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C5/4

Correspondencia con la Casa GRUBB

1899 - 1900

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

2nd.....of January.....1900 18x.....

Monsieur F. Iniguez,  
The director of  
The Madrid Observatory.

Dear Sir,

Sir Howard Grubb asked me to write & thank you most cordially for your kind letter ordering the Cdelostat at £90 and the two Domes at £275 each; also for the draft on Messrs M. Goyeneche & Co for £800 which he has been able to lodge to his credit.

As promised in former letters he hopes to send you some drawings of the instruments we have in hands for you shortly; meanwhile would you kindly say in your next letter whether you require the spectroscope for use with the photographic telescope only, or with the visual telescope as well as the photographic telescope?

Yours faithfully,

Fred. E. Ladd,

Secretary.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

10th of January 1900 18

Monsieur F. Iniguez.

The Director of

The Madrid Observatory,

Dear Sir,

I am sending you to-day by Parcels post 3 prints off drawings showing some of the details of the photo graphic telescope.

Number (I) is a general arrangement of the tubes to a scale of one fourth. On this drawing you will see the 8 inch photographic telescope, the 6 inch "Guiding" telescope furnished with its own particular breech piece, also the 6 inch Doublet with camera, and the  $2\frac{1}{2}$  inch Finder.

The details of the breech pieces of the photographic telescope and of the 6 inch "Guider" are shown full size on detail drawings No 2 and 3, but the drawing No (I) will show you more conveniently the general arrangement of the parts.

You will observe that the "Guiding" telescope

telescope/ and the photographic telescope are coupled or jointed together at both ends so as to ensure perfect collimation, and the arrangements of the parts is such as to bring as far as possible everything into balance, but as it is not possible to do this with exactitude at the present stage of the work, I shall furnish adjustable weights by which the final adjustment in this respect can be made. These weights are not shown on the drawing lest confusion might arise.

In drawing No (2), breech piece of the "Guider", the eye-piece and arrangement for illuminating the wires is also omitted but I can send you a separate drawing of this if desired.

The breech piece of the photographic telescope (drawing No 3) shows the arrangement for attaching the dark frame. Two of these dark frames are to be supplied with the telescope. If you desire a third frame I shall be glad to hear from you.

I would be glad now to enquire from you:-

(I). Which telescope you desire to use the Spectroscope on? You will observe from the wood cut of the spectroscope shown in the catalogue that it is specially adapted for attachment to the tubes of ordinary visual breech pieces. If you desire to use it on the photographic telescope we shall have to make a small special attachment.

(2). What telescope do you require to use the prism with? I have assumed that you desire to use this with the photographic telescope and for photographic purposes. You will see on the print which I send you the box which holds the prism in front of the object glass hinged so as to be removable at pleasure. Kindly say if this is as you desire it.

(3). I note your remarks with respect to the Coelostat. I shall have it constructed so as to be available for the various latitudes you mention.

(4). With regard to the Domes. We are pushing forward with the drawings of these and we hope to send you copies of these early next week and with such details as will enable you to make provision for the mounting of the circular rail road upon your walls

(5). I would like to ask whether there is any portion of the apparatus which you have ordered which need not necessarily be completed for the eclipse. I ask this because time is so very short that even by doing the very best I can it will be very difficult to get everything ready in time. If there be any parts which you would not require to use until after the Eclipse I would be glad to know of these, and with your permission to keep these over until afterwards: this would enable us to devote all our energies to getting what is absolutely necessary ready for the Eclipse.

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Page 4.

(6). When replying to this letter would you kindly say whether I am right in supposing that you desire one of the two Domes proceeded with more rapidly than the other; if so, I shall make arrangements accordingly.

Very truly yours  
H. G. Hubbard

13th of January 1900.

Monsieur F. Iniguez.  
Director of the  
Madrid Observatory.

Dear Sir,

I have now the pleasure to send you by Book Post 3 drawings of the Domes which I think will give you all the information required for attachment to your walls. The drawings consist of,

- (1). A scale drawing giving sectional elevation and plan 1/12th the actual size.
- (2) An independent drawing of the Shutter to the same scale.  
~~x3x~~ If you cut this drawing out in accordance with the outer lines and lay it upon the plan with the pivot or hinge exactly over the corresponding pivot in the plan, and place a pin through this pivot, you can then turn this round and see how the shutter works, and the amount of opening it will give.
- (3) Is a full size drawing showing details of the cast iron sole plate which attaches to the top of your wall; the cast

iron sole plate which forms the base of the dome ~~xxxxxx~~  
itself; the arrangement of the rack and pinion and rope wheel  
the arrangement of the rollers, and the flashings or ~~xxxxxx~~  
weather guards which are also shown on the sectional ele-  
vation..

With regard to the wall. This you will of course  
make to suit your requirements but I have sketched some-  
thing which will indicate about what is required.

You will observe that I have designed these domes  
with a rack & pinion for the purpose of revolving:- this is  
not necessary with domes of this size which can easily be  
moved round by a force that is not too great for a single  
person, viz:- about 8 or 10 lbs, but if you desire to have  
this rack and pinion I shall supply it without extra cost.

Very truly yours  
J. G. Webb



SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

.....27th of .....January.....1908.....

Monsieur F. Iniguez,  
Director of the Madrid Observatory.

Dear Sir,

I am obliged by your letter of the 18th Jan which conveys to me much information which will be useful to me.

You ask me how many plates each of the <sup>11</sup>chassis <sup>6</sup>carry?  
I had intended to supply with this instrument metallic chassis, made in the fashion of those used in the International Photographic Survey; these are very carefully made in order to preserve the exact registration of the plates and very costly to make, and they only hold one plate each.

If you do not consider this registration of the plates to be in your case of primary importance I would suggest that I should supply instead of these 2 metallic dark frames which only hold one plate each, say 3 ordinary frames such as are made for photographic cameras each of which would hold two plates. This I could do without additional cost.

I understand now that I am to adapt the spectroscope to the visual Equatorial only for the present.

I understand that you desire now that I should send you drawings showing the best disposition of the Equatorial instrument under the Dome. This I shall have done but must ask your indulgence if I have to delay these for some 10 or 12 days as we are very heavily pressed in our draughting department just now.

I understand also that you would desire to have the photographic Equatorial before the visual telescope but I am afraid that this will be somewhat difficult. The visual telescope is more advanced at the present moment than the photographic for several reasons:- firstly, because it was the first instrument on which we <sup>started</sup> ~~strated~~ work as it was the first instrument about which we corresponded, and Secondly because I had in my possession discs of glass out of which I could make the object glass. This obj-glass has now been worked and is very nearly complete, but the ~~obj-glass~~ for the photographic telescope, altho' ordered immediately on receipt of your order for this photographic instrument, ~~the discs~~ were only received a few days since consequently we are only now commencing work on it.

Also the disc for the prism has not even been received yet although ordered at the same time, and lastly, there is a considerably larger amount of mechanical work on the

photographic telescope than on the visual. You will therefore understand that it is somewhat difficult to have this instrument finished in time but I will bear in mind your wishes and I will do everything I can to push forward the work. *& try to finish it first*

I also understand that you desire to have one of the Domes delivered before the second. This we shall have done but I understand that you do not require either of the Domes until after the eclipse. I do not think it would be possible to have either Dome ready before June.

You will be sorry to hear that we have been obliged to abandon the idea of having an independent Expedition from Ireland to view the Eclipse. When we sent out our first notice to our Members we were greatly encouraged by having 130 applications for places on the vessel, but after this unfortunate circumstance connected with the war in South Africa, so many families here are in mourning that on the second notice being sent out the majority of those who were before willing to come had to resign. We are now trying to make arrangement for those who can come to join with the English Expedition and we hope that at least the scientific part of our party will visit Spain; in fact I am preparing the instruments at the present moment for this.

*Very truly yours  
G. G. G. G.*

REGENT LINE JAMES & B

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

6th of February 1890

Prof. F. Iniguez.

The Director of,

The Madrid Observatory.

Dear Sir,

I now have the pleasure to send you a print showing the visual 8 inch telescope as it will stand under the Dome.

I have placed the pillar in the centre of the building which gives ample room in all directions.

Sometimes if the Dome is very small as compared with the telescope we place the centre of motion, (that is the intersection of the Declination and Polar axes,) in the centre of the building which gives the utmost possible room, but necessitates the pillar being placed slightly out of the centre of the building. In your case however as there is ample room I would recommend that the pillar be placed in the centre of the building.

As regards the height for the floor. I have placed it at what is usually found to be most convenient.

As regards the Walls. I do not know of what material you propose to make the walls and therefore I have shown no

details except merely the inside and top surfaces of the wall; all the rest can be made as you desire.

Please let me know if you require any further particulars

Our cast iron wall plate will have holes in it for bolting to the wall. If the top of the wall be made of stone it would be well to have stone bolts inserted into holes in the stone and fixed there by lead or sulphur. If the top of the wall be made of wood you can screw the cast iron wall plate down on it by large iron screws, but it will be necessary in every case that this cast iron wall plate should be carefully levelled after placing upon the wall.

We are pushing on with your instruments as fast as possible. The weather here at present is rather against the trials of the optical parts.

The 8 inch visual object glass is I think perfect, or almost perfect, but I want a little finer weather before I can finally satisfy myself.

The object glass for the photographic telescope will be ready for its first trials next week.

The 6 inch "Guider" object glass is also in hands, and the 6 inch Doublet is well advanced.

We have not yet received the disc from Paris for the object glass prism, but we have the prisms for the Spectroscope and these are well in hands

As regards the Coelostat. We have the mirror for the Coelostat now perfect and we would hope to be able to let you have this instrument complete by the end of March.

*Very truly yours,  
H. G. J. G. J.*

P.S. We also send you a drawing of the Coelostat as modified according to your wishes and useable for any latitude from  $35^{\circ}$  to  $55^{\circ}$ .

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

14th of February 1890

Monsieur F. Iniguez.

The Director of

The Madrid Astronomical Observatory

Madrid.

Dear Sir,

In reply to your kind letter of the 5th inst I note your remarks as regards the photographic chassis, metallic and otherwise and shall have your directions carried out; also, that you wish the visual telescope to be sent forward as soon as ready. We are pushing both telescopes as rapidly as possible but of course there is a very large amount of work to be done on the photographic one of a troublesome nature. I think we will have the photographic object glass ready next month, but the prism will I am afraid not be ready for I have just heard from Monsieur Mantois that he has failed in the block of glass he had prepared for this prism and is now preparing another one which will cause a delay of a couple of weeks.

As regards the photographic plates and the best developers to use for these:- I will write you further on as I hope to have an opportunity before long of consulting with friends in London

who have been working on former Eclipse Expeditions and I will then be able to offer you better advice on the subject.

As regards the 0.27 metre objective of Mertz. It may be that it will require very little working to make it perfect; on the other hand it might be almost impossible to improve it, but I could not give a definite estimate of the work to be done without seeing the object glass myself. If you are not in a hurry about this matter would it not be well to leave it over until I am in Spain and that I could see myself the object glass and report to you upon it? It is possible that you might desire that I should spend a few days either in Madrid or wherever you propose to establish your eclipse instruments so as to ensure that everything is quite right for the instruments, and at the same time I might have a look through the Mertz object glass, and this could be done probably at a very small expense

I would then be able to give you a definite opinion as regards the object glass and what it would cost to put it right.

Very truly  
Yours,  
G. H. Quibb



SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

19th of March 1900

Monsieur F. Iniguez.

Dear Sir,

I am glad to be able to report to you that I have at last got a satisfactory piece of glass for the large prism and that we have commenced work on it as the time is very short for getting it completed.

I hope in a few days to be able to report to you about the time that the first of the Equatorials will be ready for dispatch, and I will then have some questions to ask as to the best means of transport &c.

*Howard Grubb*

REGENT "LIBERTY" W.S. & B.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

26th of March 1900

Monsieur F. Iniguez.

The Director of  
The Madrid Observatory.

Dear Sir,

I am in receipt of your letter of the 22nd inst for which I am much obliged.

I will have your account made out and sent to you and will include in it the packing charges. As regards the transport charges:- It is not easy to estimate what these will amount to but I will make enquiries here as to the best route to send the goods by; meanwhile perhaps you would be so good as to let me know what port or harbour in Spain the goods should be sent to in order to suit your convenience  
~~XXXXXXXXXX~~ for the observations of the eclipse

*With many thanks*

*Yours very truly*

*Howard Grubb*

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

27th of March 19 00

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I have been asked by my astronomical friends to write to you on the subject of our proposed Eclipse Expedition. The position of the matter is now as follows:-

I mentioned to you before that we were obliged to give up our Irish Expedition, principally on account of the number of persons who are prevented from taking part owing to the war in the Transvaal. We then proposed to join with the English Expedition which was organized by the British Astronomical Association, and there was every prospect of this being carried through satisfactorily when at the last moment the Government "commandeered" the vessel which had been selected, viz:- the "Tagus" belonging to

the Royal Mail steamers trading to South America, and at the same time they "commandeered" other large vessels belonging to this Line; consequently there was no choice but to select a much smaller steamer, and then when the intending passengers were informed of this they for the most part ~~xxx~~ declined to go in the smaller vessel, therefore the whole Expedition as an Expedition has been abandoned, but various individuals are going out to different places by themselves.

So far as we in Ireland are concerned, our party will be reduced to those who are strictly taking part ~~on~~ the observations, that is to say, the Astronomer Royal (Prof Joly), Mr W.E.Wilson. F.R.S; myself and my son, and we hope Dr, A.A.Rambaut who was formerly Astronomer Royal here but now Director of the Radcliffe Observatory at Oxford.

It has occurred to us that as the Expedition has been abandoned there will be no particular object in our going to a sea coast town, and that we may select any convenient position in the band of totality. I am instructed therefore to ask you whether the position you have chosen for your observations is one at which we could get accommodation for the 4 or 5 individuals forming the party, and also accommodation for our instruments? These latter will probably consist of, 2 Coelostats similar to that which

I am making for you, one to be used for photographing with a 20 foot focal length object glass the images of the corona the other to be used with a shorter focus object glass and green absorption screens, and thirdly, a prismatic camera for photographing if possible the "flash" ~~xxxx~~ layer.

It occurred to us that you no doubt have selected an excellent site, and that possibly wherever this is we might find suitable accommodation; <sup>or near it</sup> of course we would not desire to inconvenience you in any way, but possibly if our observing stations were close together we might be of some help to each other. I am quite sure that your party would be of great use to us, and I am equally sure that our party would, if it be in their power, do everything to render themselves useful to your party. Perhaps therefore you would kindly write me a line as soon as possible as the time is now short, to say whether such a project would be possible and feasible, or whether it would be pleasing to you, and at the same time we would be obliged if you could give us some hint as to the best way of transmitting our instruments, which in this case, I suppose, would be sent through Madrid. Looking at the map, Bilbao would seem to be a most convenient port for shipping the cases to provided we can find what vessels sail there.

Very truly yours  
H. P. Webb

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

29th of March 19 00

Monsieur F. Iniguez.

Dear Sir,

I have been making enquiries with regard to the transport of the instruments to Madrid, and I have got some information but not all that I require for the purpose of making up the account which you ask for.

I find there are some steamers plying from Liverpool to Santander, and also from Liverpool to Bilbao, about once a week. I expect that either of these two ports would be convenient but would like to know from you which; and also whether you could obtain the particulars of the railway carriage from the sea coast to Madrid. I will be able to ascertain the sea carriage or freight from Dublin to either of the above ports. I hope in a couple of days to be able to furnish you with all the information you require with the exception of the railway carriage from the sea coast to Madrid, and I may mention that we are now finally erecting the visual Equatorial which we hope to be able

to dispatch to you about the end of next week. The following week we would hope to dispatch the Spectroscope and the Coelostat and in about 2 weeks after that we would hope to have the photographic Equatorial ready for dispatch.

