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ESSAY XVIII.

OF THE EXCELLENT QUALITIES OF COFFEE, AND THE ART OF MAKING IT IN THE HIGHEST PERFECTION.

ILLUSTRATED BY COPPER-PLATES.

By BENJAMIN COUNT OF RUMFORD, F.R.S.

ESSAY XVIII.

THE uſe of ſcience is to explain the operations which take place in the practice of the arts, and to diſcover the means of improving them; and there is no proceſs, however ſimple it may appear to be, that does not afford an ample field for curious and intereſting inveſtigation.

As thoſe domeſtic arts, and elegant refinements, which the progreſs of induſtry, and the increaſe of wealth and knowledge introduce in ſociety, contribute to the comfort and happineſs of great numbers of reſpectable individuals; their improvement muſt be intereſting to all thoſe who take pleaſure in contemplating the proſperity of mankind, and in contributing to their innocent enjoyments.

Among the numerous luxuries of the table, unknown to our forefathers, which have been imported into Europe in modern times, *Coffee* may be conſidered as one of the moſt valuable.

Its taſte is very agreeable, and its flavour uncommonly ſo; but its principal excellence depends on its ſalubrity, and on its exhilarating quality.

It excites cheerfulneſs, without intoxication; and the pleaſing flow of ſpirits which it occaſions, laſts many hours, and is never followed by ſadneſs, languor, or debility.

It diffuſes over the whole frame, a glow of health, and a ſenſe of eaſe and well-being, which is exceedingly delightful. Exiſtence is felt to be a poſitive enjoyment, and the mental powers are awakened, and rendered uncommonly active.

It has been facetiouſly obſerved, that there is more wit in Europe ſince the uſe of Coffee has become general among us; and I do not heſitate to confeſs, that I am ſeriouſly of that opinion.

Some of the ableſt, moſt brilliant, and moſt indefatigable men I have been acquainted with, have been remarkable for their fondneſs for Coffee; and I am ſo perſuaded of its powerful effects in clearing up the mind, and invigorating its faculties, that on very intereſting occaſions, I have ſeveral times taken an additional doſe of it for that very purpoſe.

That Coffee has greatly contributed to our innocent enjoyments, cannot be doubted; and experience has abundantly proved, that ſo far from being unwholeſome, it is really very ſalubrious.

This delicious beverage has ſo often been celebrated, both in proſe and verſe, that it does not ſtand in need of my praiſes to recommend it; I

ſhall

ſhall therefore confine myſelf to the humble office of ſhewing how it can be prepared in the greateſt perfection *.

There is no culinary proceſs that is liable to ſo much uncertainty in its reſults, as the making of Coffee; and there is certainly none in which any ſmall variation in the mode of operation, produces more ſenſible effects.

With the ſame materials, and even when uſed in the ſame proportions, this liquor is one day good, and the next bad; and nobody perhaps can even gueſs at the cauſe of this difference; and what renders theſe variations of greater importance, is this remarkable circumſtance, that when Coffee is bad, when it has loſt its peculiar aromatic flavour, which renders it ſo very agreeable to the organs of

* If I have abſtained from giving a botanical deſcription of the evergreen ſhrub which produces Coffee; with an account of its culture, and the various attempts that have been made by chemiſts to analize its grain, it is becauſe this information (which would neceſſarily take up a good deal of room, without being particularly intereſting to moſt readers) may be found in other books.

The ſame reaſons have prevented my giving a hiſtory of the introduction of the uſe of Coffee in Europe, and of the introduction of the plant which produces it, into the American Iſlands, and from thence into the tropical regions of the Continent of America.

It is well known that this precious plant was firſt found growing wild in Arabia; and that it does not proſper, except in very hot climates, and in hilly countries.

taſte

taſte and of ſmell; it has loſt its exhilarating qualities, and with them, all that was valuable in it.

Different methods have been employed in making Coffee; but the preparation of the grain is nearly the ſame in all of them. It is firſt roaſted in an iron pan, or in a hollow cylinder, made of ſheet-iron, over a briſk fire; and when, from the colour of the grain, and the peculiar fragrance which it acquires in this proceſs, it is judged to be ſufficiently roaſted, it is taken from the fire, and ſuffered to cool. When cold it is pounded in a mortar; or ground in a hand-mill to a coarſe powder, and preſerved for uſe.

Great care muſt be taken in roaſting Coffee, not to roaſt it too much; as ſoon as it has acquired a deep cinnamon colour, it ſhould be taken from the fire, and cooled; otherwiſe much of its aromatic flavour will be diſſipated, and its taſte will become diſagreeably bitter.

In ſome parts of Italy, Coffee is roaſted in a thin Florence flaſk, ſlightly cloſed by means of a looſe cork. This is held over a clear fire of burning coals, and continually agitated. As no viſible vapour ever makes its appearance within the flaſk, the colour of the Coffee may be diſtinctly ſeen through the glaſs, and the proper moment ſeized for removing the Coffee from the fire.

I have endeavoured to improve this Italian method, by uſing a thin globular glaſs veſſel, with a long

a long narrow cylindrical neck. This globular veſſel is ſix inches in diameter, and its cylindrical neck is one inch in diameter and eighteen inches long. It is laid down horizontally, and ſupported in ſuch manner on a wooden ſtand, as to be eaſily turned round its axis. The globular veſſel projects beyond the ſtand, and is placed, at a proper height, immediately over a chaffing diſh of live coals. When this globular veſſel is blown ſufficiently thin; and when care is taken to keep it conſtantly turning round, when it is over the fire, there is not the ſmalleſt danger of its being injured by the heat, however near it may be to the burning coals.

In order that Coffee may be perfectly good, and very high flavoured, not more than half a pound of the grain ſhould be roaſted at once; for when the quantity is greater, it becomes impoſſible to regulate the heat in ſuch a manner as to be quite certain of a good reſult.

The end of the cylindrical neck of the globular veſſel ſhould be cloſed by a fit cork, having a ſmall ſlit in one ſide of it, to permit the eſcape of the vapour out of the veſſel. This cork ſhould project about an inch beyond the extremity of the neck of the veſſel, in order that it may be uſed as a handle in turning the veſſel round its axis, towards the end of the proceſs, when the neck of the veſſel becomes very hot. The progreſs of the operation, and the moment moſt proper to put an end to it, may be judged, and determined with great certainty; not

only by the changes which take place in the colour of the grain; but alſo by the peculiar fragrance which will firſt begin to be diffuſed by it, when it is nearly roaſted enough.

This fragrance is certainly owing to the eſcape of a volatile, aromatic, ſubſtance; which did not originally exiſt, *as ſuch*, in the grain; but which is formed in the proceſs of roaſting it.

By keeping the neck of the globular veſſel cold, by means of wet cloths, I found means to condenſe this aromatic ſubſtance, together with a large portion of aqueous vapour, with which it was mixed.

The liquor which reſulted from this condenſation, which had an acid taſte, was very high flavoured, and as colourleſs as the pureſt water; but it ſtained the ſkin of a deep yellow colour; which could not be removed by waſhing with ſoap and water; and this ſtain retained a ſtrong ſmell of Coffee ſeveral days.

I have made ſeveral unſucceſsful attempts to preſerve the fragrant aromatic matter which eſcapes from Coffee when it is roaſting, by transferring it to other ſubſtances. Perhaps others may be more fortunate.

But I muſt not ſuffer myſelf to be inticed away from my ſubject by theſe intereſting ſpeculations.

If the Coffee in powder is not well defended from the air, it ſoon loſes its flavour, and becomes of little value; and the liquor is never in ſo high perfection

fection, as when the Coffee is made immediately after the grain has been roaſted.

This is a fact well known to thoſe who are accuſtomed to drinking Coffee, in countries where the uſe of it is not controuled by the laws; and if a government is ſeriouſly diſpoſed to encourage the general uſe of Coffee, individuals muſt be permitted to roaſt it in their own houſes.

As the roaſting and grinding of Coffee takes up ſome conſiderable time, and cannot always be done without inconvenience at the moment when the Coffee is wanted; I contrived a box for keeping the ground Coffee, which I have found, by ſeveral years' experience, to preſerve the Coffee much better than any of the veſſels commonly uſed for that purpoſe. It is a cylindrical box made of ſtrong tin, four inches and a quarter in diameter, and five inches in height, formed as accurately as poſſible within, to which a piſton is ſo adapted, as to cloſe it very exactly; and when preſſed down into it, to remain in the place where it is left, without being in danger of being puſhed upwards by the elaſticity of the ground Coffee, which it is deſtined to confine.

This piſton is compoſed of a circular plate of very ſtout tin, which is ſoldered to the lower part of an elaſtic hoop of tin, about two inches wide, which is made to fit into the cylindrical box as exactly as poſſible; and ſo as not to be moved up and down in it, without employing a conſiderable force.

force. This hoop is rendered elaſtic, by means of a number of vertical ſlits made in the ſides of it.

On the upper ſide of the circular plate of tin, which cloſes this hoop below, and in the centre of it, there is fixed a ſtrong ring, of about one inch in diameter, which ſerves inſtead of a piſton rod, or a handle for the piſton. The cylindrical box is cloſed above by a cover, which is fitted to it with care, in order that the air, which is ſhut up within the box (between the piſton and the cover) might be well confined.

Before I proceed to deſcribe the apparatus I ſhall recommend for making Coffee, it will be uſeful to enquire what the cauſes are, which render the preparation of that liquor ſo precarious; and in order to facilitate that inveſtigation, we muſt ſee what the circumſtances are, on which the qualities depend, which are moſt eſteemed in Coffee.

Boiling hot water extracts from Coffee, which has been properly roaſted and ground, an aromatic ſubſtance, of an exquiſite flavour, together with a conſiderable quantity of aſtringent matter, of a bitter, but very agreeable taſte; but this aromatic ſubſtance, which is ſuppoſed to be an oil, is extremely volatile; and is ſo feebly united to the water, that it eſcapes from it into the air with great facility.

If a cup of the very beſt Coffee, prepared in the higheſt perfection, and boiling hot, be placed on a table, in the middle of a large room, and ſuffered

to cool, it will in cooling fill the room with its fragrance; but the Coffee, after having become cold, will be found to have loſt a great deal of its flavour.

If it be again heated, its taſte and flavour will be ſtill farther impaired; and after it has been heated and cooled two or three times, it will be found to be quite vapid and diſguſting.

The fragrance diffuſed through the air is a ſure indication that the Coffee has loſt ſome of its moſt volatile parts; and as that liquor is found to have loſt its peculiar flavour, and also *its exhilarating quality*, there can be no doubt but that both theſe depend on the preſervation of thoſe volatile particles which eſcape into the air with ſuch facility.

If the liquid were perfectly at reſt, the volatile particles diſſeminated in it, could not eſcape; or at leaſt not with the ſame facility as when it is agitated. Thoſe at the ſurface of the liquid might fly off, but thoſe below the ſurface would be confined and preſerved.

Now all liquids, that are either heated or cooled, are neceſſarily diſturbed and agitated; and the internal motions into which their particles are thrown, do not ceaſe, till the heating or cooling proceſs has ceaſed.

As the particles of fluids are much too ſmall to be viſible, the motions which take place among them cannot be ſeen; but means have neverthe-

leſs

leſs been found to render theſe motions quite evident.

