They ſmoke the inſide of the ſhell, by burning ſtraw under it, that helps to ſmooth the ſurface of the bell. Then they put the ſhell in the place, ſo as to leave the ſame interval between that and the core; and before the hollows of the rings or the cap are put on again, they add two vents, that are united to the rings, and to each other, by a maſs of baked cement. After which they put on this maſs of the cap, the rings, and vents, over the ſhell, and ſolder it with thin cement, which is dried gradually by covering it with burning coals. Then they fill up the pit with earth, beating it ſtrongly all the time, round the mould.

The furnace has a place for the fire, and another for the metal. The fire-place has a large chimney, with a ſpacious aſh-hole: the furnace which contains the metal is vaulted, whoſe bottom is made of earth, rammed down; the reſt is built with brick. It has four apertures; the firſt, through which the flame reverberates; the ſecond is cloſed with a ſtopple, that is opened for the metal to run; the others are to ſeparate the droſs, or ſcoriæ, of the metal by wooden rakes; through theſe laſt apertures paſſes the thick ſmoke. The ground of the furnace is built ſloping, for the metal to run down. See Dict. Commerc. Eng. edit. art. FOUNDERY.

FOUNDERY. *Manner of caſting great guns, or pieces of artillery.*—The caſting of cannons, mortars, and other pieces of artillery, is performed much like that of ſtatues and bells; eſpecially as to what regards the wax, ſhell, and furnaces.

All pieces of artillery are now caſt ſolid, and bored afterwards, by means of a machine invented at Straſburgh, (ſee *Boring of* CANNON,) and much improved by Mr. Verbruggen, head founder at Woolwich. The gun to be bored was at firſt placed in a perpendicular poſition; but the machines uſed for this purpoſe have lately been made to bore horizontally, and much more exactly than thoſe that bore in a vertical ſituation. Whilſt the inſide is bored, the outſide is turned and poliſhed at the ſame time.

As to the metal, it is ſomewhat different from both; as having a mixture of tin, which is not in that of ſtatues; and only having half the quantity of tin that is in bells, *i. e.* at the rate of ten pound of tin to an hundred of copper. The reſpective quantities of different metals that ſhould enter into the compoſition for braſs cannon is not abſolutely decided; the moſt common proportions of the ingredients are the following: *viz.* to 240lb. of metal fit for caſting, they put 68lb. of copper, 25lb. of braſs, and 12lb. of tin. To 4200lb. of metal fit for caſting, the Germans put 3687$\frac{3}{4}$lb. of copper, 204$\frac{1}{4}$lb. of braſs, and 307$\frac{3}{4}$lb. of tin. Others, again, uſe 100lb. of copper, 6lb. of braſs, and 9lb. of tin; and laſtly, others make uſe of 100lb. of copper, 10lb. of braſs, and 15lb. of tin. See CANNON.

A cannon is always ſhaped a little conical, being thickeſt of metal at the breech, where the greateſt effort of the gunpowder is made, and diminiſhing thence to the muzzle; ſo that if the mouth be two inches thick of metal, the breech is ſix. See CANNON.

Its length is meaſured in calibers, *i. e.* in diameters of the muzzle. Six inches at the muzzle require twenty calibers, or ten feet in length; there is always about the ſixth of an inch allowed play for the ball. For the parts, and their reſpective proportions of different ſorts of guns, ſee CANNON and GUN. The method of caſting iron cannon differs very little from that of braſs.

FOUNDERY, *Letter, or the method of caſting printing Letters.*—The invention of printing letters we ſhall ſpeak of under PRINTING and LETTER.

Their difference, kind, &c. have already been explained under the articles CHARACTER, &c.

