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TO THE

MANUFACTURERS

OF

POT and PEARL ASH.

THE important benefits which have been derived to our country, from the manufacture of Pot and Pearl Aſhes, muſt render every meaſure that tends to the increaſe or improvement of them peculiarly intereſting, the demand for theſe articles having of late greatly increaſed; to which happy effect a variety of cauſes have perhaps contributed, ſome of them of a temporary, but others of a more permanent nature; among the latter may be reckoned, the uſe of them in the linen manufacture of Ireland, and very lately their application in the tanning of leather in Britain and Ireland; in both which branches their conſumption is daily increaſing, and promiſes to afford a market for all this country can furniſh, at leaſt for a conſiderable time.

Impreſſed with theſe ideas, every friend to the United States will learn with pleaſure, that Samuel Hopkins, of the city of Philadelphia, has diſcovered a proceſs, by which a much greater quantity of pure Alkaline Salts can be procured from the aſhes of vegetables, than in any other method heretofore practiſed or known; in conſequence of which, the United States,

on the 31ſt day of the ſeventh month, (called July,) in the year one thouſand ſeven hundred and ninety, granted him, by Patent, the excluſive privilege of uſing or diſpoſing of the diſcovery for the term of fourteen years.

It is the intention of the preſent publication to communicate his proceſs, and the methods by which it may be made publicly uſeful: But he offers it with great diffidence, from a conviction that it is ſtill ſuſceptible of much improvement, and that time and a longer courſe of experiments and practice are neceſſary to bring it to the degree of perfection of which it is capable; under theſe circumſtances, however, he hopes for the indulgent approbation of the public for the ſtate in which the diſcovery is now preſented.

In his firſt experiments, in the ſmall way, he was flattered with a proſpect of obtaining a much larger proportion than has been repreſented. The allowance was made, with an intention of being moderate in the declaration to the public, as well as from a belief that not more than the ſpecified quantity of alkali could be obtained, without difficulty, by once burning only, when the plan of the works was enlarged. It may be proper here, to inform the manufacturer, that in order to obtain the full quantity, the aſhes were paſſed through the fire a ſecond and a third time, which two laſt operations, it is feared, will not be ſufficiently productive to make it profitable, unleſs where fuel may be had at a very reaſonable price.

In repeating the proceſs on a more extenſive ſcale, the allowance, which he ſuppoſed would be perfectly ſafe, does not appear quite ſufficient for the firſt ſtage of the manufacture in this way, though ſtill abundantly ſuperior to the common method. The difficulties which occurred in enlarging the plan, together with the knowledge obtained of the ſituation of many of the manufacturers of this article, have induced him to offer an eaſier mode of payment to ſuch as incline to

profit by the diſcovery, that ſo his patent method may be brought into more general uſe. As he has taken ſuch meaſures as will effectually prevent any Pot or Pearl Aſhes, made in violation of his patent, from being offered at market, without being liable to ſeizure, he is deſirous, as far as poſſible, to remove every cauſe of complaint from thoſe who may ſuffer by their imprudence, in carrying on this manufacture without a licenſe, and he has therefore made the terms ſo much eaſier than he had heretofore propoſed, that a licenſe under his patent is within the reach of almoſt every perſon who may manufacture this article.

The conditions on which the licenſes are now preſented, are as follow, viz. For permiſſion to work one furnace, fifty dollars, or half a ton inſpected beſt or firſt quality Pot-Aſh, in merchantable caſks, delivered to his agent either in Boſton, Providence, Norwich, Hartford, New-London, New-York, Hudſon, Albany, or Philadelphia, to be paid on receipt of the ſaid licenſe; and fifty dollars, or one other half ton of beſt or firſt quality inſpected Pot-Aſh aforeſaid, to be paid in three years, from the firſt day of the ſixth month (June), 1791; and fifty dollars, or one other half ton to be paid in four years, from the ſaid firſt day of the ſixth month, (June,) 1791; and fifty dollars, or one other half ton, to be paid in five years, from the ſaid firſt day of the ſixth month, (June,) 1791, making in the whole, two hundred dollars, or two tons of beſt or firſt quality inſpected Pot Aſh: And in lieu of five years, the time firſt propoſed, the licenſes will be extended for ſeven years and an half, from the firſt of the ninth month, (September,) 1791, with liberty to return them to his agent at the place where they were obtained, on or before the expiration of two years, from the firſt day of the ſixth month, (June,) 1791, and thereby cancel the obligations they may have given for payment of the one hundred and fifty dollars, or one and an half ton of Pot-Aſh. Thoſe who have ad-

vanced depoſit money, and wiſh to decline taking licenſes, may have it returned with intereſt, and thoſe who ſtill continue their intentions of taking the licenſes ſhall have intereſt allowed upon their advance money.

From an apprehenſion that many perſons have and may place too great a dependence upon leached aſhes, without a due regard to their quality, it will be right to inform ſuch perſons, that ſeveral experiments have been made on leached aſhes, received from divers parts of the country, ſome of which yielded three pounds and upwards to the buſhel, whilſt others did not afford a product that would pay the expence of manufacturing them.

