

(No. 20.)



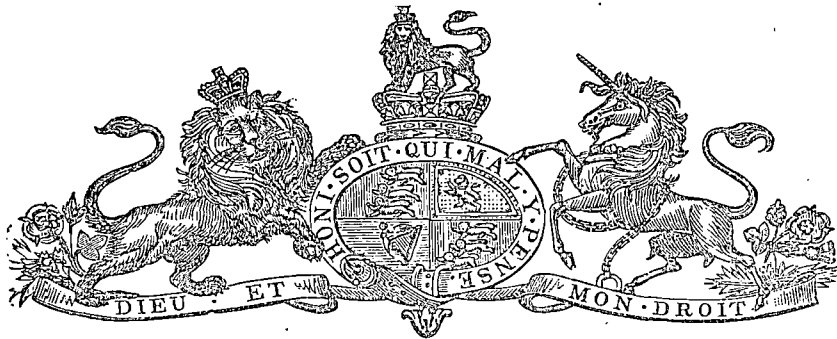
1889.

PARLIAMENT OF TASMANIA.

DISINFECTION OF CLOTHING AND BEDDING:

R E P O R T.

Presented to both Houses of Parliament by His Excellency's Command.



DISINFECTION OF CLOTHING AND BEDDING.

To the Honourable the President and the Members of the Central Board of Health.

GENTLEMEN,

IN accordance with the instructions contained in Minute No. 241, 1888, I have read the correspondence that has taken place with various public authorities relative to the means of disinfection used at the Hospitals and Gaols of the Colony, and have the honour to report to you thereupon, as follows.

1. At the General Hospital, Hobart, the linen, clothing, and bedding are soaked for several hours in a solution of carbolic acid before being sent to be washed by the women prisoners at the gaol. It is said that no cases of fever have occurred among these prisoners. The blankets and mattresses are exposed for not less than 24 hours to the fumes of sulphur in a small brick building about 7ft. 6in. x 5 feet. If necessary, the mattresses are unpicked and the horse-hair boiled. The clothes worn by patients on admission are also fumigated before being given back to them.

2. At the General Hospital, Launceston, the Surgeon-Superintendent states:—"We depend upon the boiling of all fabrics. We certainly have a small oven in which we place small articles, and expose them to the fumes of sulphur, but it is scarcely worthy of mention." In July last there was a proposal made to convert an old steam-boiler at the Hospital into a disinfecting chamber; and in connection with the subject of disinfection generally, particulars were obtained from New South Wales of the apparatus used at the Quarantine Station, Manley. This is described as a Fraser's Patent Disinfecter, and I quite agree with the Surgeon-Superintendent of Launceston Hospital in deprecating its use.

3. At the Hospital for the Insane at New Norfolk, "the soiled clothing and bedding are soaked, in dilute carbolic acid and subjected to prolonged boiling."

4. At the Hospital for the Insane at the Cascades, the Surgeon-Superintendent writes:—"No attempt has ever been made at disinfecting the clothes and bedding of the inmates of this Institution."

5. The same Surgeon-Superintendent makes the same statement in regard to the clothing and bedding of the Inmates at the Contagious Diseases Hospital, Cascades.

6. At the New Town Charitable Institution, "sulphur fumigation, and the extensive use of carbolic acid with the washing of all clothes and bedding, are the methods used."

7. The Superintendent of the Invalid Dépôt, Launceston, writes, "that the means and method are both of a very primitive character. The only way that can be used here is for the clothes and bedding to be placed in a room, and a pan of sulphur to be burnt under them, which is a very ineffectual way of dealing with them. A place where this operation can be carried out in a more thorough manner than at present it can be is very urgently required."

8. At the Hobart Gaol, "the method used for the disinfection of clothes taken from prisoners on their admission, as also the clothing and bedding of hospital patients, is by sulphur fumigation in a place specially erected for that purpose."

9. At the Launceston Gaol, "the method adopted is by placing the clothes in a cell and fumigating them with sulphur." The Superintendent adds:—"There is no place set apart especially for this work, but one is very much needed."