Very truly yours  
A. G. S. G. S.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

31st of March 1900

I Enc

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I now have the pleasure to send you an account which contains as far as I know at present all that you require; it is exactly in accordance with the matters you have ordered in your letters with the addition of a focal plane shutter which I think you will find the best if at any time you desire to take images of the Sun, or perhaps even the Moon, but in any case if you do not require this you can erase it from the account.

This would pay everything up to the shipping in Dublin. Then as regards the expenses from Dublin:- It is not easy as yet to form an estimation until we have the instruments packed in their cases & know the weights &c. As far as we know at present each telescope will weigh about  $1\frac{1}{4}$  tons, and with the Coelostat



and subsidiary instruments, I think we may estimate about 3 tons for the weight of the instruments.

The Domes of course will be heavy; probably nearly 3 tons each.

The expenses from Dublin to either Santander or Bilbao appear to be from £2. 10. 0 to £3 per ton; probable total cost £25.

As to the railway charges from the coast to Madrid, we have not been able to get any information as yet.

It was very kind of you to offer to have another instalment of money ready for me now. I had intended asking you for a small instalment, say about £400 when we got off the first 8 inch telescope and the Coelostat as we hope to do in 10 days now, but I shall leave this matter altogether for the present in your hands feeling sure that you will do the best you can in my interests.

Very truly yours  
J. Grubb.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

11th of April 1900

Monsieur F Iniguez.

Dear Sir,

I have to thank you for your kind promptitude in sending me the draft for £930 which has been placed to your credit with many thanks.

I am happy to be able to tell you that to-day we are dispatching to you the first consignment of instruments and I have written very particularly to the shipping agents in Liverpool to do everything that is necessary to ensure the prompt delivery of the cases. The shippers are to obtain the "certificate of origin" which I understand will be sent with the captain of the vessel, and I am consigning the goods to "Don Meliton Zulaica of Bilbao" to whom I send by the same post as this letter an advice note giving the number and description of the cases, a copy of which I enclose with this.

Within the next few days I will send you a full

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list containing particulars of all the different parts of the instruments that have been enclosed in each box; also a memorandum of many points that will, I expect, be useful to you in the mounting of the instrument.

I am sorry that it has been impossible for us to keep down the weights of the parcels to anything like what you mention, that is 60 ~~lbs~~ kilos. The lower portion of the pillar itself weighs I think about 250 lbs and as suitable carriage will have to be provided for this I thought it useless to limit the weights of the other cases; besides which I feared that if I divided the instrument into small parts you might find it very difficult to get it satisfactorily together again, and perhaps if something were wrongly put together the instrument might not act properly, and remembering the time for erection is very short I thought it better to send the instrument as complete as possible which I think will save your people a large amount of trouble.

With regard to the photographic plates about which you asked me. I have been making enquiries in every direction where I thought I might get valuable information.

I enclose you a copy of a list of questions which I put to Mr. J. Evershed who has had considerable experience in several Eclipse Expeditions, and a list of his replies.

The general tendency of his remarks is that it is not desirable to use plates of great rapidity except where absolutely necessary.

I hope to include in one of the boxes I am sending to-day a few sample packages of plates of one of the makers he has mentioned viz:- "The Imperial".

I should be glad if you had these tried and to know if you find them satisfactory, but from what he says it would appear that either the "Edwards", the "Imperial" or the "Wratten & Wainwright" are the best.

As regards the developer. You will see that Mr Evershed recommends the simple "pyro and Soda". If you have not got the receipt for this I shall obtain the best receipts & send them to you.

We are now working as hard as we possibly can at the Coelostat and Spectroscope which we expect to have ready next week, and the photographic 8 inch equatorial which we hope to have ready in 10 days, but there are various small positions connected with this which it would be impossible to send you just at present and which you will not absolutely require for the Eclipse work, so I must ask your kind indulgence about these which I will send as soon as possible after the eclipse trouble is over.

I have to thank you for the map of Placencia and the information you were kind enough to send me. I think, in a very short time now we shall have our arrangements concluded & will be able totell you definitely what our plans are for our Eclipse Expedition.

Very truly  
Yours  
A. H. P. Jubb

MADE IN U.S.A.

RECENT LENSES & M.S. A.B.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

12th of April 1900

Monsieur F. Iniguez.

Director of the

Madrid Observatory.

Dear Sir,

By working very hard we managed to get off yesterday the cases containing the first telescope and dispatched them from Dublin by last evening's steamer in order to make sure of catching the steamer leaving Liverpool for Bilbao on Saturday; but this morning we have a letter from the Steamship Company to say that in consequence of the Easter holidays it will be impossible to get their vessel to start from Liverpool on Saturday, and that it will not leave until the following Saturday. I am very sorry for this as it means a week's delay in your receiving the first telescope, but I am now trying, and if it be possible, I will send the Coelostat and Spectroscope at such a time next week as will catch the same steamer, so that I hope you may have these two consignments at the same time, and that the second equatorial may go by the next boat after.

We are making out the lists of contents of all the cases and will send you these as soon as we make sure that we can get off the additional instruments in time for this first boat.

Very truly,  
J. M. G. P. G. P.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

14th of April 1900

Monsieur F. Iniguez.

Dear Sir,

I omitted to mention in my last letter that there is a new photographic film just out which seems to promise very valuable results for Eclipse work. I have obtained a small packet of these and given them to our Astronomer Royal to test and will let you know the result in a few days. There are ~~also~~ also what are called "triple coated" plates which are valuable under certain circumstances and it might be well if I sent you some of these along with the others I mentioned in my last .

Perhaps you would let me know about how many plates altogether you would like to have.

Yours truly  
H. Grubb  
14/4.



TELEPHONE 531.  
TELEGRAPHIC ADDRESS:—"CASTILLO."

"SERRA LINE" & "TINTORÉ LINE"  
OF SPANISH STEAMERS.  
W. L. NICKELS & GORDON ROSS.  
MANAGERS,  
OLD CASTLE BUILDINGS, 26, PREESONS ROW,  
LIVERPOOL.



**SHIPPED** in good order and condition by **WALTER L. NICKELS & GORDON ROSS**, in and upon the good Spanish Steam Ship called the **Nieta**, whereof is Master for this present Voyage or whoever else may go as Master in the said Ship, and now lying in the Port of **LIVERPOOL** and bound for **BILBAO**.

MARKS.	Nos.	PACKAGES.	FT.	IN.	TONS.	GWT.	QR.	LB.	GROSS WEIGHT IN KILOGRAMMES
G.	1/8.	6 Cajas	}						1461.
	9/12	2 Piezas							

Queda comprendido en la condicion  
4<sup>a</sup> el impuesto de Transportes.

Seis Cajas } Instrumentos astronomicos  
Dos piezas }  
Cuatro Cajas } Instrumentos opticos y  
Instrumentos astronomicos.

**BRITISH ORIGIN**

being marked and numbered as per margin, and to be delivered in the like good order and condition at the aforesaid Port of **BILBAO**.  
(The Act of God, the Queen's Enemies, Pirates or Robbers, Restraint of Princes or Rulers, Fire at Sea or on Shore, Accidents from Machinery, Boilers, Steam or from other Goods, by Contact, Sweating, Leakage, or otherwise, Barratry, Negligence or default of Master, Pilot, or Mariners, or others performing their duties, Vermin, Jettison, and also accidents of Navigation of every kind excepted. Not liable for any latent defect in Hull, Machinery or Appurtenances, whether or not existing at the time of the goods being loaded, or the commencement of the voyage, AND THE SHIP NOT BEING LIABLE TO MAKE GOOD LOSS FROM ANY OF THE CAUSES ABOVE EXCEPTED.)

Liberty is reserved for the Steamers to sail with or without Pilots; to carry goods of all kinds, dangerous or otherwise; to tow and assist vessels in all situations; to proceed to the ultimate port of destination via any other port or ports in any order or rotation, whether in or out of the customary or advertised route, whatever may be the reason for calling at or entering such port or ports, and to deviate for all or any of the above purposes, with liberty also before shipment, or at any period of the voyage, and so often as may be deemed expedient, at any port or place to ship the whole or part of the goods by any other Steamer, or to tranship or land and store and put into hulk or craft for such time as may be deemed expedient, and thence reship by lighter or otherwise the goods, and to forward them by any other conveyance to the port of destination, extra compensation to be paid for such service; and in case of salvage services rendered to aforesaid merchandise or treasure, during the voyage, by a vessel or vessels of the Carrier for the time being, such salvage service shall be paid for as fully as if such salvaging vessel or vessels belonged to strangers.

changing route and subject to the conditions of the endorsement unto **San Don**, Meliton Zulaica, Agente de Aduanas para **the Astronomical Observatory, Madrid**

Disbursements for the said Goods as per margin, to be paid in Specie in **LIVERPOOL** on arrival at that Port of the exchange of **Portes to the Board Starting**

also any fines incurred by incorrect weights, or description of contents, as expressed on this Bill of Lading. **GENERAL AVERAGE IF ANY PAYABLE ACCORDING TO YORK & ANTWERP RULES OF 1890.** In Witness whereof the Master or Agent of the said Ship hath affirmed to 3 Bills of Lading all of this tenor and date, the one of which Bills being accomplished the others to stand void.

Dated in **LIVERPOOL** this **19 April** 1900.

Weights Contents and Value unknown, and not answerable for Leakage, Breakage, or Rust. The Goods to be discharged from the Ship as soon as she is ready to unload, and into Hulk or Lazzarette if necessary by the Agents of the Owners of the Vessel at the Merchants' risk and expense. In the case of Blockade or interdiction, or the entering of the Port should be considered unsafe by reason of War or Disturbance, or in consequence of any port being declared infected, the Master, to have the option of discharging the Goods at any near available Port which he may consider suitable, such discharge shall be deemed a final delivery and the freight to be duly earned under this Bill of Lading, and all expenses or losses incurred thereby of whatever nature or kind, to be borne by the Shippers or consignees of the Goods.

Freight on	Tons. C.	Charges Forwarded	£
	20' 9"	@ 12/6 per Ton	6. 6
	118' 11"	@ 20/-	2. 19. 6
			3. 6. 0
		10% Primage	6. 7
			£ 3. 12. 7

FREIGHT TO BE PAID IN LIVERPOOL  
CASH BEFORE UNLOADING OR NOT WORTH

*gross weight*

## CONDICIONES.

1a. No se responde de roturas, falta de peso, derrames, ni de ninguna clase de averías, aunque sea por falta de estiva que sufra la carga, ni del contenido de los bultos, ni de su valor, ni de sus marcas si estas no son claras. Tampoco se responde de los extravíos y averías que pueda sufrir la carga que no se haya ido á recoger por los interesados al tiempo de la descarga.

2a. Los bultos solo se entregaran mediante la presentacion de su respectivo conocimiento.

3a. Los armadores no responden del peso, contenido, valor y descripcion de las mercancías embarcadas. Tampoco responden de oro y plata labrados o sin labrar, monedas ú artículos laminados, joyeria, piedras preciosas, adornos, relojes, mosaicos, letras de cambio, billetes de banco de cualquier país, ordenes, notas, ó garantías para el cobro de dinero, sellos, mapas, impresos, manuscritos, escrituras, actas, cuadros, grabados, esculturas, sedas forros de pieles ó pieles, cintas, lavos, cachemiras en pieza ó confeccionadas, que contenga cualquier bulto, si no han sido detallados en el conocimiento declarando su valor al tiempo del embarque, y satisfecho el flete extraordinario que se estipule. En caso de pérdida, extravío, ó avería de los generos, que vengan á cargo de los armadores, estos responden tan solo del valor de los mismos segun factura, sin que pueda exigírseles mayor indemnizacion por ningun concepto. Cualquier reclamacion que proceda, segun las condiciones de este conocimiento, habran de hacerla los receptores á los consignatarios del vapor, dentro de las 48 horas siguientes á la entrega de las mercancías, y solo sea á pagadera en Bilbao, donde habra de pedirse, el importe de la indemnizacion, dentro de los dos meses de admitida la reclamacion por el consignatario del vapor en el punto de descarga. Pasado este plazo, sera nula y de ningun valor.

4a. La carga se recibe y entrega sobre la cubierta del vapor, verificandose estas operaciones por la empresa de cuenta y riesgo del cargador ó receptor. Los armadores se reservan el derecho de emplear las gabarras y cuadrillas que quieran en cada puerto, por cuenta y riesgo del cargador ó receptor, que satisfará directamente al capitán de la cuadrilla ó patron de las gabarras, los gastos segun la tarifa establecida por la que empleen los armadores ó consignatarios. Se reservan asi mismo los armadores el derecho de trasbordar, descargar y reembarcar, por medio de lanchas ó de otro modo, los generos en el puerto de embarque ó en cualquier otro puerto ó puertos, vapor ó vapores; descargar los generos tan pronto como este listo el buque, en almacén flotante, provisional, lanchas ó muelle, siempre de cuenta y riesgo de los cargadores y receptores de los generos, cuya entrega se entienda que queda hecha en el momento que dejan la cubierta del vapor. Los impuestos ó arbitrios que bajo cualquier denominacion haya establecidos ó se establezcan por razon de la carga y descarga seran tambien de cuenta del cargador y receptor, aunque se exijan al capitán y tengan por base el peso de la mercancía, la cabida de la nave el importe de los fletes ó cualesquiera otra. Los timbres ó sellos que por cualquier concepto hayan de ponerse en este conocimiento debe pagarlos el receptor y en su defecto el embarcador. El importe del impuesto provisional de trafico sobre movimiento de mercancías creado por la ley de 30 de Agosto de 1896, será reintegrado al consignatario ó naviero del buque por el cargador ó receptor segun se exija al buque en la carga ó/y descarga debiendo ser satisfecho por aquellos previamente á la entrega de las mercancías. Queda á opcion y es de la libre facultad del capitán atracar ó no á los muelles en los puertos donde los haya. Si la Lave atraca, pagaran los receptores, en proporcion de la carga que recibian el impuesto ó derecho de atraque, y si no atraca, se efectuará la descarga en gabarras, conforme queda dicho en esta condicion.

5a. En caso de que al llegar el vapor á puerto opine el capitán que las mareas, resacas ó el estado del tiempo impiden la descarga de los efectos que para el mismo lleva, podra retenerlos y seguir su ruta, con ellos á bordo, hasta su regreso ó trasbordarlos, á otro vapor, siendo de cuenta de los receptores los riesgos y gastos. Los receptores podran obligados á recibir los efectos tan pronto como pueda el vapor entregarlos, y no presentandose á recibirlos, deberan satisfacer, cualquiera gastos extraordinarios que hayan de hacerse para el pronto despacho y salida del buque. En caso de extravío de uno ó mas bultos, á bordo por equivocacion en la estiva, ó de que una causa mayor insuperable impidiera dejar la carga en el puerto del destino, durante la permanencia del vapor, ó se hubiese aquella dejado en el puerto de carga ó en algun otro intermedio, no tendra el receptor derecho á ninguna reclamacion, sino el de que le sea trasladada la carga del puerto en que fuere hallada al de su destino, sin aumento de flete por el primer vapor de la empresa ú otro vapor ó buque de vela, si asi conviene á la misma pero siempre por cuenta y riesgo del receptor.