The common method of obtaining Alkaline Salts, from the aſhes of vegetables, is generally known in all parts of the country. The preſent diſcovery relates particularly to the mode of treating theſe aſhes, ſo as to impregnate them with much larger quantities of the ſame ſalt, capable of extraction. It may be well, before the proceſs is particularly defined, to obſerve, that many chemical authors ſuppoſe fixed Alkaline Salt to be procured from vegetable ſubſtances by the action of fire alone. And that vegetables contain no native ſalts. Many of them aſſerting, that in burning, the fire unites with the acids, in which moſt kinds of vegetables abound, and thereby forms an Alkaline Salt. This ſentiment in ſome meaſure ſeems to be confirmed by the preſent diſcovery, in which it appears that flame, operating upon the aſhes of vegetables, loads them with a much greater quantity of ſalt than they before poſſeſſed, (or could be extracted from them in the common method.)

The reaſon of which may be, that in the uſual way of burning vegetables, the aſhes on being formed immediately ſink down, and the flame has not an opportunity of operating on, and uniting with all the acids

that were contained in the vegetable ſo conſumed, theſe acids therefore remain unconverted in the aſhes.

A further confirmation of this idea is that aſhes expoſed in a furnace, poſſeſſing too great a degree of heat, have been found not to produce ſo extraordinary a quantity of ſalt, which is probably occaſioned by the exceſſive heat volatilizing the unconverted acids. It will therefore be neceſſary, in order to obtain the greateſt quantity of ſaline matter, that an oven be conſtructed on ſuch principles, as will admit of a large portion of flame being kept in it operating on the aſhes without acquiring too great a heat, and yet poſſeſſing a ſufficiency to produce the deſired effect. The neceſſary degree may be known by a few experiments, or from the appearance of the walls, which ſhould never be allowed to be much more than a faint red. The annexed draft has a kettle placed over the flame or flue hole, which ſerves to evaporate the ley, and alſo to temper the heat in this place, which is greater than in any other part of the oven.

There are two oppoſite doors which open near the flame or flue hole, and ſerve to admit a little air in caſe the oven is likely to become too hot. They alſo anſwer a good purpoſe in giving room for ſtirring the aſhes, and afford a convenient place through which they may be drawn from the oven. There are three chimnies; the middle one directly over the front door, the flues of which muſt be very ſmall, as a ſtrong draft tends to raiſe the heat above its proper degree, and a ſmall one ſerves to detain the flame in the oven. In each chimney ſhould be a ſmall plate of iron as a damper or regulator, which may be moved at diſcretion. Over each end of the fire-place a couple of flat bottomed kettles, about 2 1-2 feet in diameter, and capable of containing 30 or 40 gallons, might be ſet to advantage; theſe would aſſiſt in regulating the heat as well as for evaporators, or their place may be ſupplied by a large oblong pan.

The grates are repreſented to be about 1 1-2 inches aſunder, of a triangular ſhape, flat at the top. The aſh-hole is three feet below the grates, which gives room for a free admiſſion of air, and ſerves to prevent too much heat being communicated to the works, from the coals that fall down. There is alſo in the back part of it, a hole for the purpoſe of giving a greater ſupply of freſh air to every part of the fire; this cauſes the flame to diffuſe itſelf, more univerſally, over the floor of the oven, which is of an eliptic form 5 1-2 by 7 feet, being the proportion that ſeems to anſwer the moſt valuable purpoſes. The kettle, over the flue hole, is of uſe in ſpreading the flame towards the ſides of the oven; this hole is made much larger (than would be proper in moſt other caſes) to prevent the neighbouring parts from acquiring a heat greater than the extremities of the oven, the complete ſucceſs of the operation depending in a great degree upon the equal diffuſion of flame throughout the whole.

The furnace and other materials being prepared, to perform the operation, let the oven be heated, until it becomes of a faint red, when contract the draft as much as the fire will any ways allow; then put about one buſhel of aſhes (which will be better if ſifted and a little moiſtened) in at a hole through the top of the oven, and ſpread the ſame over the hearth with a proper inſtrument; allow the flame to play on theſe for about fifteen minutes, then ſtir them and ſuffer them to remain about ten minutes longer, then add another buſhel of aſhes, which treat in the ſame manner as above directed, continue adding and ſtirring until the oven is pretty well loaded, (always remembering to keep the drafts contracted;) then carefully ſtir the whole once or twice, when they will all appear red, be completely alkalized and fit for drawing out, which ſhould be done with a hoe proper for the purpoſe, at the front door, and depoſited in a kettle, or ſome other convenient veſſel, covered over, when water ſhould be ad-

