

An historical account of a new method for extracting the foul air out of ships ... : with the description and draught of the machines, by which it is performed: and the relation given thereof by Dr. Mead, to the Royal Society / By Samuel Sutton.

Contributors

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AN
 HISTORICAL ACCOUNT
 OF
 A New Method
 For extracting the foul Air out of SHIPS, &c.
 WITH THE
 Description and Draught
 OF THE
 MACHINES,

By which it is performed :

And the RELATION given thereof by
 Dr MEAD, to the *Royal Society*.

By SAMUEL SUTTON, the Inventor.

L O N D O N :

Printed for J. NOON, at the *White-Hart*
 in the *Poultry*, 1745.
 [Price One Shilling.]

A NEW
HISTORICAL ACCOUNT
OF
A New Method
For extracting the foul Air out of Streets,
WITH THE
Description and Draught

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By which it is performed:
And the RELATION given thereof by
DR MEAD, to the Royal Society.
By SAMUEL SUTTON, the Inventor.

L O N D O N
Printed for J. N O O N, at the White Hart
in the Strand, 1748.
[Price One Shilling.]

A
L E T T E R

T O A

M E M B E R of the *Royal-Society*.

S I R,

P U R S U A N T to your Desire, I now send you an Historical Account of my Scheme, together with the Reasons that first inclined me to employ my Thoughts about it. In the Year 1739, I was informed by a Gentleman, that the Sailors on Board the Fleet at *Spithead* were so dangerously ill, for want of fresh Air, that they were put ashore to recover their Health; and the Ships to which they belonged stunk to such a Degree, that they infected one another. In Compassion to my Fel-

B

low

low-Creatures, I thought myself obliged to do all that was possible for their Relief in these unhappy Circumstances, and from this Time tried what could be done by Fire. I at length found, that by stopping the Air out of a Room that had three Fire-Places, and making two large Fires in two of them, I could bring the Air to draw down the third Chimney, with such Force as to put out a Candle. I then lighted a Fire in the other Chimney; which so rarified the Air in the Room, that the incumbent Air pressed to enter in, and with a Force sufficient to raise a Pulley with Half a Hundred Weight; and as soon as the Room was cooled, by the coming in of the Air, the Door would shut, and then open again in three Minutes.

Having proceeded thus far with good Success, I stopped up all the Chimnies in the House, the Garret excepted, and then lighted two large Fires, which drew the Air down the Chimney with such Violence, as to put out four or five Candles

dles immediately; whereupon I concluded, that, a Fire being always kept on Board a Ship, and a Pipe or Cavity made to the Well, one End of it being heated by Fire, a Change of Air would follow, and that by this Means rendered sweet and pure, and fit for Respiration.

From this Time I made it my Business to consult the Officers and Sailors of the Navy, who all agreed that such a Change of Air would be of the greatest Use imaginable, in preserving the Lives of the Men on Board His Majesty's Ships. I particularly remember, that, being at a Coffee-House near the Admiralty, I placed myself nigh some Gentlemen of the Navy, and enquired of them, as I had before of others, as to the Usefulness of the fore-mentioned Change of Air, who all, to a Man, acknowledged that it would be of the utmost Service; and, upon their unanimous Approbation of it, I told them, that I could procure such a Change of Air; upon which one of the Company went to another Table, and the rest followed him;

and I heard him tell the others, that he heartily pitied me, as being really mad, and out of my Senses.

Upon this unexpected Treatment, I resolved to apply to some Person of Consequence in the Navy, of approved Integrity; and well knowing that Sir *Charles Wager* was a Gentleman of this Character, and withal of the greatest Humanity, I waited upon Mr *Gashery*, a Commissioner of the Navy, and acquainted him, that I would communicate my Invention to Sir *Charles*, by Word of Mouth; and that, if I did not, in a few Minutes, convince him of it's Usefulness, I would withdraw immediately, without giving him any farther Trouble about it.

Mr *Gashery* was so kind as to speak in my Behalf to Sir *Charles*, and thereupon I was introduced into his Presence. I desired Sir *Charles* to be so good as to permit me to ask him some Questions relating to my Affair, which he was pleased to permit. I asked him, Whether he
had

had ever considered the Principles upon which the Operations of the Cupping-Glafs were founded? That, a Rarefaction being made in the Glafs, by Means of the Fire, and the Glafs pressed to the Skin, the Air in the Blood presses out the Skin; and, the Skin being cut, and a second Rarefaction made, the Blood presses forward to the Place where the Rarefaction was made. I told him, that in like Manner I proposed to procure a Change of Air on Board His Majesty's Ships, by Means of a Fire in the Cook-Room, and laying proper Pipes for that Purpose.

Sir *Charles*, upon my Discourse with him about my Scheme, not only expressed his Approbation of it, but favoured me with the following Letter to Sir *Jacob Ackworth*, Surveyor of his Majesty's Naval Works:

S I R,

S I R,

THE Bearer hereof, Mr *Sutton*,
 has found out a Method to ex-
 tract the foul Air out of the Wells of
 Ships, which will be of great Use for
 preserving the Lives of the Men a-
 board His Majesty's Ships. He will
 be willing to talk with you, if an Ex-
 periment can be made, so that he may
 not lose the Benefit of the Invention.

