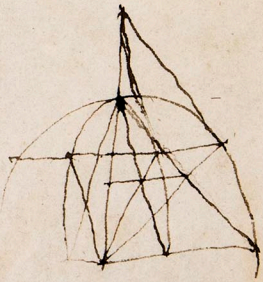
$\odot$ & ∞ ν from first Distances

V in H from it as $\frac{1}{\sin^2 \theta}$

$\therefore \rho \propto \frac{1}{\sin^2 \theta}$

$\frac{\sqrt{11}}{11}$ $S\eta \propto \frac{\sqrt{11}}{11}$ $\therefore$ finitely

9 11



TM19/9/12.

$$\sqrt{1+x} = 1 + \frac{x}{2} - \omega x$$

$$\frac{1}{2}(1+x)^{-\frac{1}{2}}\dot{x} = \frac{\dot{x}}{2} - \omega\dot{x} - x\dot{\omega}$$

$$\frac{\frac{1}{2}\dot{x}}{1+\frac{x}{2}-\omega x} = \frac{\dot{x}}{2} - \omega\dot{x} - \dot{\omega}x$$

$$\omega\dot{x} = -\frac{\frac{1}{2}\dot{x}}{\sqrt{1+x}} + \frac{\dot{x}}{2} - \dot{\omega}x$$

$$\frac{\frac{1}{2}\dot{x}}{\sqrt{1+x}} = \frac{\dot{x}}{2} - \omega\dot{x} - \dot{\omega}x$$

$$\omega = -\frac{1+x}{x} + \frac{1}{2} + \frac{x}{2}$$

$$\frac{\sqrt{1+x}}{x}\cdot\frac{1}{2}$$

$$\frac{\frac{1}{4}\dot{x}^2}{1+x} = \dot{\omega} = -\frac{\dot{x}}{x^2}$$

$$\frac{1}{2} - 1$$

$$1 + \frac{x}{n} + \frac{1}{n}\cdot\frac{1-n}{2n}\cdot x^2 + \dots$$

$$-\frac{1}{4}(1+x)^{-\frac{3}{2}}\dot{x}^2 = -\dot{\omega}\dot{x} - x\ddot{\omega} - x\dot{\omega}$$

$$\frac{1}{4}(1+x)^{-\frac{3}{2}}\dot{x}^2 + \dots + 2\dot{\omega}\dot{x}$$

$$\frac{1}{2.3}(1+x)^{-\frac{1}{2}}\dot{x}\dot{\omega} = \frac{\frac{1}{2}\dot{x}}{1+x}^{\frac{3}{2}} - \dot{\omega}$$

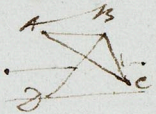
$$QF = \frac{fE^2}{Eg}$$

$$QE = -\frac{fE^2 \cdot Fg}{Eg^2}$$

$$QF : Fg :: EF^2 : Eg^2$$

1 If B moves with a uniform vel
g will ~~m~~ vel will be Eg^2

2 If a reflecting surface ~~for~~ makes 45°
degrees with herizon Ref L must
strike it so that her Ref image may
be vertical



3 from Ref ; QR can never be
= in the refle unless they meet

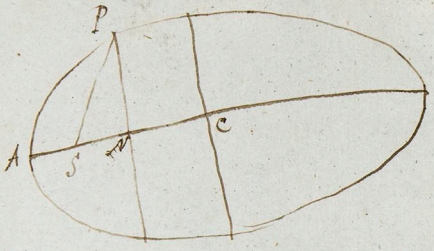
$SI : SR :: 1 : \sqrt{2}$
Req^d limit of refraction

how near can the center of
a mercurial approach to the
surface?

Explain the phenomena



Image in lens must be
between Eye & object to see



put $AN = x$; $SC = c$

$$PS^2 = \overline{c \mp x}^2 + y^2 = c^2 \mp 2cx + x^2 + \frac{b^2}{a^2}\cdot a^2 - x^2$$

$$= \frac{a^2 - b^2}{a^2} x^2 \mp 2cx + b^2 + c^2$$

$$= \frac{c^2}{a^2} x^2 \mp 2cx + b^2 + a^2 - c^2$$

$$= \left(x^2 \mp \frac{2a^2}{c} x + \frac{a^4}{c^2} \right) \times \frac{c^2}{a^2}$$

$$= \overline{\frac{c}{a} x \mp a}^2$$

$$\therefore PS = a \pm \frac{c}{a} x = \overline{\frac{a^2}{c} \pm x} \cdot \frac{c}{a}$$

$\because A N = a - x$

$\therefore x = a - AN$

$$\therefore PS = \frac{a^2}{c} \pm a + AN$$

$\sqrt{3-\sqrt{2}} \times \sqrt{2\sqrt{3}-2\sqrt{2}}$

$= 10 - 4\sqrt{6}$. Divide

$10 - 4\sqrt{6}$ by $\sqrt{3}-\sqrt{2}$

$a + \overline{a+b}$ $\varphi^{\prime\prime}$

$\overline{a-v} \cdot \overline{a+b+v}$

$a \cdot \overline{a+b} + a \cdot v - v \cdot \overline{a+b+v}$

$-av + v \cdot \overline{a+b+v}$

$$2 \times m$$

$$m^2 + 2m - 2m^2 - m + 2$$

$$m + 2 \quad \text{و} \quad 1 - 2m + m^2$$

$$m^2 + 2m + 2 - 2m - m^2$$

$$2 \cdot \frac{1-x^2}{2} \quad \frac{x^2+3}{2} \cdot$$

$$\frac{m^2+2m+1}{2} \quad \frac{1-2m+m^2}{2} \quad \text{و} \quad m+1 \quad \text{و} \quad m-1 \quad \text{و} \quad 1$$

$$\frac{m^2+2m+1}{2} \quad \frac{1-2m+m^2}{2} \quad \text{و} \quad m+1 \quad \text{و} \quad m-1 \quad \text{و} \quad 1$$

$$\frac{m^2+2m+1}{2} - x \quad \frac{1-2m+m^2}{2} \times x \quad \text{و} \quad \dots \quad \text{و} \quad \dots \quad \text{و} \quad 1+x$$

$$1 \cdot 2 \cdot \quad \text{و} \quad \dots \quad \text{و} \quad 3 \cdot 2 \cdot 1$$

$$\frac{\frac{1}{2}\quad \frac{1}{2}\cdot\frac{1}{2}\cdot\frac{1}{2}\cdot\frac{3}{2}\cdot\frac{1}{2}\cdot\frac{5}{2}}{1\cdot 2\cdot 3\cdot 4\cdot 5\cdot 6}$$

$5^{1}\ 1\times 6\times 2.5$

$$1+\frac{5}{2}\cdot x+\frac{3}{2}x+\frac{1}{2}x^{3}-\frac{1}{2}x^{4}$$

$$\sqrt{1-x}^{\frac{5}{2}}\ \text{Glied von}\ x^{6}$$

$$1+3x+3x^{2}+x^{3}$$

$$\sqrt{1-x}^{3}\cdot\sqrt{1-x}^{\frac{6}{2}}\ \text{Glied von}\ x^{6}$$

$$1-x:\sqrt{1-x}^{\frac{1}{2}} :: 1 : 1+\frac{x}{2}-x$$

$$\sqrt{1-x}^{\frac{5}{2}} = \frac{1-3x+3x^{2}-x^{3}}{1+\frac{x}{2}-x}$$

$$\left(1-\frac{x}{2}-x\right)\overline{\left)1-3x+3x^{2}-x^{3}\right.}\ (1$$

$$\frac{1+\frac{x}{2}-x}{\frac{5}{2}x}$$

If the sum of two integral quantities be decreased & the product increased, their sum is diminished. Thus if 7 & 10 if by these 6 & 10 11 — 6×11 is less than 7.10. —

Integral $a \times \overline{a+1}$ is $\int^r$ than $\overline{a-1} \cdot \overline{a+b+1}$.

$$\frac{-\frac{1}{2} \cdot \overline{-\frac{1}{2}+1} \cdot \overline{-\frac{1}{2}+2} \cdots\cdots \overline{-\frac{1}{2}+2z}}{1.2.3 \cdots \cdots 2z+1}$$

$\overline{\frac{1}{2}-1} \cdot \overline{\frac{1}{2}-2z}$ $\int^{1\text{han}}$ $1 \times \overline{2z+1}$

$\frac{1}{2}+2 \cdot \frac{1}{2}+2z-1$ $\int^1$ $2 \cdot 2z$

$\frac{\alpha}{\frac{1}{2}+z-1} \cdot \overline{\frac{1}{2}+z}$ $\int^r$ than $\overline{z-1} \cdot \overline{z+1}$

$$\frac{1}{1\cdot 1} + \frac{1}{2\cdot 1+\frac{1}{2}} + \frac{1}{3\cdot 1-\frac{1}{2}+\frac{1}{3}} + \dots$$

$$\frac{1}{1} + \frac{1}{2\cdot\frac{2-1}{2}} + \frac{1}{3\cdot\frac{2\cdot 3-3+1+2\cdot 1}{1\cdot 2\cdot 3}}$$

$$+ \frac{1}{4}\cdot\frac{1}{\frac{1\cdot 2\cdot 3\cdot 4+1\cdot 2\cdot 3\cdot 2+1\cdot 2\cdot 3\cdot 4-2\cdot 3\cdot 4+2\cdot 3}{1\cdot 2\cdot 3\cdot 4}}$$

$$\frac{1}{1}\cdot\frac{1}{2\cdot 1-\frac{1}{2}}\cdot\frac{1}{3\cdot 1-\frac{1}{2}+\frac{1}{3}} \dots \frac{1}{n\cdot 1-\frac{1}{2}+\frac{1}{3}\dots\frac{1}{n}}$$

$$1-\frac{1}{2}+\frac{1}{3}\dots\frac{1}{n} + \frac{1}{2\cdot 1-\frac{1}{2}} \times 1-\frac{1}{2}\cdot\frac{1}{3}\dots\frac{1}{n}$$

$$1-\frac{1}{2}+\frac{1}{3}\dots\frac{1}{n} + \frac{1}{2}\cdot\frac{1+\frac{1}{3}-\frac{1}{4}\dots\frac{1}{n}}{1-\frac{1}{2}}$$

$$+ \frac{1}{3}\cdot\frac{1+\frac{1}{4}+\frac{1}{5}\dots\frac{1}{n}}{1-\frac{1}{2}-\frac{1}{3}} + \dots$$

Always +

If $A < B$ under
x that is small
or $> A$ & $< B$; &
A may $= B$, A' may $= B'$
x by Induction