mitted through a ſmall hole in the cover, until they are all thoroughly wet. The ſame operations may then be commenced with another quantity; or a larger parcel may be put into the oven at firſt, and ſtirred more frequently. When a ſufficient quantity of aſhes is burnt and wet, begin to boil them, which ſhould be done in a large pan or kettle; this ſhould be about 1-3 full of aſhes, and then nearly filled up with rain or river water, allow it to boil until the ley is ſufficiently ſtrong, ſtirring the aſhes repeatedly, when it ſhould be drawn off through an iron pipe inſerted a little above the aſhes, or taken out with a proper ladle and put into a tub prepared for the purpoſe; then add a ſecond parcel of water, which keep boiling for a ſhort time, and, if this ley is ſtrong enough for evaporation, let it then be put in with the other; if not draw it into another tub, and ſo continue making the ley as long as the aſhes will produce it; after which theſe aſhes are to be placed by themſelves, and to be operated upon in the ſame manner as above directed, provided the price of fuel will warrant the repetion; and another parcel of alkalized aſhes is to be put into the kettle, upon which throw the weak ley of the laſt boiling; when this is ſufficiently ſtrong, draw it off among the other ſtrong ley, which continue to do as long as it appears of a proper ſtrength to boil down; when this is no longer the caſe, put the weak ley into a veſſel appropriated to that purpoſe, and diſpoſe of it on a third parcel, and ſo on. When a quantity of ſtrong ley is procured, it may be of advantage to ſtrew a little quicklime or ſome other abſorbent earth into it, to make it perfectly pure; this being done, it will be neceſſary to draw it off into another veſſel through a cock placed at a little diſtance from the bottom of the veſſel, to prevent the ſettlings from being diſturbed; by this means pure limpid ley will be obtained fit for evaporating, which will produce a beautiful white ſalt of a very ſuperior quality. The ſettlings may be thrown

among other aſhes that are to be burnt. This method of boiling aſhes has an advantage over leaching, as it may with great convenience be done in the winter ſeaſon, and produces a ley more beautiful in appearance, and by which it is ſuppoſed rather more ſalt can be extracted from the ſame aſhes, than could readily be done by leaching them. But where there are not proper kettles or conveniencies for boiling the aſhes, it will be well to leach them, as in the common way; in which caſe about ſixteen tubs of a cilindrical form, 4 feet high, and 4 1-2 feet in diameter at the top, ſhould be prepared. Theſe tubs ſhould be arranged in four diviſions, and a little elevated from the ground, with a trough placed in front of each diviſion, ſo as to be convenient to draw the ley through cocks inſerted near the bottom of each tub, and at the lower end of each trough a receiver ſhould be placed. Things thus prepared, let two or three ſmall billets of wood be laid in the bottoms of the firſt diviſion of the tubs, and on theſe a falſe bottom full of holes; over this ſpread a little wet hay (or ſtraw in preference) and if obtainable lay a coat of moſs on the hay or ſtraw; the whole ſhould then be covered with a thin layer of lime; when this is done, put in the burnt aſhes, preſſing them down well: theſe tubs, being thus filled with aſhes, which are previouſly to be moiſtened in the kettle or other veſſel, directed to be placed under the mouth of the oven, ſhould be ſupplied with rain or ſome other ſoft water, as long as they will receive it (hot in preference) allow them to ſtand a few hours, then begin to draw the ley into the ciſtern, and continue ſo to do as long as it is ſtrong enough to boil down. This may be known by a ſmall hydrometer, which every manufacturer ſhould have, or by its bearing an egg; when this is not the caſe, it ſhould be thrown on the ſecond diviſion of tubs prepared as above, which continue to do as long as it produces any ſalt. The aſhes thus leached ſhould be put into ſome

convenient place to undergo a ſecond ſimilar operation, provided the price of fuel and labour will profitably admit of it, and others thrown into the tubs thus emptied; in doing of which care ſhould be taken not to diſturb the ſtraw, &c. The drawing off the leyes from the ſecond ſet of tubs, into their ciſtern, may be commenced as ſoon as the ley will run, and which ſhould be continued as in the firſt ſet, diſpoſing of the weak ley on the third, and treating the third in the ſame manner; as ſoon as the ley in the firſt ciſtern is perfectly ſettled, which may be facilitated by ſtrewing a little quick-lime into it, it ſhould be drawn off through a cock fixed a little above the bottom of the ciſtern, and put into a receiver, placed above the kettles, with a conductor to each of them, having a cock in it, and kept running juſt as faſt as the evaporation takes place. This ſhould be continued until it is judged there is a ſufficiency to dry off. The fire muſt be ſlackened before the ſupply is witheld, or there will be great danger of the kettles overflowing; the fire ſhould be very moderate until the moiſture is nearly exhaled.

