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John Ball



Howard C. Levis.

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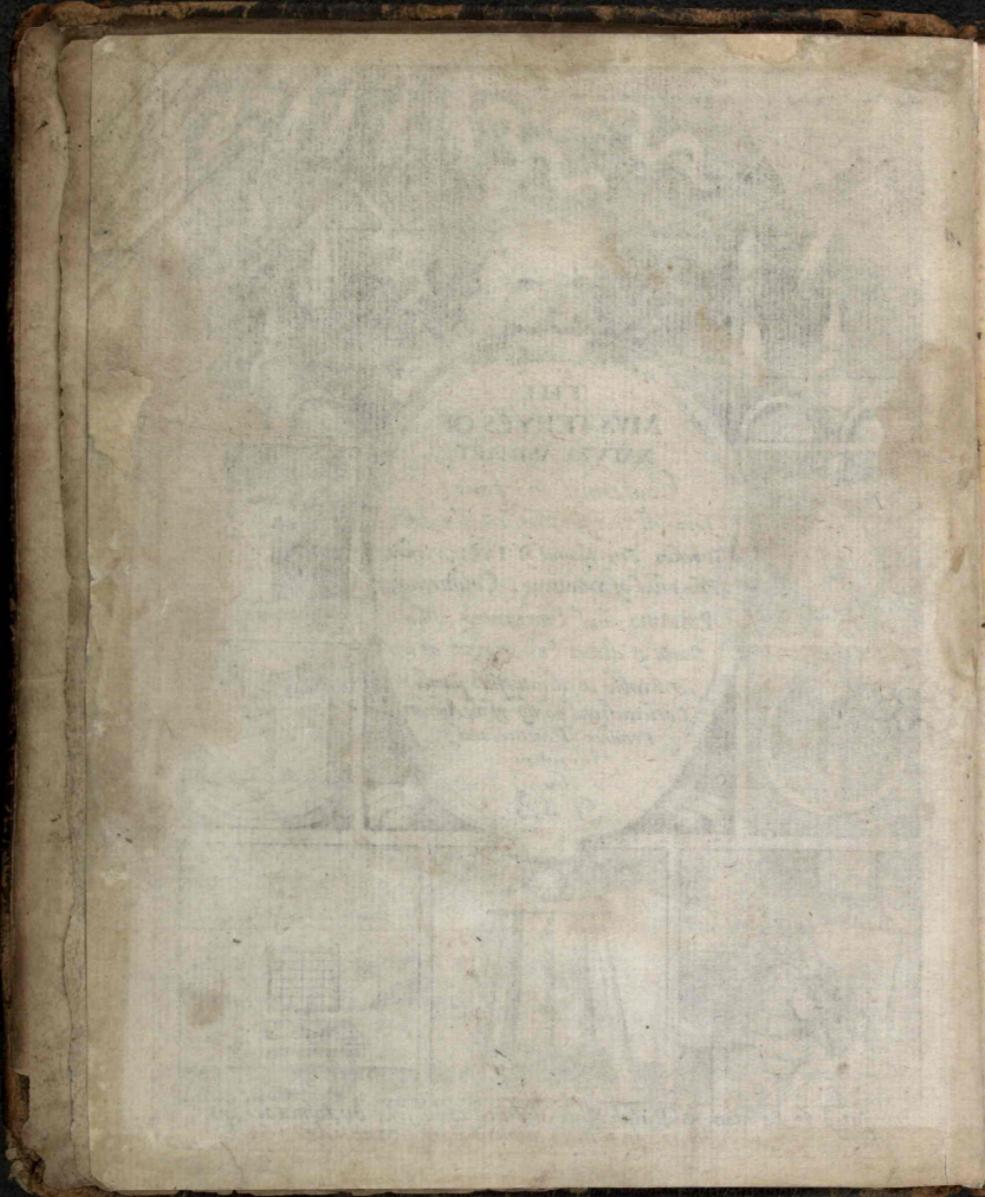
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TO THE READER.

Ourteous Reader, this ensuing Treatise hath lien by mee a long time, penned, but in a confused and undigested manner, as I gathered it, practised, or found it out by industry and experience. It was not in my minde to have as yet exposed it to the publique view: but being sollicitated by the intreaties of some, and those not a few, to impart to each particular person what his *Genius* most affected; I was enforced as well for the satisfying of their requests, as for the a-
A voydance

To the Reader.

voydance of many inconveniences, to dispose in some order such Experiments as for the present I was content to impart. Expect no elegancy of phrase, for my time would not afford that, (nor indeed my selfe to be the transcriber.) I endeavored as much as I could, to write in plaine termes, that in regard of the easinesse thereof it might suit with the meanest capacity. The whole book consisteth of foure parts: The first whereof treateth of VVater-workes. The second of Fire-workes. The third of Drawing, Painting, Graving, and Etching. The fourth and last part treateth of severall Experiments, as well serviceable as delightfull: which because they are confusedly intermixed, I have entituled them *Extravagants*.

Now my chiefeſt ayme and end being the generall good, I could wish a general

To the Reader.

nerall acceptance, but that is too uncertain to expect: I will content my selfe that I am already certaine that these my first and weak endeavours will finde acceptance with some, and I hope also with all honest and indifferent Readers; as for others, hap as hap may me, it is not to be doubted, but that I shall scape as well as many my betters have done before me. Farewell.

Your Wellwiller,

J. B.

To my friend the Authour, upon his My-
steries of Nature and Art.

WHen I scan over with a busy eye
The timely fruits of thy vast industry,
Observing how thou searchest out the heart
Of Knowledge, through th' untrodden pathes of Art,
How easily thy active minde discryes
Natures obscure and hidden rarities,
No greater wonder than thy selfe I finde,
The chiefest rarities thy active minde,
Which so fore-runs thy age. Thy forward spring
Buds forth betimes, and thou art publishing
Evn in the morning of thy day, so soone,
What others are to learne till th' afternoone.
Now since thy first attempts expos'd thou hast
To publick censure, and the Dy is cast,
Doubt not of good successe: the early rose
(Thou knowst) is snatched at, evn before it blowes.
Climbe higher yet; let thy quick-sighted eyes
Venture againe for new discoveries:
Nor be thou miser-like, so envious,
As to detain what ere thou findest, from us;
No, make the world thy debitor; be thou still
As open-handed to impart thy skill,
As now thou art; and may thy teeming braine
Bring often forth such lusty Births againe.



Of Water-works.

THath been an old saying amongst Philosphers, and experience doth prove it to be true, *Non datur vacuum*, that is to say, Nature will not admit of any vacuity, or emptinesse. For some one or other of the Elements, but especially Ayre, and Water doe insert themselves into all manner of concavities, or hollownesse, in, or upon the earth, whether they are such as are formed either by Art or Nature. For the one it is so obvious, and manifest, as that it needs not any prooffe at all. As for the other, I shall make it manifest unto you by easie demonstration. Let there be gotten a large vessell of glasse, or other, having besides the mouth another hole (though but a little one) at the top : poure water into the vessell by a tunnell thrust into the mouth of it, and you shall finde that as the water runneth into the vessell, a winde will

come forth of the little hole, sufficient to blow
out a candle being held over it. This proveth,
that before the water was poured into the vessell
(though to our sight it appeared to bee empty)
it was full of ayre, which forced out of the ves-
sell as the water ran in ; and the reason hereof
is, because the water is by nature of a massie, sub-
till, substance; and the ayre of a windy, light, e-
vaporative nature : The knowledge of this, with
the rarification of inclosed ayre, is the ground
and foundation of divers excellent experiments
not unworthy the knowledge of any ingenious
Artist whatsoever.



The order of the things contayned in
the first booke.

- E**xperiments of drawing water by the Crane.
Experiments of drawing water by Engins.
Experiments of forcing water by ayre compressed.
Experiments of forcing water by Engins.
Experiments of producing sounds by ayre and water.
Experiments of producing sounds by evaporation of water
by fire.
Experiments of producing sounds by Engins.
Experiments of motions by evaporating water.
Experiments of motions by rarifying ayre.
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THE HISTORY OF THE

ROYAL SOCIETY

OF LONDON

FROM THE YEAR 1660

TO 1703

BY JOHN WALLIS

AND JOHN WALLIS

OF THE SOCIETY

OF LONDON

AND JOHN WALLIS

OF THE SOCIETY

OF LONDON



Of Water-workes.

To draw water by a Crane.

TAke any vessell, of what bignes you please, fill it with water, then take a Crane (that is a crooked hollow Cane) one end wherof, let be somewhat longer then the other; put the shorter end of it into the vessell of water, and let the longer end hang out of the vessell, unto which longer end, put your mouth, and draw in your breath, and the water will follow; then withdraw your mouth, and you shall see the water runne so long, till it come equall to that end of the Cane which is within the vessell.

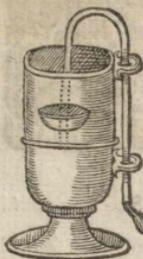


Another.

TAke a deepe vessell, having two loopes on one of the sides, fill it nigh full with water: then take a hollow Cane, like unto the aforesayd, but let there bee fastned unto the shorter end a wooden dish; put the longer end

B. hereof

The first Booke



heereof through the loopes on the side, and that end that hath the dish fastned unto it into the vessell of water, with your mouth as you did in the former, draw out the ayre, and you shall see that as the water runneth out, the Crane will sinke lower and lower, and so will continue running untill the vessell bee drawn empty.

How to make a conceited pot, which being filled with water, will of it selfe run all out; but not being filled will not run out.

MAke, or cause a pot to bee made of what fashion best liketh your mind, and make a large hollow cane to stand up in the midst thereof; having at the bottome 2 or 3 small holes; let the top of this cane be close: then make a hole in the bottome of the vessell, and put up a little cane hollow at both ends, into the other cane, so that the one end thereof may almost touch the top of the great cane, and it is done. Note, that if you put into this vessell so much liquor, that it swimme above the top of the cane, it will of its owne accord, run and never cease so long as there is any liquor in the vessell; but if you fill it below the cane, it will not run at all of it selfe: the reason whereof is this; the ayre being the lighter element, doth ascend into the higher place, but being drawne as in the two first demonstrations out of the Crane, or forced, as in this, by the weight of the water in the vessell, the water then tendeth downewards unto its proper place.



How

How to dispose 2 vessells upon one foot, that so much wine may runne out of the ene, as you shall put water into the other.

Let A, B, C, D, be the foot, at each end whereof, place a vessell equall in bignesse, the one to the other; as D, E; also let there passe a hollow cane from the one to the other, as A, R, A, the ends whereof must almost touch



the tops of the sayde vessells; in the vessell D, there must be a hollow pipe, as F, whereby you may by help of a tunnel powr water into the vessell: also in the vessell E, there must be a crane, as G; now if you fill the vessell E with wine almost unto the top of the crane, and afterwards stoppe the mouth of the vessell, that the ayre may not

breath forth, it will not run of it selfe: but if you put water into the vessell D, the ayre containd in it, will passe through the hollow pipe, A, R, A, into the vessell E, where striving for a greater quantity of roome, it presseth the wine out of the vessell E, (by the crane) answerable in quantity unto the water powred into the vessell D.

How to dispose 2 vessels upon one foot, the one being empty, and the other almost full of wine, and yet shall not runne out of the vessel, unlesse you fill the empty vessel with water, and then the one shall run pure wine, the other fayre water.

L Et there bee 2 vessels placed upon one foot, having a hollow cane passing from one to the other (as I taught in the precedent probleme) but let there bee 2 cranes as F, G, one in each vessel; then fill one of the vessels with



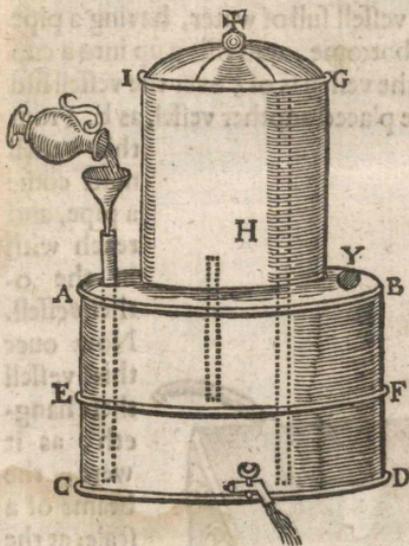
wine, but not above the crane, so it will not runne of it selfe: but if you powre water into the other

vessel, untill it bee full, it will cause that wine shall runne out of the one, and cleare water out of the other.

To make that the water contained in one vessel, shall ascend into another vessel placed above it.

L Et A, B, C, D, bee a vessel having a partition in the middle, as E, F, let there be placed upon this vessel, a Cylinder of Glasse cleare, and very transparent, that will contayne the same quantity of water, that one of the partitions

titions will, as I, G, H ; in the lowermost partition to-
wards the bottome, let there bee a cocke, and out of the
same vessell let two pipes be made to passe, the one wher-
of reacheth almost unto the top of the Cylinder, the o-
ther must come out by the side of the Cylinder :

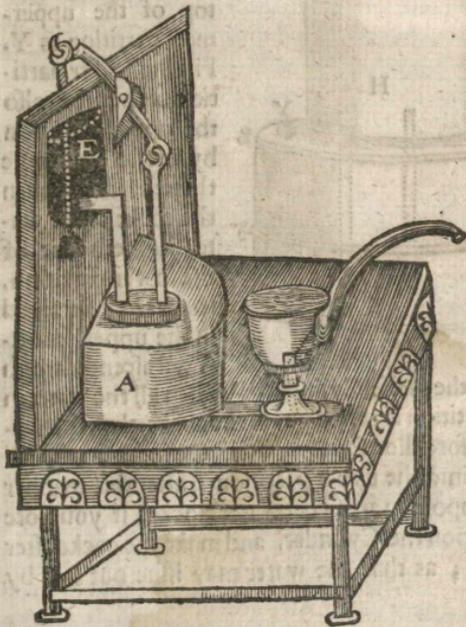


of the upper parti-
on there must come
another pipe. More-
over there must be a
hole, through the
top of the upper-
most partition as Y.
Fill the lower parti-
tion at the pipe, also
the upper partition
by the hole Y : note
then that if you turn
the cocke as the wa-
ter runneth out of
the lower partition,
the water contained
in the upper parti-
ō wil ascend throug

the pipe into the glasse Cylinder. When all the water in
the lower partition is runne out at the cocke, then the wa-
ter which before did ascend into the Cylinder, will fall
backe againe into the upper partition : after this manner
may you compose an artificiall water clocke, if you note
the howres upon the Cylinder, and make the cocke after
such manner, as that the water may issue out but by
droppes.

To make a cup or vessell that so oft as you take the liquor out of it, so oft it shall fill it selfe, but never runne over.

Suppose A to bee a vessell full of water, having a pipe coming from the bottome, and rising up into a cup of the just height that the vessell is of; over the vessell filld with water, let there be placed another vessell, as E. From



this vessell must come a pipe, and reach with in the other vessell. Now over this vessell there hangeth, as it were, the beame of a scale; at the one ende whereof, is fastened a peece of boord, having a leather nayled upon the top; at the other

other end of this beame must hang a weight, but not full so heauie as the peece of boord lethered is. Fill both these vessells with water, and the cup also; note then, that if you sucke out the water in the cup by the pipe on the side of it, the water in the vessell will come into it, untill it is in both of equall height: now as the water falleth downe in A, the peece of boord that is hanged unto one end of the beame falleth after it (because it is heauier then the weight) and so giueth way unto the water in E, which runneth into it; and when the vessell is filled againe with water, it beareth up the sayd peece of boord against the pipe of the vessell E, so that the water can run out thereat no longer, except the water bee againe drawne out of the cup:

Of drawing water by Engines.

BEfore I begin with these, take a word or two by the way. Let it bee a generall notion that no engine for water workes of what sort soeuer, whether for seruice, or meere pleasure, can be made without the help of Succurs, Forcers, or Clackes; euery of which, I haue orderly explyned both by words and demonstratiue figures.

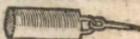
A Succur is a box, which is made of brasse (having no bottome) in the middest of which, there is a small bar goeth crosse, the same hauing a hole in the middle of it; this box hath a lid so exactly fitted unto it, that being put into it, no ayre nor water can passe betweene the creuise: this couer hath a little button on the top, and a seame that goeth into the box, and so through the hole of the aforesayd crosse barre, and afterwards it hath a little button iuxted

on

on it, so that it may with ease slip up and downe,
but not be taken, or slip quite out.



A Forcer is a plug of wood exactly turned and leathe-
red about; the end that goeth into the bar-
rell, is semicircularly concaue.



A Clacke is a peece of Leather nayled ouer any hole,
hauiing a peece of lead to make it lie close, so that
the ayre or water in any vessell may thereby bee
kept from going out.



*How to harden Leather, so as the same shall last much
longer in succurs of Pumps, then it doth
unprepared.*

LAy such Leather as is well tanned to soake in water,
wherein there hath beene store of iron filings a long
time, or else in the water that hath lien a long time under
a grinstone, into the which such yron as hath beene from
time to time ground away, hath fallen and there settled.

The making of a Pumpe to draw water.

SVppose A B C were a deepe Wel, wherein you would
make a Pumpe to draw water to the surfact or superfi-
cies of the earth. First therefore you must prouide a pipe
of Lead, or a peece of timber bored through, so long as
will reach unto the bottome of the Well: that part that
standeth in the water must bee cut with two or three
arches, as it were, if it be wood; if Leade, it must haue
somewhat to beare it a little from the bottome, that the
water may thereby bee let into the pipe, Towards the
bottome

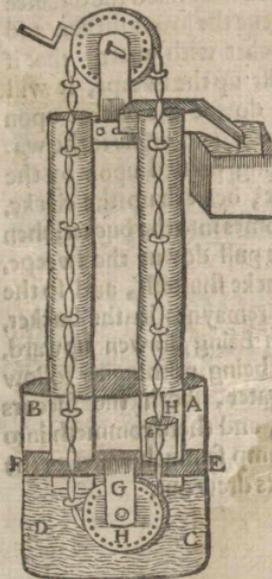
bottom of the pipe in the water there must be fastned a succur; also another of these succurs must be fastned about



two foot above the top of the ground; then haue a bucket fitted unto the hole of the wood or leaden pipe; let it bee well leathered about, and haue a clacke at the bottome of it, and let it bee hanged with a sweepe as the figure sheweth: note that after you haue filled the distance betweene the lower succur, and the bucket with water, that if you lift up the sweepe, it will thrust downe the bucket upon the water, and presse it, the water being pressed upon by the bucket, beareth up the clacke, and comes into the bucket; then if you pull downe the sweepe, the clacke shutteth, and so the water remaines in the bucket, which being drawn upward, there being nothing to follow but water, both the succurs open, and there commeth into the pump so much water as the buckets drew out.

The making of an Engin, whereby you may draw wa-
ter out of a deepe Well, or mount any River water,
to be conveyed to any place within three or foure
miles of the same. Also it is used in great
ships which I have seene.

Suppose A B C D to be a deepe Well, and E F to be a
strong peece of timber fastned athwart the same, a

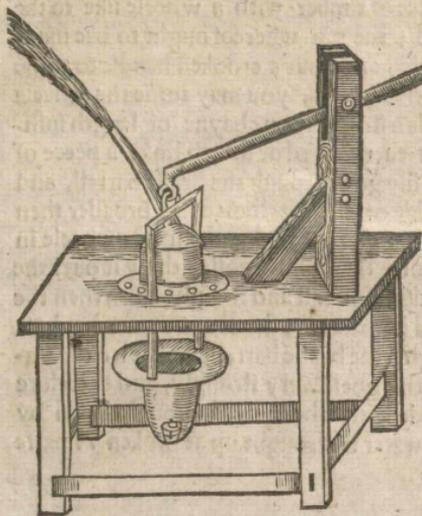


good way in the water. In this
planke let there bee fastened a
peece of timber with a strong
wheele in it, as G H, hauing
strong yron spikes droue a-
thwart the wheele within the
creuise, and strongly riueted on
each side : let them be three or
foure inches distant from each
other. Let there bee likewise
made in the sayde planke two
holes, in which set two hollow
posts, that may reach to the top
of the Well, or so much higher
as you desire to mount the wa-
ter ; let them bee made fast that
they stirre not. In the bottom
of one of these posts, there must
be fastned a barrell of brasse, as
G H, made very smooth with-
in, and betwixt those two posts
at the top ; let there bee fastned unto them both another
peece

peece of strong timber to hold them fast, lest they start a-funder; and in the midst of that make a mortice, and in it fasten a strong peece of timber with a wheele like to the former mentioned; the pin whereof ought to bee made fast unto the wheele, and have a crooked handle to turne about, that by turning of it, you may turne the wheele also. Then provide a strong yron chayne of length sufficient, having on euey third or fourth linke a peece of horne, that will easily goe through the brasse barrell, and a leather of each side of it, but somewhat brogder then the horne; put this chayne under the lower wheele in the Well upon both the hollow posts, draw it over the upper wheele, and linke it fast and straight. Turn then the handle round, and it will turne the chayne round, whose leathers comming up the brasse barrell, will beare the water before them; this goeth very strongly, and therefore had neede bee made with wheeles and wrought upon by horses, for so the water is wrought up at Broken Wharfe in London.

To make an Engin, which being placed in water will cast the same with violence on high.

Let there be prepared a strong table, with a sweepe fastened at the one end thereof, to lift up and downe; unto the end of the sweepe, let there be linked a peece of yron having two rods of length sufficient; let there bee made a hole quite through the midst of this table, whose diameter let be about five or six inches; then provide two peeces of brasse in forme of hattes, but let the brim of the uppermost be but about one inch broad, and have diuers little holes round about it; also in the crown of this must



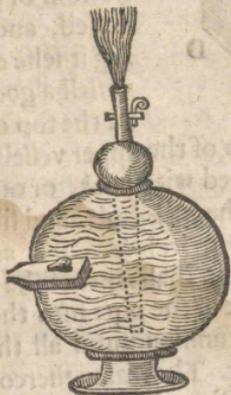
bee placed
a large suc-
cur, and o-
uer it a half
globe, frō
the top of
which,
must pro-
ceed a hol-
low trunk
about a
yard long,
and of a
good wide
bore; then
take good
liquored
leather, 2
or 3 times
double, &
put be-
tweene the

board and the brims of this, and with diuers little screws put through the holes of the brimme, screw it fast unto the top of the table. Note that the table must bee leath-
ered also underneath the compasse of the brimme of the lower brasse. Now the lowermost brasse must be of equal diameter (in hollownesse) unto the other, but it must be more spirall towards the bottome, and must haue cyther a large clacke or succur fastned in it; also the brim of this must be larger then that of the uppermost, and haue two holes made about the midst on each side one; bore then 2
holes

holes in the table, on each side of the brasse one, answerable unto the holes of the brim of the lower brasse, through which holes put the two rods, of the yron hanged unto the sweepe through them, and riuet them strongly into the holes of the lower brasse: Place this in water, and by mouing the sweepe up and downe, it will with greater violence cast the water on high.

*Experiments of forcing water by ayre
compressed.*

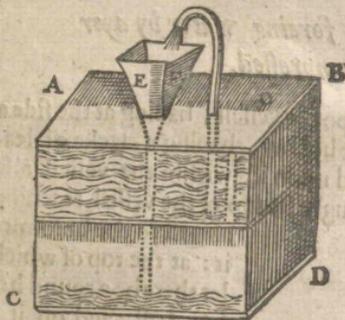
Let there bee a large pot or vessell, hauing at the side a peece of wood made hollow, hauing a clacke of leather with a peece of lead upon it, within the vessell so let there be a pipe through the top of the vessell, reaching almost to the botom of it: at the top of which let there be a round hollow ball, and on it a small cocke of brasse. Note that if you fill the said vessell halfe-full of water, and blow into the hole of the pipe, at the side, your breath will lift up the clack, and enter the vessell, but when it is in, it will



presse down the clack: blow into it oftentimes, so shall there bee a great deale of ayre in the vessell, which will presse so hard upon the water, that if you turne the cock at the top, the water in the vessell will spin out a good while.

Another.

Let A, B, C, D, be a great vessell, having a partition in the middle : let there bee a large tunnell at the top of it, E, F, whose neck must go into the bottom almost of the lower vessell : let there be a hollow pipe also coming



out of the partition, and almost touch the top of the upper vessell. In the top of the upper vessell let there bee another pipe, reaching from the bottom of the upper vessell, and extending it selfe out of the vessell a good way : let the top of it hang

over the tunnell. In the top of the upper vessell let there be a hole besides, to be stopped with cork, or otherwise : when you will use it, open the cork-hole, and fill the upper vessell with water : then stop it close againe, and poure water into the tunnell, and you shall see that the water in the upper vessell will run out of the pipe into the tunnell againe. and so will continue running untill all the water in the upper vessell be run out. The reason thereof is this; the water in the tunnell presse the ayre in the lower vessell, maketh it ascend the pipe in the partition, and presse the water in the upper vessell, which having no other way but the pipe, it runneth out thereat.

The forcing of water by pressure, that is the naturall course of water in regard of its heavinesse and thinnesse, artificially contrived to break out of what image you please.

LET A, B, C, D, bee a cestern placed upon a curious frame for the purpose, let the bottom of this frame be made likewise in the form of a cestern: Through the pillars of this frame let there passe hollow pipes from the bottom of the upper cestern, and descend to the bottom of the lower cestern, and then run all to the middle thereof, and joyne in one, and turne up into the hollow body of a beast, bird, fish, or what your fancy most affecteth: let the hole of the image whereat the water must break out, be very small, for so it will run the longer. Fill the upper cestern with water, and by reason of the weight thereof it will passe through the pipes, and spin out of the hole of the image.

Experiments of forcing water by Engines.

LET there bee an even streight barrell of brasse of what length and bignesse you please: let the bottom of it be open, and let the top be closed, but so that it be hollow on the outside like a basin: in the midst whereof let there bee a straight pipe crected, open at both ends, also let there be another short pipe at the side of it, which let bee even with the top of the basin on the outside, but stand a

little



little from it on the side
Having thus prepared
the barrell, fit a good
thick board unto it, so
that it may slip easily
up and down from the
top of the barrell unto
the bottom, nayle a
lether about the edges
of it, and another upon
the top of it : on the
underside of it let there
be fastned a good stiffe,

but flexible spring of steele, which may thrust the board
from the bottom to the top of the barrell : let the foot of
this spring rest upon a barre fastned across the bottom of
the barrell; let this board also have tied at the middle a lit-
tle rope of length sufficient. When you use it, bore a lit-
tle hole in the table that you set it on, to put the rope thro-
row, and pull the rope down, which will contract the
spring, and with it draw down the board : then poure in
water at the basin untill the vessell be full : Note then, as
you let slack the rope, the water will spirt out of the pipe,
in the middle, and as you pull it straight, the water will
run into the vessell againe. You may make birds, or di-
vers images at the top of the pipe, out of which the water
may break.

Another

Another manner of forcing water, whereby the water of any spring may be forced unto the top of a hill.

Let there be two hollow posts, with a succur at the bottom of each, also a succur nigh the top of each : let there be fastned unto both these posts a strong peece of



timber, having, as it were, a beame or scale pinned in it, and having two handles, at each end one. In the tops of

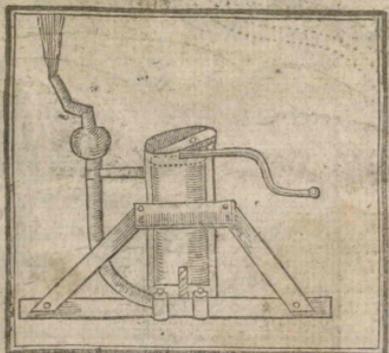
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both

both these hollow posts fasten two brasse barrels, made very even and smooth within, unto these two barrels let there be fitted two forcers, lethered according to art, at the tops of these foreers must be fastned two yrons, which must bee linked unto the aforesaid beam; from each post below towards the end of the barrels, let there bee two leaden pipes, which afterward meet in one, to conduct the water up to the place desired, which if it bee very high, there will be need of some succurs to catch the water as it cometh.

The description of an Engin to force water up to a high place: very usefull for to quench fire amongst buildings.

Let there be a brasse barrell provided, having two succurs in the bottom of it: let it also have a good large



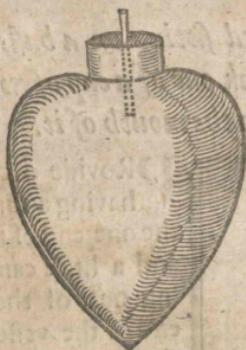
pipe going up one side of it with a succur nigh unto the top of it, and above the succur a hollow round ball, having a pipe at the top of it made to screw another pipe upon it, to direct the water to any place. Then fit a forcer unto the

barrell with a handle fastned unto the top; at the upper end of this forcer drive a strong screw, and at the lower end

end a screw nut, at the bottom of the barrell fasten a screw, and at the barre that goeth crosse the top of the barrell, let there be another screw nut : put them all in order, and fasten the whole to a good strong frame, that it may stand stedy, and it is done. When you use it, either place it in the water, or over a kennell, and drive the water up to it, and by moving the handle to and fro, it will cast the water with mighty force up to any place you direct it.

