

Cum postea Mala sive Pyra Cydonia permaturuissent, quosdam etiam Mali Cydonij particulas ad Microscopium applicavi ; & Lanuginem, quæ ex Malo Cydonio exhalatur, neque Lanugini Mali Perfici Copiâ cedit, delineandam curavi ; quæ omnia in Icone 4 designata vides per H I K L M N O. Ubi H I N O perparva est portio Mali Corticisque Cydonij, per I K L M N Lanugo ex Malis Cydoniis exfudans indicatur. Quæ Lanugo, licet in Cydoniis longior quam in Perficis, non tamen in illis erigitur, sicut in istis ; sed crispando sibi invicem implectitur.

X. *Remarks on some Attempts made towards a perpetual Motion, by the Reverend Dr. Defagulier. F. R. S.*

THE Wheel at *Hesse-Cassel*, made by Monsieur *Orféreus* and by him called a perpetual Motion, has of late been so much talk'd of, on Account of its wonderful *Phænomena*, that a great many People have believed it to be actually a self-moving Engine ; and accordingly have attempted to imitate it as such. Now as a great deal of Time and Money is spent in those Endeavours, I was willing (for the Sake of those that try Experiments with that View) to shew that the Principle, which most of them go upon is false, and can by no Means produce a perpetual Motion.

They take it for granted, that if a Weight descending in a Wheel, at a determinate Distance from the Centre, does in its Ascent approach nearer to it ; such a Weight

a Weight in its Descent will always preponderate, and cause a Weight equal to it to rise, provided it comes nearer the Centre in its Rise; and accordingly as it self rises, will be overbalanced by another Weight equal to it; and therefore they endeavour by various Contrivances to produce that Effect, as if the Consequence of it would be a perpetual Motion.

But I shall shew, that they mistake one particular Case of a general *Theorem*, or rather a *Corollary* of it, for the *Theorem* it self. The *Theorem* is as follows:

Theor. If one Weight in its Descent, does by Means of any Contrivance, cause another Weight to ascend with a less *Momentum* or Quantity of Motion than it self, it will preponderate and raise the other Weight.

Cor. 1. Therefore if the Weights be equal, the descending Weight must have more Velocity than the ascending Weight, because the *Momentum* is made up of the Weight multiplied into the Quantity of Matter.

Cor. 2. Therefore if a Leaver or Balance, have equal Weights fasten'd or hanging at its Ends, and the *Brachia* be ever so little unequal, that Weight will preponderate, which is farthest from the Centre.

SCHOLIUM.

This Second *Corollary* causes the Mistake; because those, who think the Velocity of the Weight is the Line it describes, expect that that Weight shall be overpois'd, which describes the shortest Line, and therefore contrive *Machines*, to cause the ascending Weight to describe a shorter Line than the descending Weight.

As for Example, in the Circle A D B a (*Fig. 5.*) the Weights A and B being supposed equal, they imagine, that if (by any Contrivance whatever) whilst the Weight A describes the *Arc* A a, the Weight B is carried in any *Arc*, as B b, so as to come nearer the Centre in its rising, than if it went up the *Arc* B D; the said Weight shall be overpois'd, and consequently, by a Number of such Weights, a perpetual Motion will be produced.

This is attempted by several Contrivances, which all depend upon this false Principle; but I shall only mention one, which is represented by *Fig. 6.* where a Wheel having two parallel Circumferences; has the Space between them divided into Cells, which being carv'd, will, (when the Wheel goes round) cause Weights plac'd loose in the said *Cells*, to descend on the Side A A A, at the outer Circumference of the Wheel; and on the Side D to ascend in the Line B b b b, which comes nearer the Centre, and touches the inner Circumference of the Wheel. In a *Machine* of this Kind, the Weights will indeed move in such a Manner, if the Wheel be turn'd round, but will never be the Cause of the Wheels going round. Such a *Machine* is mentioned by the Marquis of *Worcester*, in his *Century of Inventions* in the following Words, N^o. 56.

“ To provide and make that all the Weights of the
 “ descending Side of a Wheel, shall be perpetually
 “ farther from the Centre, than those of the mount-
 “ ing Side, and yet equal in Number, and heft to
 “ the one Side as the other. A most incredible thing,
 “ if not seen; but tried before the late King (of blef-
 “ sed Memory) in the *Tower* by my Directions, two
 “ extraordinary Ambassadors accompanying his Ma-
 “ jesty,

“ jesty, and the Duke of *Richmond*, and Duke of *Ha-*
 “ *milton*, with most of the Court attending him. The
 “ Wheel was fourteen Foot over, and had fourty Weights
 “ of fifty Pounds a Piece. Sir *William Balfore*, then
 “ Lieutenant of the *Tower*, can justify it, with
 “ several others. They all saw, that no sooner these
 “ great Weights passed the Diameter Line of the lower
 “ Side, but they hung a Foot farther from the Centre ;
 “ nor no sooner passed the Diameter Line of the upper
 “ Side, but they hung a Foot nearer Be pleased to
 “ judge the Consequence.

