Public Works (1898) Department.

Govt Engineer

G.O., No. 1702 W

Dated 6 July '98

[Despatch Abstract.]

Kadaikanal Observatory: Communicating letter from the Dy: to the Consg: Architect forwarding copies of Correspondence relative to the Sabbs of domes for the — Stating that the tender of Sir Howard Grubb has been accepted, the domes costing £320.

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Indexed

[P. W. 26. 1,000—12 2-98.]

BACK PAPERS.

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

FURTHER PAPERS.

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BUILDINGS AND ROADS.
CIVIL WORKS.

Government {1898} of Madras.

PUBLIC WORKS.

Recd. } 1898. *Enclosures*

Regd. *Spare copies*

G.O., No. 1702 W., 6th July 1898.

JULY.

Kodaikanal Observatory

Communicating to the Consulting Architect letter from the Director-General of Stores, India Office, forwarding copies of correspondence relative to the supply of domes for the — and stating that the tender of Sir Howard Grubb has been accepted, the domes costing £520.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following paper:—

From E. GRANT BURLS, Esq., Director-General of Stores, to the Secretary to Government, Public Works Department, Madras, dated India Office, Whitehall, London, S. W., 2nd June 1898, No. S. 3931.

With reference to your letter No. 725 W. of 17th March 1898, I have the honour to enclose for your information copies of correspondence with the Astronomer Royal and Sir Howard Grubb.

In accordance with the Astronomer Royal's advice Sir Howard Grubb's tender has been accepted for two domes of 18 feet outside diameter with vertical joints between the ribs and horizontal joints both made flush, with copper strips inside and outside.

The total price will be £520 and the domes are to be ready for shipment by 18th November 1898.

A drawing showing the construction of the domes to be supplied is forwarded herewith.

Enclosures.

From W. H. M. CHRISTIE, Esq., Astronomer Royal, to the Director-General of Stores, India Office, S.W., dated Royal Observatory, Greenwich, S.E., 1st April 1898.

With reference to your letters of the 22nd February, No. S. 1958, and 15th March, No. S. 2991, relative to the supply of some revolving drums for Kodaikánal Observatory, I have to inform you that my reply has been delayed by my absence in India, and further by the necessity of discussing the arrangements of the new Kodaikánal Observatory with Sir Norman Lockyer, who has only quite recently returned from his visit to the Indian observatories, a week after me.

I am now awaiting the plans of the new observatory which Mr. Michie Smith promised to send me, but, although details cannot well be settled without these, I would propose that, in order to save time, Sir Howard Grubb should be asked to send in alternative tenders for two drums and two domes respectively, each of 18 feet diameter, specifying the covering to be used, the form of shutter opening, the arrangements for revolving the dome, and other particulars. I would suggest that he should be referred to me for any information he may require.

Telegram to Cushing India Store Depot, Lambeth, S.E., dated 13th April 1898, handed in at O.H.M.S. Greenwich.

Have just received plans of Kodaikánal Observatory from Michie Smith, Astronomer Royal.

From Sir HOWARD GRUBB, to the Director-General of Stores, India Office, dated Optical and Mechanical Works, Dublin, 19th April 1898.

I have the pleasure to acknowledge receipt of your invitation to tender for two domes (?) for the Madras Observatory.

Before making up my tender would you kindly say—

(1) Whether there was not a mistake in the word "Domes" and if drums were not intended? My reason for asking this question is that in all my correspondence with Professor Michie Smith he always spoke about drums, and never considered the question of domes.

(2) Am I to understand that the 18 feet mentioned is the external or internal diameter?

(3) In correspondence with Professor Smith he mentioned that it would be necessary that the pieces forming the drums should not be of large size or weight as they had to be carried up on mule backs up the mountain. I would wish to enquire if there is any condition of this sort to be attached to the specification.

From E. GRANT BURLS, Esq., Director-General of Stores, to the Astronomer Royal, Royal Observatory, Greenwich, S.E., dated India Office, 21st April 1898, No. 4315.