*Experiments of producing sounds by
ayer and water.*

LEt there bee had in a readinesse a pot made after the forme of the figure following, having a little hole at the top, in the which fasten a reed or pipe, also another little hole at the bottom : presse this pot into a bucket of water, and it will make a loud noyse.



Another.

LEt there be a cestern of lead or such like, having a tunnell on the top : let it bee placed under the fall of a

Conduit, and at the one end of the top, let there come out of the vessell a small pipe, which let bee bent into a cup of water, and there will be heard a strange voice. Over



this pipe you may make an artificiall tree with diuers birds made to fit therein.

How to make that a bird sitting on a basis, shall make a noise, and drink out of a cup of water, being held to the mouth of it.

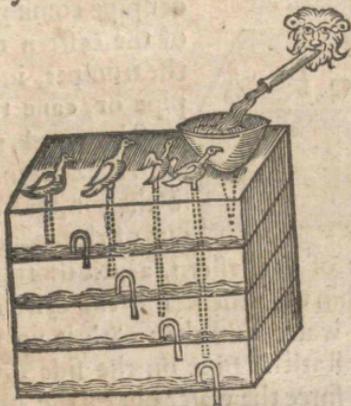


PROvide a cestern, having a tunnell at the one end of the top, and a little cane coming out of the other end of the vessell; on the top of which let there be a bird made to fit, also at the bottom of the cestern, let there bee a crane to carry away the water as it run-

runneth into the vessell. Place this vessell with its tunnell under the fall of a conduit of water, and the bird will sing; and if you hold a cup of water under his bill, hee will drink and make a noise.

A device whereby severall voyces of birds cherping may be heard.

Prepare a cestern having divers partitions, one above another; let them all have cranes in the bottoms to carry the water from one to another; also let each cestern have his severall pipe, all of them coming out at the top of the cestern, on whose tops let birds be artificially made, with reeds in them: also in the top of the upper cestern let there be a tunnell. Place it under the fall of a conduit of water, and you shall heare so many severall voyces as there are birds.



A device whereby the figure of a man standing on a basis shall be made to sound a trumpet.

Prepare a cestern having within on the lid fastned a concave hemisphere, in whose bottom let there be

D. 3

made one or two holes: let there also be a hole in the top of the sayd cestern, whereby it may be filled with water as occasion serueth.



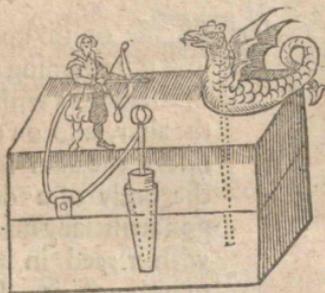
Also let there be made to stand on the top of this cestern the image of a man holding unto his mouth a trumpet: this image must likewise have a slender pipe coming out of the cestern unto the trumpeter, in this pipe or cane there must be a cock, nigh unto the cestern. Also there must come out of the concave

hemisphere at the side of the cestern, a little short pipe, having a clack on it within the vessell. Fill the cestern about two thirds full of water, and then cork it up fast, blow then into the vessell at the pipe on the side divers times, and the ayer will force the water out of the hemisphere, and make it rise up on the sides of it; turne then the cock, and the weight of the water will force the ayer out of the pipe, and so cause the trumpeter to sound.

Hercules shooting at a Dragon, who as soone as he hath shot, hisseth at him.

Let there be a cestern having a partition in the midst; in the partition let there be a deep succur, having a small

Small rope fastned unto the top of it : let the one end of the rope come out of the upper lid fastned unto a ball, the other part thereof let it be put under a pulley (fastned in the partition) and let it be carried also out of the upper cestern, and be fastned unto the arme of the image, which must bee made to slip to and againe, and to take hold of the string of a Steele bow that is held in the



other hand. At the other end of the cestern let there bee made an artificiall image of a Dragon, through whose body must come a small pipe with a reed artificially fastned in the upper part thereof. Note then, that when you put up the ball, the image will draw his bow, and when you let it fall, the Dragon will hiss.

Experiments of producing sounds by evaporation of water by ayer.

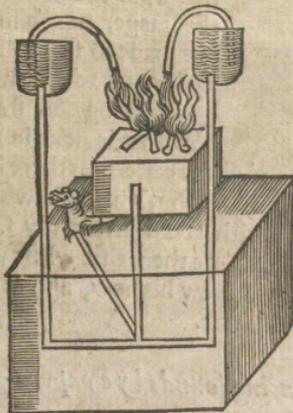


PRepare a round vessell of brasse, or latin, having a crooked pipe or neck, whereto fasten a pipe : put this vessell upou a trevet over the fire, and it wil make a shrill whistling noyse.

To

To make two images sacrificing, and a
Dragon hissing.

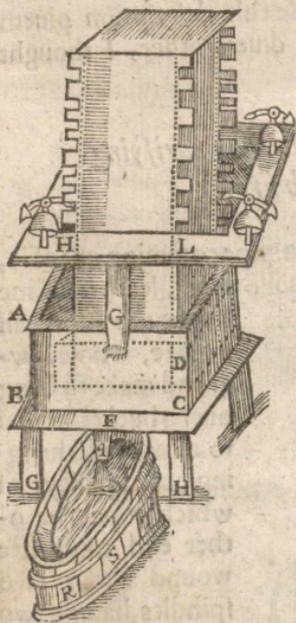
Prepare a cestern having an altar of brasse or tin upon it, let there be in the cestern a hollow pipe turning up out of the cestern at each end; also in the middle within the altar, also on the side of the altar into the body of a dragon artificially made, with a reed in the mouth of it. Let there be two boxes at the tops of the pipes, on the ends of the cestern, having two crooked pipes or cranes comming out of them. Fill the boxes with water when you occupy it, also put fire upon the altar, and the



dragon will hisse, and the water in the two boxes being wrought upon by the heat of the fire comming thorow the pipes, will drop into the fire. These two boxes ought to be inclosed in the bodies of two images, and the two short cranes comming out of them in her armes and hands.

Experiments of producing sounds by Engins.

Prepare a vessell after the forme of the figure marked with the letters A, B, C, D, place it upon a frame, as F, G, H; this vessell must have a hole in the bottom, with a pipe fastned in it, as Q, to convey the water conteyned in it into a vessell or tub set under it, marked with the letters R, S, T, also a frame must bee fastned at the top of it, as G, H, L, having so many bells with little beaters or hammers to them (artificially hanged) as are requisit to expresse your desired tune: Lastly provide a sollid peece of timber, whose lower part must bee fitted unto the aforesayd vessell, so that it may easily slip up and down, and so high as that its foot resting upon the bottom of the vessell, the upper part thereof may stand somewhat above all the bells. Note likewise that that part of this wood about its bottom or foot must be cut away about three quarters of



an inch. Vpon this wood thus fitted must bee fastned severall pins equall unto each bell, from the top unto the foot thereof, so disposed that they may orderly presse down the inward ends of the hammers of each bell, ac-

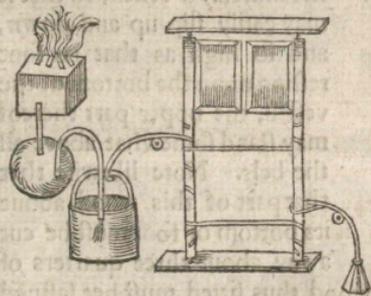
E

cording

cording as the tune goeth : when you use it, fill the ce-
 stern almost with water, and put the fitted peece of tim-
 ber into it, and as the water runneth out at the bottom, it
 it will play upon the bells : note that it were very requi-
 sit to haue a cock fastned to the pipe on the bottom of
 the vessell, that therewith you might at your pleasure stay
 the water. The like engines might be made to play upon
 wyer strings disposed upon a concavous water, to make
 the musick resound, but because this description giueth
 light enough for the framing of diuers other, I thought
 good here to omit them.

*Experiments of motions by rarifying
 water with fire.*

LEt there be an altar having a pipe comming out of it,
 and entring the body of a hollow ball, let there come

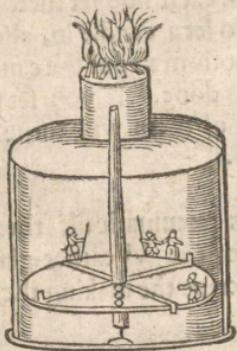


out of the same ball
 a crane, whose low-
 er end make to hang
 ouer a bucket fastned
 to a rope, and hang-
 ing ouer a pulley, of
 which rope the o-
 ther end must bee
 wound about two
 spindles, hauing two
 doores fastned unto
 them, and at the
 end of the same rope let there bee a waight fastned. So
 the fire on the altar will cause the water to distill out of
 the ball into the bucket, which when by reason of the
 water

water it is become heuier then the weight, it will draw it up, and so open the said gates or litle doores.

*Experiments of motions by rarifying
ayre by fire.*

LEt there be a round vessell of glasse, or horn, and on the top of it a vessell of brasse, and in the midst a hollow pipe spreading it selfe into foure feuerall branches at the bottom: the ends of two of the branches must turn up, the ends also of two must turn down; upon these foure branches fasten a light cord, with feuerall images set upon it. Rarifie the ayre thē by laying a red-hot iron upon the top of



the brasse or tin vessell, and it will turn the wheele about, so that you would think the images to bee living creatures.

Another way.

First prepare a round peece of wood, hauing a brasse box in the midst, such as they make to hang the mariners compasse with, but a good deale bigger, round about this peece of wood fasten diuers shreds of thin latten,

standing obliquely or alcew, as the figure doth represent; round about these fasten a coffin of thin pastbord, cut into



seuerall formes of fishes, birds, beasts, or what you please. Prepare a lantern with oyled parchment, sufficient to containe it, in the midst of whose bottom must be erected a spindle with a narrow point, to hang the pastbord cut into formes upon: upon each side let there be a socket for to set a candle in, also let

there bee made a doore in the bottom to put the candles in at, and after to be shut, and it is done. If you set two candles in the sockets, the heat of them will turne the whole pastbord of formes round.

Amongst all the experiments pneumaticall, there is none more excellent than this of the Weather-glasse: wherefore I haue laboured to describe the making thereof as plainly as it possibly might be.

What the Weather-glasse is.

A Weather-glasse is a structure of, at the least, two glasses, sometimes of three, foure, or more, as occasion serueth, inclosing a quantity of water, and a portion of ayre proportionable, by whose condensation or rarification the included water is subject unto a continuall motion, either upward or downward; by which motion of the water is commonly foreshewn the state, change, and alteration of the weather. For I speak no more than what mine experience hath made me bold to affirme;

you

you may (the time of the yeere, and the following obseruations understandingly considered) bee able certainly to foretell the alteration or uncertainty of the weather a good many houres before it come to passe.

*Of the severall sorts and fashions of
Weather-glasses.*

THere are diuers severall fashions of Weather-glasses, but principally two.

1 The Circular glasse.

2 The Perpendicular glasse : The Perpendiculars are either single, double, or treble.

The single Perpendiculars are of two sorts, either fixe or moueable.

The fixe are of contrary qualities ; either such whose included water doth moue upward with cold, and downward with heat, or else upward with heat, and downward with cold.

In the double and treble Perpendiculars, as the water ascendeth in one, it descendeth as much or more in the other.

In the moueable Perpendicular the glasse being artificially hanged, moueth up and down with the water.

How to make the water.

I Must confesse, that any water that is not subiect unto putrification, or freezing, would serue the turne, but Art hath taught to make such a water as may bee both an ornament to the work, and also delectable to the eye.

Take two ounces of vardigreafe in powder, and infuse

it so long in a pint of white wine vineger, untill it hath a very green colour, then poure out the vineger gently from the vardigrease : take also a pint and a halfe of purifide May-dew, and put therein 6 ounces of Roman vitreoll in grosse powder, let it stand till the vitreoll bee thoroughly dissolved, then mix this with the former water, and strain them through a cap paper, and put it into a cleane glasse well stopped, and its ready for use.

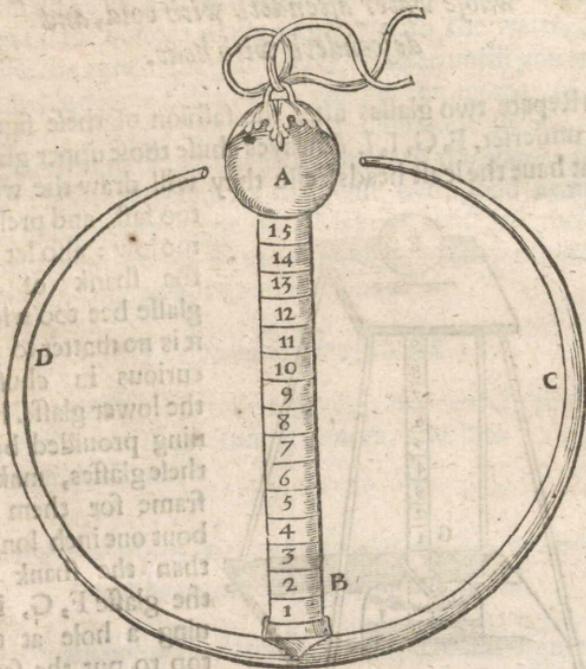
Another.

TAKE a gallon of rayn water that hath setled, infuse therein a day and a night 4 pound of quick lyme; stir it about with a cleane stick oftentimes in the day; in the morning poure the cleere water off from the lyme, into a brasse pan, and adde thereto 3 pound of sal armoniack; let it stand five or six houres, afterwards stir it about untill it be of a perfect blew colour, then straine it through a browne paper rowled within a tunnell, and reserue it for your use. This water is not so good for use as the former.

How to make the Circular glasse.

FIRST you must prepare two glasses, the fashion whereof let be like unto the figures marked with the letters A, B, and C, D. The glasse C, D, is open at both the ends, also in the middle there is a neck comming up of sufficient wideness to receive the shank end of the glasse marked with the letters A, B. Then fill the glasse C, D, a third part, with either of the waters, and diuide the glasse into so many equall parts as you would haue degrees; rarifie
the

the ayre in the head of the glasse A, B, by holding it to the fire, which being yet warme, reuerse the shank of it into the neck of the glasse C, D. Note that if the water do not ascend high enough, you must take the glasse A, B, out againe, and heat it hotter; if it ascend too high,

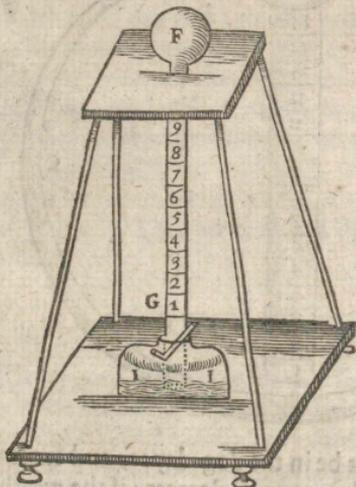


heat it not so hot. If it be in the dog-dayes, and extreme heat of summer, 1 and 2 are good degrees; if the weather be most temperate, then 3 and 4 are best; if a frost, 9 or 10. When you haue hit an indifferent degree, lute the joynts very close, and fasten a ribben unto the top of the glasse.

glasse to hang it by. In this glasse the water will with cold ascend the glasse A, B, with heat it will descend the glasse A, B, and ascend the hornes of the glasse C, D.

*How to make the single perpendicular glasse,
whose water ascendeth with cold, and
descendeth with heat.*

PPrepare two glasses after the fashion of these figures underfer, F, G, I, I. Alwayes chuse those upper glasses that have the least heads, else they will draw the water



too fast, and presse it too low: also let not the shank of the glasse bee too wide: it is no matter to be curious in chusing the lower glasse. Having provided both these glasses, make a frame for them about one inch longer than the shank of the glasse F, G, having a hole at the top to put the same thorow. There ought to be a great deale of care had in making the frame so, that the foot thereof may bee of a greater compasse than the top, to the end that it may stand firm, and not be subject to be turned down, which will distemper

per the whole work. After you have provided the frame, proceed to the making of it after this manner. Put both the glasses into the frame, and then divide the shank of the glasse F, G, into so many equall parts as you would haue it haue degrees; write figures upon paper, and paste them on (with gum tragagant dissolved in faire water;) then fill the bottom glasse 2 thirds with the water, and rarifie the ayre in the glasse F, G, so often untill you haue hit such a degree as is most fitting for the temper of the weather, put in a little crooked hollow cane for the ayre to passe in and out at, but let it not touch the water: then stop it about the joynts of the glasse with good cement, that nothing may come out. Make an artificall rock about it, with peeces of cork dipt in glew, and rowled in this following powder, and it is done.

The powder for the rock.

Take mother of Pearle 2 pound, small red Corall di. pound, Antimony crude 4 ounces, and make a grosse powder of them.

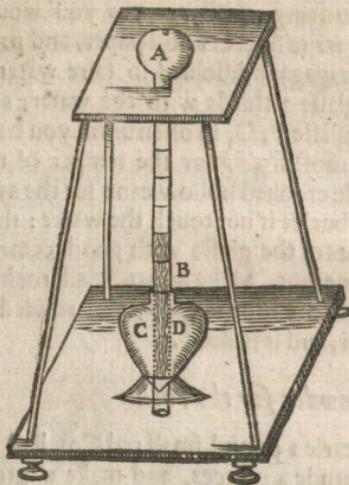
To make the single perpendicular glasse, ascending with heat, and descending with cold.

PRepare two glasses after the fashion of the figure A, B, and C, D: let the glasse A, B, haue a small pinhole at or about the top of all, and let the glasse C, D, haue besides the hole at the top, another hole at the bottom with a short pipe. Prouide such a frame for this as you did before for the other; then put the glasses into it, fasten the bottom glasse to the bottom of the frame, hauing a

F

hole

hole at the bottom, thorow which the pipe of the glasse C, D, may passe, fit a cork unto it : then lute the two



glasses together, so that no ayre may passe between the joyning; divide then the shank into so many degrees as you please, and figure it as before I taught you, then with the heat of a candle, rarifie the ayre in the glasse C, D, and fill it a third part full of water, and then put the cork fast in. Note that if the first heating of the glasse rayse not the water unto

your content, you must repeat it over and over, untill it doe : when it is sufficient, then stop the cork in very firm, that no water may come out, and it is made.

How to make the double perpendicular glasse.

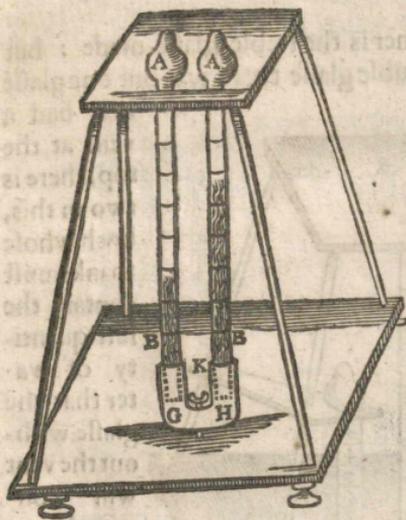
Prepare two glasses like unto the figure marked with the letters A, B, the one of them must have a small hole in or about the head thereof. Prepare likewise for the bottom a vessell of the fashion of the figure G, H, having two mouthes, at each end one, also a cocke in the middle, as K : divide then the shank of the glasse without the

the hole in the top, into equal parts, and set figures upon it: next lute them both fast into the necks of the bottom vessell. (But first remember to put them in a frame.) when the cement is dry turn the cock of the bottom vessell, and rarify the ayre in the glasse that hath no hole at

the top; then set the bottom vessell a litle way into a vessell filled with water, and it will suck up the water as it cooleth, when the bottom vessell is full, also the water mounted in that top glasse without a vent, up to a fitting degree; (the temper of the weather regarded) then depresso (but gently) the glasses into the vessell of water, untill the wa-

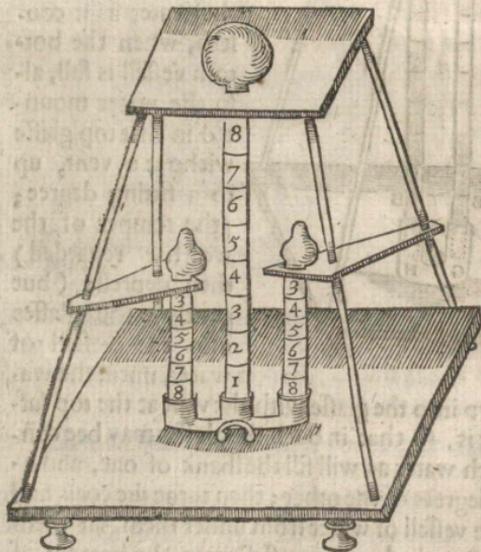
ter be come up into the glasse with the vent at the top sufficiently, that is, so that in both the glasses may bee contained so much water as will fill the shank of one, and about 2 or 3 degrees of the other; then turne the cock, and take away the vessell of water from under them, let them down, and fasten the bottom vessell unto the bottom of the frame, and make a rock about it, or else what other works you please, that the art may not be discerned. Lastly, set figures upon both, but first upon that without the

vent,



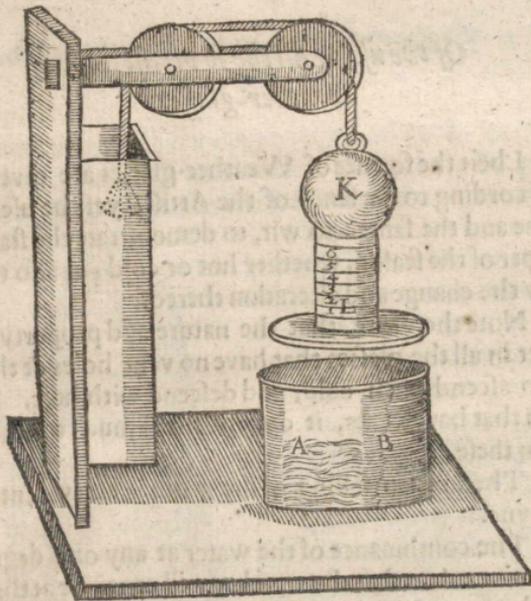
vent, beginning from the bottom, and proceeding upwards, then lay your hand upon the head of it, which will depresse the water, which when it commeth equall to the degrees, paste the same degree on the place of the water in the other glasse with the vent, and it is done.

After the same manner is the treble glasse made : but whereas in the double glasse there was but one glasse that had a vent at the top, there is two in this, both whose shanks must contain the iust quantity of water that the glasse without the vent will containe. If you do well observe the form of the subsequent figure, you cannot goe amisse.



*How to make the moveable perpen-
dicular glasse.*

First prepare the glasse A, B, fill it almost top-full of wa-
ter, provide also the glasse K, L, having a loop at the
top of it : divide it into so many equal parts as you



would have degrees, and on the mouth thereof fasten a
thin board, that will easily slip in and out of the bottom
glasse, make then a waight of lead or brasse somewhat
heavier

heavier than both the glasse and board fastned thereto; and then tie a little rope to the loop of the glasse A, B, and the weight at the other end thereof. Rarify the ayre contained in the glasse L, and reverse it into the glasse A, B, filled with water, and hang the plummet over two little pulleys fastned in a frame made for the purpose, and as the glasse K, L, cooleth, the water will ascend the same, and so by the change of the outward both the glasse and water will move accordingly.

*Of the use of all the severall sorts of
Weather-glasses.*

Albeit the formes of Weather-glasses are divers, according to the fancy of the Artist, yet the use of all is one and the same: to wit, to demonstrate the state, and temper of the season, whether hot or cold, as also to fore-shew the change and alteration thereof.

1 Note therefore, that the nature and property of the water in all the glasses that have no vent holes at the top, is, to ascend with cold, and descend with heat. But in them that have vents, it descendeth as much as it ascendeth in these.

2 The sudden falling of the water is an evident token of rayne.

3 The continuance of the water at any one degree, is a certaine token that the weather will continue at that stay it is then at, whether it be sayre, or foule, frost or snow. But when the water either riseth or falleth, the weather will then presently change.

4 The uncertaine motion of the water is a signe of fickle weather.

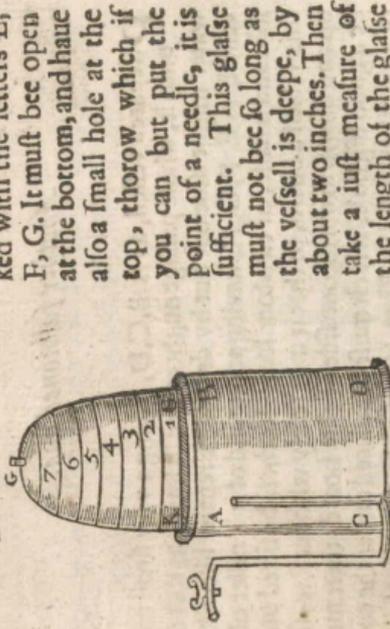
The

The single perpendicular with a vent, moveth upwards with cold, and downwards with heat, and is quite contrary in quality to the former, only that it moveth uncertainly in sickle and uncertaine weather, and keepeth a constant place in stayed weather.

Theſe rules are all certaine and true : now you may according to your owne obſervation frame other rules, whereby you may foretell the change of the weather the water being at any one degree whatſoever.

*A Water-clock, or a Glaſſe ſhewing the
houre of the day.*

Let there be provided a deepe veſſell of earth, or any thing elſe, that will hold water, as A, B, C, D, provide alſo a glaſſe made after the faſhion of the figure marked with the letters E,

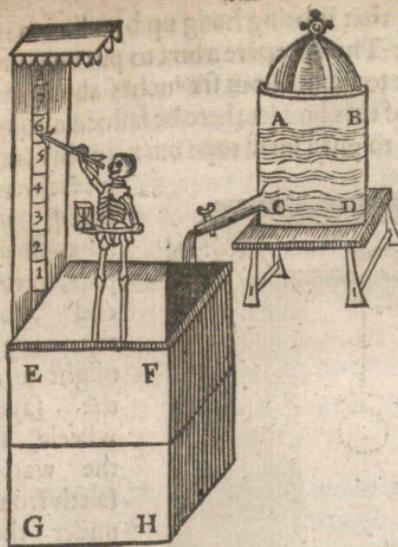


K, G, G, and ſet it on the inſide of the veſſell A, B, C, D, from the bottom towards the top, and then make a ſafe round about the veſſell ; there muſt be fitted unto this earthen

earthen vessell, a pipe reaching from the top of the outside thereof, (where there must bee a cock unto it) and going to the bottom, where it entreth the same, and againe extendeth it selfe almost unto the circle or mark rased on the vessell A, B, C, D. Fill then the vessell with fayre water up to the rase, or circle, and turne the cock, and put the glasse into the water, and you shall see that the glasse by reason of its heavinesse, will tend toward the bottom of the vessell, but very slowly, by reason that the ayre contained therein hath so small a vent: turne an houre-glasse, and at the end of each houre make a mark upon the glasse equall with the water, and it is done. When the glasse is quite sunk to the bottom of the water, turn the cock, and with one blast of your mouth at the pipe, it will ascend againe.

Another fashioned one.

Prepara a vessell, as A, B, C, D, having a very small cock unto it, whose passage ought to bee so small, as that the water might issue out but by drops. Prepare likewise a vessell, as E, F, G, H, having at one end of it a pillar of a foot and a halfe, or two foot high: let there be fitted unto this vessell a board, so that it may freely without stay, slip up and down: towards one side of this board, there must be a good big hole, which must bee placed under the cock of the other vessell. Then fasten unto the top of this board, the image of Time or Death, and pointing with a dart upon the pillar aforesaid: turn then an houre glasse, and at the end of every houre, make a figure on the place
of



of the pillar that the image with his dart pointeth at, and it is made. For note, the dropping of the water out of the cock thorow the hole of the board whereon the image standeth, causeth the same to ascend by little and little. Mark the figures.

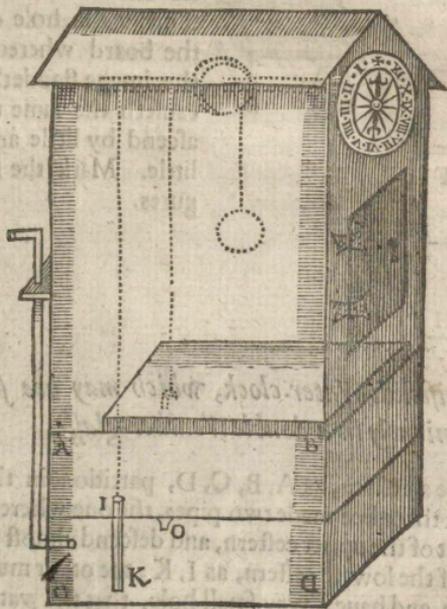
Another artificiall Water-clock, which may bee set conveniently in a double Weather-glasse.

