

GOVERNMENT NOTIFICATION.—No. 407.

The following letter and its enclosure, from the Crown Agents for the Colonies, are published.

By Command,

F. H. MAY,
Colonial Secretary.

Colonial Secretary's Office, Hongkong, 1st July, 1902.

OFFICE OF THE CROWN AGENTS FOR THE COLONIES,
DOWNING STREET, LONDON, S.W.,
27th May, 1902.

SIR,

The Secretary of State in his circular despatch of the 20th April, 1901, on the of the connection between malarial fever and mosquitoes, referred to several suggestions made by Lord Onslow's Committee, of which one was:—

“(h) That the Crown Agents for the Colonies be required to arrange “that a supply of suitable wire gauze and mosquito netting is available, “patterns of which should be easily accessible.”

2. Acting upon this suggestion we took steps to ascertain what was the most suitable quality of gauze, and on the advice of Dr. P. Manson, F.R.S., we instructed Messrs. Shelford and Son, M.M.E.C.E., to conduct an experimental investigation on the subject of the durability and most suitable dimensions of the various kinds of wire gauzes.

10-9-01.

I now have the honour to enclose, for your information, a copy of the report with which they have furnished us stating the result of their enquiry. We also obtained from a number of Colonial Governments the opinions of various experienced officers as to what quality and size of gauze was found most effective in excluding mosquitoes and at the same time permitting a free supply of air.

3. In view of the information so obtained and acting under the instructions of the Secretary of State, we invited tenders for quantities of 10,000 square feet—in 3 feet widths—of both brass and tinned-steel netting, with the result that it was found that the best quotation for adoption was one of the following:—

(1.) Brass (16 mesh and 30 B.W.G.)—2.42*d.* per square foot.

(2.) Tinned Steel (16 mesh and 30 B.W.G.)—2.00*d.* per square foot.

These prices, though stated to be for quantities of 10,000 square feet, will, subject to fluctuations in the market price of the materials concerned, apply to any smaller quantities that may be ordered, and are considerably lower than Messrs. Burrows' tender for Cop Bronze, which was at 4.09*d.* per square foot.

Brass.

Tinned Steel.

4. For your further information, I also enclose one sample of each kind of gauze recommended.

5. We are now prepared to execute indents for wire netting of this nature and, for convenience of reference, we would suggest that the material should be described as:—

“Standard” Brass Gauze,

and “Standard” Tinned Steel Gauze,

in any indents that may be sent to us.

I have the honour to be,

Sir,

Your obedient Servant,

W. H. MERCER.

The Honourable

THE COLONIAL SECRETARY,

&c.,

&c.,

&c.,

Hongkong.

(Enclosure.)

35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.,
September 10th, 1901.

TO THE CROWN AGENTS FOR THE COLONIES,
DOWNING STREET, S.W.

MOSQUITO MALARIA.

GENTLEMEN,

We herewith have the honour to hand you a short report on the results of tests made with various wire gauzes in connection with the Mosquito-Malaria Theory.

I.—PRELIMINARY.

In January last, a small Committee presided over by Lord Onslow was appointed by the Colonial Office to consider what practical suggestions could be made to the different Tropical Colonies in view of the recent investigations into Malaria, and certain recommendations made by Dr. Patrick Manson.

The Committee carefully considered the whole matter, and made the following nine suggestions, which were forwarded to the Governors of Tropical and Sub-tropical Colonies.

Briefly enumerated they are :

1. That all new Buildings should be located away from Native Quarters, Jungle, and stagnant water, and where possible on high ground.
2. That all Buildings or parts of same should be protected against Mosquitoes by Wire Gauze fitted to doors and windows.
3. The rooms to be provided with special means for the destruction of the Mosquito.
4. That Europeans should provide themselves with approved Mosquito Nets when travelling.
5. That in all rooms a special notice on "Malaria, its cause and prevention," by Dr. Manson, be exhibited.
6. That Medical Officers be appointed to inspect, instruct, and superintend the carrying out of measures for the prevention of transmission of Malaria by Mosquitoes.
7. That practical demonstrations be given to prove that residence in Mosquito proof houses diminishes infection.
8. That the Crown Agents be requested to arrange that a suitable supply of Wire Gauze and netting be available.
9. That Europeans going out to Malarial Colonies be advised to provide themselves with Mosquito Nets.