6a. En caso de guerra, bloqueo, revolucion, motin, epidemia ú otra causa que impida al buque entrar en el puerto á que va destinado, ó que por efecto de tales hechos ó parecidos no considerará el capitán prudente su entrada, ó que las procedencias del puerto de descarga no fueran libremente admitidas en otro de los á que el buque vaya destinado ó que en el puerto de descarga, aunque limpio, se rehusara admitir libremente al buque por su procedencia anterior, serán los generos entregados á su consignatario y en falta de este depositados en el puerto mas inmediato que los admita, y el capitán considere conveniente, siendo de cargo y riesgo de los cargadores ó receptores todos los gastos ocasionados al buque por cualquiera de las causas expresadas como tambien todas las penas en que se incurra por la imposibilidad de cumplir las disposiciones de las Ordenanzas de Aduanas. El depósito que el capitán verifique en el puerto mas inmediato que admita las mercancías se tendrá por entrega final, quedando el flete devengado en su totalidad. Los derechos y gastos de cuarentenas ú/ observaciones asi como los de las fumigaciones que haya de satisfacer el vapor incluso los de este, su tripulacion, viages á y de Lazareto ó puerto de observacion, asi como quinientas pesetas diarias por estancias durante la Estancia en Lazareto ó/y puerto de observacion, serán de cuenta y riesgo del receptor de la carga á prorrata del flete.

7a. Se prohibe cargar productos, fosforicos, líquidos considerados como inflamables, envasados en botellas y las demas materias y productos químicos de igual clase; siendo responsables los cargadores civil ó criminalmente segun proceda de cualquier dano ó perjuicio que resulte de que el contenido de los bultos sea diferente de lo declarado por ellos, segun que hayan procedido por ignorancia ó por malicia.

8a. El capitán hará el manifiesto en conformidad al contenido de los conocimientos. Las multas que impongan las aduanas á dicho Capitán por no resultar conformidad entre el cargamento y lo consignado en los conocimientos y manifiesto, seran satisfechas por el receptor y expedidor de la carga solidariamente asi como lo seran las que por culpa de uno ú otro se exijan al Capitán, con arreglo á las Ordenanzas de Aduanas. El Capitán tendrá el derecho de confiscar ó destruir cualquier bulto que se encuentre á bordo sin documentación. Si se encuentra mas peso del declarado ó genero perteneciente á clase superior de la tarifa, la totalidad del embarcado pagará doble flete del que le corresponda.

9a. El vapor puede suspender ó anticipar su salida, variar su ruta, tocar ó dejar de tocar en cualquier puerto para recibir ó dejar carga ó pasajeros, esté ó no previamente anunciado; pueda entrar y salir con piloto práctico ó sin él, y remolcar ó favorecer cualquier buque, sin que la empresa ni Capitán tengan por ello que indemnizar cualquier clase de perjuicios ni abonar beneficios; podra conducir carga sobre cubierta, renunciando los cargadores por todo ello y para todo á lo en los mismos dispuesto á los artículos 587, 614, 618, y 714 del Código de Comercio Español. En caso de quedar la nave inservible antes de emprender el viaje, ó despues de emprenderlo, sera facultativo del Capitán ó de la empresa, fletar ó no otro buque que portee la carga á su destino y depositarla ó no en el puerto de arribada por cuenta de los propietarios; y sea cual fuere la resolucion adoptada, se devengará íntegro el flete de la carga embarcada, como si se hubiese llevado al punto de su entrega, por lo cual el cargador renuncia expresamente á todo lo que sobre estos particulares establece á su favor el artículo 667 del Código de Comercio Español antes citado.

10a. El cargador que deje de embarcar la carga comprometida, pagará el flete como si la hubiese embarcado.

11a. El flete, capa y los desembolsos especificados en otro lugar de este conocimiento seran pagados á la llegada del vapor, sin deduccion alguna por ningun concepto, en oro ó plata precisamente, con exclusion de calderilla y de todo papel moneda creada ó por crear, aun cuando por ley se declare ó haya declarado de curso forzoso. Si apesar de esta prevencion, las disposiciones vigentes en la época del pago permitieran á los cargadores ó receptores verificarlo en papel deberan abonar ademas del importe nominal de la cantidad que venga á su cargo, otra, precisamente en metalico equivalente á la depreciacion que el papel moneda tenga en la plaza el dia en que dicho pago haya de verificarse. Los armadores del vapor, sus consignatarios y el Capitán, juntos y á solas, tienen el derecho de retener el todo ó parte de los efectos expresados en este conocimiento, en pago de su flete, capa y desembolsos, parte de impuestos de carga y descarga que hayan de abonar las mercancías y el buque que las conduce, de los desembolsos demoras, ó averías que los receptores deban abonar pudiendo utilizar este derecho de retencion pertenezcan á quien quiera los efectos ya sea por razon de los expresados en el presente conocimiento ya por razon de otros anteriormente conducidos á la misma consignacion cuyos gastos no hayan sido satisfechos; renunciando los cargadores al artículo 665 del Código de Comercio Español en lo que se oponga á este pacto.

12a. El receptor responde á prorrata del valor de sus generos, de los gastos de salvamento de la nave que deban satisfacerse, bien sea en virtud de fallo de tribunales nacionales ó extrajeros, bien á consecuencia de transaccion celebrada entre el Capitán del vapor y el de la nave salvadora.

13a. No se responde de enfermedad, dislocacion, ni muerte del ganado, cuyo flete se satisfará íntegro por el numero de cabezas embarcadas; constituyendose en todo tiempo el cargador responsable del flete estipulado, en caso de que por cualquier motivo no fuere pagado en el puerto del destino.

14a. En uso de la facultad que concede el artículo 846 del Código de Comercio Español, queda especialmente convenido entre el Capitán y los cargadores y receptores de la carga que la clasificacion, liquidacion y reparto de cualquier avería que pueda afectar al buque en el viaje actual, deberan efectuarse en el puerto de Liverpool, y con sujecion á las reglas York-Antwerp, no obstante cualesquiera de las disposiciones de dicho Código de Comercio relativas á dicha clasificacion, liquidacion y reparto, ó de las Leyes de Enjuiciamiento en materia de competencia, á las que especialmente renuncian los interesados. En garantia de la efectividad de la contribucion que pueda afectar á las mercancías por razon de dicha avería, los receptores depositaran en poder del consignatario, y bajo la responsabilidad de la empresa naviera, la cantidad correspondiente al valor de las mismas que señalará el propio consignatario, con sujecion al tanto por ciento á que se calcule habra de ascender la contribucion, y sin este previo depósito, no les seran entregados los generos. Dicha cantidad servirá á cuenta de la que los receptores hayan de pagar por razon de la avería, y terminada la liquidacion definitiva de esta, se les devolverá el sobrante, si lo hay, ó deberán abonar la diferencia que tal vez exista entre la depositada y la que les corresponda satisfacer.

15a. El flete que se anticipa no se devuelve por ningun concepto.

16a. El Capitán, y en su defecto el consignatario, en la calidad de representante de la nave y mandatario del Capitán, podrán en juicio y fuera de él, ejercitar todas las acciones, y verificar toda clase de cobros y arreglos referentes al contrato de fletamento y liquidacion de averías y demas concernientes á la nave.

17a. Aun cuando por cualquier causa se omita continuar en este conocimiento (que constituye contrato de fletamento entre los armadores, embarcadores y receptores) la firma del cargador, se le tendrá por conformado con las condiciones que anteceden (no obstante cualesquiera costumbre del puerto en contra), en el mero hecho de haber aceptado el mismo conocimiento.

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

19th of April 19<sup>00</sup>

I Enc.

Monsieur. F. Iniguez.

Dear Sir,

In reply to your kind letter of the 31st March. The Members of our Expedition desire to thank you most heartily for the kind expressions in your letter and for the offer of your valuable assistance. I fear we are putting you to a good deal of trouble in this matter but we must only hope that we may be in a position some time to return the obligations which we feel we are under towards you; meanwhile for our information, might I ask you if you would kindly answer the enclosed list of questions which we have drawn up. If we had replies to these I think we would be able to ~~xxxxxxx~~ definitely make up our minds as to our movements. Some of our party thought of going by long sea to Lisbon which would be much less expensive but we fear there would be great delay in getting from Lisbon to Placencia as there does not appear to be any direct line of railway. I hope you will excuse our giving you so much trouble at a time when no doubt you are very busily engaged in preparations for your own Expedition.

Very truly yours,  
Howard Grubb

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

19th of April 1900

Monsieur F. Iniguez.

The director of

The Madrid Observatory.

Dear Sir,

I am happy to be able to tell you that I have dispatched the Coelostat which will be delivered by the same vessel that carries the visual Equatorial, but I have not been able as yet to get the Spectroscope fully adjusted and this must go by the next boat.

We are now working every available workman on the second instrument which is being finally erected now in the workshop. Unfortunately we had a slight accident which necessitated the re-dividing of some of the circles but we expect to get this instrument off by the next boat which the Shippers tell me leaves Liverpool on the 28th of this month .

I must ask you to bear in mind that these instruments have been completed under extraordinary pressure and there will be some small matters which we have not been able to furnish with them at the present time but which will follow after, however we hope to let you have everything that will be necessary

For the Eclipse work.

The advice notes showing contents of the cases, and a memorandum containing information about the mounting of the instruments will be sent you so that you receive same in good time before the instrument arrive at Bilbao.

With regard to the mounting and erecting of your instruments. There are of course a number of important points to be attended to in the mounting which may give you some little trouble on account of the haste with which they will have to be effected, and it occurred to me that perhaps you would desire my son to be sent a few days before the general party goes to assist in the mounting of the instruments; if so, I would endeavour to spare him for the necessary time and let you have his services for one week for say £20.

With regard to the photographic plates. Besides those mentioned in my former letter, there are a class of plates called "triple coated" plates which have the advantage of bearing a large amount of over-exposure without halation or other injury, and the same makers have lately produced a film which possesses these properties in a very high degree. I got some of these films over from London a week or so ago and put them in the hands of our Astronomer Royal for trial, and he reports that they are excellent in many ways but they possess one disadvantage which for his particular work would be fatal. They

enlarge or swell very much in the development, and although this enlargement can be afterwards neutralized by immersion in alcohol there seems to be a doubt that this expansion & contraction is perfectly equal throughout the film; therefore for any purposes which require accurate measurement they are not be recommended; at the same time for some purposes they might be very valuable and I am therefore asking the Company to send you a few of these by post in order that you may have an opportunity of experimenting on them beforehand, and I would recommend them to send some of the "triple coated" plates along with the others.

Very truly yours,  
H. G. P. G. G.

ADVICE OF GOODS.

Offices:  
57, RATHMINES-ROAD,  
Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES.

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Dublin, 20/4/1900 189

Sent to *Monsieur Feniques*  
+ copy to  
*Don Meliton Lulacia*

Astronomical Observatory Madrid

G/12.

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS. of dimensions of cases.
		One case		3'. 7" x 3'. 5". x 2'. 0"
	On	One case	Per	5'. 6" x 3'. 3". x 2'. 0"
	11/4/00	One case	City of Dublin	10' 8" x 1'. 9". x 1'. 6"
	14/00	One case	Steam Packet	3'. 7" x 1'. 7". x 1'. 6"
		One case	Co To the	2'. 6". X 1'. 0". X 1'. 0"
		One case	"Serra" & "Tintore" Steam Ship Co	1'. 6". x 1'. 3". X 1'. 0"
		One C.I Pillar	Liverpool	2'. 4". X 1'. 9"
		One C.I Pillar	for transmission by the "Nieta"	2'. 4". X 2'. "2
		One Case	to Bilbao.	2'. 0" x 1'. 6" x 1'. 0"
	18/4/00	One case		2'. 6" x 2'. 6". x 1'. <del>8</del> II"
		One case		1'. 8" x 10" x 9"
	19/4/00	One case		1'. 5" x 1'. 5" x II".



*Details particulars*  
**ADVICE OF GOODS.**

Offices:  
 57, RATHMINES-ROAD,  
 Goods Entrance  
 TO  
 OBSERVATORY  
 AND  
 ASTRONOMICAL WORKS  
 BY  
 OBSERVATORY-LANE,  
 RATHMINES.

From  
**SIR HOWARD GRUBB,**  
 RATHMINES.

Sent to The Director of  
The Astronomical Observatory  
Madrid

Dublin, 20/4/1900 1900

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
	II/4/00	One Case	Per  City of Dublin  Steam	Equatorial head for 8 inch telescope with clock work complete. Polar axis, AR circles, AR screw AR sector, anti-friction arrangement for P Axis. Gearing plate Sliding counterpoise weight for tube. One lead balance weight for Spectroscope.
 <i>Astronomical Observatory                      Madrid</i>		One Case	Packet Co to the "Serra & Tintore" Steam Ship Co Liverpool	Cross Head. Declination axis. Declination circle. Centre casting for tube. Decln clamp & Decln slow motion and slow motion arm. A box containing elevating screw & bracket & 4 stone bolts for the pillar. AR quick motion wheel & pinion. 4 long bolts for Cross Head Clock shackle. Clock winding handle. Azimuthal adjustment screw & frame. Four 5/8th screws & washers for pillars. Four 5/8th screws & washers for fastening Equatorial head to top part of pillar. 2 AR clamp cord guides 4 spanners. 8 capstan bars.



ADVICE OF GOODS.

Offices :  
57, RATHMINES-ROAD,  
Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES:

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Sent to **The Director of**  
**The Madrid Observatory**  
**Madrid**  
**Spain.**

Dublin, **20/4/1900** ~~1900~~

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<p><b>[R] 3</b></p> <p><i>Astronomical Observatory Madrid</i></p> <p><b>[R] 4</b></p> <p><i>Astronomical Observatory Madrid</i></p> <p><b>[R] 5</b></p>	<p>11/4/00</p>	<p>One Case</p>	<p>Per City of Dublin Steam Packet Co to the "Serra" &amp; "Tintore" Steam Ship</p>	<p>One piece of telescope tube with complete eye-end attached. One piece of telescope tube for object glass. Declination microscope reader &amp; support. prism &amp; eye-piece for same Electric hand reader with lamp &amp; flexible cord. 2 Decln vernier supports, one with prism &amp; lamp attached. One Rheostat. AR clamp thimble and cord. One long screw for sliding counter poise weight with its supports &amp; screws. Decln clamp handle &amp; Decln slow motion handle. Hook's joint &amp; clamp screw for Decln clamp. One piece of Decln slow motion shaft, Hook's joint &amp;c.,</p>
		<p>One Case</p>	<p>Co Liverpool</p>	<p>Dew cap for object glass 2 inch Finder complete with eye-piece &amp; supports. 1 packet <math>\frac{1}{2}</math> "Imperial Ordinary" photographic plates. 1 packet <math>\frac{1}{2}</math> "Imperial" landscape 1 ... .. Flash light Mahogany box <del>xxxxxxx</del> containing 4 negative eye-pieces 2 dark glasses Combined polarising &amp; "Dawes" solar eye-piece.</p>
		<p>One Case</p>		<p>3 cast iron clock weights.</p>

ADVICE OF GOODS.

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RATHMINES.

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Sent to **The Director of**  
**The Madrid Observatory**  
**Madrid**

Dublin, **20/4/1900** **PER**

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<i>G/6</i>		One Case		2 Counterpoise lead weights for end of Declination axis.
<i>G/7</i>	11/4/00	One C.I. Pillar	Per	Top part of stand
<i>G/8</i>		One C.I. Pillar	City of Dublin	Lower part of stand.
<i>G/9</i>	18/4/00	One Case	Steam Packet Co	8 inch visual object glass in cell with 3 adjusting screws packed in corner of box.
<i>G/10</i>	18/4/00	One Case	To the Serra & Tintore Steam Ship Co Liverpool.	Coeleostat complete with exception of 8 inch mirror. One parcel containing 2 double $\frac{1}{2}$ plates slides One parcel containing 3 double $\frac{1}{2}$ plate slides I packet of "Edwards" isochromatic Snap shot $\frac{1}{2}$ plates I packet of "Edwards" isochromatic medium $\frac{1}{2}$ plates. I packet of "Wratten & Wainwright ordinary $\frac{1}{2}$ plates.
<i>G/11</i>	18/4/00	One Case		3 clock weights for Coeleostat
<i>G/12</i>	19/4/00	One Case		8 inch plane mirror packed in separate inside case for Coeleostat

Astronomical Observatory Madrid

Memorandum respecting the mounting of  
8 inch Visual Equatorial.