If a ſmall quantity of any ſolid ſubſtance, in the form of a coarſe powder, and having the ſame ſpecific gravity as any tranſparent liquid, be mixed with it, and the liquid be either heated or cooled, the currents formed in the liquid in conſequence of the change of its temperature, will carry along with them the viſible particles of the powder, diffeminated in the liquid, and the directions and velocities of thoſe currents will become apparent.

The cauſe of theſe motions among the particles of liquids, that are heated or cooled, is perfectly known.

When a hot liquid is cooled, thoſe of its particles which are the firſt expoſed to the cooling influence, on loſing a part of their heat, become ſpecifically heavier than they were before; conſequently they become ſpecifically heavier than the ſurrounding hotter particles, which cauſes them to deſcend towards the bottom of the containing veſſel.

This deſcent of the particles which are cooled neceſſarily puts the whole maſs of the liquid in motion. The warmer and lighter particles are continually riſing towards the ſurface of the liquid; while the colder and heavier particles are deſcending; and theſe motions never can ceaſe, till the whole of the liquid has acquired the preciſe temperature of the ſurrounding atmoſphere.

When

When the liquid is heated, ſimilar motions take place; but in an oppoſite direction. The particles firſt heated, being rendered ſpecifically lighter by this augmentation of temperature, riſe upwards; and give place to the colder and heavier particles which deſcend.

Theſe motions may be rendered viſible by a very ſimple contrivance.

If one ounce of common ſalt be diſſolved in eight ounces of water, a brine will be formed, which will have the ſame ſpecific gravity as yellow amber; conſequently, if a ſmall quantity of that ſolid ſubſtance be pounded in a mortar, ſo as to be reduced to a coarſe powder (of about the ſize of muſtard ſeeds), this powder, on being put into the brine, will remain ſuſpended in that liquid, and in all parts of it, without either ſinking or riſing to its ſurface; and the particles of the amber being viſible in the brine, will, by their motions, indicate the motions and directions of the currents in the liquid, which take place when the temperature of the liquid is changed *.

If now, two like glaſs tumblers be filled, the one with the pure brine moderately heated, the other with an equal quantity of the ſame brine, at the ſame temperature, containing a ſmall quantity of the powdered amber, intimately mixed with it, on

* In order that the brine may be rendered perfectly tranſparent, it ſhould be filtered, or made to paſs through filtering paper.

expo-

expoſing theſe two glaſs veſſels with their contents, to cool in the air, in a quiet room, no motion will be perceived among the particles of the pure brine (which are inviſible), but the motions which will be ſeen to take place among the particles of amber in the other tumbler, will afford a convincing proof that the apparent reſt in the pure brine muſt neceſſarily be a deception; and that the particles of both theſe maſſes of cooling liquid are moſt undoubtedly in motion.

As ſoon as theſe liquids have acquired the temperature of the ſurrounding atmoſphere, their internal motions will ceaſe; but on every change of temperature they will recommence.

We may conceive the particles of amber, diſſeminated in the brine, to repreſent the particles of the aromatic ſubſtance, diſſeminated in new-made Coffee: as long as the Coffee remains at reſt, that is to ſay, as long as its temperature remains unchanged, theſe aromatic particles cannot eſcape; for they cannot come to the ſurface of the liquid; but when the liquid is put in motion, their eſcape is greatly facilitated.

When the cauſe of any evil is perfectly known, it is ſeldom very difficult to find means to prevent it.

In order that Coffee may retain all thoſe aromatic particles which give to that beverage its excellent qualities, nothing more is neceſſary, than to prevent all internal motions among the particles of that liquid;

liquid; by preventing its being expoſed to any change of temperature, either during the time employed in preparing it; or afterwards, till it is ſerved up.

This may be done, by pouring boiling water on the Coffee in powder; and ſurrounding the machine in which the Coffee is made, by boiling water; or by the ſteam of boiling water: for the temperature of boiling water is *invariable*, (while the preſſure of the atmoſphere remains the ſame,) and the temperature of ſteam is the ſame as that of the boiling water from which it eſcapes.

But the temperature of boiling water is preferable to all others for making Coffee, not only on account of its *conſtancy*, but alſo, on account of its being moſt favourable to the extraction of all that is valuable in the roaſted grain.

As it is well known that the heat of boiling water is not that which is the moſt favourable for extracting from malt thoſe ſaccarine parts which it furniſhes in the proceſs of making beer; I thought it poſſible, though not at all probable, that ſome lower temperature than that of boiling water, might alſo be moſt advantageous in preparing Coffee; but after having made a great number of experiments, in order to aſcertain that important point, I found that Coffee, infuſed with boiling water, was always higher flavoured, and better taſted, than when the water uſed in that proceſs was at a lower temperature.

I have

I have frequently taken Coffee, of the beſt quality, newly burnt, and with equal portions of it, in powder, and equal quantities of water, have made Coffee, in two like coffee-pots, with this ſingle difference, that the water poured into one of them has been boiling hot; while that poured into the other, has been at ſome lower temperature; and I have conſtantly found, that the Coffee made with the boiling water has been preferred by all good judges; eſpecially when they have been preſented with the two kinds of Coffee at the ſame time, without being told in what manner they were prepared.

I have likewiſe made Coffee with cold water, and afterwards heated it; but this I have always found to be *of a very inferior quality:* it is very bitter, and not unfrequently of a ſour diſagreeable taſte, eſpecially when the cold water is a long time in paſſing through to Coffee in powder, and when they are ſuffered to remain together over night.

The fine aromatic ſubſtance is either not extracted by cold water, or it eſcapes afterwards, while the Coffee is heating.—The fact is, that very little of it can be perceived in the Coffee, after it has been heated; nor does Coffee, ſo prepared, poſſeſs thoſe exhilarating qualities which render that beverage ſo delightful in its effects, when it is made in perfection, and taken before it has had time to be ſpoiled by cooling. As Coffee is an expenſive article, which muſt be imported into Europe from hotter climates,

climates, the economy of it deſerves attention; now it is quite certain that boiling water extracts from the prepared grain, more of thoſe particles which give the agreeable taſte and flavour to the Coffee, or, in other words, that give it *ſtrength*, than an equal quantity of water leſs hot: this fact has been aſcertained by many experiments, and is now generally acknowledged: it is indeed not a little ſurpriſing, that it ſhould ever have been called in queſtion; for the agency of heat, in facilitating ſolutions of this kind, has long been known.

As all kinds of agitation muſt be very detrimental to Coffee, not only when made, but alſo while it is making, it is evident that the method formerly practiſed, that of putting the ground Coffee into a coffee-pot, with water, and boiling them together, muſt be very defective, and muſt occaſion a very great loſs.

But that is not all; for the Coffee which is prepared in that manner can never be good, whatever may be the quantity of ground Coffee that is employed.

The liquor may, no doubt, be very bitter, and it commonly is ſo; and it may poſſibly contain ſomething that may irritate the nerves, but the exquiſite flavour and exhilarating qualities of good Coffee will be wanting.

A decoction of Jeſuit's bark is alſo very bitter, and it is ſometimes irritating, but nobody ever found it to be exhilarating; cuſtom might perhaps

render the taſte of it agreeable, for even the taſte of tobacco becomes agreeable to thoſe who are in the habit of chewing it; but it would be difficult to perſuade me, or any other unprejudiced perſon, that Coffee is good, which has nothing to recommend it but a ſtrong, bitter, auſtere taſte.

Coffee may eaſily be too bitter, but it is impoſſible that it ſhould ever be too fragant. The very ſmell of it is reviving, and has often been found to be uſeful to ſick perſons, and eſpecially to thoſe who are afflicted with violent head-achs. In ſhort, every thing proves that the volatile, aromatic matter, whatever it may be, that gives flavour to Coffee, is what is moſt valuable in it, and ſhould be preſerved with the greateſt care; and that in eſtimating the ſtrength, or richneſs of that beverage, its *fragrance* ſhould be much more attended to, than either its bitterneſs or its aſtringency.

Nobody, I fancy, can be fonder of Coffee than I am; I have regularly taken it twice a day, for many years, and I certainly take care to have the very beſt that can be procured, and no expence is ſpared in making it good.

The reader will no doubt be ſurpriſed, when I aſſure him, that one pound averdupois, of good Moka Coffee, which, when properly roaſted and ground, weighs only fourteen ounces, ſerves for making fifty-ſix full cups of the very beſt Coffee, in my opinion, that can be made.

The

The quantity of ground Coffee which I uſe for one full cup, is 108 grains Troy, which is rather leſs than a quarter of an ounce. This Coffee, when made, would fill a coffee-cup, of the common ſize, quite full; but I uſe a larger cup, into which the Coffee being poured boiling hot, on a ſufficient quantity of ſugar (half an ounce), I pour into it about one-third of its volume of good ſweet cream, *quite cold*. On ſtirring theſe liquids together, the Coffee is *ſuddenly cooled*, and in ſuch a manner as not to be expoſed to the loſs of any conſiderable portion of its aromatic particles in that proceſs.

In making Coffee, ſeveral circumſtances muſt be carefully attended to: in the firſt place, the Coffee muſt be ground fine, otherwiſe the hot water will not have time to penetrate to the centers of the particles; it will merely ſoften them at their ſurfaces, and paſſing rapidly between them, will carry away but a ſmall part of thoſe aromatic and aſtringent ſubſtances on which the goodneſs of the liquor entirely depends.

In this caſe, the grounds of the Coffee are more valuable than the inſipid waſh which has been hurried through them, and afterwards ſerved up under the name of Coffee.

This ſecret has been but too well known to ſome ſervants abroad, where Coffee is more generally uſed than in England, and where the preparation of it has not been controuled by the laws. When complaints are made that the Coffee is too weak,

they are never at a loſs for a remedy for that evil; and when it has once been eſtabliſhed as a rule in the family, that *one ounce* of ground Coffee is *indiſpenſably neceſſary* to make a cup of good ſtrong Coffee, their point is gained.

But before we can determine with certainty how much ground Coffee is neceſſary in order to make a cup of good Coffee, we muſt aſcertain the contents of a coffee-cup; and as the ſizes of coffee-cups are very different in different countries, and even vary conſiderably in the ſame country, we muſt begin by adopting ſome certain ſize, to ſerve as a ſtandard. — The ſize moſt commonly to be met with in England, and in France, is a cup which contains $8\frac{1}{3}$ cubic inches, Engliſh meaſure, when filled quite full to the brim; when this cup is made perfectly cylindrical within, and juſt as high as it is wide, it will be $2\frac{2}{10}$ Engliſh inches in diameter, and conſequently $2\frac{2}{10}$ inches in height, internally.

One gill, or one quarter of a wine pint of liquor, will fill this cup to within *three-tenths* of an inch of the level of its brim, and that quantity of Coffee will weigh 1820 grains Troy, or ſomething more than four ounces averdupois, or more exactly $4\frac{1}{6}$ ounces.

As a *gill* is a meaſure well known in England, I ſhall adopt it as a ſtandard meaſure for a cup of Coffee; and as it is inconvenient to fill coffee-cups quite full to the brim, I ſhall propoſe coffee-cups to be made of the form and dimenſions they now

commonly have, or of a ſize proper for containing $8\frac{1}{3}$ cubic inches of liquor, when filled quite full to the brim.

As a gill is equal to 7.1875 cubic inches, about ſeven-eighths only of the capacity of the cup will, in that caſe, be occupied by the Coffee. — Now I have found, by the reſults of a great number of experiments, that *one quarter of an ounce* averdupois of ground Coffee is quite ſufficient to make a gill of moſt excellent Coffee, of the higheſt poſſible flavour, and quite ſtrong enough to be agreeable.