Hence always $f(x) > 0$
when $A < B$
if A always $> B'$, A always
$< B$; if B always $< B'$
$> B$;

$$(1-x)^{\frac{1}{n}} = 1 - \frac{1}{n}x - \frac{1}{n}\cdot\frac{1-n}{2n}x^2 + V$$

$$\frac{1}{n}(1+x)^{\frac{1}{n}-1} = \frac{1}{n} + \frac{1}{n}\cdot\frac{1-n}{2n}\cdot 2x + \frac{V'}{x}$$

$$\frac{1}{n}\cdot\frac{1-n}{n} = \frac{1}{n}\cdot\frac{1-n}{2n} + \frac{V''}{x}$$

$$\frac{1}{n}\cdot\frac{1-n}{n} = \frac{1}{2}\cdot\frac{1-n}{2n} + \frac{V''}{x}$$

$$(1+x)^{2-\frac{1}{n}}$$

$$(1+x)^{\frac{1}{n}} = 1 + \frac{1}{n}x - \frac{1}{n}\cdot\frac{n-1}{2n}x^2$$

$$+ \frac{1}{n}\cdot\frac{n-1}{2n}\cdot\frac{2n-1}{3n}x^3 \&c$$

$(1+x)^{\frac{1}{n}}$ is $\int^r$ when $\log 3$ $\int$ when
circle $\int$ in ∞ = their $\int^r$

$$\therefore \frac{\frac{1}{n}\,dx}{(1+x)^{1-\frac{1}{n}}} \text{ may } = \frac{1}{n}\,ix - \frac{1}{n}\cdot\frac{n-1}{2n}\cdot 2\pi i$$

integ
but $\int$ if $x=0$ $\int$ $\int^r$ when $\int$

$$\therefore \text{again } \frac{\frac{1}{n}\cdot\frac{1}{n}-1\;ix}{(1+x)^{2-\frac{1}{n}}} \text{ may} =$$

$$-\frac{1}{n}\,\frac{n-1}{2n}\cdot 2\pi i$$

$$\text{or } \frac{\frac{1}{n}\cdot\frac{n-1}{n}}{(1-x)^{2-\frac{1}{n}}} \text{ may} = \frac{1}{n}\cdot\frac{n-1}{n}$$

integrable. $\therefore$ &c by 3

$$(1-x)^{\frac{1}{n}} = 1 - \frac{1}{n}x - \dots - \frac{1}{n}\cdot\frac{1-n}{2n}\cdot\frac{1-2n}{3n}\cdot\frac{1-3n}{4n}\cdots\frac{1-mn}{m+1,n}\,x^{m+1}$$

$$\frac{1}{n}\cdot(1-x)^{\frac{1}{n}-1} = \frac{1}{n} + \alpha x + \beta\cdot m+1\, x^{m}$$

Let the mast cost
b feet, c inches d 12ths inches
a x the no of the feet y no
x rth yards x

Then the m^{th} = $b + \frac{c}{12} + \frac{d}{12^2}$
feet. x the n^{th} 2 h $\frac{e}{12} \frac{r}{12^2}$
feet the whole is

$b + \frac{a}{12} \times h + a$ feet

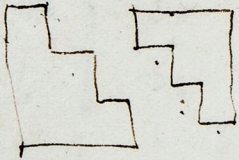
= wd. mk
wd x h is $\frac{hd}{144}$
$+ \frac{he}{12} + hb$
wd x $\frac{g}{12}$ is a
wd is $\frac{d}{144}$ is a

b $\frac{c}{12}$ $\frac{d}{144}$
h $\frac{g}{12}$ $\frac{r}{144}$

hb $\frac{he}{12}$ $\frac{hd}{144}$

Suppose $hd = m \times 12 + s$
Then $\frac{hd}{144} = \frac{m}{12} + \frac{s}{144}$

$\therefore$ why does $\frac{s}{144}$ in my case a
$\frac{m}{12}$ & $\frac{he}{12}$. suppose the sum $\frac{he+m}{12}$





$= \frac{n \cdot 12 + t}{12} = n + \frac{t}{12}$.

Now why does $\frac{t}{12}$ mean any
more n & t. & when

p.

I suppose the hundreds will go
when the shillings are & there
= agreeable to hundreds & it is and
that what time my hands do
together by adding them & &
either by adding them & &
the [illegible] may be inspected by counting
how distant any one dot is from
12 on the face of 12.

But suppose any product as
pq or pd, is $\frac{1}{n}$ or $\frac{1}{n}$ of the n
that $= m \cdot n + s$ then $\frac{pd}{12n}$ =
$\frac{m \cdot n + s}{12n} = \frac{m}{12} + \frac{s}{12n}$ as before 4

Does the it is and the $\frac{m}{n}$ may
mean and $\frac{pc}{12}$ as

$$a \cdot \frac{n-1}{2} a^{\wedge} \leftarrow \frac{n}{3} a^{\frac{1}{3}} x + \alpha n$$

$$1+x \Big) 1 + ax + p \Big(1 + \overline{a-1} \cdot x \quad + \frac{a-1 \cdot x^2 + p}{1+x}$$

$$\frac{1 - \alpha x}{\overline{a-1} \cdot x}$$

$$a \to x + \overline{a-1} \cdot x^{\wedge}$$

$$a x^{i-1} = \frac{n}{n} x^i + \overline{a-1} \cdot \frac{n}{n} x^i + \frac{\overline{a-1} \cdot x^i + p}{1+x} \cdot \frac{n}{n} x^i$$

$$\overline{1+x}^{\frac{m}{n}} = 1 + ax + \beta x^2$$

$$\overline{1+x}^{m} = \overline{1+ax+\beta x^2}^{n}$$

$$1 + mx + \gamma x^2 =$$

$$1 + nax + n\beta x^2 + n\cdot\frac{n-1}{2}\cdot\overline{ax+\beta x^2}^2$$
$$+ n\cdot\frac{n-1}{1}\cdot\frac{n-2}{3}\cdot\overline{ax+\beta x^2}^3 + \&$$

$$1 + nax + n\beta x^2 + Q x^2 - g\beta x^3$$
$$+ \&\beta^2 x^4 =$$

$$\gamma x^2$$

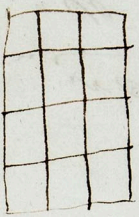
$$\gamma = n\beta + Q + g\beta x + \&\beta^2 x^2$$

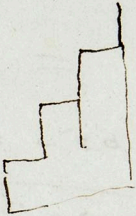
$$\&\beta = \gamma - Q = m\cdot\frac{m-1}{2} - \frac{n-1}{2}\frac{m^2}{n^2}$$

$$\frac{m^2}{2} - \frac{m}{2} - \frac{m^2}{2}$$
$$+ \frac{m^2}{2n}$$

$$\frac{m^2}{2n} - \frac{m}{2} = m\cdot\frac{m}{2n} - \frac{1}{2}$$

$$= m\cdot\frac{\frac{m}{n}-1}{2}$$





$$\sqrt{1+x}^{\frac{1}{2}} = 1 + \frac{1}{2}x + px^2$$

$$1+x = 1 + x + 2px^2 +$$

$$\frac{x^2}{4} + p^2x^4 + px^3$$

~~$p^2x^2 +$~~

~~$x + 1 = px^2$~~

~~$2 + \frac{1}{4}$~~

$$x^2p^2 + \overline{2+x}\cdot p = -\frac{x^2}{4}$$

$$p^2 + \frac{2+x}{x^2}\cdot p = -\frac{1}{4x^2}$$

$$p = -\frac{2+x}{2x^2} \pm \sqrt{\frac{1}{4x^4} + \left(\frac{2+x}{2x^2}\right)^2}$$

ult $-\frac{1}{2x} \pm \frac{1}{2x} \times 1 - \frac{x^2}{2} + \alpha$

$$\sqrt[m]{1+x}$$

$$= 1 + \frac{1}{m}x + \frac{1-m}{2m^2}x^2 + \frac{1-m}{2m^2}\cdot\frac{1-2m}{3m^2}x^3 + \frac{1-m}{2m^2}\cdot\frac{1-2m}{3m^2}\cdot\frac{1-3m}{4m^2}x^4 + \text{etc.}$$

$$1 + \frac{1}{m}x + \frac{1-m}{2m^2}x^2 + \frac{1-m}{2m^2}\cdot\frac{1-2m}{3m^2}x^3 + \text{etc.}$$

$$\frac{\frac{u}{w}}{\frac{u}{w}} = \frac{\frac{u}{w}}{\frac{u}{w}}$$

$$\overline{1+x}^{\frac{m}{n}} = 1 + ax + px^2$$

$$\overline{1+x}^{m} = \overline{1+ax+px^2}^{n}$$

$$ax^2 + gxp + Rp^2$$

$$x^2 + \gamma$$

$$1 + mx + \alpha = 1 + nax + np + \alpha$$

$$m + \gamma x = nx + \frac{np}{x} + 2x + gp + \frac{Rp^2}{x}$$

(1)

$$\frac{m}{n} \cdot \overline{1+x}^{\frac{m}{n}-1} \dot{x} = a\dot{x} + \dot{p}x + 2x\dot{x}p$$

$$\dot{p} : \dot{x} :: 2p : x$$

$$px^2 = \overline{1+x}^{\frac{m}{n}} - 1 - ax$$

$$\dot{p} = \frac{\overline{\dot{x} - a\dot{x}} \times x^2 - 2x\dot{x} \times A - \frac{g}{2}}{x^4}$$

$$= a\dot{x} + \dot{A} - a\dot{x} \cdot \text{ff} - 2\frac{A - \frac{g}{2}}{x}\dot{x} + 2x\dot{x}p$$

$$\overline{1+x}^{\frac{m}{n}} = \frac{m}{n}\overline{1+x}^{\frac{m}{n}-1} x \ldots$$

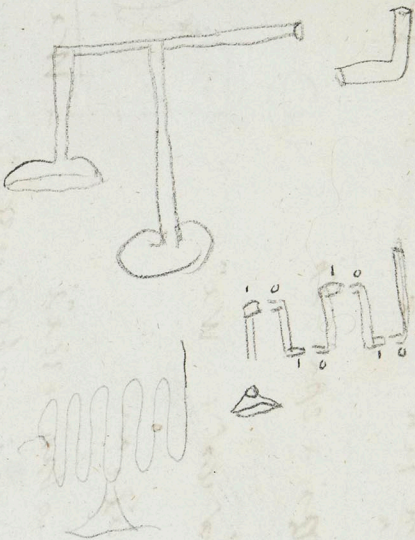
$$1 + \frac{\alpha}{n}x + \beta x^2 = \alpha x + 2\beta x^2 + \alpha^2 x^2$$

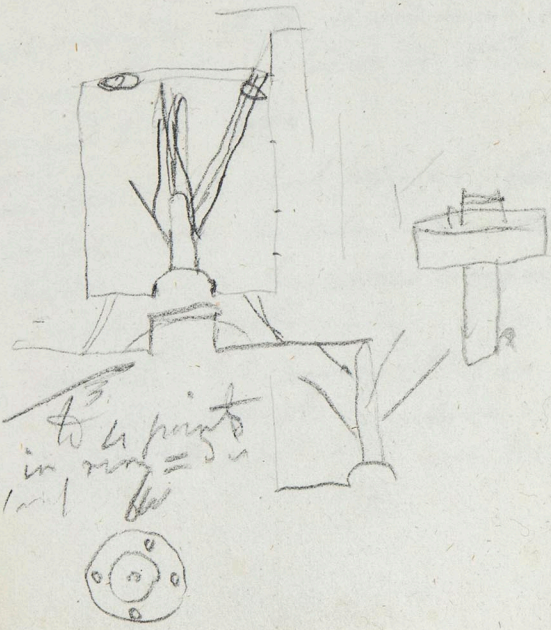
$$\overline{1+x}^{\frac{m}{n}} = 1 + ax + bx^2 + cx^3 + \ldots + Wx^n$$

$$\frac{m}{n}\cdot\overline{1+x}^{\frac{m}{n}-1} x \quad ax + 2bx^2 + 3cx^3 + \ldots$$

$$\frac{m}{n}\cdot\overline{1+x}^{\frac{m}{n}} x \quad ax + 2bx^2 + 3cx^3 \ldots + Wx^n$$
$$+ ax^2 + 2bx^3 + 3cx^4 \ldots + Wx^{n+1}$$

or $\overline{1+ax+bx^2}^{-\frac{m}{n}}$ ..... —







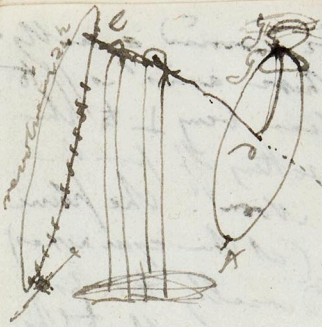
within side at H is a small chamber seperated from the vase (like a blister on the side) but communicating with the vase by a stop-cock. the tube FC is first to be screwed in at H & its end F (having a little water in it to be applied to the fire

Let there be a short pipe, aB, first in the part where the tube is to enter the cistern. stop the inner orifice, a, when necessary, with a plug. & fix on the pipe FC at B having 1st (if you please) pierced thro the aperture of the outward Vase, which is not here depicted.