First prepare a cistern, as A, B, C, D, partition in the middle, let there bee made two pipes, the one whereof must reach out of the upper cistern, and descend almost to the bottom of the lowest cistern, as I, K; the other must be a short one, and haue a very small hole, that the water may thereby issue out of the upper cistern but by drops; also at the side nigh the bottom of the upper cistern, let a small pipe enter. To the upper cistern fit a board, (with a peece of lead nayled upon it to make it somewhat heavy) so that it may easily slip up and downe in it; this board must haue a loop to fasten a rope unto, and you must so

C

poyse

poyle the said board, that it being hung up by a line, may hang even, and level. Then prepare a box to put ouer the cestern, which ought to stand about six inches about the cestern. In the top of this box let there be fastned a long pulley with a creuice to put a small rope ouer, in this cre-



vice it were fitting to fasten small pins, to the end that the rope might turn the sayd wheele as the water faeth from under the board: let the spindle of this pulley come out at one side of the box whereon there is a Dyall drawn, con-

tayning so many houres as you would haue it go for; unto this end of the spindle let there bee fitted a needle, or director, to shew the houre, then put a small cord ouer the pulley in the box, fasten one end thereof to the loop of the board, and at the other end let there bee tied a waight

not

not quite so heavy as the board, then fill the upper cestern with water, and the board will presse it out into the lower vessell, at the pipe O, drop by drop, and as the board sinketh lower, it will by meanes of the rope upon the pulley, turne the index fastned unto the spindle of the pulley about the dyall; you may set it by an houre-glasse or Watch: when it is quite downe, if you doe with your mouth blow into the pipe at the side of the cestern, the water will all mount up againe into the upper cestern.

A wheele which being turned about, it casteth water out at the spindle.

Let A, B, be a tub hauing in the bottom a brasse barrell, with a hole open quite through one side of it: let D, E, F, be a wheele, whose spindle must bee also hollow, and haue a hole through one side of it, so that being put into the hollow barrell, both the holes may be equall together. Note then, that so long as these holes are equall together, the water will run out at the spindle of the tub, but if you



turne the wheele to another side, it will not run.

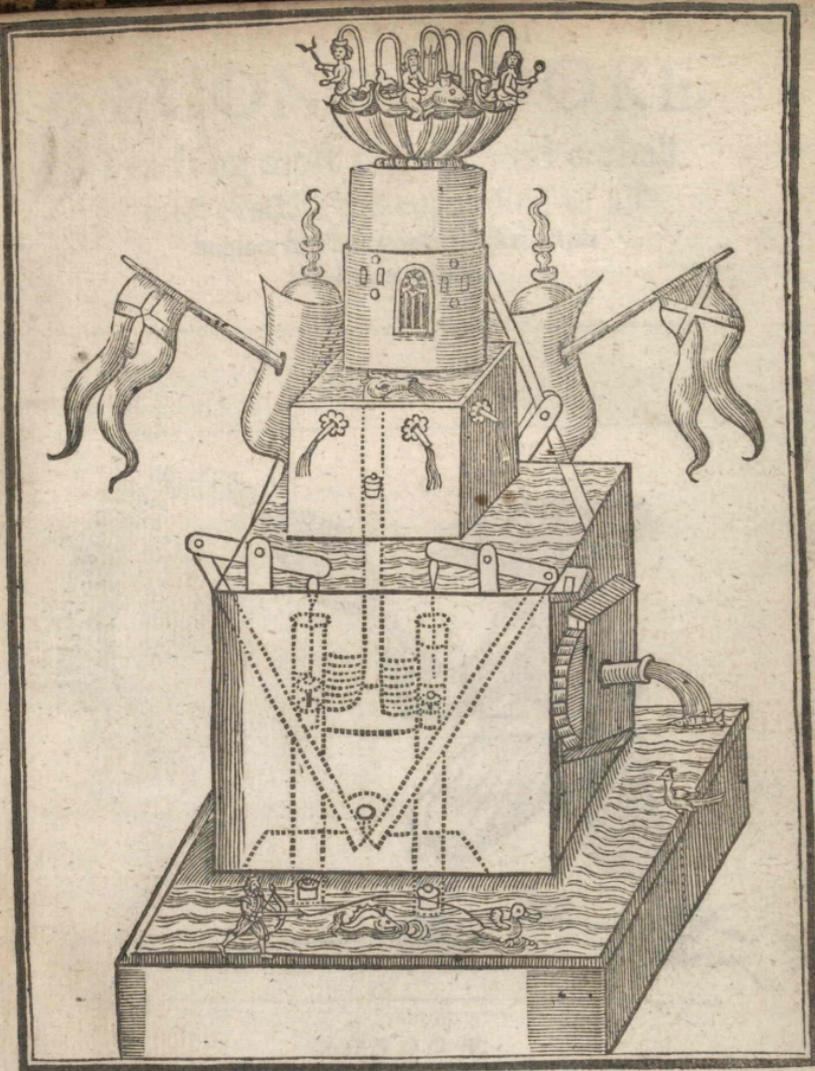
*A water-presser, or the mounting of water
by compression.*

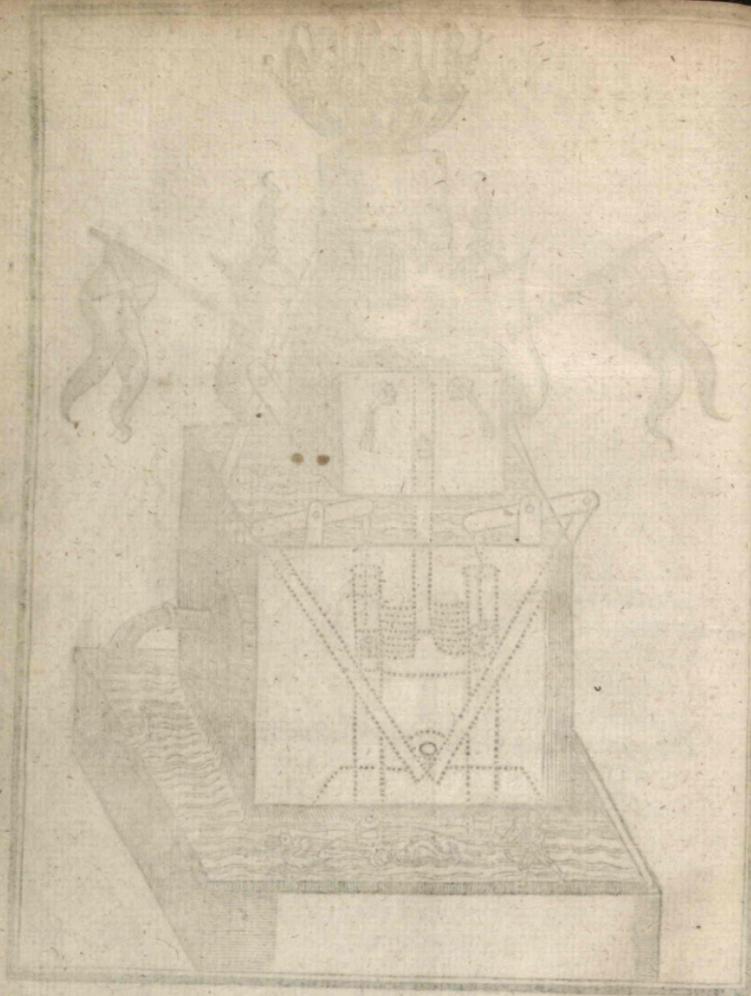
Let there bee provided a barrell of brasse, of what length and widenesse you please, let it bee exactly smooth within, and very tight at bottom; unto this barrell fit a plug of wood leathered about, and let there bee made diuers small holes quite through it, wherein fasten diuers formes and shapes of birds, beasts, or fishes, hauing very small pin-holes through them, for the water to spin out at: you shall do well to make this plug very heavy, either by pouring molten lead into certaine holes made for the purpose, or else by fastening some waight unto the top: fill the barrell with water, and put the plug into it, which lying so heavy upon the water, it will make it spin out at the pin-holes of the images placed thereupon.



*How to compose a great or little peece of
Water-worke.*

First prepare a table, whereupon erect a strong frame, and round about the frame make a moat with a leaden cestern to be filled with water; let the leaden moat somewhat undermine as it were the frame, which ought to be built in three stories, one aboue another, and euery one lesser than another. Within the middle story fasten a very strong Iack that goeth with a waight, or a strong spring, the ending of whose spindles ought to be crooked, thus Z, whereby diuers sweeps for pumps may bee moued to and againe, whose pumps must go down into the moat, and haue small succurs unto them, and conuayances towards their tops, whereat the water may be mounded into diuers cesterns, out of some wherof there may be made conuayances in their bottoms, by small pipes running down into the riuer or moat again, and there breaking out in the fashions and formes of Dragons, Swans, Whales, Flowers, and such like pretty conceits: out of others the water may fall upon wheelles, out of whose spindles, the water turning round, may bee made to run. In the uppermost story of all, let there bee made the forcer by ayre, as I taught before, or else a presser, hauing at the top, Neptune riding on a Whale, out of whose nostrils, as also out of Neptunes Trident, the water may be made to spin through small pin-holes; you may also make diuers motions about this work, but for that the multitude of figures would rather confound than instruct the Reader, I haue of purpose omitted them.





THE
SECOND BOOKE,

Teaching most plainly, and withall
most exactly, the composing of all
manner of Fire-works for Triumph
and Recreation.

By I. B.



LONDON,
Printed by *Thomas Harper* for *Ralph Mab.* 1634.

SECOND BOOK

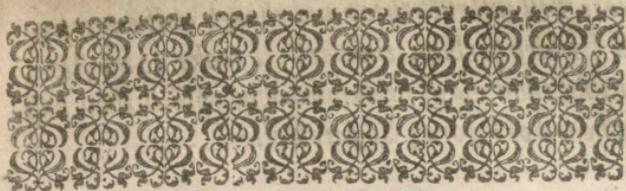
Teaching most plainly and withal
most exactly the composing of all
manners of Poetical Works for Triumphs
and Revelations.

By A. B.



LONDON

Printed by Thomas Hurst for Ralph Child, 1634.



To the Reader.

Courteous Reader, there hath a de-
sistance been occasioned since the in-
ception of this work, by reason of the
occurrence of certaine Authours, that
contrary unto my knowledge had la-
boured so fully herein ; but after consideration had
(that for the most part they were but translations)
I thought it might bee no lesse lawfull and commen-
dable for mee than for others, to communicate unto
such as are yet desirous of further information,
that wherein I haue bestowed both cost and paines.
Notwithstanding, I haue so used the matter, as that
I might not derogate from the estimation had of o-
thers to increase mine owne. Read it throughly,
iudge indifferently, and if thou likest it, practise
considerately. If thou art ignorant herein, I am

sure it will instruct thee, and though well experien-
ced (which perhaps thou art) I make no question,
but that thou mayst find somewhat which thou hast
not heard of before ; So fare well.

Your Wellwiller

I. B.



Of Fire-workes.

Have euer found (in conference with diuers desirous of instruction in any Art or Science whatsoeuer) that the summe and chiefest end of all hath been, to know the reasons and causes of those things they were desirous to be informed in. Wherefore I thought good, before I came to the matter it selfe, to set down some few *Præcognita* or Principles (as I may so call them) whereby such as are ingenious, upon occasion, may informe themselves, if they stand in doubt of the cause of any thing that is heereafter taught.

Certayne Præcognita or Principles, wherein are containd the causes and reasons of that which is taught in this Booke.

1 **T**He foure Elements, Fire, Ayre, Earth, and Water, are the *prima principia* (I meane the materialls) whereof euery sublunary body is composed, and into the which it is at last dissolued.

2 Every thing finding a dissolution of those *natura catena*, that is, meanes whereby their *principia* are connected, and ioyned together, their lighter parts ascend up-

ward, and these that are more grosse and heauy, doe the contrary.

3 It is impossible for one and the selfe same body to possesse at one time two places; It followeth therefore, that a dense body rarified, and made thin, eyther by actual or potenti.all fire, requireth a greater quantity of room to be conteyned in, then it did before. Hence it is, that if you lay your hand upon a glasse, hauing a straight mouth reuerst into a dish of water, it rarifieth the ayre contayned therein, and makes it breake out thorough the water in bubbles. Also, that gunpowder inclosed in the barrell of a gun, being rarified by fire, applied unto the touch-hole, it seeketh a greater quantity of roome, and therefore forceth the bullet out of the barrell. This is called violent motion.

4 According unto the strength and quantity of a dense body rarified, and according unto the forme and length of its inclosure, it forceth its compresser further or neerer at hand.

Thus much shall suffice to haue spoken concerning the *Præcognita*: Now I will passe *ad maiora, & ad magis necessaria*: to wit, those necessary Instruments, and seuerall sorts of Ingredients, that ought to be had in readines.

As for the instruments they are these; Morters and Pestles, Serces, also seuerall sorts of Formers, Paper, Parchment, Canuas, Whipcord, strong binding thread, Glew, Rosin, Pitch, with diuers vessells meet to contayne and mingle your compositions in. The ingredients likewise are chiefly these, Saltpeter, Rochpeter, Sulpher, Charcoale, good Gunpowder, Filings of steels, oyle of Peter, and Spirit of wine.

Instructions for chusing your ingredients.

Saltpeter is very good, if that being layd upon a board, and fire put to, it rise with a flamed ventofous exhalation, raying no scum, nor leauing no pearle, but onely a blacke specke burnt into the board.

The best brimstone, is quick brimstone, or liue sulphur, and that sort is best that breaketh whitest; if this cannot be gotten, take of the whitest yellow brimstone.

The best Coales for use are the fallow, willow, hazel and beech; onely see they be well burnt. Euery of these ingredients must be powdred finely and searfed.

All kindes of gunpowder are made of these ingredients imposed, or incorporated with vineger, or aquauitæ, and afterward grayned by art: The Saltpeter is the Soul, the Sulphur the Life, and the Coales the Body of it. The best sort of powder may be distinguished from others, by these signes:

1. If it be bright and incline to a blewish colour.
2. If in the handling it proue not moyst but auoydeth quickly.
3. If being fired, it flash quickly, and leaue no dregs nor feelings behinde it.

*A device to try the strength of diuers sorts
of Gunpowder.*

IF so be you haue at any time diuers sorts of Gunpowder, and it is your desire to know which of them is the strongest, then you must prepare a box, as A, B, being foure inches high, and about two inches wide, hauing a

lid

lid ioynted unto it. The box ought to be made of iron, brasse, or copper, and to bee fastned unto a good thick plank, and to haue a touch-hole at the bottom, as O, and that end of the box where the hinge of the lid is, there must stand up from the box a peece of iron or brasse, in length answerable unto the lid of the box : this peece of



iron must haue a hole quite through it, towards the top, and a spring, as, A, G, must bee screwed or riueted, so that the one end may couer the sayd hole. On the top of all this iron, or brasse that standeth up from the box, there must bee ioynted a peece of iron (made as you see in the figure) the hinder part of which is bent downward, and entreth the hole that the spring couereth; the other part resteth upon the lid of the box. Open this box lid, and put in a quantity of powder, and then shut the lid down, and put fire to the touch hole at the bottom, and the powder in the box being fired, will blow the box lid up the notches more or lesse, according as the strength of the powder is : so by firing the same quantity of diuers kindes of powders at seuerall times, you may know which is the strongest. Now perhaps it will bee expected that I should speak of the making of Saltpeter, Gunpowder, Coales, with the refining of Sulphur : but because they are so commonly to bee had, and to bee bought at better rates than I know they can bee made by any that intend it for their priuate use, I haue forborne it: There are diuers I am sure that would willingly bee in action:

action : I have thought fitting therefore to set downe the collection of naturall Saltpeter, which is a kinde of white excrecence growing upon stone-wals, and (as I have seene great store) in the arches of stone-bridges. First therefore gather this white excrecence, and adde unto it Quick-lyme, and Ashes, mingle them, and put them into a halfe-tub that hath a hole to draw the liquor out at ; then put into this halfe-tub warm water, and let it stand untill all the peter be dissolued ; let it then drain out at the hole by little and little, and if the liquor be not cleere, double a brown paper, and put it within a tunnell, and straine the liquor through it. Then boyle it and scum it untill it bee ready to congeale, neither too hard, nor yet too tender : then take it from the fire, and put it into shallow vessels, either of earth or brasse ; set them in a cold place two or three dayes, and it will shoot into isicles, and this is called Rochpeter. Thus much for the ingredients. Now I am come unto the Formers, the number whereof I cannot certainly determine, because it dependeth upon the variety of each particular persons invention. Now that I may formally proceed, I will first make some distinction of each kinde in generall ; and then I will speak of euery particular contained in each generall. Fire-works are of 3 sorts.

1 Such as operate in the ayre, as Rockets, Serpents, Raining fire, Stars, Petards, Dragons, Fire-drakes, Feinds, Gyronels, or Fire-wheeles, Balloons.

2 Such as operate upon the earth, as Crackers, Trunks, Lanterns, Lights, Tumbling bals, Saucissons, Towers, Castles, Pyramids, Clubs, Lances, Targets.

3 Such as burn in or on the water, as Rockets, Dolphins, Ships, Tumbling bals:

Part of either of the three kinds are simple, and part are compounded; part also are fixed, and part moueable, First I will treat of the diuers compositions, and then of the Formers, Coffins, and manner of composing euery of them.

Of the diuers compositions of fire workes.

First of the compositions of fire workes, for the ayre; and therein first I will speake of the compositions for rockets, because that all moueable fireworkes haue their motion from the force of them accordingly applied.

Compositions for Rockets of all sizes, according unto the prescription of the noted Professors, as

Mr Malthus, Mr Norton, and the

French Authour, Des recreations Mathematiques.

A Composition for Rockets of one ounce.

Take of gunpowder, saltpeter and charcoale, of each one ounce and a halfe, mingle them together, and it is done. Note heere, as I told you before, that all your ingredients ought to be first powdred by themselves, and afterwards mixed very well together.

A Composition for Rockets of two and three ounces.

TAke of gunpowder fowre ounces and a halfe, saltpeter one ounce, mixe them together.

A Composition for Rockets of foure ounces.

TAke of gunpowder fowre pounds, saltpeter one pound, charcoale fowre ounces, mingle them together.

A Composition for Rockets of fowre ounces.

TAke of gunpowder fowre poundes, saltpeter one pound, charcoale fowre ounces, brimstone halfe an ounce, mingle them together.

A Composition for all middle sized Rockets.

TAke of gunpowder one pound, two ounces of charcoales, mingle them.

A Composition for Rockets of five or six ounces.

TAke of gunpowder two pound five ounces, of saltpeter halfe a pound, of charcoale six ounces, of brimstone and yron scales, of each two ounces, mingle them.

A Composition for Rockets of ten or twelve ounces.

TAke of gunpowder one pound and one ounce, saltpeter fowre ounces, brimstone three ounces and a halfe, charcoale one ounce, mingle them.

*A Composition for Rockets of one pound,
or two.*

TAke of saltpeter twelue ounces, gunpowder twenty ounces, and charcoale three ounces, quicke brimstone and scales of yron, of each one ounce, mingle them.

*A Composition for Rockets of eight, nine and
tenne pounds.*

TAke saltpeter eight pounds, charcoale two pounds twelue ounces, brimstone one pound fowre ounces. Note that no practitioner (how exact soeuer) ought to relie upon a receipt, but first to trie one rocket, and if that be too weake adde more gunpowder, if it be too strong let him adde more charcoale untill hee finde them flie according unto his desire. Note that the charcoale is only to mitigate the violence of the powder, and to make the taylor of the rocket appeare more beautifull, Note also that the smaller the rockets be, they need the quicker receipts, and that in great rockets, there needeth not any gunpowder at all.

The Composition for middle sized Rockets may serve for Serpents, and for raying fire, or else the receipt for Rockets on the ground, which followeth heereafter.

Compositions for Starres.

TAke saltpeter one pound, brimstone halfe a pound, gunpowder foure ounces, this must be bound up in paper or litle ragges, and afterwards primed.

Another receipt for Starres.

TAke of saltpeter one pound, gunpowder and brimston of each halfe a pound; these must be mixed together, and of them make a paste, with a sufficient quantity of oile of peter, or else of fayre water; of this paste you shall make litle balles, and roll them in drie gunpowder dust; then drie them, and keepe them for your occasions.

Another.

Take a quarter of a pinte of *agua vita*, and dissolue therein one ounce, and a halfe of camphire, and dip therein cotten bumbast, and afterwards roule it up into litle balles; afterwards rowle them in powder of quick brimstone, and reserue them for use.

*Another receipt for Starres, whereof you may make
fiends and diuers apparitions according unto
your fancie.*

Take gum dragant, put it into an yron pan, and rostit in the embers; then powder it, and dissolve it afterwards in *aqua vite*, and it will become a jellie, then straine it; dissolve also camphire in other *aqua vite*. Mixe both these dissolutions together, and sprinkle therein this following powder.

Take saltpeter one pound, brimstone halfe a pound, gunpowder three pound, charcoale halfe a pound; when you have mingled and stirred them well together, mixe them well with the aforesayd jelly, and then make it into little ballses, or into what fashion else you please, then cool them in gunpowder dust, and keepe them for use.

*Compositions for receipts of fireworkes, that
operate upon the earth.*

FOR Rockets there needeth onely gunpowder finely beaten and searced.

Likewise for all the other sorts, searced gunpowder will serue, which may be abated, or alayed with charcoale dust at your pleasure.

*Compositions for fireworkes that burne upon,
or in the water.*

A Receipt for Rockes that burne upon the water.

TAke of saltpeter one pound, brimstone halfe a pound, gunpowder halfe a pound, charcoales two ounces. This composition will make the Rockets appeare with a great fiery taylor. If you desire to have it burne cleare, then take of saltpeter one pound, three ounces of gunpowder, brimstone halfe a pound.

A Receipt of a composition that will burne, and seed upon the water.

TAke masticke halfe a pound, white Frankincense, gum sandrake, quicklime, brimstone, bitumen, camphire, and gunpowder, of each one pound and a halfe, rosin one pound, saltpeter fowre pounds and a halfe, mixe them all together.

A Receipt of a composition that will burne under water.

Take brimstone one pound, gunpowder nine ounces, refined saltpeter one pound and a halfe, camphire beaten with Sulphur, and Quicksilver; mixe them well together with oyle of peter, or linseed oyle boyled, untill it will scald a feather. Fill a canvas ball with this composition, arme it, and ballast it with lead at the bottome, make the vent at the top, fire it well and cast it into the water, and it will fume and boyle up slowly.

*A Receipt of a Composition that will kinde with
the water.*

Take of oyle of Tile one pound, Linseed oyle three pounds, oyle of the yelks of egges one pound, new quick lime eight pounds, brimstone two pounds, camphire fower ounces, bitumen two ounces; mingle all together.

Another.

Take of Roch peter one pound, flowre of brimstone nine ounces, coales of rotten wood six ounces, camphire one ounce and a halfe, oyle of egges, and oyle of Tile enough to make the mixture into a paste.

Or take callamita one pound, sal niter and asphaltum, of each fowre ounces, quicke brimstone three ounces, li-

quid varnish sixe ounces, make them all into a paste.

Put cyther of these compositions into a pot wherein is quick lime, so that the lime come round about the past; then lute it fast, binde it close with wires, and set it in a limekill a whole baking



time, and it will become a stone that any moysture will kinde.

If you make a little hole in the top of an egge, and let out all the mear, and fill the shell with the following powder,

powder, and stop the hole with wax, and cast it into a running water, it will break out into a fire.

Take of salt-niter, brimstone, and quick-lyme, of each a like quantity, mix them.



*How to make stouple, or prepare cotten-week to
prime your fire-works with.*

Take cotten-week, such as the Chandlers use for candles, double it six or seven times double, and wet it thoroughly in saltpeter water, or aqua vitæ, wherein some camphire hath been dissolved, or, for want of either, in faire water; cut it into diuers peeces, rowle it in mealed gunpowder, or powder and sulphur; then dry them in the Sun, and referue them in a box where they may lie straight, to prime Starres, Rôckets, or any other fire-works.

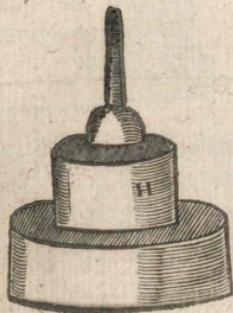
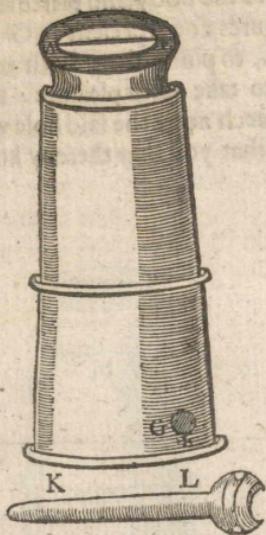
How to know the true time, that any quantity of fired Gun-match that shall doe an exploit at a time desired.

TAKE common gun-match, rub, or beat the same a little against a post to soften it; then either dip the same in salt peter water, and drie it againe in the Sunne, or else rub it in a little powder and brimstone beaten very small, and made liquid with a little *agua vita*, and dried afterwards; trie first how long one yard of match thus prepared will burne, which suppose to be a quarter of an houre, then foure yards will be a iust howre. Take therefore as much of this match as will burne so long as you will haue it to be ere your worke should fire, binde the one end unto your worke, lay loose powder under, and about it lay the rest of the match in hollow, or turning so that one part of it touch not another, and then fire it.

A Water called Aqua Ardens.

TAKE old red wine, put it into a glased vessell, and put into it of orpment one pound, quicke sulphur halfe a pound, quicke lime a quarter of a pound; mingle them very well, and afterwards distill them in a rosewater still: a cloth being wet in this water will burne like a candle, and will not be quenched with water.

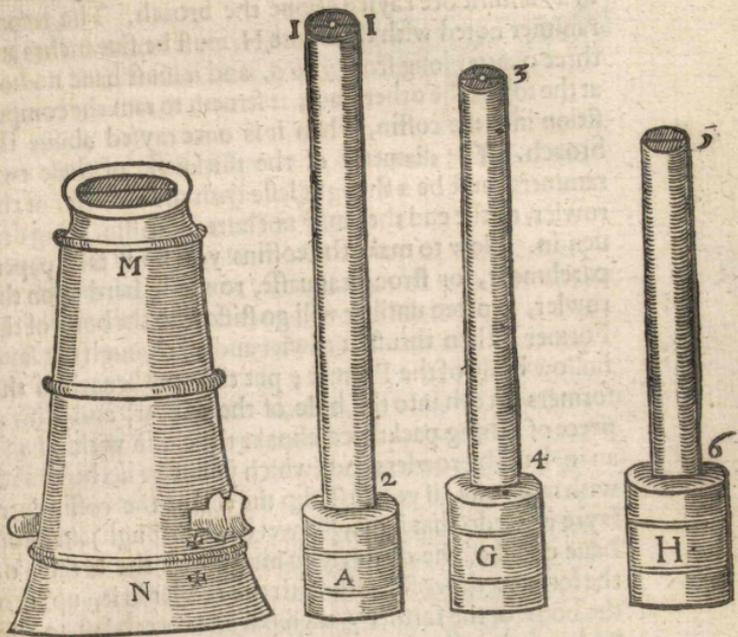
The Formers are instruments wherewith the coffins for the fireworkes are made and formed, whercof in order; and first for Rockets that operate in the ayre. The Formers for Rockets consist of two parts, represented by the two next figures following, the uppermost whercof
repre-



representeth the body of the Former, which must be made of Maple, Walnut tree, or of other close & well seasoned wood, seven inches, wanting halfe a quarter in length, turned equally, and exactly hollow quite through, the diameter of whose hollownesse, represented by the line at the top marked at each end with a, c, must be one inch and a quarter; the breech of the former is represented by the lowest figure, the upper part wherof, must be made to enter the body of the Former; the height of the whole breech, beside the broach is 3 inches and a halfe; it entreteth the body of the Former, one inch and three quarters; the top of it must be made like a halfe nutmeg, in the midst whercof (as

K 2 Mr.

The next figure marked with M, N, doeth expresse both the parts of the Former pinned together; unto this Former there must be made one Rowler expressed by the figure A; also two rammers expressed by the figures G H; they must all of them be turned very even and smooth;



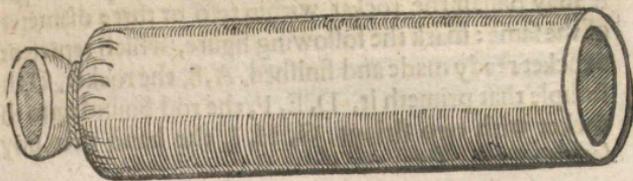
let the diameter of the thickness of the rowler expressed by the line on the top marked I I, be three quarters of an inch, let it be eight inches long from 'I, to 2, and have a hole bored in the very midst of the end, so wide and so

K 3

deepe

deep, that all the broach of the former may enter the same: this is to rowle the coffin of paper and upon. The first rammer noted with the figure G, must be seven inches and a half long, from 3 to 4, and have a hole at the end of it, as the rowler had; this rammer is to ram the composition into the former (having the coffin in it) untill it be rayfed about the broach. The second rammer noted with the figure H, must be five inches and three quarter long from 5 to 6, and it must have no hole at the top as the other had; it serueth to ram the composition into the coffin, when it is once rayfed about the broach. The diameter of the thickeffe of these two rammers must be a thought lesse than the diameter of the rowler, to the end they may not hurt the coffin, being driven in. Now to make the coffins you must take paper, parchment, or strong canuasse, rowle it hard upon the rowler, so often untill it will go stiffe into the body of the Former: then thrust it rowler and all through the sayd hollow body of the Former; put then the broach of the formers breech into the hole of the rowler, and with a peece of strong packthred choake the coffin within halfe an inch of the rowlers end (which you may do best, and with most ease, if you first dip the end of the coffin into sayre water, so that it may be wet quite through) after you have choaked the coffin, you must thrust the breech of the former, the coffin also with the rowler in it, up into the body of the former: then pin the breech fast to the body of the former with the pin, and on the rowler giue one stroak or two with a mallet lightly, then unpin the breech, and with the rowler thrust the coffin out of the bottom of the former, lay it by untill the end be dry. Thus you may at leifure times make diuers coffins ready

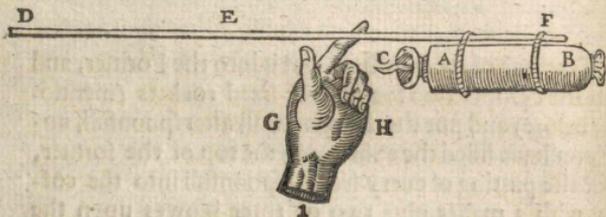
to use upon any occasion. The following figure expresseth an empty coffin.