With reference to your letter, dated 1st April, and previous correspondence, relative to the supply of revolving drums for Kodaikánal Observatory, I have the honour to forward a copy of a letter from Sir Howard Grubb, dated 19th instant, in reply to my invitation to tender, a copy of which is also enclosed. I understand that the terms of the invitation to tender were arranged in conjunction with you, subsequently to your letter, dated 1st April 1898.

As I understand you are now in possession of the plans of the new observatory, I shall esteem it a favour if you will advise me as to the reply which should be sent to Sir Howard Grubb's enquiry.

From W. H. M. CHRISTIE, Esq., Astronomer Royal, to the Director-General of Stores, India Office, S.W., dated Royal Observatory, Greenwich, S.E., 23rd April 1898.

In reply to your letter of the 21st instant, No. S. 4315, forwarding an enquiry from Sir Howard Grubb as to certain points in the specification for the domes required for Kodaikánal Observatory, I would suggest, in the first place, that it should be pointed out to Sir Howard Grubb that he would have saved time by applying direct to me for information as directed in the specification.

As regards the questions raised by Sir Howard Grubb, the following particulars might be communicated to him:—

(1) It has been decided after full discussion, on the spot, between Mr. Michie Smith and myself to have hemispherical domes and not drums.

(2) The towers for the domes are 20 feet diameter outside and 16 feet inside, the walls being 2 feet thick, and the domes should be of as large a diameter as these towers will conveniently carry. It would be better that the domes should be of 18 feet internal diameter.

(3) Pieces up to 10 cwt. or more can be carried up the mountain by coolies or on a trolley, but it is desirable that the size and weight of the separate pieces should be kept as small as practicable.

From E. GRANT BURLS, Esq., Director-General of Stores, to Sir HOWARD GRUBB, F.R.S., Rathmines, Dublin, dated India Office, 25th April 1898, No. S. 4434.

With reference to your letter of 18th April 1898, I have the honour to enclose for your information a copy of a letter from the Astronomer Royal, and I shall be obliged by your furnishing me with your tender accordingly as soon as possible.

From Sir HOWARD GRUBB, to the Director-General of Stores, India Office, dated Optical and Mechanical Works, Dublin, 28th April 1898.

I have the pleasure to enclose herewith my tender for the supply of two domes for the Kodaikánal Observatory, of Madras, and also a drawing showing the proposed construction.

I would desire to explain that there are many different constructions of domes, and if this particular form which appears to me to be most desirable, be not approved of, I can submit other designs.

With regard to the papier maché covering, I propose to use this of $\frac{1}{4}$ inch thick which I consider ample for this size of dome.

As regards the method of jointing the gores of paper. I propose that the horizontal joints, of which only one will be necessary, be made flush and covered with copper strips inside and outside. The vertical joints I propose to make lap joints, each alternate gore being lapped on

that next to it. It is possible to make the vertical joints flush as well as the horizontal joints, but I do not consider that this is as stanch and permanent arrangement for small domes as the lapped joints.

As regards the revolving gear. I have specified for that which is usually employed for domes of this size. I have also a design in which the dome is carried on live rollers which enables it to be moved with much less friction but I consider that these canted taper rollers are quite sufficiently effective for the present size of dome.

As regards time for delivery. I have mentioned six months which is the usual time necessary for such work.

The specification sent to me speaks of two domes of 18 feet diameter. The outside measurement of these domes is that usually specified. If 18 feet outside diameter would suffice the price given could be reduced by £80.

From E. GRANT BURLS, Esq., Director-General of Stores, to the Astronomer Royal, Royal Observatory, Greenwich, S.E., dated India Office, 29th April 1898, S.D.O. No. 9288.

With reference to your letter, dated 23rd instant, and previous correspondence, I have the honour to forward for the favour of any remarks, a tender from Sir Howard Grubb, dated 28th instant, for the supply of two revolving domes for Kódaikanal Observatory.

The Indian estimate for the cost of the drums demanded was £450.

From W. H. M. CHRISTIE, Esq., Astronomer Royal, to the Director-General of Stores, India Office, S.W., dated Royal Observatory, Greenwich, S.E., 4th May 1898.

