thermometer; let y be the expanſion of 10,000 parts of air ; let *e* be = to, *m = 2,7976, n =* 0,01768 : then *y = e m + nx - 627,5.* Now *e* being ≡≡ 10, it is plain that *e m+n* x is the number, of which *m* + *n x* is the common logarithm. This formula is very exact as far as the temperature 6o⁰: but beyond this it needs a correction ; becauſe air, like the vapour of water, does not expand in the exact proportion of its bulk.

We obſerve this law conſiderably approximated to in the augmentation of the bulk or elasticity of elaſtic va­pours ; that is, it is a fact that a given increment of temperature makes very nearly the ſame proportional augmentation of bulk and elasticity. This gives us ſome notion of the manner in which the ſuppoſed expanding cauſe produces the effect. When vapour of the bulk 4 is expanded into a bulk 5 by an addition of 10 de­grees of ſensible heat, a certain quantity of fire goes in­to it, and is accumulated round each particle, in ſuch a manner that the temperature of each, which formerly was m*,* is now m+10. Let it now receive another equal augmentation of temperature. This is now m+2c, and the bulk is — or 61/4, and the arithmetical increaſe of bulk is 11/4. The abſolute quantity of fire which has entered it is greater than the former, both on account of the greater augmentation of ſpace and the greater temperature. Consequently if this vapour be compreſsed into the bulk 5, there muſt be heat or fire in it which is not neceſſary for the temperature *m* + 20, far leſs for the temperature m + 10. It muſt therefore emerge, and be diſpoſed to enter a thermometer which has already the temperature *m* + 20: that is, the va­pour muſt grow hotter by compression ; not by ſqueezing out the heat, like water out of a ſponge, but be­cauſe the law of attraction for heat is deranged. It would be a very valuable acquiſition to our knowledge to learn with precision the quantity of ſensible heat pro­duced in this way; but no ſatisfactory experiments have yet been made. Μ. Lavoisier, with his chemical friends and colleagues, were buſily employed in this inquiry ; but the wickedneſs of their countrymen has deprived the world of this and many other important additions which we might have expected from this celebrated and unfortunate philoſopher. He had made, in conjunc­tion with M. de la Place, a numerous train of accurate and expenſive experiments for meaſuring the quantity of latent or combined heat in elaſtic vapours. This is evidently a very important point to the diſtiller and practical chemiſt. This heat muſt all come from the fuel ; and it is greatly worth while to know whether any ſaving may be made of this article. Thus we know that diſtillation will go on either under the preſſure of the air, or in an alembic and receiver from which the air has been expelled by ſteam ; and we know that this laſt may be conducted in a very low temperature, even not exceeding that of the human body. But it is un­certain whether this may not employ even a greater quantity of fuel, as well as occaſion a great expence of time. We are diſpoſed to think, that when there is no air in the apparatus, and when the condenſation can be ſpeedily performed, the proportion oſ fuel expended to the fluid which comes over will diminish continually as the heat, and conſequently the density of the fleam, is augmented ; becauſe in this cafe the quantity of com­bined heat muſt be leſs. In the mean time, we earneſtly recommend the trial of this mode of distillation in veſſels cleared of air. It is undoubtedly of great advan­tage to be able to work with ſmaller fires; and it would ſecure us againſt all accidents of blowing off the head of the still, often attended with terrible conſequences @@(B).

We muſt not conclude this article without taking notice of ſome natural phenomena which ſeem to owe their origin to the action of elaſtic fleam.

We have already taken notice of the reſemblance of the tremor and ſuccuſſions obſerved in the ſhocks of ma­ny earthquakes to thoſe which may be felt in a veſſel where water is made to boil internally, while the break­ing out of the ebullition is ſtifled by the cold of the up­per parts ; and we have likewiſe ſtated the objections which are uſually made to this theory of earthquakes. We may perhaps reſume the ſubject under the article Volcano ; but in the mean time we do not hesitate to ſay, that the wonderful appearances of the Geyzer spring in Iceland (ſee Huer ; and Iceland, n⁰3—5.) are undoubtedly produced by the expanſion of ſteam in ignited caverns. Of theſe appearances we ſuppoſe the whole train to be produced as follows.

A cavern may be ſuppoſed of a ſhape analogous to CBDEF (fig. 5.), having a perpendicular funnel AB iſſuing from a depreſſed part of the roof. The part F may be lower than the rest, remote, and red-hot. Such places we know to be frequent *in* Iceland. Water may be continually trickling into the part CD. It will fill it up to B, and even up to E *e,* and then trickle ſlowly along into F. As ſoon as any gets into contact with an ignited part, it expands into elaſtic steam, and is partly condenſed by the cold sides of the cavern, which it gradually warms, till it condenſes no more. This

@@@(b) We earneſtly recommend this ſubject to the conſideration of the philoſopher. The laws which regulate the formation of elaſtic vapour, or the general phenomena which it exhibits, give us that link which connects chemiſtry with mechanical philoſophy. Here we ſee chemical affinities and mechanical forces ſet in immediate opposition to each other, and the one made the indication, characteriſtic, and meaſure of the other. We have not the leaſt doubt that they make but one ſcience, the Science of Univerſal Mechanics; nor do we deſpair of feeing the phenomena of ſolution, precipitation, cryſtallization, fermentation, nay animal and vegetable ſecretion and aſſimilation, succeſsfully investigated, as cases of local motion, and explained by the agency of central forces. Some thing of this kind, and that not inconsiderable, was done when Dr Cullen firſt showed how the double affini­ties might be illustrated by the assistance of numbers. Dr Black gave to this hint (for it was little more) that elegant preciſion which characterizes all his views. Mr Kirwan has greatly promoted this study by his numerous and ingenious examples of its application ; and the moſt valuable paſſages of the writings of Mr Lavoiſier, are thoſe where he traces with logical preciſion the balancings of force which appear in the chemical phenomena. It is from the ſimilar balancings and conſequent meaſurements, which may be obſerved and obtained in the preſent cafe, that we are to hope for admiſſion into this almoſt unbounded ſcience of contemplation. We have another link equally interesting and promiſing, viz. the production of heat by friction. This alſo highly deferves the conſideration of the mathematical philoſopher.