Take one of these coffins, put it into the Former, and take the composition for middle-sized rockets (mentioned before) and put thereof spoonfull after spoonfull, untill you haue filled the coffin unto the top of the former, after the putting of euery second spoonfull into the coffin, with a mallet giue two or three blowes upon the head of the rammer, that the composition may bee well rammed into the coffin: euery third or fourth driuing M. Norton wilheth (if the rockets are to be fired in three or foure dayes) to dip the rammer in gum-dragant, and camphir dissolued in spirit of wine, or good aqua uise: but if it will bee a month before they will bee fired, then dip the rammer in oyle of peter, or liquid varnish, and linseed oyle mixed together: If you would haue the rocket to giue a report or blow, then within one diameter of the top, driue a bottom of leather, or six or eight double of paper, pierce and prime either of them through in three or foure places, and fill the rest of the coffin with whole gunpowder; afterwards driue another bottom of leather, and then with strong packthred choak the coffin close unto it: then take the rocket out of the Former, and prime

it

it at the broach-hole with a peece of prepared stouple, and binde unto it a straight rod 6 or 7 times the length of the rocket, and so heavy, that being put on your finger, it may ballast the rocket within two or three diameters of the same: mark the following figure, which represents a rocket ready made and finished, A, B, the rocket, C, the stouple that primeth it, D, E, F, the rod bound unto the rocket with two strings, G, H, I, the hand that poyseth it.



How to make Serpents.

THe coffins for serpents are made of paper rowled nine or ten times upon a rowler not much thicker than a goose quill, and about foure inches long. The coffins must bee choaked almost in the midst, but so that there may bee a little hole, through which one may see: the longest part of the coffins for Serpents must be filled with the composition specified before: if you would haue it wamble in the ayre, then choak it not after the composition, but if you would haue it wamble, then halfe-choak it, as is demonstrated by the following figure, the shorter end of the coffin must bee filled with whole gunpowder,

der, and choaked quite up, as appeareth at B, in the figure M, N, O, which is the figure of a Serpent ready made.



How to make rayning fire.

TAKE diuers goose quills, and cut off the hollow ends of them, and fill them with the composition before mentioned, stopping them afterwards with a little wet gunpowder, that the dry composition may not fall out.

How to make starres.

IHAve sufficiently taught the making of these in describing their compositions, wherefore I will now onely present the figures of them unto your view;



A, A, signifieth two that are bound up in paper or cloth, and peirced, and primed with stouple: the other two, E, E, signifieth those that are made up without paper, and need no priming more than the powder or sulphur dust that they are rowled in.

How to make Petards.

YOU must make the coffins for them either of white yron, or else of paper, or parchment rowled upon a

L

Former

Former for the purpose, and afterwards fitted with a co-
uer, which must be glewed on: these coffins must be filled
with whole gunpowder, and peirced in
the midst of the broad end, and primed
thereat with prepared stouple; the paper
ones must be couered all ouer with glew,
and the peirced. The figure of a Petard
ready made, and primed, is signified by



the figure E.

How to make compound

How to make compound
Rockets.

First you must make the Rocket I taught you before; you must not choake the end of it, but eyther double downe halfe the coffin, and with the rammer and a mallet, give it one or two good blowes: then with a bodkin pierce the paper unto the composition, or else drive a bottome of leather fitted unto the bore of the Rocket, and pierce it through in two or three places; then pare or cut off the coffin equall thereunto; to this end of the rocket you must binde a coffin wider a great deale then the Rocket is; strew into it a little gunpowder dust, that it may cover the bottome of this coffin, and put therein with their mouthes downward eyther golden rayne, or serpens, or both; also starres, or petards; you must put some gunpowder dust among these; when you have filled the coffin with these or such like, cover the top of it with a peece of paper, and paste upon that a picked crowned paper,

paper, balast it with a rod, and it is finished; the figure followeth.



How to make fiends, or fearefull apparitions.

THese must be made of the compositions for Starres, wrought upon cotton weeke dipped in *aqua vita*, wherein camphire hath beene dissolved, and after what fashions your fancy doth most affect.

How to make fire Boxes.

YOU must make the coffins for fire Boxes of paste-board, rowled upon a Former, of what bignesse you list; then binde them about with packthread, and glew over the cords; also glew bottoms unto them, which must be pierced with a bodkin to prime them at.

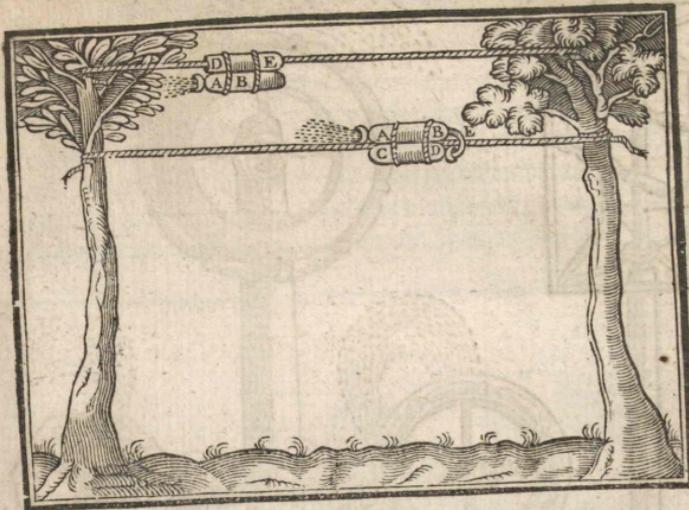


xes you may put golden rayne,
starres, serpents, petrars, fiends,
devils. The tops of these fire
boxes must be covered with
paper as the compound Roc-
kets. Note that you must strew
gunpowder dust a pretty thick-
nesse on the bottome of the fire-
boxes, and prime the hole at
the bottome with prepared
stouple.

How to make Swevels.

SWevels are nothing else but Rockets, having in stead
of a rod (to ballast them) a little cane bound fast unto
them, where through the rope passeth. Note that you
must be carefull to have your line strong, even & smooth,
and it must be rubd over with sope that it may not burn.
If you would have your Rockets to returne againe, then
binde two Rockets together, with the breech of one to-
wards the mouth of the other, and let the stouple that
primeth the one, enter the breech of the other; both kinds
are expressed by the figures, the uppermost whereof re-
presenteth the single one; A B signifieth the Rocket; D
E, the cane bound unto it, through which a rope passeth.
The lowermost representeth the double Rocket; A B
signifieth

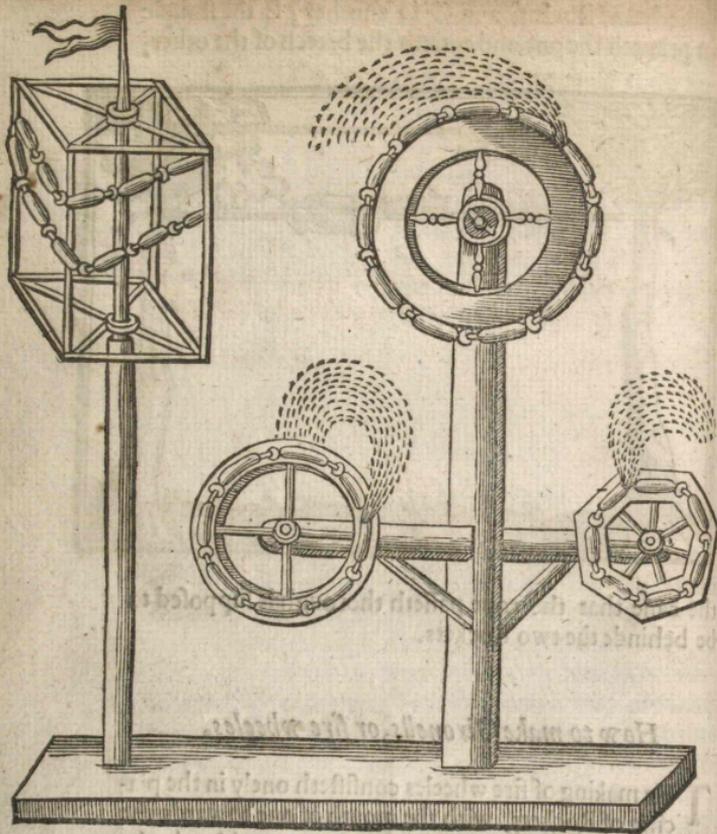
signifieth one Rocket, and C D another; E the stouple that primeth the one, and entreteth the breech of the other;



the cane that the rope passeth thorough is supposed to be behinde the two Rockets.

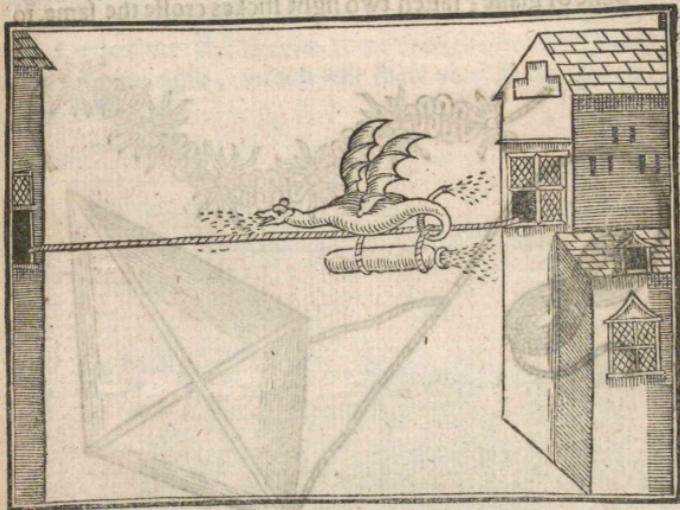
How to make Gironells, or fire wheeles.

THe making of fire wheeles consisteth only in the placing of Rockets, with the mouth of one towards the tayle of another, round about certaine moveable wheels; wherefore I thinke it sufficient only to describe the diversity of their fashions which follow.



How to make flying Dragons.

THe flying Dragon is somewhat troublelome to compose ; it must be made eyther of dry and light wood, or crooked-lane plates, or of thin whalebones covered with Muscovie glasse, and painted over. In the body thereof, there must bee a voyde cane to passe the rope through ; unto the bottome of this cane must bee bound one or two large Rockets, according as the bignesse and

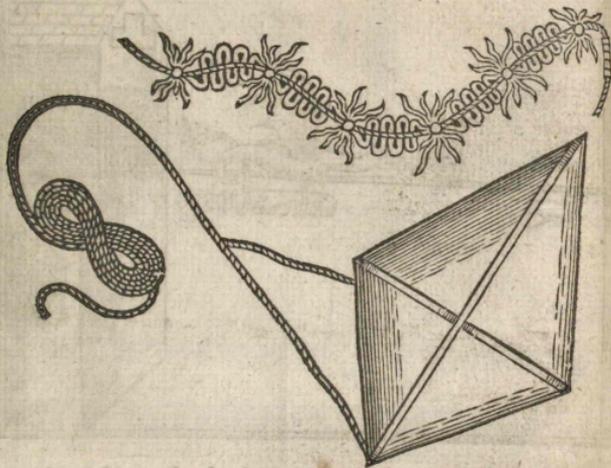


weight of the Dragon shall require ; the body must bee filled with divers petrars, that may consume it, and a sparkling receipt must be so disposed upon it, that being fired, it may burne both at the mouth and at the tayle thereof ;

thereof; then hang the wings on in such wise, that they may shake as the Dragon runnes along the line; you may dispose divers small serpents in the wings; marke the figure.

How to make fire Drakes.

YOU must take a peece of linnen cloth of a yard or more in length; it must bee cut after the forme of a pane of glasse; fasten two light sticke crosse the same, to



make it stand at breadth; then smeaie it over with linseed oyle, and liquid varnish tempered together, or else wet it with oyle of peter, and unto the longest corner fasten a match

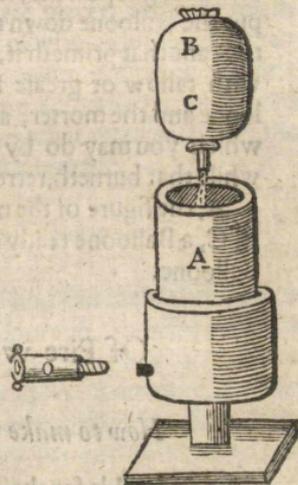
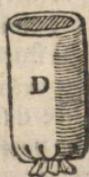
match prepared with saltpeter water (as I have taught before) upon which you may fasten divers crackers, or Saucissons; betwixt every of which, binde a knot of paper shavings, which will make it flie the better; within a quarter of a yard of the cloth, let there bee bound a peece of prepared stoupell, the one end whereof, let touch the cloth, and the other enter into the end of a Saucisson: then tie a small rope of length sufficient to rayse it unto what height you shall desire, and to guide it withall: then fire the match, and rayse it against the winde in an open field; and as the match burneth, it will fire the crackers, and saucissons, which will give divers blowes in the ayre; and when the fire is once come unto the stoupell, that will fire the cloth, which will shew very strangely and fearefully.





*How to make Balloones, also the mortar Peece
to discharge them.*

THe diameter of the hollownesse of the mortar Peece must be one foot, the longer it is the further it will carry. Let the diameter of the hollownesse of the sacke be the third part of a foot, and halfe a foot deepe: it must have a square foot, and a portfire to strew into the bot-



some of the sacke on the side of it; this portfire is to be made like a cane about three inches long, and have a bottome sodered unto the inside of the screw, which bottome must be pierced with a small touch-hole. This mortar peece may be made of yron, red copper, or for a neede

M 2

with

with pastbord, armed with cord, and glewed ouer, but the sack, and foot of it must bee made of wood, and the pastbord mortar must bee nayled fast upon it. A Balloone must be made of canuasse rowled eight or nine times upon a Former, it must bee made so, that it will easily go into the mortar peece; into this Balloone you may put Rockets, Serpents, Starres, Fiends, Petards, and one or two Saucissons to breake the Balloone; then choak it up with cord, and prime it with a little cane rammed full of a slow composition; fill the stock of the mortar peece full of whole gunpowder, then screw on the portfire, O, then put the Balloone down to the bottom of the mortar with the cane that primeth it, downward into the stock; then with tallow or grease stop the chinks between the Balloone and the mortar, and it is ready to bee discharged, which you may do by putting fire to the portfire, and while that burneth, retreat out of harmes way.

A, the figure of the mortar peece with its portfire. O, B, C, a Balloone ready made. D, an empty coffin for a Balloone.



Of Fire-works for the earth.

How to make Rockets for the earth.

THe moulds for these Rockets for the earth are now madelike those for the ayre, because that it is required that these should last longer, and haue a more gentle motion: obserue therefore the following directions for the making of them, which may serue for all occasions, without any alteration for bigger or lesser. Let the diameter

meter of their hollownesse bee halfe an inch, let their hollownesse be five or six inches long, let the rowler for to rowle the coffins on, bee the third part of an inch thick, and let the rammer to charge it bee a thought lesse, let the breech bee three quarters of an inch long, and let the breech enter halfe an inch into the mould, then fill it with the composition proper for it, observing those rules in the ramming it, as you did in ramming rockets for the ayre; when you haue filled it within an inch of the top of the mould, double down a quarter of the coffin, beating it with three or foure strokes of the mallet; then with a bodkin peirce it in two or three places, and then put in the quantity of a pistoll charge of whole gunpowder, then double down the halfe of the coffin, giuing it a gentle blow or two with the mallet, and with a strong packthred choak the rest of the coffin, and what remaineth after the coffin is choaked, cut it of, and it is made.

How to make Crackers.

IT is well known, that euery boy can make these, therefore I think it will be but labour lost, to bestow time to describe their making: only thus much, if you would make a Cracker to giue forty, fifty, a hundred, or two hundred blowes, one after another, then binde so many Crackers upon a stick, so that the end of the one may ioyne to the mouth of the other.

How to make Trunkes.

THese you may make of paste-board, paper, or wood, and of what bignesse and length you please, and ram

them full of the composition of Rockets for the earth; if you would have them to change colour, then alter the composition that is, put in two or three spoonfulls of the composition of Rockets for the water, and ramme that in, then put in two or three spoonfulls of the composition of Rockets for the ayre, and ramme that in, then put in two or three spoonfulls of gunpowder dust, and ramme that in, doe so till you have quite filled it, then tie a bottome of leather upon it, and pierce it and prime it with stoupell; after the same inanner may you make lanternes and lights.

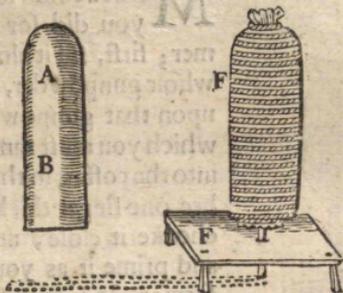
How to make tumbling balls.

MAke a ball of canvas, and fasten in it a double Rocket for the earth; you may stufte the rest of the ball with a slow composition of two parts charcoale dust, and one part of gunpowder dust, mingled together, and put divers petrards amongst it.

How to make Saucissons.

SAucissons are of two sorts, cyther to be placed upon a frame, or such like, and so to bee discharged with a trayne of gunpowder, or else to bee discharged out of the mortar-peece. The standing Saucisson is thus made; you must roll paper or canvas, nine or ten times upon a roller as A, B, and choake the one end of it: fill it then with
whole

whole gunpowder, and then choake the other end also, then cover all the Saucisson with cord, and glew it over; then pierce one end of it, and prime it with a quill filled



with gunpowder dust; place it upon a forme having a hole for the quill to passe thorough; then fire it by a traine of gunpowder layd under the frame, it will give a report like a canon: mark the figure F F.

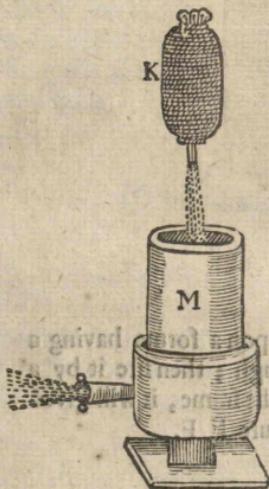
How to make a fire work.

How

Y^e author makes a word of woods having a hole
 cut into the back of it, where the quill is
 set for the ground; then two or three (or more)
 (with their mouths inward) let the quill that primeth

*How to make the flying Saucisson to be deliuered out
of the mortar peece.*

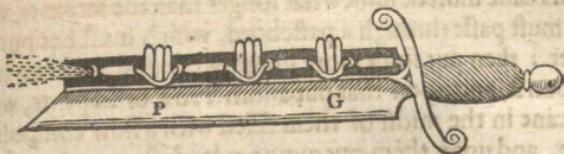
MAke a coffin for this, as you did for the former; first, fill it almost with whole gunpowder, then put upon that gunpowder dust, which you must ramme hard into the coffin, so that it may bee one finger thicke; then choake it close, and arme, and prime it as you did the former. It is represented by the figure, K. M.



How to make a fire sword.

YOU must make a sword of woode, having a deepe channell in the backe of it, wherein place first a Rocket for the ground; then two or three serpents upright; (with their mouthes inward) let the stoupell that primeth the

the Rocket come under the mouth of the serpents, so that being kindled, it may set them on fire, and enter the breech of the next rocket, so fill the channell quite full



with rockets and serpents, binde the rockets fast into the channell, but the serpents must be placed so, that being once fired, they may fly out of the channell, and it is made: mark the figure G, P.

*The description and making of three sorts
of Fire-lances.*

TO make the first Fire-lance, whose figure is noted
A, you must make a hollow trunk of what length or
bignesse you please, either of wood, paper, or pastbord
rowled on a rowler, and armed with some cord and glew:
first put into the bottom of whole gunpowder about one
or two fingers thick; then ram upon it a pastbord peir-
ced with a little hole in the middle, hauing a quill fastned
in it, which quill must be filled with a slow composition,
or else with gunpowder dust: this quill must stand up in
the lance two or three inches; then fill the coffin up to
the top of the said quill with starres, and strew among the
starres some gunpowder dust, then put pastbord over
them, hauing a hole for the quill fastned in the former
bottom of pastbord to passe; then upon this pastbord

N

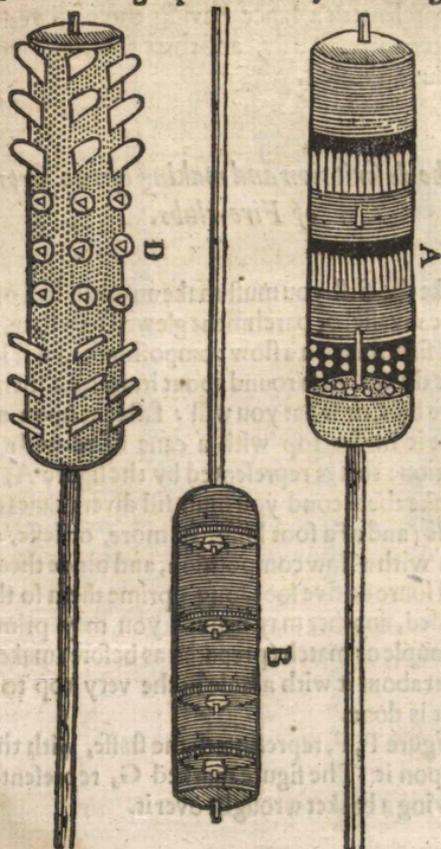
ram

ram gunpowder dust one or two fingers thick, then put a row of serpents in, and in the midst of the serpents put a cane open at both ends, and filled with gunpowder dust; this cane must be somewhat longer than the serpents, and it must passe through a pastebord, which must bee put o-uer: then put some more gunpowder dust, and ram it in upon it, and upon that put another row of serpents, with a cane in the midst of them filled with a slow composition, and upon them put gunpowder dust, or else a slow composition, ramming it in till the lance bee full; then put a pastebord upon it, and in the midst of the pastebord put a little cane filled with a slow composition, then fasten it upon a staffe of what length you will, and it is made.

To make the second Fire-lance, you must prepare a trunk like unto the former, first ram in the bottom of it some of the composition of rockets for the earth about two fingers thick, then put a pastebord upon it, having a petard fastned in the midst; this pastebord must bee pierced in three or foure places, round about the petard, that thereby the powder that is rammed ouer the pastebord may take fire: then ram in some more composition upon the petard, about two or three fingers thick, then another petard, then more composition, so doing untill you have filled the trunk: then fasten it upon a staffe, and and prime it as you did the former, it is represented by the figure noted B.

To make the third Fire-lance you must haue a trunk also, which must bee rammed full of a slow composition, of two parts charcoale dust, and one part gunpowder dust well mixed; prime it as the former, then bore diuers holes round about it, from the top to the bottom, into e-
 very

very of which holes glew a saucisson, or a serpent, or a little ball filled with gunpowder dust, and having a petard



in the middle: either of these must be well primed, and their primed ends must be towards the inside of the lance,

How to make a Fire Rocket.

Take a length of the twigs or of the light wood, & divide it into three parts, the first part being a very low composition, the second part being open, and the third part being primed with powder. Mark the first part with the letter G.



in the middle of the rod you may have a small hole, which you may fill with the same composition as you did the others. Mark the hole with the letter M, N, O.

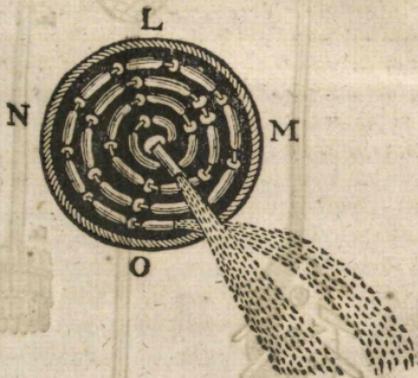
Of the works for the water.

How to make Rockets for the water.

The diameter of hollowed out the middle of the mould for Rockets that swim on the water, must be one inch, and eight inches.

How to make a Fire-target.

Make a Target of osier twigs, or else of light wood, & binde upon it divers canes filled with a very flow composition: the canes must bee open at both ends, and primed with stouple, that one may give fire unto ano-



ther: in the midst of all you may set up a large cane also, if you please, which you may fill with the same composition as you did the others. Mark the figure L, M, N, O:

*Of Fire-works for the water.**How to make Rockets for the water.*

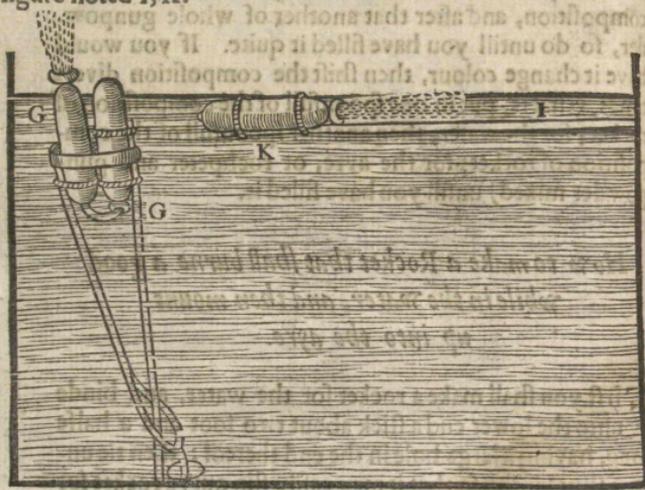
The diameter of hollownesse of the mould for Rockets that swim on the water; must be one inch, and eight inches

inches long : let the breech enter into the body of the Rocket one inch, and it must have no broach at all in it. Let the diameter of the thicknesse of the rowler bee three quarters of an inch, the rammer must be a thought lesser; then ram it full of the composition of Rockets for the water; joyne to the upper end of it a Saucisson: then cover it all over with melted pitch, rosin, wax, or tallow, to the end that the water may not spoyle the coffins; and to make it float along the water, binde a rod about two foot long, as you did unto the rockets for the ayre: now if you would have the rocket to change his actions, (that is, to swim one while above the the water, and one while under the water) then put into it in the filling, one spoonfull of composition, and ram that in; then one spoonfull of whole powder, and ram that in; and then another of composition, and after that another of whole gunpowder, so do untill you have filled it quite: If you would have it change colour, then shift the composition divers times, (that is, put in one spoonfull of the composition of rockets for the water, then another spoonfull of the composition of rockets for the ayre, or rochpeter and gunpowder mixed) untill you have filled it.

How to make a Rocket that shall burne a good while in the water, and then mount up into the ayre.

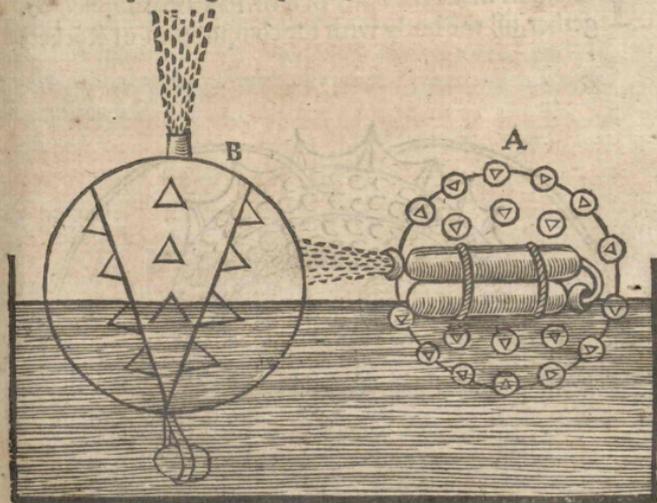
First you shall make a rocket for the water, and binde unto the lower end a stick about two foot and a halfe long, having a large hole in the end thereof: then tie unto it (but loosly, so that it may easily slip out) a rocket for the

the ayre, and let the stouple that primeth for the rocket for the ayre, enter into the breech of the water rocket, then let the end of the rod of the rocket for the ayre enter into the hole of the rod of the rocket for the water : besmeare then both the rockets with tallow, grease, or wax, or any oyle colour that the water may not spoyle the coffins of the rockets ; then hang a stone at the bottom of the stick that hath the hole in it, to make it sink down into the water ; then fire the water rocket, and cast them into the water ; the fired rocket will burne in the water, and being consumed, will giue fire unto the other rocket, which being loosly tyed, will slip the bond, and mount up into the ayre. This is represented by the figure G, G. The floating rocket mentioned before, is expressed by the figure noted I, K.