With reference to your letter of the 29th April. S.D.O. No. 9288, forwarding Sir Howard Grubb's tender for the supply of two revolving domes for Kodaikanal Observatory, I have to inform you that the drawing submitted by Sir Howard Grubb appears satisfactory and that I consider his tender fair and reasonable.

An examination of the drawing of the domes in conjunction with the plans of the building which I now have shows that domes of 18 feet *outside* instead of internal diameter would be best suited to the building, and would be as large as could be advantageously mounted on it.

As regards the jointing of the gores of paper, I consider that the vertical joints as well as the horizontal should be made flush and covered with copper strips inside and outside. Experience here shows that the papier-maché is liable to suffer from the weather at the lap joints, while the flush joints covered with copper bands inside and outside are sound and permanent, if properly stopped and painted.

I would therefore recommend that Sir Howard Grubb's tender for two domes of 18 feet diameter *outside measurement* at £500 should be accepted on the understanding that both vertical and horizontal joints in the papier-maché will be made flush and covered with copper strips inside and outside.

As regards the excess of £50 on the Indian estimate for 3 drums, I imagine that it will be covered by savings in the estimate for the building due to the omission of one tower and reduction in the height of the building which I arranged with Mr. Michie Smith.

I return your enclosures herewith.

From HOWARD GRUBB, Esq., to the Director-General of Stores, India Office, dated Optical and Mechanical Works, Dublin, 7th May 1898.

In reply to yours of yesterdate. I note that the domes are required to be only 18 feet outside diameter, and I am willing to make these according to the drawing supplied for the sum mentioned, £500, but if the vertical joints are to be flush, and that copper strips are to be supplied for both inside and outside, the additional cost will be just £20 for the two domes, which sum represents only the value of the copper in the strips and the additional copper rivets. This is on the supposition that the joints in the paper are to be made between the ribs. If the Astronomer Royal however desires that the joints should be made on the steel ribs, it will be necessary that these ribs should be of the form of 2 inch Tee iron instead of 1½ inch angle iron; as it would not be possible to get two rows of rivets in the 1½ inch angle iron and this would again increase the cost by £15, being £10 additional for the heavier ribs and £5 additional for the workmanship as the number of rivets will be doubled.

The total cost therefore for the two domes with vertical joints copper stripped inside outside would be £520 if the Astronomer Royal is satisfied with the joints between the rib domes (?) the joints have to be made on the ribs the cost will be £535.

From E. GRANT BURLS, Esq., Director-General of Stores, to the Astronomer Royal, Royal Observatory, Greenwich, S.E., dated India Office, 9th May 1898, S. No. 5046.

On receipt of your letter of 4th May 1898, for which I have to thank you, I enquired of Sir Howard Grubb whether he would be willing for the sum of £500 to supply the two domes of 18 feet diameter outside measurement and to make both the vertical and horizontal joints in the papier-maché flush and covered with copper strips inside and outside.

I now enclose a copy of his reply and I shall be obliged if you will be good enough to favour me with your opinion upon the offers therein contained.

From W. H. M. CHRISTIE, Esq., Astronomer Royal, to the Director-General of Stores, India Office, S.W., dated Royal Observatory, Greenwich, S.E., 10th May 1898.

In reply to your letter of yesterday's date, relative to the specification for the domes for Kodaikánal Observatory, I have to inform you that I do not consider it necessary that the joints should be made on the steel ribs, and Sir Howard Grubb's proposed additional charge of £20 for the copper strips and rivets for the two domes seems not unreasonable.

I would therefore recommend that his tender of £520 for the two domes, with vertical joints between the ribs and horizontal joints both made flush, with copper strips inside and outside, be accepted.

ORDER—No. 1702 W., dated 6th July 1898.

Communicated to the Consulting Architect with reference to G.O., No. 724 W., dated 17th March 1898.

(True Extract.)

Under Secretary to Government.

To the Consulting Architect to Government, with plan.
" Superintending Engineer, V Circle.
" Examiner, Public Works Accounts.
" Public Department.

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Public Works (1898) Department.

CURRENT No. 5359

Public Works

No. 1702 W dated 4th July 98

From The Director General of Stores, India Office, London.

No. 3931.

Dated 2nd June 1898

Received 21 Do

Registered 27.6.98

Enclosures 13 (1 Plan)

Spare copies

SUBJECT.