If it is intended to make Pot-aſh, the fire muſt be raiſed, when the ſalts will readily fuſe; when completely done (which may be known by their being at perfect reſt) take them out with an iron ladle, and diſpoſe of them in ſmall iron kettles to cool, which kettles ſhould be thoroughly dry, as moiſture may be productive of very dangerous conſequences to the workmen: They ſhould alſo guard well againſt the leaſt particle of water getting among the Pot-aſh when in fuſion. Theſe aſhes are now fit for market, and will be of a very ſuperior quality. If Pearl-aſh is intended, the ſalts may be calcined in the kettles, which may be done by carefully ſtirring them, and allowing them to remain ſome time over a ſlow fire, as a high heat may from their great purity change their colour,

very poſſibly to a green, which is not ſo well approved in America, though by ſome chemiſts moſt prized. The Pearl-aſh will be very liable to melt unleſs particular care is taken. If calcined in a kettle it is abundantly more cauſtic than in the common way, though ſeldom of that clear ſky colour. If it is deſired to make them beautiful to the eye, it ſhould be done in the oven, which muſt be perfectly clean, and the ſalts operated upon with a moderate fire for ſome time, ſtirring them repeatedly, that the whole may be benefitted; equal care, as in the other proceſs, muſt be taken, to guard againſt their melting or changing their colour: When of a perfect ſky colour, they muſt be taken out, and are fit for moſt chemical uſes.

MATERIALS, &c.

For erecting the furnace, there ſhould in the firſt place be 1500 good ſalmon brick provided, alſo ſtone enough to ſupply the place of about 3000 brick, and a ſufficiency of loam or clay and ſand to lay the brick and ſtone, having a little lime for the outſide walls that are the moſt expoſed, alſo one plate of caſt iron, or a good flat fire ſtone, about 18 inches ſquare, to be placed under the front door of the oven; ſee the dotted lines each ſide of M. fig. 1.

Two plates about 13 inches ſquare to be placed under the ſide doors: See the dotted lines each ſide of K. K. in fig. 1, and P. P. in fig. 2.

Eight hooks and four ketches to hang the doors upon, theſe ſhould have ſhanks 8 or 10 inches long.

One ſtrong ſheet iron door 14 inches high and 16 inches wide, for the fire place, where the wood is put in over the continuation E. of the aſh-hole in fig. 1. which could not be repreſented in that figure, though may be ſeen in E. fig. 3.

One ditto, 12 inches high and 16 inches wide, repreſented by Q. in fig. 2.

Two ditto, 12 inches wide and 7 inches high, for the door ways into the oven, K. K. in fig. 1.

Three plates of ſheet iron to run in the chimnies as dampers, about 4 by 12 inches. See I. I. I. in fig. 1. and K. K. K. in fig. 2.

A ſmall ſized Pot-aſh kettle, to be ſet a few inches forward of the bridge of the oven.

A ſufficiency of grates (or pig-iron as a ſubſtitute,) for the fire place, about 7 1-2 feet in length, and 15 inches over, theſe grates or pigs ſhould be 20 inches long at leaſt, ſo that they may have a ſufficient ſupport in the wall, placed 1 or 1 1-2 inches apart.

Reference *to the* Figures.

Figure 1.

The ground plan of the furnace, in which A. repreſents a kettle about 3 feet in diameter.

a. A hole through the top of the oven 4 inches in diameter.

B. The oven, 5 1-2 by ſeven feet in diameter.

C. Grates to make the fire on, directly over the aſh-hole, 7 1-2 feet in length and 15 inches in breadth.

D. Continuation of the aſh-hole from under the grates 12 inches, for the purpoſe of admitting freſh air to the fire.

E. Continuation of the aſh-hole from under the grates 18 inches, for the purpoſe of ſupplying the fire with air, and drawing out the aſhes produced by the wood conſumed.

F.F.F. Three buttreſſes to ſupport the works, 1 1-2 by 2 1-2 feet.

G. G. Top of the bridge for the flame to paſs over into the oven.

H.H.H. Three chimnies 4 by 8 inches in the clear.

I. I. I. Dampers or regulators to be fixed in the chimnies.

K. K. Door ways into the oven.

L. A 13 inch wall ſupported by an arch over the aſh-hole, 12 inches above the ſurface of the ground, forming the back part of the fire-place (or ſtoke-hole,) this wall is carried up with and tyed into the other walls.

M. A door-way into the oven from the front of the furnace.

N. A wall back of the fire-place.

Figure 2.

A groumd plan of the furnace repreſented in perſpective, which will give a general idea, particularly to theſe who are acquainted with the principles of perſpective drawings; in which A. ſhews the oven.

a. The hole through the top.

B. The fire grates, only one half of which are repreſented, the other half may be diſcovered by a continuation of dotted lines. See C. in in the ground plan, Figure 1.

C. & D. Continuations of the aſh-hole. See D. and E. fig. 1.

E. A kettle, the ſame as repreſented by A. fig. 1.

F. F. F. Three buttreſſes. See F. F. F. fig. 1.

G. A door-way into the oven opening directly under the middle chimney. See the dotted lines from thence to the oven, alſo ſee M. fig. 1.

H. An upright wall, being the furtheſt ſide of the fire-place, 7 1-2 feet long and 14 inches high.

I I. I. Three chimnies. See H. H. H. fig. 1.