I accordingly waited on Sir *Jacob*,
 who ordered me to come to him again,
 five Days after, at seven in the Morning;
 at which Time he being engaged in Busi-
 ness, I waited at the Office till Evening,
 when he was pleased to express himself
 to me in the following Words, ' Sir, I
 suppose you intend to throw Air into
 the Wells of Ships.' I answered, ' No,
 I proposed to draw it out, by Means,
 of Fire.' Upon this he asked me, ' If I
 knew how far I was to draw it out?' I re-
 plied, ' Not six Inches; for, if I could
 extract

‘ extract it never so small a Distance, the
 ‘ incumbent Air would prefs forward of
 ‘ Course, and, in so doing, cause a con-
 ‘ stant Change.’ He admitted this. I
 then told him, that I waited upon him,
 by Sir *Charles Wager*’s Orders, in Hopes
 that he would appoint a Time for an
 Experiment to be made of my Scheme;
 to which he replied, ‘ That no Experi-
 ‘ ment should be made, if he could hin-
 ‘ der it.’

Upon this Disappointment, I petitioned
 the Lords of the Admiralty, and thereby
 obtained an Order from them to the
 Commissioners of the Navy, to cause my
 Experiment to be tried on Board the
Greenwich Man of War, then lying at
Woolwich. I forthwith carried their
 Lordships Order to *Woolwich*, and, pur-
 suant thereto, to the Satisfaction of my-
 self, and all on Board the *Greenwich*,
 I placed the Pipes, and all Things necessa-
 ry to my Experiment, except the Sol-
 dering of two Pipes: But, whilst the
 Solder was hot, and the Plummer in
 Readiness

Readiness to folder them, a Messenger from the Builder of His Majesty's Yard came to order the Workmen ashore. I thereupon repaired to the Builder, who acquainted me, That I must apply to the Navy-Board, to procure an Order to have my Experiment performed on Board the *Hulk* at *Woolwich*. I instantly replied, that, all the proper Preparations being already compleated, except the Soldering of two Joints, which might be done in an Hour's Time, I desired it might be tried immediately. But to this he made Answer, that I *must* apply to the Navy-Board, in order that they might procure an Order from the Lords of the Admiralty for trying it on the *Hulk* aforesaid. I thereupon told him, that I insisted on those two Joints being soldered, that I might make my Report to the Lords of the Admiralty, that I had faithfully executed their Order; upon which, he assured me, they should be soldered that very Night; but, when I went on Board the next Day, to see if they were soldered,

folded, I found them just as I left them the Day before.

Finding myself thus disappointed, I took a Candle, and went down to the Pipes, which were carried through Deck, and laid under the Beam, towards the Well, about thirty Feet in Length from the Copper; and, as soon as I put the Candle to the Ends of the Pipes, they immediately extinguished the Flame: Which fully convinced those on Board of the great Usefulness of my Invention. But, to my extreme Surprize, I no sooner came on Shore, than I found, that the Master afloat was sent from the King's Yard, to take down my Pipes, and plug up the Holes: Upon which, perceiving the Obstructions my Experiment would meet with, I determined to apply to some Gentlemen of the Faculty, that were proper Judges of the Usefulness of my Scheme.

Being no Stranger to the Character of *Dr Mead*, Physician to His Majesty, distinguished as much by his Humanity as

his Abilities, I went directly to his House, shewed him Sir *Charles's* Letter, and, by his Appointment, the next Morning came thither again, where I met the learned *Martin Folkes*, Esq; President of the Royal Society, whom the Doctor had desired to talk with me, together with himself, upon my Proposal. They both expressed their Approbation of it, and most readily offered to do whatever was in their Power, to encourage an Invention which they judged must be of great Service to the Publick. Accordingly Dr *Mead* immediately waited on the Lords of the Admiralty, and represented to them, in a strong Manner, the Advantage of such a Contrivance: Whereupon, they were pleased to order, that it should be tried, as soon as possible, on Board any of His Majesty's Ships in the River.

Being now left at my own Liberty, to chuse a proper Place for my Experiment, I fixed upon the Hulk at *Deptford*, because that was immovable, and could not, like a Ship, be sent away:

And

And upon this I directly went to *Deptford*, in order to make the necessary Preparations. I was soon acquainted there, that several of the Workmen belonging to the King's Yard, were busily employed in trying the Usefulness of another Machine, industriously set on Foot to supplant mine: But, after the strictest Enquiry I have since been able to make, I cannot learn that they had any Orders to that Purpose from the Lords of the Admiralty.

This Proceeding, together with the excessive Shyness and Caution of the Gentlemen of the Yard, led me to conclude, that my Scheme, at last, would be set aside, in spite of all the Steps I could take to prevent it; and I was confirmed in this Opinion, when I found the Pipes were made of Wood, between five and six Inches wide, in such an unworkmanlike Manner, that, to render them tight, I was forced to get Size and Paper from *Deptford*, to put over the Joints; and that, moreover many Hands were em-

ployed in erecting Wind-Sails, in order to shew, that they could thereby procure as much Air as my Scheme would afford.

At length, in *September* 1741, the Day appointed for the Trial of my Experiment came; when the Lords of the Admiralty, the Commissioners of the Navy, Dr *Mead*, *Martin Folkes* Esq; and several other Members of the *Royal Society*, being present on Board the said Hulk; Sir *Jacob Ackworth* was pleased to say, in the Hearing of them all. ‘ I am sorry that you are come to see the Trial of such a foolish Experiment, that I tried myself Yesterday, and it would not shake a Candle.’ To this I replied, ‘ It would be in good humour to-day, and the End of every one of the Pipes would blow out a Candle.’ And accordingly notwithstanding the forementioned Obstructions, and that the Tarpawlins were taken away, which I had ordered to be laid over the Hatches, I was as good as my Word; and

and all the Lords and Gentlemen aforesaid, upon the Trial of my Experiment, expressed their Approbation of the Performance.

