Now to apply this (in a few words) to the Trumpet, where the Notes are produced only by the different force of the breath; it is reaſonable to imagine that the ſtrongeſt blaſt raiſes the ſound by breaking the Air within the Tube into the ſhorteſt vibrations, but that no Muſical ſound will ariſe unleſs they are ſuited to ſome aliquot part, and ſo by reduplication exactly meaſure out the whole length of the Inſtrument, as in Fig. *C*, for otherwiſe a remainder will cauſe the ſame inconvenience in this caſe, as in Fig. *D*. To which if we add that a Pipe, being ſhortned according to the Proportions we even now diſcours'd of in a String, raiſes the ſound in the ſame degrees, it renders the caſe of the Trumpet juſt the ſame with the Monochord.

For a Corollary to this Diſcourſe, we may obſerve that the diſtances of the Trumpet Notes aſcending, continually decreaſed in proportion of $\frac{1}{1}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ in *infinitum*, For,

The { ſecond / third / fourth } { Note in the Table, differs from the } { firſt / ſecond / third } by { $\frac{1}{2}$ / $\frac{1}{3}$ / $\frac{1}{4}$ } { of the String, / &c. }

An Account of the cauſe of the Change of the Variation of the Magnetical Needle; with an Hypotheſis of the Structure of the Internal parts of the Earth: as it was propoſed to the Royal Society *in one of their late Meetings.* *By* Edm. Halley.

SOme years ſince I publiſhed in theſe Tranſactions, (Numb. 148,) a Theory of the Variation of the Magnetical Compaſs, wherein having collected as many Obſervations as at that time I could procure, and having

carefully compared them together, I came at length to this general concluſion, *That the Globe of the Earth might be ſuppoſed to be one great Magnet, having four Magnetical Poles or Points of Attraction, near each Pole of the Equator two: and that in thoſe parts of the World which lie near adjacent to any one of thoſe Magnetical Poles, the Needle is chiefly governed thereby; the neareſt Pole being always predominant over the more remote.* And I there have endeavoured to ſtate and limit the preſent poſition of thoſe Poles in the Surface of our Globe, which the Reader pleaſing to conſult will ſave us the pains of repeating. But after all, though that Diſcourſe was favourably received both at home and abroad, as ſeeming to render a tollerable account of the obſerved Variations, yet I found two difficulties not eaſie to ſurmount, the one was that no Magnet I had ever ſeen or heard of, had more than two oppoſite Poles; whereas the Earth had viſibly four, and perhaps more. And ſecondly, it was plain that thoſe Poles were not, at leaſt all of them, fixt in the Earth, but ſhifted from place to place, as appeared by the great changes in the Needles direction within this laſt Century of years, not only at *London* (where this great Diſcovery was firſt made,) but almoſt all over the Globe of Earth; whereas it is not known or obſerved that the Poles of a Load-Stone ever ſhifted their place in the Stone, nor (conſidering the compact hardneſs of that ſubſtance) can it eaſily be ſuppoſed: Though the Matter of Fact be too notorious and univerſal, not to be accounted for.

Theſe difficulties had wholly made me deſpond, and I had long ſince given over an inquiry I had ſo little hopes of; when in accidental diſcourſe, and leaſt expecting it, I ſtumbled on the following Hypotheſis; in delivering whereof, if I ſhall ſeem to advance any thing that looks like Extravagant or Romantick, the Reader is deſired to ſuſpend his cenſure, till he have

conſidered

conſidered the force and number of the many Arguments which concur to make good ſo new and ſo bold a Suppoſition.

Though it be ſufficiently known and allowed that the Needles Variation changes, it will be neceſſary however to give a few inſtances, whereby it may appear that this change is gradual and univerſal, and the effect of a great and permanent motion. For which take the following Examples.