10. In reference to the whole of those reports, it may be remarked that the methods described as disinfecting processes are satisfactory only so far as concerns fabrics that can be and are boiled. It is therefore probable that at the Cascades Establishment, where it is presumed such fabrics are boiled in the process of washing, the actual disinfection is as well secured as at the other institutions. In regard to the fumigation processes, some remarks will be made in another part of this report. The whole of the reports also show that the means of disinfection at each Institution are intended for its own special needs, and are not available for the use of the public.

11. In considering the question of disinfection of clothing and bedding, it must be borne in mind that there are two distinct objects that should be aimed at—the sterilization of the contagia of infectious diseases, and the destruction of parasitic vermin in all states of their existence; and the means adopted should be capable of fulfilling both these objects without injury to the tissues and materials operated upon.

12. Much attention has recently been paid to the subject, and many experiments have been undertaken with a view of ascertaining the conditions under which sterility of virus and the destruction of vermin can be secured; and a very complete account of such experiments may be found in the Supplement to the Fourteenth Annual Report of the Local Government Board, dated March, 1885, in a Report by Dr. Parsons on "Disinfection by Heat." From this report the following conclusions may be drawn:—

As to disinfection by chemical agents:—"The general result of the experiment with chemical agents was to show the comparative or entire inertness as germicides of most of the substances commonly received as disinfectants,—as carbolic and sulphurous acid, chloride of zinc, &c." I shall therefore not revert to the consideration of these means of disinfection.

As to disinfection by heat:—"That exposure to dry heat at 230° Fahrenheit for one hour, or to boiling water or steam at 212° for a shorter period, destroyed the vitality of virus such as that of smallpox or scarlet fever, and killed parasitic insects in all stages of their growth.

It should be observed that these results, first obtained by experiments properly controlled—that is, by comparing the action of portions of the same infective material both before and after treatment for disinfection,—have been fully borne out by the experience of Medical Officers of Hospitals throughout Great Britain during at least 15 years, and up to the present time. It must be also observed that the above-mentioned period of exposure refers not to the article containing the infective matter, but the matter itself, for much longer exposure of the article may be necessary to insure that the heat penetrates throughout.

13. It may therefore be assumed that heat is the only reliable and practicable means of disinfecting clothing and bedding. "We have next to ascertain"—as Dr. Parsons tersely puts it—"how the required degree of heat may be made to penetrate through bulky and badly conducting articles * * * * * We have also to learn whether such articles can be submitted to the required degree of heat without injury, for, if not, disinfection presents little advantage over destruction." Both these points have been ascertained.

14. As all experience has shown that boiling such infected articles as will be uninjured by the process is the surest and cheapest method of disinfecting them, provision should be made at any disinfecting station that may be established for so treating all linen, cotton, and such like tissues. But as many articles would be totally spoilt by being boiled, it is necessary that some other means of disinfection by heat be also provided. These means must be considered.

15. It is found that steam at atmospheric pressure, or superheated, permeates bulky non-conducting articles such as pillows, mattresses, and cushions far more quickly than dry air. Furthermore, under ordinary circumstances its temperature can be easily maintained at a given point. On the other hand it injures many articles in the same manner that boiling them does, and therefore a steam apparatus would not be a full complement to a boiling one in a disinfecting station, but some other means would also have to be furnished.

16. The objections to employing hot dry air have been, that with bulky articles some hours were required to make the heat permeate the mass; that it was difficult to ensure uniform temperature in all parts of an apparatus—that is, to avoid making some parts too hot while other parts were left too cold; that it required constant supervision by skilled labour to maintain any given temperature, and consequently that it was a costly process in itself; and if the constant supervision were relaxed, was liable to injure or destroy all articles that were being disinfected. These objections have now all been met and obviated by a system based on the researches of Dr. Henry, of Manchester, and perfected by Dr. Ransome, of Nottingham, and his Engineers, Messrs.