*The description and making of two sorts of fire-bals
for the water.*

FOR to make the first, you must make a ball of Canvas, about the bignesse of a Foot-ball, or bigger if you please, and fasten in it a double Rocket for the water: if you will, also you may stuffe the rest of the ball with the composition that will burne under the water, and cut holes in the sides, and therein fasten other bals, and pe-trards in them: then cover the ball over with Tallow, Pitch, or painting, except the place where the Rocket is



primed, and it is done. It is represented by the figure no-
ted with A, and it will tumble up and downe in the wa-
ter.

To make the second fire-ball, you must first make a ball of Canvas, Pasteboard, or such like, and cut a wide hole in the top of it, and place in it a channell of Tinne pierced in divers places: fill the channell with the compositions of Rockets for the water; against every hole thereof, place a petnard: cover it with a cover, pitch it over, and prime it, then ballast it with leade, or a stone, that the vent may burne upwards, and it is done. It is represented by the figure B.

How to make a Dolphin.

YOU must make the body of it of Pasteboard glued together, fill the body with the composition of Rockets



for the water, pierce it in the back with divers little holes,
whercin

wherein put Serpents, besmeare the body all ouer with the following pap: Take gunpowder dust, foure ounces, camphire, and sulphur, or brimstone in powder, of each one ounce, make them into a soft pap with oyle of tiles, then binde unto it a large Rocket for the water, which Rocket must be armed (as afore) that the water may not hurt it: then ballast it with a wyre, hauing at each end a piece of lead of weight sufficient, and it is done. Marke the figure.

I might haue bene infinite in the describing of such like with Ships, Towres, Castles, Piramides. But considering that it would but increase the price of the booke, and not better your understanding: since all consist of the former workes, which are so plainly described, as that the most ignorant may easily conceiue thereof, and (if any whit ingenious) thence contriue others, of what fashion they list.

FINIS.

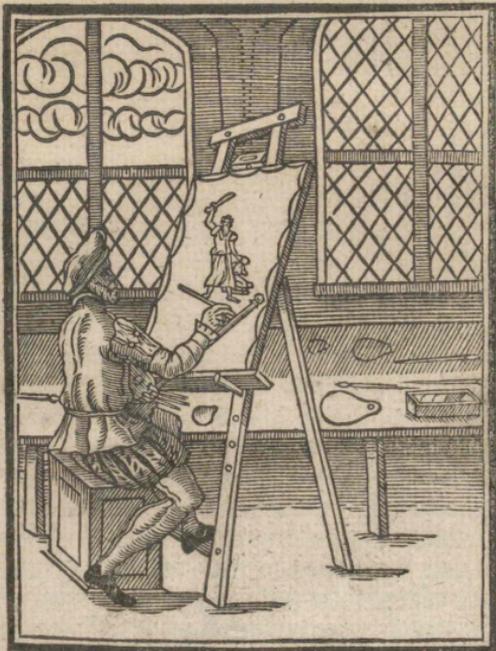
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THE
THIRD BOOKE
Of Drawing, Limming, Colouring,
Painting, and Graving.

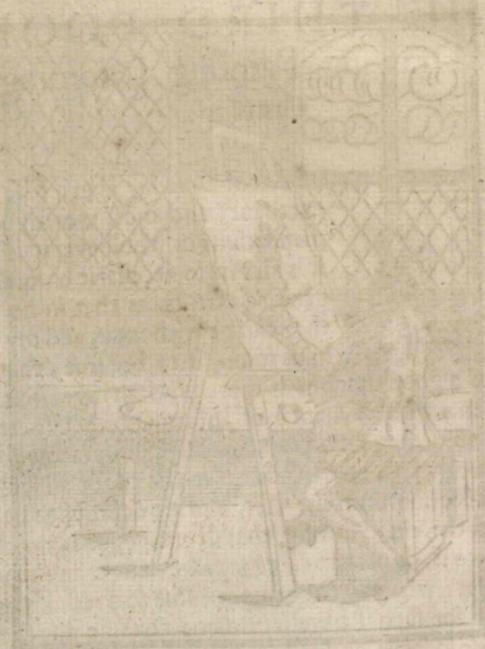
By I. B.



LONDON.
Printed by THOMAS HARPER, for RALPH MABE,
1634.

THE
THIRD BOOK
of Drawing, Planning, Colouring,
Painting and Gilding.

PLATE



LONDON,
Printed by THOMAS WARRER, for RALPH MANLY.

1734.

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THE THIRD BOOKE
of Drawing, Painting, Limning,
Graving.

THe Art of *Drawing* is in it selfe most excellent, and most worthy commendations in whosoever it is : yea it is an Art so necessarie unto all ingenious Artists, as that in no wise they can be without it, and my selfe haue found it to bee true, that the sight of a good draught is more unto an ingenious person, then a whole Chapter of Information ; Wherefore I haue, according unto my knowledge and practise therein, faithfully penned the same ; for the use of all such as beare affection unto the Art, and are desirous to be instructed therein : And for that diuers persons cannot attaine unto it, or perhaps are loath to bestow any time to practise it : whereby they might come to a requisite perfection : for such I haue set downe certaine directions, and those so facile, and easie ; that persons altogether unskillfull, may (having a patterne) worke very well ; But before

before I begin, it behooveth that I prescribe what things are to be had in readinesse to worke withall: first there fore provide good smooth and cleare paper, divers plummetts made of blacke leade, oker, or blacke chalke, or else Charcoals made of Ash, Sallow, or Beech, split in sunder, and pointed; also a wing: having provided these your implements, you shall thus begin to worke. First, let the thing, whose pourtrature you intend to take, stand before you, so that the light be not hindred from falling upon it, and with a pointed peece of charcoale draw it rustically, which when you have done, consider a while whether all the parts thereof are proportionable, and whether it carry the semblance of the thing that you drew it from, which if it do not, wipe it out with your wing, and begin anew: but if it be faulty in one part onely, wipe onely that part out, and draw it againe; whensoever it liketh you, or that you have so drawne it, that you can finde no great fault in it: wipe it over gently with your wing, so that you may perceive the former strokes: then with your blacke chalke, or blacke lead plummetts; draw it as perfectly, and as curiously as you can, and shadow it according as the light falleth upon it; This way is workeman like, and the most difficult of all, yet by a little practice may easily be attained unto: so that the persons stand well affected unto the Art. Instead of white paper, you may take light coloured blew paper, and draw upon it with charcoale, and white chalke pointed, which will shew very wel: but note, that after you have made your draught, you must wet it in faire water, and let it dry of it selfe; this will make the drawing to hold fast on, which would otherwise easily be wiped off. This may serve for such as are contented to take some paines to attaine so noble a Science.

Science. But for others there are divers other helps, which follow in order.

How to take the perfect draught of any printed, or painted Picture.

TAKE a sheete of Venice (or in stead thereof) of the finest white paper that you can get: wet it all over with cleane sallet oyle: then wipe the oyle off from the paper, as cleane as you can, so that the paper may be dry, otherwise it will spoyle a printed picture by the soaking through of the oyle: hauing thus prepared your paper, lay it upon any painted or printed picture, and you shall see the picture through the same more perfectly appearing, then through glasse, and so with a blacke lead pen, you may draw it ouer with ease, and better first with a soft char-cole, and then with a pen. After that you haue thus drawne the picture upon the oyled paper, put it upon a sheete of cleane white paper, and with a little stick pointed, or (which is better) with a feather taken out of a Swallowes wing: draw ouer the picture againe, and so you shall haue the same very prettily and neatly drawne upon the white paper, which you may set out with colours, as shall be taught hereafter.

Another way.

HAving drawne the picture, first open the oyled paper, put it upon a sheete of cleane white paper, and prick it ouer the same drawing, with a good big pin, then from the cleane sheete, that is pricked, pounce it upon

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another: that is, take some small coale, powder it fine, and wrap it in a piece of Tiffanie or such like, and binde it up therein loosely, and clap it lightly ouer all the pricked lines by little and little, and afterwards draw it ouer again with a Pen or Pencill, or otherwise as you please.

Another way very pretty and easie to be performed.

TAKE some Lake, and grinde it fine, and temper it with Linseed oyle, and afterwards with a pen, draw with this mixture (in stead of Inke) all the out stroakes of any printed picture, also the muscles: then wet the contrary side of the picture, and presse it hard upon a sheete of cleane white paper, and it will leaue behinde it all the stroakes of the said picture that you draw ouer.

Another way much like the former.

TAKE Printers Blacking, grinde it fine, and temper it with faire water, and with a pen dipt therein, draw ouer the master stroakes and out lines of the muscles: wet then a faire paper with a sponge, and clap the picture upon it, pressing it very hard thereupon, and you shall finde the stroakes you drew, left upon the faire paper.

An easie way to lessen any picture: that is, to draw a picture from another, in a lesser compasse.

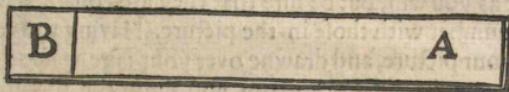
FIRST, with a ruler, and a blacke lead plummet, draw a line at the very top: also another at the bottome parallel,

lell, or equally distant from the other: from the upper line, let fall two perpendicular or plum-lines euen unto the lowermost line, so those foure lines will make a square: now you must diuide this square into diuers equall parts, with a paire of compasses, and draw lines with a ruler and blacke lead plummet, quite over the picture: so the lesse lines will diuide the picture into equall parts or squares: then take a faire paper, and make as many squares upon it, as there is in the picture: you may make them as little as you will, but be sure that they are equall, and of just number with those in the picture. Having thus crossed your picture, and drawne over your faire paper into squares, take a blacke lead pen, and draw the picture by little and little, passing from square unto square, untill you

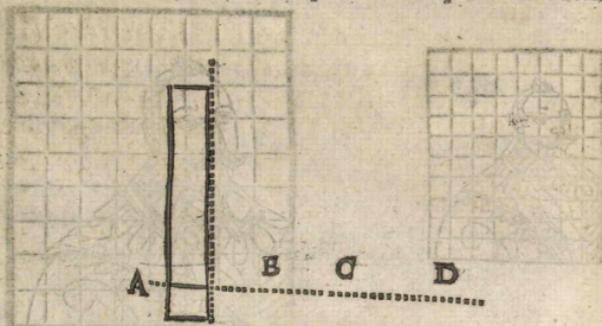


have finished the whole: still observing the order of the squares as they stand in either: then draw it ouer with a pen, in which second drawing of it over, you may easily mend any fault: when it is dry, rub it over with the crum

of white bread, and it will take off all the blacke lead strokes, and your draught onely will remaine faire upon the paper or parchment. Here I might have entred into discourse of drawing paralels, perpendiculars, making of squares, and such like: but to deale truly, I was as loth to trouble my selfe, as to wearie you: you shall neede onely to provide a ruler of thin brasse or copper, having a crosse thwart one end of it: the charge will not be much, nor the use tedious: the figure followeth, noted A, B.



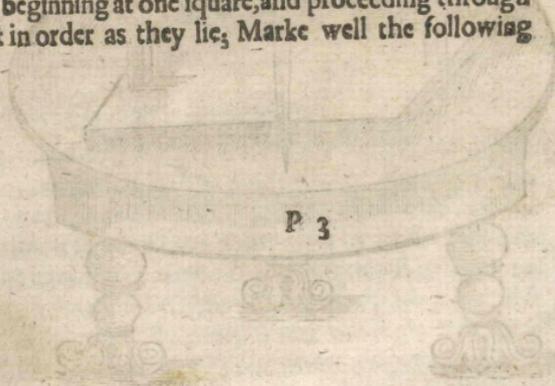
Let a, b, c, d , be a line given, whereon to erect a perpendicular or plumb line: lay the ruler so, that the crosse

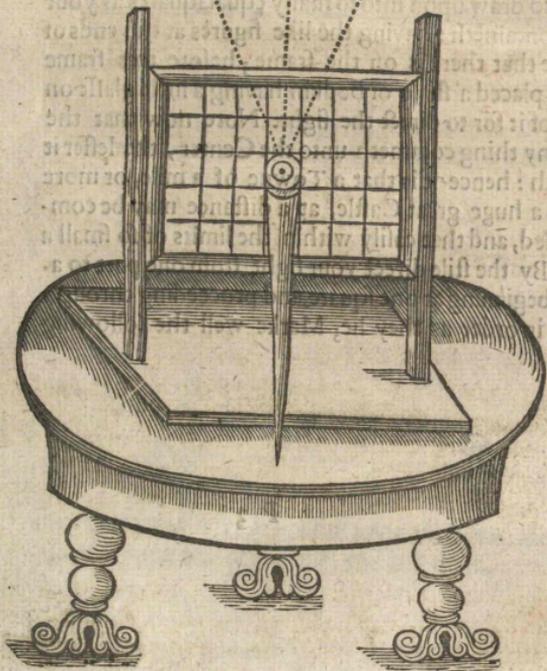


over the end of it, may lye full upon the Line, then draw a Line by the side of the rule, and it is done.

*A verie easie way, to describe a Towne, or Castle:
being within the full sight thereof.*

FOr the effecting of this, you must have a frame made, and crossed into equall squares with Lute strings, and figured at the end of each string: this frame must have a foot, wherein it must be made to be lifted higher or lower as occasion serveth; also you must divide your paper that you are to draw upon into so many equal squares as your frame containeth: having the like figures at the ends of each line that there is on the frame; before this frame must be placed a stile or bodkin having a little glasse on the top of it for to direct the sight. Note now that the nearer any thing commeth unto the Center, the lesser it appeareth: hence it is that a Towne of a mile, or more long, or a huge great Castle, at a distance may be comprehended, and that easily within the limits of so small a frame; By the stile direct your sight from one part to another, beginning at one square, and proceeding through the rest in order as they lie; Marke well the following figure.

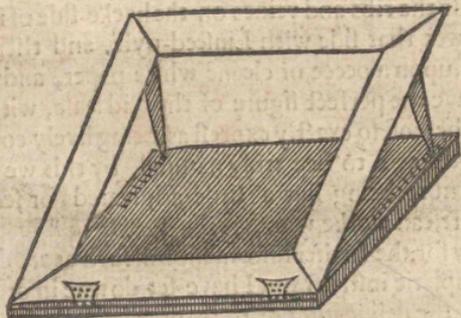




How to make a Deske : by meanes whereof you may draw, and that most exactly with great facilitie any printed picture, or sollid Image.

First let there be a frame made, and with hinges let be joynted unto a board of equall breadth unto it : let this frame also have two stayes at the top, at each end one, by meanes whereof the deske may be raised higher, or lower, as need shall require ; then fasten to the frame a peece of pure cleare glasse fitted thereunto, and it is finished. The figure followeth.

The Deske.



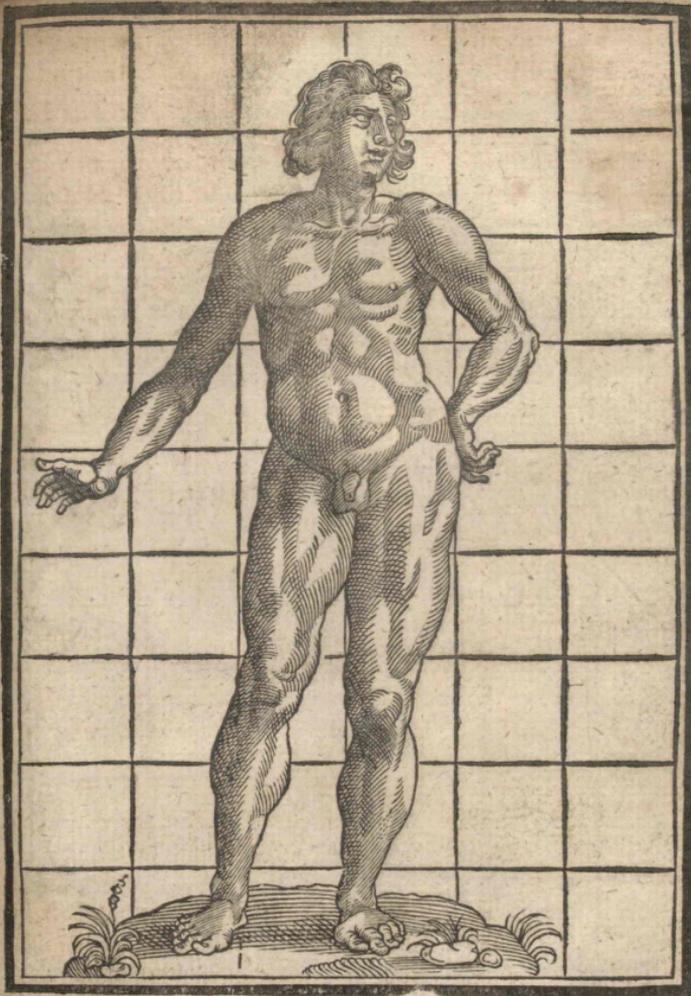
The manner of using this Deske is thus, If the picture that you intend to draw be a printed one, then first fasten it next unto the Deske with waxe, paste, or such like : upon it fasten a sheet of faire paper : If it be in the day-time place the backe of it towards the Sunne ; if it be in the night that you worke, place a lampe behinde it, and so you shall see perfectly every (even the least) stroake of the picture, which with your penne you may draw as accurately.

accurately as any Limmer whatsoever. If it be a solid peece, then place it behinde the Deske, betweene the light and the Deske: then fasten a sheet of cleane white paper upon the Deske; raise then the Deske higher, or lower untill you see the perfect shadow of the image through your Deske, and paper, and then draw the posture of the Image, and shadow it afterwards (without the Deske) as light falleth upon it.

An easie way to take the naturall, and lively shape of the leafe of any hearbe or tree, which thing passeth the Art of man to imitate with Pen or Pensill.

First take the leafe that you would have, and gently bruise the ribs and veines on the backe-side of it, afterwards wet that side with Linsced-oyle, and then presse it hard upon a peece of cleane white paper, and so you shall have the perfect figure of the said leafe, with every veine thereof, so exactly exprest as being lively coloured, it would seeme to bee truly naturall, by this we learne, that Nature being but a little adjuvated or seconded with Art, can worke wonders.

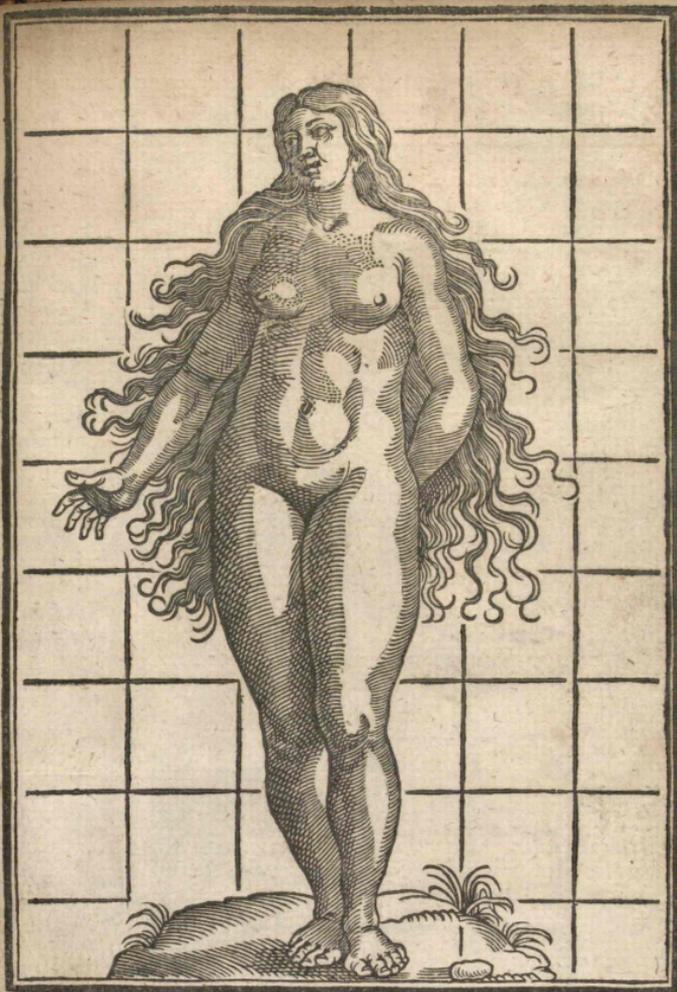
Now for the farther information of such as are desirous of exemplarie instruction, I have set downe in order following the delineation of the proportion of such things as in my iudgement seemed most necessarie for young beginners, and those in such easie demonstrations as for the most part they consist of equall squares, and require no more for their right understanding, then diligent observation, I might have filled a whole Booke of such like: but having considered that what I had done, was a sufficient ground for a farther procession, I thought fitting to leave each person to the exercise and practise of his best Invention.



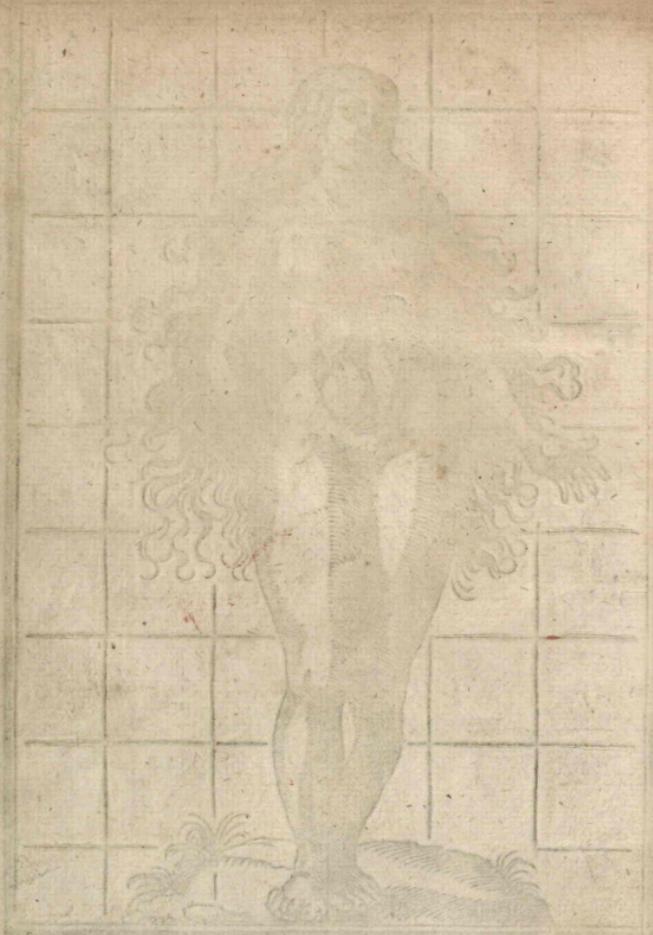
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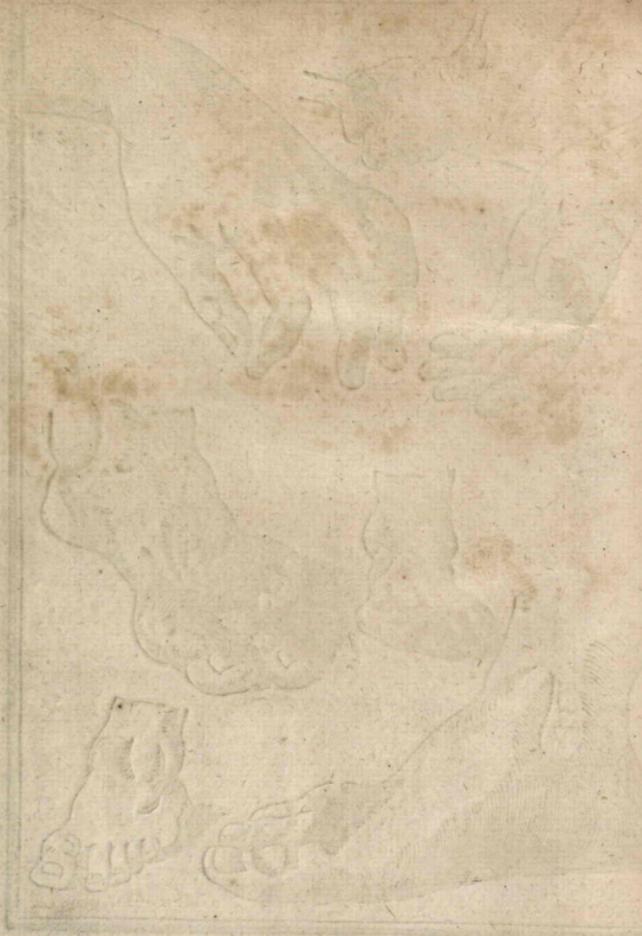
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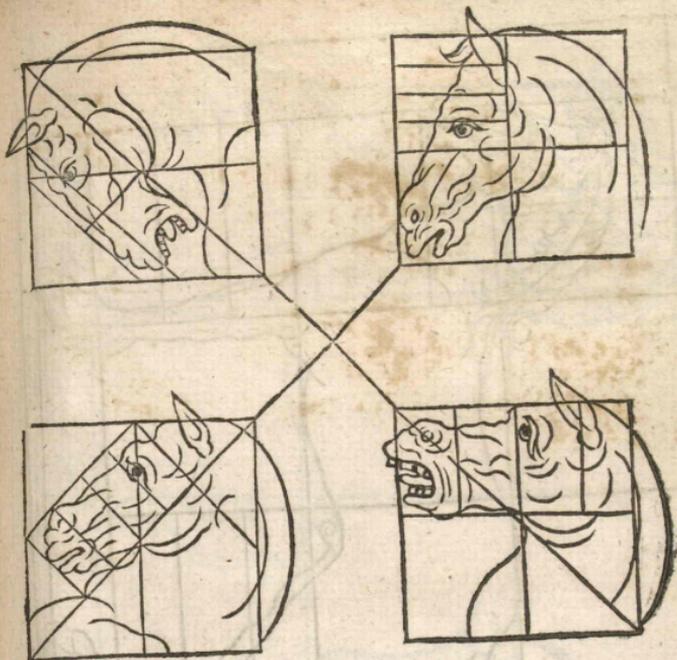






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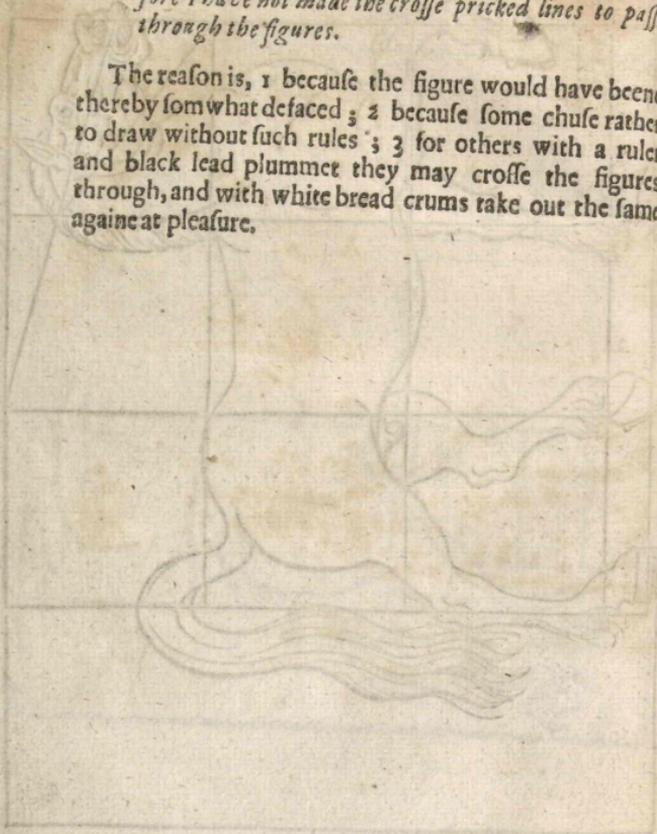
9.2





I thought fitting to give you a word or two, wherefore I have not made the crosse pricked lines to passe through the figures.

The reason is, 1 because the figure would have beene thereby somwhat defaced; 2 because some chuse rather to draw without such rules; 3 for others with a ruler and black lead plummet they may crosse the figures through, and with white bread crumbs take out the same againe at pleasure.



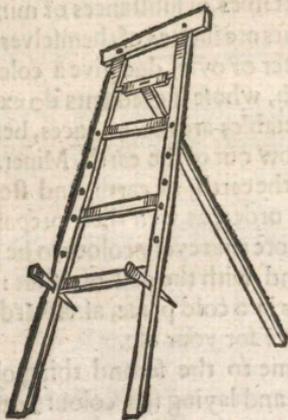
Of Painting.



He principall end and subject of this Art, is to set out things both in proportion of parts, and livenessse of colour.