PILLAR.

The Pillar is made in 2 parts bolted together with an Azimuthal adjustment between the two. (Azimuthal adjustment is in box No 2).

The door in the lower pillar should face South. The upper pillar has upon it on the South side a number of holes for bolting on the elevating screw of Polar Axis. This will determine its position N & S.

Case No I.

As will be seen by the Advice notes, this contains the whole of the Equatorial Head. It requires to be unpacked carefully.

Equatorial  
Head

Place the whole box with the side marked "this side up" uppermost, and then the two sides of the box can be unscrewed completely off exposing the Equatorial Head which is bolted down to the bottom of the box and can then readily be unpacked.

Elevating  
screw

The Equatorial Head can then be lifted bodily in one piece up upon the pillar and bolted to same, and the elevating screw (in Case No 2) can be attached.

Polar  
Axis

It will be then seen that for the purposes of transit wooden blocks have been placed between the square flange at upper end of Polar Axis and the frame, and a pair of bolts holding down this same flange to frame. These should be removed when the Axis will drop slightly down upon its own bearings.

Clock  
Worm

It will also be seen that the Clock Worm has been removed and taken out of gear from the sector or arc, for the purpose of safe transit. It is better that this should not be re-gearred until the whole instrument is erected.

Case No 2.

In this case will be found the Cross Head of the Polar Axis; the Declination Axis, Declination Circle with its clamp &c. &c., which may now be lifted on and bolted to the top flange of the Polar Axis.

Centre part  
of Tube.

The centre portion of the tube is also in this same case and attached in its position on the Declination Axis.

Memorandum for mounting  
8" Visual Equatorial.

Case No 3.

In this case will be found the two end portions of the telescope tube which can then be attached. No difficulty will be found in ascertaining the right positions for these as the flanges have been carefully marked, and the various microscope readers, finder &c, can then all be attached.

When the whole of the instrument has been put together and put in fair balance the important points to be observed are the following :-

(a) The gearing of the AR screw. It will be observed that this AR screw is mounted upon an iron plate bolted to the Head, and there are screws supplied for tightening this, and also screws for pushing up this plate carrying the screw into gear with the sector or arc. By means of these the screw can be properly geared, care being taken that the plate is advanced equally at both ends.

When properly geared the screw should turn perfectly *worm* freely with the fingers and yet have no perceptible "loss".

The gearing between this screw & the clock has been left in its place .

During the operation of gearing the worm into the sector care should be taken that the upper bearing shaft which connects the screw to the clock, and also the little collar which joins together the two portions of that shaft should be left free so that this shaft may not be strained in any way; in like manner when any adjustment has to be made in the inclination of the Polar Axis these particular parts should be left free, but as soon as the axis has been set at its right angle and the screw shaft properly geared these portions may be clamped.

Anti-friction Roller of Polar Axis.

Screws are supplied for the purpose of bringing this roller up into sufficient contact with the Axis to lift a considerable portion of the weight.

The exact positions of these screws is best ascertained when the telescope is completely erected and pointed to a star. If the screws be advanced too far by the very smallest quantity the telescope becomes unsteady. By slack-

ening back the screws then a small quantity, the Polar Axis will rest upon the bearing with sufficient weight to ensure steadiness, and will have so much weight upon its roller as to ensure freedom of action

Wrenches  
& capstan  
bars

In case No 2 will be found wrenches or spanners, and capstan bars for working all the various screws of the instrument; no other tool is required except a screw driver.

Sliding  
Balance  
weight  
Spectroscope  
balance  
weight

It will be observed that a heavy balance weight on a screwed shaft has been applied to the telescope. This weight will vary in its position according to circumstances.

For a great difference of weight such as the application of the Spectroscope, an independent weight has been hung upon a stud at the eye-end. When the Spectroscope is attached to the tube this weight may be removed altogether; when not using the Spectroscope the weight is attached.

The sliding weight on the screw can then be used for final adjustment of balance

Object Glass  
Case No 9.

The object glass will be found in this case and is supplied with a set of levelling screws for attachment to the tube. These screws were adjusted as far as possible before the instrument left Dublin but no doubt they will require final adjustment when re-erected.

ADVICE OF GOODS.

Offices:  
57, RATHMINES-ROAD,  
Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES.

*Second Copy*  
From

SIR HOWARD GRUBB,  
RATHMINES.

Dublin, 20/4/1900 ~~1899~~

Sent to The Director of  
The Astronomical Observatory  
Madrid

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<p>Ⓟ /</p> <p><i>Astronomical Observatory</i> <i>Madrid</i></p>	<p>II/4/00</p>	<p>One Case</p>	<p>Per City of Dublin Steam</p>	<p>Equatorial head for 8 inch telescope with clock work complete. Polar axis, AR circles, AR screw AR sector, anti-friction arrangement for P Axis. Gearing plate Sliding counterpoise weight for tube. One lead balance weight for Spectroscope.</p>
<p>Ⓟ</p>		<p>One Case</p>	<p>Packet Co to the "Serra &amp; Tintore" Steam Ship Co Liverpool</p>	<p>Cross Head. Declination axis. Declination circle. Centre casting for tube. Decln clamp &amp; Decln slow motion and slow motion arm. A box containing elevating screw &amp; bracket &amp; 4 stone bolts for the pillar. AR quick motion wheel &amp; pinion. 4 long bolts for Cross Head Clock shackle. Clock winding handle. Azimuthal adjustment screw &amp; frame. Four 5/8th screws &amp; washers for pillars. Four 5/8th screws &amp; washers for fastening Equatorial head to top part of pillar. 2 AR clamp cord guides 4 spanners. 8 capstan bars.</p>

# ADVICE OF GOODS.

Offices :  
57, RATHMINES-ROAD,  
Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES.

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Dublin, 20/4/1900 **DSGX**

Sent to The Director of  
The Madrid Observatory  
Madrid

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<i>G/6</i>		One Case		2 Counterpoise lead weights for end of Declination axis.
<i>G/7</i>	11/4/00	One C.I. Pillar	Per	Top part of stand
<i>G/8</i>		One C.I. Pillar	City of Dublin	Lower part of stand.
<i>G/9</i>	13/4/00	One Case	Steam Packet Co	8 inch visual object glass in cell with 3 adjusting screws packed in corner of box.
<i>G/10</i>	13/4/00	One Case	Serra & Tintore Steam Ship Co Liverpool.	Coelostat complete with exception of 8 inch mirror. One parcel containing 2 double $\frac{1}{2}$ plates slides One parcel containing 3 double $\frac{1}{2}$ plate slides I packet of "Edwards" isochromatic Snap shot $\frac{1}{2}$ plates I packet of "Edwards" isochromatic medium $\frac{1}{2}$ plates. I packet of "Wratten & Wainwright ordinary $\frac{1}{2}$ plates.
<i>G/11</i>	18/4/00	One Case		3 clock weights for Coelostat
<i>G/12</i>	19/4/00	One Case		8 inch plane mirror packed in separate inside case for Coelostat

Astronomical Observatory Madrid

Telegrams: "GRUBB, RATHMINES, DUBLIN."

Telephone No. 1024.

Offices:

57 RATHMINES-ROAD.

Goods Entrance

TO

OBSERVATORY

AND

ASTRONOMICAL WORKS:

BY

OBSERVATORY LANE,

RATHMINES.

—0—

*J. E. Ladd*

## Memorandum.

From

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES.

Dublin, 21/4/1900

Monsieur F. Iniguez

The Director of Madrid Observatory

Madrid

Sir,

Sir Howard Grubb has asked me to enclose herewith advice notes showing the contents of the cases which have now been dispatched to Bilbao to the care of Don Meliton Zulaica, Agent de Aduanas who will receive in a day or two advice of the number of cases, marks, &c, &c, which I posted to him yesterday.

Sir Howard had a good examination of the spectroscope yesterday and finally adjusted it, so this will go by the next boat which we understand will leave about the 1st May from Liverpool.

Your two kind letters of the 18th have just arrived for which I am desired to thank you and to say that answers will be sent as soon as possible.

Yours faithfully,

F. E. Ladd.

Secretary.

*Memorandum re-mounting will follow on Monday -*



SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

25rd of April 19 00

I Enc.

Dear Sir,

I have now the pleasure to enclose a Memorandum which may be useful to you in erecting the 8 inch visual Equatorial which is at present on its way to Madrid

To-morrow I expect to have from the Shippers the certificate of origin and the Bills of Lading which I shall forward to you without any delay.

I took it upon my own responsibility to insure the cases for £500 as far as Bilbao; the cost of this is very small only about £4.

*Very truly yours  
H. Grubb*

REGENT LINE

Telegrams: "GRUBB, RATHMINES, DUBLIN."

Telephone No. 1024.

Offices:

57 RATHMINES-ROAD.

Goods Entrance

TO

OBSERVATORY

AND

ASTRONOMICAL WORKS:

BY

OBSERVATORY LANE,

RATHMINES.

—0—

## Memorandum.

From

SIR HOWARD GRUBB, F.R.S.,

RATHMINES.

Dublin, 25/4/1900

To Monsieur F. Iniguez.

The Director of the

Astronomical Observatory Madrid

Dear Sir,

I have now the pleasure to enclose the "certificate of origin" which I received this morning from the Shippers, and also a copy of the Bill of Lading of the 10 cases & 2 cast iron pillars. By this same post a copy of the Bill of Lading will be sent to Sr, Don Meliton Zulaica at Bilbao. Trusting all will arrive in good order and in good time.

Yours faithfully

Fred. E. Ladd  
Secretary.

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

27th of April 19 00

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

According to instructions received from the Shipping Agents it appeared necessary that we should ship all the instruments, both for your Observatory and for the Irish Expedition, from Dublin this day, and consequently by using the most strenuous exertions and working our men late at night, &c., &c., we have managed to get all completed, and I am glad to be able to tell you that I think every part is very satisfactory. The Spectroscope performs with beautiful definition, and all portions of the photographic Equatorial that I understand to be necessary for the eclipse work, are complete, and we are just now engaged in closing the last of the cases with a view of dispatching from Dublin this evening, but unhappily we have again met with a disappointment for we have a telegram from the Shipping Agents in Liverpool to say that the steamer "Nina" is to be delayed 4 days in her departure and

2

will not now be due in Bilbao until the 12th May. It is very disappointing after our exertions to find that the cases will be 4 days lying idle waiting for the steamer, and I am just ~~not~~ <sup>now</sup> making enquiries to see ~~ix ix~~ if it be possible to get some other Shipping Company that will have a steamer sailing earlier.

---

4pm. Since writing above I have been in the town making enquiries at the various Shipping Agencies, and so far I *have* not found that there is any other Company which we could avail ourselves of. It appears that this Company, the "Serra & Tintore" Steamship Co, send their vessels first of all to "Aviles" and then to Gijon and possibly after that to a third Port before reaching Bilbao, and there are no steamers directly from Liverpool to Bilbao.

Our local shipping Company (The City of Dublin Steam Packet Company) have telegraphed to Liverpool to ascertain more exactly particulars about these boats but up to the time of writing no answer has been received. It would appear therefore that we cannot do better than send the cases as before.

The "Serra & "Tintore" Company suggested that we should send the goods to one of the Ports which their vessels touch at before they reach Bilbao, but I fear that

this would lead to further complications as your Agent, Sr, Don Meliton Zulaica is at Bilbao; however, unless we receive orders from you to the contrary, we will send the cases in exactly the same way as before, but if you see any possibility of sending them by any quicker route, or that you desire any change to be made, please send me a telegram as soon as possible after this letter reaches you, and I will carry out whatever instructions you give. So far as I can see, however, we cannot do better than adhere to the former mode of consignment.

I note from your letter just received that you desire my son to go and help in the erection of the Equatorials. I will enquire what way he had best travel, but as far as I can see at present it would be best for him to travel by the "Sud Express", leaving Paris on the evening of the 11th May so that he would be with you on the night of the 12th or 13th. The rest of our party propose travelling by the "Sud Express" which leaves Paris on the 21st, arriving at Madrid on the night of the 22nd, and I suppose at Placencia on the morning of the 24th, so by this means my son's services will be available to you for about 10 days before we arrive. Perhaps in writing again you would say what Hotel in Madrid you would recommend to us.

Perhaps the heaviest parts of the whole Equatorials are the cast iron pillars, and if you desire it I should think it would not be necessary to take these to Placencia and that wooden structures could be erected for which I could send you a design which would amply suffice for the temporary installation.

Yours truly  
A. Grubb  
mc

Monsieur F. Iniguez.

The director of

The Madrid Observatory.


Dear Sir,

since writing you last night we have had several telegrams from the shipping Companies which we find rather difficult to understand, but according to the information received from our local shipping Co here it would appear that there is a vessel starting on Tuesday next the 1st May from Liverpool for Bilbao although we had contrary information from another quarter; however, in order that ~~no possible opportunity~~ no possible opportunity may be lost we are sending off everything to Liverpool in time for this boat and it is probable I will send my son over to Liverpool on Monday night in order that he may personally see that these cases are transferred from the one vessel to the other safely and in good time. I do hope that the news that we have heard that this vessel is to start on Tuesday is true, as it will give quite 3 or 4 days additional time for the erection of the instruments at Plasencia. This

Consignment to you will now complete everything that I know of as being required for the Eclipse, and some matters even that will probably not be wanted but that you will use afterwards. Full particulars will be sent you of the contents of the cases in a few days.

You will have seen from my letter of yesterday that I propose to send my son so that he will have rather more than a week with you, and I hope that he will be of considerable service to you as, although he is young, and only a year or so at the business, he has seen these instruments made & finished and is intimately acquainted with every part, and I think will save much time of your people in the erecting: he can speak a little French so I hope ~~I hope~~ will be able to get on with your staff.

I can assure you that I have done everything in my power to ensure the prompt and careful delivery of these instruments, but it was only by putting other work aside for the time that I was able to put almost my whole staff upon this work & get all done in time, and I trust that your staff may be able to get good results at the Eclipse.

In the same vessel we are sending a large consignment of things for our Irish Expedition but these cases have all been marked in a totally different manner, the marks are in red and consist of a G in a circle thus  besides which we put a distinctive card on each case to show that they belong to the Irish Commission; this is I think in accordance with your ideas.

*Yours truly*  
*H. G. G. G.*  
*H. G. G.*

ADVICE OF GOODS.

Offices:  
57, RATHMINES-ROAD.

Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES.

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Dublin, 30/4/1900 189

Sent to Mons. F. Iniguez

The Director of  
The Madrid Observatory.

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<p>③/13</p> <p><i>Astronomical Observatory Madrid</i></p>	<p>30/4/00</p>	<p>One Case</p>	<p>Per City of Dublin Steam Packet Company To The "Serra" &amp; "Tintore" S. S. Company for transmission to Bilbao</p>	<p>Cross Head. Decln Axis, Decln circle, Decln clamp, Decln slow motion &amp;c, &amp;c, complete. In separate compartment. Elevating screw for Polar axis. 4 long studs for counterpoise weight on Cross Head. Wheel &amp; pinion for AR quick motion. 4 spanners. 8 podger bars. 4 stone bolts. Clock winding handle. Sector winding handle. AR clamp thimble &amp; cord. 2 AR cord guides. Sliding balance weight for tube. Small balance weight for upper end of tube to balance when prism is not in use. Azimuthal adjusting frame. 4 screws for joining the two pillars. 4 screw for top of pillar clock shackle.</p>
<p>③/14</p>		<p>One Case</p>	<p>per their S. Ship. "Nina"</p>	<p>Equatorial Head for photo telescope with clock work, Russell control &amp;c complete. Polar axis, AR sector, Ar circles, anti-friction arrangement for Polar axis. &amp;c.</p>



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ASTRONOMICAL WORKS  
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OBSERVATORY-LANE,  
RATHMINES.