This deciſion has been the reſult of fifteen years' experience, and as Coffee is to me by far the moſt valuable luxury of the table, with which I am acquainted, and that in which I indulge with the greateſt pleaſure and ſatisfaction, I have ſpared no pains in my endeavours to find out how it can be prepared in the higheſt perfection: and I can ſafely aſſert that economy has not, in the ſmalleſt degree, influenced my opinion on that ſubject.

I am happy when I find that improvement leads to economy, but I have always thought that excellence ſhould never be ſacrificed to paltry ſavings in any thing, and leaſt of all in thoſe habitual enjoyments which are at the ſame time the comforts and conſolations of life.

The fact is, with reſpect to Coffee, that when it is made very ſtrong, its taſte becomes ſo very bitter and auſtere, that it is no longer poſſible to diſtinguiſh that delicate aromatic fragrance which is

ſo liberally diffuſed when the Coffee is properly prepared.

Habit may render very bitter Coffee agreeable to ſome palates, and all perſons may not perhaps be able to ſavour in perfection that peculiar fragrance which renders the ſmell of Coffee ſo very agreeable; but I am confident, that thoſe who will take the trouble to make the experiment with due care, will find, as I have done, that Coffee, of the very beſt quality, may be prepared with the quantity of materials above-mentioned.

But this cannot be done, unleſs the method which I uſe be employed for making the Coffee.

In order that the advantages which will reſult from the adoption of that proceſs may be perceived and eſtimated, it will be uſeful to give a ſhort deſcription of the method formerly purſued, and to explain the diſadvantages which reſulted from it.

Formerly, the ground Coffee being put into a coffee-pot, with a ſufficient quantity of water, the coffee-pot was put over the fire, and after the water had been made to boil a certain time, the coffee-pot was removed from the fire, and the grounds having had time to ſettle, or having been fined down with iſing-glaſs, the clear liquor was poured off, and immediately ſerved up in cups.

From the reſults of ſeveral experiments, which I made with great care, in order to aſcertain what proportion of the aromatic and volatile particles in the Coffee eſcape, and are left in this proceſs, I found

found reaſon to conclude, that it amounts to conſiderably more than half. This loſs may eaſily be explained; it is occaſioned principally, no doubt, by the motions into which the liquid is thrown in being heated, and afterwards on being made to boil; but there are two other unfavourable circumſtances attending this proceſs that deſerve attention.

The air that is attached to the ſmall ſolid particles of the ground Coffee, often remain attached to them, and cauſing them to riſe up to the ſurface of the water, and to remain there, theſe particles contribute very little to the ſtrength or qualities of the liquor; and even thoſe particles which, becoming thoroughly ſoaked with the water, are mixed with it; as they are ſurrounded, not by pure water, but by a ſolution of Coffee, more or leſs ſaturated, that circumſtance is unfavourable to their ſolution.

It is well known to chemiſts, that any ſolid ſubſtance, which is ſoluble in any liquid menſtruum, is diſſolved with greater difficulty, or more ſlowly, as the liquid is more charged with that ſubſtance.

Now, when Coffee is made in the moſt advantageous manner, the ground Coffee is preſſed down in a cylindrical veſſel, which has its bottom pierced with many ſmall holes, ſo as to form a ſtrainer, and a proper quantity of boiling hot water being poured cautiouſly on this layer of Coffee in powder, the water penetrates it by degrees, and after a certain time begins to filter through it.

This gradual percolation brings continually a ſucceſſion of freſh particles of pure water into contact with the ground Coffee, and when the laſt portion of the water has paſſed through it, every thing capable of being diſſolved by the water, will be found to be ſo completely waſhed out of it, that what remains will be of no kind of value.

It is however neceſſary to the complete ſucceſs of this operation, that the Coffee ſhould be ground to a powder ſufficiently fine, as has already been obſerved.

This method of making Coffee, by percolation, has been practiſed many years, and its uſefulneſs is now univerſally acknowledged. I do not know who was the firſt to propoſe it, but being thoroughly perſuaded of the merit of the contrivance, I have been deſirous of recommending it; and I conceived that the moſt effectual way of recommending it, would be to explain the mechanical and chemical principles on which its ſuperiority depends.

In order that the Coffee may be perfectly good, the ſtratum of ground Coffee, on which the boiling water is poured, muſt be of a certain thickneſs, and it muſt be preſſed together with a certain degree of force. If it be too thin, or not ſufficiently preſſed together, the water will paſs through it too rapidly; and if the layer of ground Coffee be too thick, or if it be too much preſſed together, the water will be too long in paſſing through it, and the taſte of the Coffee will be injured.

Another

Another circumſtance, to which little attention has hitherto been paid, but which I have found to be of conſiderable importance, is the levelling of the ſurface of the ground Coffee, after it has been put into the ſtrainer, before any attempt is made to preſs it together.

When the ground Coffee is poured into the ſtrainer it always ſtands much higher in one part of this veſſel than elſewhere; and if, in that ſituation, it be preſſed down on the perforated bottom of this veſſel, without being previouſly levelled, it will be much more preſſed in ſome parts than in others; and as the water will not fail to paſs moſt rapidly, where it meets with the leaſt reſiſtance, a conſiderable portion of the ground Coffee will be ſo crouded together as to prevent the water from paſſing through it, and conſequently will contribute little or nothing to the ſtrength of the beverage.

To remedy this inconvenience, I uſe the following ſimple contrivance: The circular plate of tin, with a rod faſtened to its centre, which ſerves as a rammer for preſſing down the ground Coffee, has four ſmall projecting ſquare bars, of about one-tenth of an inch in width, faſtened to the under ſide of it, and extending from the circumference of the plate to within about one quarter of an inch of its centre.

On turning this plate round its axis, by means of the rod which ſerves as a handle to it, (the rod being made to occupy the axis of the cylindrical veſſel,)

veſſel,) the projecting bars are made to level the ground Coffee; and after this has been done, and not before, the Coffee is preſſed together.

This circular plate is pierced by a great number of ſmall holes, which permit the water to paſs through it, and it remains in the cylindrical veſſel during the whole of the time that the Coffee is making. It repoſes on the ſurface of the ground Coffee, and prevents its being thrown out of its place by the water which is poured on it.

The rod which ſerves as a handle to this circular plate is ſo ſhort, that it does not prevent the cover of the cylindrical veſſel from being put down into its place.

After having made a great number of experiments, in order to determine what thickneſs is beſt for the layer of ground Coffee, I have found that two-thirds of an inch anſwers beſt for the Coffee in powder, before it is preſſed together, and that it ought to be ſo preſſed as to be reduced to the thickneſs of ſomething leſs than *half an inch.*

And as the quantity of ground Coffee neceſſary for making a cup of good Coffee (a quarter of an ounce averdupois) juſt fills a cylindrical meaſure, which is 1.15 inches in diameter and in height, its volume amounts to 1.1945 cubic inches; conſequently, a cylindrical veſſel (which I ſhall call the ſtrainer) proper for making *one cup of Coffee,* muſt be of ſuch diameter that 1.1945 cubic inches

of

of ground Coffee will fill it to the height of two-thirds of an inch.

On making the computation, it will be found that one inch and a half is the moſt proper diameter for the ſtrainer to be employed in making one ſingle cup of good Coffee. And as the thickneſs of the ſtratum of ground Coffee muſt always be the ſame, whatever may be the number of cups that are made at the ſame time; the diameter of ſtrainers, of different ſizes, will be as follows, viz.

	Inches.
For 1 cup - - - - -	1.5
2 - - - - -	2.1213
3 - - - - -	2.5986
4 - - - - -	3
5 - - - - -	3.3541
6 - - - - -	3.6742
7 - - - - -	3.9687
8 - - - - -	4.2426
9 - - - - -	4.5
10 - - - - -	4.7434
11 - - - - -	4.9749
and for 12 - - - - -	5.1962

For common uſe, the following ſizes will anſwer very well; and, in order that workmen may not have the trouble of computing the heights of the cylindrical veſſels, which I have called ſtrainers, which contain the water that is poured on the ground

ground Coffee, I have given theſe heights in the following Table. They have been determined on the ſuppoſition, that the diameter of the veſſel is always juſt equal to the diameter of the perforated bottom by which it is cloſed below; and that the quantity of water neceſſary for making one cup of Coffee, is $8\frac{1}{3}$ cubic inches.

A *Table*, ſhewing the diameters and heights of the cylindrical veſſels (or ſtrainers) to be uſed in making the following quantities of Coffee:

Quantity of Coffee to be made at once.	Diameter of the ſtrainer.	Height of the ſtrainer.
1 cup - - -	$1\frac{1}{2}$ inches -	$5\frac{1}{4}$ inches.
2 cups - - -	$2\frac{1}{8}$ - - -	$5\frac{1}{4}$
3 or 4 cups -	$2\frac{3}{4}$ - - -	5
5 or 6 cups -	$3\frac{1}{2}$ - - -	$5\frac{1}{8}$
7 or 8 cups -	4 - - -	$5\frac{1}{4}$
9 or 10 cups -	$4\frac{5}{8}$ - - -	$5\frac{1}{3}$
11 or 12 cups -	5 - - -	$5\frac{1}{2}$

As there is ſo little difference in the heights of theſe ſtrainers, and as a ſmall additional height will be rather advantageous than otherwiſe, I would recommend them to be made all of the ſame height, viz. $5\frac{1}{2}$ inches in height.

As theſe ſtrainers muſt be ſuſpended in their reſervoirs, which are deſtined for receiving the Coffee, and at ſuch a height that after all the Coffee has

paſſed

paſſed through the ſtrainer, the bottom of the ſtrainer may ſtill be above the ſurface of the Coffee in the reſervoir; it will be beſt to make the reſervoir of a conical form, and juſt large enough above to receive the ſtrainer in ſuch a manner that it may be ſuſpended in the reſervoir by means of a narrow projecting brim.

The boiler in which the reſervoir is ſuſpended may likewiſe be made conical, and of ſuch diameter above, as to receive the reſervoir in ſuch a manner as to be firmly united to it.

The reſervoir and its boiler muſt be ſoldered together above, at their brims; and the reſervoir muſt be ſuſpended in its boiler in ſuch a manner, that its bottom may be about a quarter of an inch above the bottom of the boiler.

The ſmall quantity of water which it will be neceſſary to put into the boiler, in order that the reſervoir for the Coffee may be ſurrounded by ſteam, may be introduced by means of a ſmall opening on one ſide of the boiler, ſituated above, and near the upper part of its handle.

The ſpout through which the Coffee is poured out paſſes through the ſide of the boiler, and is fixed to it by ſoldering. The cover of the boiler ſerves at the ſame time as a cover for the reſervoir, and for the cylindrical ſtrainer, and it is made double, in order more effectually to confine the heat.

The

The boiler is fixed below to a hoop, made of ſheet-braſs, which is pierced with many holes. This hoop, which is one inch in width, and which is firmly fixed to the boiler, ſerves as a foot to it, when it is ſet down on a table, and it ſupports it in ſuch a manner, that the bottom of the boiler is elevated to the height of half an inch above the table.

When the boiler is heated over a ſpirit lamp, or over a ſmall portable furnace in which charcoal is burnt, as the vapour from the fire will paſs off through the holes made in the ſides of the hoop, the bottom of the hoop will always remain quite clean, and the table-cloth will not be in danger of being ſoiled, when this coffee-pot is ſet down on the table.