Goddard, Massey, and Warner, and which has now stood the test of many years, and is extensively adopted by Municipal and Hospital authorities at home and abroad. I therefore recommend that this system be adopted.

17. The Nottingham system has been based, first, upon the results of the experiments above referred to, showing that the contagia of infectious diseases are sterilized by exposure to heat at 230° F., and vermin destroyed; secondly, upon further experiments showing that leather, silk, wool, linen, and cotton goods—in fact, all that enter into the composition of dress and bedding—remain uninjured by exposure to *air* of the above-mentioned temperature; and, thirdly, upon the consideration of how to obviate, in the best and completest manner, the objections above enumerated to the use of hot air as a disinfectant.

18. The apparatus for carrying out this system consists of a stove 5ft. × 6ft. × 5ft. inside, with doorways at each end for the putting in and taking out of the articles to be treated. The stove consists of panelled iron casing, with 3 inches in thickness of felt between the inner and outer casing. At the side of and at a lower level than the chamber of the stove is the furnace, the heat of which is obtained by burning ordinary gas with smokeless flames, by means of a large atmospheric gas ring-burner contained in a double cast-iron cylinder, having at its sides webs through which air enters. The products of combustion mixed with heated air pass from this cylinder by means of a horizontal flue, and enter the chamber through a perforated floor, the holes in which are so regulated by calculation as to ensure the equal distribution of the heat, allowance being made for the expansion of the air and for friction. For the escape of the heated air an outlet flue is fixed to the top of the chamber, fitted with a damper to regulate the speed of the current. A slide is also fixed in connection with the perforated floor-plates, so as to ensure that no more air enters than can be properly heated. Fixed thermometers in the inlet and outlet flues show the temperature of the incoming and outgoing currents, indicating consequently maximum and minimum heat of the chamber. The entrance of gas into the furnace is controlled by a *governor* of gas pressure, and also by a self-acting mercurial *regulator*. This latter is a special feature of the apparatus, for it is so designed that the expansion of the mercury by the rise of temperature gradually shuts off the supply of gas in such wise as to make the supply exactly balance the requirement for keeping up any desired temperature. So the *regulator*, having been once set at any given temperature, that temperature can be maintained for an almost indefinite period. The *governor* acts so as to equalise gas pressure by day and night. There is also fixed near the outlet flue an automatic arrangement for the extinction of any fire that may take place in the chamber (caused, for instance, by a lucifer match having slipped between the cloth and lining of a tramp's jacket, and which had not been discovered on the search made before submitting the clothes for disinfection—this is said to have been the cause of the only two fires that have occurred at Nottingham.) This apparatus is worked by a chain having a fusible link melting at 300° F., the result of the fusion being the fall of dampers closing all inlet and outlet, and shutting off the supply of gas, and ringing a warning bell. The apparatus takes about 55 cubic feet of gas an hour during the time it is in use. It is fixed in the partition wall between the infected and disinfected sides of the station, and the doors are so linked together that those on the one side can only be opened when those on the other are closed, and thus there can be no communication between the two sides except by passing through the stove. The chamber is fitted with slides, &c. for the things to be disinfected.

19. The stove takes about six hours for the requisite heat to penetrate through a flock bed or pillow; but in practice it is found more convenient to work it with only two "shifts" a-day. The chamber is charged in the morning with the things to be disinfected, left all day to take care of itself, emptied and re-charged in the evening, and again left, and so on; so that only two or three hours of the attendants' time is occupied. The things are brought to the station in a special cart that is used for no other purpose, and taken away in another, the two carts being painted in distinguishing colours. At Nottingham, during one year 5000 articles were disinfected at a cost of £106 17s. They included 220 mattresses, 201 beds, 351 bolsters and pillows, 224 blankets, 365 coats and vests, 168 pairs of trousers, 54 carpets, 43 quilts, and 700 books. As gas is more expensive in Hobart, the corresponding cost here would have been about £140. In reference to the action of the stove, it has been tried on "dresses of silk, satin, velvet, and grenadine, eiderdown skirts, sealskin and other furs, waterproof cloaks, jewellery, and papers;" and Dr. Seaton says that in no instance has there been damage, and "the injury caused by periodical stoving of bedding, &c. does not amount to more than may be called fair wear and tear."