In the buſineſs of cutting, caſting, &c. letters for printing, the letter-cutter muſt be provided with a vice, hand-vice, hammers and files of all ſorts for watch-makers' uſe; as alſo gravers and ſculpters of all ſorts, and an oil-ſtone, &c. ſuitable and ſizeable to the ſeveral letters to be cut: a flat gauge made of box to hold a rod of ſteel, or the body of a mould, &c. exactly perpendicular to the flat of the uſing-file: a ſliding gauge, whoſe uſe is to meaſure and ſet off diſtances between the ſhoulder and the tooth, and to mark it off from the end, or from the edge of the work; a face-gauge, which is a ſquare notch cut with a file into the edge of a thin plate of ſteel, iron, or braſs, of the thickneſs of a piece of common tin, whoſe uſe is to proportion the face of each ſort of letter, *viz.* long letters, aſcending letters, and ſhort letters. So there muſt be three gauges, and the gauge for the long letters is the length of the whole body ſuppoſed to be divided into forty-two equal parts. The gauge for the aſcending letters, Roman and Italic, are $\frac{5}{7}$, or 30 parts of 42, and 33 parts for the Engliſh face. The gauge for the ſhort letters is $\frac{3}{7}$ or 18 parts of 42 of the whole body for the Roman and Italic, and 22 parts for the Engliſh face.

The Italic and other ſtanding gauges are to meaſure the ſcope of the Italic ſtems, by applying the top and bottom of the gauge to the top and bottom lines of the letters, and the other ſide of the gauge to the ſtem; for when the letter complies with theſe three ſides of the gauge, that letter has its true ſhape.

The next care of the letter-cutter is to prepare good ſteel punches, well-tempered, and quite free from all veins of iron; on the face of which he draws or marks the exact ſhape of the letter, with pen and ink, if the letter be large; or with a ſmooth blunted point of a needle, if it be ſmall; and then with ſizeable and proper ſhaped and pointed gravers and ſculpters, digs or ſculps out the ſteel between the ſtrokes or marks he made on the face of the punch, and leaves the marks ſtanding on the face. Having well ſhaped the inſide ſtrokes of his letter, he deepens the hollows with the ſame tools: for if a letter be not deep in proportion to its width, it will, when uſed at preſs, print black, and be good for nothing. This work is generally regulated by the depth of the counter-punch. Then he works the outſide with proper files till it be fit for the matrice.

But before we proceed to the ſinking and juſtifying of the matrices, we muſt provide a mould to juſtify them by, of which you have a draught in *Plate* XV. *Miſcellany, figs.* 2, 3.

Every mould is compoſed of an upper and an under part. The under part is delineated in *fig.* 2. The upper part is marked *fig.* 3, and is in all reſpects made like the under part, excepting the ſtool behind, and the bow, or ſpring, alſo behind; and excepting a ſmall roundiſh wire between the body and carriage, near the break where the under part hath a ſmall rounding groove made in the body. This wire, or rather half-wire, in the upper part, makes the nick in the ſhank of the letter, when part of it is received into the groove in the under part. Theſe two parts are ſo exactly fitted and gauged into one another (*viz.* the male gauge, marked c in *fig.* 3. into the female marked g in *fig.* 2.) that when the upper part of the mould is properly placed on, and in the under part of the mould, both together, make the entire mould, and may be ſlid backwards for uſe ſo far, till the edge of either of the bodies on the middle of either carriage comes juſt to the edge of the female gauges, cut in each carriage: and they may be ſlid forwards

wards ſo far, till the bodies on either carriage touch each other: and the ſliding of theſe two parts of the mould backwards makes the ſhank of the letter thicker, becauſe the bodies in each part ſtand wider aſunder, and the ſliding them forwards makes the ſhank of the letter thinner, becauſe the bodies on each part of the mould ſtand cloſer together.

The parts of the mould are as follow; *viz.*

a The carriage.
b The body.
c The male gauge.
d e The mouth-piece.
f i The regiſter.
g The female gauge.
h The hag.
a a a a The bottom plate.
b b b The wood, on which the bottom plate lies.
c c c The mouth.
d d The throat.
e d d The pallet.
f The nick.
g g The ſtool.
b b The ſpring or bow.