As the hoop is in contact with the boiler, in which there will always be ſome water, it will be ſo cooled by this water as never to become hot enough to burn the table-cloth.

The bottom of the boiler may be cleaned occaſionally, on the underſide with a bruſh or a towel, but it ſhould not be made bright, for when it is bright it will be more difficult to heat the water in it than when it is tarniſhed and of a dark brown colour.

But the ſides of the boiler ſhould be kept as bright as poſſible, for when its external ſurface is kept clean and bright, the boiler will be leſs cooled by the ſurrounding cold bodies, than when its metallic

metallic ſplendour is impaired by neglecting to clean it *.

As the ſmall quantity of water which is put into the boiler ſerves merely for generating the ſteam which is neceſſary in order to keep the reſervoir and its contents conſtantly boiling-hot; if the reſervoir be made of ſilver, or even of common tin, the boiler may, without the ſmalleſt danger, be made of

* I have in my poſſeſſion two porcelaine tea-pots of the ſame form and dimenſions, one of which is gilt all over on the outſide, and might eaſily be miſtaken for a gold tea-pot; the other is of its natural white colour, both within and without; being neither painted nor gilt. When they are both filled at the ſame time with boiling water, and expoſed to cool in the ſame room, that which is gilt retains its heat half as long again as that which is not gilt. The times employed in cooling them, a given number of degrees, are as three to two.

The reſult of this intereſting experiment (which I firſt made about ſeven years ago) affords a good and ſubſtantial reaſon for the preference which Engliſh ladies have always given to ſilver tea-pots.—The details of this experiment may be ſeen in a paper publiſhed in the Memoirs of the French National Inſtitute for the year 1807.

I have likewiſe a ſet of tea-cups, and another of coffee-cups, which are gilt on the outſide, and they preſerve the heat of thoſe liquids, much longer than China-cups which are not ſo gilt.

Little advantage would be derived from gilding them on the inſide, and none at all if they were filled quite full with the hot liquid.

I have found that all metals are alike uſeful in preſerving heat (or cold), provided their ſurfaces be quite clean and bright.

copper;

copper; or of copper plated with ſilver, which will give to the boiler an elegant appearance, and at the ſame time render it eaſy to keep it clean on the outſide.

The boiler may likewiſe be made of tin, and neatly japanned on the outſide, provided the hoop to which it is fixed below be made of copper, but this hoop muſt never be japanned nor painted; and it muſt always be made of ſheet-copper or ſilver; and the boiler muſt always be heated over a ſmall portable fire-place or lamp, ſomewhat leſs in diameter above, than the hoop on which the boiler is placed.

In order that the flat bottom of the boiler may not ſmother and put out the fire, the brim of the ſmall furnace or chaffing-diſh, which is uſed, muſt have ſix projecting knobs, at the upper part of it, each about one quarter of an inch in height, on which the bottom of the boiler may reſt.

If theſe knobs (which may be the large heads of ſix nails), be placed at equal diſtances from each other, the boiler will be well ſupported; and as the hot vapour from the fire will paſs off freely between them, the fire will burn well. As a very ſmall fire is all that can be wanted, no inconvenience whatever will ariſe from the heating of the boiler on the table, in a dining-room or breakfaſt-room, eſpecially if a ſpirit lamp be uſed, and the quantity of heat wanted is ſo very ſmall, when the

water

water is put boiling hot into the boiler, that the expence for ſpirits of wine, would not, in London, amount to one penny a day, when Coffee is made twice a day for four perſons.

It is a curious fact, but it is nevertheleſs moſt certain, that *in ſome caſes*, ſpirits of wine is cheaper, when employed as fuel, even than wood. With a ſpirit lamp, conſtructed on Argand's principle, but with a chimney made of thin ſheet iron, which I cauſed to be made about ſeven years ago (and which has ſince become very common in Paris *), I heated a ſufficient quantity of cold water, to make Coffee for the breakfaſt of two perſons, and kept the Coffee boiling hot, one hour after it was made; with as much ſpirits of wine as coſt *two ſous*, or one penny Engliſh money.

A fire could not have been made with wood at a leſs expence to heat this water.

As the ſize of the flame of this lamp may be increaſed or diminiſhed, at pleaſure, by means of the rack which raiſes and lowers its circular wick, all the fuel which is conſumed is uſefully employed, and no heat is waſted in forming ſteam, when nothing more is wanted than the preſervation of the temperature at which water is diſpoſed to boil.

* I intend, if poſſible, to ſend one of theſe ſpirit lamps to England, with this Eſſay, in order that it may be put into the hands of ſome workman there, who may be diſpoſed to imitate it.

In order to convey diſtinct ideas of the different parts of the apparatus neceſſary in making Coffee in the manner I have recommended, I have added the figure 1, which repreſents a vertical ſection (drawn to half the full ſize) of a coffee-pot conſtructed on what I conceive to be the very beſt principles. Its ſize is ſuch as is moſt proper for making four cups of Coffee at once.

a—is the cylindrical ſtrainer, into which the ground Coffee is put, in order that boiling hot water may be poured on it; when this ſtrainer is filled with boiling water (after an ounce of ground Coffee has been properly preſſed down on its bottom) the quantity of the liquid is juſt ſufficient for making four cups of Coffee.

b—is the ground Coffee in its place.

c—is the handle of the rammer which is repreſented in its place.

d—is the reſervoir for receiving the Coffee which deſcends into it from the ſtrainer; and

e—is the ſpout through which the Coffee is poured out.

f—is the boiler, into which a ſmall quantity of water is put, for the ſole purpoſe of generating ſteam, for keeping the reſervoir hot.

g—is the opening by which the water is poured into the boiler or out of it; this opening has a flat cover, which moves on a hinge, that is repreſented in the figure. The

The boiler is of a conical form, and is enlarged a little at its upper extremity, in order to receive the cover which closes it above.

The reservoir and the boiler are fixed together above by soldering, so that the reservoir remains suspended in the boiler.

The cylindrical strainer is suspended on the upper extremity of the reservoir, by means of a flat projecting brim, about two-tenths of an inch broad.

h—is the hoop, made of sheet-copper, and perforated with a row of holes, on which the boiler repose: a part of the bottom of the boiler is seen through these holes.

The reservoir is represented by dotted lines, in order the better to distinguish it.

The opening in the side of the boiler, by which the water enters it, is represented in the figure. This opening is covered by a part of the handle of the coffee-pot.

The diameter of the hoop *h*, on which the coffee-pot stands, should always be at least *six inches in diameter* whatever may be the contents of the coffee-pot; and the spirit lamps or portable furnaces, used with these coffee-pots, should always be *rather less than six inches in diameter above*, or at their openings, in order that the bottom of the coffee-pot may, in all cases, be set down properly on the six knobs belonging to the lamp or the furnace, which are destined to support it.

The figure 2. has been added, in order to ſhew how the ſame coffee-pot may be made to ſerve for making any number of cups of Coffee, within certain limits, that may be wanted, by being furniſhed with ſtrainers of different ſizes.

This coffee-pot has three ſtrainers, the largeſt of which is cylindrical, and of a ſize proper for making either *five* or *ſix* cups of Coffee.

The ſecond in ſize, is deſigned for making either *three* cups or *four* cups. It is compoſed of two tubes or cylinders, of different diameters, united together. The lower cylinder, which is one inch in length, and two inches and three quarters in diameter, is cloſed below by a perforated bottom, on which the ground Coffee is placed. The upper cylinder, which is united to it, is about three inches in length, and juſt wide enough to enter without difficulty, into the larger cylindrical ſtrainer, on the top of which it repoſes by means of a projecting brim, when not in uſe.

The ſmaller ſtrainer, which is of a ſize proper for making *two* cups of Coffee, enters that laſt deſcribed, and repoſes on it (when not in uſe). This ſtrainer is alſo compoſed of two cylinders united together. That which is loweſt is two inches and one eighth in diameter and one inch in height, cloſed below by a flat bottom, perforated with ſmall holes. The other cylinder, which is united to it above, is of ſuch a diameter as to enter the ſecond ſtrainer without difficulty, and of the height which

is

is neceſſary, in order that it may contain two coffee-cups full of water.

Each of theſe ſtrainers has its ſeparate rammer to ram down the ground Coffee placed in it, but one common handle ſerves for them all. This handle is ſcrewed into the middle of a circular plate, which forms the principal part of the rammer.

The circular plate which belongs to each of theſe ſtrainers, remains in it, when the coffee-pot is not in uſe, and the handle remains attached to the circular plate belonging to the ſmaller ſtrainer.

When only *two* cups of Coffee are wanted, the two largeſt ſtrainers being taken away, the ſmaller ſtrainer is uſed alone.

If either *three* or *four* cups are wanted, the ſmalleſt and the largeſt ſtrainers are taken away, and the other ſtrainer is uſed.

When *five* or *ſix* cups are wanted, the largeſt ſtrainer is uſed, and the other two are taken away.

If *ſeven*, *eight*, *nine*, or *ten* cups are wanted, *ſix* cups are firſt made with the largeſt ſtrainer; when that ſtrainer being removed, the remaining number of cups are made with the ſtrainer next in ſize.

By making uſe of the three ſtrainers one after the other, *eleven* or *twelve* cups of Coffee may be made in this coffee-pot, and as the heat always remains the ſame during the whole of the time employed in theſe operations, the Coffee is juſt as good as if the whole of it were made at once.

By adding two additional ſtrainers to the coffee-pot repreſented by the figure 1. one of them of a proper ſize for making *one* cup of Coffee; and the other of a proper ſize for making *two* cups; this coffee-pot may be uſed for making either *one*, *two*, *three*, *four*, *five*, or *ſix* cups of Coffee.

All the coffee-pots that have been made of this ſize, have been furniſhed with theſe two additional ſtrainers; but they were omitted in the figure, in order to render it more ſimple, and more eaſy to be underſtood.

Moſt of the coffee-pots of this ſize (figure 1.) have had their boilers made ſufficiently capacious for heating the water neceſſary for making the Coffee, as well as that which is required for generating the ſteam which is employed for keeping the reſervoir boiling hot.

This may be done in all caſes; but when this method is employed, it will be neceſſary that the boiler ſhould be furniſhed with a braſs cock, placed about one quarter of an inch above the level of its bottom, in order that the boiling water neceſſary for pouring on the ground Coffee in the ſtrainer may be drawn off, without removing the boiler from the fire. By placing this braſs cock immediately under the handle of the coffee-pot, it may be ſo united to it as almoſt to eſcape obſervation. I have a coffee-pot of this kind, in which the braſs cock, by which the boiling water is drawn off, is entirely concealed in the ornaments of the handle.

I have

I have another, in which the boiling water is poured out by means of a ſecond ſpout, placed juſt oppoſite to that by which the Coffee is poured out; but in uſing this coffee-pot, it is indiſpenſably neceſſary to pour out *at once* all the boiling water that is wanted, and before any water has been put into the ſtrainer.

When coffee-pots are made with two ſpouts, one for the water, and the other for the Coffee, the handle muſt be placed between them, and at equal diſtances from each of them.

I have cauſed a very beautiful urn to be conſtructed, with a concealed ſpirit lamp, which ſerves for heating water for making either tea or Coffee, and for making both tea and Coffee at the ſame time. It is repreſented by the figure 3, which is drawn to a ſcale of one quarter of the full ſize.