20. The accompanying plan shows the general arrangement of such a disinfecting station as I would propose for Hobart and for Launceston. Accommodation is provided for the processes of disinfection both by boiling and by dry heat, for destruction of what is not worth disinfecting, and there are sheds for the carts for bringing in infected things and taking away the purified. The larger yard in connection with the infected side would be used for partially drying the boiled articles, their drying being always completed in the stove, through which they would pass to the disinfected side. There is also a shed provided for the moveable disinfecting apparatus, that could be sent into the country when necessary. I estimate the cost of the building in brick at £670.

21. I think it very desirable that provision should be made for the locomotive disinfecting apparatus mentioned above. One could be constructed to act by means of hot air and charcoal fumes generated in a charcoal-burning furnace for about £50. One should be kept at Hobart and one at Launceston, as head-quarters, to be sent wherever required.

22. The two light spring-carts mentioned above should also be provided and kept exclusively for their respective special services. They would cost about £50.

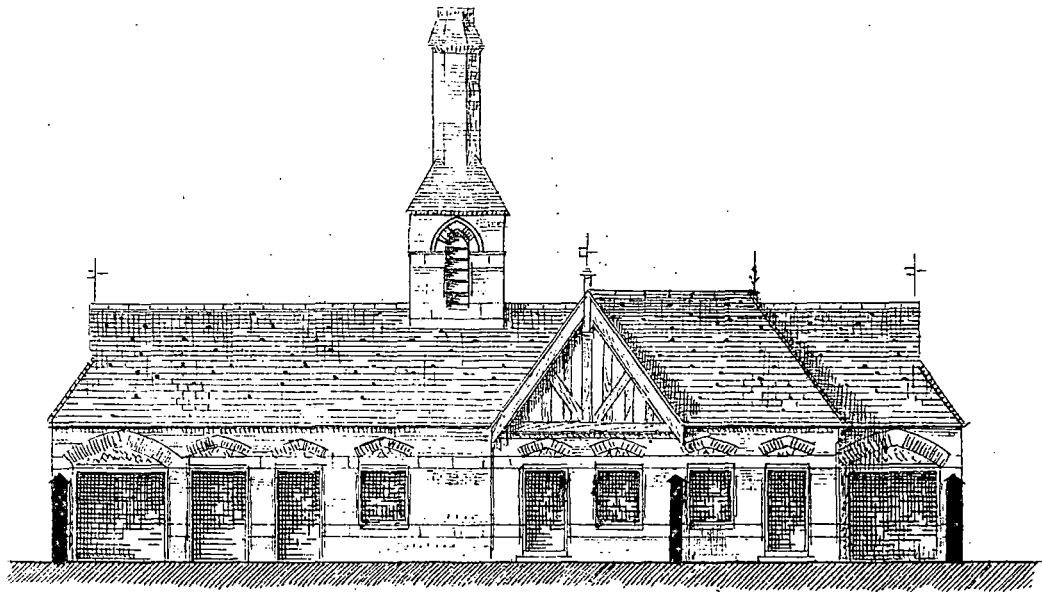
23. The total cost of each station, with its necessary plant for working, would thus be about £770. Part of this might be saved by building with galvanised iron instead of brick, but I would not recommend this saving in prime cost, as it would be attended with increased working expenses. The annual working cost would, of course, depend upon the work done, but it would be very small in comparison to the good it would do, and the saving it would effect in such exceptional times as an outbreak of smallpox or other such epidemic. In each of the towns one station would be amply sufficient for all the purposes of the hospitals, benevolent institutions, and gaols, and these places alone, for their everyday work, require its establishment.

I have the honour to remain,
Gentlemen,
Your faithful Servant,

A. MAULT.

Hobart, 18th April, 1889.