Then the mould muſt be juſtified: and firſt the founder juſtifies the body, by caſting about twenty proofs or ſamples of letters, which are ſet in a compoſing ſtick, with all their nicks towards the right hand; and then by comparing theſe with the pattern letters, ſet up in the ſame manner, he finds the exact meaſure of the body to be caſt. He alſo tries if the two ſides of the body are parallel, or that the body be no bigger at the head than at the foot; by taking half the number of his proofs, and turning them with their heads to the feet of the other half; and if then the heads and the feet be found exactly even upon each other, and neither to drive out nor get in, the two ſides may be pronounced parallel. He farther tries whether the two ſides of the thickneſs of the letter be parallel by firſt ſetting his proofs in the compoſing ſtick with their nicks upwards; and then turning one-half with their heads to the feet of the other half: and if the heads and feet lie exactly upon each other, and neither drive out nor get in, the two ſides of the thickneſs are parallel.

The mould thus juſtified: the next buſineſs is to prepare the matrices. A matrice is a piece of braſs or copper of about an inch and a half long, and of a thickneſs in proportion to the ſize of the letter it is to contain. In this metal is ſunk the face of the letter intended to be caſt, by ſtriking the letter punch about the depth of an n. After this the ſides and face of the matrice muſt be juſtified and cleared, with files, of all bunchings made by ſinking the punch.

Every thing thus prepared, it is brought to the furnace, which is built of brick upright, with four ſquare ſides, and a ſtone on the top, in which ſtone is a wide round hole for the pan to ſtand in. A foundery of any conſequence has ſeveral of theſe furnaces in it.

As to the metal of which the types are to be caſt, this, in extenſive founderies, is always prepared in large quantities; but caſt into ſmall bars of about twenty pounds weight to be delivered out to the workmen as occaſion requires. In the letter foundery which has been long carried on with reputation, under the direction of Dr. Alexander Wilſon, and ſons, at Glaſgow, we are informed, that a ſtock of metal is made up at two different times of the year, ſufficient to ſerve the caſters at the furnace for ſix months each time. For this purpoſe a large furnace is built under a ſhade, furniſhed with a wheel vent, in order the more equally to heat the ſides of a ſtrong pot of caſt iron, which holds, when full, fifteen hundred weight of the metal. The fire being kindled below, the bars of lead are let ſoftly down into the pot, and their fuſion promoted by throwing in ſome pitch and tallow, which ſoon inflame. An outer chimney, which is built ſo as to project about a foot over the fartheſt lip of the pot, catches hold of the flame by a ſtrong draught, and makes it act very powerfully in melting lead; whilſt it ſerves at the ſame time to convey away all the fumes, &c. from the workmen, to whom this laborious part of the buſineſs is committed. When the lead is thoroughly melted, a due proportion of the regulus of antimony and other ingredients are put in, and ſome more tallow is inflamed, to make the whole incorporate ſooner. The workmen now having mixed the contents of the pot very thoroughly, by ſtirring long with a large iron ladle, next proceed to draw the metal off into the ſmall troughs of caſt iron which are ranged, to the number of fourſcore, upon a level platform, faced with ſtone, built towards the right hand. In the courſe of a day fifteen hundred weight of metal can be eaſily prepared in this manner; and the operation is continued for as many days as are neceſſary to prepare a ſtock of metal, of all the various degrees of hardneſs. After this the whole is diſpoſed into preſſes, according to its quality, to be delivered out occaſionally to the workmen.

