dem ex metallis; de actione ejus in metalla; de metallis ipſis; quæ in adverſaria redegi. Otium nactus forte evulgabo: ut moniti parcant vano labori, & ſumtibus. Valete!

II. *A* Spirit Level *to be fixed to a* Quadrant *for taking a Meridional Altitude at* Sea, *when the* Horizon *is not viſible.* *By* John Hadley, *Eſq; V. Pr. R. S.*

THE Neceſſity of ſeeing the Horizon, in order to find the Latitude of a Ship at Sea, has always been ſo great an Inconvenience, that any Method for determining it without the Help of the Horizon, will be of conſiderable Uſe, although it ſhould be liable to an Error of a few Minutes: And as it is generally agreed by Seamen, that they are much oftner ſenſible of this Inconvenience in calm Weather, than in rough; it is hoped that the following manner of conſtructing and uſing a Spirit Level, may, in that Caſe, be capable of ſo much Exactneſs, at leaſt, as may render it acceptable to the Publick. *Vide Fig.* 1.

This Level is compoſed of a Glaſs Tube AB, bent into an Arch of a Circle, and containing ſuch Number of Degrees as will be moſt ſuitable to the Degree of Exactneſs with which the Obſervation can be made. The Bore of it muſt not be wider than one Tenth of an Inch in Diameter, that the Liquor

in it may the better keep together, and the two Ends of it ſtand Perpendicular to the Tube in all Poſtures: Nor ſhould it be much leſs, leaſt the hanging of the Spirit to the Sides hinder it from ſettling ſo truly by its Weight to the loweſt Part of the Tube. This Tube is cemented into another Braſs one C D E F, of the ſame Curvature, the outer Half of which is taken off, ſo as to ſhew the Glaſs, leaving only a ſmall Part in the Middle D F entire, in which a ſmall Stop-cock G is placed. The Glaſs Tube is divided in two in the Middle to make room for this Stop-cock, the Key of which muſt be pierced through with a Hole of only about one hundredth Part of an Inch, for the Paſſage of the Liquor. The outer Ends of the Glaſs Tube muſt have a Communication with one another round about by Means of two ſmall Pipes I and K, and the Tube H, the manner of which is ſufficiently ſhewn by the Figure.

Each half of the Glaſs Tube A B muſt have a Scale of Degrees anſwering the Curvature of the Tube, ſubdivided at Pleaſure. They may be numberd either as the upper or under Scale in the Figure; and obſerve that in the under Scale two Degrees are numberd as one; the Reaſon of which is, that the Motion of the Spirit in the Tube encreaſing the Number on one Hand, and at the ſame time as much diminiſhing that on the other, their Difference is alterd thereby, ſo as to anſwer to double that Motion. The Diviſion of the Scales are cut on the Edge of the Braſs half Tube, or Trough, which is made thick for the greater Strength.

In one of the ſmall Pipes I or K, juſt againſt the Return of it, which enters the End of the firſt-mentioned Glaſs Tube at A or B, is a ſmall Hole, by which to introduce into it ſo much Spirit of Wine as may fill it from the Middle of the Scale on one Hand to the Middle of that on the other; this Hole may be afterwards ſtopped by a Skrew-pin.

The inner Ends of the two Halves of the Glaſs Tube A B ſhould be fixed into the entire Part of the Braſs Tube D F with a Cement made with old hard Bees-Wax, or ſome other Materials not diſſolvable by Spirit of Wine, as ſhould alſo the Ends of the ſmall Pipes I and K into this and the Tube H: Thoſe Halves, as to the remaining Part of their Lengths, may be faſtned down with any ſtrong Cement.

This Level may be ſet on to one of the Limbs of the Quadrant, fitted up for this Purpoſe, in the manner expreſs'd in the Figure. It hath an Index moveable on the Center, and a Spring at the other End to keep it ſteady, when it is directed to any of the Diviſions on the Arch, which needs no other Diviſion than into whole Degrees. The Index may be furniſhed either with plain Sights, or may carry a ſhort Teleſcope, with a Vane in its Focus, to receive the Image of the Sun, when it is bright enough; but if the Sun be hazy, or the Moon, or a Star be obſerved, a ſliding Shutter may be drawn out to tranſmit the Rays of Light to the Eye-glaſs. The Vane has alſo a Thread fix'd on it perpendicular to the Plane of the Quadrant. The whole Inſtrument (for the eaſier managing it) may be ſupported by a Staff, reſting with one End on the Floor.