For the former, the proportion of parts, I have given sufficient information for the meanest capacite in the precedent part of this tract: now therefore I will speake of the other, the colouring or setting out in colours. But first provide a frame or Easel called by Artists, which is very necessary to worke upon, especially in greater pieces of worke: the forme whereof followeth.

The Easel.



Also you must provide divers little shels to put your colours in, also pensils of all sorts, both for priming and other: a light ruler of one foot and a halfe, or two foot long: and colours of all sorts ground very fine upon a porphire or marble. Having provided these, you shall see to worke, observing the subsequent directions.

Painting may be performed either with water colours, or with oyle colours.

First I will speake of water colours, wherein I shall observe two things.

First, the diversitie of colours, and preparations. Secondly, their mixture, and manner of laying them on the ground.

First of the first, the diversitie of colours and their preparation.

Colours are either simple or compounded, meerey tinctures of vegetables, or substances of minerals, or both: the simple colours are such as of themselves, being tempered with the water or oyle, doe give a colour. The compounded are such, whose ingredients do exceed the number of one. Vegetables are rootes, juces, berries, and such like things as grow out of the earth. Minerals are such as are dig'd out of the earth, as earth, and stones, &c. All which follow in order, as well their preparations, as description. First note that every colour to be ground, ought first to be ground with the gall of a near: then let them dry of themselves in a cold place, afterwards grinde them with gumme water for your use.

Now I am come to the second thing observable (to wit) the mixture and laying the colours on the grounds, which is thus: your colours prepared for use, ought to be tempered according unto direction, still observing a meane:

meane: and to that end, mixe them by little and little, till the colour please you; first you must lay on the ground colour, and let it dry throughly: then with a small pen-fill, pricke on the second colour, else it will be apt to run abroad, nor can you worke it so well, to make it seeme liuely, as you may by pricking it one, specially in small peeces.

If you are to paint ouer maps, or printed pictures that haue writing in them, they use to lay on the thinnest colours, and alwaies before you lay any colours upon paper, wet the backe side of it with faire water, wherein store of Allum hath bene dissolued, and let it dry of it selfe: after wet it againe, and let it dry: doe it the third time, for this will strengthen the paper, that the colour shall not sinke through it, and moreouer it will make the colour shew the brighter, and last, the better.

To make Gum water to temper your Colours with.

TAKE cleane water, and put into it of gum Arabicke a little, and let it stand untill the gumme be dissolued. Now you must haue a care that it be neither too thicke, by reason of the Gumme, nor yet too thin: for with the one you cannot worke well, and the other will not binde the colour fast.

A Purple colour.

TAKE two pound of Heidleber, two ounces of Allum, halfe an ounce of ashes of Copper, halfe a pound of water; put them into a Skillet, and let them boyle till a

R

third

third be consumed: when it is cold, straine it into a cleane vessell, and let it stand a while, then straine it into another, and then let it stand till it be thicke enough.

A Crane Colour.

You must onely grinde blacke Lead with Gum water.

Browne Colour.

TAKE good browne, and grinde it with Gumme water: his false colour is made with two parts browne, and a third part white lead, sad it with the same browne.

Hayre Colour.

Take Vmber or Spanish browne, grinde it, temper it with Gumme water.

A Blew.

Boyle Mulberries with Allum.

An Emeralld Colour.

TAKE Verdigreese, and grinde it first dry, and put unto it a little of the Gall of a neat: also of Saffron, and the juyce of Rew, of each a little: grinde them together, and put them into a shell, and let it dry there: when you would use it, grinde it againe with Vineger or Verjuice, and a litle neats gall dissolved in either of them. His false colour is two parts greene, and a third ceruse: it must bee sadded with a good greene.

A Motlie Greene.

This colour is compounded of red and Greene.

A blacke Colour.

First you must lay on a light blacke, mingled with white lead, and afterwards when it is dry, sad it with good blacke, for sad blacke, mixe Indie Baudias with Gumme water.

A marble or ashe colour.

This is compounded of blacke and white.

A russet or sad Browne.

This colour is made by compounding a little white, with a good quantity of red.

A browne Blew.

Take two parts of Indie Baudias, and a third of ceruse and temper them with gumme water.

A Brasse Colour.

This is compounded of Masticot and Vmber.

A gold yellow for Armes.

TAke Orpment, and Masticot, grinde each by themselves: but in grinding of the Masticot, adde a little Saffron, and worke with them. Note you may alay your

R 2

Orp.

Orpment with chalke, and sadde it with browne of Spain
or Oker de Luke.

Azure.

TAke of white lead foure ounces, of Indicum two ounces, put them into a leaden pot with vinegar : boyle them well, and that which swimmes on the top is the colour.

A purple or violet Colour.

THIS is a compounded colour, and it is made either by mixing a quantitie of Azure, and a portion of Turnsole : or else by mixing a quantitie of cuset, and a quantitie of Azure:

Sanguine or Blood-colour.

THIS is likewise a compounded colour, and it is made by mixing a good quantitie of Cinaper with a little blacke.

Orange-tawny.

THIS colour is compounded of a bright red, and a bright yellow.

A Lyon-tawny.

THIS colour is made by mixing red lead and Masticot together.

A Canation, or Flesh-colour.

First you must lay on a white colour tempered with gumme-water, and when it is drie you must go it over againe with Vermillion or lake, or else you must temper ceruse and vermilleon together, and being dry, go over it againe with lake or vermillion.

A Peach Colour.

This is compounded of Ceruse and Vermillion.

A Skie Colour.

This colour is compounded of vermilleon and azure.

A Blood red.

This colour is made of Cinaper, and afterwards faded with Vermilleon at the sides, or else with a browne colour. A bloody colour, grinde Cinaper, Lake, and Cinaper tops, put them into good water, and if they be too light, put to them a little Turpsole.

A Lincoln-green.

This colour is compounded of a good greene and Saffron.

A Poppin-jay greene.

This colour is compounded of azure, and masticot.

A good yellow.

TAke Saffron, or Cambugium, and temper it with gum-water, Sad it with Vermillion.

A sable or blacke.

TAke a Torch, hold it under a lattyn Bafon, temper that blacke with gumme-water.

A velvet-blacke.

BVrne harts-horne on a Colliers hearth; then grinde it with the gaul of a neat, put it into a shell, and let it dry in the shade: when you would use it, grinde it againe with gumme-water.

To write gold with Pen or Pensil.

TAke a shell of gold, and put a little gum-water unto it, and temper it together, and then you may write with it as with other colours.

To make Azure, or bise sadder.

TAke blew Turnsole, wet it in gum-water, and then wring it out, and mixe it either with Bise, or else overshadow the Bise with it.

Red Colour.

TAke Vermillion, and temper it with gumme water: His false colour is two parts vermillion, and a third part ceruse.

Another

Another Red.

Take russet, and temper it with gumme-water, clay it with ceruse, and sad it with it selfe.

Another Red.

Take Brassill in grosse powder, allum in powder: steep them in gum water a night and a day: then straine it, and keepe it for use.

A greene Colour.

Take Copper plates, put them in a copper pot, & put distilled vineger to them: set them in a warme place till the vinegar become blew, then put it out into another leaded pot, and poure more vinegar into it again; let it stand so till it become blew; this do so many times till you thinke you have enough: then let it stand till it be thicke.

To make good Inke.

Take two handfuls of gauls, cut each gaul into three or foure peeces, poure into them a pint of beere or wine, then let it stand eight houres; straine it from the gauls, and put vitreoll therein, and to the vitreoll a third part of gumme, set it on the fire to warme; but let it not seethe, and it will be good Inke, and of these gauls you may make Inke foure or five times more.

To see the Brasill.

TAke an ounce of Brasill, twelve ounces of beere, wine, or vinegar, put it in a new pot, let it stand a night; and in the morning set it on the fire, and let it see the till halfe be consumed: then put into it two peny worth of allum beaten together, and as much beaten gum-Arabicke: stirre them well together, and let them see the againe; if you desire to have it somewhat darke, then scrape a little chalke into it when it seetheth: let it not see the over the pot: when it is cold straine it through a cloth, and put it into a glasse well stopt.

Aurum Muscum.

TAke one ounce of Salarmoniack, one ounce of quicksilver of counterfein, halfe an ounce of brimstone, bruisse the brimstone, and set it on the fire, but let it not be over hot (lest it burne) then take the Salarmoniacke, and the quicksilver being in powder: mixe them well together, then mingle with them the brimstone: stirre them well, and quickly with a sticke till the brimstone become hard, then let it coole, grinde it on a stone, and put it in a glasse well stopt with waxe, and set it in a pan with ashes; make a fire under it, and let it stand halfe a day in that manner (but not over hot) till a yellow smoke riseth on it, and when the yellow smoke is gone it is prepared.

Argentum Muscum.

TAke an ounce of Tynne, melt it, and put thereto one ounce of tartar, and one ounce of quicksilver, stirre them

them well till they be cold: then beat all in a mortar, and grinde it on a stone; temper it with gumme-water, and write therewith, and afterward polish it.

To write a gold colour.

TAKE a new hennes egge, make a hole at one end, and let the substance out, then take the yolke without the white, and foure times as much in quantitie of quicksilver; grinde them well together, and put them into the shell; stop the hole thereof with chalke, and the white of an egge, then lay it under an henne that sitteth with sixe more, let her sit on it three weeks, then breake it up, and write with it.

To write with gold out of a Pensil.

TAKE honey, and salt a like quantitie, grinde them well, and put to them a lease of gold, with a little white of an egge; put it into a mussell shell, and let it purifie; then temper it with gumme-water, and write with it, polish it.

Or else grinde a lease of silver, or gold, very small with gumme-water, and wash it in a mussell shell as aforesaid.

To temper Azure of Bise.

TAKE Azure or Bise, and grinde it on a stone with cleane water; then put it in a broad glasse, or shell, and when it hath stood a while all the dregs will flect above, and the cleane colour will fall to the bottome; then poure out the water with the dregs, and poure the azure in

cleane water againe; then stirre the colour and water together, and let it stand, and sine, and after that poure out the water, and dregs againe: do thus till it be well purged; then grinde it againe on a stone with gumme-water, and put it into a horne, or shell; when you paint or write, stirre it, and let the sticke drop into the pen, for it will sinke to the bottome as lead.

To temper Turnsole.

TAKE Turnsole, and wet it once or twice in cleare water, and let it lye till it be well steeped; then wring it into a dish till the colour be good, and sad; with this you may flourish red letters, or vestures, and this colour shall be darked, fadded, or renewed with blacke inke.

To make colouring, called Vernix: to varnish gold, silver, or any other colour on vellem, paper, timber, stone, &c.

TAKE Bengewine, and bray it well betwixt two papers; then put it into a viol, and poure on it *Aqua visa*, that it may stand above the bengewine three or foure fingers, and let it steepe so a day or two; then put to it for halfe a violl of *Aqua visa* siue or fixe chieues of Saffron slenderly stamped; this done, straine it, and with a Pensil vernish therewith any thing gilded, which will become bright and shining; drying it selfe immediately, and will continue the brightnesse many yeares; But if you will varnish on silver, then take the white that is found in Bengewine and dresse it with *Aqua visa* as afore, leauing out the Saffron, and the said vernish made with these onely

onely is very good to varnish all things as well painted, as not painted: for it maketh Tables of Walnut tree and Hebene to glister if it bee laid on them, and all other things, as Iron, Copper, or Tin gilded, or not: it maketh bright, preserveth and aideth the colour, and dryeth incontinent without taking dust.

To make a double size to lay gold or silver on an embossed ground.

TAke Venice Ceruse, white lead, plaister of an old Image, or chalke, any of these made in fine powder, and ground with the white of an egge, and a little water: this will make a good bottome to lay silver on. But when you use any of these to lay under gold, put to it a litle Saffron, put not too much water; mingle it after discretion, and looke the size be thicke standing: put the size thus tempered, in a horne or shell in some Celler, or shadowed place, where it may stand moyst seven dayes, till it be perfect clammy and rotten, and once a day stirre it; the elder the size is, it is the better. If there stand any bubbles on the size, put in care waxe, for that is a remedy thereto, and before you lay it on your worke, lay the size on a scrow, and dry it, and when it is dry, bend it, and if it bend and breake not, then it is perfect, and if it breake, put to it a litle water to make it weaker, and proue if it cleaveth fast to the booke, if not, put glayr thereto, and make it more stedfast: the like size may you make of Gypsum, Bolcarmoniacke, red or yellow Oker, Orpment or Malticor, with browne of Spaine, or red lead: if euery of them be ground severally, and tempered as afore.

Of painting in Oyle.

Here you must provide one thing more then you did before: that is, a Pallet (so called by Artists) where upon you must put a small quantitie of euery such colour you are to use, the forme whereof followeth.

The Pallet.

The colours to be used, are altogether such dry substances as I mentioned formerly: as Oker, Vermilion red lead, Vmber, Spanish browne, Lam-blacke, Gambugice, Masticor, Orpment, Ceruse, or Spanish white, blew and greene Bise, Verdigrease, and a multitude of such like, which may be had at the Rose in *Cornhill, London.*

Your colours must be ground all very finely, and tempered with Linseed oyle; and to preserve them, put them in litle earthen pans, and put water upon them, and cover them, that the dust come not at them: thus they may be

be kept a great while, and from thence you may take them as your use doth require.

There are divers colours which without the admixture of another colour, will not be dry a great while; as Lake, Verdigrease, Lam-black: with such you must temper a little Vmber or red lead.

Divers Painters there are, that having haste of worke, doe use to temper their colour with one part of fatte oyle, and two of common Linseed oyle, and by this means they make the colours dry the sooner: this fat oyle is one-ly Linseed oyle exposed to the weather, and so it becometh thicker: yea sometimes you shall see it so thicke, that you may cut it almost like Butter: it may bee made likewise by boyling of it a little while, but the former is the best. As for the tempering of your colours, I can prescribe no surer way then experience with diligent obseruation.



Of Graving.

IT is possible for one to be a good Painter, and yet not to be able to draw well with the pen, because there is not required in a Painter such a curious and exact carriage of the hand: but it is impossible for one ever to Grave or Etch well, except he can draw well with the pen. First therefore presupposing you can doe the first before you attempt the second, you must provide divers graving tooles, both long and short: some for hard worke, some for sweet worke, some for smaller worke, and some for greater: also a peece of a Beaver hat, and a good oyle stone, smoothed on one side, and free from pin holes, and plates of Copper or Brasse exactly polished.

OF

reflect against the ball of the thumb, and the point
 guided with the forefinger. And there ought to be a
 little page of lead under your plate, to the end that
 202

Of Gravers.

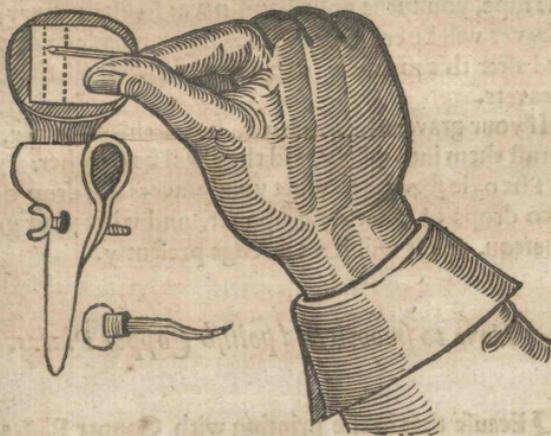
THere are two principall sorts of Gravers, the long and the short: the long are straight, and for to engrave Plates withall, especially the greater, and these are to be held as the figure following doth expresse: where you may note that the pummell of the Graver



resteth against the ball of the thumb, and the point is guided with the forefinger. And there ought to be a little bagge of sand under your Plate, to the end that you

you might turne your plate upon it as your worke doth require.

The second sort is a short Graver, and turneth up somewhat at the end, and that is to engrave Letters and Scutchions in plate seales, and smaller plates, being fastened in some convenient instrument: this must be held likewise according unto the expression of the figure following: where it is to be noted, that the pummell of the Graver is stayed against the further part of the hand, and



is guided by the inward side of the thumbe. It were needfull that there were a piece of leather like a Taylors thimble, about the end of the thumbe, waxed or glued, whereby to guide the Graver more steadily, and stay it upon occasion.

How to make Gravers.

Provide some good crosse-bow steele, and cause it to be beaten out into small rods, and softened: then with a good file you may shape them at your pleasure: when you have done, heat them red hot, and dip them straight downe into sope, and by so doing, they will bee hard indeed. Note that if in the dipping of them into the sope, you turne your hand never so little awry, the Graver will be crooked. These Gravers made and hardened after this manner, doe farre exceed all the other Gravers.

If your gravers be too hard, heate them a little, and thrust them into tallow, and they will be tougher.

The oyle stone is to whet your gravers on; drop one or two drops of sallet oyle upon it, and whet your graver thereon, and it will have an edge presently.

How to smooth and polliish Copper Plates.

Because that in the printing with Copper Plates, the least scratch, though it be scarce visible, receiveth its impressiion, and so many times disgraceth the worke: I have set downe a way to smooth plates for impressiion.

First, take a piece of Brasse, or Copper, of what bignesse you intend, of an indifferent thickeesse, and see as neere as you can, that it bee free from fire flaws. First beat it as smooth as you can with a hammer, then rub it
smooth

smooth with a pumice stone that is void of gravell, (least it
 race it, & so cause you as much more labour to get the out)
 burnish it after with a burnishing iron, having first drop-
 ped a drop or two of sallet oyle on it: then rub it over
 with a cole, prepared as is after taught, and lastly with a
 peece of beaver hat dipt in sallet oyle, rub it very well for
 an houre: thus you may polish it exactly.

How to prepare your Coales.

TAke Beechen charcole, such as when they are broke,
 doe shine, such as are void of clifts, and such as
 breake off even: burne them againe, and as soone as
 they are all through on fire, quench them in chamber lye:
 after take them out, and put them in faire water, and re-
 serve them for your use.

Having prepared all things in a readinesse, you must
 have a draught of that you intend to cut or engrave.

Take the plate then, and waxe it lightly over, and then
 either pounce the picture upon it, or trace it, or by draw-
 ing over the lines of the picture with ungummed inke, re-
 print it upon the Plate: then worke upon it, observing the
 shadow, so that being printed, it may stand right, for it
 will be backward upon your plate: when you have cut one
 stroke, drop a little sallet oyle upon your peece of Bever,
 and rub over the said stroke, for by this meanes you shall
 better see the stroke, and how to cut the next equall unto
 it, and so the rest proportionally distant one from another;
 but to worke by a Candle, you must place a glasse of faire
 water betweene the Candle, and a paper betweene that

and the Plate, (which casteth a true light) or you will never be able to worke truely and aright.

Of Etching.

ETching is an imitation of engraving, but more speedily performed. Things may be expressed to the life thereby, but not so sweetly as by the Graver: It is thus performed: the Plate you are to etch upon, must first exactly be polished, afterwards overlaid but very lightly with a ground made for the purpose, (of which anon) and thereupon must be pounced, drawne, or traced, the thing that you are to etch: then the said ground is to be pierced with diuers stiles of severall bignesse according as the shadowes of the picture doe require: afterwards the edges of the Plate are to be raised with soft waxe and strong water, (for so they terme it:) (It is to be had at the signe of the Legge in *Fesler Lane* a Distiller) is to be put upon it, which in those places where the strokes, are required to be lightly performed, is to be abated or alayed with faire water, which hauing dured a while upon the plate, will eate into it, as it were engraven, then put it into cold water, and wash it about, and it will leaue eating further, and then take off the ground and it is done.

A red ground for Etching.

Take red lead, grinde it very well, and temper it with varnish.

A white ground.

TAke one ounce of Waxe, and two ounces of Rosin, melt them together, and adde thereto a quarter of an ounce of Venice Ceruse ground fine, lay it on while it is hot.

A blacke ground.

TAke Asphaltum two parts, Bees waxe one part; melt them together, and being warme, lay it on very thinly with a fine lawne ragge. If it seeme somewhat red in any one part, hold it over the smoake of a Linke or waxe candle, and it will be amended. Note that it is a principall thing in this Art to lay the ground on a right.

Another way how to engrave with water.

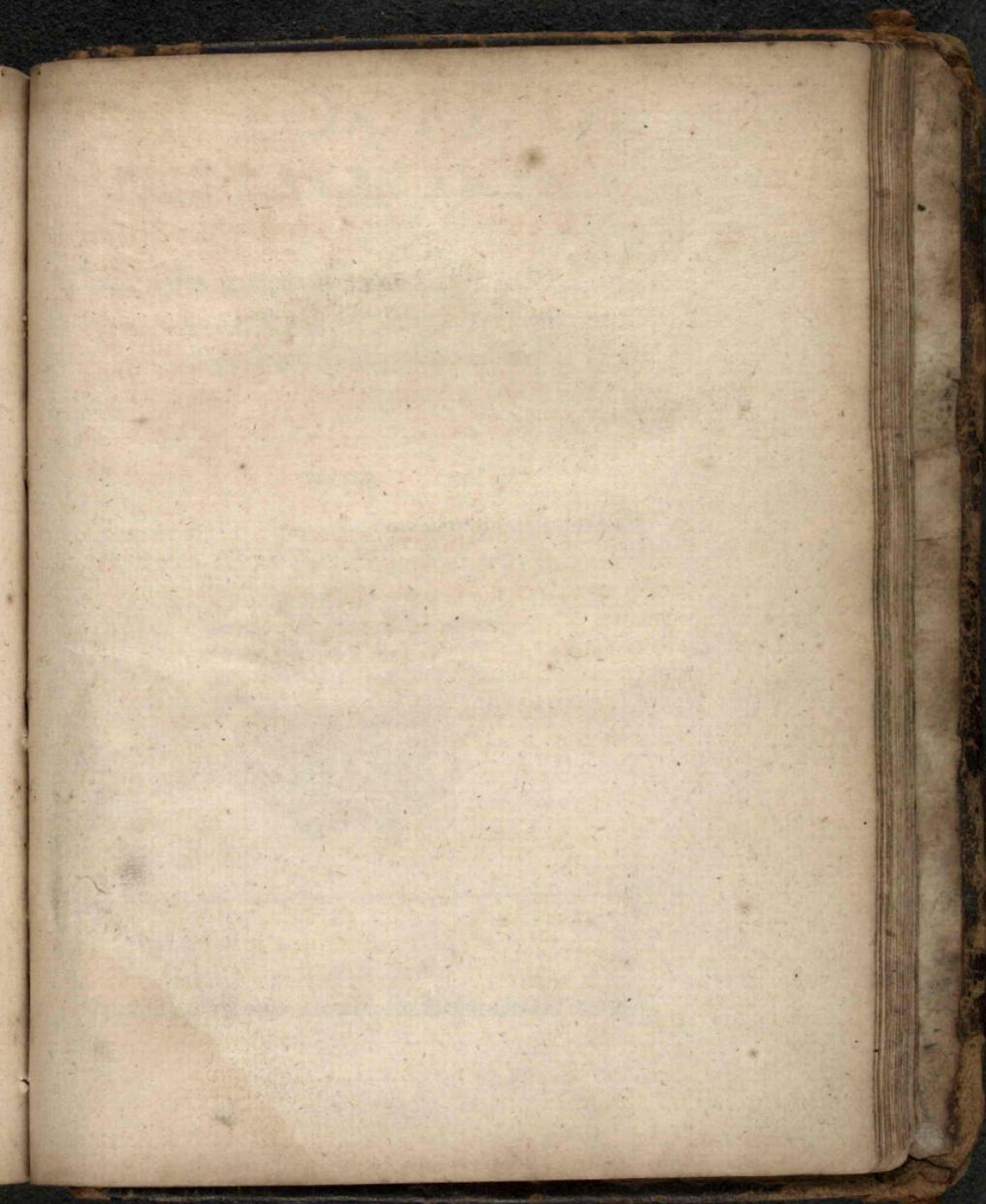
TAke Verdigrease, Mercury sublimated, vitreoll, and allum, a like quantity, beate all to powder, put them into a glasse, and let it stand so halfe a day, and stirre it often, then lay on the plate, waxe, mingled with Linseed oyle, or red lead with Linseed oyle, and write in it

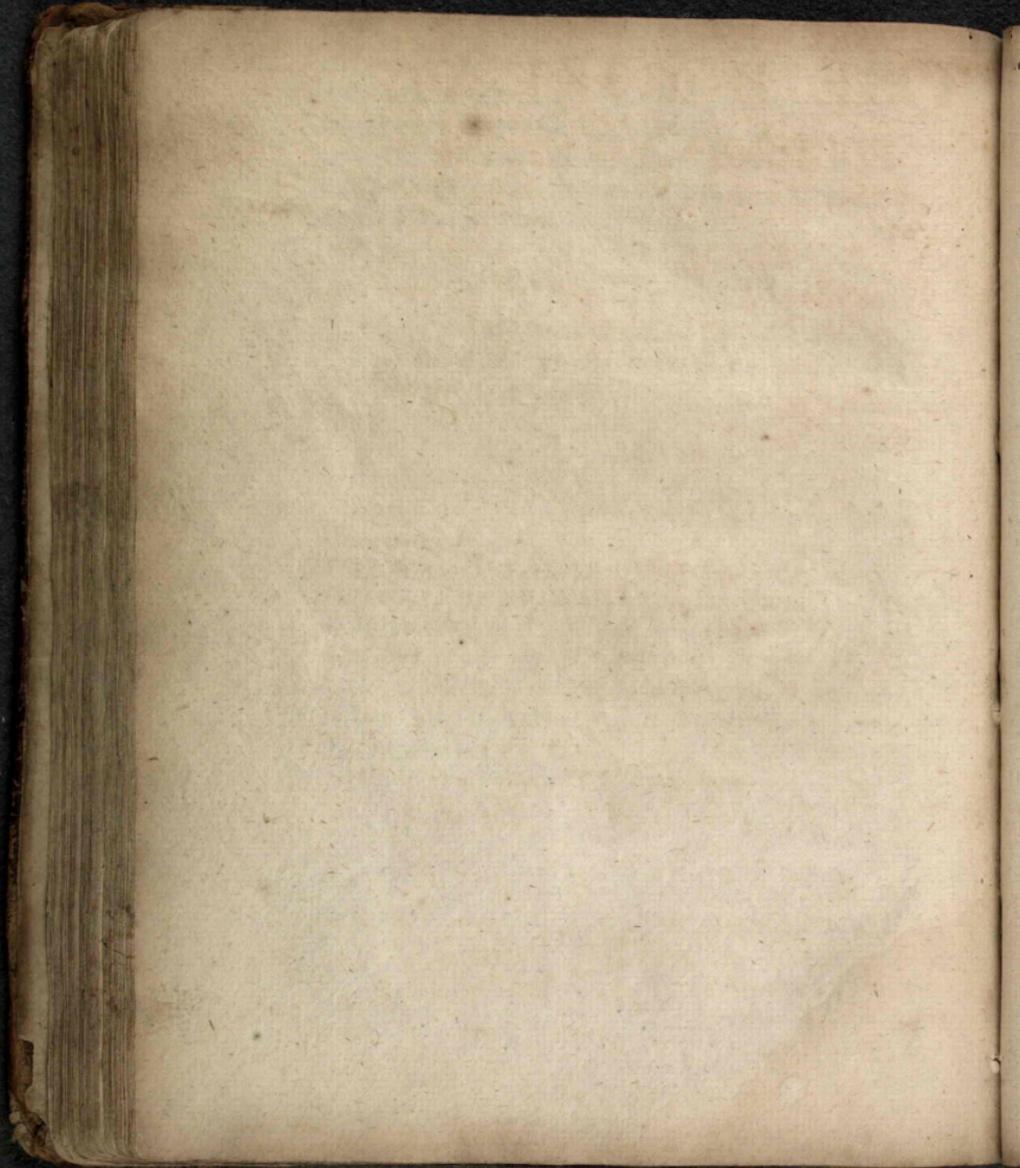
that you meane to grave, then put the water on it, and let it so remaine halfe a day, if you will have it very deepe, let it lye longer. If you will engrave Images, &c. lay the waxe on the Iron or Steele, thin, and draw what you will thereon, that it may touch the mettall, then put the water into the strokes, and it will be engraven.

How to engrave on a flint stone.

TAke a Flint, and write on it what you will, with the fat or tallow of an Oxe, afterward lay the flint in vineger, foure dayes.

FINIS.





THE BOOKE OF EXTRAVAGANTS:

Wherein amongst others, is principally contrived divers excellent and approved Medicines for severall maladies.

By I. B.



LONDON.

Printed by *Thomas Harper*, for *Ralph Mab*: 1634.

THE BOOKE OF
EXTRA-VAGANTS:

Wherin amongst others, is principal-
ly contained their excellent and apper-
tent Miracles for several hundred

By A. B.



LONDON,
Printed by Thomas Stimpert for Hugh Collins, 1634.