K. K. K. Dampers in the chimnies. See I. I. I. fig. 1.

L. L. The bridge for the flame to paſs over. See G. G. fig. 1.

M. A door ſhewn from this ſide only; there is alſo one on the oppoſite ſide, to ſhut up the paſſages, P. P. See K. K. fig. 1.

N. The air hole under the back end of the fire-place.
O. The fire door. See E. fig. 3.
P. P. Door-ways. See K. K. fig. 1.
Q. The front door of the oven.

Figure 3.

Is a ſection of the furnace in which it is ſuppoſed all the works front of the kettle are removed; when the flame hole, the bridge, the poſition of the fire, the ends of the grates, the depth and length of the aſh-hole &c. will appear as there repreſented. In which

A. Shews that part of the aſh-hole under the grates which is 3 feet from them to the bottom.
B. The flame or flue-hole, 4 1-2 feet in length.
C. C. C. Are ends of grates, on which the fire reſts.
D. A kettle, the ſame as ſhewn in fig. 1. and 2.
E. A fire door, which could not be repreſented in fig. 1. or 2.
F. The fire made on the grates.
G. The bridge for the flame to paſs over.
H. & I. Continuations of the aſh-hole.

From the ſurface of the ground, to the upper part of the air-hole, N. fig. 2.	14 inches
To the top of the fire grates, fig. 1. C.	19 inches
To the top of the buttreſſes, F. F. F.	24 inches
To the bottom of the bridge, G. G. fig. 1.	29 inches
To the floor of the oven,	30 inches
To the top of the fire door, ſee E. fig. 3.	33 inches
To the top of the bridge, G. G. fig. 1. and G. fig. 3.	33 inches
To the bottom of the kettle,	34 inches
To the entrance of the two outſide chimnies,	35 inches
To the beginning of the arch of the oven,	35 inches
To the top of the door-ways, K. K. fig. 1.	37 inches

To the top of the door way, M. fig. 1. 38 inches
To the higheſt part of the flame-hole, where the arch meets the kettle, depending a little on the ſhape of the kettle, about 42 inches
To the higheſt part of the arch of the oven, 44 inches

Figure 4.

A Section of two pot-aſh kettles, ſeen from the ſide, ſet as in the common way, repreſented by A. A.

B. The chimney.
C. The ends of grates, for the fire to be kept on, theſe are on a level with the ground.
D. A door thrown open, through which the fire receives a ſupply of wood.
E. Part of the aſh-hole, that extends outſide of the wall.
F. The aſh-hole under the grates.

Figure 5.

A ſection of boilers per fig. 4, ſeen from the front, in which

A. Repreſents the aſh-hole below the grates.
B. A kettle.
C. The door-way under the kettles.
D. The door thrown open.

DIRECTIONS FOR BUILDING.

The materials being all prepared, an aſh pit ſhould be dug in ſome convenient part of the building, of which a better judgment may be formed by a reference to the draft, fig. 1. This hole ſhould be 2 feet deep and large enough to leave a ſpace 15 inches in breadth

and 11 feet in length, after the walls are built, which ſhould be 9 inches thick, if of brick, or 16 inches if of ſtone; theſe walls muſt be raiſed to the ſurface of the ground, when the projections D. and E. in fig. 1. are complete; the bottom of the aſh-hole ſhould be paved with brick or good flat ſtone. A foundation is now to be laid as per the outlines of the ground plan, including the buttreſſes F. F. F. ſufficiently deep to ſecure it from injury by froſt.

The walls of the aſh pit, of 7 1-2 feet ſhould then be raiſed 17 inches, and when carrying them up there ſhould be an arch thrown over L. 12 inches from the ground, repreſented in perſpective by N. fig. 2, this is for an air hole mentioned hereafter; when theſe walls are 17 inches high, the grates are carefully to be bedded, leaving a vacancy of 1 or 1 1-2 inches between each, which will make the top of the grates juſt 19 inches from the ſurface of the ground. It will now be time to raiſe a wall, 2 feet 4 inches high upon the foundation before directed to be laid, which will be better if done with ſtone, except ſuch parts as will be expoſed to the fire. The ſides of the fire-place (or ſtoke-hole) ſhould be continued 14 inches above the grates, gathering over a little from the back part, when near the top, at the ſame time the hooks and ketches for the door are to be worked in the walls, obſerve that a row of brick are laid on edge. See G. G. fig. 1. The upper ſides of which will be on a level with the top of the fire door, and the bottom one inch below the floor of the oven. Theſe brick muſt be carefully placed and well laid in good clay.

The outſide walls being thus raiſed, it will be well to fill up the oven part with ſtone or earth well rammed after this is done, the floor of the oven muſt be laid, the ſize and form of which may be ſeen by the inner dotted lines in fig. 1 and 2. This floor ſhould be made of brick, placed on edge in preference, and in good loam mortar, the face may then be ground ſmooth,

the rows of brick ſhould run lengthways of the oven, and extend rather farther than the ſize the oven is intended to be, that the wall may be built on it.