This urn is placed on what appears to be a block of black marble, ſeven inches ſquare, and two inches and a quarter in thickneſs. This is made of ſtrong ſheet iron, japanned black, which ſerves for concealing a ſpirit lamp, on Argand's principles, which is employed in keeping the water in the urn boiling hot. The foot of the urn is hollow, and ſerves for concealing the chimney of the lamp.

It is perforated by two rows of ſmall round holes, the one in the moulding at its lower extremity; which ſerves for the admiſſion of the air, which is neceſſary for keeping the lamp burning; the other near the upper extremity of the foot where it is

united to the body of the urn, which ſerves as a paſſage for the eſcape of the vapour, which is generated in the combuſtion of the ardent ſpirits.

There is a large circular hole in the top of the ſquare box (of ſheet-iron), on which the urn is placed, which hole is covered and completely concealed by the foot of the urn.

This hole, which is five inches and a half in diameter, is the paſſage by which the lamp enters when it is placed in the ſquare box: and by means of a rim about a quarter of an inch in width and five inches and a half in diameter, which is fixed to the lower part of the foot of the urn, and which enters the circular hole in the top of the box; by turning round the urn to the left, one quarter of a whole revolution, the rim attached to the foot of the urn being in its place, the urn and the ſquare box are locked together, in a manner ſimilar to that which is uſed in fixing a bayonet to its muſket; and in taking up the urn by its two handles, the ſquare box is taken up along with it, and remains firmly attached to it.

The ſize of the flame of the lamp is regulated, and the lamp is extinguiſhed when no longer wanted, by means of a rack which moves the wick of the lamp up or down; and this rack is moved by means of a horizontal rod of ſtrong wire, which lies in a ſmall groove made to receive it in the top of the ſquare box. This wire has a ſmall knob at the end of it, which projects juſt beyond the

the ſide of the box; and as both this wire and the knob at the end of it are painted black and japanned, they are little obſerved, and conſequently do not produce any diſagreeable effect.

Two braſs cocks (which are not repreſented in the figure) are placed at the diſtance of about four inches from each other, at the level of the bottom of the reſervoir which ſerves for containing the Coffee, when made; one of theſe ſerves for drawing off the boiling water contained in the boiler, and the other for drawing off the Coffee; and the words *Water* and *Coffee* are inſcribed on their handles.

This urn has one large cover, nine inches in diameter, which cloſes the boiler without cloſing the opening of the reſervoir for the Coffee, and which appears to form the upper part of the urn; and another cover, about four inches and a quarter in diameter, which being made to fit into a circular hole in the top of the cover of the boiler, cloſes the reſervoir, which contains the cylindrical ſtrainer and the Coffee.

When the boiler is filled with boiling water both covers muſt be removed; but the ſmall cover only is removed when the ground Coffee is put into the ſtrainer; and when boiling water (which may be drawn out of the boiler) is poured on it.

The reſervoir for the Coffee is firmly fixed in its place, in the middle of the boiler, by means of three ſhort feet of ſtrong tin (of about half an inch in height),

height), which are ſoldered to the reſervoir, and to the boiler.

The form of the reſervoir is conical, and it is about ſix inches in diameter below, four inches and one-tenth in diameter above, and ſeven inches and a half in height.

By uſing two or three ſtrainers ſucceſſively, *ſixteen* or *eighteen* cups of Coffee may be made in this urn; and when the ſtrainers are taken away, and the reſervoir is quite filled with Coffee, it will hold more than *twenty* cups.

This urn has been found to be very uſeful for ſerving up Coffee after dinner to large companies; and it is the more ſo, as thoſe who find their Coffee too ſtrong can eaſily make it weaker, by mixing with it a little boiling water, which may be drawn from the boiler, which is always at hand.

The form of the boiler, and that of its large cylindrical ſtrainer, are faintly repreſented in the figure by dotted lines.

The boiler muſt always be filled with water *already boiling hot*; for the lamp, though quite powerful enough to keep this water boiling hot, and even to make it boil with violence, does not furniſh heat enough to heat ſo great a quantity of cold water, and make it boiling hot in any reaſonable time.

As often as the ſmalleſt quantity of ſteam is ſeen to iſſue from the boiler, the flame of the lamp ſhould be reduced, for no advantage whatever attends

tends the actual boiling of water, which is boiling hot; and it always occaſions a very great loſs of heat, and fills the room full of ſteam and of inviſible vapour, which makes every thing in it damp and uncomfortable.

A conſiderable number of theſe Coffee urns have been made and ſold at Paris within theſe laſt five or ſix years; ſome of them have been made of ſilver richly ſculptured and ornamented by gilding. Several others have been made of copper and ornamented with copper plated with ſilver; theſe laſt, with their lamps, and a ſet of three ſtrainers made of tin, have coſt about ſix guineas. But the greater part of thoſe which have been ſold, have been made of tin; and they have in general been gilt ſo as to be entirely covered over on the outſide with leaf gold, and this leaf gold covered by a coating of tranſparent varniſh.

When ſo conſtructed and ornamented, they have coſt four guineas with all their apparatus quite complete.

I cannot help flattering myſelf that they will find their way into England, and there meet with approbation. I ſhall never ceaſe to be particularly deſirous that my labours to improve the domeſtic arts may be found uſeful in that country.

The figure 4. repreſents a ſmall urn with two ſhort ſpouts and two handles, of a proper ſize for making one ſingle cup of Coffee. It is drawn to a ſcale of half the full ſize. Its boiler contains

water enough to furniſh what is required for making the Coffee, as well as that which is neceſſary for generating ſteam, for keeping the Coffee hot. The water deſcends below the foot of the urn into the flat plinth, on which it ſtands, and to which it is united.

The figure 5. repreſents an urn with two long ſpouts, which ſerve at the ſame time as handles. Its ſize is ſuch as would be proper for making either *one* or *two* cups of Coffee. The ſtrainer, which is repreſented by dotted lines, is of a proper ſize for making two cups.

Both theſe urns are deſtined to be heated over ſpirit lamps, or ſmall portable furnaces.

It is hardly neceſſary that I ſhould obſerve, that in caſe the forms of either of theſe urns ſhould be thought inelegant, their ſizes may, without any difficulty, be conſiderably augmented; but when ſpouts are uſed with large urns, they occaſion a good deal of inconvenience.

As Coffee is very wholeſome, and may be afforded at a very low price, eſpecially in countries which have colonies where the climate is proper for growing it, many public advantages would be derived from the general introduction of it among all claſſes of ſociety.

One moſt important advantage, which, on a ſuperficial view of the ſubject, is not very obvious, would moſt probably be derived from it. As Coffee poſſeſſes, in a high degree, an exhilarating quality,

it

it would, in ſome meaſure, ſupply the place of ſpirituous liquors among the lower claſſes of the people.

Thoſe who work hard, ſtand in need of ſomething to cheer and comfort them, from time to time, and it is greatly to be lamented that the ſtrong liquors now uſed for that purpoſe, are not only very unwholeſome and permanently debilitating, both to the mind and the body, but that their operation is accompanied by a peculiar ſpecies of madneſs, which renders thoſe who are under the influence of it very miſchievous, and ſo loſt to all ſenſe of decency and propriety, as to become objects of horror and averſion.

The pleaſing flow of ſpirits that is excited by Coffee, has none of theſe baneful effects.

Inſtead of irritating the mind, and exciting to acts of violence, it calms every turbulent and malevolent paſſion, and is accompanied by a conſciouſneſs of eaſe, contentment, and good-will to all men, which is very different from that wild joy and unbridled licentiouſneſs which accompanies intoxication.

Coffee is not only very wholeſome, but when ſweetened with ſugar, is very nouriſhing.

Sugar is ſuppoſed to be the moſt nouriſhing ſubſtance known. Its nouriſhing powers are even ſuch, that the uſe of it has been recommended in fattening cattle.

An

An ingenious young man, Doctor ————, a phyſician, who reſided in London, made a long courſe of experiments on himſelf, ſeveral years ago, with a view to determine the relative nutritive powers of thoſe ſubſtances which are moſt commonly uſed as food by mankind, and he found that ſugar was more nouriſhing than any other ſubſtance he tried.

He took no other food for a conſiderable time, than ſugar, and drank nothing but water; and he contrived to ſubſiſt on a ſurpriſingly ſmall quantity of ſugar. If my memory does not fail me, it was no more than two ounces a day.

It is much to be lamented, that this intereſting young man ſhould have fallen a ſacrifice to his zeal in promoting uſeful ſcience; but his health was ſo totally deranged by theſe experiments, which he purſued with too much ardour and perſeverance, that he died ſoon after they were finiſhed. All the reſources of the medical art were employed, but nothing could ſave him.

As common brown ſugar is quite as nouriſhing as the beſt refined loaf ſugar, and as a great many perſons prefer it for Coffee, it appears to me to be extremely probable that Coffee may be found to be one of the cheapeſt kinds of food that can be procured, and more eſpecially in Great Britain.

Half a pint of the beſt Coffee, or two full cups, may be made with half an ounce of ground Coffee, which, if one pound averdupois weight of raw

Coffee

Coffee can be bought in the ſhops for twelve-pence ſterling, will coſt only *ſix-ſevenths* of a farthing; and if a pound of brown ſugar can be bought for one ſhilling, one ounce of ſugar, which would be a large allowance for two cups of Coffee, would coſt only three farthings; conſequently the materials for making half a pint of Coffee would coſt leſs than one penny.

As Coffee has a great deal of taſte, which it imparts very liberally to the bread which is eaten with it, and as the taſte of Coffee is very agreeable to all palates, and the uſe of bread greatly prolongs the duration of the pleaſure which this taſte excites, a very delicious repaſt may be made merely with Coffee and bread, without either butter or milk.

The taſte of the Coffee predominates in ſuch a manner, that the butter would hardly be perceived, and might be omitted without any ſenſible loſs. But I acknowledge, that in my opinion, the addition of a certain quantity of good cream or milk to Coffee, improves it very much. Milk, however, is not a very expenſive article in Great Britain; and if the butter be omitted, which is by no means neceſſary, (and is even unwholeſome,) a good breakfaſt of milk Coffee might be provided for a very ſmall ſum.

What a difference between ſuch a breakfaſt, and that miſerable and unwholeſome waſh which the poor people in England drink under the name of *tea!*

All

All the Coffee that can be wanted, may be had in the Britiſh colonies, and paid for in Britiſh manufactures; but tea muſt be purchaſed in China, and paid for in hard money.

Theſe are circumſtances which ought, no doubt, to have great weight, eſpecially in ſuch a country as England, where all ranks of ſociety are equally ſenſible of the advantages of their diſtinguiſhed ſituation, and equally anxious to promote the public proſperity.

There are ſome difficulties, no doubt, in changing the habits of a nation, but theſe difficulties have been too much exaggerated, and they have too often been an excuſe for indolence.

If any thing really uſeful be propoſed to the public, it can hardly fail to be adopted, if it be properly recommended; but ſo many new things, unworthy of notice, are every day propoſed, that it is by no means ſurpriſing that little attention is paid to ſuch recommendations.

Many uſeful improvements have been propoſed by ingenious and enlightened men, which have failed, merely becauſe thoſe who have brought them forward have neglected to give directions ſufficiently clear reſpecting the details of their execution.