In *November* following, I was sent for by the Messenger to the Commissioners of the Navy, and by them, pursuant to an Order from the Lords of the Admiralty, sent down to *Portsmouth*, to prepare the *Norwich* Man of War according to my Scheme; and, upon this occasion, Sir *Charles Wager*, in the Presence of the then Lords of the Admiralty, honoured me with the following Letter to Commissioner *Hughes* at *Portsmouth*.

Admiralty-Office, 24 Nov. 1741.

S I R,

I Send this by Mr *Sutton*, who has found out a Way to draw bad Air out of close Places, particularly from Wells of Ships, which you know are sometimes so bad, as to stifle Men before they can be drawn up; as happened on Board the *Lynn*, while I was
 ‘ at

‘ at *Helvoet-Sluys*; one Man being kil-
 ‘ led by it, and two narrowly escaped.
 ‘ This Contrivance is approved by much
 ‘ wiser Men than I am in such Things;
 ‘ and therefore I desire you will let
 ‘ Mr *Sutton* have all the Encouragement
 ‘ and Assistance you can give him. I
 ‘ take Mr *Alleyn*, your Builder, to be an
 ‘ ingenious Man; if you recommend Mr
 ‘ *Sutton* to his Care, he will see that he
 ‘ meets with no Obstruction or Discourage-
 ‘ ment from any body, that may think
 ‘ themselves wiser. There is an Order
 ‘ from this Board to the Navy, from
 ‘ whom you will have it, to have the
 ‘ *Norwich*, who is to go to the Coast of
 ‘ *Guinea*, to be fitted according to Mr
 ‘ *Sutton’s* Scheme; which will be a very
 ‘ good Experiment. I am,

S I R,

Your Humble Servant.

CHARLES WAGER.

This

This Letter I carried down to *Portsmouth*, and delivered to Commiffioner *Hughes*, who received me in a very friendly Manner, and recommended me to Mr *Alleyn* the Builder; who both of them (and indeed all the Perfons belonging to that Yard) exerted themselves to the utmost of their Power, to forward my Undertaking; and at length I compleated it, agreeable to the Plan I fhall hereafter exhibit.

Having finished this Bufinefs, I waited some Days at *Portsmouth*, for a Report figned by Admiral *Lestock*, and feveral Commanders of Ships, which Captain *Gregory* gave me reafon to expect: But, at laft (tho' to do the Captain Juftice, I muft own, that he treated me, whilft at *Portsmouth*, in an obliging Manner) I was acquainted, that no Report could be made till the *Norwich* returned from it's Voyage; which was fent to *Guinea*, and from thence to the *West Indies*, which constrained me to repent of my Journey.

Soon

Soon after my Return to *London*, I found Things in the utmost Confusion, by the sudden Change of the Ministry, which likewise occasioned a Change in the Admiralty. I petitioned however the Commissioners of the Navy, humbly requesting them to make a Report of what I had done, from Time to Time, from the 10th of *July*, to the 10th of *December*, 1741, at *Greenwich*, *Deptford*, and *Portsmouth*, in Compliance with the Orders of the Lords of the Admiralty; in order that I might receive a suitable Reward for my useful Invention, and reasonable Satisfaction for my Trouble, Loss of Time, to the Neglect of my other Affairs, and Expences in the Execution of the same. But I received no Answer; nor to many Petitions I delivered to the Lords of the Admiralty themselves, until at length, justly moved at the cold and ungenerous Treatment I met with, I freely expressed my Sense of their ill Usage, in the following Petition.

To the Right Honourable the Lords of the
Admiralty, the Petition of Samuel
Sutton,

Humbly Sheweth,

THAT your Lordships Petitioner,
having invented an useful Scheme,
for the Extracting foul Air out of His
Majesty's Ships (which, in the Month of
September, 1741, was tried before the
then Lords of the Admiralty, who ap-
proved the Performance) lately applied
to your Lordships; but, to his extreme
Surprize, he finds, that he is not likely
to receive any Reward, either for the In-
vention itself, or his Loss of Time and
Expences; nor are His Majesty's Sailors
and Mariners likely to receive any Benefit
from his Scheme, tho' it is universally
acknowledged, that more of them have
lately died in *America*, for want of good
Air, than by the *Spaniards*. That your
Lordships Petitioner cannot help remark-
ing, that, tho' no Invention ever met
D with

with more Applause from the Public than his, never was any Man (himself excepted) employed by the Lords of the Admiralty, from Time to Time, at his own Charges, as he has been, without a proper Consideration. That your Lordships Petitioner now desires, that you would be pleased to consider him on that Account, and order him a suitable Satisfaction; and, as in Duty bound, for your Lordships he will

Ever Pray.

This Petition was overlooked like the rest, nor was there any Notice taken by the Lords, either of me, or my Scheme, till Captain *Gregory* returned to *London*; who, soon after his Arrival, sent a Letter to the Lords of the then Admiralty, in Reference to the *Norwich* Man of War, which I fitted up at *Portsmouth*; and the following Extract of it was left at their Office for me.

Extract

*Extract of a Letter from Captain Gregory,
late Commander of his Majesty's Ship the
Norwich, to Mr Corbett, dated June, 11
1743.*

‘ **A**S to the Air-Pipes which were
‘ put on Board of me, I was obliged
‘ to stop up two of them, by Reason the
‘ Fire came down between Decks : the o-
‘ ther to the Well was kept open, but the
‘ Ship making Water enough to keep her
‘ sweet, I was not able to judge of their Use,
‘ having been so healthy as to bury only two
‘ Men all the Time I was on the Coast.