It will be seen that the chief point in the above is the provision of suitable wire gauze and netting, and in a letter from yourselves dated February 19th, 1901, you approved of an expenditure, not exceeding £25, being made to ascertain and test the climate resisting qualities of certain kinds of gauze which it is proposed to use in houses in West Africa, for the purpose of making them Mosquito proof.

II.—MATERIALS TO BE TESTED.

We have made a large number of enquiries from various Firms connected with the wire gauze trade, but chiefly with the Firms of Messrs. John Staniar & Co., of Manchester; and the E. T. Burroughs Co., of Portland, Maine, U.S.A. From the former Firm we obtained samples of Steel, Tinned Steel, Painted Iron, Copper, Brass, and perforated Zinc. We also had specially woven by this Firm some Nickle Steel Gauze made from Nickel Steel, kindly provided by Messrs. Cammell & Co., Sheffield. Messrs. Burroughs Co. supplied us with their Standard Gauzes—Enamelled Steel, Enamelled Galvanized Steel and Cop-Bronze.

All these Gauzes have been tested, with results which we give later. Other gauzes, such as Aluminium and Nickel, etc., have been suggested, but they have not been tested on account of their prohibitive cost.

III.—SIZE OF MESH AND WEIGHT PER Sq. Ft., AND THICKNESS OF WIRE.

The aperture between the wires or mesh is of primary importance, and it appears to be the general opinion that a mesh having 16 wires to the inch will be sufficient. A larger mesh than this, that is one having less wires to the inch, might allow a Mosquito to pass through, whereas a smaller mesh will, to some extent, prevent the air from passing freely.

The weight of the gauze supplied by Messrs. Staniar was in all cases too heavy, the majority weighing about $4\frac{1}{2}$ to $5\frac{1}{2}$ ozs. per sq. ft.; on the other hand that supplied by Messrs. Burroughs appears rather too light, it weighing on the average, with the small mesh, about 2 ozs. Apparently a gauze weighing $2\frac{1}{2}$ ozs. per sq. ft. and having a 16 mesh, will be found most suitable.

The durability of gauze depends considerably on the diameter of the wire employed, a thicker wire, *i.e.*, a heavier gauze resisting corrosion better than a thinner wire. The best size of wire would appear to be 30 B.W.G.

IV.—TESTS OF MATERIAL.

(a.) In order to ascertain the quality of gauze to resist rust, we constructed a small apparatus by means of which samples could be introduced and exposed to a jet of steam. There are various chemical methods of rusting metals, but we considered the next best thing to actual exposure in tropical climates was to make an experiment whereby the hot damp climate could be reproduced on a small scale.

This steaming process was carried on each day over a period of about three months, the total amount of time during which the apparatus was under steam being about 300 hours. During each night the specimens were exposed to the air, and during the latter part of the experiment they were additionally tested by being alternately moistened by the steam and then dried.

(b.) The results of the experiments can now be given:—

PAINTED IRON, STEEL AND TINNED STEEL.

Those gauzes supplied by Messrs. Staniar & Co., and marked A, B and C respectively, were tested for 150 hours, spread over about 45 days. The result is that the steel specimen (B) is almost entirely blocked up with rust, whilst the other specimens of Painted Iron and Tinned Steel are nearly in the same state.

This convinces us that any type of gauze consisting of Steel or Iron, although well painted or galvanized, is unsuitable for use in damp, hot climates.

COPPER.

The specimen marked D has been tested for over 300 hours during three months, and there are, as might be expected, no signs of its having been affected, except slight discolouration. This gauze might be used, but it has the disadvantages of being poisonous and more costly than other suitable gauzes.

BRASS (SPECIMEN E).

This material, supplied by Messrs. Staniar & Co., has also been tested for the same length of time as the Copper, *viz.*, 300 hours, and shows no sign of decay. It is not so expensive as Copper, and we think will be found one of the most suitable for tropical climates.

NICKEL STEEL (SPECIMENS F AND G).

