4.11.075

[L. & M.
2,000—23-10-97.]

Local & Munl. (1898) Department.

MISCELLANEOUS.

G.O., No. 522 & 523 M.

DATED 8-3-98

INDEXED.

[Despatch Abstract.]

Washington Lyons patent portable steam disinfection.

Forwarding for the infn of H. E. the Governor Genl in council a copy of the Proceedings of this Govt. in which the purchase by the Harbour Trust Bd. Madras, of a ______ has been sanctioned

1. 11. 97

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

LOCAL AND MUNICIPAL DEPARTMENT.

Papers to be read in Proceedings:—

Again GO., No. , dated 189 .
Again G.O., No. , dated 189 .
Current No. 886. M of 1898, dated 22nd Febry. 98, from The Marine Department.
" " " 189 , " , "
" " " 189 , " , "

Secy.

Mis. ORDER. No. 522 Mis. d/ 8/3/98

In G.O. No. 2182. L d/ 5.10.97

The following letter will be despatched to the Government of India:—

Letter. No. 523 L Mis. d/ 8/3/98

To

The Secretary to the Govt. of Ind.
Home Dept.

Sir,

Advertng to para. 2 of your letter No. 2084. Sanitary, dated 6th September 97, stating that if it ~~is~~ shd be decided not to procure a steam disinfector for the Municipality of Madras, the Government of India considered it very necessary that such a disinfector sh be procured for use in the port, ~~if~~ in case the port ~~is~~ shd not already be provided with suitable apparatus

ble —
Manlove

of His Excellency the Governor-General in Council, a copy of the marginally noted Proceedings of this Government in which the purchase by the Harbour Trust Board Madras, of a Washington Lyon's patent portable steam disinfector has been sanctioned.

G.O. No. 139. Marine
22-2-98

I have etc.

V.R.
5/3/98

Despd 8/3/98

Local & Municipal (1898) **Department.**

CURRENT No. 88/Misc ~~105~~

From The Marine Depte

Secy.
Mis. Order. The following letter will be despatched to the Govt. of India:-
Letter.

No. 139 Mar

Dated 22-2-98
Received 23-2-98
Registered 24-2-98
Enclosures 5 Books.
Spare copies

Steam [illegible] for the [illegible]itor

S[illegible]oning the purchase of [illegible] Washington Lyon's patent portable — by Messrs Manlove Alliott & Co with[illegible]

BACK PAPERS.

G.O.	No.	Department.	D[illegible]
fo	2160-61	Ln	5-10-97
"	2162	L	5-10-97
"	15[illegible]-85	L	3-7-97
"	1387	L	9-6-97

FURTHER PAPERS.

G.O.	No.	Department.	Date.

LOCAL & MUNICIPAL DEPT.
CURRENT No. ~~105~~8881/h

Marine Department.

Department

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following:-

From the Local & Municipal Department, No. 2162 Mis. d/5. 10. 97.

" Messrs. Oakes & Co., Madras, dated 7th December 1897.

" -Do- -do- 9th December 1897.

" the Chairman, H. T. Board, Madras, No. 4627, d/27th Jany. 98

" Messrs. Oakes & Co., Madras, dated 2nd February 1898.

" the Chairman, H. T. Board, Madras, No. 4752, d/4th Feb. 1898.

" -Do- -do- No. 4776, d/8th -do-.

" -Do- -do- No. 4867, d/15th -do.

Order thereon No. 139 Mar 8 22.2.98

In accordance with the suggestion of the Government of India that, failing the Municipality, a steam disinfector should be procured for the use of the Port of Madras, His Excellency the Governor in Council sanctions the purchase of a Washington Lyon's patent portable steam disinfector by Messrs. Manlove, Alliott & Co. with its own boiler complete, as recommended by the Harbour Trust Board. As the matter is one of urgency, the order will be placed by the Chairman with Messrs. Oakes & Co. on condition that the firm wires to the manufacturers at home and urges immediate compliance with the order.