Copy, *Tho. Corbett.*

I have many Remarks to make upon
this Letter, which by no means can be
justly called a Report, since the other Of-
ficers of the Ship were not consulted ;
particularly the Surgeon, and the Carpen-
ter, or other Under-Officers, the most com-
petent Judges ; the former, of the Health
of the Men ; and the latter, of the Sweet-

ness and good Condition of the Provisions. As to Mr *Haddon* the Carpenter, who had been several Voyages to *Guinea* before, and never knew the like; he assured me that the Provisions continued entirely sound, and the Men healthy, free from the Scurvy or anyother Disorder, to the Admiration of the People of *Barbadoes*, who therefore questioned, whether they had been at *Guinea*, or no: and indeed, this matter of Fact, which is the main Point, is for Substance acknowledged by the Captain himself; tho', at the same time, he is pleased to say, ' That he was not able to judge of the Use of my Pipes.' This Gentleman it seems lost so few Men, that he could not discern the Usefulness of my Pipes; but, had he lost the greatest Part of his Crew, I dare say that he would have been able to judge, that my Pipes were of no Service at all. But, tho' the Extract of the Captain's Letter carries it's own Confutations along with it; yet, as it was sent to the Lords of the Admiralty, I thought it expedient to give an Answer to it,

in

in the following Lines to the Earl of
Winchelsea.

MY LORD,

TH O' I have petitioned the Right Honourable the Lords of the Admiralty several Times, and even wrote to your Lordship, in Reference to my Extracting foul Air out of His Majesty's Ships, and never received any Answer, except an Extract from Captain *Gregory's* Letter; yet, in Justice to my Scheme, I apprehended myself obliged to lay before your Lordship some just Remarks on the said Extract, which I hope will effectually remove any Inferences that may be thence drawn, to the Prejudice of my useful Invention, that is founded on the most evident Principles, and may be put in Execution, at so easy a Charge as about thirty Pounds, in any of His Majesty's Ships. As to the Captain, he says, that he was obliged to stop up two of my Pipes, by Reason some Sparks of Fire came down
between

between the Decks. But this might easily have been prevented, by adding two Pipes of Tin (which they never want) three Feet long, and bringing them through the Chimney, by which all Communication would be cut off between those Sparks and it. The Captain also declares, that he could not tell, whether the Pipe to the Well, because of the Water in it, was of Use, or not ; but, which seems to be very unfair Dealing, he entirely overlooks two other Pipes. I intreat your Lordship to be pleased to consider, that the Pipes draw more Air than any Kitchen-Chimney, and what is sufficient to sweeten any Ship in the Navy. The Captain himself owned to me, that not so much as one of his Men had the Scurvy, which cannot be said of any of His Majesty's Ships heretofore, or that out of such a Number, so few have lost their Lives, and so many have returned in perfect Health from such a Voyage : and indeed, if my Scheme was generally put in Practice, this, in all Likelihood, would become a common Case,

nor

nor would Ships, that come from infected Places, have any occasion at all to perform Quarentine, the Air being preserved by the foresaid Pipes, in a pure and wholesome State. I am, *My Lord, &c.*

And as the principal, and indeed only; Objection, in the Extract against my Scheme, was the Danger of Fire ; I wrote the following Letter to Sir *Jacob Ackworth*, His Majesty's Surveyor, in order to shew, that it was entirely groundless :

Honoured Sir,

WHEN a Scheme is proposed for the Good of Mankind in general, and the Preservation of the Lives of His Majesty's Subjects in particular ; it is doubtless highly reasonable, that, as it is a Matter of great Consequence and Importance, a strict Inquiry should be made, whether it be practicable, and will effectually

tually answer the End proposed. As to the Inconveniency apprehended to attend mine, that it will expose Ships to the Danger of Fire, I intreat you to be so good as to enquire of any Bricklayers, or Builders, whether this Apprehension be not entirely groundless. I could heartily wish, that you would be pleased to satisfy yourself in this Particular, as your Declaration, on this Point, in my Favour would have great Weight with the Lords of the Admiralty, in order to my being by them appointed to have the Directions of laying Pipes on Board of His Majesty's Ships. I am, Sir, firmly relying on your Goodness,

Your Humble

and Obedient Servant,

SAMUEL SUTTON.

Soon

Soon after, when the Plague raged in *Sicily*, and timely Precautions were taken to prevent it's being introduced hither, I again wrote to the Earl of *Winchelsea*, as follows :

MY LORD,

A Proclamation being issued out for Ships to perform Quarantine, I humbly beg Leave to acquaint your Lordship, that if my Scheme for the Extraction of foul Air, was properly put in Practice on Board such Ships; it would effectually preserve the Health and Lives of His Majesty's Subjects. And, such a Fume being let down as the Physicians may judge expedient, great Advantages would arise, without any ill Consequences whatsoever: because, the foul Air being consumed by the Fire, the Fume, by means of a Pipe let into the Hold of the Ship, will with Ease be drawn down, there being a Want of it to supply what is extracted. If your

E

Lordship

Lordship will be pleased to consult the Physicians, you will find that what I offer is practicable, being founded on just and rational Principles. I am,

My Lord,

Your Humble

and Obedient Servant,

SAMUEL SUTTON.

Sir *Jacob Ackworth*, Mr *Alleyn* of *Deptford*, and the rest of the Surveyors will readily attest, That no damage can arise from the Fire made Use of in my Scheme; which is the only Objection, that has hitherto been advanced against it.

Having thus refuted the forefaid Objection, and I hope in a convincing Manner, it was natural for me to expect, without

out any longer Delay, a Reward suitable to the Importance and Usefulness of my Invention ; but it was some Time after this, before I received the following Order from the Lords of the Admiralty.

Extra.

Received, the 31. Oct. 1743, N^o 668.