From  
**SIR HOWARD GRUBB,**  
RATHMINES.

Dublin, 30/4/00 189

Sent to **Mons F. Iniguez.**  
The Director of  
The Madrid Observatory

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
<p>⑥/15</p> <p><i>Astronomical Observatory Madrid</i></p> <p>⑧/16</p> <p>⑨/17</p> <p>⑩/18</p>	<p>30/4/00</p>	<p>One Case</p>	<p>Per City of Dublin Steam Packet Co to the Serra &amp; Tintore S.Ship Co Liverpool for transmission to Bilbao</p> <p>per their s.Ship <del>XXXXXX</del> "Yina"</p>	<p>2 pieces of telescope tube for 8 inch photo Obj-glass. Telescope tube in one piece for 6 inch "Guider" Obj-glass. Finder of 2 inch aperture with eye-piece &amp; wire plate complete. 2 Decln verniers. Magnifying prism &amp; lamp for Decln circle. Microscope reader for Dec circle with lamp, eye-piece &amp; supports. Screw for sliding balance weight. Decln clamp handle &amp; Decln slow motion handle. Slip tub &amp; steel bar for attachment of Spectroscope. 2 fig of 8 castings, one for eye-end and one for upper end of tubes One support for 2 inch Finder Dew cap for 6 inch obj-glass Dew cap for 8 inch obj-glass Micrometer breech piece for the "Guider" telescope. Breech piece for 8 inch photo telescope.</p> <p>3 counterpoise weights for the Decln axis</p> <p>4 clock weights.</p> <p>6 inch Doublet lens, tube, camera and supports. Three 7½"x5" double dark slides One 4½"x3½" double dark slide. Focal plane shutter for Doublet 4 dozen 8½"x6½" Sandell plates 1 dozen 7½"x5" .. .. 4 dozen 4½"x3½" Sandell triple coated plates 4 dozen "Edwards" 4½"x3¼" plates</p>

ADVICE OF GOODS.

Offices :

57, RATHMINES-ROAD,

Goods Entrance  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL WORKS  
BY  
OBSERVATORY-LANE,  
RATHMINES.

From

SIR HOWARD GRUBB,  
RATHMINES.

Dublin, 30/4/1900 189

Sent to

Mons F. Iniguez

The Director of

The Madrid Observatory

MARK.	DATE OF DISPATCH.	NUMBER AND DESCRIPTION OF PARCELS.	HOW SENT,	PARTICULARS.
G 19		One Case	Per City of Dublin	Spectroscope "H" packed with its prisms and eye-pieces (4) in a mahogany polished box.
G 20	30/4/1900	One Case	S.S. Co To the Serra & Tintore	8 inch photographis object glass in separate inside case with 3 adjusting screws.
G 21		One cast iron pillar	S.S. Company Liverpool for Transmission to Bilbao	6 inch Guider obj-glass in separate case with 3 adjusting screws. 8 inch obj-glass prism with its mounting packed in separate inside case
G 22		One cast iron pillar	per their S. Ship "Nina.."	Top part of pillar  Lower part of pillar

Astronomical Observatory Madrid

1st of May 1900

Enc.

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I am glad to be able to tell you that everything has been dispatched for your eclipse work by the steamer "Nina" which according to the last advice leaves Liverpool to-morrow (Wednesday). We have asked the Shippers (as before) to procure for us the "certificate of origin which we will send to you as in the case of the last consignment.

I enclose advice notes which give you the contents of the cases and in a few days I hope to send you some memoranda respecting the mounting of the instruments.

Yours truly,  
H. Grubb  
1900

MADE IN U.S.A.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

7th of May 1900

*ever*

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I am greatly obliged by your kind letter dated from Plasencia which I will answer more particularly in a day or two, meanwhile I hasten to send you a tracing of a rough design for the wooden pillars such as I would suggest for the temporary installation of the Equatorials at Plasencia.

You will observe that it is made up of 4 wooden vertical posts which can be inserted in the ground, and a sort of platform on the ground level with stays from that to the top forming a pyramidal pillar. The idea is that when placed in the ground it would be possible to load the space between the square pillar and the outer tapered sides with stones or earth in order to increase the weight <sup>of</sup> ~~of~~ solidity; this can be done on at least 3 sides and possibly it would be well to leave the 4th side open <sup>to the north</sup> for getting at the clock weight.

I am much obliged by the information about the

tents and covering. I gather from what you say that you consider that we can get accommodation in the hotels ourselves, and that the covering will only be required for the instruments. Some of our party thought that it would be necessary to take tents for sleeping in on the spot actually, but if you think we can get sufficient accommodation in the town perhaps you would be so good as to take steps to ensure that we may have rooms ready on our arrival. Thinking that we might require a tent I sent one of about 15 feet diameter in the cases last dispatched.

There will probably be one gentleman in addition to those I mentioned before, (Mr Samuel Geoghegan, Civil Engineer, and a Member of the Council of the Royal Dublin Society), so that our party will really consist of seven:- my son who leave here to-morrow night and expects to arrive in Madrid on Saturday night, <sup>the 12<sup>th</sup></sup> and 6 of us who leave Paris on the 21st arriving in Madrid on the 22nd.

I hope before my son leaves London to hear from you what Hotel you would recommend us to go to in Madrid.

Very truly yours  
A. G. Gabb

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

14<sup>th</sup> of

May

1900

Monsieur F. Iniguez.

Dear Sir,

*Yesterday*

I wrote you <sup>^</sup> on another sheet on business matters  
This letter you will kindly consider as confidential.

I myself, and my colleagues here feel that we are greatly indebted to you for all the trouble you have taken to save us inconvenience, and to put us under the most favourable conditions for observing the eclipse of the Sun at Plasencia, and no doubt the Societies which we represent will make suitable acknowledgments of this to you <sup>v</sup> directly on our return from Spain, but I should very much desire that the Royal Dublin Society, of which I am Vice President, should in some way specially mark their appreciation of your kindness, and it is my intention when the proper time arrives, to propose your name as an Honorary Member of this Society; it is a very unusual proceeding for I myself do not recollect more than one Honorary Member having been made during the last 20 years, but the circumstances of the present case are special, and the services which you have been able to

render to us are so great that, if pleasing to you, I think they will not refuse my request.

In order that I may place this in proper form before the Society I would ask you if you would be so kind as to prepare for me a little memorandum of your full name, titles and position, making mention also of any works of a scientific character which have been published in your name.

I would have preferred to have spoken to you personally about this but not speaking Spanish and only in a very small degree understanding French, I feel I could not express myself intelligibly to you, and therefore I write this before I go to Spain.

You need not trouble to reply to this letter but if before leaving Spain you can favour me with such a memorandum it would facilitate very much my efforts in the direction I have indicated above.

Since writing the above I have been making enquiries and I find that 3 Honorary Members have been elected during the last 20 years. One is the Rev. W.S.Green who contributed valuable services to the Society in connection with the natural history survey of the fisheries. Another was Prof Mendelejeff of the University of St Petersburg, and a third not mentioned in the list enclosed was Professor Helmholtz whose name you are no doubt familiar with, so

Page3.

That you will see that the distinction is only given in rare cases of eminent services rendered to the Society.

You will also see that there are about 20 official Honorary Members who hold Membership only as long as they hold their official positions, but the actual number of created Members now amounts to only 8. I shall bring you a full list of the Members with me but~~ix~~ it is perhaps too bulky to send by post.

*Respectfully,  
J. M. G. G. G.*



SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

14<sup>th</sup> of May 19 00

Monsieur F. Iniguez.

The director of  
The Madrid Observatory.

Dear Sir,

I am much obliged by your kind letter of the 11th and am much relieved to hear that you have received the first consignment of the goods. I was very anxious about these until a few days ago when I heard from the Shipping Company that the first vessel had arrived at Bilbao on the 4th, and the second was almost certain to be there ~~on~~ on the 12th, so I trust that everything will be in time.

In the absence of any information about the hotels I told my son to go to the Hotel de Roma but I can quite understand that in the great press of business which must be thrown upon your staff at the Observatory just at present, that Mr Ventosa should have forgotten to write about it.

I will consult with my friends here as to the Hotel we will go to, and possibly also I may hear from my son before we leave Ireland as to his experiences of the Hotel de Roma, but

indeed it is not of very great consequence to us as we will probably arrive in Madrid on the night of the 22nd and leave on the night of the 23rd for Plasencia, unless for some reason you desire that I should remain longer in Madrid.

I gave instructions to my son that he should put himself altogether under your orders and directions, and to do everything he could to assist in the putting together of your installation until we arrive, so in this way you will have his services for about 10 days and I hope with his knowledge of the instruments it may shorten and facilitate the erection and somewhat relieve the work thrown upon your staff.

With regard to the instruments for our own installation. If they arrive before we get to Madrid, (as I should hope they would) perhaps you would be good enough to have them sent on at once to Plasencia and we will, of course, defray all expenses as soon as we arrive in Madrid.

I am not sure whether you will unpack your instruments in Madrid or send them on at once to Plasencia, in which latter case you will probably also have sent my son on. If this be so perhaps you would kindly transmit to him the enclosed letter as I am asking him to write me to Paris any experiences of his that might be useful to us.

~~XXXXX~~

As regards our party:- it has been in-

creased now by the addition of my friend Mr Geoghegan who is a Civil Engineer and a Member of the Council of the Royal Dublin Society, so that our party now consists of ~~xxx~~ a party of 7 including my son; the other 6 arrive together in Madrid on the 22nd.

My friend Mr Gerald Balfour, the chief Government Officer here in Ireland under the Viceroy kindly gave me a letter of introduction to the Spanish Ambassador in London which I transmitted to Mr W.E.Wilson (another of our party) who happened to be in London at the time, and he, and also my son, have been given letters to the Customs authorities at Irun which I hope will facilitate the passing of our personal baggage.

Thursday

I purpose leaving this next ~~Friday~~ morning the 17th for London when I will call upon the Spanish Ambassador, get my passport vised and I hope get a similar letter to the Customs authorities. I will be in Paris on the Sunday and Monday up to the time of the starting of the "Sud Express" on Monday evening and should anything occur about which you would like to communicate to me, a letter or telegram would find me in Paris if directed to the care of "Gaze's Excursion Agent, Rue Scribe, Paris".

*Very truly yours  
J. H. G. G. G.*

22nd of June 19 00

Prof F. Iniguez.

Dear Prof Iniguez,

Very many thanks for your two kind letters. I will shortly send you a sketch of the instrument you refer to with a description which I think will make it quite clear, also now that I know the conditions that exist in your observatory I will be better able to advise you as to your best course for getting up an efficient installation for observations of the Sun. You will remember that when I was in Spain you mentioned to me that you purposed to alter the Coelostat into a Heliostat but I don't know exactly how this is to be done without some complications. Perhaps when you are next writing me you would send me a little sketch of what you propose. Please note that the axis in the Coelostat goes round once in 48 hours whereas in the Heliostat it will go once round in 24 hours; this however could be easily altered.

As far as I know, you would desire to convert the

*lantern or tower*

*(See over)*

on top of the building into a Solar Physics Observatory sending in a beam of light from the Coelostat or Siderostat planted upon the roof of the building outside; you can then fit up this room so that it could be darkened and made suitable for spectroscopic observations. This certainly appears to me the best use you could put this room to which otherwise would be useless.

The other points also in your letter with regard to the 6 inch obj-glass for solar work &c I will answer at the same time, meanwhile I write to thank you for all your kindness and to ask if you could give me any information as to the dispatch of our instruments from Bilbao for as far as I can learn there is no advice as yet of their having arrived in Liverpool. When next writing perhaps you would tell me if you know when they were dispatched from Bilbao & how?

Wynne J. G. Gubb

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

10th of July 19 00

Prof. F. Iniguez,

Dear Prof Iniguez,

I have been away for a few days & find your kind letters of the 27th and 29th of June on my return.

I am sorry that the pamphlet I sent you was not complete and I now enclose you another one.

I am glad to hear that the Merz Obj-Glass is improved and I hope you will be able to get it alright with a little further adjustment.

Now as regards the mounting of the Coelostat in the yard or court of the Observatory and the solar physics observatory in the lantern. You will of course remember that in the installing of the Coelostat it is necessary that whatever instrument or instruments you desire to use that these must be mounted upon a carriage which will run upon a circular railroad the centre of which will co-incide with the centre of the mirror of the Coelostat; that is the only way it is possible to use the Coelostat for the direction of the beam reflected from the Coelostat will vary in its azimuthal direction according to the declination N or S of the object under observation; in fact

the condition necessary to be fulfilled is this:- that the direction of the beam in a horizontal plane will be the same ~~ix~~ as if you were directing a telescope to that particular object at the moment of its rising above or setting below the horizon, so that you will see that for every different declination a different azimuthal direction of the beam will be required, but in every case it will of course pass through the centre of the mirror.

If you would give me an indication of what kind of instruments you would desire to use with this Coelostat, or tell me what size of carriage you would require to carry this instrument, I would design for you a circular railroad which would be suitable. I suppose you will be using this almost solely for the Sun and therefore you would not require a very wide range dependent upon the different declinations of the Sun at different times of the year.

Then, as regards the converting of the lantern of the Observatory into a Solar Physics Observatory. I see no difficulty in this if you have room for a sufficiently long telescope.

In order that you may have a 3 inch image of the Sun it will be necessary that the focus of the telescope should be about 30 feet. Will you have room for a telescope of 30 feet focus on the terrace? If so, what would be the most convenient direction N, S, E, or W? for the telescope to lie in as respects the lantern? If I had this information I would design the best form

of Heliostat for you. The Heliostat itself will of course have to be in the open and should have a cover to protect it against ~~xx~~ weather when not in use. If I had this information I could make a design and send you an estimate for all. The photographic 6 inch objective itself of special focus and specially corrected for photographic rays would cost £66.

With regard to the instrument for observing the Solar Prominences.

I am not losing sight of this but it will take a considerable amount of experimenting before I obtain the best form, and it will be difficult for me therefore to say exactly what the price will be. I have lately been examining into the question of gratings <sup>improved</sup> on celluloid which can be obtained at about a 20th part the cost of the original gratings as supplied by "Rowland". I have seen some of these and they give most excellent results and by employing one such I think I would be able to reduce the cost of this instrument to a comparatively small sum, probably under £20, but I shall certainly keep you advised of this as I proceed, for I could not help being struck with the exquisitely <sup>clear</sup> clear skies of Spain and I have no doubt that the results you would get there would be equal to if not better than anything that could be obtained elsewhere.

Very truly yours  
H. G. Jones



30th of July 19 00

I Enc.

Professor F. Iniguez.

Dear Prof Iniguez,

We have not yet got our cases from Bilbao and I wrote a short time since to Senor Don Zulaica asking him to send the boxes by any steamer at all that would reach Liverpool or any English port as we are really wanting them here now. I have just had a letter from him which I have a difficulty in translating but which I understand to mean that the cases have not yet left Bilbao and that there appears to be some difficulty in finding a steamer. I enclose you his letter and might I trouble you to write to him urging on him the necessity for sending them forward as it is now nearly two months since they left Plasencia. If you would do this for me you would greatly oblige

*No more news from the Embassy about  
the decoration*

*Yours truly*

*H. Grubb*

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

26th of October 1900

2 enc

Professor F, Iniguez.

Dear Prof Iniguez,

I have just returned from London where I have been on business for the last week and find your kind letter of the 19th.

I send you herewith a print off a design for an instrument which we made for Prof. Becker of Glasgow, for the examination and measurement of plates of the same size that you use. The price of this instrument would be £50, only, and I think it would amply meet your requirements. Of course if you wanted a more elaborate instrument with scales and reading microscopes &c we could make it for you, but I think that which I send you design of will suffice for your requirements.; the other would be nearly double the price.