Let a plane be carried equally
in 24 hours
about a ring whose axis is ∥ to
the pole; the plane being ⊥ to the
plane of the ring setting off from the
north point at ☌ Noon. The plane
will face the sun (at the equinoxes)
Incline the plane ☆ equally to & from
the plane of the ring, agreeably to the
declination, it will always face the
sun.

☆ is making the intersection of the
two planes the axis of motion

If the ring was carried about by
wheel work equally, & the
plane set for the day, it would
intently & purposely always face the
sun.

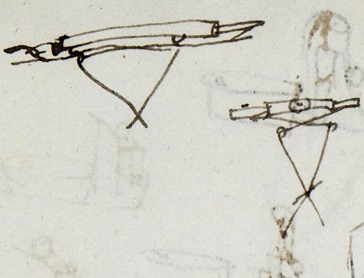


o centre
S mirror
A room point
d pole
DS shaft car rying mirror
⊙ imaginary
l north. d south
B post on stand.

Axis of mirror inclined ~~to the d~~ declination
~~of the~~ meets axis of pole, d
in L, whose complement is
⊙ Dec". at d at equinoxes,
towards l in Summer, towards
x in winter

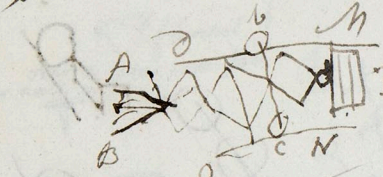
The float may be steadied to
the last pin ~~&~~ & prevented rolling round
by flats ~~on~~ ends to the last clamp, stand-
ing upstairs or by having 2 Quires down
float one under
the rocker



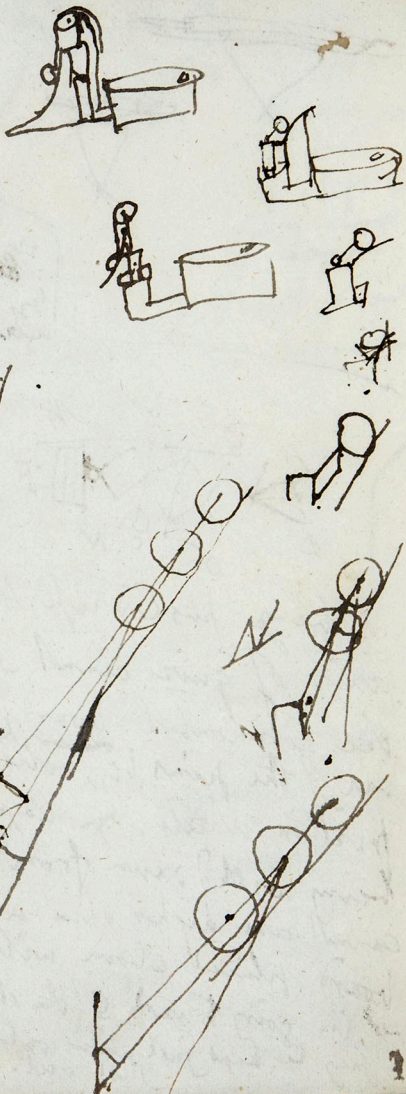


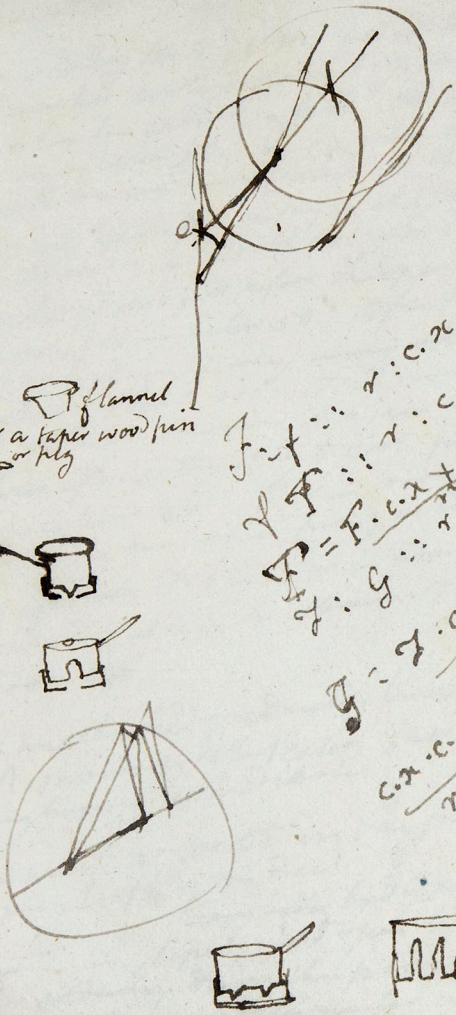
Rods from the last pin to the float stem before the last claws escape rolling if the pin rolls. This is prevented by the last claws working against the float thus,





being pushed up towards A the axis of guide cannot slide further than the horizontal board B C D on which the pins, b C, roll by means of friction wheels at endways. so again B being withdrawn from A, the axis cannot rise higher than a certain other board placed above with allowance. so as in going towards S (the stem) the float may be kept just under water, & in coming back just out.




flannel
over a taper wood pin
or nail or pilz

Memorandum

On Sunday Oct. 8th 1882 placed a certain apparatus containing about 7 parts quartz in a chamber gilded after the H has the room being below 50°. In 13 hours raised the temp with one candle (renewed) to the t of 190°

Closed it an hour after midnight at 170° & withdrew the candle left it cool the t about the apparatus in closed just before the opening of the Chimney being below 50°. After 5 hours at 8 o'clock on Tuesday morning opened door a mom. Ther 210°. Temp room below 50°. Closed it. examined it again at 12, (11 hours after setting it by 8 cool, found its temperature 86°. Ther in room 65° the window having been open from 9 o'clock. 8th in afternoon Th 52. Th in room 48° on wednesday at 2 in the afternoon Th 48, Th in Room 64+

— The weather had gradually been changing & cold several days before I took the observations as may be seen by the diaries

The waste of water in the process was very trifling in deed

~~I~~ having been badly soldered ~~I~~ the papers I had opened by the heat of the soldering during the process. Whether this was detrimental or not I cannot say

by another apparatus oil by 3 hours at 160° after 11 hours found it 86°
heavy oil is twice before: oil (orders 131
2 hours 124

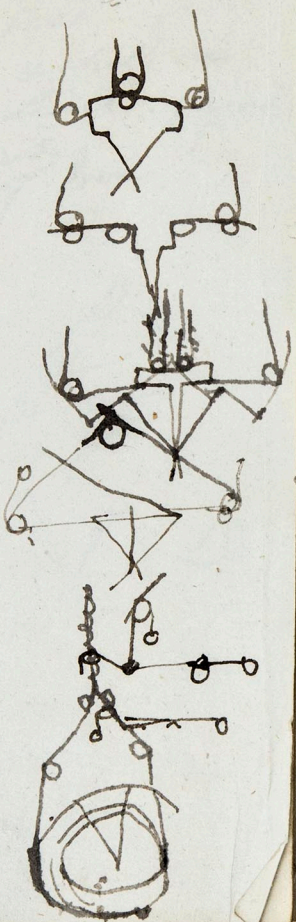
Set by the same vessel with the same quantity of water in 3 pints at the same temperature 160°
after 1 hour 114°
2 hours 97°
Fire room in both cases by from 55° to 56°

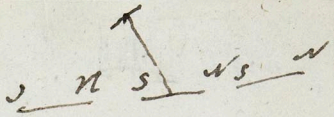
Carpet to resist 2 Gallons in 8 hours with one Camp oil Heavy to 130°

kettle with pins  ?

A piece of tin rolled up  a quill
filled with stopper

bag of wool




J
N
S
NS
W



$6^2 \times 8$ $\left\{ \begin{matrix} 36 \\ 8 \end{matrix} \right.$
$4^2 \times 5\frac{1}{3}$ $\overline{288}$

$\frac{16}{5}$
$8 \quad 0 \quad 5\frac{1}{3}$
$85\frac{1}{3}$
3
756

$3\overline{)858}$
286

Sesquicarbonate Salt
Soap oil. Volatile oil & chalk. & heated. cooled. Lime. Shock
Carbonate of potash. | oxide of Iron.






The moonlight tower
The Bower of Bliss
Where in wells Cedar & the quiet moon riding
& Dianas Sky

That hears the music of Venus Star

That shines & reach the Sphere
Where man is said the most Unclear
The Bower of moonlight contemplation
That holds Converse with the Moon

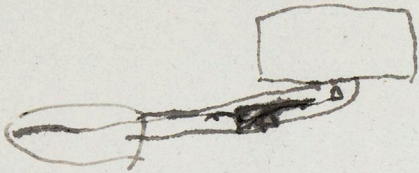
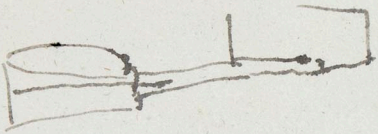
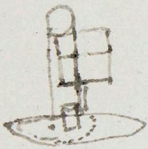
That covers the roof of the M
Erected in the Sky
Where the Cedar rides on high
Hears the Con of the quiet Sky
Listens to the silent Sky

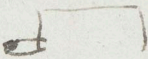
That Cedar Branch each & high
Where the voices in the moonlight Sky
The Sky stored Bower
That hears the [illegible] of the moonlight
The Sky
That hears the moon
The Sky cept Venus that parleys with the moon