Mr. Treasurer,

N^o 2619. ‘ **I** N Pursuance of an Order
 1743 ‘ **I** from the Right Honour-
 ‘ able the Lords Commissioners of the
 ‘ Admiralty, dated 22 *October* 1743, sig-
 ‘ nifying that, whereas Mr *Samuel Sut-*
 ‘ *ton* did, some Time since, propose to
 ‘ that Board an Invention of his, for Ex-
 ‘ tracting the foul Air out of Ships by Fire,
 ‘ and letting in fresh Air, an Experiment
 ‘ of which was ordered to be made on
 ‘ Board His Majesty’s Ship the *Norwich*,
 ‘ bound to the Coast of *Africa* ; and Cap-
 ‘ tain *Gregory*, who commanded the said
 E 2 Ship,

‘ Ship, having since his Return made a
 ‘ Report thereof, a Copy of which their
 ‘ Lordships sent us therewith, whereby
 ‘ it appears, that it does not, in all Respects,
 ‘ come up to the Expectation, and that the
 ‘ Use thereof is dangerous, and liable to
 ‘ Accidents by Fire: Yet, as the said Mr
 ‘ *Sutton* has employed a great deal of
 ‘ Pains and Time about the said Invention,
 ‘ for the Benefit of the Navy, and had
 ‘ Encouragement from their Lordships so
 ‘ to do; and their Lordships being desi-
 ‘ rous to give Encouragement to Per-
 ‘ sons who shall turn their Thoughts
 ‘ to any Inventions, that may tend to the
 ‘ Advantage of the Navy, do thereby
 ‘ desire and direct us to cause a Bill of
 ‘ one Hundred Pounds to be made out
 ‘ to the said *Samuel Sutton*, as a Re-
 ‘ ward for the Loss of Time and Ex-
 ‘ pences he has been at about the said
 ‘ Invention.

We

‘ We pray you to pay unto Mr *Samuel*
‘ *Sutton* accordingly, the Sum of One
‘ Hundred Pounds, dated 22. *Oct.* 1743.

J. B.
31. *Oct.* 1743.

Jam. Compton—Ca. Account.

Rich. Haddock.

N^o $\frac{2360}{359}$ } 1743. J. H.
J. B.

This, Sir, was all the Satisfaction I
could procure from the Lords of the Ad-
miralty, though I had, from Time to
Time, executed their Orders with the ut-
most Fidelity, and even that, not till above
two Years after the Trial of my first Ex-
periment on Board the Hulk at *Deptford*;
a Satisfaction that scarcely defrayed my
Expences. But I am perswaded, from
what has been already said, you clearly
perceive,

perceive, that, as matters stood, if the Usefulness of my Scheme had appeared in the most demonstrative Light, I should, after all, have fallen short of a suitable reward; and indeed, this is the Truth of the Case. Dr *Hales's* Ventilators, which were designed to answer the same Purposes as my Pipes, had, by some means or other, got such an Ascendant in the Esteem and Regard of some leading Persons in the Affairs of the Navy, as, in spite of Conviction itself, to admit of nothing to come in Competition with them; tho' even that Darling Scheme is now out of Date and exploded. Far be it from me, to insult and triumph over a conquered Adversary; and it is needless, as well as cruel, to spend much Time in confuting a Scheme, that Experience has abundantly shewn to be absurd and ridiculous. However, I think it incumbent on me to observe, how much I was surprized to find no mention made by the candid Author of the *Description of Ventilators*, of my Invention: whereas he himself saw an Experiment

ment made before the *Royal Society* with a Model of it, and heard Dr *Mead's* account of it read to that learned Body; which Account was published in the *Philosophical Transactions* some time before the Book of Ventilators was Printed. Upon the whole, this is a peculiar Advantage attending my Invention, that it's beneficial Influences are perpetual, without the least Intermiffion; whereas Doctor *Hales* fully evinces the Insufficiency of any Attempts to make the Air in Ships wholesome, by only a few Hours Ventilation. ' It were to be wished (says he, pag. 41.) that there should not be so much as one Hour without Ventilation, when the Ports are shut.' His Ventilators are cumbersome Machines, taking up more Room than can conveniently be spared, and require many Hands to work them: My Pipes take up no Room, but what may be very well spared, and stand in need of no manual Labour at all. His Ventilators have only a casual

fual and uncertain, but my Pipes a certain and uninterrupted, Effect. His Ventilators cannot extract the Air from the Well at the bottom of the Ship; but mine do this, and introduce pure and wholefome Air, in the Place of impure and unwholefome. His Ventilators, he tells us, will keep a Prison sweet; but my Pipes will sweeten even a Bog-house, and may be conveyed miles under ground into the deepeft Mines and fubterraneous Cavities, with the fame Succels. His Ventilators require much more Air than my Pipes, which will admit of more or lefs, as fhall be thought expedient. And, as my Scheme, in all thefe Refpects, furpaffes his, fo his is dead and buried, without any Hope of a Refurrection; whilft mine riles in it's Reputation daily, and the Report of Captain *Comyns*, Commander of the *Fame* Privateer, which I fitted up fome Months ago, and which is return'd to *Lifbon* with his Crew in Health and Vigour, will give fuch an ample and fatisfactory Atteftation of the Safety and

Ufefulness

Usefulness of my Pipes, as will be sufficient to dispel the Doubts and Suspicions of the most Incredulous.

To conclude : the Simplicity of this Machine ; it's easy Stowage without being cumbersome ; it's Operation without any Labour to the Seamen ; the small Expence to put it in Execution, and maintain it ; besides it's Tendency to preserve the Health and Lives of the Seamen, to keep the Ship dry, and the Merchandize from damaging ; are strong Reasons why no Ship should go to Sea without it.