Now the Consequence of this, and such like *Ma-*
chines, is nothing less, than a perpetual Motion ; and
 the Fallacy is this. The Velocity of any Weight is
 not the Line, which it describes in General, but the
 Height that it rises up to, or falls from, with respect
 to its Distance from the Centre of the Earth. So that
 when the Weight (*Fig. 5.*) describes the *Arc A a*, its
 Velocity is the Line *A C*, which shews the perpen-
 dicular Descent (or measures how much it is come
 nearer to the Centre of the Earth) and likewise the
 Line *B C* denotes the Velocity of the Weight *B*, or the
 Height that it rises to, when it ascends in any of the
Arcs B b, instead of the *Arc B D* : So that in this Case,
 whether the Weight *B* in its Ascent be brought nearer
 the Centre or not, it loses no Velocity, which it ought
 to do, in order to be rais'd up by the Weight *A*. Nay,
 the Weight in rising nearer the Centre of a Wheel,
 may not only not lose of its Velocity, but be made
 to gain Velocity, in Proportion to the Velocity of its
 counterpoising Weights, that descend in the Circum-
 ference of the opposite Side of the Wheel ; for if we
 consider two *Radij* of the Wheel, one of which is

Horizontal, and the other (fasten'd to and moving with it) inclin'd under the Horizon in an Angle of 60 degr. (*Fig. 7.*) and by the Descent of the End B of the *Radius* B C, the *Radius* C D by its Motion causes the Weight at D, to rise up the Line p P, which is in a Plane that stops the said Weight from rising in the Curve D A, that Weight will gain Velocity, and in the Beginning of its Rise, it will have twice the Velocity of the Weight at B; and consequently, instead of being rais'd, will overpoise, if it be equal to the last mentioned Weight. And this Velocity will be so much the greater, in Proportion as the Angle A C D is greater, or as the Plane P p (along which the Weight D must rise) is nearer to the Centre. Indeed if the Weight at B, *Fig. 5.* could by any Means be lifted up to β , and move in the *Arc* βb , the End would be answer'd; because then the Velocity would be diminished, and become βC .

Experiment (Fig. 7.)

Take the Leaver B C D, whose *Brachia* are equal in Length, bent in an Angle of 120 degr. at C, and moveable about that Point as its Centre: In this Case, a Weight of two Pounds hanging at the End B of the horizontal Part of the Leaver, will keep in *Æquilibrio* a Weight of Four Pounds hanging at the End D. But if a Weight of one Pound be laid upon the End D of the Leaver, so that in the Motion of D along the *Arc* p A, this Weight is made to rise up against the Plane P p (which divides in half the Line A C equal to C B) the said Weight will keep in *Æquilibrio* two Pounds at B, as having twice the Velocity of it, when
the

the Leaver begins to move. This will be evident, if you let the Weight 4 hang at D, whilst the Weight 1 lies above it : For if then you move the Leaver, the Weight 1 will rise four times as fast as the Weight 4.

XI. *A Method for rowing Men of War in a Calm. Communicated by Monsieur Du. Quet.*

TO perfect the Art of Navigation, Two Things seem principally wanting ; *viz.* An easy Method for finding the Longitude at Sea ; and a Way to give a Vessel its Course, when there's no Wind stirring.

I flatter my self to have found the last ; and hope to make it appear, by Reason and Experiment, That a Man of War may make a League an Hour in a Calm, by Means of revolving Oars, which are easily apply'd to the Sides of the Ship, without occasioning any Incumbrance : As I shall make appear by the following Account, after having deliver'd my Notion of the Motion of Bodies in Fluids.

A Body swims upon Water, when it weighs less than the Volume of Water, whose Place it takes up ; and it sinks more or less in the Water, only in proportion as its Volume is more or less increas'd.

A Body lying in still Water, is as it were in *Equilibrium* ; the least Effort gives it Motion, and makes it lose that *Equilibrium*. If the Effort be continued, tho' ever so little, the Motion it communicates will be ve-

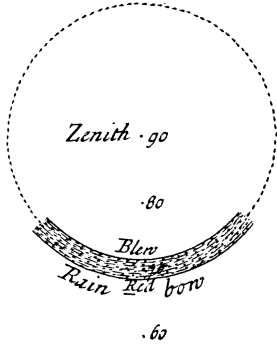


Fig. 1.