When laying the floor, a plate of iron ſhould be bedded therewith in the door-way, M. fig. 1. to project three inches over the wall, this plate is to be under the center chimney, as per the dotted lines, there ſhould alſo be plates of iron level with the floor of the oven, placed under the door-ways, K. K. in fig. 1. and to project a little over the wall; it will now be right to form the oven with a courſe of headers, the diameters 5 1-2 by 7 feet, leaving three openings or door-ways, repreſented by the dotted lines in the ground plan.

The two oppoſite ones K. K fig. 1, are to be 12 inches wide; the ſides of theſe doors, that are the neareſt the fire-place, are upon a range with the ends of the brick directed to be laid for the flame to paſs over into the oven; the places of theſe doors may be ſupplied with ſuitable flat ſtone, there not being occaſion for opening them ſo frequently as the other doors: the front door M. 12 inches on the inſide, and 16 inches on the outſide; raiſe this wall 2 courſes of brick.

Then cover 18 inches of each end of the fire-place with flat ſtone if ſuitable ones are obtainable, or flat bottomed kettles of a diameter not exceeding 2 1-2 feet, may be ſet here to advantage, ſee definition of the proceſs; obſerve to place theſe kettles ſo as not to be ſubject to boil over when the works become hot, ſhould neither kettles or ſtone be obtainable, it muſt be done with plates or bars of iron.

The Kettle A. fig. 1, ſhould now be ſtationed on a billet of wood, the bottom to be 1 or 1 1-2 inches higher than the top of the bridge G. G. fig. 1, and a few inches forward of the ſaid bridge. Skew backs ſhould now be laid to form the arch or crown of the oven upon. Theſe ſkew backs muſt not only be placed

as per the inner dotted lines, fig. 1, but over the wall back of the fire-place, and the parts of the fire-place above directed to be covered, as the arch will extend from the ſaid back wall to the front door M. fig. 1.

A centre of ſand ſhould now be formed, having care that it be as flat on the top as it will admit of, on account of ſtrength, making the higheſt part 14 inches from the floor of the oven; this centre muſt extend over the grates, except the ends of the fire-place, to be covered with ſtone, or ſome other way; in forming this centre, care ſhould be taken, that the paſſage for the flame to go into the oven from the fire-place, be ſhaped ſimilar to the one repreſented in B. fig. 3; the higheſt part where it appears to ſtrike the kettle to the bridge is 9 inches, and the upright jams 2 bricks or 5 inches; the length of this Flue hole is intended to be 4 1-2 feet, though 4 or 4 1-4 will anſwer as well, tho' much will depend on the ſize of the kettle placed here. The arch ſhould now be made, with a 9 inch wall of good ſalmon brick, laid in loam, leaving flues for the two outer chimneys, the entrance of which are to be 5 inches from the floor of the oven, and to have a pretty quick riſe as they go back, ſo that they may not be ſubject to be choked by the aſhes that are to be burnt in the oven, lodging in them. When carrying up the walls, remember that the hooks and ketches for the different doors, be worked in; the door-ways K. K. fig. 1, are to be covered with an arch or flat ſtone, if ſuitable ones are obtainable: 7 inches from the floor, the front door-way M. ſhould be 8 inches high in that part [illegible] the oven, and 12 or 14 on the outſide; the inſide of this door-way ſhould be covered with a plate of [illegible] or very good ſtone, ſo as to ſecure the arch from injury by the hoe and other inſtruments uſed in working the aſhes. Between the inner and the outer parts of the door-way, is to be a vacancy for the chimney about 4 by 8 inches; the arch or crown of the oven may now be compleated, having great care that the kettle

A. be well ſecured ; there is to be a hole left through the top of 4 inches in diameter : it will now be neceſſary that the chimneys be carried up to a height proper for the buildings that the works are erected in ; if very high, they may all be carried up in one without any diſadvantage, obſerving that the dampers are below the place where the chimneys join ; the walls, except the buttreſſes, ſhould all be raiſed to a level with the crown of the arch, and well tied together to ſtrengthen them ; the buttreſſes will be better if covered with a heavy flat ſtone, as they will be conſiderably expoſed, which will alſo be the caſe with the corners of the furnace.

The foregoing deſcription of a furnace and directions for erecting the ſame, with an account of the proceſs, &c. it is hoped are ſo plain as to enable the manufacturers to proceed in the buſineſs without difficulty ; but from a conviction that many improvements may be made both in the conſtruction of the works and the mode of operation, the following encouragement to the ingenious is offered, viz. The perſons forwarding within twelve months from the firſt day of the 4th month, April, 1791, to the patentee or his attorney at New-York, poſtage free, the three beſt eſſays on the ſubject, to be ſubmitted to the opinion of two or more judicious perſons, to be nominated by the Governor of the State of New-York, ſhall each be entitled to and have a licence preſented them, authoriſing and permitting them to work one furnace on the patent principles, for ſuch time as ſhall be unexpired of ſeven and an half years from the 1ſt day of the 9th month, September, 1791. By the Manufacturers reſpectful friend,

SAMUEL HOPKINS,
Per his Attorney,
WILLIAM SHOTWELL.