At *London* in the year 1580, the Variation was obſerved by Mr. *Burrows* to be 11°. 15′ Eaſt. In *Anno* 1622, the ſame was found by Mr. *Gunter* to be but 6°. 0′ Eaſt. In the year 1634, Mr *Gellibrand* found it 4°. 5′ Eaſt. In 1657, Mr. *Bond* obſerved that there was no Variation at *London*. *Anno* 1672, my ſelf obſerved it 2°. 30′ to the Weſt; and this preſent year 1692. I again found it 6° 00′ Weſt. So that in 112 years the direction of the Needle has changed no leſs than 17 degrees.

At *Paris*, *Orontius Finæus* about the year 1550, did account it about 8 or 9 degrees Eaſt Variation. *Anno* 1640, it was found 3 degrees Eaſt. *Anno* 1666, there was no Variation there, and *Anno* 1681, I found it to be 2°. 30′ to the Weſt.

At *Cap d' Agulhas*, the moſt ſoutherly Promontory of *Africa*, about the year 1600, the Needle pointed due North and South without Variation, whence the *Portugueze* gave it its name. *Anno* 1622, there was 2 degrees Weſt Variation. *Anno* 1675, it was 8°. 00 Weſt; and this year 1691. it was curiouſly obſerved not leſs than 11 degrees Weſt.

At St. *Helena*, about the year 1600, the Needle declined 8 degrees to the Eaſt. *Anno* 1623, it was but 6°. 00′ Eaſt. *Anno* 1677, when I was there, I obſerved it accurately on ſhore to be 0 *d.* 40′ Eaſt; and now this year it was found about 1 *d.* to the Weſtward of the North.

At *Cape Comorine* in *India*, in the Year 1620, there was 14^{g} 20′ Weſt Variation; in the Year 1680, there was 8° 48′, but now lately in the Year 1688, it was no more than 7° 30′, ſo that here the Needle has returned to the Eaſt about ſeven degrees in ſeventy Years.

In all the other Examples the Needle has gradually moved towards the Weſt, and the places are too far aſunder to be influenced by the removal of any Magnetical matter, which may by accident be tranſplaced within the Bowels or on the Surface of the Earth. If more Examples are deſired, the Reader may be furniſhed with them in the *Portugueze Routier* of *Aleixo de Motta* (written about the year 1600,) and in the Voyage of *Beaulieu*, both publiſhed in Mr. *Thevenot*'s firſt Collection of curious Voyages, printed at *Paris*, *anno* 1663. which he is to compare with the Journals of our late *Eaſt India* Voyagers, and I am aſſured that it will be thereby evident, that the Direction of the Needle is in no place fixt and conſtant, tho' in ſome it change faſter than in others. And where for a long time it has continued as it were unaltered, it is there to be underſtood that the Needle has its greateſt deflection, and is become Stationary in order to return, like the Sun in the Tropick. This at preſent is in the *Indian* Sea, about the Iſland *Mauritius*, where is the higheſt Weſt Variation, and in a Tract tending from thence into the N. N. W. towards the *Red Sea* and *Egypt*. And in all Places to the Weſtward of this Tract, all over *Africa* and the Seas adjoining, the Weſt Variation will be found to have encreaſed; and to the Eaſtwards thereof, as in the example of *Cape Comorine*, to have decreaſed, *viz.* all over the *Eaſt-Indies* and the Iſlands near it.

After the like manner in that Space of Eaſt Variation which, beginning near St. *Helena*, is found all over the South

South *America*, and which at preſent is higheſt about the Mouth of *Rio de la Plata*, it has been obſerved that in the Eaſtern parts thereof, the Variation of the Needle gradually decreaſes; but whether on the contrary it increaſes in thoſe places which lie more Weſterly than that tract wherein the higheſt Eaſt Variation is found; or how it may be in the vaſt *Pacifick Sea*, we have not experience enough to aſcertain, only we may by Analogy infer, that both the Eaſt and Weſt Variations therein do gradually increaſe and decreaſe after the ſame Rule.