2. The cost of an M size disinfector is quoted by manufacturers at £272, which, with 2½ per cent for commission to Messrs. Oakes & Co., will be equal to £280 or about Rs 4,250 at current exchange. The charge will be met from Madras Port Funds.

(True Extract)

SUBJECT

pecting

ust Board

or Ma

the Chairman, H. T. Board with price quotations.

Officer.

with th "means of a

infecto Itwe is

To.

H.C. – C.S. L & M Dept.

The following is the telegram from the G. of India Home dept, Sanitary No. 2311 dated 19 inst transferred to us under L & M. dept endt 1084 d/23/10/97

"Your letter number
"2161 M Miscellaneous
"of 5th October + Madras
"is now infected under
"terms of Venice
"Convention and moreover
"has to take measures
"against infected and
"suspected ships which
"may arrive there +
"One of these measures
"is disinfection which
"has to be done under
"Chap. 3 paragraph 2 by
"means of a stove + provision
[illegible] disinfection stove is
[illegible]tory if
[illegible]
"cannot be required
"to provide it + steps
"should be taken
"to carry out wish
"expressed by Govt
"of India in paragraph
"2 of my letter
"No. 2084 of 6 September
"last."

E.D.M.

R.R.
29/10/97

H.C.
29/10/97

Lyon's disinfecting machine

Local & Munl. (1897) Department.

To be filed with Cl. 522/8-3-98 (under Secy's verbal orders)
[illegible]
17/3/98

H.M. to see

Please send to Marine these two d.o. & Ind[illegible] confidential & the pamphlets
H.S.
1/12/97

D.O. No. 9

From The Sanitary Commissioner for Ma

No.

Dated 19-10-97

Received 26-10-97

Registered 26-10-97

Enclosures

Spare copies

SUBJECT

Regarding the purchase of disinfecting machine by the Harbour Trust Board

Orders

We do not know here what is being done about a disinfecting apparatus for the Port which is a question being dealt with I understand in the Marine Dept. But as the pp. below are connected with that subject, the file should go to Marine for perusal

E.H.
6/11/97

To Mar. Dept. u.o.

Seen and returned with thanks. The question

the use of the port is now
with the Hon Sir Henry Bliss

11.11.97

To The Local & Marine Dept.

C.S.

E/ No. 155 E dated March 12, 1898.

Papers returned with thanks. The purchase of a disinfector for the port of Madras has since been sanctioned - vide G.O. 139 Marine d/ 22 February 1898

C H D Burton
Under Secretary
P.W.D.

C.S.

To The L & M Dept.

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

Local & Munl. (1897) Department.

D.O. No. 99

From

The President, Munl.
Comn, Madras.

For **Orders**

No.

Dated 5. Novr. 97
Received —
Registered
Enclosures
Spare copies

SUBJECT

Forwarding the Health Officer's note on the subject of Lyon's disinfecting apparatus.

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

Office of Sanitary Commissioner,
Madras, ... 189 .
No............
900—1-7-97.

Confidential

D.O. No 91

19th (Oct 1897-.

Dear Mr Forbes,

Your Conf. No 57.----- I agree with the San. Commr.'s arguments . As I suggested to you de demi-officially -although opposition might be expected to this pattern (or indeed to any machine) there can be no doubt that it is "a good all round machine". Still more recent experiments than those quoted by the San. Commr with this machine and others, show that this opinion is correct. I trust pressure will be placed early on the Harbour Board to secure a machine. The Municipality ought at least to be able to afford a portable form . When large amounts of clothing have to be disinfected -as will be the case if plague comes to stay- it would be idle to

Note for the Head Clerk
Marine Dept

Can you give the information required by Col Moore?

M. S. Makenmkar
2d asst
18/4/98

193 [illegible] 14-3-98

The letter referred to has been recorded with reference to G. O. No: 139 Marine d/22nd February 1898 which has been communicated to the Local & Municipal Department

Mai
18/4/8

Please show papers as they are not available here
[illegible]
18/4/98

Herewith
Mai 18/4/8

---

attempt to deal with it by boiling in chatties et genus hoc.