Some little time ago you asked me as to how your account stands. On looking into it I find that you owe me very little. From the enclosed account which includes everything you will see that you owe me £14. 4. 6d, while I think you have

a bill against me or at least against our Eclipse Committee for some railway freights and charges to Plasencia which I shall be glad to have from you as soon as possible as I desire now to make up the accounts of the Eclipse Committee.

In a former letter or letters I mentioned the price of various other pieces of apparatus you spoke of, viz:- a 6 inch special focus object glass, price £66, and a Heliostat according to whichever design you select, £100, or £150. I think this will give you the information you require.

I have been so busy about other matters I have not been able as yet to put together & try the instrument for observing the solar prominences, but you may be assured when I get any results I shall let you know immediately. I fear the season is so far advanced now I will not be able to do much before the Spring as the Sun gets so very low in these latitudes in the winter.

I have to return you my very best thanks for the copy of the publication on the Solar Eclipse, and for the photographs which I shall distribute to the Members of the Eclipse Committee.

As regards the affair of the decoration. I have not had any news lately. I suspect that the elections here and the change of ambassadors in Spain, and the change also I hear of your Ministry will all delay matters still further.

With kindest regards to all your staff  
Yours very truly,  
H. G. P. G.

SIR HOWARD GRUBB, F.R.S.,  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

21st of December 19 00

Professor F. Iniguez.

Dear Professor Iniguez,

I just write a line to apologise for not having answered your letter of the 15th of Nov before.

I am making enquiries and will let you know very soon the particulars you ask for, but just at this present time, before the Xmas holidays, it is very difficult to get the shipping Companies to attend to anything; shortly after Xmas however I hope to write you fully.

I have to thank you for the additional order for the measuring machine which has been put in hands.

Would you allow me to convey to you my best wishes for the Xmas season and for the coming New Year, and I will ask you to convey also my kind wishes and those of my son to all your Staff whom we met at Plasencia, an occasion of which we retain very pleasant memories.

Very truly  
Yours  
H. Grubb  
H.G.

Optical and Mechanical Works.

Office,  
57, RATHMINES ROAD,  
Goods Entrance,  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL  
INSTRUMENT WORKS,  
BY  
OBSERVATORY LANE,  
RATHMINES.

RATHMINES.

Dublin 7<sup>th</sup> of July 1890.

The Astronomical Observatory Madrid

To Sir Howard Grubb, D<sup>ns</sup>

Cheque received from  
Professor F. Arizquez on  
acc of measuring machine  
for above Observatory and  
other small matters

£90-0-0

Received with thanks £90.00

Howard Grubb  
7<sup>th</sup> July 1890



Madrid le 3 Janvier 1900

Monsieur Howard Crosby

Subhi

Monsieur: Je suis en possession de  
votre très estimable du 29 décembre et je  
suppose qu'à présent vous aurez reçu la  
mière du 28, dans laquelle, en vous  
envoyant une lettre d'échange sur Londres  
montant £ 900, je vous faisais définitive-  
ment la vente des coupes et du  
velostat. C'est par un oubli que je  
faisais de vous dire que le dit velo-  
stat, etant des conditions du (3) de  
votre lettre du 20 octobre, doit être con-  
tinuit pour <sup>des</sup> latitudes de  $36^{\circ}$  à  $44^{\circ}$  N.

Il ne faut pas oublier que le 30 août  
1905 nous aurons une éclipse totale  
de soleil, de près de 4 minutes, beaucoup  
plus important que celui du 28 mai  
prochain, et dont la ligne cen-  
trale pénétrera dans notre pays un

peu à l'Est de Antropol (Asturias) dans le  
hautabrique, et sortira au Nord de  
Castillon dans la Méditerranée, et le Col  
brat doit il servir à l'observation des deux  
éclipses.

Je vous prie aussi de préparer le projet  
d'installation d'une des coupes, à fin de vous  
tenir à son temps le pavillon, et q' il soit  
disposé à recevoir la coupe sitôt qu'elle  
soit arrivée.

En vous remerciant par les desirs que  
vous avez la bonté de préparer à fin de  
les envoyer, et que nous désirons vivement, j'ai  
l'honneur, Monsieur, de vous envoyer  
mes salutations respectueuses

Madrid le 10 Janvier 1900

M<sup>r</sup> Howard Grubb  
Dublin

Monsieur: Je suis en possession de  
la lettre de M. S. Ladd, 2 janvier; je ne vous  
ai donnée réponse immédiatement par des  
occupations pressantes.

J'ai le plaisir de vous manifester, quant  
à la spectroscopie, que nous désirons l'au-  
ployer avec l'équatorial visuel ~~spécia-~~  
spécialement dans les observations directes,  
et seulement par exception, en profitant  
des circonstances particulières, avec la  
lunette directrice de l'équatorial photo-  
graphique.

~~Monsieur~~, Monsieur, agréer mes saluta-  
tions respectueuses



Madrid le 18 janvier 1908.

M. Howard Crosby.  
Athènes.

Monsieur: Je suis en possession de vos lettres  
très estimées du 10 et du 13 janvier, et j'ai reçu  
aussi les dessins représentant l'équatorial photo-  
graphique et l'une coupole: je vous remercie bien  
de toutes vos bienveillantes attentions.

~~Je vous prie de m'envoyer (dark frames) par la poste  
deux exemplaires de votre photographie, afin de m'en faire  
un usage personnel.~~

Quant aux châssis (dark frames) je vous  
 ~~prie~~ <sup>prie</sup> de m'indiquer combien de plaques peut  
porter chacun d'eux simultanément.

J'eus occasion déjà de vous manifester que  
nous voulons employer l'équatorial avec l'é-  
quatorial visuelle: c'est dans une de vos  
lettres que vous nous suggérez l'idée d'  
utiliser aussi la lunette directrice de l'é-  
quatorial photographique dans des obser-  
vations visuelles, et c'est par ça que nous  
avons pensé que peut être dans quelque oc-  
sion exceptionnelle serait il convenant qu'on  
pourrait accommoder le spectroscopie dans la  
dite lunette visuelle, mais seulement par

exception. Si l'arrangement q' il faut employer avec cet objet la, vous fait perdre beaucoup de temps, laissez le au présent; on peut y penser dans l'avenir si il y a besoin.

Effectivement, nous voulons le prisme pour des applications photographiques, et disposé de la manière indiquée dans votre dessin de la lunette équatoriale photographique

J'ai parfaitement compris la disposition q' il faut donner au mur, a fin de supporter le soliel circulaire de la coupole: je desire a' present avoir quelques indications sur la disposition intérieure de la chambre circulaire, tant spécialement de l'elevation du mur et ~~de la~~ de la disposition du <sup>support</sup> ~~support~~ destiné a recevoir le pied de l'équatorial. Je vous prie de adresser moi une section vertical de la dite chambre, a fin de la donner a l'architecte qui ~~recevra~~ recevra la construction de construire le pavillon photographique, ou on emploiera la lunette équatoriale depuis l'éclipse

Les instruments vraiment indispensables pour l'éclipse sont ibs les deux équatoriales, le spectroscope et le cœlestrot; quant aux coupoles et a quelques accessoires on peut attendre. Mais ~~je~~ nous voudrions que l'équatorial

3  
toriel photographique fut elle terminée quelque  
temps avant de l'éclipse, a fini de l'essayer  
ici avant de la porter au point où pour l'ob-  
servation de l'éclipse: nous faisons pour ça  
une installation provisoire.

Je desirais effectivement une des coupoles  
~~avec~~ plus <sup>promptement</sup> ~~et~~ que l'autre, par des motifs de  
installation; on installera immédiatement  
l'une d'elles dans le jardin, ou on construira  
un pavillon ad hoc; je veux installer l'  
autre dans la part la plus élevée de l'Ob-  
servatoire, ou il y a lieu pour l'y placer  
avec toutes les conditions de solidité, immobilité  
ampleur d'horizont, etc. qu'on peut desi-  
rer, mais je ne <sup>sais</sup> pas si je arriverai à vain-  
cre toutes les difficultés qu'on trouvera dans  
cet affaire.

Je laisse à votre décision la manière de  
faire tourner les coupoles, soit en les poussant  
directement, soit avec des engrenages.

~~Je vous prie~~  
Veuillez bien Monsieur recevoir mes salutations  
empresées

Madrid le 5 Janvier 1900

Sir Howard Grubb.  
Dublin.

Monsieur: Votre tres aimable lettre  
du 27 janvier me renseigne sur le "dark fra-  
me" dont vous avez le projet de ~~donner~~<sup>munir</sup> notre  
equatorial photographique; je suis bien  
d'avis que la dite equatorial photographe  
que ~~peut~~ soit elle <sup>munie</sup> du chassis me-  
tallique de precision, dont vous parlez,  
et qui est celui meme employe dans la  
photographie  
~~transmission~~ internationale; il n'est ~~pas~~<sup>ce</sup>  
chassis, <sup>ce</sup> qui nous employerons quand l'  
equatorial soit <sup>elle</sup> instalée dans cet Obser-  
vatoire, depuis l'eclipse. Mais dans l'ob-  
servation de ce u, il faut avoir des  
chassis <sup>suffisants</sup>~~suffisants~~, a fin de tenir deja  
preparés les plaques qui doivent être  
impressionnées, et pour ce nous desirons  
que, outre le dit "frame" metallique l'  
equatorial portat elle six "ordinary  
frames" destinées a la lunette equatoriale

et trois autres pour le « doublet », portant chacune deux plaques. Vous ne devez le montant total de ces pièces additionnelles, ni fin de les ajouter dans ~~to~~ notre compte.

Je suppose que ~~est~~ <sup>tant</sup> la lunette, que le doublet photographiques porteront les obturateurs indispensables.

Si la equatorial visuelle es si avancée dans sa construction, je vous prie de ne la laisser, mais la continuer jusqu' à la fin, et l'envoyer avec l' spectroscopie.

Quant à l'equatorial photographique, moins avancée, puis que ~~elle~~ n'arrive <sup>à l'opération</sup> vite elle avec l' ~~adaptation~~ <sup>opération</sup> nécessaire pour l'exposer, je vous prie de vous indiquer les plaques photographiques plus acceptable pour les employer dans le cylindre et obtenir photographies de la couronne spécialement, des environs du Soleil, et du Soleil aussi avant et après la totalité; et je vous serai de

3

plus très obligé si vous indiquez les meilleurs liquides à employer dans la revulsion et fixation: avec ça on peut espérer que tout ira bien avec seuls quelques jours d'essai.

Je espère aussi que le colostat ura il terminé opportunément.

Sans avoir eu dans l'Observatoire une équatorial de North de  $0^m, 27$  d'objectif et  $4^m, 87$  distance focale: l'instrument est bien acceptable, mais l'objectif donne des images defectueuses, d'une définition peu exacte. Peut être l'objectif n'est il <sup>bien</sup> uniforme, peut être s'est il déformé avec le temps. Je suis d'avis qu'on pourrait corriger ses défauts par une nouvelle <sup>de</sup> polissage de l'objectif en lui donnant la forme exacte sans altération très sensible de la distance focale. J'espère de votre amabilité votre opinion sur ce point.

J'ai de la peine que l'expédition irlandaise à notre pays ne se vérifie pas, et je sens surtout le motif de la suspension

4

nous savons par une expérience  
 bien récente et douloureuse  
 le ~~premier~~ de que la guerre est la <sup>cause</sup> ~~la~~  
<sup>cause</sup> ~~la~~ <sup>des importantes</sup> ~~des~~ <sup>ventures</sup> ~~des~~ <sup>des</sup> ~~des~~ <sup>des</sup> ~~des~~  
 annonce plus d'une expédition.

Madrid le 12 février 1900.

M. Howard Grubb  
Dublin.

Monsieur. - J'ai le plaisir de vous avoir  
reçu les dessins que vous avez eu la  
bonté de m'adresser avec votre lettre du 6.  
Nous ~~ferons~~ <sup>construirons</sup> le pavillon en briques,  
avec le "top" en pierre: l'Architecte  
me charge de vous manifester q' il n'  
a <sup>pas</sup> besoin à présent de plus amples rensei-  
gnements, mais q' il desiré que vous en  
voyez avec la coupole les ~~châ~~ boulons  
ou "bolts" (~~je suppose de fer, mais vous avez~~  
~~constamment écrit "stone bolts"~~) servant à  
assujétir au "top" du mur la base en  
fonte - the cast iron wall plate - de la  
coupole.

Je vis avec reconnaissance l'attention que  
vous dediez à nos instruments, à fin ~~de~~  
q' ils résultent parfaits, et j'espère q' avec  
des objectifs bien réussis, <sup>malgré</sup> ~~non obstant~~  
ses <sup>petites</sup> dimensions, on pourra dans ce vil



presque toujours si j'en ai le loisir faire  
quelque chose de bon.

Madrid le 20 février 1900

Sir. Howard Crosby.

Monsieur: Votre très aimable lettre du 14<sup>e</sup> me renseigne sur l'état d'avancement de nos instruments et sur les quelques détails dont on fait mention dans nos lettres ~~à votre égard~~.

La notice de votre intention de venir visiter l'Espagne a été pour moi avec le mouvement d'un grand bonheur, mais nous ne resterons pas à Madrid <sup>pour</sup> observer l'éclipse, au ~~moins~~ savoir bien ça — l'éclipse n'est pas total, nous allons à Navalmaral de la Mata ou à Plasencia, dans la ligne central et on la totalité à la plus grande duration. Le pays n'est pas si beau q' Helle, Alicante, Santa Pola, etc., mais à la fin de moi il n'y a pas il n'y a pas en Espagne un seul point qui ne soit

très blanc.

Je ne suis pas nullement pressé par la question de l'équatorial de M. de ~~Blanc~~ ~~ou~~ on peut attendre.

Je ai trouvé ~~ici~~ ainsi dans un coin de l'Observatoire, posés dans des ~~caisses~~ <sup>caisses</sup> pompeusement choies deux miroirs concaves de 0m65 de diamètre, je ne puis dire sa distance focal, <sup>très longue</sup> car je me suis limité à constater l'existence et note qu'ils son en ~~le~~ état <sup>apparemment</sup> satisfaisant de conservation. ~~Car ne s'en doute pas~~ ils sont de fabrication anglaise et sont une part d'un télescope de réflexion, dont la construction fut ordonnée au commencement du siècle, et qui n'arriva <sup>pas</sup> à fonctionner <sup>ou</sup> s'il fonctionna très peu de temps par les vicissitudes de la guerre française, alors que l'Observatoire fut occupé par les troupes de Napoléon, ~~et~~ tous les instruments astronomiques et les tuyaux des télescopes transférés en crèches pour les chemises! Quel destin on pourrait donner aujourd'hui à ces miroirs? J'espère que votre visite à cet Observatoire <sup>en nos diversant</sup> sera pour occasion de nous <sup>nos sentiments</sup> ~~nos~~ <sup>leur</sup> ~~bien~~ <sup>haute est</sup> ~~beneficence~~ <sup>profitable</sup> ~~profitable~~ <sup>recreation</sup> envers vous, mais sera aussi bien profitable.

Equatorial visual de Grub.	1900
Caja de oculares -	
Helióscopo. de Dawes	5 L y 5 cheques 1901
Id combinado	8 L 8 " - 1901
Micrómetro unifilar.	15 L 1900
id bifilar.	24 1901

Equatorial fotográfica  
 con chássis de metal.  
 con id de madera  
 3 " " " pequeños.  
 Cuadrícula en vidrio  
 Macro-micrómetro 50 L  
 Prisma objetivo

Aparato para ampliaciones.  
 Objetivo de Coetz 100 ptas.

Anteojo meridiano de Salviroagli	7050 fr	1901
" de Paris	5050	1900
Geodolito	2000	1900

Cochet 350

Magnetómetro de viaje, sistema Brienne, construido por Salviaggi. 850 fr. 1901

Espectroscopio de Grubb.