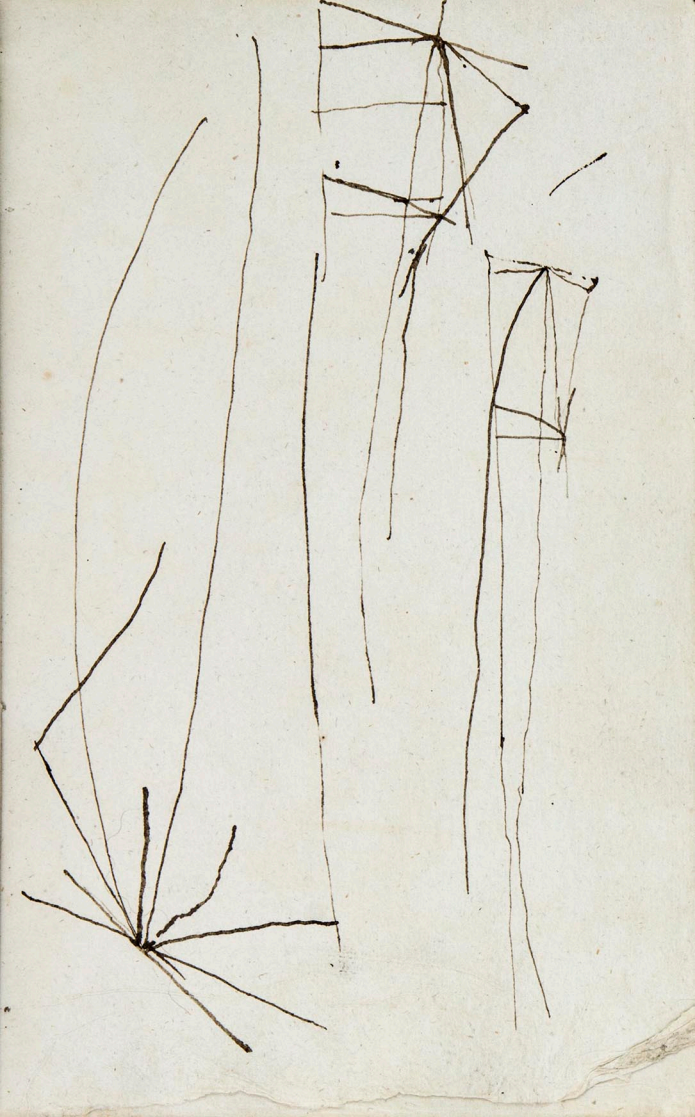
Psal. 3. Tower whose roots on high
And converse with the moon & moonlight Sky

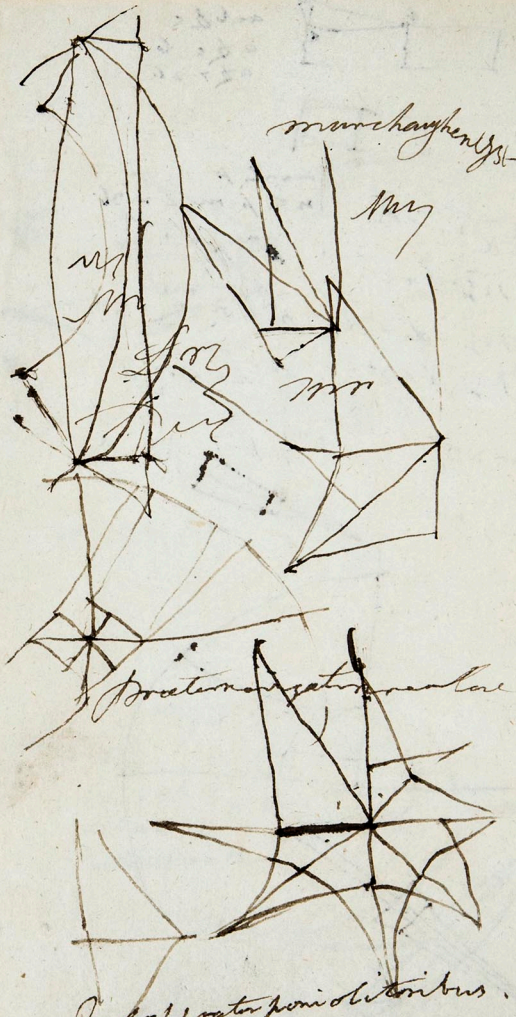
The tower of the city bowers on high
That parleys with the moonlight Sky

The tower of the city bowers on high
To parley with the moonlight Sky

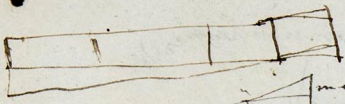




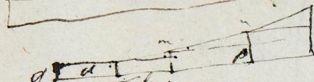


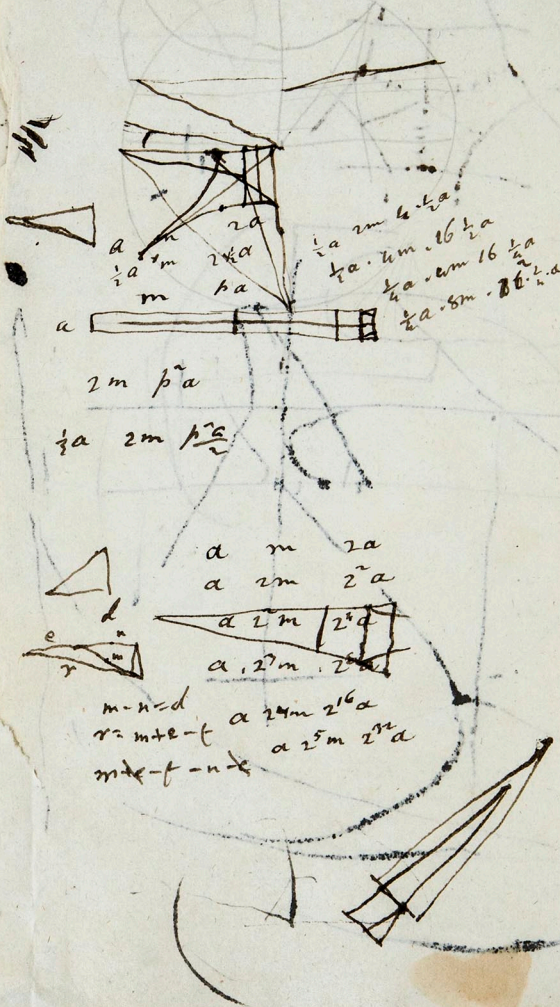


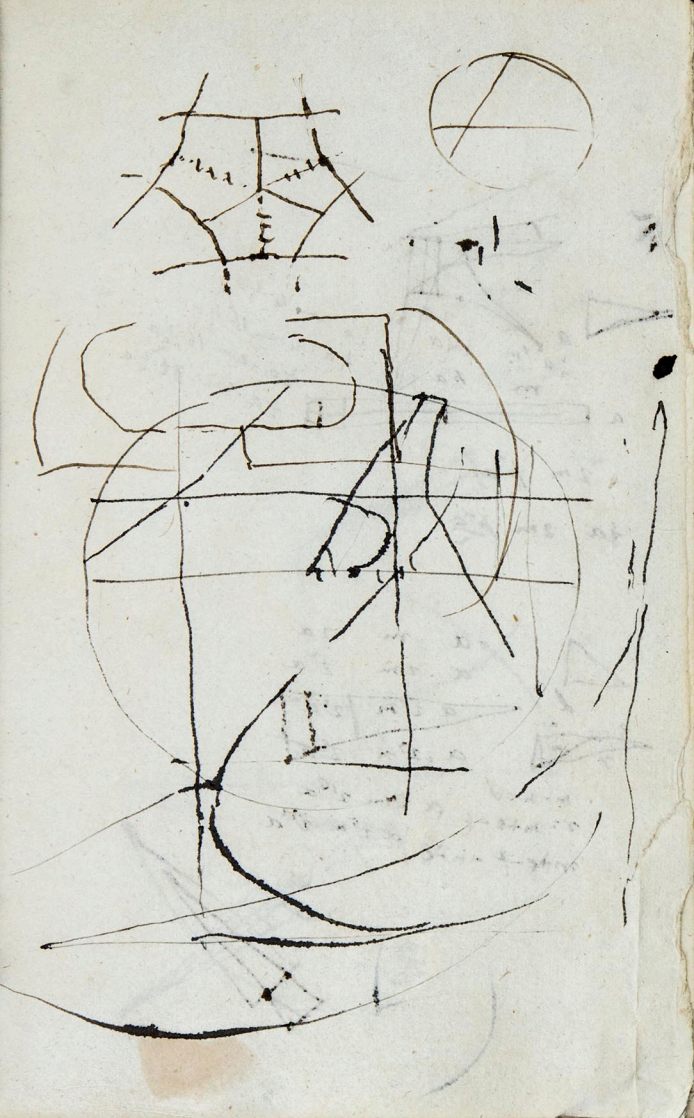









a
m
2a
a
2m
2^2a
a 2^2m 2^4a
a 2^3m 2^6a
a 2^4m 2^8a
a 2^5m 2^10a
m-n=d
r=m+t-f
m+t-f-n+t



山 xian
干 can — Compliments. to say. appellation.

傑 jie or nieu — To turn again. reiterated. again & again accustomed

岐 ky lofty branch — variant. Branching off.

徹 che clear. — to clear (as a horn) Clears a leaf? to clear away. What is clear is passable — to clear off the skin or to put through or up to or to pull to pieces? i.e. to pull down & clear away? must see an example. drain

嶮 xey say — local word for son or child — Insulting term

山 缺 kan — an indented place — to inlay.

巢 chiao — to go about — make a circuit with a fence either to ward off something or to force something into your circuit. ward you, to — forward off. Screen off.

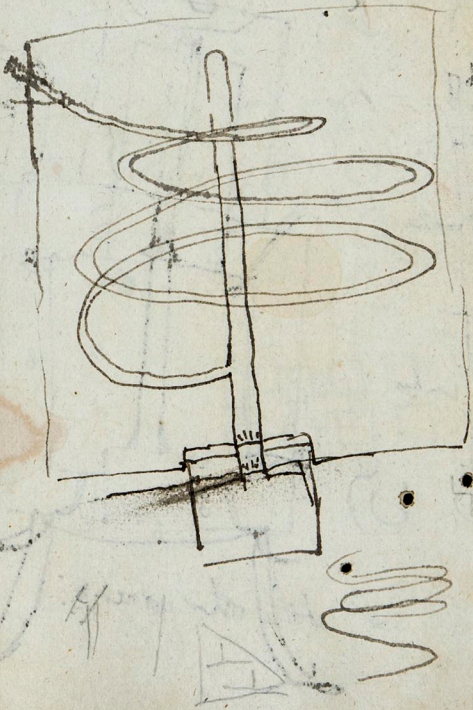
中正 ching. The Closet, in archery.