Yours faithfully,

W G Moore

[redacted]

Jessop
18/4/8

The Marine Dept states that the letter in question was recorded with reference to its G.O. No 139 d/ 22-2-98, Our G.O. thereon is No 522 d/ 8-3-98. A copy of this might go to Col Moore

Lemy
18/4/98

To be copied & sent from here with reference to this

D.O.

Lemy
18/4/98

Despd
23-4-98

SECRETARY TO GOVERNMENT
16 APR. 1898
LOCAL & MUNICIPAL DEPARTMENT

Madras
16th April 1898

My dear Lemesurier

What is the situation as regards letter from the Presidency Post Office, Madras, dated 12th Novr. 1897 No 9d 91391 G. to the Secretary to Govt., Marine Department.

Yrs sincerely
G. M. Moore

Anything known in our Dept.?

1 11.07

The President,

Sir,

With reference to the "Confidential" (Govt. of India) on steam disinfecting stoves, I may mention that I have used the terms "Saturated" & "Superheated" in the exact senses given in the definitions.

2 In para 2 it is stated that the Washington Lyon's — apparatus saturated steam under pressure is used. If this is the case I see no reason why it should not be as effective a disinfector as the machine I recommended. But I find it difficult to reconcile this statement with those of Manlove, Alliott & Co. the patentees and manufacturers in their catalogue:—

(i) "The efficient working of this machine depends on the fact that it is a steam jacketed chamber, with the steam in the jacket at a pressure and temperature distinctly higher than that employed

in

in the chamber among the articles to be disinfected. The result of this arrangement is that *the steam used for disinfecting is kept dry and free from condensation*, and the goods operated on are not wetted."

(ii) "It is clear that in the Lyon's Machine the attendant should always see that the jacket is heated up before steam is turned into the inner chamber, but even such a simple matter is sometimes carelessly overlooked, and the result, of course, is that goods are moistened or wetted owing to condensation of steam."

(iii) "When preliminary heating is adopted the object is to prevent the condensation of steam on the goods."

(iv) "It should be particularly noted that this Disinfector works with dry steam. The steam in the jacket is at a higher pressure than the steam in the disinfecting chamber and consequently it is at a higher temperature; *the effect of this is to slightly superheat the steam in the chamber*, and this ensures its dryness."

It would appear from these statements made by the Patentees of the Lyon's Stove that the object they aim at is to prevent the superheated steam being cooled down to its saturation point throughout the whole process. In the "Confidential," para 5 a resume of Von Esmarch's experiments is given, showing that superheated steam is "no more effective as a disinfecting agent than heated air". If then the avowed objects of the Patentees and Manufacturers are attained it would appear that the Lyon's stove is no better than a hot air apparatus. I believe that as a matter of fact in practice the machine generally

being

fails to attain this desideratum of the Patentees and that at the begining of the process some condensation usually occurs. I should say that the efficiency of the disinfection largely depended on this failure. But it appears to me that a machine in which the steam only condenses to a limited extent and that not with certainty and which depends mainly on conduction to heat the articles to be disinfected is inferior to one in which saturated steam is used throughout and latent heat liberated until the articles are heated throughout approximately to the temperature of the steam admitted. It was on these grounds that I made my recommendation and gave the preference to the Geneste Herscher Machine.

3. On page 2 of the Report, it is stated on the authority of Rideal,

whose

whose name and work unfortunately I am not acquainted with that "the essential difference between the two Machines is the pressure that can be applied, the Lyon's being a high pressure machine and the Geneste Herscher ~~Machine~~ a low pressure machine! This is correct in so far as the Lyon's usually works at a pressure of 20 lbs on the square inch and the Geneste at 10 lbs. But the term low pressure machine is commonly applied to machines working at a pressure of 2 or 3 lbs and certainly not more than 5 lbs on the square inch. The reason why a higher pressure is not used with saturated steam stoves is that the temperature increases with the pressure. Thus 10 lbs gives a boiling point

for

for water of 239° F., 20 lbs 261° F.: as 239° F is sufficient to kill the most resistant spores no higher temperature is required. Moreover a higher temperature is more injurious to delicate fabrics.