An Account of Mr Sutton's Invention and Method of Changing the Air in the Hold, and other close Parts of a Ship; communicated to the Royal Society by Richard Mead, M. D. Physician to His MAJESTY, Fellow of the Royal Society, and of the Royal College of Physicians, LONDON.

Read Feb. 11. 1741-2.

IT is found by daily Experience, that Air shut up and confined in a close Place, without a Succession and fresh Supply of it, becomes unwholesome, and unfit for the Use of Life.

This is more sensibly so, if any stagnating Water be pent up with it.

But it grows still worse, if such an Air as this is made use of in Respiration, that
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is, becomes moister and hotter, by passing and repassing through the Lungs.

These bad Effects, in different Degrees, according to the different Manner in which Air is inclosed, are observed in many Cases; particularly in deep Wells and Caverns of the Earth, in Prisons or close Houses, where People are shut up with Heat and Nastiness: but most of all in large Ships, in which, with the Stench of Water in the Hold, many Men being crouded up in Close-quarters, all the mentioned Circumstances concur in producing greater Mischief than would follow from any of them single.

The Reason of these bad Effects is this: It is that Property of the Air which is called it's Elasticity or Springiness, which makes it so useful to our Life. When any part of it is inclosed and kept from the Communication of the outward Air, it expands itself, and, in Proportion to the Closeness of the Place, loses it's Spring; and if any Heat or Moisture comes to it, the elastic Force

may be quite lost and destroyed. And not only so, but if it happens to be impregnated with noxious *Effluvia*, either from unwholesome Substances of any kind, or from the infectious Breath of diseased Bodies; it will become quite poisonous and deadly, in a manner suitable to the original Cause.

It is proposed at present to find out a Remedy for this Evil in Ships only: but by making Alterations according as particular Places require, the same may be applied to any Houses or Parts of them, as Prisons, the sick Wards in Hospitals, &c.

Now it is a natural Consequent of the Elasticity of the Air, that when it is rarefied in any Part, (which is most effectually done by Heat) the neighbouring Air will rush that way, till this Part is brought to be of an equal Density and Elasticity with itself; and this again will be followed by the Air next to it: So that, if a Conveyance for Air be laid from the Hold or Well of the
Ship,

Ship, and a Rarefaction of the Air therein be made; the foul Air from this Place will run or be drawn out that way, and fresh Air from the adjacent Parts, will succeed in it's room.

It is upon these Principles that the following Scheme is most humbly offered to the Right Honourable the Lords of the Admiralty, and Commissioners of the Navy, which it is hoped will be found effectual for clearing the bad and corrupted Air from the Holds and other close Parts of His MAJESTY'S Ships; and thereby prove beneficial to the Public, by preserving the Healths of many of His MAJESTY'S good Subjects serving on board the same; the whole thing being indeed easy to be executed, and what will no ways incumber, or be troublesome, in any of the Vessels where it shall happen to be applied; the same being, in short, no more than this: that whereas in every Ship of any Bulk there is already provided a Copper or Boiling-place proportionable to the Size
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of the Vessel, it is proposed to clear the bad Air by means of the Fire already used under the said Coppers or Boiling-places, for the necessary Uses of the Ship.

It is well known, that under every such Copper or Boiler, there are placed two Holes separated by a Grate; the first of which is for the Fire, and the other for the Ashes falling from the same; and that there is also a Flue from the Fire-place upward, by which the Smoke of the Fire is discharged at some convenient Place of the Ship.

It is also well known, that the Fire once lighted in these Fire-places, is only preserved by the constant Draught of Air through the forementioned two Holes and Flue; and that if the said two Holes are closely stopped up, the Fire, though burning ever so briskly before, is immediately put out.

But if after the shutting up the above-mentioned Holes, another Hole be opened, communicating with any other Room or airy Place, and with the Fire; it is clear,
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the said Fire must again be raised and burn as before ; there being a like Draught of Air through the same, as there was before the stopping up of the first Holes: this Case differing only from the former in this, that the Air feeding the Fire, will now be supplied from another Place.

It is therefore proposed, that in order to clear the Holds of Ships of the bad Air therein contained, the two Holes above-mentioned, that is, the Fire-place and Ash-place, be both closed up with substantial and tight iron Doors ; and that a copper or leaden Pipe, of sufficient Size, be laid from the Hold into the Ash-place, for the Draught of Air to come in that way to feed the Fire. And thus it seems plain from what has been already said, that there will be from the Hold a constant Discharge of the Air therein contained ; and consequently, that that Air so discharged must be as constantly supplied by fresh Air down the Hatches, or such other Communications as are open into the Hold : whereby the same must be

continually

continually freshened, and it's Air rendered more wholesome, and fit for Respiration.

And if into this principal Pipe so laid into the Hold, other Pipes are let in, communicating respectively either with the Well or lower Decks; it must follow, that Part of the Air consumed in feeding the Fire, must be respectively drawn out of all such Places, to which the Communication shall be so made.



*An Abstract of the Letters Patent, granted
by His Majesty, for the aforesaid In-
vention.*

GEORGE the Second, by the
Grace of God, of Great Britain,
France, and Ireland, King, Defender of
the Faith, &c. To all to whom these
Presents shall come, Greeting. Whereas
our trusty and well-beloved *Samuel Sutton*,
of our City of *London*, Brewer, hath, by
his Petition, represented unto us, that he
has after long Study, much Pains, great
Expence, and repeated Experiments, found
out, and brought to Perfection, a new
Invention or Method for extracting foul
Air out of Ships by Means of Fire, and
will equally contribute to the removing
of all noxious Air whatsoever, and may
be conveniently applied to Mines and
Caverns in the Earth, Dungeons, Prisons,
and all infected Places; that the said In-
vention may be likewise used in hot
G Houses.