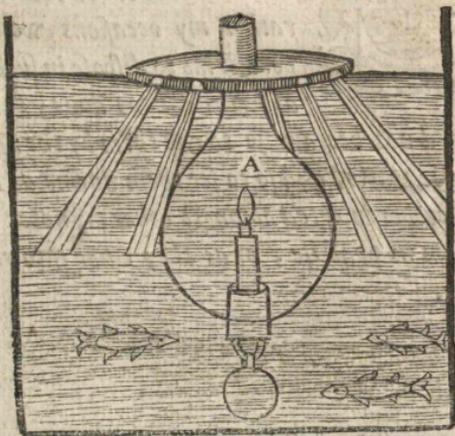
To the Reader.



Courteous Reader, forasmuch as there were divers experiments that I could not conveniently, or rather my occasions would not permit me to dispose in such order as I would have done; I thought it would not bee amisse to call them by the names of Extravagants, and so to set them downe as I found them, eyther inserted amongst other my notes, as I put them in practise, or as they came into remembrance.

How to make a light burne under the water, being a very pretty conceipt to take fish.

Let there be a glasse, as A, having a hole at the bottome, to put a candle in with a screwed socket. The socket must have a loope at the bottome, whereunto you must hang a weight of such heaviness, that it may draw the body of the glasse under water. The necke of this glasse must bee open, and stand above the water; also a.



about the necke must bee fastened a good broad peece of wood; round about which (but on that side of it that is next unto the water) must be placed divers peeces of looking-glasses; so the light of the candle in the glasse body will

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will bee multiplied according unto the number of them.
All the fishes neere unto it will resort about it, as amazed
at so glorious a sight, and so you may take them with a
cast net or other.

*How to make an image hang in the
middle of a glasse.*

MAKE the lower part of the image of hard wax, and
the upper part of wood, and overlay it with oyle
colours; then put it into a globe glasse filled with fayre
water, and which way soever you turne the glasse, the i-
mage will still hang in the middle, and stand as it were up-
right; which, to my knowledge, hath been a thing cau-
sing no small admiration among divers that have not un-
derstood the cause of it.

*How to make five or six dice of the ordinary big-
nesse of dice, such as you may game withall, and
such as would be taken by their lookes to bee
ordinary dice, and yet all of them to
weigh not above one grain.*

TAKE a peece of Elder, and pith it, lay the pith to dry,
and then make thereof with a sharp knife five or six
dice, and you shall finde it true that I haue sayd.

To lay gold on any thing.

TAKE red Lead ground first very fine, temper it with
linseed oyle: write with it, and lay leafe gold on it, let
it dry, and pollish it.

To lay gold on glasse.

GRinde Chalk, and red Lead, of each a like quantity, together, temper them with linseed oyle, lay it on; when it is almost dry, lay your leafe gold on it, when it is quite dry polish it.

To make yron as soft as lead.

TAke black flints, powder them very finely; then put the powder in an iron pan, and make it red-hot, then cast it on a marble stone, till it be almost cold, then make it red-hot againe, and let it coole, and grinde it so long till it cleave to the stone, and grinde as it were clay; then put that in a glasse, and set it under the eaves of a house, where the Sunne commeth not nigh in the day, then the night after take out the water that you shall finde in the glasse above the powder, then take that powder and grinde it with the water, and put it in a stillatory, and let it still out the halfe; after ward poure the water againe on the sayd powder, and still it againe with a soft fire; then take and see the that water till the halfe bee wasted, then take some iron blade that is new broke, and put it together, and hold it so a little while; then take of the water which was sod to the half, and with a feather lay it first to the one side of the blade, and when the water is cold, lay it on the other side, and it will soder fast with this water; and with this water you may make steele as soft as lead. It is likewise a soveraigne water to help the gout, being anoynted where the gricfe is, for it giveth ease very speedily.

To colour tin, or copper, &c. of a
golden colour.

TAke linseed oyle, set it on the fire, scum it cleane, then put therein of amber, and aloë hepaticum, a like quantity, then beat and stir all well together with the oyle till it wax thick; then take it off, and cover it close, and set it in the earth three dayes: when you would use it, strike your metall all over therewith, and so let it dry, and it will be of a golden colour.

To gild iron with a water.

TAke running water 3 pound, rochallum 3 pound, and Roman vitreoll one ounce, of vardigrease one penny waight, saltgem three ounces, orpment one ounce, boyle all these together, and when it begins to boyle, put in lees of tartar and bay salt, of each halfe an ounce; make it seethe, and being sod a pretty while, take it from the fire, and strike the iron over therewith, then let it dry against the fire, and then burnish it.

To soder on iron.

SEt your joynt of iron as close as you can, then lay them so in a glowing fire; then take of Venice glasse in fine powder, and the iron being red-hot, cast the powder thereon, and it shall soder of it selfe. If you clap it in clay, it will be the surer way.

To gild on iron or Steele.

TAKE one ounce of argall, three drammes of vermilion, and two drams of bol armeniack, with as much aqua vitæ, then work and grindethem all together on a stone, with linseed oyle; having so done, put thereto lapis calaminaris as big as a hazell nut, and grindethere-with in the end three or foure drops of varnish; take it off the stone, and strain it through a linnen cloth into a stone pot, (for it must bee as thick as hony) then strike over your iron therewith, and let it dry, and then lay your gold or silver on, as you would do upon the varnish.

*A varnish like gold, for tin, silver,
or copper.*

TAKE small pots well leaded, then put therein six ounces of linseed oyle, one ounce of mastick, one ounce of aloes opaticum; make them altogether in fine powder, and then put it into your sayd pot, and cover it with such another; yet in the bottom of the uppermost pot make a small hole, wherein put a small stick with a broadend beneath to stir the other pot withall, and when the pots are set just together, close them all about with good clay, and couer them all over also, leaving the hole open above to stir the other pot with the stick: set it over the fire, and stir it as often as it seetheth, and when you will gild, pollish your metall over first, and then strike this over the metall, and let it dry in the Sunne:

To lay Gold on Iron, or other mettall.

TAke liquid Varnish. i. Turpentine, & oyle of Lynseed, of each an ounce: mixe them all together: with this ground you may gild on any mettall, first striking it upon the mettall, and afterward lay on the gold or silver. When it is dry, polish it.

To make Ice that will melt in fire, but not dissolve in Water.

TAke strong water made with saltpeter, allum, and oyle of tartar, of each, one pound. Infuse them together, then put into them a little *aqua ardens*, and it will presently coagulate them, and turne them into ice.

A cement as hard as stone.

TAke powder of Loadstone, and of flints, a like quantity of either, and with whites of egges, and gumme dragant, make paste, and in a few dayes it will grow as hard as a stone.

To make Paper waved like unto marble.

TAke divers oyled colours, put them severally in drops upon water, and stirre the water lightly, and then wet the paper (being of some thicknesse) with it, and it will be waved like a marble: dry them in the Sun.

To make Copper or Brasse have the colour of silver.

TAke *Sal Armoniacke*, allum, and salt, of each a like quantity, and with a little filings of silver, let all be mixt together, then put them into the fire, that they may be hot, and when they shall cease to smoke, then with the same powder moistned with spittle, rub your Copper or Brasse.

How to make glew to hold things together as fast
as stone.

TAke of the powder of tile sheard, two pound, unflake lyme, foure pound, oyle of Lynseed, a sufficient quantity to temper the whole mixture; this is marvellous strong.

To make a thinne glaw.

TAke *gluten piscis*, beate the same strongly on an An-vill, till it be thin; after lay it to soke in water, untill it be come very soft and tender: then worke it like paste, to make small rowles thereof, which draw out very thinne, and when you will worke with it, put some of it into an earthen pot, with a litle water, over the embers, and skim the same very cleane, and let it seeth a litle while, then worke with the same: keeping it still over the fire. With this glaw you may fasten peeces of glasse together.

To make Iron have the colour of Brasse.

First, polish it well, rub it after with *aqua fortis*, wherein the filings of brasse are dissolved: the like may be done with Roman vitrioll dissolved in vineger and faire water, of each a like quantity.

To make wood or bone red for ever.

Take the powder of Brazill, mingle it well with milke, but so, that it be very red, and put therein, either wood or bone, letting it lye in eight dayes, and it will looke red for ever.

How with one Candle to make as great a light, as otherwise of two or three of the same bignesse.

CAuse a round and double glasse to be made, of a large size, and in fashion like a globe, but with a great round hole in the top, and in the concave part of the uppermost glasse, place a candle in a loose socket, and at the same hole or pipe which must be made at the side thereof, fill the same with spirit of wine, or some other cleere distilled water that will not putrefie, and this one candle will give a great and wonderfull light, somewhat resembling the sunne beames.

A Cement for broken Glasses.

BEate the whitest Fish glew with a hammer, till it begin to waxe cleere, then cut the same into very small pieces, suffering the same to dissolve on a gentle fire, in a lea-

ded pan, with a few drops of *aqua vite*, then let some other that standeth by, hold both the pieces that are to be cemented, over a chafingdish of coles, till they be warme: and during their heat, lay on the dissolved glew with a fine penfill: then binde the glasse with wyre or threed, and let it rest till it be cold.

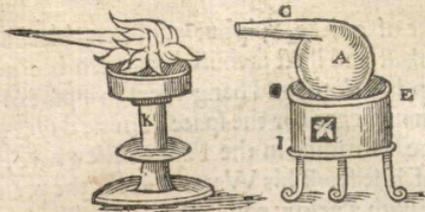
An admirable secret of representing the very forme of Plants, by their ashes, philosophically prepared, spoken of by Quertitanus and Angelus salæ.

TAKE saith hee, the salt both the fixed and the volatill also. Take the very spirit, and the phlegme of any herbe, but let them all be rightly prepared; dissolve them, and coagulate them, upon which if you put the water stilled from May dew, or else the proper water of the herbe you would have appear, close them all very well in a glasse for the purpose, and by the heat of embers, or the naturall heat of ones body, at the bottome of the glasse, the very forme and Idæa thereof will be represented: which will suddenly vanish away, the heat being withdrawne from the bottome of the glasse. As I will not argue the impossibility of this experiment, so I would be loth to employ mine endeavours, untill I were expert therein.

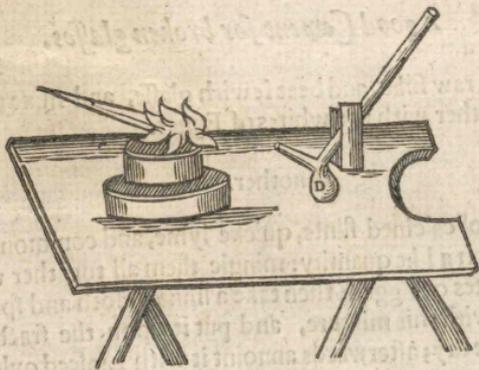
A device to bend glasse Canes, or make any small worke in Glasse.

LET there be a vessell of Copper about the bignesse of a common Foot-ball, as, A, let it have a long Pipe at the top as G. which must be made so that you may upon occasion screw on lesser, or bigger vents made for the

the purpose. Fill this one third part with water, and set it over a fornace of coals, as F, G, H, I, and when the water beginneth to heat, there will come a strong breath out of



the nose of the vessell, that will force the flame of a lampe placed at a convenient distance as K: if you hold your glasse in the extension of the flame it will melt suddenly; so you may worke what you will thereof. There are that instead of this globe make use of a Pipe, as A, fastned in a



stick e as, F, of which I have made use, but hold it not so convenient for those that are not accustomed thereunto.

*An excellent Water for any Morpue, or scur-
viness in the Face.*

TAke of quicke Sulphur 2. ounces, blacke Sope, the
rankest and illest favoured that can bee got: binde
them up in a cloth, and hang them in a pint of the stron-
gest wine-vineger for the space of nine dayes; herewith
wash the Morpue in the Face or elsewhere, and let it
dry in of it selfe: This Water will for the present staine
the face with a yelow colour, which will weare away in
time.

How to sefiex Iron.

TAke of Allum, sal Armoniacke, Tartar, a like quan-
tity of either, put them into good vineger, and set
them on the fire: heat your Iron, and quench it therein.

A good Cement for broken glasses.

TAke raw silke, and beat it with glasse, and mixe them
together with the whites of Egges.

Another.

TAke of calcined flints, quicke lyme, and common salt,
of each a like quantity: mingle them all together with
the whites of Egges; then take a linnen cloth and spread
it over with this mixture, and put it upon the fracture,
and let it dry; afterwards annoint it with Linseed oyle.

How

How to cause that the same quantitie both of powder and shot discharged out of the same peece shall carry closer, or more scattering.

TAKE the quantitie of a pease of Opium, and charge it amongst the shot, and this will make the shot to flie closer together then otherwise it would. This I had of a Sea-man, who had made triall hereof, as he said, and unto whom I sold some for the same purpose.

A Baite to catch Fish with:

TAKE *Cocculus India* $\frac{3}{4}$ ss, Henbane-seeds, and wheaten flower, of each a quarter of an ounce, hive honey as much as will make them into paste. Where you see most store of Fish in the River, cast of this paste into it in divers little bits about the bignesse of barley cornes, and anon you shall see the fish swimme on the top of the water, some reeling to and fro as drunken, others with their bellies upwards as if they were nigh dead; so that you may take them either with your hands, or a small net at the end of a sticke made for the same use. Note here, that if you put the Fish that you thus take, into a bucket of faire and fresh water, or if it raine after that you have cast this your bait into the water, they will revive and come to themselves to your admiration; and this was told me by a Gentleman of good credit, that hath often made use thereof.

I have heard that the stinking oyle drawne out of the roots of Polipody of the oake by a retort, mixed with Turpentine, and hive-honey, and being anointed upon

the bait will draw the fish mightily thereto, and make them bite the faster: and I my selfe have seene fishes, as Roches, and taken in the dead time of Winter with an angle, bayted onely with paste made of Wheaten flowre, but it hath bene in the morning, and when the Sunne hath shined.

How to write without inke that it may not be seene, unlesse the paper be wet with water.

TAKE some Vitriol, and powder it finely, and temper it with faire water in any thing that is cleane, when it is dissolved, you may write whatsoever you will with it, and it cannot be read, except you draw it through water wherein some powder of galls hath bene infused, and so it will shew as blacke as if it had bene written with inke.

How to make white letters in a blacke Feild.

TAKE the yelke of a new layd egge, and grinde it upon a marble with faire water, so as you may write with it: having ground it on this wise, then with a penne dipt into it, draw what letters you will upon paper, or parchment, and when they are through drie, blacke all the paper over with inke; and when it is drie, you may with a knife scrape all the letters of that you wrote with the yelke of the egge, and they will shew faire and white.

How to sodder upon Silver, Brasse, or Iron.

THERE are two kindes of Sodder, to wit, hard Sodder, and soft Sodder. The soft Sodder runneth sooner then
the

the hard : wherefore if a thing be to be soldered in two places, which cannot at one time well be performed, then the first must be soldered with hard solder, and the second with soft: for if the first be done with soft, it will unsolder againe before the other be soldered. Note, that if you would not have your solder to runne over any one part of the peece to be soldered, you must rub over that part with chalke that you would not have it runne upon.

Note likewise that your solder must be beaten thinne, and then laid over the place to be soldered, which must be first fitted together, and bound with wyer as occasion shall require. Then take Burras, powder it, and temper it with water like pap, and lay it upon the solder, and let it drie upon it by the fire : Afterwards cover it with quicke coals, and blow them up, and you shall see your solder run immediately : then presently take it out of the fire, and it is done.

Hard Soder is thus made.

TAke a quarter of an ounce of silver, and a three penie weight of copper, melt them together, and it is done.

Soft Soder is thus made.

TAke a quarter of an ounce of silver, and a three penie weight of brasse, melt them together, and it is done.

How to gild Silver, or Brasse, with water-gold.

First take about $\frac{3}{4}$. ii. of quicke silver, put it into a little melting pot, and set it over the fire, and when it begin-

neth to smoke, put into it an angel of fine gold: then take it off presently for the gold will presently be dissolved in the quicke silver, which if it be too thinne, you may through a peece of tustian straine a part of the quicke-silver from it. Note likewise that your silver, or brasse, before you go about to gild it, must be boyled in argol, and beare, or water, and afterwards scratcht with a wyer brush: then rub the gold, and quicke-silver upon it, and it will cleave unto it, then put your silver or brasse upon quicke coales untill it begin to smoke: then take it from the fire, and scratch it with your wyer-brush: Do this so often till you have rubd the quicke-silver as cleane off as you can, then shall you perceiv the gold to appeare of a faint yellow colour, which you may make to shew faire with sal armoniacke, bole armoniacke, and vardigrece ground together, and tempered with water.

How to take the smoake of Tobacco through a glasse of water.

First fill a pinte glasse with a wide mouth, almost full of faire water: fill also a pipe of Tobacco, and put the pipe upright into the glasse of water, so that the end of the pipe may almost touch the bottome of the glasse: then take another crooked pipe, and put it into the glasse, but let the end thereof not touch the water: waxe then the mouth of the glasse, that no ayre may come in nor out, but at the pipes: then put fire unto the Tobacco, and sucke with your mouth, at the end of the crooked pipe, and you shall see the smoake of the Tobacco penetrate the water, and breake out of a bubble, and so come into your mouth.

To colour Ivory or any other bones, of an excellent greene colour.

TAke *aqua fortis*, wherein dissolue as much Copper, as the said water is able, then let the bones that you would have coloured, lye in the same all night, and they will be like a Smaragdin colour: *Mizaldus*.

How to make birds drunke, so that you may take them with your hands.

TAke such meate as they loue, as Wheate, Barley, and lay the same to steepe in the lecs of Wine, or else in the juyce of Hemlocks, and sprinkle the same in places where Birds use to haunt.

A way to catch Crowes.

TAke the Liuer of a Beast, and cut it in diuers pieces, put then into each piece, some of the powder of *nux vomica*, and lay these pieces of Liuer in places where Crowes and Rauens haunt. Anon after they haue eaten them, you may take them with your hands, for they cannot flye away.

How to take Crowes or Pigeons.

TAke white Pease, and steepe them eight or nine daies in the Gall of an Oxe: then cast the same where they use to haunt.

You may make Partridges, Duckes, and other birds drunke, so that you may take them with your hand: if

you set blacke wine for them to drinke in those places whereunto they resort.

Another.

TAke Tormentill, and boile it in good wine: put into it Barley or other graine: Sprinkle this in those places you haue appointed to take Birds in, and the Birds will eate the pieces amongst the graine, which will make them so drunke, that they cannot flye away. This should be done in the winter, and when it is a deepe snow,

Another way to take Birds.

Make a paste of barley meale, onion blades, and Henbane seeds: set the same upon seuerall little boards, or pieces of tiles, or such like, for the birds to eate of it.

How to make Brasse white for ever.

TAke Egge shels, and burne them in a melting pot: then powder them, and temper them with the whites of Egges; let it stand so three weekes: heate your brasse red hot, and put this upon it.

How to make Marble.

TAke 3 vj. of quicke Lime, put it into a pot, and poure upon it, one pinte of good wine: let it stand siue or fixe dayes, stirring it once or twice a day: then poure off the cleare, and therewith temper flint stones calcined, and made into fine powder, then colour it, and make of it what you please, and let them dry.

How

How to whiten copper.

TAke a thin plate of copper, heat it red-hot divers times, and extinguish it in common oyl of tartar, and it will be white.

To make Saltpeter.

TAke quick lyme, and poure warm water upon it, and let it stand six dayes, stirring it once or twice a day: take the cleare of this, and set it in the Sunne untill it bee wasted, and the Saltpeter will remaine in the bottom.

How to make Corall.

TAke of red Lead ground, \bar{z} i. vermilion finely ground, \bar{z} \bar{z} ss. unquenched lyme, and powder of calcined flints, of each \bar{z} vj. these powders must bee tempered with a *Lixivium* that is made with quick lyme and wine: adde unto the whole a litle salt; then make thereof what you list; then boyle them in linseed oyle.

How to make Pearles of Chalk.

TAke some Chalk, and put it into the fire; there let it lie untill it break: temper it then with the whites of eggs. Then make of it divers fashions of Pearles, both

great and small : wet them being dried, and cover them with leafe gold, and they are done.

*An approved and excellent plaster for ach in the
raines of the back, or in any other part
whatsoever.*

TAke one pound of black Sope, and foure ounces of frankincense, and a pinte of white wine vineger : boyle all together upon a gentle fire, untill it be thick ; spread it then upon a lether, and apply it unto the grieved place. If the ach bee very great and fervent, then adde unto it a little *aqua vite*, and it will be much better.

*An excellent oyntment for the Sbingles, Morpew,
Tetter, and Ringwormes.*

TAke a quarter of a pound of sope, and mingle with it two drams of the powder of black Ellebor, litharge of silver in fine powder, two ounces, vardigrease halfe an ounce, and a quarter of an ounce of glasse in powder, and as much quicksilver, make them all into an oyntment by stirring them well together ; wherewith anyont the grieved parts. This is approved and true.

*An excellent Balme, or water for grievous sore eyes,
which commeth either of outward accident, or
of any inward cause.*

TAke two spoonfulls of the juyce of Fennell, and one spoonfull and a halfe of the juyce of Celandine, and twice as much hony as them both; then boyle them a little upon a chafingdish of coales, and scum away the dregs which will ascend, but first let it coole somewhat, and then let it run through a fayre cleane cloth: then put it into a violl of glasse, and stop it close. Put a little quantity of this into the eye. This medicine is approved, and more precious than gold.

*A speedy way to assuage the paine of any scald, or
burne, though never so great, and to take
the fire out of it.*

TAke old lawn rags, dip them into Runnet, for want of it dip them into verges, and apply them cold upon the grieved place, shifting them for halfe an houre together, as oft as they dry: this I have known to give ease in an instant, and quickly to take out the fire.

*An approved oyle for to beale any burne
or scald.*

TAke of housleek one handfull, and of brooklime as much, boyle them in a quart of creame untill it turne
unto

unto an oyle; boyle it very gently: with this oyle a little warmed, anoint the grieved place twice a day, and it will soone make it well.

*An oyntment, very excellent and often proved,
for the same.*

TAke a good quantity of mosse scraped from off a stone wall, fry it in a fryingpan with a call of mutton suet a good while, then straine it, and it is done. Dresse the grieved part therewith once or twice a day, as you shall see fitting.

Another oyntment for a burne.

TAke one part of fallet-oyle, and two parts of the whites of eggs, beat them together exceeding well, untill they come to be a white oyntment, wherein dip the feather of a black hen, and anoynt the grieved place divers times every day, untill such time as the scales fall off, using in the meane while neither clothes nor any outward binding. This, sayth *Minsbet* the authour, though it seeme to be a thing of no estimation, yet was there never found any more effectfull for a burn than it is.

An excellent oyntment for a green wound.

TAke foure handfuls of Clowes, Allheale, bruse it, and put it into a pan, and put to it foure ounces of barrowes greafe, fallet-oyle halfe a pound, Bees wax a quarter of a pound,

pound; boyle them all untill the iuyce be wasted; then straine it, and set it over the fire againe, and put unto it two ounces of Turpentine, then boyle it a little while more, and it is done. Put hereof a little in a saucer, and set it on the fire, dip a tent in it, and lay it on the wound, but first lay another plaister round about the wound, made of diapalma mollified a little with oyle of Roses: This cureth very speedily all greene wounds, as saith M. Gerard.

A Balsam of wonderfull efficacy.

TAKE Burgundie pitch, brimstone, and white frankincense, of each one ounce: make them into an oyntment with the whites of egges: first draw the lips of the wound, or cut, as close as you can, then lay on some of this spread upon a cloth, and swathe it ouer after wards.

An excellent healing Water, which will drie up any old sore, or heale any greene wound.

TAKE a quarter of a pound of Bolearmoniacke, powder it by it selfe, then take an ounce of Camphire, powder it also by it selfe: also take foure ounces of white Coppras in powder: mixe the Coppras and Camphire together, and put them into a melting pot, and set them on the fire, untill they turne unto water: afterwards stirre it untill it come to be as hard as a stone: then powder it againe, and mixe it with the Bolearmoniacke: keepe this powder close in a bladder, when you would use it, take one pinte and a halfe of faire water, set it on the fire, and when it is even ready to boyle,

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put

put into it three spoonfuls of the powder; then take it off from the fire, and put it into a glasse, and let it stand untill it be cleare at the top, then take of the clearest, and wash the sore very warme there with, and dip a cloth foure double in the same water, and binde it fast about the sore with a rowler, and keepe it warme: dresse it thus twice a day.

A Water for a Fistula.

TAke one pint of white wine, 1 ounce of juyce of Sage, three penie weight of Borace in powder, Camphire in powder the weight of foure pence: boyle them all a prettic while on a gentle fire, and it is done: Wash the Fistula with this water, for it is certainly good, and approved to be true.

A Water for the Toobache.

TAke ground ivie, salt, and spearemint, of each an handfull: beat them very well together, then boile them in a pint of vineger; straine it, and put a spoonfull of it into that side that aketh, and hold downe your checke.

Another Water approved for the same.

TAke red rose leaves halfe a handfull, Pomegranate-flowers as many, two gaules sliced thinne: boyle them all in three quarters of a pint of red wine, and halfe a pint of faire water untill the third part be wasted: then straine it, and hold a little of it in your mouth a good while;

while: then spit it out, and take more. Also if there be any swelling on your cheek, apply the strainings betweene two clothes as hot as may be suffered. This I have knowne to do good unto divers in this Citie, when as they have beene extreamely pained.

To make a Water for the eyes.

TAKE *Lapis Calaminaris*, and burne it in the fire nine times, and quench it in white wine, and beat it into powder, and when you use it, put it into rose-water, and drop the water into the eye.

For Deafenesse.

TAKE a good quantitie of Camomill, and two handfuls of greene Wormewood, and seethe them in a pot of running water till they be very well sodden, and put a funnell over it, and let the steame go up into the care, and then go to bed warme, and stop your care with a little blacke wooll, and a grain of Civet: do this morning and evening, and with Gods assistance you shall finde ease.

*An excellent Electuary for the Cough, Cold,
or against Flegme.*

TAKE of Germander, Hissope, Horehound, white Maidenhaire, Agrimony, Bettony, Liverwort, Lungwort, and Harts-tongue, of each one handful: put these to nine pints of water, and let them boyle to three pints; then let it coole and straine it. To this

juyce put of clarified honey halfe a pound, fine powder of Liquorice five ounces, fine powder of Enulacampana root three ounces, boyle them to the thicknesse of an E-lectuary. Take of this at any time, but specially in the morning fasting, as also at night when you go to bed, or two houres after supper, the quantitie of a Walnut or Nutmeg.

A very excellent salve to heale, well proved, for any old sore, or new wound.

TAke of Waxe, Rosin, Sheeps suet, Turpentine, of each a like quantitie, Sallet oyle also as much: mixe them all together, and take the juyce of Smallach, of Planten, of Orpin, of Buglosse, of Comfery, of each a like quantitie: let them boyle untill the iayce of the hearbes be consumed; and in the seething put a quantitie of Rose-water, and it will be a very good Salue.

*A soveraigne Water to heale a greene wound:
and to stanch bloud.*

TAke a pottle of running water, and put thereto foure ounces of Allum, and one ounce of Copras, and let them see the to a quarr, and then straine it, and keepe it in a glasse, and wash the wound, and wet a cloth, and lay to the sore, and with Gods helpe it will soone be healed.

For the Byting of a mad Dogge.

TAke brine, and bathe the wound : then burne Claret wine, and put in a little Mithridate, and so let the patient drinke it; Then take two live pigeons, cut them through the middle, and lay them hot to his hand if he be bitten in the armes. If in his legges, to the sole of his feet.

An Oyle for any Ach.

TAke a pound of unwashed butter, and a handfull of red mints, and a handfull of camomill, a handfull of rew, two ounces of oyle of Exeter : stamp the herbs to a juyce, and boyle them with the butter; straine them in a cloth, and rub them out very well: this so done, take the oyle of Exeter, and put to them, and stir them well together, and put them into a gally pot, and where the ach is anoint the place against the fire, and lay a browne paper on it, and wrap a cloth about the place, and keepe it warme : proved to be excellent.

To stanch the bleeding of a cut.

TAke a peece of a felt hat, and burne it to a coale; beat it to powder, and put it in the cut, and it will stanch the bleeding presently. Or else apply linnen rags that in the spring of the yeere have beene often washed in the sperm of frogs, and after ward dried in the Sunne.

For an ague, to bee layd to the wrists.

TAke a handfull of foot, a spoonfull of bay salt, halfe a spoonfull of pepper; bruse them together, and temper them with two yelks of eggs; spread it on a cloth, and lay it to the wrists.

Almond milke for the cough of the lungs.

TAke foure spoonfulls of French barley well washed, and boyle it in three wine pints of faire water, unto a pint and a halfe; then take it from the fire, and let it coole, and setle; then take the cleere liquor, and straine therewith a quarter of a pound of sweet almonds blanchd, and beaten; then set it on the fire, and let it boyle a while till it begin to grow thick; then beat two yelks of eggs, and put them to it; stirre them well together, and put to it as much fine suger as will sweeten it, and a spoonfull of damask rose water, and so let it boyle a while longer, till it be as thick as good cream; eat of it warm twice or thrice a day, but at breakfast especially.