" de Pellin de Pruit, 5 prismas.

Cámara fotográfica para el mismo.

Espectroscopio de dos prismas de cuarzo Pellin.

Goggles.

Accesorio de espectroscopia.

Lente de Bunsen. 100 1900

Cámara primitiva (Objetivo para)

Péndulo de Strasser ~~2000~~ 1112 fr 1900

" eléctrico - Puyo Favarger y Comp. 3000 fr

Levoniógrafo

Parja de colimadora - Salviaggi. 1900 fr. 1901

Ocular de precisión 1350 - 1902

Cronómetro con contactos eléctricos.

Oculares radiales 74.50 fr. 1900

Máquina de división rectas y círculos 1130 fr 1900

Teodolito de Grubb 900 - 1900

Teodolito de Grubb

Teodolito de Mailhat. 2300 fr. 1901

Objetivos " 1100 fr

Cámara para el Sol con obturador 180 1901

Máquina para examinar prismas

Apasato para la electricidad atmosférica.

Pirómetro de Angström 300 fr. Upsala 1903

Forma de precisión H. Weber - Berlin 1581,25 - 1900

Mirra 225 1901

Lens chinos 50 1901

22 mars 1944

Sir Howard Grubb.

Monsieur: Il est possible que j'aie  
besoin de vous payer brièvement le  
rangement de votre compte, et c'est  
pour ça que je vous prie de  
m'envoyer la liquidation si com-  
plète que possible, en y incluant les  
frais d'emballage et transport  
prudemment estimés, si on ne  
peut savoir à présent le montant  
exact; je pourrai ainsi vous livrer  
la quantité estimée et puis la  
différence, si quelque un a, sera  
l'objet de notre liquidation de  
finitive.

Les formalités de notre administra-  
tion, qui finit retarder de presque un  
mois l'envoi de la première tirai-  
son q'on vous fut adressée, exigent  
peut être q'on avance ~~ou~~ le  
paiement ~~definitif~~ de ce qui reste et

je veux être présente si c'était le  
cas.

Nous attendons déjà la prochaine  
arrivée du Colostat



000

Madrid le 31 mars 1900

Monsieur Howard Crosby  
Dublin

Monsieur: Je ~~vous~~ réponds  
à votre très estimée lettre du  
26 et j'ai le plaisir de vous  
manifestar que la meilleure  
manière d'envoyer nos in-  
struments c'est par le port  
de Bilbao en les adressant  
à cet Observatoire: déjà sous  
la Douane auroit l'ordre  
de les recevoir à Madrid  
sans ouvrir les caises. Il faut  
que vous envoyez le certi-  
ficato de <sup>du consul Ma-</sup> origen a fin de  
faciliter in les opérations

Je vous  ~~prie~~ <sup>demande</sup> de ~~me~~ pardon-  
~~ner~~ si je vous prie de n'oublier



par le conseil de Mr. Loskyer  
de ne disposer dans une  
caisse des poids supérieurs  
à soixante kilogrammes <sup>m</sup> n'  
pu de ~~faute~~ supérieurs sans  
coup de difficultés.

Vanilles etc

1

Madrid le 31 mars 1900

Sir Howard Lamb  
Dublin

Monsieur: J'ai eu l'honneur  
de vous accuser réception de vo-  
tre aimable lettre du 27, et je  
voudrais ~~par~~ <sup>en</sup> vous manifester  
que c'est avec le plus grand  
plaisir que je me suis renseigné  
sur votre projet de venir  
pres de nous observer l'éclipse  
de mai prochain.

Vous nous avez définitivement  
fixé notre expédition à Pla-  
sencia, ville placée dans la  
ligne de la centralité, avec  
des moyens de s'installer con-  
fortablement, dont les immédiate-  
ments ont des collines de ~~élévation~~ hau-  
teur considérable et facile accès, et

en communication avec Madrid  
 par chemin de fer; la de plus  
 la duration de la totality sera  
 la plus grande des points ana-  
 logues en Espagne, circonstance  
 ce pas mesurable certainement.

Je vous ai adressé la carte to-  
 pographique de Plasencia,  
 dressée par notre Doyen de la  
 guerre; cherchez vous dessous  
 la ville; voila la colline  
 de Santa Barbara à laquelle  
 on peut aller en voiture: là  
 on trouve a present un  
 goniometre a fin de en rectifier  
 la position géographique, dont  
 les éléments provisionnels  
 sont a present

Altitude = 657<sup>m</sup> 23

Latitude = 40° 0' 50" 20

Longitude =  $2^{\circ} 22' 50'' 34$  W. de Madrid

A la fin d'april nous inviterons  
les deux astronomes et un auxi-  
liaire, à fin de déterminer exacte-  
ment le temps et la latitude, et  
de plus préparer l'installation  
des instruments; quelques jours avant  
l'eclipse ira ce qui reste des astro-  
nomes et auxiliaires à fin de  
vérifier les observations.

La colline de Santa Barbara  
est elle, d'après ~~je~~ mes infor-  
mations, de l'espace pour y  
installer commodément vos ins-  
truments et ceux qui nous por-  
teront, et en faisant la distribu-  
tion des installations nous aurons  
présents avec vrai plaisir, et de  
vos nécessités et de vos convenien-  
ces.

C'est en effet Bilbao le port

le plus conveniement pour le  
 débarquement de vos instru-  
 ments. A votre arrivée déjà  
 le Souverain aura l'ordre de  
 vous laisser passer vos instruments  
 et équipages avec franchise de  
 tout droit de paiement. ~~Et~~  
 Une fois débarqués, vous pourrez  
 facturer vos caisses par chemin  
 de fer à Madrid, pour être  
 réexpédiées à Placencia, ou  
 déjà directement à Placen-  
 cia. La compagnie des ~~chemins~~  
 chemins de fer du royaume a  
 elle fait l'offre de conduire  
 les instruments des artrou-  
 mes en grande <sup>vitesse</sup> ~~vitesse~~ au  
 tarif de la petite vitesse, et  
 nous prouverons que ce propos  
 soit elle tenue  
 Cependant il faut n'oublier

pas que le temps est déjà  
présent et il faut n'en pro-  
dre pas un instant, à fin  
que les instruments ~~soient~~ soient  
installés opportunément.

Nous sommes volontiers à la  
votre disposition, et ferons tout  
ce qui pourra vous être utile  
et sera dans nos moyens d'ac-  
tion.

À propos de l'éclipse on dit  
qu'un Mr. Cook conduira une nombreu-  
se expédition anglaise à Savaburo-  
rol de la Mata (pres de Fla-  
sencia) ou à Falavera de la  
Reina, dans la même région;  
je n'ai des renseignements par-  
ticuliers sur cette expédition.

Une autre expédition d'allemands  
ira à le centre d'Espagne, peut-être  
à Orgamevilla

vous voyez que la bande de l'eclipse  
 central va remonter naturellement  
 divisée aux fins de l'observation  
 de l'eclipse en trois regions,  
 la region orientale occupée par  
 les français; il y aura aussi la  
~~bande~~ Santa Pola, la mission  
 de Sir J. N. Lockier; la region cen-  
 trale pour les allemands; la  
 occidentale pour les anglais: je  
 crois que ce dernière region doit  
 être de conditions avantageuses.

Madrid le 2<sup>e</sup> avril 1900

M<sup>r</sup> Howard Lamb  
Dublin

Monsieur: En répondant à votre lettre du 27 mars j'ai l'honneur de vous manifester que vous pourrez vous signer les caisses des instruments à Bilbao à "D. Melitón Zulaica, Agente de Aduanas", en lui ordonnant de faire la réexpédition à Madrid par chemin de fer en "doble pequeña velocidad" à fin d'obtenir quelque gain de temps; tout ça, bien compris, si c'est que vous n'avez la un autre représentant. Si vous avez un autre représentant, c'est à lui que vous pourrez ordonner ce que je vous indique par Mr. Zulaica. La direction des douanes <sup>advisera</sup> ~~pour~~



les dispositions nécessaires a fin ~~de~~  
que les caisses ne soient ouvertes  
à Bilbao, et que elles arrivent in-  
tactes jusqu'à Madrid; pour ça  
il faut que dans les memes  
caisses inscrire la direction à  
cet Observatoire.

Je vous prie de me donner avis in-  
tot que les caisses soient livrées, in-  
diquant le nombre et les marques  
des caisses, à fin que dans le temps  
qui elles ~~partiront~~ depensezont en vo-  
yagement à Bilbao je puisse adopter  
rapidement les dernières dispositions.

Et de nouveau je vous répète ma prière  
de n'oublier pas le certificado de ori-

gen

Veuillez bien, toujours, agréer mes  
salutations empreintes

Madrid le 2<sup>e</sup> avril 1900

M. Howard Grubb

Américain

Monsieur: Je vous indiquerai sommairement notre programme d'observations de l'éclipse prochaine.

Premièrement les observations purement astronomiques, c'est à dire, les déterminations exactes des coordonnées géographiques et de l'heure locale; ces déterminations du temps et de la latitude, fondamentales, pour bien apprécier les moments <sup>précis</sup> des contacts seront faites avec l'anticipation nécessaire par les deux astronomes et l'auxiliaire mentionné dans ma lettre du 31 mars.

Avec l'écliptique visible nous avons intention de faire des mesures spectroscopiques dans les régions orientale et occidentale de la couronne en vue d'apprécier sa rotation.

Le cabinet en combinaison avec

une lunette servira à conduire les radiations solaires sur un autre spectroscopie destinée à faire des déterminations ~~de~~ <sup>de</sup> calculer la longueur d'onde de la mystérieuse raie verte.

Peut être nous ~~ferons~~ <sup>fais</sup> quelque essai à fin d'obtenir des photographies de la région ultraviolette de l'espectre avec un petit ~~spectroscopie~~ <sup>en</sup> ~~en~~ <sup>en</sup> quart et spect: je ne puis encore rien affirmer de définitif sur ce point; ça dépend de plus d'une difficulté.

Avec l'équatorial photographique nous désirons obtenir une série de images de la couronne avec l'objectif de huit ~~et~~ <sup>de</sup> pouces, et seulement trois images des environs de Soleil avec le doublet.

Et à propos de cette équatorial j'ai à vous manifester que nous n'avons pas de temps nécessaire pour acquiescer les plaques; et pour ça je vous prie

de nous envoyer quelques douzaines  
 des dites plaques de dimensions et qua-  
 lités convenables; et ~~de~~ plus je vous repe-  
 te ma priere d'indiquer ~~les meilleures pla-~~  
~~ques~~ quelles seront ces plaques, a fin d'  
 avoir quelque temps de les essayer ~~et~~  
 avec un autre instrument, si heurte-  
 rement il y en avait d'elles ~~et~~ a Ma-  
 drid, ce que je crains que <sup>ne</sup> sera pas ainsi.  
 Car celles qui je vous prie d'envoyer  
~~avec l'ap l'equatorial~~ nous n'aurons  
 le temps de les essayer q' a Plasencia,  
 quelque jour avant l'eclipse. Peut etre  
 vous pourrez deja envoyer quelque portion  
 avec les autres instruments; si c'est ain-  
 si je vous prie de les envoyer, toujours  
 en envoyant quelques autres avec l'equa-  
 torial photographique.

A les indiquees observations faites junc-  
 tion des indispensables observations me-  
 teorologiques, des variations de la hu-  
 midite, de quelque observation astro-  
 nomique, des hautes, de l'umbra, etc.  
 etc. et vous aurez ~~une~~ action de nos

intentions. Je vous serai bien obligé  
de me chercher sur ce point votre opi-  
nion et celles de Mrs. Joby et Wilson  
son.

Quant au montant de ce qui res-  
te de notre compte je ne me suis  
bien expliqué; je ne desire pas le mon-  
tant exact; (d'autre part se servirait  
bien impossible, puis que je vous fais  
encore des nouvelles demandes); je desi-  
re seulement une approximation, ~~me~~  
~~bien~~ ~~un~~ ~~calcul~~ ~~approximatif~~ a fin d'  
être renseigné ~~en~~ et en disposition  
de vous livrer la quantité, si c'est  
nécessaire par les formalités toutes  
especiales de notre administration; mais  
ça ne signifie pas la nécessité d'une  
une liquidation définitive.

Recevez, Messieurs, l'assurance  
de ma considération la plus obli-  
gée.

Madrid le 5 avril 1900

Sir H. Grubb  
Dublin

Monsieur: J'ai le plaisir de vous adresser ci avec un check ~~sur le~~ <sup>sur le</sup> Crédit Lyonnais à London, montant neuf cents trente livres sterling — (930 £) — que vous annoterez dans votre compte.

Je suis conforme avec l'addition <sup>et vos remerciements</sup> du focal plane shutter dont vous faites mention dans votre lettre du 31 mars.

Les dépenses <sup>de</sup> ~~qui~~ occasionne la construction des instruments des Dittas à Madrid nous nous chargerons de remboursement et vous n'avez à faire que donner l'avis opportunément, d'après ce que je vous en <sup>de</sup> ~~ai~~ <sup>ai</sup> indiqué.

~~Les~~ vous avons cette année un printemps complètement anormal, et jusqu'à présent on peut dire une prolongation de l'hiver; tout ça fait espérer un mois de mai splendide, avec un

aid d'une parfaite transparence ;  
q' il soit ainsi  
breveté etc.

En carta dirigida a este Observatorio por Sir Howard Grubb, de Dublin, con fecha 11 de abril de 1900, consta el siguiente párrafo:

"Tengo que dar a V. las gracias por su amable prontitud en dirigirme la libranza por £930 que he abonado a V. en cuenta: muchas gracias."

Certifico que lo consiguado es traducción fiel del original inglés a que se refiere, y que la cantidad en cuestión fue girada para el pago de la cantidad estipulada por los encargos de instrumentos hechos a la Casa H. Grubb de Dublin. Madrid 15 de Agosto de 1900



Madrid le 30 avril 1900

Sir. Howard Grubb  
Dublin

Monsieur: J'ai le plaisir de  
vous adresser réception de la liste des objets  
dont se compose votre première consignation  
à cet Observatoire. J'ai reçu  
aussi le Memorandum, avec les notices  
relatives à l'installation des instru-  
ments, dont je vous remercie.

D'après mes informations il y  
a à Madrid une maison, Gusta-  
vo Malbines, 25 Anón de Fornos, qui  
fait le commerce de toiles imprimées  
bles; je savais déjà que la on construi-  
sait des tentes, car il a fait celles  
que nous portons. Mr. Malbi-  
nes il m'a informé q' il a une  
des couvertes en ~~toile~~ toile imprimée  
de 6 mètres <sup>7 5 mètres</sup> au prix de

une perle et demi - perle 1,50 - par  
jour, étant naturellement à la  
charge de celui qui fait emploi  
des toiles les frais de conduction. Peut  
être vous trouverez ces circonstances  
avantageuses, car le taux n'est pas  
excessif, et à Plasencia il y a des  
moyens de faire installer les dites  
toiles, de manière qu'elles abritent les  
instruments.

Je pars aujourd'hui à Plasencia  
et retournerai probablement ven-  
dredi prochain.

Unillea, Monsieur, agresseurs  
relaxationes expressas

J. Triguera

Madrid le 19 mai 1900

M<sup>r</sup> Howard Lubb  
Dublin

Monsieur: Votre aimable lettre du 14  
me renseigne sur ~~vos~~<sup>vos</sup> projets de voyage  
et sur vos ~~avis~~ <sup>avis</sup>. Or, votre fils demeurait-il les  
jours qu'il est passé à Madrid dans l'  
Hotel de Madrid. Tant cet Hotel, que  
ceux de la Paix et de Roma sont  
tous tres bons: aussi l'Hotel del Univer-  
so, à la Puerta del Sol, est bien  
acceptable.