4. As regards the rapidity of the process and the dryness of the articles after disinfection in Paris, where I became acquainted with

with the Geneste machine the articles are kept in the stove for 17 minutes, and they come out as nearly as possible dry owing to a current of hot air being admitted at the end of the process and driving off the steam. I can find no record of the time which it is usual to keep things in the Lyon's Stove, but to the best of my recollection it is not as a rule less than 12 minutes, so that there is a saving of 5 minutes in disinfecting a truck full of goods. This would not appreciably affect us in Madras. The Geneste machine has an automatic recording cylinder on which a record is made of the time taken in the process and the temperature of the interior throughout. This gives a valuable check on the workmen, as any laxity on their part is at once made manifest. I looked over a number of these charts in Rue de Recollets: they showed that the machine in ordinary daily use works with wonderful regularity

5. As regards Mr Wolf Defries' qualifications as an authority on steam disinfection, he is a graduate of the London University, a member of

Engineers and a good bacteriologist. I am aware that he is interested in the sale of Equifex disinfectors, but his papers on steam disinfection read at the Liverpool Congress of the Sanitary Institute in 1894 and at the Hull Congress of the British Institute of Public Health in 1895, and his reply to Dr. Mearns Fraser in "Public Health" for December 1896, which were not controverted, besides the experimental work which he has done himself, give him I consider a strong claim to rank as an authority on the subject. In his papers he keeps to general principles and so far as I am aware nowhere advocates the use of any particular stove.

(Sd) J. Nield Cook D.P.H.
Health Officer.
Madras Municipality

2nd November 1897.

In the use of saturated steam with a suitable apparatus it is not found that the thin film of water condensed on the surface injures in articles except some so called "~~most~~ non washing" materials in which very inferior dyes have been used: in such cases the pattern may be

of condensation is driven off again at the end of the process. The stove is heated before the admission of the saturated steam.

References.

1- Definitions of Superheated & Saturated steam V. "Public Health", Decr 96. p. 99-100

2. Comparative merits of Superheated and Saturated Steam:- V. "Theory & Practice of Disinfection by heat" p-10-17.

3. Description of Lyon's stove V. Manlove. Alliott & Co's catalogue

4. Description of Geneste Hers.-Cher,- V. Equifin catalogue p. 18-19.

5- Independent Reports on Geneste Herscher - V. Equifin Catalogue p. 26-37 & "Service Municipale de Désinfection" p. 22-27.

[Confidential.]

In paragraph 6 of the letter addressed by the President of the Madras Municipality to the Secretary to the Government of Madras, it is stated that the Washington-Lyon's disinfecting apparatus has been practically superseded by machines in which saturated steam under pressure is used, and an editorial article, which appeared in the *British Medical Journal* of November 3rd, 1894, is quoted in support of this statement.

Before the Washington-Lyon's apparatus, in which, by the way, saturated steam under pressure is used, was recommended, the relative advantages of the various apparatus in use were very carefully considered, and it seems to be desirable that some criticism of the statement made by the President of the Municipality, and of the article which he quotes, should be made.

The article in the *British Medical Journal*[*] is professedly based on a paper read by a Mr. Defries, at a meeting of the Congress of the Sanitary Institute. The fact that such a paper was read is mentioned in a previous issue of the *British Medical Journal*,[†] but no details of the paper are given; the paper is not mentioned in the "*Lancet's*" report of the meeting, and the meeting itself is not mentioned in "*Public Health.*" Mr. Defries is not a medical man, and there is nothing to show what his qualifications, as an unbiassed authority on steam disinfection, may be.

His paper, however, seems to have been founded on an article by Professor E. v. Esmarch in the *Zeitschrift f. Hygiene Bd. IV.*, 1888. Unfortunately we have not in this office a copy of the paper, but we have a summary of it by Professor Emmerich[‡] of Munich in which the most important part is quoted.