Theſe *Phænomena* being well underſtood and duly conſidered do ſufficiently evince, That the whole magnetical Syſtem is by one or perhaps more Motions tranſlated, whether Eaſtwards or Weſtwards I ſhall anon diſcuſs; that this moving thing is very great, as extending its effects from Pole to Pole; and that the Motion thereof is not *per ſaltum*, but a gradual and regular Motion.

Now conſidering the ſtructure of our *Terraqueous* Globe, it cannot be well ſuppoſed that a very great part thereof can move within it, without notably changing its Centre of Gravity and the Equilibre of its parts, which would produce very wonderful Effects in changing the Axis of Diurnal Rotation, and occaſion ſtrange alteration in the Sea's Surface, by Inundations and Receſſes thereof, ſuch as Hiſtory never yet mentioned. Beſides, the ſolid parts of the Earth are not to be granted permeable by any other than fluid Subſtances, of which we know none that are any ways Magnetical. So that the only way to render this Motion intelligible and poſſible, is, to ſuppoſe it to turn about the Centre of the Globe, having its Centre of Gravity fixt and immoveable in the ſame common Centre of the Earth: And there is yet required that this moving internal Subſtance be looſe and detached from the external parts of the Earth, whereon we live; for otherwiſe were it affix'd

thereto

thereto, the whole muſt neceſſarily move together.

So then the External Parts of the Globe may well be reckoned as the Shell, and the Internal as a *Nucleus* or inner Globe included within ours, with a fluid medium between. Which having the ſame common Centre and Axis of diurnal Rotation, may turn about with our Earth each 24 hours; only this outer Sphere having its turbinating Motion ſome ſmall matter either ſwifter or ſlower than the internal Ball. And a very minute difference in length of time, by many repetitions becoming ſenſible; the Internal parts will by degrees recede from the External, and not keeping pace with one another will appear gradually to move either Eaſtwards or Weſtwards by the difference of their Motions.

Now ſuppoſing ſuch an Internal Sphere having ſuch a Motion, we ſhall ſolve the two great difficulties we encountred in my former Hypotheſis. For if this exterior Shell of Earth be a Magnet having its Poles at a diſtance from the Poles of Diurnal Rotation; and if the Internal *Nucleus* be likewiſe a Magnet, having its Poles in two other places diſtant alſo from the Axis; and theſe latter by a gradual and ſlow Motion change their place in reſpect of the External; we may then give a reaſonable account of the four Magnetical Poles I preſume to have demonſtrated in *No.* 148. of theſe Tranſactions; as likewiſe of the changes of the Needles Variations, which till now hath been unattempted.

The Period of this Motion being wonderful great, and there being hardly an hundred Years ſince theſe Variations have been duly obſerved, it will be very hard to bring this Hypotheſis to a Calculus, eſpecially ſince, tho' the Variations do increaſe and decreaſe regularly in the ſame place, yet in differing places, at no great diſtance, there are found ſuch caſual Changes thereof

thereof as can no ways be accounted for by a regular Hypotheſis: as depending upon the unequal and irregular diſtribution of the Magnetical matter within the ſubſtance of the External ſhell or coat of the Earth, which deflect the Needle from the poſition it would acquire from the effect of the general Magnetiſm of the whole. Of this the Variations at *London* and *Paris* give a notable inſtance, for the Needle has been conſtantly about 1° ½ more Eaſterly at *Paris* than at *London*; tho' it be certain that according to the general effect the difference ought to be the contrary way. Notwithſtanding which the Variations in both places do change alike.