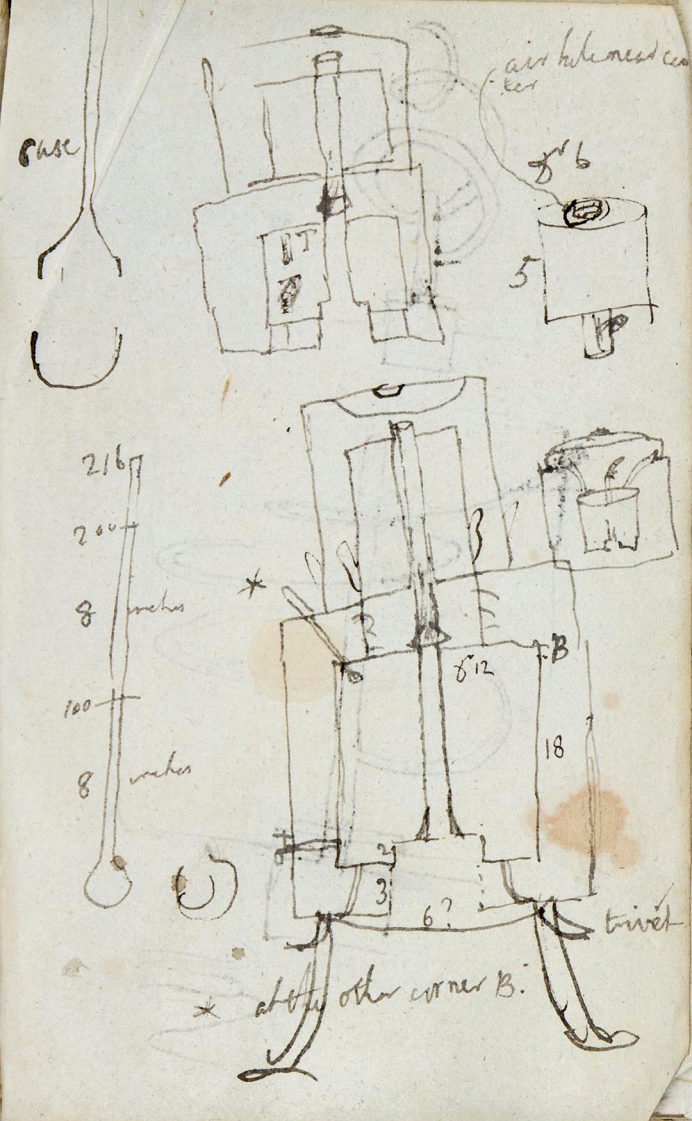
修 fung to send — to cause

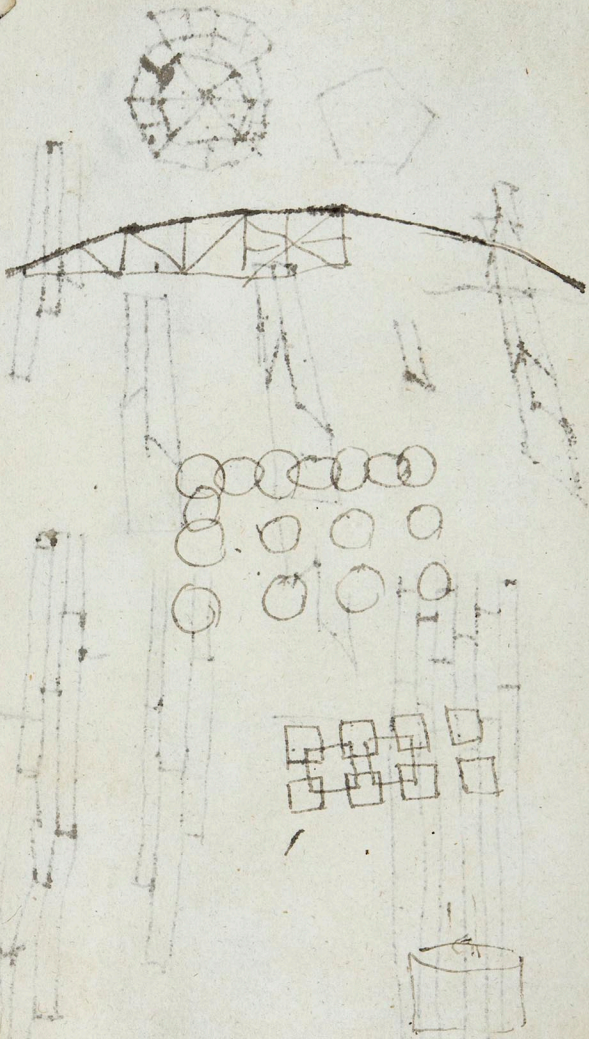
延 geng. To Extremost entirely.

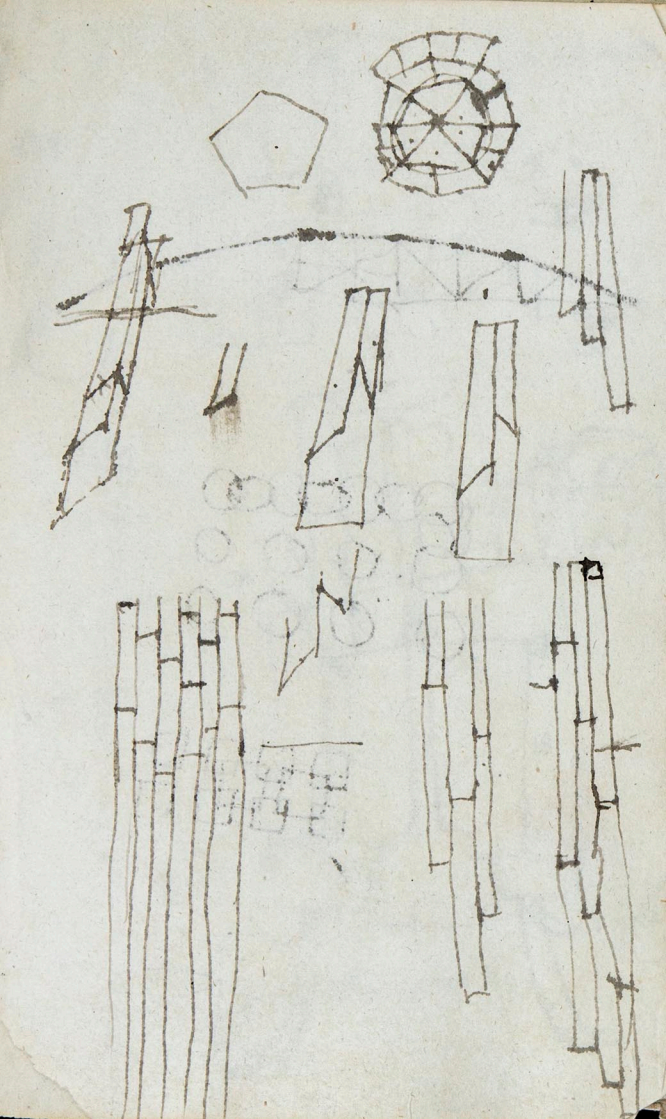
值 che — To give effect to. to cause to operate — same as 陟 chi

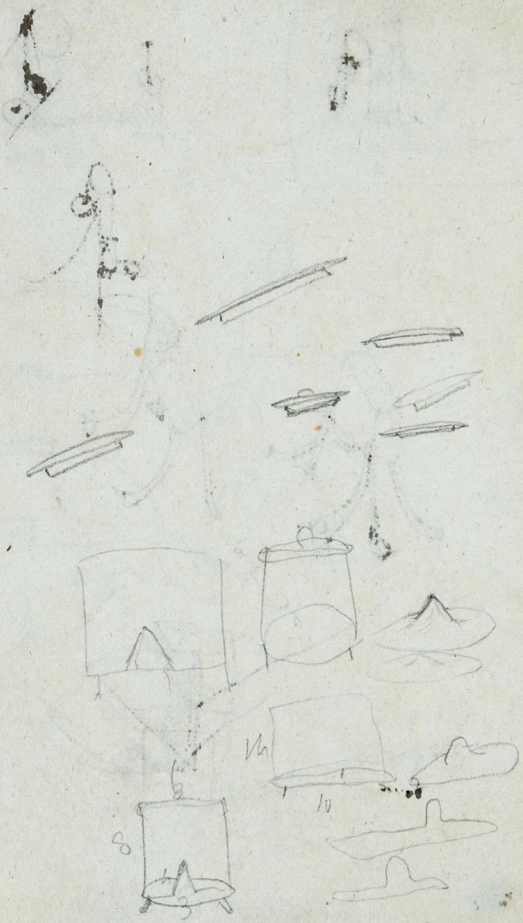





air hole covered with wire
gauze
5
216
200
8 inches
100
8 inches
12
B
18
3
6?
trivet
* about other corner B.