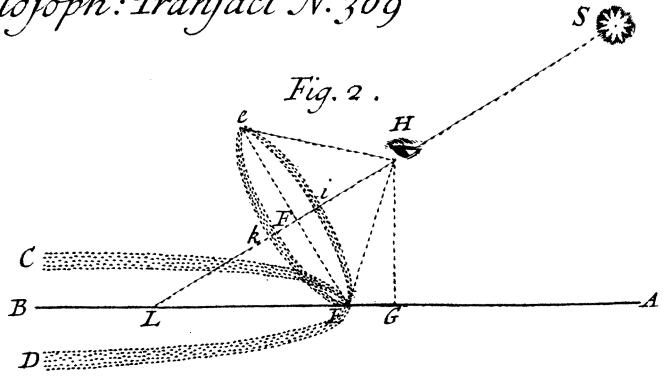


Fig. 2.

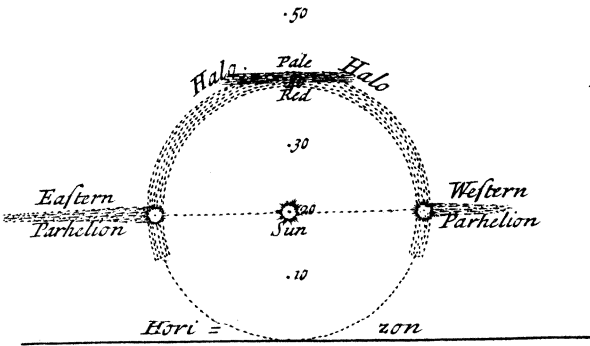


Fig. 3.

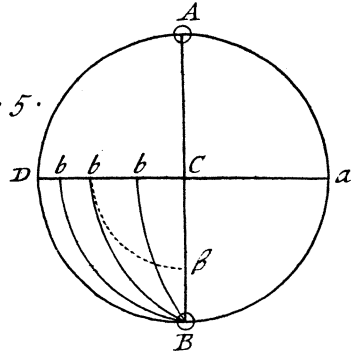


Fig. 5.

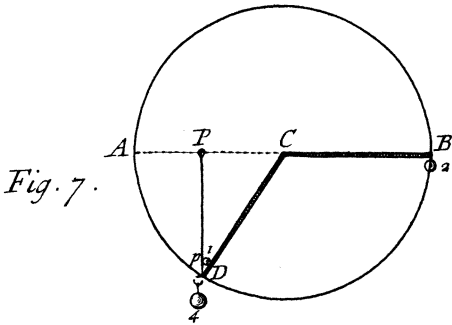


Fig. 7.

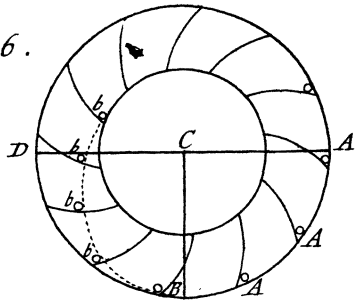


Fig. 6.

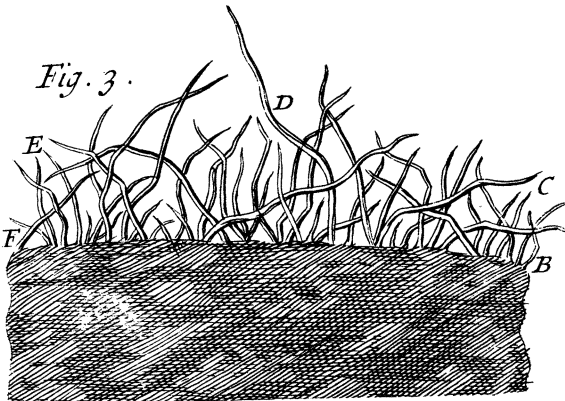


Fig. 3.

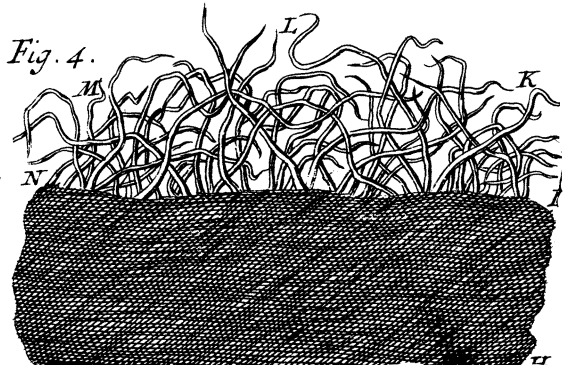


Fig. 4.