Should it be neceſſary to transfer the Licence, the following Form is recommended.

I, A. B. within named, for a valuable conſideration by me received, wherewith I acknowledge myſelf to be fully ſatisfied, Do hereby grant, ſell, aſſign, and transfer the within licence, and all my right and title to uſe the within mentioned diſcovery or improvement to C. D. of his executors, adminiſtrators and aſſigns. In witneſs whereof, I have hereunto ſet my hand and ſeal, the day of 179

SINCE firſt obtaining the foregoing Patent, it has been the uniform determination of the Patentee, to conduct the buſineſs in ſuch a way as ſhould appear moſt likely to give general ſatisfaction. He being under the neceſſity of taking a northern journey, ſubmitted the care of it to the ſubſcriber, with a requeſt that attention be paid to the intereſt of thoſe who might engage in the manufacture, as well as the particular intereſt of the Patentee, and for this purpoſe authoriſed, lengthening the term of the licences, in which ſtate they now come forward: But ſince the departure of the Patentee, ſeveral of the manufacturers have expreſſed a wiſh for a further deviation from the original plan, which the ſubſcriber finds the powers veſted in him not competent to, but aſſures ſuch perſons as may incline to take licences under the preſent arrangements, that they ſhall be entitled to any privileges the Patentee may, on his arrival, authoriſe to be made, by the maſacturers reſpectful friend,

WILLIAM SHOTWELL.

New-York, 25th 5mo. 1791.

A COLONIAL INDUSTRY (Potash)

In these days of complex industrial organization it is hard to realize that the time ever existed when a complete manufacturing process, together with specifications for equipment, might be described in two pages. The following account of the process for making potash is taken from the letter book of Henry Lloyd for the years 1765-1767:

"Process for Making Pot Ash with the Necessary Utensils

It will be proper to have the Buildings 24 feet by 22 Situated on the South side of a Hill so that a Cart can come conveniently at it to put the Ashes into the Loft. The underpart serves for the Furnace Cisterns &c. The Cisterns must be made of good Clear Seasoned White Pine Plani 2/2 or 3 Inches think about 4½ feet high & of any length or breadth Secur'd by bands of Oak Joyce, they are generally made to Contain about 1400 gallons each. Cisterns of that Size will take about 125 Bushells of Ashes to fill one of them. Two are the General number for a work, more are useful & profitable. They shou'd have a false bottom resting on slips of Plank which are laid on the true Bottom. The false bottom shou'd be narrow strips of Green Boards about 8 inches wide plac'd at a Quarter of an Inch a Sunder for the Lye to drain through & fall on the true bottom. a Cock or Fossett shou'd be fixt in the Side of the Cistern near the bottom & a hole pierced to receive it about the Centre between the falst bottom & true bottom. Scuttles should be made in the Chamber floor over each Cistern to save

Russell, George A. comp.
Articles on the Potash industry transcribed fm. various sources.
fm: Bulletin of the Business Historical Society] Arlington, Vt. 1941?
7(3):11-14. May 1933.

Labour & Waste in filling them with Ashes. Receivers shou'd be plac'd in the ground Underneath the Cisterns well Clay'd sides & bottom made of the same materials with theCisterns & Made in the same manner (except the false bottoms) of the same length, breadth, & half the depth. TheCisterns are placed on them leaving a foot of the Receivers open in Front by projecting them a foot over behind. They should be sett near the front wall with a Window over each, to throw the Ashes out of after all the Salts are extracted. There are generally two Boilers sett in brick work, the bottom & sides left bare hanging only by two Courses of Bricks at top, the bottom of the Kettles 18 inches from the Hearth of the Furnace, by which name I call theBrick work. The Chimney directly opposite the mouth of the Furnace. The throat or passage for the smoke & draft of the blaze to be 4 Inches by 5. The works & necessary Implements being thus prepared with a Stock of Ashes beforehand. Fill the Cisterns with Ashes by a Hoe or Shovell through the Scuttles made in the ChamberFloor, frequently treading them down, when the Cisterns are thus filld from a Hollow or a Bason in the middle of the Ashes to prevent the water getting a Passage between the Ashes & sides of theCistern, lay a broad Slate Stone to receive the Water from the Troughs to prevent the Stream Gullying the Ashes. Pump on Water till it lays on the Surface, Rain or River Water is best, hard or brackish water is pernicious. As the Water soaks away replenish it, & in about two or three days the Lye will pass through to the Cock or Fossett, the Strength of which may be provd by two Phials of equal Contents & weight, filling one with water the other with Lye. If the Lyes exceed the weight of the water 25 or 26 Caracts it is good & you may let it continue to run into the Receiver for Boiling till it is reduced by repeatedly filling the leach to 12 Caracts then let the remainder run into the small Lye Receiver, it is best to employ one Receiver for Strong Lye the other for weak Lye. That Cistern which is placed over the Strong Lye Receiver conveys it Immediately from the Cock of Fossett into it. A small Trough easily conveys the Strong Lye of the other Cistern into the same Receiver. The same Method serves to convey the small Lye from each Sistern