The manner of uſing it is thus: Holding the Quadrant in a vertical Poſture, with that Limb to which the Level is fixed parallel to the Horizon, raiſe the Index to ſome Diviſion of the Arch, as near as you can to the true Height of the Object; which is ſuppoſed to be near the Meridian, and conſequently to alter its Altitude but ſlowly: Then turning the Key of the Stop-cock, ſo as to let the Spirit of Wine paſs through the ſmall Hole in it, keep the Image of the Object as cloſe to the Thread on the Vane as you can, endeavouring that the unavoidable Vibrations of it above and below the Thread, may be equal, both in reſpect of their Length, and the Swiftneſs of their Motions, *&c.* Continue this 'till the Spirit ſeems quite ſettled to ſome Part of the Scale, and ſomething longer. This it will do ſlowly, but without any ſenſible Vibrations; for the Stop-cock allowing it no Paſſage but through the ſmall Hole in its Key, will give ſuch a Check to its Motions, as not only to ſtop thoſe Vibrations, but alſo to hinder its being thrown backwards and forwards in the Tube by any Shocks of the Inſtrument; and yet as far as I have obſerved will not prevent its ſettling (with ſufficient Truth, though ſlowly) to the loweſt Part of the Tube. About half a Minute of Time or more may be neceſſary for this, according as the aforeſaid ſmall Hole is greater, or leſs in Proportion to the Bore of the Tube. When you judge the Spirit quite ſettled, turn the Stop-cock again: It is of no Importance that the Image of the Object be exactly on the Thread at the Inſtant that this is done. Obſerve againſt what Degree, and Part of a Degree, each End of the Spirit in the Tube ſtands. If your Scale be number'd like the upper one in the Figure, and the Quantity of Spirit be exact, both

Ends

Ends will agree, and the Degree and Parts marked muſt be added to, or ſubſtracted from the Altitude ſhewn by the Index, according to the Directions. If the Ends do not exactly agree, take the Mean between them. If you uſe the under Scale, ſubſtract the leſs Number from the greater, and add, or ſubſtract the Exceſs, the Number reſulting will ſhew the mean Elevation of the Index during the latter Part of the Obſervation, and will differ from the true Altitude of the Object about half ſo much as the Vibrations of its Image above and below the aforementioned Thread on the Vane fail of compenſating one another during that time. If either End of the Spirit leave the Scale, the Index muſt be remov'd three or four Degrees, and the Obſervation repeated.

Inſtead of the Curve Tubes A and B, two ſtrait ones might be uſed, ſet together ſo as to make a very obtuſe Angle in the Middle; but then it will be convenient to have the Quantity of Spirit more exactly fitted to the Scale, becauſe the allowing for the Difference will be ſomething more troubleſome.

If the Obſerver have an Aſſiſtant to attend to the Level, while he himſelf obſerves the Object, the whole Apparatus of the Braſs Tube, and Stop-cock, may be omitted, ſubſtituting in its room only a Plug with a ſmall Hole in it, which may be wrapped round with a very thin Slice of Cork, and ſo thruſt down into the middle of the Glaſs Tube. The cutting the Glaſs Tube in half in the Middle may likewiſe be avoided, if, inſtead of the Stop-cock at G, there be one fixed in one or both of the Pipes I and K, to open and ſtop the Paſſage of the Air, having a larger Hole in their Keys, there being alſo a Plug with a ſmall Hole, thruſt down into the Middle of the Tube, as before.

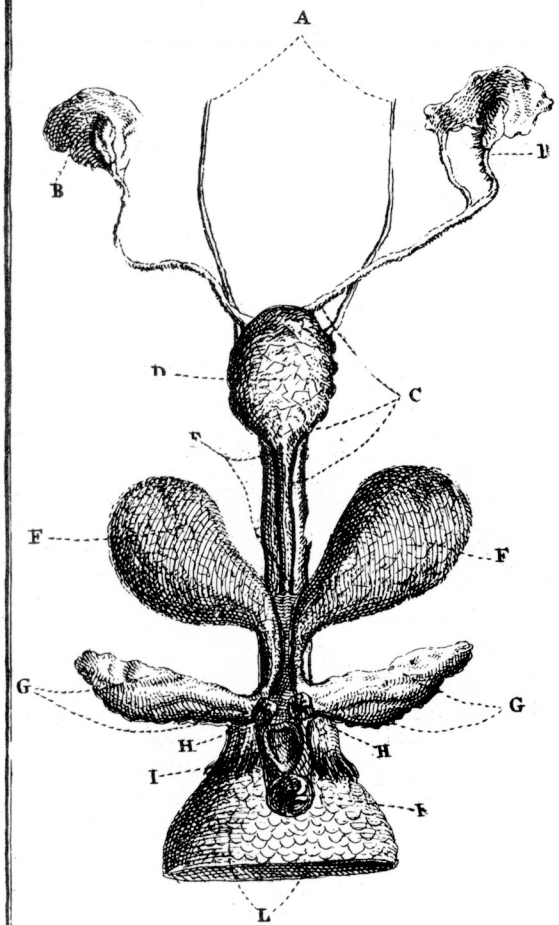
The Bore of the ſmall Pipes I and K, and the Tube H, muſt not be ſo narrow as to make it difficult to reduce the Spirit into its Place, if by any Accident either End of it ſhould get into them.