The founder muſt be now provided with a ladle, which differs nothing from other iron ladles, but in its ſize. And he is provided always with ladles of ſeveral ſizes, which he uſes according to the ſize of the letter he is to caſt. Before the caſter begins to caſt, he muſt kindle his fire in the furnace to melt the metal in the pan. Therefore he takes the pan out of the hole in the ſtone, and there lays in coals and kindles them; and, when they are well kindled, he ſets the pan in again and puts in metal into it to melt; if it be a ſmall bodied letter he caſts, or a thin letter of great bodies, his metal muſt be very hot; nay ſometimes red-hot, to make the letter come. Then having choſen a ladle that will hold about ſo much as the letter and break is, he lays it at the ſtoking hole, where the flame burſts out, to heat. Then he ties a thin leather, cut with its narrow end againſt the face to the leather groove of the matrice, by whipping a brown thread twice about the leather-groove, and faſtening the thread with a knot. Then he puts both halves of the mould together, and puts the matrice into the matrice-cheek, and places the foot of the matrice on the ſtool of the mould, and the broad end of the leather upon the wood of the upper half of the mould, but not tight up, leſt it might hinder the foot of the matrice from ſinking cloſe down upon the ſtool in a train of work. Then laying a little roſin on the upper-wood of the mould, and having his caſting-ladle hot, he with the bolling ſide of it melts the roſin: and, when it is yet melted, preſſes the broad end of the leather hard down on the wood, and ſo faſtens it to the wood: all this is the preparation.

Now he comes to caſting. Wherefore placing the under half of the mould in his left hand with the hook or hag forward, he clutches the ends of its wood between the lower part of the ball of his thumb and his three hind fingers; then he lays the upper half of the mould upon the under half, ſo that the male gauges may fall into the female gauges, and at the ſame time the foot of the matrice places itſelf upon the ſtool; and, claſping his left hand

hand thumb ſtrong over the upper half of the mould he nimbly catches hold of the bow or ſpring with his right hand fingers at the top of it, and his thumb under it, and places the point of it againſt the middle of the notch in the backſide of the matrice, preſſing it as well forwards towards the mould, as downwards, by the ſhoulder, of the notch cloſe upon the ſtool, while at the ſame time with his hinder fingers, as aforeſaid, he draws the under half of the mould towards the ball of his thumb, and thruſts by the ball of his thumb the upper part towards his fingers, that both the regiſters of the mould may preſs againſt both ſides of the matrice, and his thumb and fingers preſs both halves of the mould cloſe together.

Then he takes the handle of his ladle in his right hand, and with the boll of it gives a ſtroke, two or three, outwards upon the ſurface of the melted metal, to ſcum or clear it from the film or duſt that may ſwim upon it; then takes up the ladle full of metal, and having his mould, as aforeſaid, in his left hand, he a little twiſts the left ſide of his body from the furnace, and brings the geat of his ladle (full of metal) to the mouth of the mould, and twiſts the upper part of his right hand towards him to turn the metal into it, while at the ſame moment of time he jilts the mould in his left hand forwards, to receive the metal with a ſtrong ſhake (as it is called); not only into the bodies of the mould, but while the metal is yet hot running, ſwiftly and ſtrongly, into the very face of the matrice, to receive its perfect form there, as well as in the ſhank.

Then he takes the upper half of the mould off the under half, by placing his right hand thumb on the end of the wood next his left hand thumb, and his two middle-fingers at the other end of the wood; and finding the letter and break lie in the under half of the mould, (as moſt commonly by reaſon of its weight it does,) he throws or toſſes the letter, break and all, upon a ſheet of waſte paper laid for that purpoſe on the bench, juſt a little beyond his left hand, and is then ready to caſt another letter as before; and alſo, the whole number that is to be caſt with that matrice.

A workman will ordinarily caſt about three thouſand of theſe letters in a day.