to the small Lye Receiver. These small Lyes are to be Pumped on the Fresh Ashes of the succeeding Leach till the whole is expended, then make use of water. Care must be taken to beat down the Edges of the Ashes close to the Cisterns every morning before filling with a wooden mallett or something of that sort. Fill your Kittles from the Strong Lye Cistern about four fifths full, keep up a steady fire till they boil. A small Fire will afterwards keep them boiling. Keep a Pail of Cold Strong Lye always at hand to check the boiling over, when about half the Lye is boild away fill the boilers as before repeating this method for Two days - as the Salts gather at the bottom by the boiling keep them stirred up or take them out with your Ladle for those two days & put them into your Coolers to remain there till the Third Day, at which time you neither fill up your Boilers nor take out Salts unless you begin earlier than usual working hours. This days boiling must be kept up as strong as the Liquor will bear without boiling over & must be checkt only by the Ladle or drawing away the Firs from the Furnace, when the Liquid part is near Exhausted it will cease rising though the Fire be strong, then put in your Salts that were taken out the day before. The heat may be then kept more than at any other time of boiling & the Fire should be graduly increasd till the Salts are quite dry, which will be about 6 or 7 hours from the time of your beginning work in the morning, when it will cease bubling intirely. You should have an Iron Rod flatted at the end like a Broad Chizzle which shoud be frequently used in Stirring the Salts & scraping the sides of the Boilers in this part of the Operation. The Salts being quite dry, the Fire must be rais'd to as great a highth as the Furnace will admit off by the Dryest Split wood, which will turn the Salts to a black Crust, & by continuing to keep the Fire to the highest Degree for about three hours it will become Liquid & of a blood Colour. This is what is calld Fluxing & will operate gradually under the black Crust which may be sometimes broke up & stirred together. The Boilers will appear Red ~~xxxxx~~ hott - when the whole is thoroughly dissolv'd & the Liquid thin, the Crust at top not thicker than parchment, which may be stirred in & the whole Laded out into the Coolers, which should be heat as well as the Ladle for this purpose. It will

be Cool enough to turn out the next morning & must be broken up & packt Close in tight Casks. Barrells full Bound are best. Cold Lye or any Cold Liquid thrown into the Boilers when Red hot will have the same Effects as Fire to Gun Powder.

A Caract is the 128th part of the weight of the Lye Containd in your Phial. Let the Size be what it will a half pint Phial is generally used. Small Pumps shou'd be used to Convey the Lye as occasion requires, these Pumps should be made of Pitch Pine. 500 Bushells of ashes are generally Computed to a Ton of Pot Ash. Cost in Boston from 6 1/2 @ 8d p Bushells, besides the Expence of fetching them & waste. The ashes in Sea Ports in this Province do not produce Pot Ash so good as the Country Ashes, suppos'd to be occasioned by a mixture of marine Salts, the wood being frequently wet with Salt water in transporting it to market, besides the Sea Sands used on the floors being swept into the Chimney among the Ashes, & other Impurities from Charcoal Ashes &c. reduce the value at Home near 30 p Ct. It will be best to have a manufacturer with you before you Errect your works that no mistake be made, most of them here can assist in the building them as Carpenters of masons. The Common Coolers made use of are Iron Kettles that Contain about 11 or 12 Gallons. "

Mr. Thomas Smith

Another letter shows the manner in which exchange of information took place among early manufacturers. It is of interest that, in 1753, Moses Lopez of New Port, Rhode Island, to whom the following letter was addressed, was granted a monopoly of the manufacture of potash in Rhode Island. Such monopolies were granted by various colonial governments in order to stimulate the production of this commodity. Potash was then considered the most important of all chemical products, being necessary to the manufacture of glass, soap, drugs, dyes, and explosives.

Boston, March 30, 1765.

Mr. Moses Lopez

Sir

My Bro^{r} in Law M^{r} Shri(m)pton Hutchinson desires me to inform you that he will give youa most minute & exact Acco^{tt} of the process in making Potash, that if you should fail in any part when you come to put his directions into practice that you may then come to Town or send any person you can Confide in to see every part perform^{d} at his Works. M^{r} Hutchinson would be glad you would communicate to him your method of making use of Potash for Hard & Soft Soap, & that he may see the process perform^{d} if he should be a Newport & desires it, he is already made acquainted with Frobishers method of using Potash for Hard & Soft Soap & would be glad to know yours, that he may judge which is most frugal & profitable. Frobisher is the principal Soap Boyler in Town, as soon as I can procure you another barrel of Potash will send it.

I am

Your most hum^{l} Serv^{t}

(Henry Lloyd)