I have been ſo much perſuaded of that important fact, that I have perhaps ſometimes erred on the other ſide, and taken up too much time in deſcribing things, in all their moſt minute details, which many perſons would be able to comprehend at once,

once, and almoſt without any deſcription; but I have done that which I thought moſt likely to render my labours uſeful.

I never write, except it be to recommend to the public ſomething which I conceive to be of importance, or to communicate the reſults of new experimental reſearches, which appear to be ſufficiently curious and intereſting to merit attention; and it muſt, I think, be quite evident to thoſe who read my writings, that I have never heſitated to ſacrifice to perſpicuity, not only every ornament of ſtyle, but alſo every brilliant idea which, by getting too ſtrong hold of the imagination, might diſtract the attention.

The reader muſt condeſcend not only to go with me frequently into the humbleſt walks of private life, but alſo to examine the various objects that preſent themſelves, with the greateſt care, and in all their moſt minute details.

But I muſt haſten to put an end to this Eſſay, which has already exceeded the limits to which I had hopes of being able to confine it. Being anxious that it might be read by many perſons, (as I thought that it would be very uſeful,) I felt the neceſſity of making it as ſhort as poſſible. I ſhall conclude with a few obſervations on the means that may be employed for rendering the uſe of Coffee more general among the lower claſſes of ſociety.

In the firſt place, the method of making *good Coffee* muſt be known; and the utenſils neceſſary in

that proceſs muſt be ſo contrived, as to be cheap and durable, and eaſy to be managed.

It will be in vain that the laws are repealed which laid reſtrictions on the free uſe of Coffee, as long as the great maſs of the people remain ignorant of its excellent qualities; they will be little diſpoſed to ſubſtitute it in the place of another beverage, to which long habit has given them an attachment.

As long as Coffee ſhall continue to be made according to the method generally practiſed in England, I ſhall have no hope of its being preferred to tea, for its qualities are ſo inferior when prepared in that way, that it is hardly poſſible that it ſhould be much liked.

The utenſils which I have recommended for making Coffee, though ſome of them are ſufficiently ſimple to be afforded at a low price; yet, as they are contrived to be uſed with ſpirit lamps, or with portable furnaces, which muſt be heated with charcoal, they are not well calculated for the uſe of thoſe perſons who inhabit the rooms in which they cook their victuals; and of many others, who though they may have ſeparate kitchens, may not find it convenient to uſe ſpirit lamps and portable furnaces.

For the uſe of ſuch perſons, the coffee-pots repreſented by the figures 1. and 2. may be made to anſwer perfectly well, merely by taking away the perforated hoops on which they ſtand. For, when theſe are taken away, theſe coffee-pots may be heated

over

over a common chimney fire juſt as any common coffee-pot is now heated.

For very poor perſons, who cannot afford to buy a coffee-pot, I ſhall recommend a very ſimple contrivance, by means of which Coffee may be made, and even in the highest poſſible perfection. —I have often made uſe of this contrivance in making my own breakfaſt, and I have not found the Coffee to be in the leaſt inferior to that made in the moſt coſtly and complicated machines.

This little utenſil is diſtinctly repreſented in the figure 6. which is drawn to a ſcale of half the full ſize.

The whole of this apparatus conſiſts of a coffee-cup, which ſhould hold about three quarters of a pint; and a ſtrainer, made of tin, which is ſuſpended in it by its brim.

This coffee-cup ſhould be cylindrical, and when employed in making one gill of good ſtrong Coffee, ſhould be three inches in diameter within, and three inches and a half deep. The lower part of the ſtrainer is one inch and a half in diameter, and one inch deep; and the upper part of it two inches and nine-tenths in diameter, and about one inch and a half in depth.

The water which is poured on the ground Coffee ſhould be boiling hot; the cup and the ſtrainer having both been previouſly heated, by dipping them into boiling water.

As the Coffee will not be more than eight or ten minutes in paſſing through the ſtrainer, it is probable that it will be quite as hot as it can be drank, after it has deſcended into the lower part of the cup; but if it ſhould be neceſſary to keep it hot a longer time, the cup may be placed in a ſmall quantity of boiling water, contained in a ſmall ſaucepan, or other fit veſſel, placed near the fire.

When all the Coffee has paſſed into the lower part of the cup the ſtrainer may be taken away, and the cup may be covered with the cover of the ſtrainer.

I do not think it poſſible to contrive a more ſimple apparatus than this for making Coffee, nor one in which Coffee can be made in higher perfection.

That repreſented by figure 7., which is of a ſize proper for making two cups of coffee, is equally ſimple; and as it may be made entirely of pottery, it would coſt a mere trifle, perhaps not more than a ſhilling.

The cup, which ſerves in two capacities, firſt as a reſervoir in making the coffee, and then as a cup in drinking it, (and which, in a family, may be uſed for other purpoſes,) is three inches and a half in diameter, internally, and four inches deep.

As many perſons may prefer coffee-pots made entirely of Staffordſhire-ware, porcelain, or other pottery, to thoſe made of the metals, not only on account of the low prices at which they may be

afforded, but alſo on account of their ſuperior neatneſs and cleanlineſs, I have added the figure 8., which, on a ſcale of half the full ſize, repreſents a coffee-pot made of pottery, of a ſize proper for making five or ſix cups of coffee at once, or three, four, five, ſix, ſeven, or eight cups, if two ſtrainers are uſed, one after the other.

When this coffee-pot is uſed, it will be neceſſary to place it in boiling water to keep it hot, and it will be uſeful to cover the whole with a cylindrical veſſel turned upſide down; by which means both the ſtrainer and the coffee-pot will be ſurrounded by hot ſteam, which will contribute very eſſentially to the goodneſs of the Coffee.

As ſoon as the Coffee has paſſed into the coffee-pot the ſtrainer may be taken away; and the coffee-pot covered with the cover, which is common to it, and to the ſtrainer.

I ſhall conclude by a few obſervations, on the means that may be uſed for preſerving ready made Coffee, good for a conſiderable time, in bottles.

How to preserve Coffee ready-made

The bottles having been made very clean, muſt be put into clean cold water, in a large kettle, and the water muſt be heated gradually, and made to boil, in order that the bottles may be heated boiling hot.

The Coffee, freſh prepared and ſtill boiling hot, muſt be put into theſe heated bottles, which muſt be immediately well cloſed with good ſound corks.

The

The bottles muſt then be removed into a cool cellar, where they muſt be kept well covered up in dry ſand, in order to preſerve them from the light.

By this means ready-made Coffee may be preſerved good for a long time, but great care muſt be taken not to let it be expoſed to the light, otherwiſe it will ſoon be ſpoiled.

When wanted for uſe the Coffee muſt be heated in the bottle and before the cork is drawn; otherwiſe a great deal of the aromatic flavour of the Coffee will be loſt in heating it. And in order that it may be heated in the bottle, without danger, the bottle muſt be put into cold water, and this water muſt be gradually heated till the Coffee has acquired the degree of heat which is wanted. The cork may then be drawn, and the Coffee poured out, and ſerved up.

As good Coffee is very far from being diſagreeable when taken cold, and as there is no doubt but it muſt be quite as exhilarating when cold as when it is taken hot, why ſhould it not be made to ſupply the place of thoſe pernicious drams of ſpirituous liquors, which do ſo much harm?

Half a pint of good cold Coffee, properly ſweetened, which would not coſt more than half a pint of porter, would be a much more refreſhing and exhilarating draft; and would no doubt be incomparably more nouriſhing.

How much then muſt it be preferable to a dram of gin!

The

The advantages and diſadvantages to agriculture and commerce, which would ariſe from the introduction of a new beverage for ſupplying the place of malt liquors and ardent ſpirits diſtilled from grain; muſt be eſtimated and balanced, by thoſe whoſe knowledge of political economy fits them for determining theſe moſt intricate and important queſtions.

END OF THE EIGHTEENTH ESSAY.

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Fig. 1.

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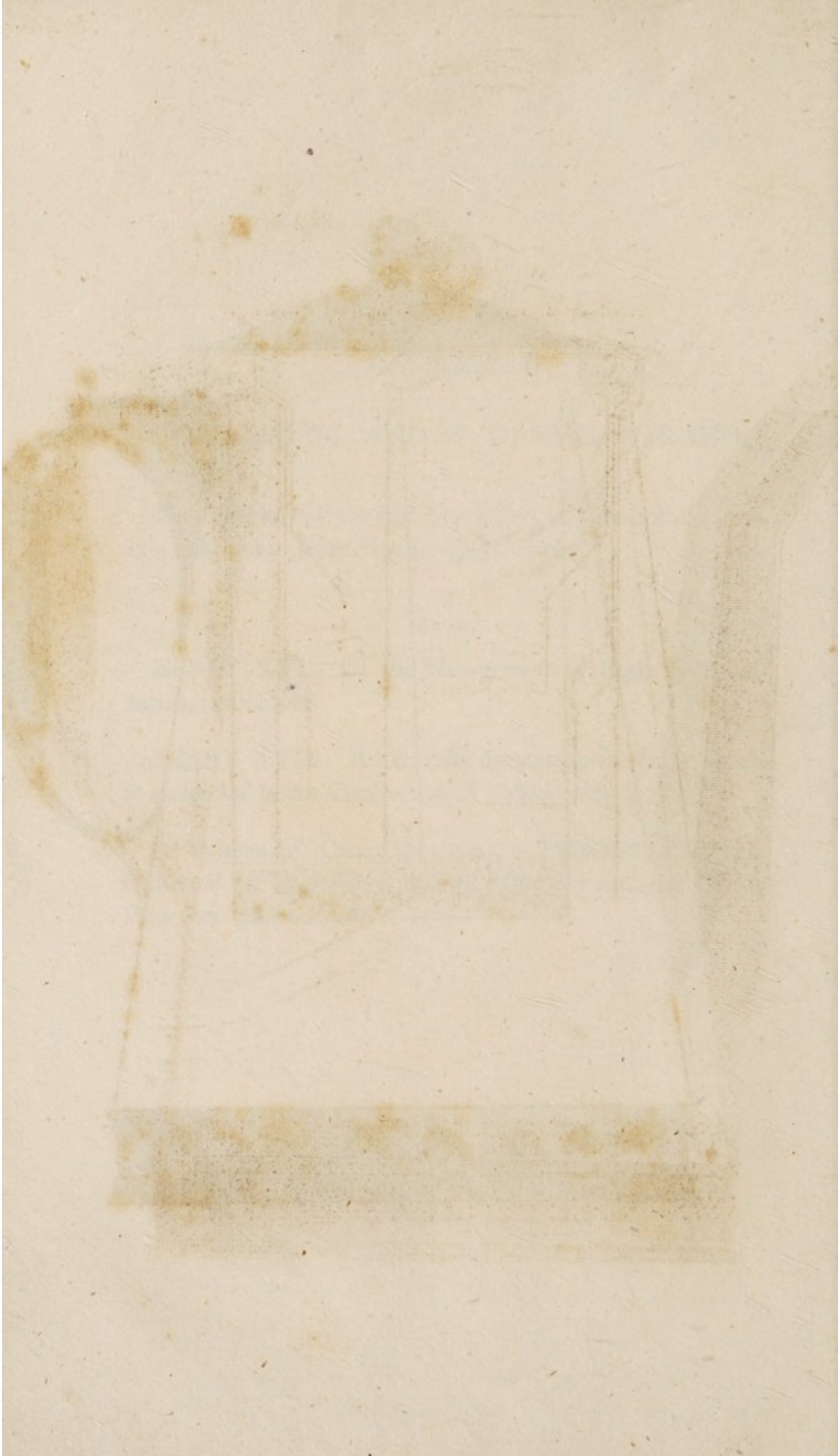

Fig. 2.