When the caſters at the furnace have got a ſufficient number of types upon the tables, a ſet of boys come, and nimbly break away the jets from them: the jets are thrown into the pots, and the types are carried away in parcels to other boys, who paſs them ſwiftly under their fingers, defended by leather, upon ſmooth flat ſtones, in order to poliſh their broad-ſides. This is a very dextrous operation, and is a remarkable inſtance of what may be effected by the power of habit and long practice; for theſe boys, in turning up the other ſide of the type, do it ſo quickly by a mere touch of the fingers of the left hand, as not to require the leaſt perceptible intermiſſion in the motion of the right hand upon the ſtone. The types, thus finely ſmoothed and flattened on the broad-ſides, are next carried to another ſet of boys, who ſit at a ſquare table, two on each ſide, and there are ranged up on long rulers, or ſticks, fitted with a ſmall projection, to hinder them from ſliding off backwards. When theſe ſticks are ſo filled, they are placed, two and two, upon a ſet of wooden pins fixed into the wall, near the dreſſer, ſometimes to the amount of a hundred, in order to undergo the finiſhing operations. This workman, who is always the moſt expert and ſkilful in all the different branches carried on at the foundery, begins by taking one of theſe ſticks, and, with a peculiar addreſs, ſlides the whole column of types off upon the dreſſing-ſtick: this is made of well-ſeaſoned mahogany, and furniſhed with two end-pieces of ſteel, a little lower than the body of the types, one of which is moveable, ſo as to approach the other by means of a long ſcrew-pin, inſerted in the end of the ſtick. The types are put into this ſtick with their faces next to the back or projection; and after they are adjuſted to one another ſo as to ſtand even when they are bound up, by ſcrewing home the moveable end-piece. It is here where the great and requiſite accuracy of the moulds comes to be perceived; for in this caſe the whole column, ſo bound up, lies flat and true upon the ſtick, the two extreme types being quite parallel, and the whole has the appearance of one ſolid continuous plate of metal. The leaſt inaccuracy in the exact parallelism of the individual type, when multiplied ſo many times, would render it impoſſible to bind them up in this manner, by diſpoſing them to riſe or ſpring from the ſtick by the ſmalleſt preſſure from the ſcrew. Now, when lying ſo conveniently with the narrow edges uppermoſt, which cannot poſſibly be ſmoothed in the manner before mentioned by the ſtones, the workman does this more effectually by ſcraping the ſurface of the column with a thick-edged but ſharp razor, which at every ſtroke brings on a very fine ſmooth ſkin, like to poliſhed ſilver; and thus he proceeds till in about half a minute he comes to the farther end of the ſtick. The other edges of the types are next turned upwards, and poliſhed in the ſame manner. It is whilſt the types thus lie in the dreſſing-ſtick that the operation of bearding or barbing is performed, which is effected by running a plane, faced with ſteel, along the ſhoulder of the body next to the face, which takes more or leſs off the corner, as occaſion may require. Whilſt in the dreſſing-ſtick they are alſo grooved, which is a very material operation. In order to underſtand this, it muſt be remembered, that when the types are firſt broken off from the jets, ſome ſuperfluous metal always remains, which would make them bear very unequally againſt the paper whilſt under the printing-preſs, and effectually mar the impreſſion. That all theſe inequalities may, therefore, be taken away, and that the bearings of every type may be regulated by the ſhoulders imparted to them all alike from the mould, the workman or dreſſer proceeds in the following manner. The types being ſcrewed up in the ſtick, as before mentioned, with the jet-end outermoſt, and projecting beyond the wood about one eighth of an inch, the ſtick is put into an open preſs, ſo as to preſent the jet-end uppermoſt, and then every thing is made faſt by driving a long wedge, which bears upon a ſlip of wood, which lies cloſe to the types the whole length: then a plough or plane is applied, which is ſo conſtructed as to embrace the projecting part of the types betwixt its long ſides, which are made of poliſhed iron. When the plane is thus applied, the ſteel cutter bearing upon that part between the ſhoulders of the types, where the inequalities lie, the dreſſer dextrouſly glides it along, and by this means ſtrips off every irregular part that comes in the way, and ſo makes an uniform groove the whole length, and leaves the two ſhoulders ſtanding; by which means every type becomes preciſely like to another, as to the height againſt paper. The types being now finiſhed, the ſtick is taken out of the preſs, and the whole column replaced upon the other ſtick; and after the whole are ſo dreſſed, he proceeds to pick out the bad letters, previouſly to putting them up into pages and papers. In doing this he takes the ſtick into his left hand, and turning the faces near to the light, he examines them carefully, and whenever an imperfect or damaged letter occurs, he nimbly plucks it out with a ſharp bodkin, which he holds in the right hand for that purpoſe. Thoſe letters which, from their form, project over the body

of

of the type, and which cannot on this account be rubbed on the ſtones, are ſcraped on the broad-ſides with a knife or file, and ſome of the metal next the face pared away with a pen-knife, in order to allow the type to come cloſe to any other. This operation is called kerning.