For a scald head.

TAke a pinte of running water, and as much Mercury as a good walnut, three or foure branches of Rosemary; boyle these all together till a third part be boyled away,

way, or thereabout, and every morning and evening wash the infected place with some of this water cold, and a quarter of an houre after or lesse anoint the place with lamp oyle, and every morning after the first dressing try to pull up some of the hayre as easily as you can: have care where you set this water, for it is poyson: If you shave the head, and apply a plaster called *Emplastrum Cephalicum cum Euphorbio*, it is also excellent:

*For to heale a red face that hath many
pimples. Proved.*

TAKE foure ounces of barrowes grease. and as much oyle of bayes, halfe an ounce of quicksilver killed with fasting spettle, then take two spoonfuls of wilde tanfic water, or honisuckle water, and let all be ground in a mortar three houres at the least, untill you see nothing of the quicksilver, and so keep it close in a glasse, the older, the better; and when you go to bed anoint the face, and look that you keep it from your eyes.

To wash the Face, if it be given to heat.

TAKE Snailles, beat them shels and bodies together: steep them a night in new milke: then still them with the flowers of white Lillies:

To make Vsquebach.

TAke a gallon of the smallest *Aqua vite* you can make, put it into a close vessell of stone; put there to a quart of Canary Sacke, two pounds of Raisons of the Sunne stoned, but not washed, two ounces of Dates stoned, and the white skinned of them pulled out, two ounces of Cinamon grossely bruised, foure good Nutmegs bruised, foure good Liquorish sticks sliced, and bruised, tye up all your Spices in a fine linnen cloth, and put them into your *Aqua vite*, and tye up your pot very close, and let this infuse a weeke, stirring it three times a day, then let it runne through a jelly bagge close covered; keepe it in giasse bottles.

To make Almond Butter.

TAke two pound of Almonds, and blanch them, and let them lye all night in cold water: then grinde them in a mortar very small, and put in a blade of Mace or two; then straine it through a strong cloth as neare as you can, that the milke be not too thin, and let it see the a prettyle while: then put in a little Rose-water, and a little salt when you take it off the fire, and stirre it still: then take a bigge cloth very cleane, and let
two

two hold it; then you must take the milke and cast it round about the sides of the cloth that the whay may come from it; then with a saucer put it downe from the sides: then knit the cloth, and hang it up untill it have left dropping; then take it forth, and scason it with fine Sugar and Rose-water.

To make lelly for one that is in a Consumption, or troubled with a loosenesse.

TAke the feet of a Calfe, and when the haire is cleane scalded off, slit them in the middle, and cut away all the blacke veines, and the fat, and wash them very cleane, and so put them in a bucket of faire water, and let them lye foure and twentie houres, and in that time the oftner you shift them in faire water it will be the better; then set them on the fire in two gallons of water, or somewhat lesse, and let them boyle very softly, continually taking off the scumme and fat which riseth; and when the liquour is more then halfe boyled away, put in: o it a pinte and a halfe of white wine, and as it boyleth there will come a foule scumme upon it, take it off still cleane, and when the Jelly is boyled enough, you may know, for your fingers will sticke to the spoone; then take it from the fire, and with a Culender take out all the bones and flesh, and when the Jelly is almost cold, beat the whites of sixe Egges, and put into it, and set it on the fire againe, and so let it boyle

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till it be cleare: then straine it through a cleane cloth into a Bason, and so let it stand all night long; the next morning put it into a skellet, and put to it a pound of Sugar, halfe an ounce of Cinamon broken in peeces, one ounce of Nutmegs, an ounce of Ginger bruised, and a good quantitie of large Mace; boyle all these together till it taste of the Spices as much as you desire, and when it is almost cold, take the whites of six eggs, and beat them, and put into it, and set it on the fire, and when it riseth wilde it in halfe a pint of white wine; then strain it through a jelly bag.

To stay the flux.

TAke Date stones, and beat them to fine powder, and take the quantity of one of them, and drink it with posset drink, or beere; use these two or three mornings together, and after as often as you finde occasion; this is very good.

In the month of May gather of the reddest Oak leaves you can get, and still them, and when need requireth make pap thereof, mingled with milk or fine flower, suger, and cinamom, as oft as your stomack serveth to eat it.

To

bious, Egrimony, *Rosa solis*, and Balme, of e ch a handfull, or like quantity by weight ; wash and shake them in a cloth ; then shred and put them into a gallon of white wine, with a quarter of an ounce of Gencian roots, and as much of Angelica roots ; let it stand two dayes and two nights close covered, and then distill it at your pleasure, and stop the glasse very close in which you keep the same.

*To avoyd urine that is stopped with
the stone.*

TAke as much black sope as a walnut, temper it with eight or ten leaves of English saffron, spread it upon a round leather as big as the palme of your hand, and cover the navell of your belly therewithall, and it shall cause you to make water.

For the stone and strangury.

TAke the filmes that is within the mawes of geese, and let them bee purely dried, and then make powder thereof, and drink it with stale ale, and it will help him with Gods grace. Proved.

For scald heads.

TAke green Coperas, and mingle it with creame till it be turned yellow, and let it stand three or foure dayes: then take primrose roots, leaves and all, with May butter, and beat the roots and leaves in the butter, and boyle them together with a litle beere and butter, and let it touch no salt.

To cure an old Vlcer.

TAke a quart of the strongest Ale that is to be gotten, or brewed, halfe a pint of raw honey, two ounces of roch allum beaten, halfe a pint of Sallet oyle, and the quantitie of a Tennis ball of common washing Sope, one ounce of stone pitch beaten; one ounce of Rosin beaten, two ounces of yellow waxe: boyle all these together, and straine them through a thin linnen cloth; and this will cure any old Vlcer.

*A Water to cleanse, and mundifie old rotten
sores and ulcers.*

TAke a wine pint of stilled water of Planten, as much white wine; put therein two ounces of Roch allum, a dramme of Verdigrease, a dramme of Mercurie sublimed: boyle all these together, and keepe them in a thicke glasse being stoped with waxe very close that the strength go not out; this will cleanse and mundifie old sores: It will also heale a Fistula if you use a sistring, so that the water may come to the bottome of the sore.

*The Medicine of medicines proved for
the Stone.*

TAke a quantity of eg-shels, wash them cleane; those are the best whereout chickens are come; dry them very dry in an oven, or betweene two tile-stones; then make powder thereof, scarce it, and mingle it with sugar, or powder of licoras to give it taste, and let him use it as often as hee needeth, morning and evening, either with Rhenish wine, white wine, or stale ale, a spoonfull of the powder at a time, and use to make water in a cleane bason, and so you shall see the deliverance hereof.

A precious water for the sight.

TAke Smallage, Fennell, Rew, Vervaine, Egrimony, Daffadill, Pimpernell, and Sage, and still them with breast milk together with five drams of frankincense, and drop of it in your eyes each night : often proved.

For the Fluxe to stay it.

TAke the yolke of an Egge, and beat it, then mixe with it one grated Nutmegge, and lay it on an hot tyle stone to bake, and eat thereof fasting, and before Supper, and after meales, and it will stay it. Often proved to be excellent.

A good Powder for the Gout.

TAke fine Ginger the weight of two groats, and Enula-campane-roots dried, the weight of foure groats, of Liquorish the weight of eight groats, of Sugar-candy three ounces; beat all these into a powder, searce them fine, and then mingle them together, and
drinke

drinke thereof morning and evening, and all times of the day. Approved.

*A speciall Medicine for the
Collicke.*

TAKE Horehound halfe an handfull, of Sage, and Hy-
sop of either as much, twelve leaves of Betony, of
Centaury sixe crops, one Alexander-root, foure penie
weight of Enula-campana-roots powdered, Spikenard
of Spaine one penie worth; seethe all these in three
quarts of fine wort to a pottle, and draw it through a
linnen cloth, and take three spoonfuls at once morning
and evening.

*To take away rednesse of burning of
the Eyes.*

TAKE the white of an Egge, and beat it very well with
a spoonfull or two of red Rose-water, then put there-
to the pap of a rosted apple, mingle them well together,
and spread it upon a little Flaxe; so lay it on the eye,
binding it on with a linnen cloth.

For the Rheume in the Eyes.

TAke the white of an Egge, and so much Bolearmo-
niacke as will thicken it, and spread it on a round
plaister of sheeps leather, and lay it on the temples on
that side the Rheume is.

The Oyntment for the same.

TAke *Lapis Turis* and burne it in a fire-shovell of
quicke coales, quench it in a poringer of womans
milke, do so halfe a score times, then grinde it in a
cleane mortar till it be very fine powder, then mingle it
with fresh Barrows greafe till it looke russet: anoint your
eyes with a little of it when you go to bed.

For Deafenesse.

TAke Rew, and rub it betweene the palmes of your
hands untill it be so brused that you may make there.

of a tent; then dip it in sweet fallet oyle, and put in each care one, so that you may pull them forth againe. This doe for seven or eight dayes, and change the tent every day.

Take a quarter of a pinte of Angelica water, of *Cardus Benedictus* water, and of white wine, of either a like quantity: mingle them together, dividing the same into two equall parts; drink it in two severall mornings: then the next night after the taking of the second draught of water, take the fish of an oyster, and put it into a sayre linnen cloth, and stop the same into the care that is thickest of hearing, and lie on that side as long as you can: in the morning pick that care as cleane as you can, and after that take a draught of the best ale you can get, with a toast of household bread toasted very dry, a reasonable quantity of nutmegs; use the same every morning for five or six dayes, fasting after the taking hereof two houres, every time you take it.

For the cough of the lungs.

TAKE two handfuls of Rosemary, and strip it of the stalk, one of Hissop, and see the them in a pottle of running water, till it come to a quart, and then put a quarter of a pound of fine sugar, and let it see the a little, and scum it, drink it morning and evening.

bake them in the hot embers, or in an oven, till they may be powdered, then take the powder of one of the Snailles, and put it in white wine, and let the patient drinke it in the morning at his rising, and fast two houres after, and drinke these nine Snailles in eightene dayes, that is, every other day one. And if the sicknesse be so old that it will not heale in eightene dayes, begin againe, and drinke other nine Snailles, and he shall be whole. *Probatum est.*

A Salve for all sores.

TAKE a pound of sheepes-tallow, and a pound of Turpentine, and a pound of Virgin-waxe, a pint of Sallet oyle, a quarter of a pound of Rosin: take also Bugle, Smallach, and Plantaine halfe the quantitie of the other, or so much as will make a pint just: boyle all these together upon a soft fire of coales, alwayes stirring it till a third part be consumed; then take it from the fire, and straine it through a new canvas cloth into an earthen pot.

For Bleeding.

TAKE a blacke Toade in May, drie it betweene two tile stones, and hang it in Sarcenet about the parties necke.

To procure sleepe.

TAke Betony, Rose leaves, Vinegar, Nutmeg, and the crummes of Rye bread: put this in a cloth warme to the poll of the head.

For the Cough.

TWO handfuls of last Saverie, steepe it five dayes in white wine vineger, put into the vineger halfe an ounce of Pepper, at the five dayes end draine out the vineger, and as soone as the bread is drawne, set them in a Pewter dish into the oven, and stop it up, and let them stand all night. In the morning take them out of the Oven and powder them. Take of this powder and drinke it with Sacke, so much of it as will lye on a three-pence.

A Gargill for the Vvula.

TAke a pint of good strong Ale, and as much Sacke, and a good quantitie of long pepper, and bruiſe it grossely, and boyle it from a quart to a pinte, and let the parties gargle their mouthes, and throats as warme as they may suffer it.

If the palat of the mouth be downe, it will fetch it up.

For Deafnesse very excellent good.

TAke the hooves of the Neats feet after they be sodden, and hold them in a cloth so warme as may be to your eare, divers times together one after another: they will last to be warmed in the same they were sodden in some three or foure dayes without sowing.

FINIS.

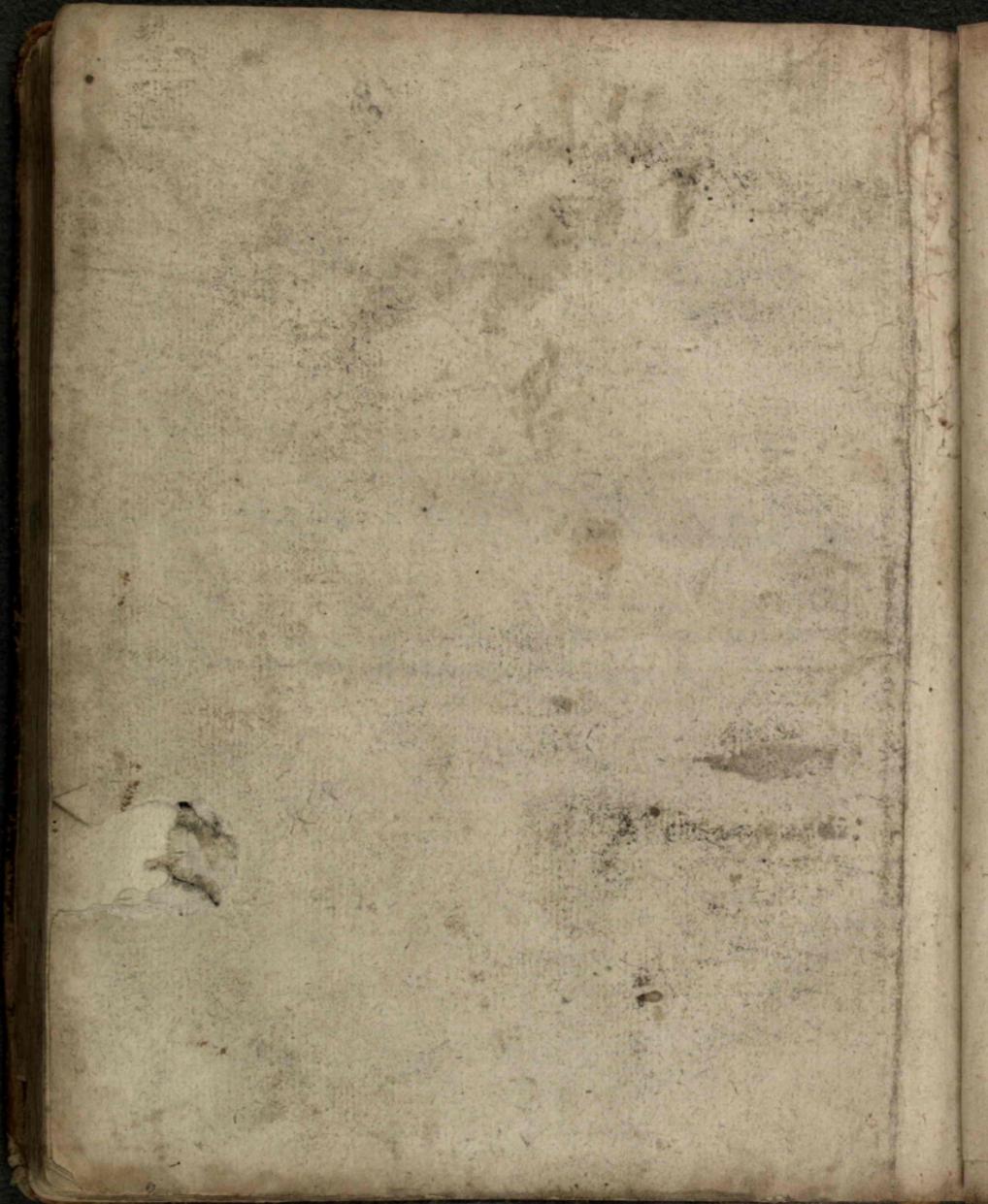
For 1 : Tooth Ach

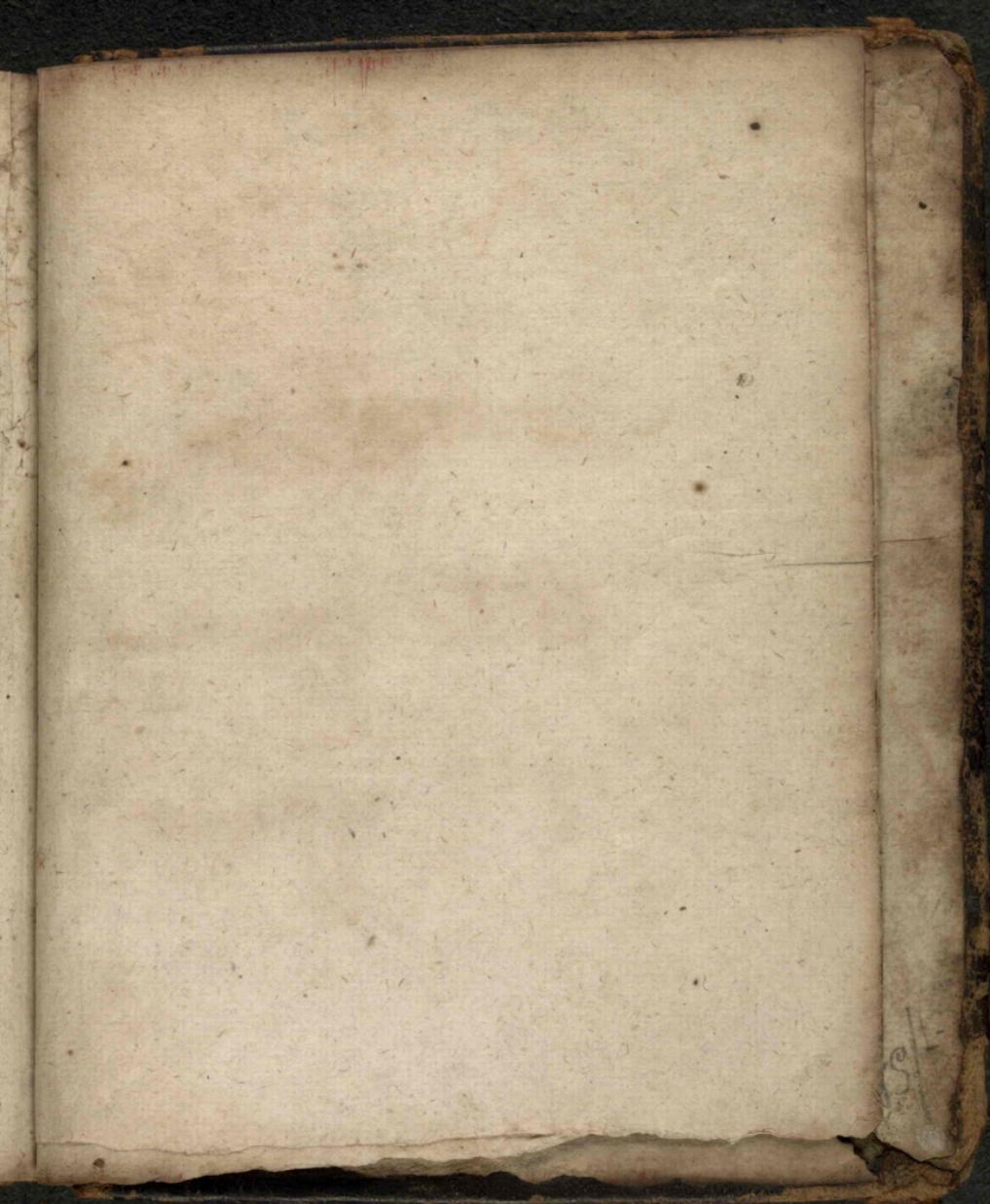
Slaves Acere bruised tied up in a fine
rag, dipd in brandy & held between the
Teeth ——— Probatum —

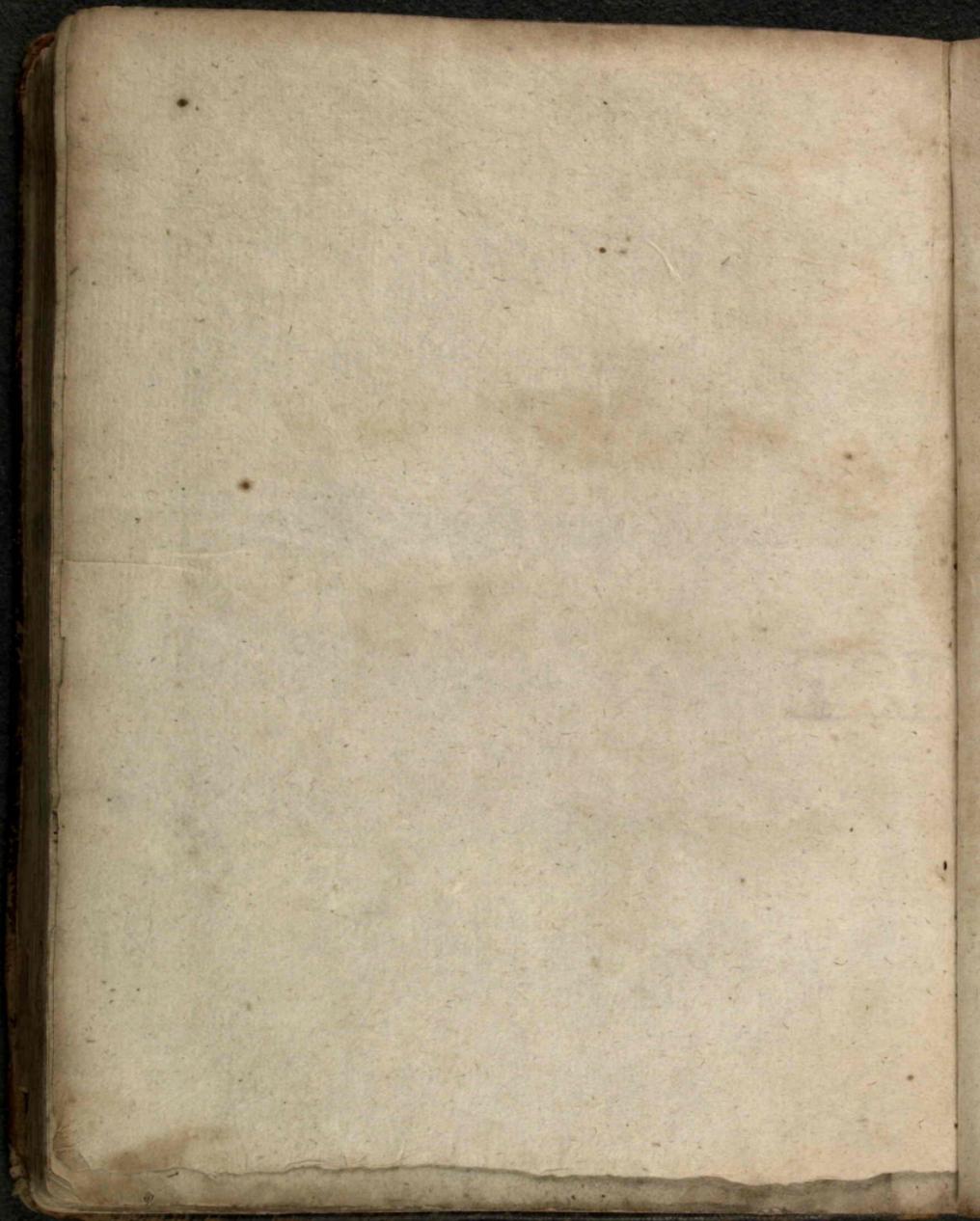
To take away pain occasioned by
a Bruise

Mix a small quantity of Spirit of Lavender
in a quarter of a pint of Hungary water
& bathe the bruised part 3 or 4 times a day —

for an Immediat Bruise rub the part presently
with Cold water Vinegar & salt mixt togth at her







MS 20 Apr 49

Bate, John

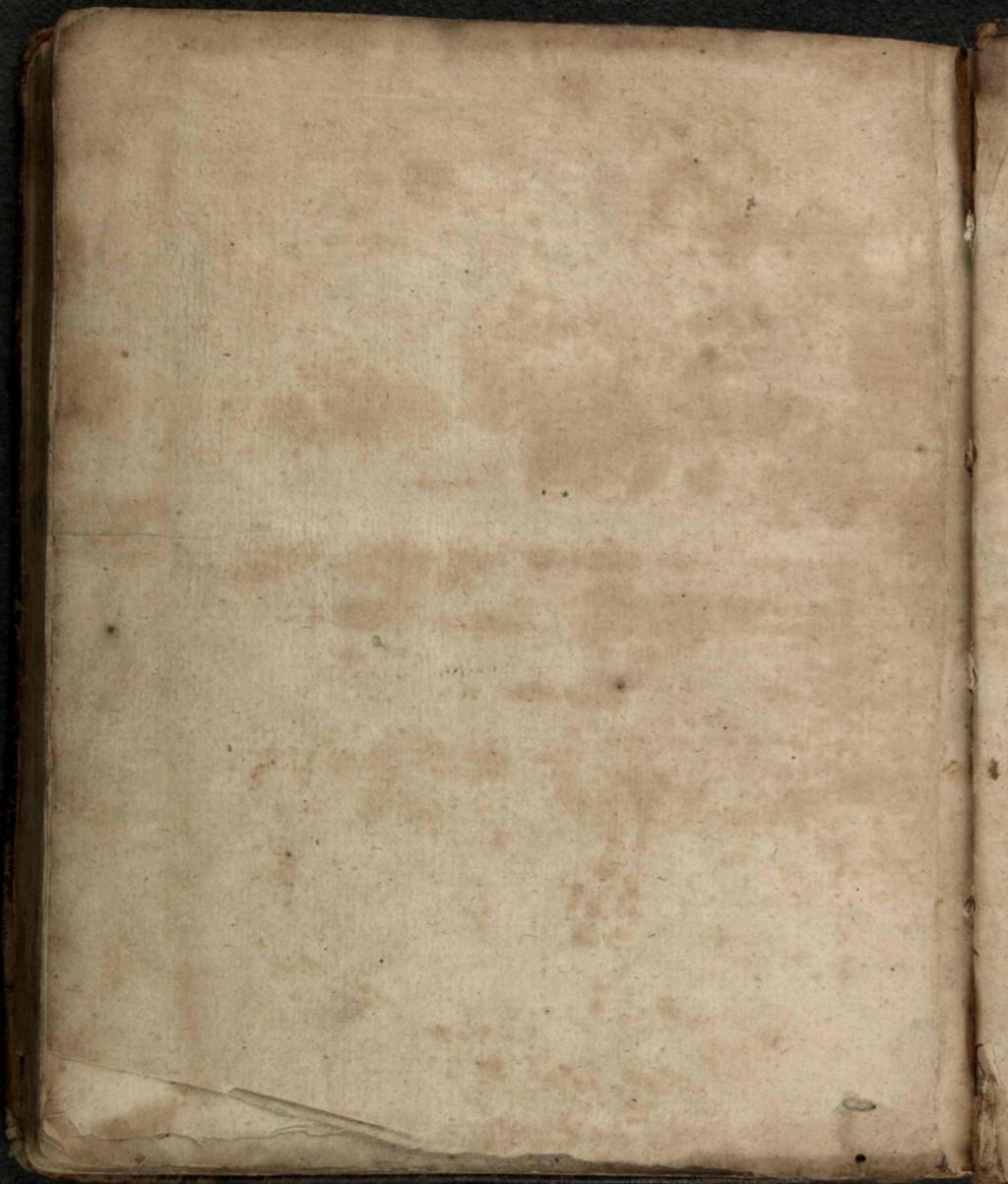
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From Catalogue of Henry Cottons Sale, March 1910

[PLATE] [John.] The MYSTERIES OF NATURE and ART: contained in four several Treatises, the first of WATER WORKES, the second of FVER WORKES, and the third of DRAWING, COLOURING, PAINTING, and ENGRAVING, the fourth of DIVERS EXPERIMENTS, as wel serviceable as delightful; partly collected, and partly of the Authours Peculiar Practice, and Invention, first edition, with finely engraved title in compartments, and very numerous curious and well-executed woodcuts (some full-page), sm. 4to. contemporary calf (some lt. stained, a few headlines shorn, and the divisional title to Book III supplied from a shorter copy; otherwise a SOUND AND UNUSUALLY TALL COPY in the original binding).

John Jackson and Francis Church at the Kings armes in Chesapeake, 1654

The first edition of this curious work is EXCESSIVELY RARE, no copy having happened for sale for the last 90 years, while a copy of the second edition, which is far commoner, fetched £3.3s in 1903. Some of the experiments described and depicted are very curious, including instructions how to make Weather-glasses; Water-clocks, etc. Experiments of "drawing water by the Crane, and by Engines, of forcing water by ayre compressed and by Engines, of producing sounds by ayre and water, by evaporation of water by fire, and by Engines, of motions by evaporating water, and by rarifying ayre, &c. &c. being in many of the early date of publication, its descriptions of engines driven by steam are of considerable interest. There is a copy of this work in the British Museum, nor is the author noticed in D. N. D.

Page 145 describes how to make a Fahrenheits Museum, nor is the author noticed in D. N. D. with making the first experiments in 1667—thirty-three years after the publication of the above work.

*The above is not worse than is a copy in the B.M.
The england part in this copy as shown described
was badly discoloured and had several small oil stains.
I had it cleaned by Messrs. Legg at No. 62 theop-
side and it came out in its present beautiful
condition. H.C. Lewis, London March 1910*