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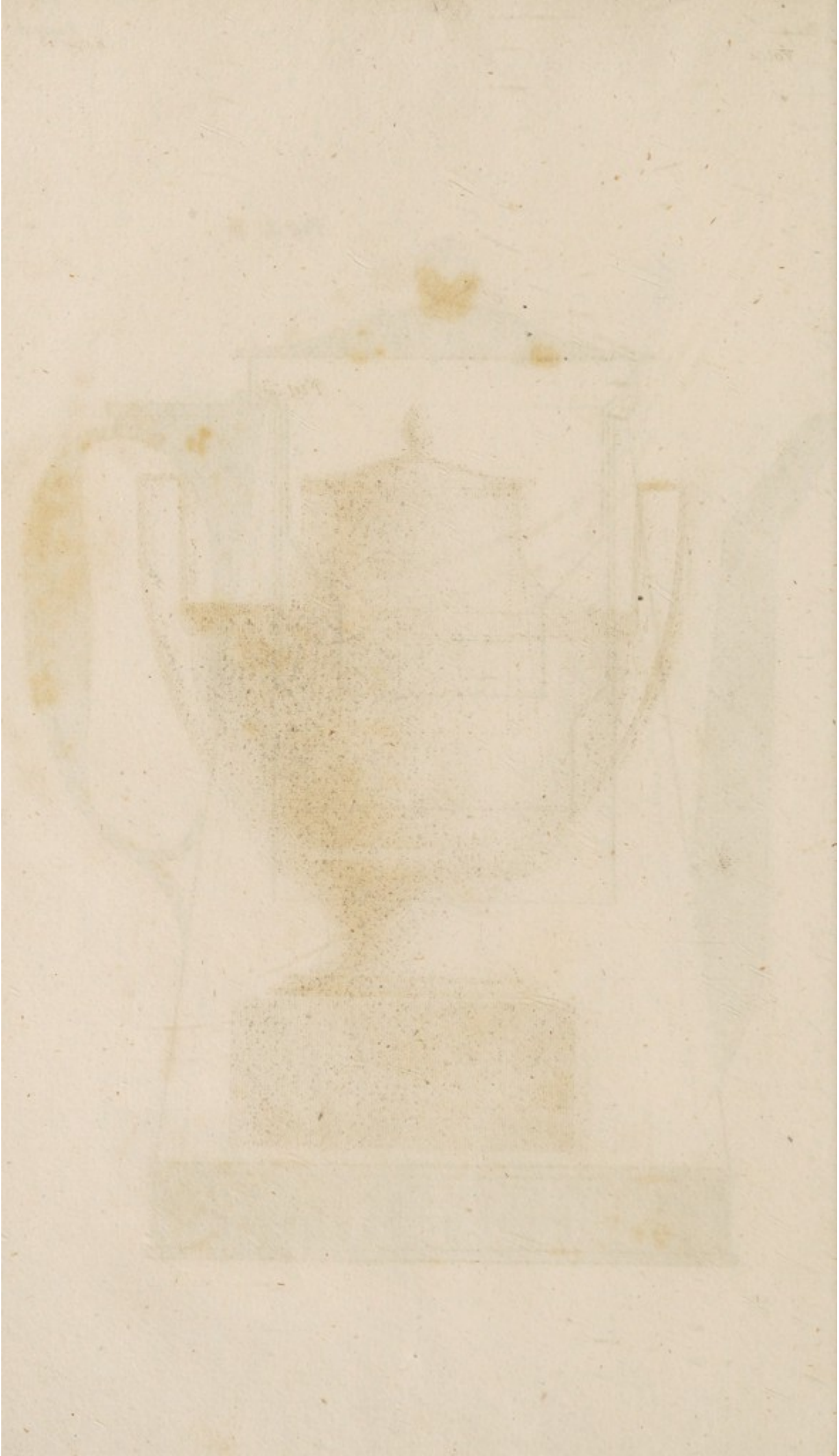

Fig. 3.

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Fig. 4.

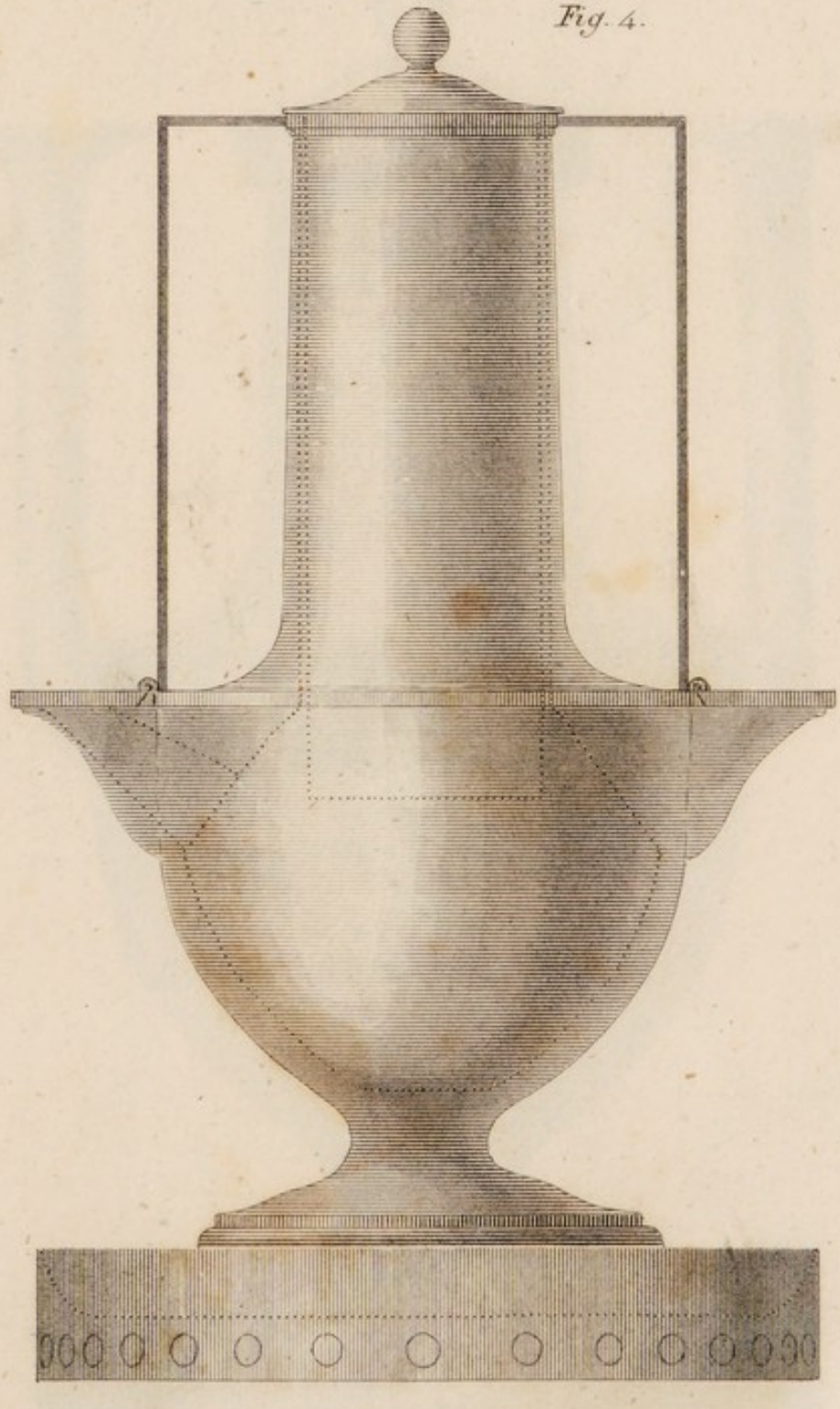

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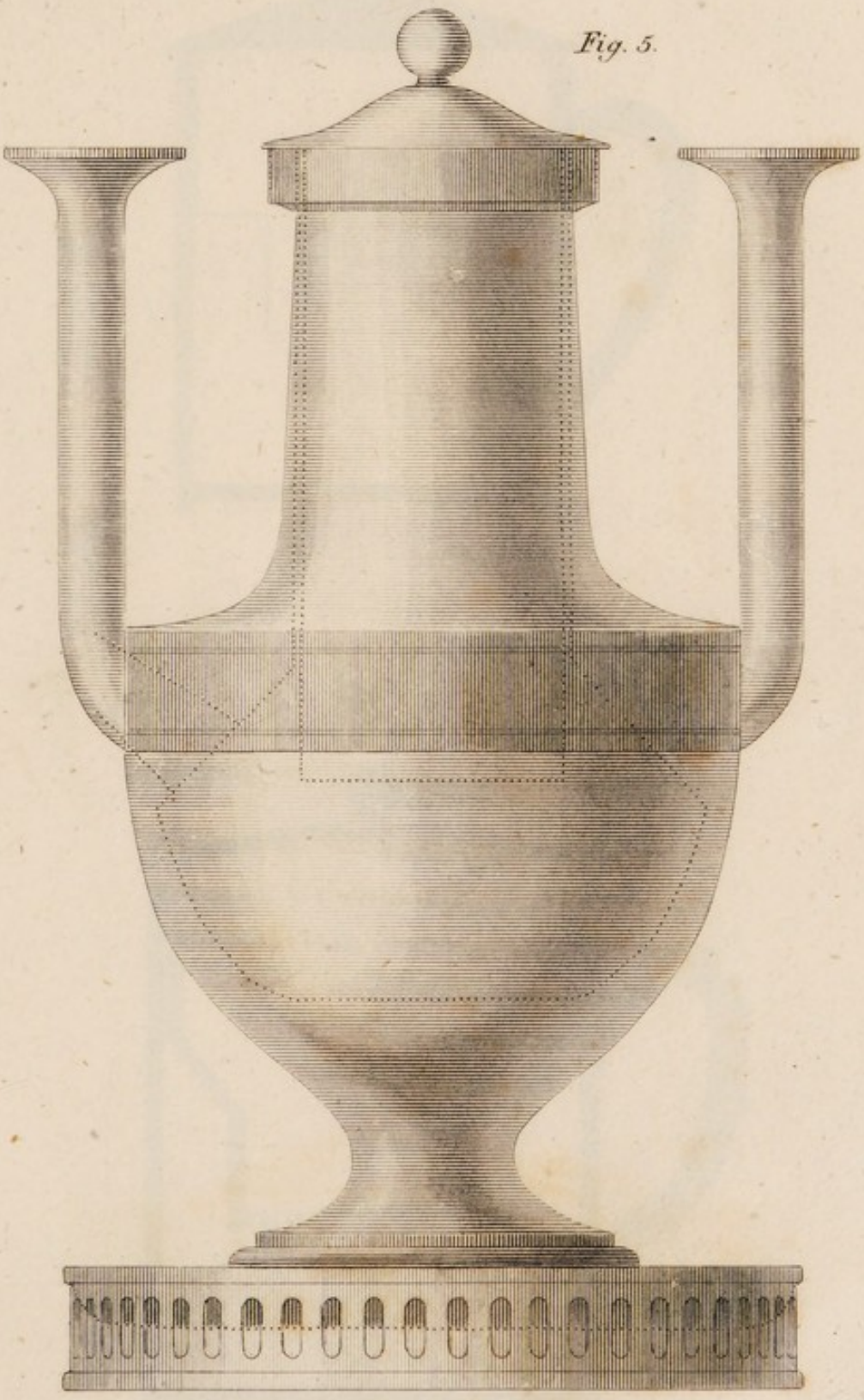
Fig. 5.