Houses and Walls, which will greatly warm the Earth, for the speedy Production of it's Fruits, and also in Granaries for the Preservation of Corn and Grain; that the said Invention will greatly tend to the Preservation of the Lives of great Numbers of our Subjects, and be of publick Use and Benefit, to this our Kingdom in general: and as the Petitioner is the first, and sole Discoverer of the said Invention, or Method, and also, in Regard to the great Expence of Money and Time, the Petitioner has sustained, in making so valuable a Discovery; he therefore most humbly prays Us, that **We** would be pleased to grant him our Royal Letters Patent, for the sole Use and Benefit of his said new Invention, within that Part of our Kingdom of *Great Britain*, called *England*, and the Dominion of *Wales*, and Town of *Berwick* upon *Tweed*, and in Our Plantations in *America*, for the Term of Fourteen Years, according to the Statute in such Case, made and provided: **We** being willing
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to give Encouragement to all Arts and Inventions, which may be for the publick Good, are graciously pleased to condescend to the Petitioner's Request. **Know** ye therefore that **We** of Our especial Grace, certain Knowledge and meer Motion, **have** given and granted, and by these Presents for Us, Our Heirs and Successors, **do** give and grant unto the said *Samuel Sutton*, his Executors, Administrators, and Assigns, Our especial Licence, full Power, sole Privilege, and Authority, that he, the said *Samuel Sutton*, his Executors, Administrators, and Assigns, and every of them, by himself, and themselves, or by his and their Deputy or Deputies, Servants or Agents, or such others, as he the said *Samuel Sutton*, his Executors, Administrators, or Assigns, shall at any Time agree with, and no others, from Time to Time, and at all Times hereafter, during the Term of Years herein expressed, shall and lawfully may make, use, exercise, and vend his said Invention, within that Part of Our King-

dom of *Great Britain* called *England*, Our Dominion of *Wales*, and Town of *Berwick* upon *Tweed*, and Our Colonies and Plantations in *America*, in such Manner, as to him, the said *Samuel Sutton*, his Executors, Administrators, and Assigns, or any of them, shall in their Discretions seem meet: **and** that the said *Samuel Sutton*, his Executors, Administrators, and Assigns, shall and lawfully may have and enjoy the whole Profit, Benefit, Commodity, and Advantage, from Time to Time, coming, growing, accruing, and arising, by reason of the said Invention, for, and during the term of Years herein mentioned, **To have, hold,** exercise, and enjoy the said Licence, Powers, Privileges, and Advantages herein before granted, or mentioned to be granted, unto the said *Samuel Sutton*, his Executors, Administrators, and Assigns, for, and during, and unto the full End and Term of Fourteen Years, from the Date of these Presents next, and immediately ensuing, and fully to be compleat
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and ended, according to the Statute in such Case made and provided. **And** to the End, that he the said *Samuel Sutton*, his Executors, Administrators, and Assigns, and every of them, may have and enjoy the full Benefit, and the sole Use, and Exercise, of the said Invention herein before declared; **We** do by these Presents, for Us, Our Heirs and Successors, require, and strictly command all and every Person, and Persons, Bodies Politick and Corporate, and all other Our Subjects whatsoever, of what Estate, Quality, Degree, Name, or Condition soever they be, within that said Part of Our Kingdom of *Great Britain* called *England*, Our Dominion of *Wales*, and Town of *Berwick upon Tweed*, and Our Colonies and Plantations in *America* aforesaid, that neither they, nor any of them, during the Continuance of the said Term of Fourteen Years hereby granted, either directly, or indirectly, do make, use, or put in Practice the said Invention, or any Part of the same so attained unto
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by the said *Samuel Sutton* as aforesaid, nor in any wise counterfeit, imitate, or resemble the same, nor shall make, or cause to be made, any Addition thereunto, or Subtraction from the same, whereby, to pretend himself, or themselves the Inventor or Inventors, Devisor or Devisors thereof, without the Licence, Consent, or Agreement of the said *Samuel Sutton*, his Executors, Administrators, or Assigns, in Writing under his or their Hands and Seals, first had and obtained in that Behalf, upon such Pains and Penalties as can or may be justly inflicted on such Offenders, for their Contempt of this Our Royal Command; and further, to be answerable to the said *Samuel Sutton*, his Executors, Administrators, and Assigns, according to Law, for his and their Damages thereby occasioned. **And moreover** We do by these Presents for Us, Our Heirs and Successors, will and command all and singular the Justices of the Peace, Mayors, Sheriffs, Bailiffs, Constables, Headboroughs, and all other Officers,

ficers, and Ministers, whatsoever of Us, Our Heirs and Successors, for the Time being, that they, or any of them do not, nor shall at any Time hereafter, during the said Term hereby granted, in any wise molest, trouble, or hinder the said *Samuel Sutton*, his Executors, Administrators, or Assigns, or any of them, or his, or their Deputy, Servants, or Agents, in or about the due and lawful Use or Exercise of the aforesaid Invention, or any thing relating thereto.