Hence, and from ſome other of like nature, I conclude, That the two Poles of the external Globe are fixt in the Earth, and that if the Needle were wholly governed by them, the Variations thereof would be always the ſame, with ſome little Irregularities upon the account I but juſt now mentioned: But the internal Sphere having ſuch a gradual tranſlation of its Poles, does influence the Needle and direct it variouſly according to the reſult of the attractive or directive power of each Pole; and conſequently there muſt be a period of the Revolution of this internal Ball, after which the Variations will return again as before But if it ſhall in future ages be obſerved otherwiſe we muſt then conclude that there are more of theſe Internal Spheres, and more Magnetical Poles than Four, which at preſent we have not a ſufficient number of Obſervations to determine, and particularly in that vaſt *Mar del Zur*, which occupies ſo great a part of the whole Surface of the Earth.

If then two of the Poles be fixt and two moveable, it remains to aſcertain which they are that keep their place: and tho' I could wiſh we had the experience of another Century of years to found our Concluſions upon, yet I think we may ſafely determine, *That our European*

European North Pole (which in *No.* 148. I ſuppoſed near the Meridian of the Lands End of *England*, and about ſeven degrees therefrom) is that that is moveable of the two Northern Poles, and that that has chiefly influenced the Variations in theſe parts of the World: For in *Hudſon*'s Bay, which is under the Direction of the *American* Pole, the change is not obſerved to be near ſo faſt as in theſe parts of *Europe*, tho' that Pole be much farther removed from the Axis.

As to the *South Poles*, I take the *Aſian* Pole, which I place about the Meridian of the Iſland *Celebes* to be the fixt, and conſequently the *American* Pole to move; from the like obſervation of the ſlow decreaſe of the Variation on the Coaſt of *Java*, and near the Meridian of the *Aſian* Pole; tho' I muſt confeſs to have no account of the effects of the other beyond *Magellan*'s Streights.

If this be allowed me, 'tis plain that the fixt Poles are the Poles of this External Shell or *Cortex* of the *Earth*, and the other two the Poles of a Magnetical *Nucleus* included and moveable within the other. It likewiſe follows, that this Motion is Weſtwards, and by conſequence that the aforeſaid *Nucleus* has not preciſely attained the ſame degree of Velocity with the exteriour parts in their Diurnal Revolution: but ſo very nearly equals it, that in 365 Revolves the difference is ſcarce ſenſible. This I conceive to ariſe from the Impulſe whereby this diurnal Motion was impreſt on the Earth, being given to the external parts, and from thence in time communicated to the internal; but not ſo as perfectly to equal the Velocity of the firſt Motion impreſſed on, and ſtill conſerved by the ſuperficial parts of the Globe.

As to the Quantity of Motion it is almoſt impoſſible to define it, both from the Nature of this kind of Obſervation, which cannot be very accurately performed

formed, as alſo from the ſmall time theſe Variations have been obſerved, and their change diſcovered. It appears by all Circumſtances, that its period is of many Centuries of Years, and as far as may be collected from the Change of the Place, where there was no Variation by reaſon of the Equilibre of the two Southern Magnetical Poles, *viz.* from *Cape d' Agulhas* to the Meridian of St. *Helena* (which is about 23^{gr} in about 90 years) and of the place where the Weſterly Variation is in its ἀκμὴ or greateſt Deflection, being about half ſo much, *viz.* from the Iſle of *Diego Rioz* to the South Weſt parts of *Madagaſcar*. We may with ſome Reaſon conjecture, that the *American* Pole has moved Weſtwards 46 degrees in that time, and that the whole Period thereof is performed in 700 Years, or thereabouts; ſo that the nice Determination of this and of ſeveral other particulars in the Magnetick Syſtem is reſerved for remote Poſterity; all that we can hope to do is to leave behind us Obſervations that may be confided in, and to propoſe Hypotheſes which after Ages may examine, amend or refute. Only here I muſt take leave to recommend to all Maſters of Ships and all others, Lovers of natural Truths, that they uſe their utmoſt Diligence to make, or procure to be made, Obſervations of theſe Variations in all parts of the World, as well in the North as South Latitude (after the laudable cuſtom of our *Eaſt-India* Commanders) and that they pleaſe to communicate them to the *Royal Society*, in order to leave as compleat a Hiſtory as may be to thoſe that are hereafter to compare all together, and to compleat and perfect this abſtruſe Theory.