Von Esmarch made a series of experiments with steam at the boiling point of water (100° C.), under normal pressure, and found that such steam "killed anthrax spores in 10 minutes, while superheated steam at the same pressure destroyed such spores at a temperature of 100° C. in 20 minutes, at 120° C. in 15 minutes, and at 150° C. in 10 minutes." He found, in fact, that superheated steam was no more effective as a disinfecting agent than heated air. The conclusion to be drawn, says Professor Emmerich, is that "steam to be used for disinfecting purposes should not be heated above 100° C., *unless* it is under pressure."

---

[*] Page 999, November 1894.

[†] Page 767, October 6th, 1894.

[‡] Virchow's Jahresbericht, 1888, Volume I, page 586.

There appears to be a good deal of confusion regarding *superheated* and *saturated* steam. Some writers evidently consider any steam at a temperature over 212° F. superheated; but this is of course wrong. As will be observed in von Esmarch's experiments, *saturated* and *superheated* steam may be at the same temperature, the difference depending on the *pressure* on the steam.

"The saturation pressure of any vapour at any temperature is the same as the pressure at which the corresponding liquid boils at that temperature."[*]

Pure water, at the normal pressure of the atmosphere (760 *m. m.*), boils at 100° C. (212° F.), and, at that pressure and temperature, steam is saturated.

If the pressure is lowered by the creation of a partial vacuum, the steam becomes superheated, although the temperature remains the same. Similarly, if the temperature is increased, while the pressure remains normal, the steam becomes superheated.

In other words, whenever the temperature of steam at a given pressure, is raised above the temperature at which water boils under the same pressure, that steam is superheated.

The chamber of the Lyon's apparatus is surrounded by a steam jacket: in one form the jacket is the boiler. All forms of the apparatus are constructed to bear a high pressure. In this the Lyon's differs from the Geneste-Herscher, where a much lower pressure must be used. The Geneste-Herscher has no steam jacket, but the chamber is surrounded by a non-conducting cover.

The essential difference between the two machines, then, is the pressure that can be applied, the Lyon's being a high pressure machine and the Geneste-Herscher a low pressure machine.[†]

In the Lyon's, therefore, superheated steam at a high temperature can be used, and is, in fact, used at the end of the disinfecting process. Rideal[‡] on this point says:—"In most, if not all steam-jacketted machines, the earlier portions of the operation must, perforce, be conducted with saturated steam, and in the better machines from which the articles come out absolutely

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[*] Daniell's Physics, page 300.
[†] Rideal "Disinfection and Disinfectants," page 44.
[‡] *Op. cit.*, page 30.

dry, it is probable that the steam contained in the chamber becomes slightly superheated towards the end of the process. Hence it matters but little in a jacketted machine whether saturated or superheated steam be the better disinfecting agent, for steam may be used in both conditions. As a matter of fact the difficulty has always been to bring the articles out dry, and so long as they come out with even ½ per cent. added moisture, it is certain that the steam has never been entirely superheated."

It will be seen, then, that the writer in the *British Medical Journal* either did not know the difference between saturated and superheated steam or had some reason to extol the Geneste-Herscher (Equifex) apparatus at the expense of jacketted machines, of which the type, in England, is the Lyon's.

In the article, it is implied that it is only in England that high pressure steam is used. This is in a measure true, as during the last ten years, three-fourths of the installations have been high pressure machines, whereas, on the continent, low pressure machines are commonly used, but for reasons very different from those suggested in the *British Medical Journal*. One of the leading works on Hygiene in Germany is that by Professor Lehmann of Wurzburg, which has been translated by Sir W. Crookes, F.R.S. On page 414, Volume II, of the translation, the essential features of a steam disinfecting machine are given. These essentials are taken from a paper written by Professor von Esmarch for the first number of the *Hygienische Rundschau* (page 1, Volume 1, 1891). He prefers an apparatus without tension (*i.e.*, low pressure), because, although a high tension machine acts more quickly, this advantage is more than compensated for by the greatly increased first cost.

Lehmann (page 417) says that the test of a machine is its effect on spores, but that it is not fair to condemn a machine, though it does not kill the most resistant spores (hay bacilli, bacilli from garden-soil) "for which high pressure steam is needed."