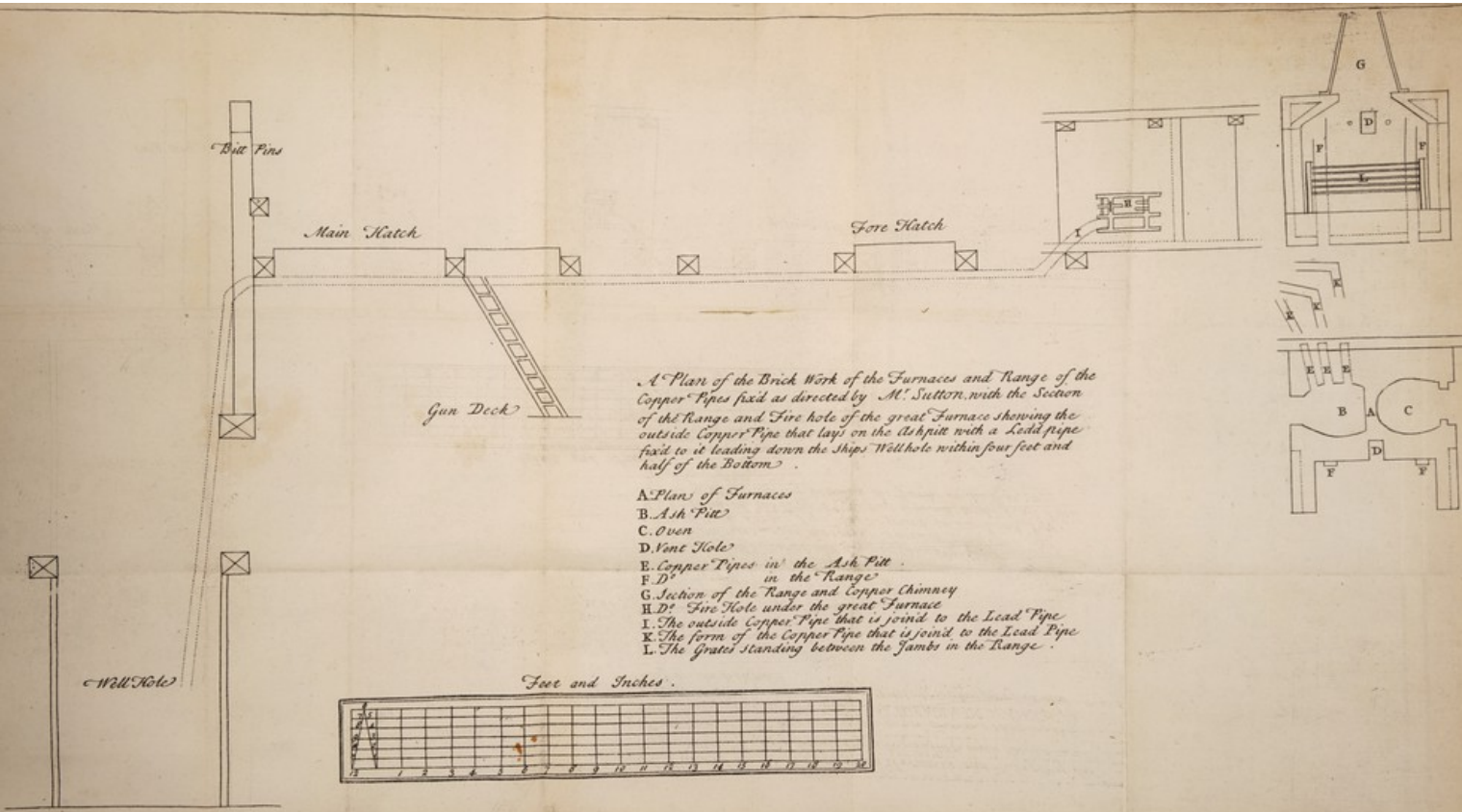
And lastly We do by these Presents, for Us, Our Heirs and Successors, grant unto the said *Samuel Sutton*, his Executors, Administrators, and Assigns, that these Our Letters Patent, or the Inrollment or Exemplification thereof, shall be in and by all things good, firm, valid, sufficient and effectual in the Law, according to the true Intent and Meaning thereof, and shall be taken, construed, and adjudged, in the most favourable and beneficial Sense, for the best Advantage of the said *Samuel Sutton*, his Executors, Administrators,

Administrators, and Assigns, as well in all Our Courts of Record as elsewhere, and by all and singular the Officers and Ministers whatsoever of Us, Our Heirs and Successors, in that Part of Our said Kingdom of *Great Britain* called *England*, Our Dominion of *Wales*, and Town of *Berwick* upon *Tweed*, and Our Colonies, and Plantations, in *America* aforesaid, and amongst all and every the Subjects of Us, Our Heirs and Successors, whatsoever and wheresoever, notwithstanding the not full and certain describing the Nature or Quality of the said Invention, or of the Materials thereto conducing and belonging. **In Witness** whereof we have caused these Our Letters to be made Patent. **Witness** Ourself at *Westminster*, the sixteenth Day of *March*, in the seventeenth Year of Our Reign.

By Writ of Privy Seal.

C O C K S,

F I N I S,



A Plan of the Brick Work of the Furnaces and Range of the Copper Pipes fixed as directed by M. Sutton, with the Section of the Range and Fire hole of the great Furnace showing the outside Copper Pipe that lays on the Ashpitt with a Lead pipe fixed to it leading down the Ships Wall hole within four feet and half of the Bottom.

- A. Plans of Furnaces
- B. Ash Pitt
- C. Oven
- D. Vent Hole
- E. Copper Pipes in the Ash Pitt
- F. D. Copper Pipes in the Range
- G. Section of the Range and Copper Chimney
- H. D. Fire Hole under the great Furnace
- I. The outside Copper Pipe that is joined to the Lead Pipe
- K. The form of the Copper Pipe that is joined to the Lead Pipe
- L. The Grates standing between the Jambs in the Range

Feet and Inches.