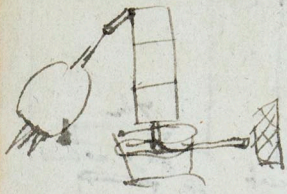




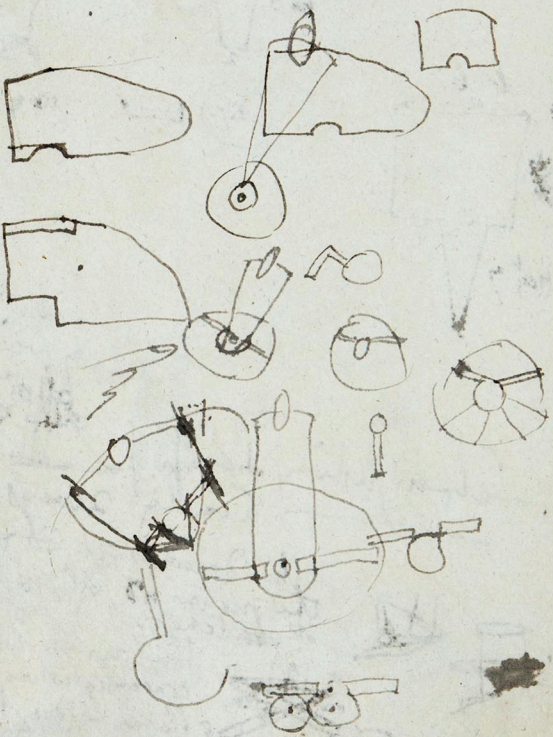


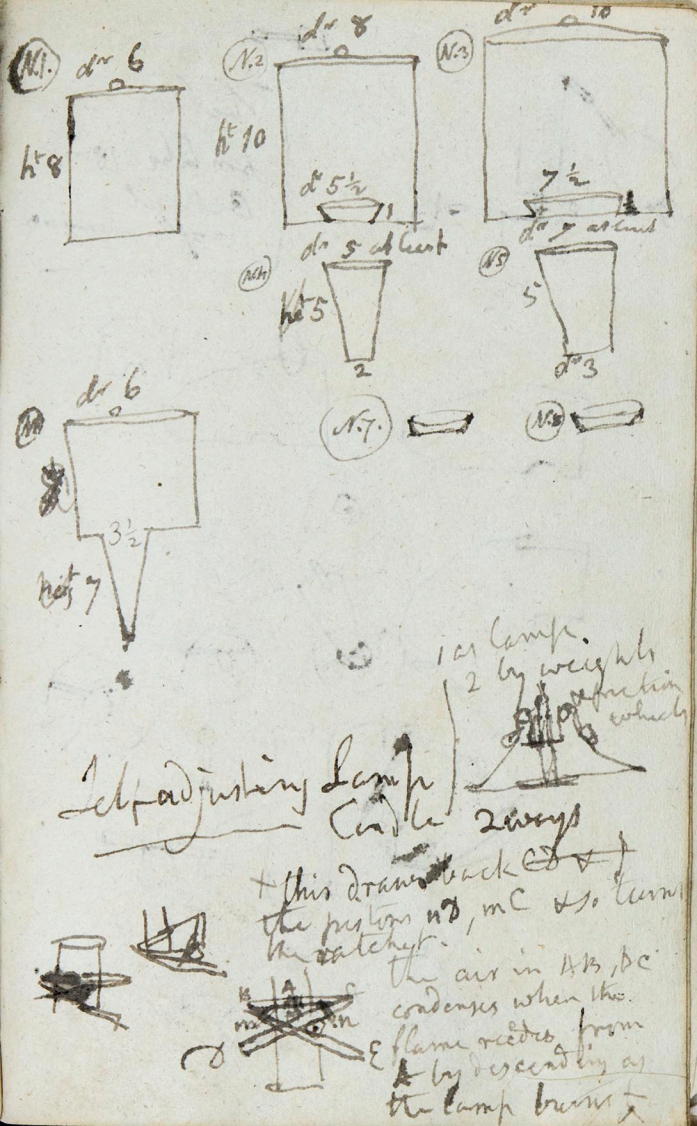


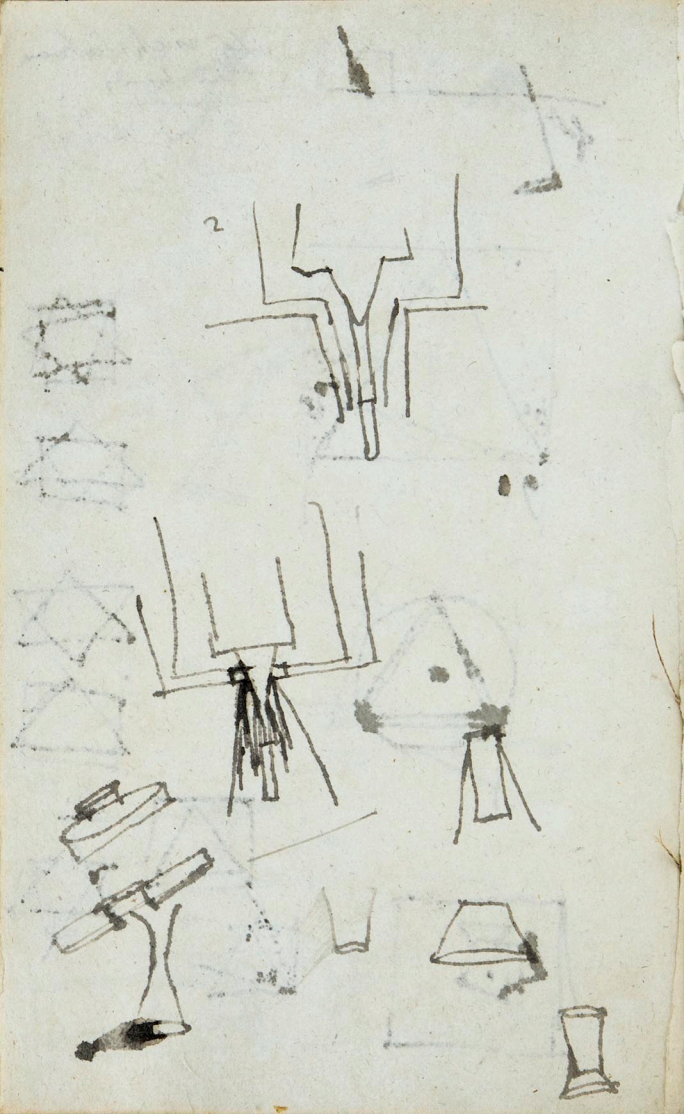
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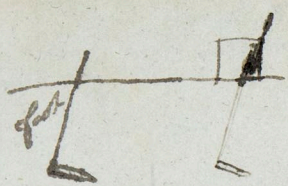


Bellows
Iron tube 18 inch
Oatmeal
muslin or canvas




No 1.
dr 6
ht 8
No 2
dr 8
ht 10
dr 5½
No 3
dr 10
7½
dr 7 at least
No 4
dr 3 at least
ht 5
2
No 5
5
dr 3
No 6
dr 6
3½
ht 7
No 7.
No 8
1 cr Lamp.
2 by weights
reduction
1 adjusting Lamp
Candle
2 ways
+ this draws back
the piston rd, mC
the catchet.
the air in AB, DC
condenses when the
flame recedes from
by descending as
the lamp burns



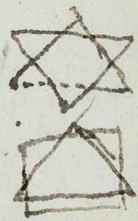


15 inch between the heads
8 bet the feet



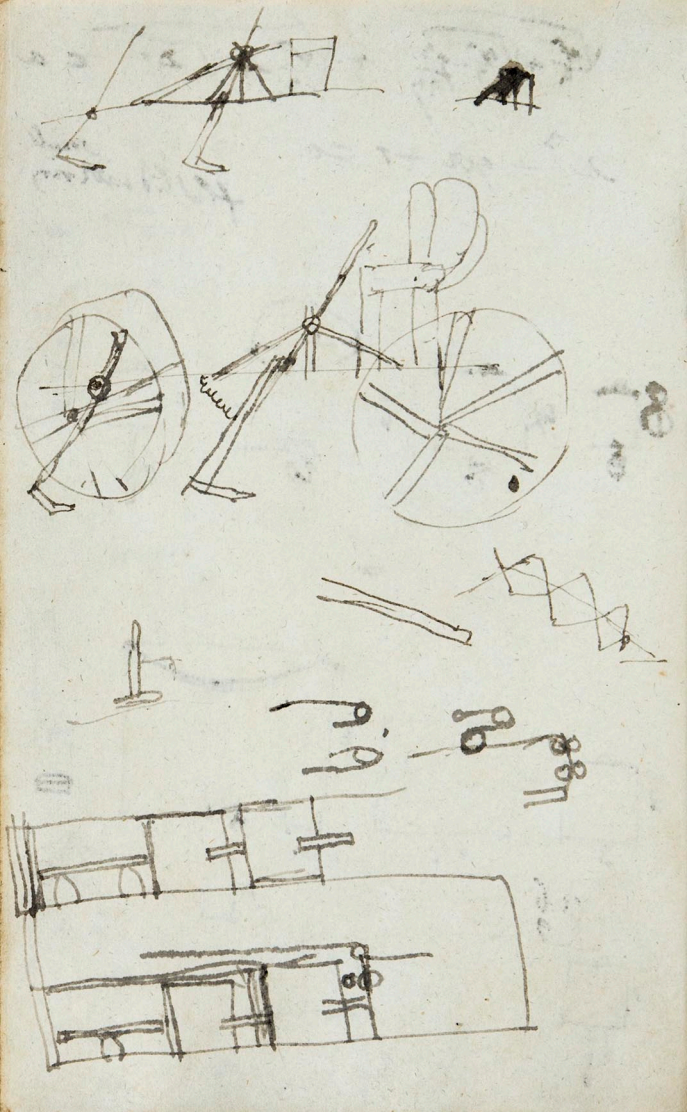








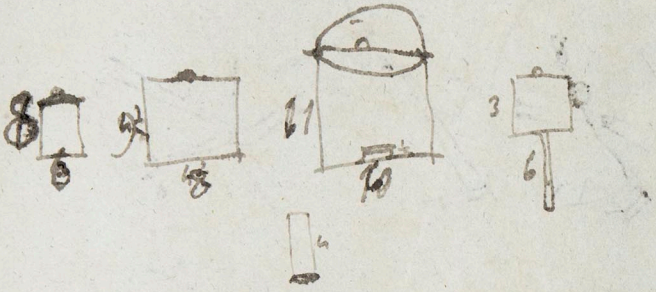


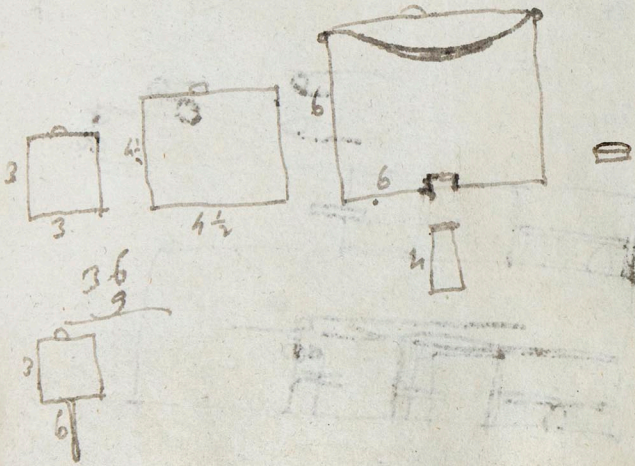


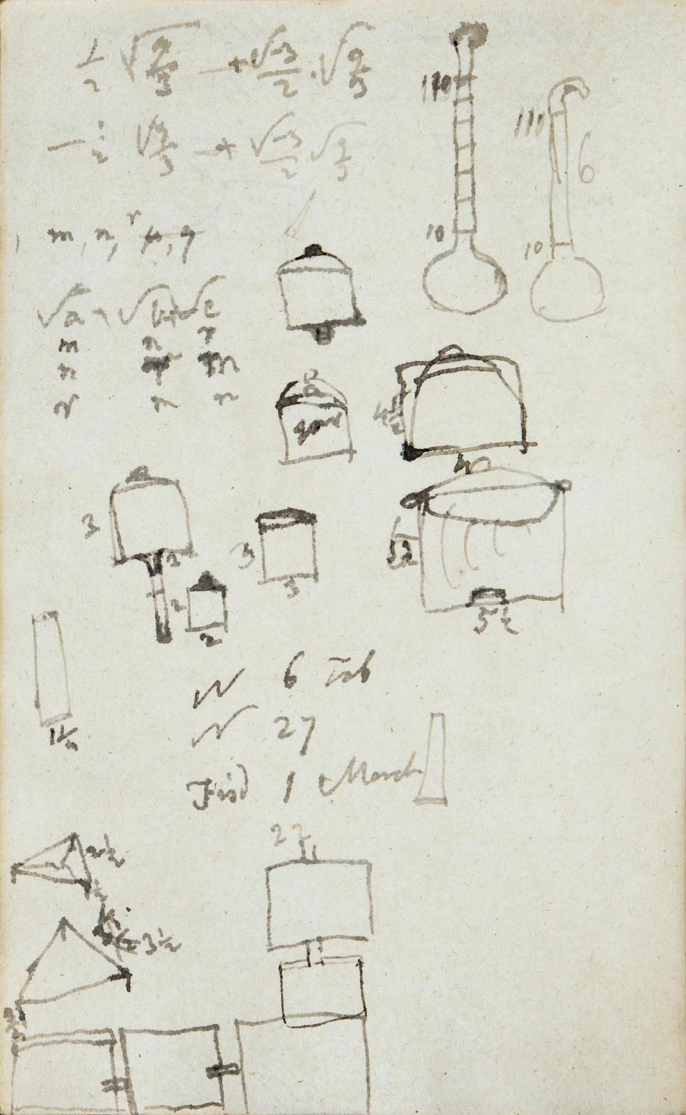
$\sqrt{\frac{r^2}{2} + \sqrt{\frac{r^2}{2} - \frac{p^3}{27}}} + \sqrt{\frac{r^2}{2} + \sqrt{D}}$ c a

$x^3 - px + r = 0$

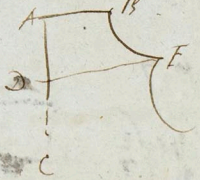
Hat Lid with ring






6
Fuss 1 Mond

of the last event to the
Lemma cannot be applied
When I was 2 ought to be
nothing.



They trampled out with curses
blasphemy & with dreadful lace
rations have torn it out

It is the duty of every nation
& unite together, to wrest out
frame in order & bring her back
& the old order — it is their duty
& fight till they subdue the foe &
or die in the attempt.