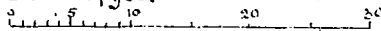
P.S.—Since writing the above I have received from the Honourable the Premier an official copy of the Memorandum, dated April, 1888, of Dr. Buchanan, of the Local Government Board, on the proceedings advisable in places attacked with epidemics, and I take from it the following passage:—"Provision by the public authority for disinfection by heat of bulky articles, and of those which cannot without injury be exposed to chemical agencies, ought always to be in readiness. Without such provision no complete disinfection can be effected. Partial and nominal disinfection, besides being wasteful, may be mischievous, as giving rise to a false security." In a letter dated 2nd January, 1889, Dr. Buchanan mentions "perchloride of mercury and sulphurous acid as the only chemical agents for real and valid disinfection."



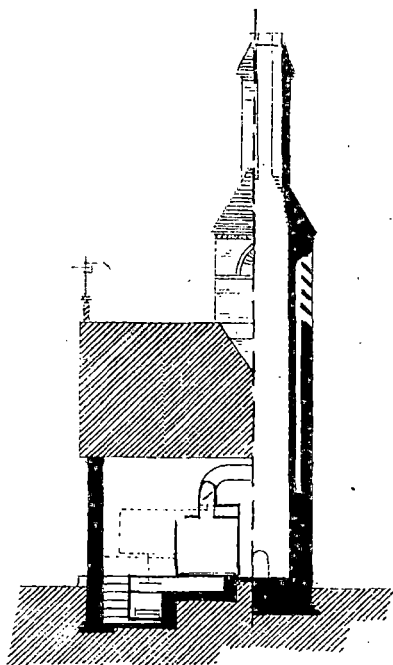
Elevation

Disinfecting Station.

Scale of feet

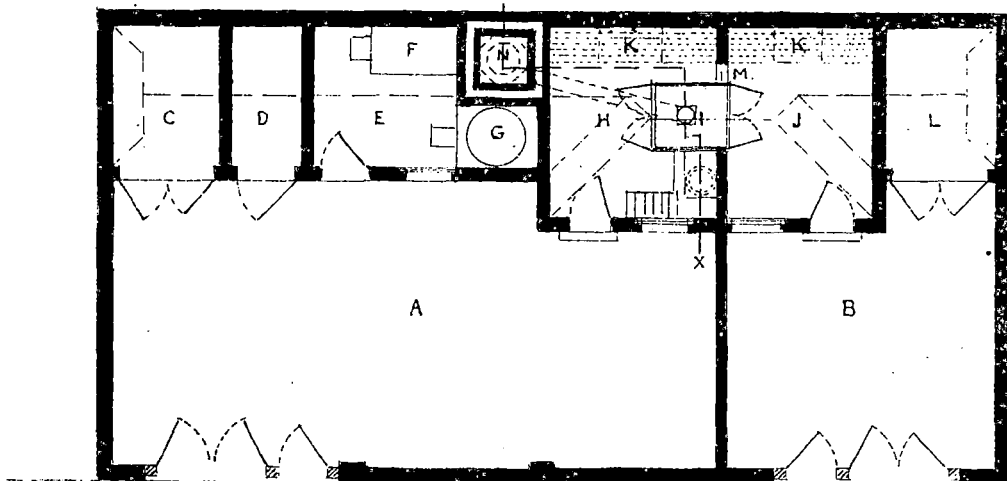


A. Mault
April 1889



Section on XY.

- A. Side for Infected things.
- B. Side for Disinfected things.
- C. Shed for Cart used only for bringing Infected things.
- D. Shed for locomotive Disinfectors.
- E. Furnace and Boiler room.
- F. Furnace for destroying what is not worth disinfecting.
- G. Coppers for disinfecting by boiling.
- H. Room for disinfecting by heated air.
- I. Automatic disinfecting stove.
- J. Room for disinfected articles.
- K. Racks for clothing, etc.
- L. Shed for Cart used only for removing disinfected things.
- M. Fixed window.
- N. Chimney and ventilator.



Ground Plan.