Nickel Steel Gauze is, we find, not commercially procurable, but, thinking it would be found to be one of the most suitable, we ordered some of this gauze to be made by Messrs. Staniar & Co. Whilst, however, this gauze was being made, we obtained some Nickel Steel wire, and wove it into gauze ourselves for testing purposes. Our own specimen (marked F) has been tested for 300 hours, spread over three months, during the whole of the experiments, with the result that the Nickel Steel wire is completely covered with rust. On receiving the other specimen from Messrs. Staniar we immediately started experimenting on it, and after a test of 250 hours, spread over $2\frac{1}{2}$ months, we found that the specimen was nearly as good as when sent from the makers, and it had not been discoloured.

From the above remarks it is evident that the durability of Nickel Steel Gauze depends upon the proportion of its constituents, and elaborate

and prolonged experiments are necessary to determine the best composition of Nickel Steel which will possess climate-resisting properties. Since, however, we tested this gauze we have obtained from the makers its price if ordered in large quantities, and regret that the price quoted, viz., $8\frac{1}{2}d.$ per square foot, prohibits its adoption, this price being more than double that for Brass or Cop-Bronze.

ENAMELLED STEEL AND ENAMELLED GALVANIZED STEEL.

These specimens (marked H and I) were supplied by Messrs. Burroughs & Co., of Portland, U.S.A., and as we are informed, the type of gauze used in protecting houses from Mosquitoes in the Southern States of America. Both specimens have been experimented upon for about 170 hours with the result that the Enamelled Steel has, as previously, quite rusted away. The Enamelled Galvanized Steel has stood the test better, but for all that we think that any type of gauze of this material is quite unsuitable for Tropical climates.

COP-BRONZE.

This specimen (marked J) is also made by the Burroughs Co., U.S.A., and although of a rather light weight is, we think, a very suitable material. It has been tested for 170 hours and shows no sign of decay. We think that this gauze is probably one of the most suitable for use in the tropics and we suggest that it should be given a trial when an opportunity occurs.

(c.) All the gauzes mentioned above which have been tested in the manner indicated have also been tested in a lesser degree by being exposed continuously on the grass in a meadow in the suburbs of London during the wet weather from February to May.

Specimens of Painted Iron, Steel, Tinned Steel, Copper, Brass and Nickel Steel (marked K, L, M, N, O and P respectively) were exposed in this manner for three months, and specimens of American Gauze, viz., Enamelled Steel, Enamelled Galvanized Steel and Cop-Bronze (marked Q, R and S) were exposed for $1\frac{1}{2}$ months.

These specimens have been affected by the rust in the same way as described above but in a lesser degree.

V.—CONCLUSION.

From these experiments it will be seen that the only gauzes likely to be suitable for damp tropical countries are—

	Per Sq. Ft.
1. Copper, approx. price	-/6
2. Brass,	-/3½ to -/4
3. Nickel Steel—Messrs. Staniar, according to weight	-/8½ to 1/0½
4. Cop-Bronze—Messrs. Burroughs, according to weight	-/3½ to -/4½

It appears that the selection of the most suitable materials lies between Brass and Cop-Bronze, as Copper and Nickel Steel at present prices are too expensive.

The Cop-Bronze is manufactured by Messrs. Burroughs & Co., Portland, Maine, U.S.A., and is only obtainable in 14 or 18 mesh, and of these two sizes we would recommend the 18 mesh. Messrs. Burroughs also supply complete door and window frames fitted with their gauze wire.

VI. Finally we beg to recommend that a quotation for the supply of 10,000 square feet of Cop-Bronze of 16 or 18 mesh, made with wire of 30 B.W.G., and 3 ft. wide be asked for, f.o.b. Liverpool, from Messrs. Burroughs & Co., Portland, Maine, U.S.A., and a similar quotation be obtained for Brass wire gauze.

Firms will probably quote to you a price on the best terms, and you would then obtain a reliable comparison as to price between common Brass gauze and the speciality manufactured by Messrs. Burroughs, so that in case of the occurrence of a demand for mosquito gauze, the difference in price between these two commodities would be at once known.

For the sake of convenience to yourselves we retain possession of the samples for the present.

We have the honour to be, Gentlemen,
Your obedient servants,

(Signed.) SHELFORD & SON.