For otherwise I will pull
out heart out & plant Burnam
in our Bosom

Advice & letter a note of St
Delicey (alluding to the forgery
being the work) got copied by
him by second channel & could
receive from them — These pros
tors are allowed & the preachers
ministers of the gospel here are
Nice easy to the priest is at in
stated — but the reverence for
him is not sufficiently deep

I'm sorry it is addressed on cardboard
may have reach perhaps — but the
folley soon as for one more near

by a greater cultivation of man
this softness will at last be emplaced
the heart will be tamed, & his
bloody propensities against the beasts
in the nations — then the sword
shall be beat into a plowshare &c

In the mean time the very decrease
& wreck & combust the means
by which man is & the soft and
to oppose the incursions of the cruelty
& shock & ghastliness of them — to aid in
all the enemy within in thy ut
ward & deed

In former ages of the world this
never was systematically attempted
the softness & tenderness of man
nature was relatively considered
rarely cultivated
but in our days a republican has
arisen that has endeavored & en
thrown the whole system — & pull out
the heart of the beast — it was a
difficult undertaking, its ramifica
tions were so interwoven in man nature

If means that softening which is
indeed over the ferocity of the
beast — causes of this softening — by
conversation in Parties like —
Essay this that affects the courtier
like Judges trumpets. Chivalry — no
manner — the way of war & the way of
peace — Charity — fashion for dress
forms of politeness — &c &c &c —
List of the persons who are most
particularly concerned in producing this
softening teachers, priests &c
Duty of high reverence to priests
kings &c — In this nation the first
is not yet insulted, but the veneration
for him is too feeble.
Theory of the reverence for Kings
Qualities of a King to be looked upon as the
most excellent device of men — to be
almost adored — to be considered as
most religious & most gracious
how the prosperity of their Reign
marked in Scripture &c &c

* Richard the Lyon two columbus
All abundant by faith now by the
Incarnate Word people.

peace — beautiful enlargement upon
this idea — the Lion & the Tyger are not
at peace, do not fight — their cautious
hostile meditations, preparation for war
& armed state — the weaned &
slaughter, they wrath exhibit that
their state of mind is expressed by
the smiling of newts — now is
an alliance between these nations
at all, Thus signing by the Lion & the
a state of peace —
Tyger may unite & chase down the
Elephant, but they are not at peace
each his selfish & their private
animosity, still rebutts
against — neither is a common master
in between a state of peace
they are not brothers — each
lives & such & feeds upon the wild
blood & strength of the other —
self-love is the foundation of love
& scale — Dreadful with the of this raging fire
Explanation of what is meant by
the head of a nation in the Visions
of Daniel.

is no law there is no transgression
Nations may act how they please & against
each other when they like, & how they
like — invent & practise in & a
desert fire — murder blunder &c
there is a law however for man
individual considered as a member of his
own state, in every respect — one
exception — duty to himself — & his
neighbour & the state & the King &c —
there is no law between man & brute
he may & must hew off up to the eyes
in blood hunt & slay & stab,
kill wound &c &c —
In same manner now between state &
state. —
Man transgresses if he does not
lend his whole strength & energy &
his courage (together with battles or
if he be not absolutely present,
yet be present in mind in thought &
in in prayer
Of the impossibility of peace between
nations — can be no such thing — a
suspension of the actual hostilities is not

~~Scripture proof at end~~

1 War is a great calamity
2 picture of it

State of the world from a
view of the map

Mankind divided into separate
portions

Reason Why — because such
is the spirit of strength & pride
of men, that if all mankind
formed one nation, he would rebel
against God — Babel

~~Nations in war~~

God divided mankind, in order
that each portion of it
might among themselves obey the
laws of morality & piety

Nations are separated in the
same manner as different species
of beasts — there is no
law between them — when there

What was proved of the subtense in ⊙ is true a fortiori of all curves which admit of any a ⊙ being drawn to the same tangent fully within the curve

For if Dr can be made less than $\frac{4D}{m}$ a fortiori DR may. —

Ex. 2nd To draw a tangent to a ⊃

Put L = latus rectum

Then $Lx = y^2$

& $Lx + L\dot{x} = y^2 + 2y\dot{y} + \dot{y}^2$

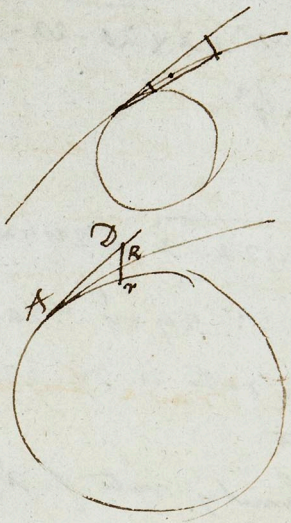
$\therefore L\dot{x} = 2y + \dot{y} \cdot \dot{y}$

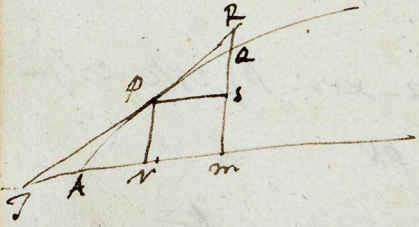
$\dot{x} : \dot{y} :: 2y + \dot{y} : L$

∴ limiting ratio of $\dot{x} : \dot{y}$ is $2y : L$

but limiting ratio is also PS : SR

$\therefore 2y : L :: PS : SR :: SN : \frac{1}{2}NP$





$$\angle JN = \frac{2\mathcal{H}}{L} = \frac{2Lx}{L} = 2x .$$

or $2ax - x^2 - y^2$

& $2ax - x^2 + \dot{x} \times 2a - 2x - \dot{x} =$

$y^2 + 2y\dot{y} + \dot{y}^2$

Subtract &

$\dot{x} \times 2a - 2x - \dot{x} = 2y\dot{y} + \dot{y}^2$

& $\dot{x} : \dot{y} :: 2y + \dot{y} : 2a - 2x - \dot{x}$

whose limity ratio is $2y : 2a - x$

or $y : a - x$

But the limity ratio of $\dot{x} : \dot{y}$

is also $PS : SR$

$\therefore y : a - x :: PS : SR$ :: (sim

Δs) $TR : PN$

$\therefore TR$ is a tg^t to n^o, pp^r

$a - x \,.\, y :: PN : TN.$

& TN is a subn^l to n^o, pp^r

Draw A V any Chord in the ⊙

AP : DP is a constant ratio

∴ DB may become less than

any part of DP or (DP − DB) BP

Ex. of the use of these axioms

in drawing Tangents

To find from what point T in

the dr a the TP is a tangent to

the point P.

Construct.

Put a, the radius = a ; an = x

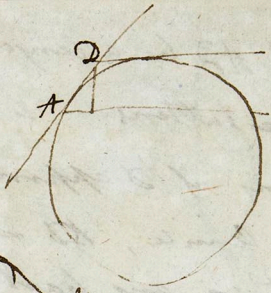
np = y , nm the int of x = x

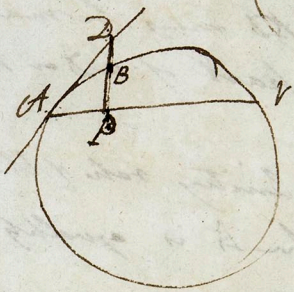
& the int of y = y

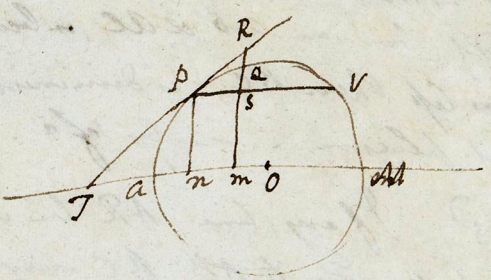
Then by the = nt Theorem

$x + 2a - x = y^2$

$\sqrt{x+x} + 2a - x - x = y + y$


D
A


D
B
A
V


R
p
q
V
s
J
a
n
m
O
At

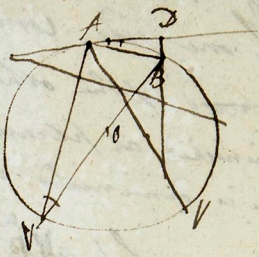
Let AD be a tangent to the ⊙
DB a subtense, ∠ at D given
Then if D approaches to A
sine limite, BD may be made
less than any part of AD or AB.

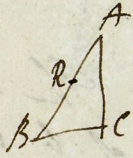
Cor 2ª The limiting ratio of the
other sides of the Δ is equality

Let of AB : AC is AB : AB
for diff between AB & AC, in being
always less than BC, is diminisha-
ble at pleasure ∴ &c by def^n.

Cor 3ª If any line AR be in
a ratio to AB, BC may
become less than any part of AR
or of ~~AR − AB~~ or AR − BC

Ex.


A
D
B
O
V
V


A
R
B
C

Book First After Euclid

If one side and one angle of a ~~triangle~~ and the other adjoining to be diminished at pleasure, the adjoining side is diminished at pleasure



Let abc be first ∠ and a diminishable similar, bc is d. s. l.

The same is true of the angle at b varies, provided ~~it~~ there be certain limits nearer than which it never comes to two ∠ts or 0 or if it will prove it never could attain it

Cor bc be comes less than any part of ab or of ac, if any other ∆ be constituted perpendicularly similar to abc the side homologous to bc will become less than any part of the other sides

Cor


A
C
B
a

A ratio can have but one limit

Let a ratio be expressed two different ways. Let it one way be reducible to the ratio $1 : a \pm x$ & the other way to the ratio $1 \div b \pm y$, x & y being diminishable ~~ad~~ infinite.

~~I say that $a = b$~~

Then the limit the former way is $1 : a$ & the latter $1 : b$. I say $a = b$

If not let $a = b + r$ & let $y - x$ be called m when r & then since $1 : a + x = 1 : b + y$

$$1 : b + r - x = 1 : b + y$$

$$\therefore b + r - x = b + y$$

$$\therefore r = y - x$$

call any one of the parts of the area á & the corresponding part of the external area é then if the number of parts be increased ad libitum the dif between a & 2á may be made less than $\frac{a}{m}$ however great m be ∴ (Cart)

Area : external area :: 2 : 1

That the dif may is thus demonstrates

Aa : Ab :: ad² : be²

∴ Aa : ab :: ad² : be² − ad²

:: ad² : be + ad × ee

∴ $Aa \times ee^{\frac{ad+be}{ad}} = ab \times ad \times \frac{ad}{ad+be}$

$ab \cdot fg \cdot 2 + \frac{be}{ad} = a$

$fg + dee \cdot 2 + \frac{be}{ad} \cdot fg - 2dee = a \cdot dfe$



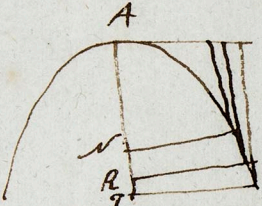
$$2fg = a \div \frac{be}{da} \cdot fg$$

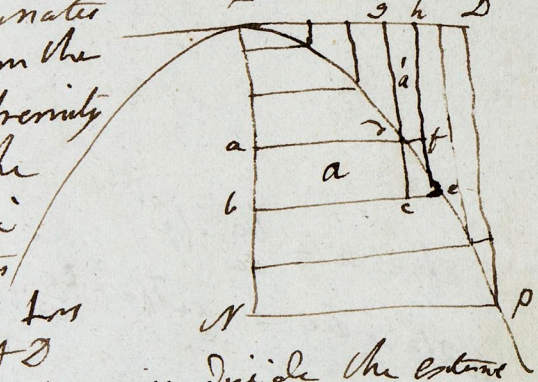
$$\overline{2fg + 2dee} = a + 2fe - \frac{be}{da} \cdot fg - dfe$$
$$+ 2dee$$

Illustration of the use of these articles

The area of a ∩ is $\frac{2}{3}$ of the circumscribing □.