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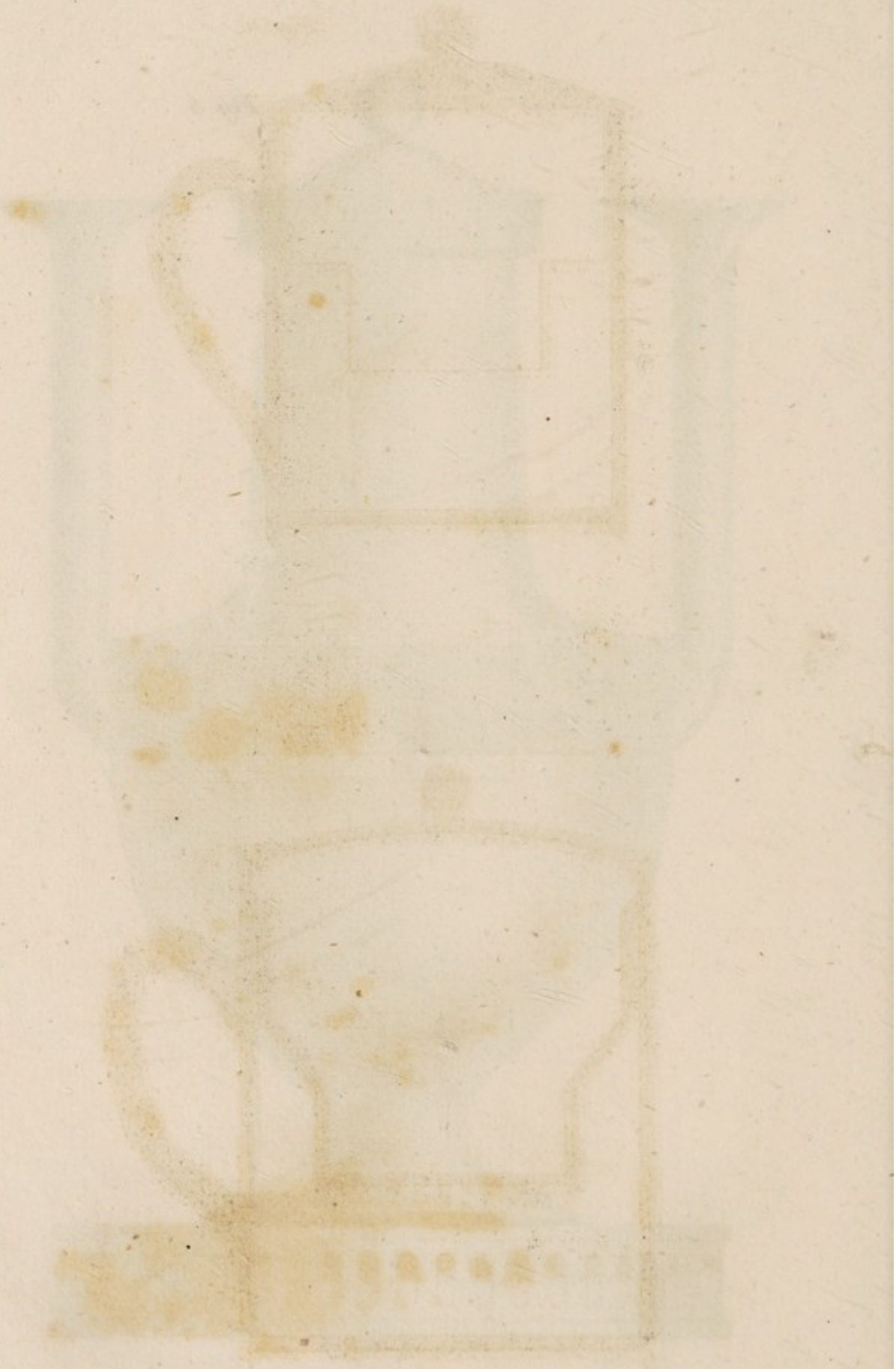

Fig. 6.

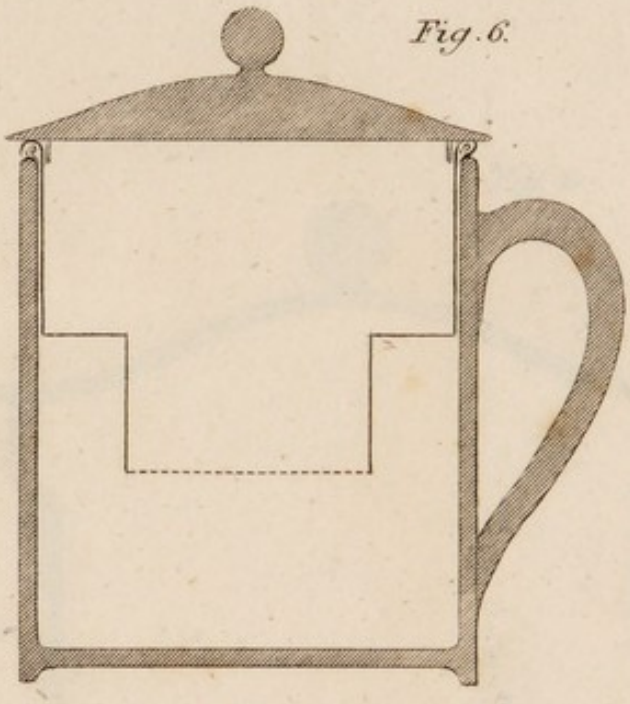

Fig. 7.

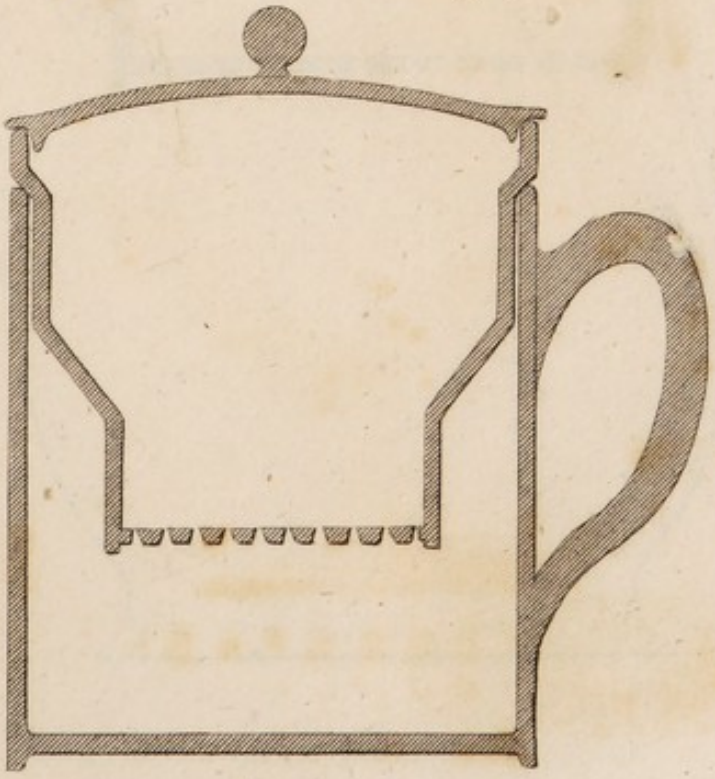

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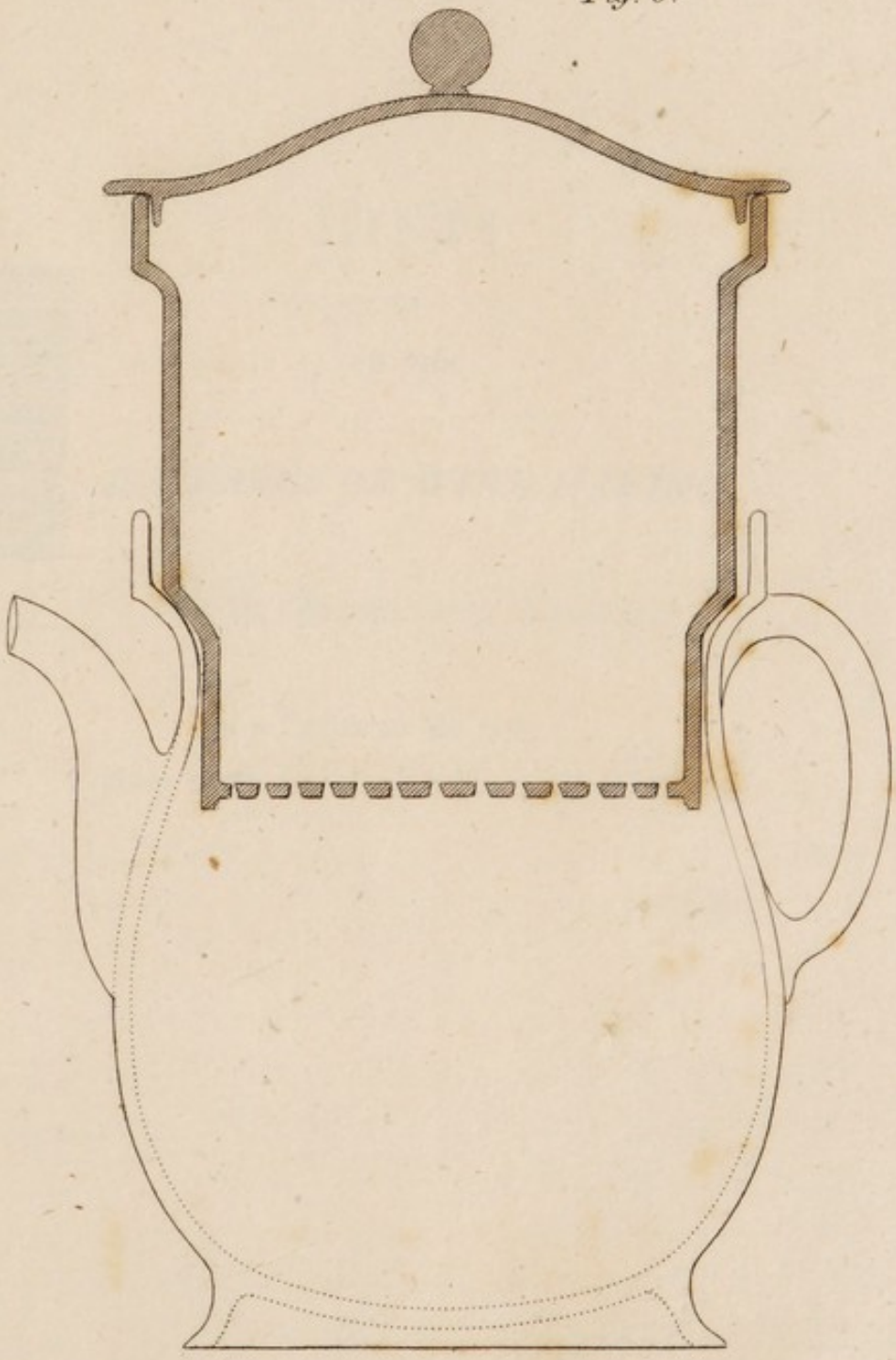
Fig. 8.



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