Kodaikanal Observatory

Forwarding for information copies of correspondence with the Astronomer Royal & Sir Howard Grubb re: the domes for ——— and intimating that the tender of Sir Howard Grubb for the supply of the domes has been accepted.

Communicate to the Comptroller with reference to No. 7244 W dated 17th March 1898.

A.H. 28.6.98.

1.7.98

C.A. to Govt. with plan — S.2. E. Cabinet from Mysore

Public Dept.

28/6 B.H.7 OS 53

H.S. 1.7.98 Dy. 7.98

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	445 w	-	15-2-97
	1299 w	-	21-5-98

ROYAL OBSERVATORY, GREENWICH.

S. E.

1898 April 1.

Sir,

With reference to your letters of the 22nd February, S. 1958, and 15th March, S. 2991, relative to the supply of some revolving drums for Kodaikanal Observatory, I have to inform you that my reply has been delayed by my absence in India, and further by the necessity of discussing the arrangements of the new Kodaikanal Observatory with Sir Norman Lockyer, who has only quite recently returned from his visit to the Indian Observatories, a week after me.

I am now awaiting the plans of the new Observatory which Mr. Michie Smith promised to send me but, although details cannot well be settled without these, I would propose that, in order to save time, Sir Howard Grubb should be asked to send in alternative tenders for two drums and two domes respectively, each of 18 feet diameter, specifying the covering to be used, the form of shutter opening, the arrangements for revolving the dome, and other particulars. I would suggest that he should be referred to me for any information he may require.

I am, &c.,

(Sd.) W.H.M. Christie,

Astronomer Royal.

The Director General of Stores,
India Office,
S.W.

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T E L E G R A M.

HANDED IN AT O.H.M.S. Greenwich.

To Cushing India Store Depot, Lambeth, S.E.

Dated April 13th, 1898.

Have just received plans of Kodaikanal observatory

from Michie Smith, Astronomer Royal.

OLS.13
1355/98

OPTICAL AND MECHANICAL WORKS,

DUBLIN.

19th April, 1898.

The Director General of Stores,
India Office.

Sir,

I have the pleasure to acknowledge receipt of your invitation to tender for two Domes(?) for the Madras Observatory.

Before making up my tender would you kindly say (I) Whether there was not a mistake in the word "Domes" and if Drums were not intended? My reason for asking this question is that in all my correspondence with Prof. Michie Smith he always spoke about Drums, and never considered the question of Domes.

(2) Am I to understand that the 18 feet mentioned is the external or internal diameter?

(3) In correspondence with Prof. Smith he mentioned that it would be necessary that the pieces forming the Drums should not be of large size or weight as they had to be carried up on mule backs up the mountain. I would wish to enquire if there is any condition of this sort to be attached to the specification.

Yours faithfully,

(Sd.) H. Grubb.

INDIA OFFICE.

4315. 21st April, 1898.

Sir,

With reference to your letter dated 1st April, and previous correspondence, relative to the supply of revolving drums for Kodaikanal Observatory, I have the honour to forward a copy of a.letter from Sir H. Grubb dated 19th Instant, in reply to my invitation to tender, a copy of which is also enclosed. I understand that the terms of the invitation to tender were arranged in conjunction with you, subsequently to your letter dated 1st April, 1898.

As I understand you are now in possession of the plans of the new observatory, I shall esteem it a favour if you will advise me as to the reply which should be sent to Sir H. Grubb's enquiry.

I have, &c.,

(Sd.) E. Grant Burls,

Director General of Stores.

The Astronomer Royal,
Royal Observatory,
Greenwich, S.E.

ROYAL OBSERVATORY, GREENWICH,

S. E. 1898 April 23.

Sir,

In reply to your letter of the 21st Instant, S. 4315, forwarding an enquiry from Sir Howard Grubb as to certain points in the specification for the Domes required for Kodaikanal Observatory, I would suggest, in the first place, that it should be pointed out to Sir Howard Grubb that he would have saved time by applying direct to me for information as directed in the specification.