Divide a n into equal parts & each point of division draw ordinates from the extremity of the ordinates draw tns on A D





These tns will divide the extent A D P into an equal number of ~~parts~~ corresponding parts

If A & B be divided
each
correspond
into two variable parts
A into y & z & B into Y & Z
it will be found that however nearly
y & Y both differ from
A & B respectively, y : Y
is the same ratio m : n
A : B :: m : n and also z : Z :: m : n

For let A - $\frac{A}{r}$: B :: m : n
but A - z : B - Z :: m : n

take z less than $\frac{A}{r}$

Then A - z is greater than A - $\frac{A}{r}$
& B - Z is less than B
but A - $\frac{A}{r}$: B :: A - z : B - Z
& A - $\frac{A}{r}$: A - z :: B : B - Z
alternd.

Shd the Dif between a $\frac{N}{M}$ ny
be less than $\frac{a}{r}$ &c

Then $a + \frac{a}{r} > \frac{N}{M} a$

$b + \frac{b}{r} > \frac{N}{M} b$

&c

$\therefore A + \frac{A}{r} > \frac{N}{M} B$ C. H.

Then ~~A~~ +

Then $a + \frac{a}{r} \to A$

$b + \frac{b}{r} \to B$

$c + \frac{c}{r} \to C$

&c

$a+b+c+\&c + \frac{a+b+c\&c}{r} \to A+B+C\&c$

or $A + \frac{A}{r} \to B$ C^a &c.

If upon the same hyp the Diff between a & $\frac{N}{M} a$, may be made a less part of a than $\frac{a}{m}$, & the Diff between b & $\frac{N}{M} b$ a less part of b than $\frac{b}{m}$ &c &c

$A \; B :: N : M$.

Dem. If not Let $A + \frac{A}{r} = \frac{N}{M} B$.

Divide A & B into as many parts

If two quantities A & B be
divided into the same number of parts
, A into the parts a, b, c, d &c
& B into the parts a', b', c', d'
&c it will be found that upon increasing
the number of parts ad libitum
the difference between a & a'
may be made less than any part
$\frac{A}{m}$ (however great a number
m be assigned for m) & the diff between
b & b' less than $\frac{B}{m}$ &c so on through
all the parts, $A = B$

Dem. If not let $A + \frac{A}{r} = B$ or $A = B + \frac{B}{r}$
take r greater than m, & divide
A & B into r many parts that the
diff between a, a' & b, b' &c may
be less than $\frac{A}{r}$, $\frac{B}{r}$ &c so
evidently

a L a' + $\frac{A}{r}$

b L b' + $\frac{B}{r}$

c L c' + $\frac{C}{r}$

&c

$\therefore A L B + \frac{B}{r}$

If two quantities A & B
be divided into an equal num
ber of parts, A into the parts
a, b, c, d, &c & B into the parts
a' b' c' d' &c it be found that
upon supposition of increasing the
number of parts at pleasure the
ratios a : a' b : b' have all a
limit, & moreover all the same
limit (A : A'), A is to B in
that limiting ratio (A : B :: A' : B'),

$p : p+x$

$a \quad a+y$

$x : x+y$

$x : x+\frac{x}{2}$

$1 : 1-\frac{1}{2}$

To find the limiting ratio when some of the terms are diminishable at pleasure, & some not, ~~& some~~ constant

~~any~~ ~~mentable at pleasure~~.

Rule. Strike out all the terms that are diminishable at pleasure

To find the limiting ratio when all the terms are diminishable at pleasure

Strike out all the terms that may be made less than the rest in any proportion. The ratio that remains either is the limiting ratio or has the same limiting ratio

To find the L. R. when some of the terms are augmentable at pleasure

Strike out all the terms which may be exceeded by ~~one or more~~ each of the rest in any proportion

If possible $p:q$ unlimited
& that p may become greater than any
multiple of q than it may be
greater than any multiple of $\frac{q}{m}$
$\therefore$ then $p-\frac{p}{m}$ may be greater than
any multiple of $\frac{q}{m}$ i.e. in this
~~ratio~~ ratio is unlimited
~~capable of exceeding any~~
ratio of greater inequality
~~$p:q$~~ but $p:q$ unlimited $\frac{p}{q}$ is
not greater
new $p-\frac{p}{m} : q-\frac{q}{m} = 1 : \frac{q-\frac{q}{m}}{p-\frac{p}{m}}$

$$= 1 : \frac{\frac{p}{q} + \frac{pq}{n} - \frac{p}{m}}{p - \frac{p}{m}} = 1 : \frac{\frac{p}{q} + \frac{pq}{n} - \frac{p}{m}}{1-\frac{1}{m}}$$

$$1 : \frac{p}{q} + \frac{q}{p} - \frac{1}{m} \div 1 - \frac{1}{m}$$

$$p + \frac{p}{m} \Big| 1 + \frac{q}{n} \Big(\frac{q}{p}$$

$$\frac{q}{n} - \frac{qp}{pm} \qquad q + \frac{q}{m}$$

$$\frac{q}{n} - \frac{q}{m} \qquad p - \frac{p}{n}$$

$$\frac{1}{n} - \frac{1}{m} \quad \frac{1}{n+1} \quad \frac{q}{p} \times \frac{\frac{1}{n} - \frac{1}{m}}{1 - \frac{1}{n}}$$

The 1st rule is evidently groundless
in dispute and
that the [illegible] are agreeable
to the definition may be formally demonstrated thus

Let $p + y : q + z$ denote any ratio $\frac{p}{q} = \frac{y}{z}$ being the sum
of all those terms in a series
which the ratios differ by a constant
in a series by any number of terms
Let $r : s$ be two quantities either
constant or varying within certain limits
as may be wanted $t : v$ w
be such that respectively as
$p : q$ $y : z$

Then $p + y : q + z$ is the same
ratio as $r + t : s + w$

1st Let

$p + y : : q + z : :$

$1 : \frac{q+z}{p+y} : : 1 : \frac{q}{p} + \frac{pz+qy}{p \cdot p+y}$

$+ \frac{z}{p+y} - \frac{qy}{p \cdot p+y} = 1 : \frac{q}{p}$

$p - \frac{p}{n} \to nQ$

$\frac{n+1}{n} p \to nQ$ $\qquad 1 - \frac{1}{n+1}$

$p \to n \frac{n}{n+1} Q$

$\to nQ - \frac{Q}{n+1}$

$nQ \qquad \frac{nQ+Q}{n} \qquad \overline{n-1}\ Q + \frac{Q}{n}$

$p+y \quad \frac{Q}{p}$

$Q + \frac{Qy}{p}$

$\frac{Qy}{p}$

$p : Q - Q \cdot \frac{y}{p-y}$

$p : \frac{pQ + Qy - Qy}{p-y}$

ratio is 1 : 1 ∴ the limiting ratio
of $a+x : a-x$ is 1 : 1

4th Required the limiting ratio of
$a+x : 2x$, x being augmentable
at pleasure

$$a+x : 2x = \frac{a+x}{2x} : 1$$

$$= \frac{1}{2} + \frac{a}{2x} : 1$$, whose limiting
ratio is $\frac{1}{2} : 1$ or 1 : 2.

5th Required the limiting ratio
of $x+x^2 : 2x+x^2$, x being
diminishable at pleasure.
the ratio is $1+x : 2+x$
whose limit is 1 : 2

9. If x & y be two variable quantities & x : y has a limit a : b, a : b is called the limiting ratio of x : y

Examples of Limiting ratios

1st Required the limiting ratio of $a+x : 2a$ when x may be decreased at pleasure

Ansr $a : 2a$ or $1 : 2$

2d Of $a-x : 2a$ iisdem positis

Ansr $a : 2a$ or $1 : 2$

3d Of $a+x : b-x$ iisdem positis

Ansr $a : b$

$a+x : b-x = 1 : \frac{b-x}{a+x}$ where limiting

7 Def. If the antecedents or consequents of two varying ratios be fixed, & the less the consequent or antecedent, the less the ratios are said to differ, & if the diff. between the antecedents or consequents may be decreased ~~antec~~ cons. ~~cons~~ ante. ~~ante~~ cons. ~~cons~~ ante. ~~ante~~ cons. ~~cons~~ ante. ~~ante

$\frac{1}{2}$ If x be diminishable since
limits, $a+x : b+y$ &
$a.b$ diminisher since limits
for $a+x : b+y :: 1 : \frac{b+y}{a+x}$

$a+x\left(b+y\left(\frac{b}{a}+\frac{y-\frac{b}{a}x}{a+x}\right.\right.$ $:: ay+by-\frac{b}{a}x : \frac{by+\frac{ay^2}{a}-by}{a+x}$
$b+\frac{by}{a}$ $:: 1 : \frac{by}{a}+\frac{ay^2}{a^2}$
$\frac{by-\frac{b}{a}x}{a+x}$ $:: a : b+\frac{ay-bx}{a+x}$

but $\frac{ay-bx}{a+x}$ is diminishable
since limits $\therefore$ the two ratios $a : b$
& $a : b+\frac{ay-bx}{a+x}$ come under the
description in art 7. $\therefore$ so do $a+x : b+y$
& $a : b$

x be that it is the diminishd
at pleasure. Then the limit of

$a - x$ is a .

For it approaches to a
it never reaches a
it can exceed any thing less than a,
as $a - r$; viz by making x less than
r for then $a - x$ will be $> $ than $a - r$.

6 If in the same manner a variable
decreasing quantity approaches to a
fixt quantity (but always exceeds it
the first quantity is the limit of
the variable

Exc

Let a be the fixt qy
$a + x$ the variable
Supp that x is to be diminishd at
pleasure. Then limit of $a + x$ is

the sum of 10 terms ~~in the former~~
is made up ~~of the~~ by the addition of
the successive terms, which may
be called the increments of the sum
& the increment ~~in the~~ latter series
is always double of the increment in
the former ∴ the sum of ten terms
~~in the latter~~ is double the sum of
10 terms in the former.

5 If x be a fixed quantity & a
variable quantity, ~~&~~ ~~upon a certain hypo~~
~~thesis the variable quantity~~ may approach
in value to the fixed quantity, but ne-
ver reach that value, but reach &
exceed any thing else than the fixed
quantity ~~the fixed quantity is~~
called the limit, or limiting value (in that case) of
the variable quantity

Ex

Let a be the fixed quantity &
a − x the variable, on account
of x varying. Let the hypothesis of

1. Fluxions is a method of comparing quantities by means of their increments.

2. Quantities are considered either as being generated by motion, or by accession & parts.

3. If the generation of two quantities begins at the same time, & the coetemporary increments are always equal the quantities themselves will always be equal.

4th Hence, if the coetemporary increments be always in the same ratio to each other, the quantities will always be in that same ratio to each other

Example

Take the two geometrical series

1 3 9 27 &c
2 6 12 54 &c