In this connection, the most recent experiments made by Christen are of importance.[*] He found that the so-called "earth spores" were not killed by steam at 100° C. in 16 hours. Up to 115° C. the time required was inversely proportional to the heights of the temperature and the pressure. From 120° C. there was a seemingly sudden increase in the killing power of the compressed steam, and no organism could resist for even one minute the high pressure steam, at 140° C. No doubt, steam at a temperature of 100° C. at the ordinary atmospheric pressure, is quite sufficient to kill most pathogenic organisms, the advantage of the high pressure machines is, however, two-fold, they act more quickly, and bulky articles can be disinfected through and through in a reasonable time. The only real disadvantage is the first cost, which, as they must be much more strongly built than the low pressure machines, is considerable.

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[*] Abstract in the Jahresbericht, Volume 1, page 485, 1895.

Thus in England and the United States,*—where speed is of greater importance than money, high pressure steam machines are used; on the continent, where first cost is very important and speed matters comparatively little, low pressure machines are used. It may be added that "low pressure disinfectors have been tried and very largely abandoned at home."†

The most recent article on this subject, which I remember to have seen in an English paper, appeared in the *Lancet*‡ of January 11th, 1896, where the Special Sanitary Commission on Disinfection describe Dr. Thresh's machine. In the course of their article, they lay down certain conditions which should be fulfilled by a steam disinfector. These are:—

"1. Its actual cost should be such that it can be available for institutions, hospitals, infirmaries, work-houses, schools, etc., both large and small.

2. Its working expense or cost of maintenance should be small—commensurate of course with the amount of work it has to do; this should include the cost of labour.

3. It should be of simple construction and easily managed.

4. It should effect a uniform distribution of heat in all parts of the chamber which should not vary.

5. The heat should attain the maximum as quickly as possible, and should insinuate itself into the innermost recesses of bulky articles like bedding, etc.

6. It should satisfy bacteriological tests of infected material well wrapped up and, so to speak, guarded by folds of non-conducting material as mattresses, blankets, etc.

United States, Lyon's machine and M'Lautlin's
The latter is similar to the Geneste-
ed for high pressure. Rideal,
ants," page 52.
2.
age 120.

7. The articles disinfected should come out uninjured and in the same condition as they went in, especially in regard to dryness."

These conditions are, practically, those laid down by Lehmann, to which allusion has been made.

The *Lancet's* Commission especially praised Thresh's machine, because these conditions were fulfilled and no skilled attendance was required.

In the issue of the Journal of a fortnight later,* Mr. Washington-Lyon wrote complaining that the article by the Lancet Sanitary Commission was calculated to damage his machines which had been "used for fifteen years by unskilled workmen with most satisfactory results," and invited the Commission to experiment on his machine. The editorial reply was as follows:—

"The efficiency of the Washington-Lyon's apparatus for disinfection by steam under pressure was established by the careful investigation of Dr. Klein and Dr. Parsons, whose report appeared in the Supplement of the Fourteenth Annual Report of the Local Government Board.† There is, therefore, no necessity to repeat the experiment. We did not state that the employment of steam under pressure "necessitates the service of skilled engineers," but that the use of high pressure steam involved a *certain* amount of engineering knowledge and skill. Surely this is not overstating the case where the use of a safety valve and the control of a high pressure gauge are involved."

---

* Page 261, January 25th, 1896.

† Page 303, where Dr. Parsons says, "of those" (disinfectors) "employing steam, Lyon's patent steam disinfector in my experiments gave the best results of any in their respective classes."

[G. C. Press, Simla.—No. 1286 H. D.—4-9-97.—40.

When given for co ng Ut
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189 .

READ AGAIN G.O., No. , DATED
189

CURRENT No.

LOSURES TO C. No.

RDER OF GOVERNMENT .. .. .. A A A A A A A

TTER OF GOVERNMENT.

ATEMENT WITH DITTO.

RS NOT FILED UP, BEING MEANT FOR DESPATCH IN ORIGINAL.

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