The excellence of printing types conſiſts not only in the due performance of all the operations above deſcribed, but alſo in the hardneſs of the metal, form, and fine proportion of the character, and in the exact bearing and ranging of the letters in relation to one another.

FOUNDERY, *Military*. Under the ſeveral appropriate heads, we have furniſhed information regarding the ſeveral kinds of foundery neceſſary to the eſtabliſhment of that variety of profeſſions, wherein caſtings of different kinds, whether in metal, wax, plaſter, &c. are deſiderata: we now have to offer a few remarks on ſuch as appertain more particularly to the ſupply of our arſenals.

The caſting of cannon, ſhot, &c. was, until about half a century ago, conſidered an arduous undertaking; and ſo little were the fundamental principles of the art underſtood, that we are aſſured not one in three of the ſhells caſt for the mortar ſervice could be admitted into the ſtores. Such have been the improvements made, that thouſands of articles, which uſed to be from neceſſity made of wrought iron, are now to be had from the founderies at leſs than one-fifth of their former prices; while the material itſelf has been ſo highly perfected, that inſtances have been known of caſt-iron being ſufficiently ſoft to bear the file, and ſufficiently ductile to undergo the hammer. Such, indeed, could not be done but at conſiderable expence; nor does it appear that much good could reſult in general. With reſpect to military apparatus, it is found expedient to have the whole of our cannon, mortars, carronades, ſhot, ſhells, and garriſon gun-carriages, caſt at the ſeveral founderies eſtabliſhed in the vicinity of coal and iron mines; whereby the work is done at comparatively a low expence, and the articles can be conveyed by water to the warren at Woolwich much under the prices at which they could be caſt at the place, to which both the iron and the coals muſt be tranſported.

The French have, ſince the commencement of the revolution, ſhewn what may be effected in this branch of military economy, by a people determined to overcome every difficulty, and to apply their reſources, whether public or private, towards national purpoſes. It is a well aſcertained fact, that in ſeveral of the departments of France, from which the trains of artillery, together with the ſeveral ſtores appertaining to them, had been withdrawn, the people ſupplied their national guards with field-pieces caſt in ſmall temporary founderies, where the furnaces were rarely equal to heating more than from twenty to thirty pounds of bell-metal, &c. of which the ſacred edifices, &c. throughout the country had been ſtripped. By a due combination of the whole, very ſerviceable cannon, and eſpecially howitzers, which ſeem to be a favourite ſpecies of artillery among the French, were thus ſupplied.

Though it muſt be admitted that a foundery ſuited to caſting cannon, of any deſcription, could not be attached to the ordnance department of armies ſerving out of the kingdom, we are inclined to hazard the opinion, that ſmall laboratory furnaces, adequate to the caſting of ſhot and grape, but eſpecially of muſket balls, might be annexed thereto. In ſome inſtances, when the ſtock of grape-ſhot has been expended, it has become neceſſary to make caſe-ſhot of muſket balls, whereby the infantry have been very ill ſupplied with ammunition. If, in ſuch inſtances, portable furnaces, and crucibles, together with proper moulds, have been at hand, (for the whole might be conveyed in a waggon, or perhaps in a cart,) abundance of refuſe iron could have been formed into grape-ſhot; and there would have been no ſcarcity of muſket ammunition.