And by the way it will not be amiſs to amend a received Error in the Practice of obſerving the Variation, which is, to take it by the Amplitude of the Riſing and Setting Sun, when his Centre appears in the viſible Horizon; whereas he ought to be obſerved when his under

Limb is ſtill above the Horizon about $\frac{1}{3}$ of his Diameter, or 20 Minutes, upon the ſcore of the Refraction, and the height of the Eye of the Obſerver above the Surface of the Sea: Or elſe they are to work the Amplitudes as they do the Azimuth, reckoning the Sun's diſtance from the Zenith 90° 36′. This, tho' it be of little conſequence near the Equinoctial, will make a great error in high Latitudes, where the Sun riſes and ſets obliquely.

But to return to our Hypotheſis, in order to explain the change of the Variations, we have adventured to make the Earth hollow and to place another Globe within it: and I doubt not but this will find Oppoſers enough. I know 'twill be objected, That there is no Inſtance in Nature of the like thing; That if there was ſuch a middle Globe it would not keep its place in the Centre, but be apt to deviate therefrom, and might poſſibly chock againſt the concave Shell, to the ruine or at leaſt endammaging thereof; That the Water of the Sea would perpetually leak through, unleſs we ſuppoſe the Cavity full of Water; That were it poſſible yet it does not appear of what uſe ſuch an inward Sphere can be of, being ſhut up in eternal Darkneſs, and therefore unfit for the Production of Animals or Plants; with many more Objections, according to the Fate of all ſuch new Propoſitions.

To theſe, and all others that I can foreſee, I briefly anſwer, That the Ring environing the Globe of *Saturn* is a notable Inſtance of this kind, as having the ſame common Centre, and moving along with the Planet, without ſenſibly approaching him on one ſide more than the other. And if this Ring were turned on one of its Diameters, it would then deſcribe ſuch a concave Sphere as I ſuppoſe our External one to be. And ſince the Ring in any poſition given, would in the ſame manner keep the Centre of *Saturn* in its own, it follows that ſuch a

concave

concave Sphere may move with another included in it, having the ſame common Centre. Nor can it well be ſuppoſed otherwiſe, conſidering the Nature of Gravity, for ſhould theſe Globes be adjuſted once to the ſame common Centre, the Gravity of the parts of the Concave would preſs equally towards the Centre of the inner Ball, which Equality muſt neceſſarily continue till ſome external force diſturb it, which is not eaſie to imagine in our caſe. This perhaps I might more intelligibly expreſs, by ſaying that the inner Globe being poſited in the Centre of the exterior, muſt neceſſarily aſcend which way ſoever it move; that is, it muſt overcome the force of Gravity preſſing towards the common Centre, by an impulſe it muſt receive from ſome outward Agent: but all outward efforts being ſufficiently fenced againſt by the Shell that ſurrounds it, it follows, that this *Nucleus* being once fixt in the common Centre, muſt always there remain.

As to the leaking of the Water through this Shell, when once a paſſage ſhall be found for it to run through, I muſt confeſs it is an Objection ſeemingly of weight; but when we conſider how tightly great Beds of Chalk or Clay, and much more Stone do hold water, and even Caves arch'd with Sand; no Man can doubt but the Wiſdom of the Creator has provided for the Macrocoſm by many more ways than I can either imagine or expreſs, eſpecially ſince we ſee the admirable and innumerable Contrivances wherewith each worthleſs Individual is furniſht both to defend it ſelf and propagate its Species. What Curioſity in the Structure, what Accuracy in the Mixture and Compoſition of the parts ought not we to expect in the Fabrick of this Globe, made to be the laſting Habitation of ſo many various Species of Animals, in each of which there want not many Inſtances that manifeſt the boundleſs Power and Goodneſs of their Divine Author; and can

we then think it a hard ſuppoſition that the Internal parts of this Bubble of Earth ſhould be replete with ſuch Saline and Vitriolick Particles as may contribute to petrifaction, and diſpoſe the tranſuding Water to ſhoot and coagulate into Stone, ſo as continually to fortifie, and if need were to conſolidate any breach or flaw in the Concave Surface of the Shell.