As regards the questions raised by Sir Howard Grubb, the following particulars might be communicated to him:-

1. It has been decided after full discussion, on the spot, between Mr. Michie Smith and myself to have hemispherical Domes and not Drums.

2. The towers for the Domes are 20 feet diameter outside and 16 feet inside, the Walls being 2 feet thick, and the Domes should be of as large a diameter as these towers will conveniently carry. It would be better that the Domes should be of 18 feet internal diameter.

3. Pieces up to 10 cwt. or more can be carried up the mountain by coolies or on a trolley, but it is desirable that the size and weight of the separate pieces should be kept as small as practicable.

I am, &c.,

(Sd.) W.H.M. Christie,

Astronomer Royal.

The Director General of Stores,
India Office,
S.W.

S. 4434.

INDIA OFFICE,

25th April, 1898.

Sir,

With reference to your letter of 18th April 1898, I have the honour to enclose for your information, a copy of a letter from the Astronomer Royal and I shall be obliged by your furnishing me with your tender accordingly as soon as possible.

I am, &c.,

(Sd.) E. Grant Burls,

Director General of Stores.

Sir Howard Grubb, F.R.S.,
Rathmines,
Dublin.

OPTICAL AND MECHANICAL WORKS,

DUBLIN.

April 28th 1898.

The Director General of Stores, India Office.

Sir,

I have the pleasure to enclose herewith my Tender for the supply of two Domes for the Kodiakanal Observatory, of Madras, and also a drawing showing the proposed construction.

I would desire to explain that there are many different constructions of Domes, and if this particular form which appears to me to be most desirable, be not approved of, I can submit other designs.

With regard to the papier mache covering I propose to use this of ¼ inch thick which I consider ample for this size of Dome.

As regards the method of jointing the gores of paper. I propose that the horizontal joints, of which only one will be necessary, be made flush and covered with copper strips inside and outside. The vertical joints I propose to make lap joints, each alternate gore being lapped on that next to it. It is possible to make the vertical joints flush as well as the horizontal joints, but I do not consider that this is as stanch and permanent arrangement for small domes as the lapped joints.

As regards the revolving gear. I have specified for that which is usually employed for Domes of this size. I have also a design in which the Dome is carried on live rollers which enables it to be moved with much less friction but I consider that these canted taper rollers are quite sufficiently effective for the present size of Dome.

As regards time for delivery. I have mentioned

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six months which is the usual time necessary for such work.

The specification sent to me speaks of two Domes of 18 feet diameter. The outside measurement of these Domes is that usually specified. If 18 feet outside diameter would suffice the price given could be reduced by £80.

Faithfully yours

(Sd,)H. Grubb.

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INDIA OFFICE.

S.D.O. 9288.

29th April, 1898.

Sir,

With reference to your letter dated 23rd Instant, and previous correspondence, I have the honour to forward for the favour of any remarks, a tender from Sir H. Grubb dated 28th Instant, for the supply of 2 revolving Domes for Kodaikanal Observatory.

The Indian estimate for the cost of the Drums demanded was £450.

I have, &c.,

(Sd.) E. Grant Burls,

Director General of Stores.

The Astronomer Royal,
Royal Observatory,
Greenwich,
S.E.

O&S.6
5355/10

ROYAL OBSERVATORY, GREENWICH, S.E.

1898, May 4.

Sir,

With reference to your letter of the 29th April, S.D.O. 9288, forwarding Sir Howard Grubb's tender for the supply of two Revolving Domes for Kodaikanal Observatory, I have to inform you that the Drawing submitted by Sir Howard Grubb appears satisfactory and that I consider his tender fair and reasonable.

An examination of the drawing of the Domes in conjunction with the plans of the building which I now have shows that domes of 18 feet <u>outside</u> instead of internal diameter would be best suited to the building, and would be as large as could be advantageously mounted on it.

As regards the jointing of the gores of paper, I consider that the vertical joints as well as the horizontal should be made flush and covered with copper strips inside and outside. Experience here shows that the papier-mache is liable to suffer from the weather at the lap joints, while the flush joints covered with copper bands inside and outside are sound and permanent, if properly stopped and painted.