Nor can we ſee any objection to the ſupply of proper materials for eſtabliſhing founderies, ſuited to caſting field-pieces, being ſhipped with extenſive armaments proceeding on foreign ſervice; ſince the ſpace they would occupy muſt be far leſs than is required for that immenſe quantity of ſtores neceſſarily ſent to places where no foundery exiſts. Hence tonnage, time, and treaſure, are often laviſhly expended. The caſting of ſhot and ſhells, in ſuch ſituations, would generally prove eaſy, and liberate many a tranſport from the conveyance of ſuch dead-weight, as not only precludes the ſupply of other equally neceſſary ſtores, but, in many inſtances, riſks, or even cauſes, a total loſs.

FOUNDLING HOSPITAL. See *Foundling* HOSPITAL.

FOUN-HING, in *Geography*, a town of China, of the ſecond rank, in the province of Fo-kien; 175 miles E.S.E. of Peking. N. lat. 26° 54′. E. long. 119° 49′.

FOUN-IM, a town of China, of the third rank, in the province of Pe-tche-li; 20 miles E. of Young-ping.

FOUNT, or FONT, among *Printers*, &c. a ſet, or quantity, of characters, or letters, of each kind, caſt by a letter-founder, and ſorted.

We ſay, a founder has caſt a fount of pica, of Engliſh, of pearl, &c. meaning that he has caſt a ſet of characters of theſe kinds.

A complete fount does not only include the running letter, but alſo majuſcules, or large and ſmall capitals, ſingle letters, double letters, points, commas, lines, borders, head-pieces, tail-pieces, and numeral characters.

Founts are large or ſmall, according to the demand of the printer, who orders them by the hundred weight, or by ſheets. When the printer orders a fount of five hundred, he means that the fount ſhould weigh five hundred pounds. When he demands a fount of ten ſheets, it is underſtood, that with that fount he ſhall be able to compoſe ten ſheets, or twenty forms, without being obliged to diſtribute. The founder takes his meaſures accordingly: he reckons a hundred and twenty pounds for a ſheet, including the quadrates, &c. or ſixty pounds for a form, which is half a ſheet: not that the ſheet always weighs a hundred and twenty pounds, or the form ſixty pounds; on the contrary, it varies according to the ſize of the form; beſides, it is always ſuppoſed that there are letters left in the caſes.

The letter-founders have a kind of liſt, or tariff, whereby they regulate their founts: the occaſion of which is, that ſome letters being in much more uſe, and oftener repeated, than others, their cells, or caſes, ſhould be better filled and ſtored, than thoſe of the letters which do not return ſo frequently.

Thus the *o*, and *i*, for inſtance, are always in greater quantity than the *k*, or *z*.

This difference will be beſt perceived from a proportional compariſon of thoſe letters with themſelves, or ſome others. Suppoſe a fount of a hundred thouſand characters, which is a common fount: here the *a* ſhould have five thouſand; the *c*, three thouſand; the *e*, eleven thouſand; the *i*, ſix thouſand; the *m*, three thouſand; the *k*, only thirty; and the *x*, *y*, and *z*, not many more. But this is only to be underſtood of the letters of the lower caſe; thoſe of the upper caſe having other proportions, which it would be here too long to inſiſt on.

FOUNTAIN, FONS, in *Philoſophy*, a ſpring, or ſource, of water, riſing out of the ground.

For

THE

CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS,

BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

VOL. XV.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, & BROWN, PATERNOSTER-ROW,

F.C. AND J. RIVINGTON, A. STRAHAN, PAYNE AND FOSS, SCATCHERD AND LETTERMAN, J. CUTHELL, CLARKE AND SONS, LACKINGTON HUGHES HARDING MAVOR AND JONES, J. AND A. ARCH, CADELL AND DAVIES, S. BAGSTER, J. MAWMAN, JAMES BLACK AND SON, BLACK KINGSBURY PARBURY AND ALLEN, R. SCHOLEY, J. BOOTH, J. BOOKER, SUTTABY EVANCE AND FOX, BALDWIN CRADOCK AND JOY, SHERWOOD NEELY AND JONES, R. SAUNDERS, HURST ROBINSON AND CO., J. DICKINSON, J. PATERSON, E. WHITESIDE, WILSON AND SONS, AND BRODIE AND DOWDING.

1819.