And this perhaps may not without reaſon be ſuppoſed to be the final Cauſe of the admixture of the Magnetical Matter in the Maſs of the Terreſtrial parts of our Globe, *viz.* To make good and maintain the Concave Arch of this Shell: for by what the excellent Mr. *Newton* has ſhewn in his *Principia Philoſophiæ*, it will follow that according to the general Principle of Gravity, viſible throughout the whole Univerſe, all thoſe Particles that by length of time or otherwiſe ſhall molder away or become looſe on the Concave Surface of the External Sphere, would fall in, and with great force deſcend on the Internal, unleſs thoſe Particles were of another ſort of Matter capable by their ſtronger tendency to each other, to ſuſpend the force of Gravity; but we know no other ſubſtances capable of ſupporting each other by their mutual Attraction but the Magnetical, and theſe we ſee miraculouſly to perform that Office, even where the power of Gravity has its full effect, much more within the Globe where it is weaker. Why then may we not ſuppoſe theſe ſaid Arches to be lined throughout with a Magnetical Matter, or rather to be one great Concave Magnet, whoſe two Poles are the Poles we have before obſerved to be fixt in the Surface of our Globe.

Another Argument favouring this Hypotheſis is drawn from a Propoſition of the ſame Mr. *Newton*, where he determines the force wherewith the *Moon* moves the *Sea* in producing the *Tides*: his words are, *Denſitas Lunæ eſt ad denſitatem Terræ ut* 680 *ad* 387 *ſeu* 9 *ad* 5 *quamproxime. Eſt igitur corpus Lunæ denſius ac magis terreſtre*

quam

quam Terra noſtra, p. 466. Now if the Moon be more ſolid than the Earth as 9 to 5, why may we not reaſonably ſuppoſe the Moon, being a ſmall Body and a Secondary Planet, to be ſolid Earth, Water, and Stone, and this Globe to conſiſt of the ſame Materials, only four ninths thereof to be Cavity, within and between the internal Spheres: which I would render not improbable.

To thoſe that ſhall enquire of what uſe theſe included Globes can be, it muſt be allowed, that they can be of very little ſervice to the Inhabitants of this outward World, nor can the Sun be ſerviceable to them, either with his Light or Heat. But ſince it is now taken for granted that the Earth is one of the Planets, and they all are with reaſon ſuppoſed Habitable, though we are not able to define by what ſort of Animals; and ſince we ſee all the parts of the Creation abound with Animate Beings, as the Air with Birds and Flies, the Water with the numerous varieties of Fiſh, and the very Earth with Reptiles of ſo many ſorts; all whoſe ways of living would be to us incredible did not daily Experience teach us. Why then ſhould we think it ſtrange that the prodigious Maſs of Matter, whereof this Globe does conſiſt, ſhould be capable of ſome other improvement than barely to ſerve to ſupport its Surface? Why may not we rather ſuppoſe that the exceeding ſmall quantity of ſolid Matter in reſpect of the fluid Ether, is ſo diſpoſed by the Almighty Wiſdom as to yield as great a Surface for the uſe of living Creatures as can conſiſt with the conveniency and ſecurity of the whole. We our ſelves, in Cities where we are preſſed for room, commonly build many Stories one over the other, and thereby accommodate a much greater multitude of Inhabitants.