I have been informed, that an Object may be kept in View without much Difficulty, even in pretty rough Weather, thro' a Teleſcope magnifying about ten times. Now as ſuch Teleſcopes ſeldom comprehend an Area of much more than one Degree in Diameter, or at moſt 1 Deg. 20 Min. it follows that the Axis of the Teleſcope is always kept within 40 Min. at moſt of the Object, and that is the greateſt Vibration of the Image above and below the Thread on the Vane. If this be allowed, it ſeems reaſonable to expect that the Medium of the Vibrations one Way ſhould not exceed the Medium of thoſe the other, more than by about one fifth or one ſixth Part of the greateſt Vibration; *i. e.* about 7 or 8 Min. the half of which will be the Error of the Obſervation. In ſtill Weather it will probably be much leſs, if the Inſtrument be in the Hands of a Perſon moderately ſkilful in obſerving.

III. *The Anatomy of a* Female Beaver, *and an Account of* Caſtor *found in her.* *By* C. Mortimer, *M. D. R. S. Secret.*

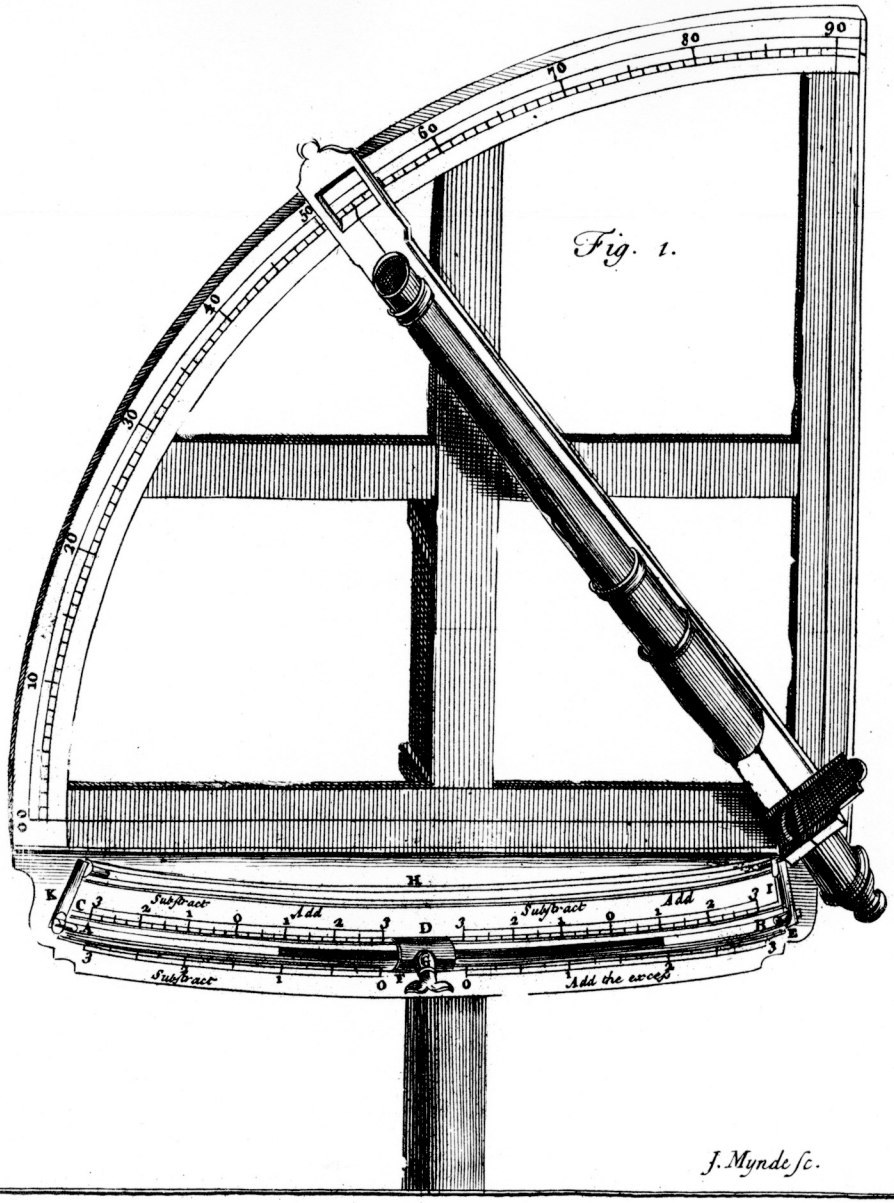
IN the *Acta Erudit. Menſe Aug.* 1684, *pag.* 360, *& ſeq.* I find the Account of the Diſſection of a Male and Female *Beaver* by *E. G. H.* who miſtakes, in opening the Male, the Receptacles of the *Caſtor* for the *Uterus*, and the two *Glands* below them for *Dugs*;

Fig. 2.



C. M. ad nat. delin.

Fig. 1.



J. Mynde sc.