**the whole machine; But the regulator and ſpring of a** watch are vastly inferior to the weight and pendulum of a clock, neither of which can be employed in watches. In place of a pendulum, therefore, we are obliged to use **a** balance (fig. 1.) to regulate the motion of a watch ; and **a** ſpring (fig. 2.) which serves **in** place of **a** weight, to give motion to the wheels and balance.

The wheels of a watch, like thoſe of a clock, are placed **in** a frame formed of two plates and four pillars. Fig. 3. repreſents the inside **of a** watch, after the plate (fig. **4.) is taken** off. A is the barrel which contains the ſpring (fig. 2.) ; the chain is rolled about the barrel, with one end of it fixed to the barrel A (fig. 5.), and the other to the fuſee B.

**When a watch is wound up, the chain which was upon** the barrel winds about the fuſee, and by this means the ſpring is stretched ; for the interior end of the ſpring is fixed by a hook to the immoveable axis, about which the barrel revolves ; the exterior end of the ſpring is fixed to the inside of the barrel, which turns upon an axis. It is therefore eaſy to perceive how the ſpring extends itſelf, and how its elasticity forces the barrel to turn round, and con­ſequently obliges the chain which is upon the fuſee to un­fold and turn the fuſee ; the motion of the fuſee is commu­nicated to the wheel C (fig. 5. ) ; then, by means of the teeth, to the pinion c, which carries the wheel D ; then to the pi­nion *d,* which carries the wheel E ; then to the pinion c,

Unfortunately this periſhed in the burning of Gresham College, where Mr Hooke had apartments from the Royal Society ; and he does not ſeem to have replaced it. It was perhaps, like the rest, nothing more than ſcraps. The Correſpondent who favours us with theſe obſervations ſaw, in 1768, many papers of Mr Hooke’s writings in the Society’s archives, which had evidently been reſcued from the flames, and had been in the possession of Mr Waller ; part of which he publiſh­**ed,** and would have given more had he lived. Many of the leaves were scraps, perhaps single lines ; many had **dates ;** many of them were ſuch as would be fragments of this mechanical algebra. Mr Hooke poſitively says, that it was by this ſystem that he diſcovered the regulating power of a ſpring. And this brings us to the subject in hand, to which we hope the foregoing obſervations will not be thought too long **a** preface.

In 1655 he was admitted into the Invisible Society at Oxford, and was particularly patroniſed by Dr Ward, after­wards biſhop of Saliſbury, who instructed him in astronomy, and strongly recommended to his mechanical genius the diſcovery of ſome method of maintaining the vibrations of a pendulum, as of immenſe ſervice to the astronomer. This Hooke accompliſhed immediately, and thought of using pendulum clocks for diſcovering the longitude at ſea ; and *his method* of mechanic inventions *quickly* led him, he says, to the diſcovery of the regulating power of ſprings as equivalent (nay, he says, ſuperior) to that of gravity. This is remarkable ; for it appears that he had at that time mathematics enough to inform him, that nothing would produce iſochronous vibrations but an accelerative force proportional to the space *to be passed through,* a truth neither obvious nor easily come at ; and that the accelerative action of gravity on a com­mon pendulum was not exactly in this proportion : but he did not then know the mechanical properties of the cycloid, **a** diſcovery reſerved to do honour to Mr Huyghens. Our Correſpondent farther informs us, that he recollects seeing, among the ſcraps of Mr Hooke’s writing, words nearly to the following purpoſe : “ To produce a tranſlation of a moveable thus or thus in the same time, requires **a** pressing power thus.

This will evidently appear to be a hasty expression of a force as the distance to be run through. He had found by experiments, made probably with other views, that the force of a ſpring was proportional to its deviation from its quiescent ſhape, and this whatever was its ſhape. Of this truth he now ſaw the value, and marked it in his register, and gave it to his friends, agreeably tothe custom of the times, in the form of a cipher *ce, ii, no, sss, tt, uu* ; which was afterwards explained “ *Ut tensio, sic vis.”*

Mr Boyle was then his chief patron, and to him he communicated his ſcheme of meaſuring time accurately by a balance- watch regulated by a ſpring ; and ſhowed him watches so constructed, which performed with ſurprising accuracy. Im­mediately after the Restoration, Mr Boyle acquainted Lord Brouncker and Sir Robert Moray, the most eminent gentle­men of the age for mathematical learning, and for natural knowledge in general, with Mr Hooke’s diſcovery and ſcheme; and thoſe gentlemen encouraged him to apply for a patent, and even drew up a form for an act of parliament, to give him **a** profit on his in vention by a duty on ſhipping. This draught was ſhown to the king, and he granted a warrant for apatent to Mr Hooke for 14 years ; which warrant was in the possession of Mr Waller.

It appears that theſe gentlemen were ſo ſensible of the merits of the invention, and ſo confident of its ſucceſs, that they associated themſelves with Dr Hooke in the proſecution of it. But in what reſpect they were to contribute, besides their influence in procuring the patent and the act of parliament, does not appear. There remained, however, in Mr Waller’s possession ſeveral ſcrolls and drafts of a mutual agreement between them to this effect: In one of them it was agreed, that if the profits ſhould exceed L. 6000, Mr Hooke ſhould have ¾ths of the overplus ; if it ſhould be only L.4000, he ſhould have ⅔ds &c. they having the rest; and that Dr Hooke ſhould be declared the author and inventor. It is probable that they were to advance the money neceſſary for carrying on the trade of watchmaking.—Many alterations were made in the terms of agreement; and it appears, that before any thing definitive was done, Hooke was diſguſted, because they in fitted, that if they or any other perſon ſhould fall on any way of improving on theſe principles, they ſhould enjoy the benefit of it during the currency of the patent. This he flatly refuſed ; ſaying, that it was *facile inventis addere.* It is pro­bable that his manner of refuſal, which never was gracious or polite, might offend persons of their rank, and contribute to put an end to the whole affair ; for it never went farther, and Hooke became much more retentive and cloſe than formerly.

But while things were on a friendly footing, there occurred ſufficient; proofs of Dr Hooke’s being the author of the invention, and that even Mr Huyghens could hardly fail of knowing ſomething of it when he was in England in 1663, **ten** or eleven years before **he** publiſhed his claim, and even before he had analyſed the motion of pendulous bodies. In page 247 of the Society’s Register, in 1660, mention is made of Hooke’s watches for the pocket, where the motion is regulated by ſprings. Now Hooke, in his first watches, employed two oppoſite ſprings, straight, and acting on the ba-