But ſtill it will be ſaid that without Light there can be no living, and therefore all this *apparatus* of our inward Globes muſt be uſeleſs: to this I anſwer that there are many ways of producing Light which we are wholly ignorant

ignorant of; the Medium it ſelf may be always luminous after the manner of our *Ignes fatui.* The Concave Arches may in ſeveral places ſhine with ſuch a ſubſtance as inveſts the Surface of the Sun; nor can we, without a boldneſs unbecoming a Philoſopher, adventure to aſſert the impoſſibility of peculiar Luminaries below, of which we have no ſort of *Idea.* I am ſure the Poets *Virgil* and *Claudian* have gone before me in this Thought, inlightning their *Elyſian Fields* with Sun and Stars proper to thoſe infernal, or rather internal, Regions. Vir. Æneid. 6.

Largior hic campos æther & lumine veſtit
Purpureo; Solemque ſuum ſua Sidera norunt.

And *Claudian* lib. 2. *De Raptu Proſerpinæ.*

Amiſſum ne crede diem, ſunt altera nobis
Sidera, ſunt orbes alii, lumenque videbis
Purius, Elyſiumque magis mirabere Solem.

And though this be not to be eſteemed as an Argument, yet I may take the liberty I ſee others do, to quote the Poets when it makes for my purpoſe.

Laſtly, To explain yet farther what I mean, I have adventured to adjoyn the following Scheme, wherein the Earth is repreſented by the outward Circle, and the three inward Circles are made nearly proportionable to the Magnitudes of the Planets *Venus, Mars* and *Mercury,* all which may be included within this Globe of Earth, and all the Arches more than ſufficiently ſtrong to bear their weight. The Concave of each Arch, which is ſhaded differently from the reſt, I ſuppoſe to be made up of Magnetical Matter; and the whole to turn about the ſame common Axis *p. p.* only with this difference, that the Outer Sphere ſtill moves ſomewhat faſter than the