I would therefore recommend that Sir Howard Grubb's tender for two domes of 18 feet diameter <u>outside measurement</u> at £500 should be accepted on the understanding that both vertical and horizontal joints in the papier-mache will be made flush and covered with copper strips inside and outside.

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The Director General of Stores,
India Office,
S.W.

As regards the excess of £50 on the Indian estimate for 3 drums, I imagine that it will be covered by savings in the estimate for the building due to the omission of one tower and reduction in the height of the building which I arranged with Mr. Michie Smith.

I return your enclosures herewith.

I am, &c.,

(Sd.) W.H.M. Christie,

Astronomer Royal.

OPTICAL AND MECHANICAL WORKS,

D U B L I N.

7th May, 1898.

The Director General of Stores,
India Office.

Dear Sir,

In reply to yours of yesterdate. I note that the Domes are required to be only 18 feet outside diameter, and I am willing to make these according to the drawing supplied for the sum mentioned, £500, but if the vertical joints are to be flush, and that copper strips are to be supplied for both inside and outside, the additional cost will be just £20 for the two Domes, which sum represents only the value of the copper in the strips and the additional copper rivets. This is on the supposition that the joints in the paper are to be made between the ribs. If the Astronomer Royal however desires that the joints should be made on the steel ribs, it will be necessary that these ribs should be of the form of 2 inch Tee iron instead of 1½ inch angle iron; as it would not be possible to get two rows of rivets in the 1½" angle iron and this would again increase the cost by £15, being £10 additional for the heavier ribs and £5 additional for the workmanship as the number of rivets will be doubled.

The total cost therefore for the two Domes with vertical joints copper stripped inside and outside would be £520 if the Astronomer Royal is satisfied with the joints between the ribs; or if the joints have to be made on the ribs the cost will be £535.

Faithfully yours

(Sd.) Howard Grubb.

S. 5046.

INDIA OFFICE.

9th May, 1898.

Sir,

On receipt of your letter of 4th May, 1898, for which I have to thank you, I enquired of Sir H. Grubb whether he would be willing for the sum of £500 to supply the two domes of 18 feet diameter outside measurement and to make both the vertical and horizontal joints in the papier-mache flush and covered with copper strips inside and outside.

I now enclose a copy of his reply and I shall be obliged if you will be good enough to favour me with your opinion upon the offers therein contained.

I have, &c.,

(Sd,) E. Grant Burls,

Director General of Stores.

The Astronomer Royal,
Royal Observatory,
Greenwich, S.E.

ROYAL OBSERVATORY, GREENWICH,

S. E.

1898 May 10th.

Sir,

In reply to your letter of yesterday's date, relative to the specification for the Domes for Kodaikanal Observatory, I have to inform you that I do not consider it necessary that the joints should be made on the Steel ribs, and Sir Howard Grubbs proposed additional charge of £20 for the Copper Strips and rivets for the two Domes seems not unreasonable.

I would therefore recommend that his tender of £520 for the two Domes, with vertical joints between the ribs and horizontal joints both made flush, with copper strips inside and outside, be accepted.

I am, &c.,

(Sd.) W.H.M. Christie,

Astronomer Royal.

The Director General of Stores,
India Office, S.W.

It is requested that in any further communication on this subject the under-mentioned letter and number may be quoted, and the reply addressed to

The Director-General of Stores,
India Office,
Whitehall,
London, S.W.

S. 3931.

India Office,
Whitehall,
London, S.W.

2nd June, 1898.

Sir,

With reference to your letter No. 725 W. of 17th March, 1898, I have the honour to enclose for your information copies of correspondence with the Astronomer Royal and Sir Howard Grubb.

In accordance with the Astronomer Royal's advice Sir Howard Grubb's tender has been accepted for two domes of 18 feet outside diameter with vertical joints between the ribs and horizontal joints both made flush, with copper strips inside and outside.

The total price will be £520 and the domes are to be ready for shipment by 18th November, 1898.

A drawing showing the construction of the domes to be supplied is forwarded herewith.

I have the honour to be, Sir,

Your obedient Servant,

Grant Duff

Director General of Stores.

The Secretary to Government,
Public Works Department,
Madras.

Y 1728. 5 rms.—8/97. I. 1324.