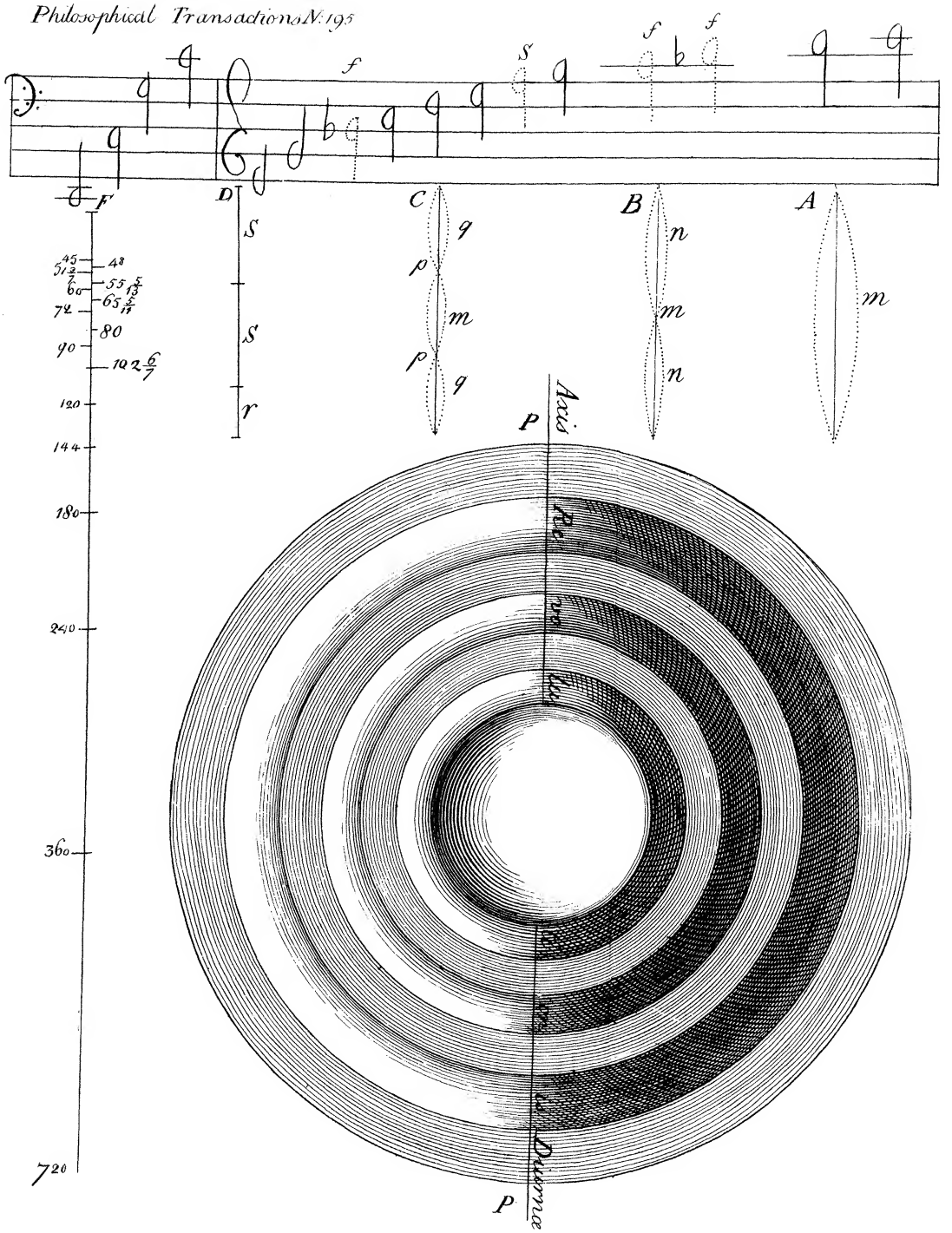
the Inner. Thus the Diameter of the Earth being about eight thouſand *Engliſh* Miles, I allow five hundred Miles for the thickneſs of its Shell, and another ſpace of five hundred Miles for a Medium between, capable of an immenſe Atmoſphere for the Uſe of the Globe of *Venus*: *Venus* again I give a Shell of the ſame thickneſs, and leave as great a ſpace between her Concave and *Mars*; ſo likewiſe from *Mars* to *Mercury*, which latter Ball we will ſuppoſe ſolid, and about two thouſand Miles Diameter. Thus I have ſhewed a poſſibility of a much more ample Creation, than has hitherto been imagined; and if this ſeem ſtrange to thoſe that are unacquainted with the Magnetical Syſtem, it is hoped that all ſuch will endeavour firſt to inform themſelves of the Matter of Fact and then try if they can find out a more ſimple Hypotheſis, at leaſt a leſs abſurd, even in their own Opinions. And whereas I have adventured to make theſe Subterraneous Orbs capable of being inhabited, 'twas done deſignedly for the ſake of thoſe who will be apt to ask *cui bono*, and with whom Arguments drawn from *Final Cauſes* prevail much. If this ſhort Eſſay ſhall find a kind acceptance, I ſhall be encouraged to enquire farther, and to poliſh this rough Draft of a Notion till hitherto not ſo much as ſtarted in the World, and of which we could have no Intimation from any other of the *Phænomena* of Nature.

Since this was written, a Diſcovery I have made in the Celeſtial Motions, ſeems to render a farther account of the Uſe of the Cavity of the Earth, *viz.* To diminiſh the Specifick Gravity thereof in reſpect of the Moon: for I think I can demonſtrate that the Oppoſition of the Ether to the Motions of the Planets in long time becomes ſenſible: and conſequently the greater Body muſt receive a leſs Oppoſition than the ſmaller, unleſs the Specifick Gravity of the ſmaller do proportionably exceed that of the greater, in which caſe only they

can

can move together; ſo that the Cavity I aſſign in the Earth, may well ſerve to adjuſt its weight to that of the Moon. For otherwiſe the Earth would leave the Moon behind it, and ſhe become another Primary Planet. But this I deſign to explain by a Diſcourſe apart more at large.

FINIS.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