Quant aux instruments: ils ont été  
envoyés de Bilbao le 17; je les atten-  
dais ici hier soir ou aujourd'hui  
matin, mais ils ne sont pas arrivés;  
m<sup>is</sup> à la suite avis télégraphique à fin  
d'en acquiescer des nouvelles et à pré-  
sent — midi — je n'ai reçu pas de  
réponse; je espère que les instruments  
arriveront aujourd'hui et sitôt que  
les réexpédiera à Florence.

de peu. arriver à faire avec le porteur de votre équipement.

L'équatorid visuelle est déjà à Plasencia avec d'autres instruments, et je <sup>les</sup> suppose déjà installés tous, sous ses tentes. On se trouve Mr. votre fils, si dès le 17. nous n'avons pu en du temps pour essayer les instruments à Madrid

Le temps est en ce moment assez mauvais dans toute la Peninsule, mais la tendance à s'améliorer est très sensible.

Je n'ai nullement intention de vous venir à Madrid: je voudrais seulement que vous donneriez un coup d'oeil à l'objectif de l'équatorid de North et je desirerais aussi porter avec vous pour Plasencia tous ensemble.

A Jour vous n'aurez que des facilités en exhibant les documents qui montrent votre caractère officiel; les caisses des instruments ont été déjà

Sabrid Junis 18/900

Li H. Grubb.

Thomasius - J'crois avoir eu  
pouis que vous aviez à present l'idée  
de construire un appareil nouveau pour  
étudier la chromosphère solaire: je vous  
serais bien obligé si vous auriez  
la bonté de me donner quelque  
information sur les conditions de  
l'application du dit instrument,  
et du prix des révolutions, à fin d'en  
juger si vous souvenez en état de  
vous le commander

Je voudrais aussi avoir les prix  
de vos Helioscopes et des objectifs  
photographiques: peut être vous  
obtiendrez quelque quantité  
d'argent applicable à l'acquisition  
d'un objectif de six pouces

pour l'appliquer à la photographie  
de l'objet en jonction avec un résis-  
tant. A présent vous avez à insta-  
ler ici d'une manière permanente  
les équatoriaux portés de Plancia.

Veuillez bien, Monsieur, agréer  
mes sentiments respectueux.

Madrid le 14 juillet 1890

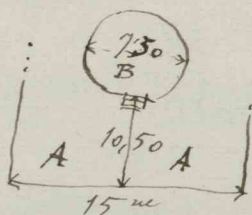
M<sup>r</sup> Hermann Grubb.

Amsterd<sup>am</sup> <sup>Suisse</sup>  
Mon cher Monsieur:

Je vous remercie de votre lettre du 10, et de la brochure sur le montage des équatoriales que j'ai reçue aussi.

Le devant est-il déjà monté à la cour de l'observatoire en relation avec un spectroscope placé dans une baraque sur des roues et rails.

À la lanterne je veux placer un autre spectroscope et une chambre photographique si c'est que vous avez des moyens, et pour ça je aurais à placer à la terrasse du sud un sidérostait ou un heliostat à fin d'envoyer en la direction N.E. un faisceau des rayons horizontaux



J'en de l'appare bien suffisante ~~ce~~ ce qui vous vaudra par le petit croquis ci ~~joint~~ joint on A A c'est la terrasse N. et B

la hauteur

J'espère obtenir une complète correction  
de l'objectif de Murey et alors, en ameli-  
orant son mouvement d'horlogerie  
je pourrai placer au centre spectroscopique à  
fin d'étudier l'impact et les perturbations  
des bandes du Soleil et des étoiles doubles  
équatorial visible à les étoiles doubles  
etc. L'instrument pour l'observation  
des perturbations nous pourrions l'acquie-  
rir si effectivement le prix se trouve  
la quantité par vos mentions.



Madrid le 14<sup>e</sup> juillet 1900

M<sup>r</sup> Howard South  
Sublime

Mon cher Monsieur:

Je ne fais reposer l'affaire de la dévotion et j'espère que la demande de l'agrement du Gouvernement anglais se verra elle-même immédiatement.

Je vous remercie vivement de l'offre des photographies de la l'éclipse à Placentia. A en juger par les descriptions c'est à Placentia ou on a eu un ciel plus beau: d'après la relation de M<sup>r</sup>. Deppaud ses photographies indiquent une couronne de une extension d'un fois le diamètre de la Lune; j'ai une plaque où la couronne va presque à trois fois le diamètre lunaire. Effectivement les uniques photogra-

graphies positives faites jusqu'à présent  
ont été présentées à S. M. La Reine  
qui les a gardées; je lui présenterai  
encore les vôtres si vous avez la ben-  
té de les envoyer pour ça.

A présent je prépare un petit  
projet historique de l'observation de l'  
éclipse à Plasencia; il n'aura caract-  
ères scientifique, si bien on indiquera  
sa les résultats obtenus. La plus  
grande difficulté que j'expérimente  
c'est la reproduction des photogra-  
phies avec toute sa richesse des de-  
tails: c'est bien difficile de les con-  
server.

Le calcul nous a-t-il donné pour la  
longueur d'onde de la raie verte  $\lambda 5297,3$

Je vous enverrai des photographies  
de la couronne  
si tôt que nous aurons des positives

J'ai une vraie curiosité de connaître le  
résultat de l'instrument de Mr. Braun  
font.

Je suis toujours quelque peu malade  
et j'aurais besoin de me charger de  
Stavrod quelque temps si j'ai d'éc pour  
dre des camps minérales; je voudrais avant  
ma partie laisser tous mes affaires  
terminées: en tout cas je vous donnerai  
avis de ma partie et de la ma-  
nière de m'adresser la correspon-  
dance.

Madrid le 3 octobre 1940

M. Howard Grubb

Dublin

Monsieur: Les œuvres de construction du pavillon destiné à abriter les équatoriaux commenceront incontinent. Je suppose que vous aurez besoin des comptes à la fin de décembre. Cependant il faudra ~~trif~~ que vous m'envoyez avant une indication du probable montant de notre compte, car les lois de notre comptabilité nous imposent l'obligation de terminer tout paiement avant de la <sup>fin</sup> ~~terminaison~~ de l'année. C'est pour ça que je vous prie de m'adresser une indication confidentielle de votre opinion sur le montant ~~de~~ final de notre compte à fin de vous le livrer opportunément, et puis nous faisons la liquidation de fin

utile. Ça sera pour moi un moyen  
d'éviter beaucoup des difficultés.

J'espère votre information sur l'in-  
strument destiné à l'observation de la  
cromosphère solaire.

Veuillez etc.

A Grubb en 19- oct<sup>bre</sup> 1900

Monsieur: ayant besoin  
de un micromètre à fin de l'  
utiliser dans l'épaisseur des plaques  
photographiques, je vous prie de m'  
indiquer le prix de l'instrument  
~~en question~~ tel que vous le construisez sans  
doute dans vos ateliers.

Les œuvres pour l'installation de  
équatoriaux sont déjà commencées.

Madrid le 29 decembre 1940

Sir Howard Crosby  
Dublin.

Mon cher Sir Crosby: J'ai l'honneur  
de vous envoyer un cheque à \_\_\_\_\_  
\_\_\_\_\_ pour la quantité de £90, quatre-  
vingt dix livres, dont je vous prie de m'envoyer  
reception

J'ai reçue votre lettre du 21 et je suppose  
que vous serez aussi en possession d'une autre  
à moi qui je vous écris en craignant que vous  
n'avez pas reçue l'autérieure.

Les œuvres du pavillon avancent; la construction  
en briques sera tout prochainement termi-  
née; ensuite on placera les corniches en pie-  
res pour recevoir la base des canopées.

Remilles ajoutées . . . .

Si il est possible, je vous prie de nous envoyer  
une ou deux mètres de la toile noire dont il  
est fait l'obturateur du doublet de l'appareil  
optique photographique; il faut corriger les  
bubblures faites par le Soleil à Placencia.

Remilles . . . . P.L. Le cheque est adressé à  
Monsieur.

A Dublin le 22 1900

Mon cher Sir Lubbock: Je vous reçois  
une lettre en 15 novembre, en vous recommandant  
la construction d'un micro-mètre au  
prix de £ 50, en vous indiquant que le  
~~montant~~ des frais payés ici par la com-  
mission scientifique de Dublin etait de  
pesetas 216,45 et en vous priant de m'en  
voyer votre confidentielle sur le montant  
<sup>répond</sup> des frais de construction à Bil-  
bao des comptes, afin de vous le livrer à  
bonne compte. Je n'ai pas eue de réponse,  
et je crains qu'elle se soit égarée en  
route, et je vous serais gré de me l'in-  
diquer, avant la fin de l'année, si possible  
Le travail pour le placement des <sup>un</sup> ~~un~~  
<sup>travaux</sup> ~~travaux~~ est déjà bien avancé et j'espère



	2		t	
27°	57'	6,1	- 21 <sup>me</sup>	54,56
	44	45,9	17	46,8
	41	0,4	13	16,6
	38	21,8	11	19,1
	34	6,1	10	41,6
	33	41,5	8	1,5
	30	16,6	6	10,1
28	23	23,9	+ 3	52,4
	28	22,2	7	49,6
	31	35,6	12	12,9
	36	1,8	14	39,9
	38	23,1	16	43,4
	42	53,6	18	42,6
	47	13,1	21	12,9

qui il sera terminé très prochainement.

Quand il arrivera la <sup>des instr</sup> omission ~~des instru-~~  
~~ments~~ je voudrais aussi recevoir

50 douzaines de plaques pour l'équato-  
 rial photographique, et une douzaine de  
 petites lampes électriques pour l'illumina-  
 tion ~~des lanternes~~ des lanternes: j'espère que vous serez la  
 bonté de nous fournir <sup>de</sup> ces objets  
 vitelles etc.

Al Jefe del departamento de exactitud de  
Instrucción P. en 22 de setiembre 1900.

Adjunto remito a V. el  
documento extracto de la cuenta de este  
Observatorio con la casa Brno de Berlin;  
en el verso V. L. indicada la cantidad  
de 573 Libras esterlinas que fueron  
gratificadas directamente por la Oficina  
de pagos. Cuando se termine  
el contrato que este centro tiene  
hecho con la referida casa en-  
viará esta recibo de la cantidad  
total si que ascenden sus recibos  
y podrá entregarlos a V. L.; ent-  
tanto solo puedo ofrecerle la pre-  
sentación de las cartas don-  
de se acusa el recibo de las can-  
tidades que sucesivamente se han  
gratificado, pero sin que sea posible  
a esta dirección desprenderse

de dichas cartas, por cuanto  
en ellas se contienen datos de impor-  
tancia relativos a los instrumentos  
sin cuyo conocimiento sería difícil la  
instalación y manejo de estos in-  
trumentos.

Es etc.

à Sir Brubb en 15 novembre 1900

~~Mention~~ à Sir Brubb.

Je vous remercie sincèrement des renseignements que vous avez eu la bonté de me communiquer sur le macromicromètre et je crois bien que'il suffit à mes besoins du moment un instrument des conditions de celui mentionné dans votre lettre du 26 octobre, dont le prix de £50 j'accepte, et je vous prie de procéder à la construction. Voici les quantités payées au nom de la Commission scientifique de Berlin

~~L'équivalence des livres et des pesetas  
a-t-elle été réglée bien des fois de moi à  
octobre; je vous laisse la tâche de fixer  
vous même cette équivalence~~

Quant à l'Heliostat et l'objectif photogra-

publique je crains qu'il faudra attendre une  
autre occasion.

D'après une communication que je reçus  
du Ministère de l'Intérieur la ~~commiss~~ petition  
du placet pour votre dévotion fut-elle  
faite le mois de Septembre: peut-elle  
elle doit à l'ambassade anglaise, ou  
à Londres et il faudra activer la résolution.

Je desirais une indication confidentiel de  
montant probable des frais d'expédition  
des sceaux, etc. à fin de vous lier la quan-  
tité à bon compte; ça vous facilitera ici beau-

coup les choses

vous transmettrai à votre la note des quantités  
payées ici au nom de la Commission scien-  
tifique de Dublin

Veuillez etc.

Offices  
57, RATHMINES ROAD.

Goods Entrance  
TO  
OBSERVATORY & ASTRONOMICAL WORKS.  
BY  
OBSERVATORY-LANE, RATHMINES.



GOLD MEDAL, PARIS EXHIBITION, 1867.  
CUNNINGHAM GOLD MEDAL, 1881.

HIGHEST AWARDS AT ALL EXHIBITIONS TO  
WHICH EXHIBITS WERE SENT.

Packing and Delivery in Dublin charged 5 per cent. Mechanical, and 2½ per cent. Optical Goods.  
Pin-lined Cases for India, &c., extra.  
No allowance for returned Empties.  
All Optical Work must be tested before leaving the Works in Dublin.

# Estimate

FROM

SIR HOWARD GRUBB,  
ASTRONOMICAL INSTRUMENT MAKER.

To the British and Colonial, German, Austro-Hungarian, Belgian, Russian, Mexican, Italian, and Spanish Governments, and to the Principal Public and Private Observatories of Great Britain and Colonies,

DUBLIN.

19th of October 1899.

M. le Directeur de l'Observatoire

M A D R I D.

## I propose to Supply

### CONTRACT TERMS.

IN the case of orders of £100 and upwards payment is required in instalments—one-third with order, one-third when work is well advanced, and one-third on completion.

(A).

A portable Equatorial instrument of the general character of that figured on page 8 of catalogue 1899, of very strong and rigid construction & carrying a photographic telescope of 8 inches in aperture and about 80 inches in focus, fully equipped for taking celestial photographs.

All details as to tube, breech piece, &c being modelled after the design of the International Survey telescopes and supplied with two metallic dark frames.

Also supplied with a "Guiding" telescope of 6 inches in aperture, furnished with a micrometer breech piece and all appliances on the same general design as those of the International Survey telescopes.

The clock work to be of the best construction & supplied with electrical control on

Estimate (A). continued.

the system of Mr, Russell of Sydney.

The whole of the above to be of  
the best workmanship and materials and deli-  
vered at my Works for the sum of

SIX HUNDRED AND TWENTY FIVE POUNDS.

£ 625 0 0

*James Gull*  
Oct 19 99

Offices  
57, RATHMINES-ROAD.

Goods Entrance  
TO  
OBSERVATORY & ASTRONOMICAL WORKS,  
BY  
OBSERVATORY-LANE, RATHMINES.



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DUBLIN.

19th of October 1899

M. Le Directeur de l'Observatoire

M A D R I D.

### I propose to Supply

(B).

A 6 inch Photographic Doublet lens of similar construction to that with which the photograph (Plate II) in my catalogue 1899 was taken; suitable for taking pictures with a larger angular field than could be obtained with the 8 inch mentioned in Estimate (A); furnished with a camera, dark slides, and all the necessary attachments for attaching to the telescope of estimate (A).

The above of best materials & workmanship and delivered at my Works for the sum of ONE HUNDRED & THIRTY FIVE POUNDS STERLING.

£ 135 0 0

Additional breech piece for converting the 6 inch "guiding" telescope into an ordinary visual telescope, suitable for micrometer work with position circle, clamps &c.

Delivered at my Works for the sum of

TWENTY POUNDS STERLING.

£ 20 0 0

*Howard Grubb  
Oct 19 99*

CONTRACT TERMS.

In the case of orders of £100 and upwards payment is required in instalments—one-third with order, one-third when works well advanced, and one-third on completion.



SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

19<sup>th</sup> of October 1899

Signor. F. Iniguez.

The Director of

The Astronomical Observatory. M A D R I D.

Dear Sir,

In reply to your kind letter of the 14th inst. I beg to express my congratulations that your Government have voted the money for your astronomical equipment, and I would take the opportunity of saying that to any work you entrust to my charge I shall give my personal attention and use my best endeavours to meet your requirements in every way.

You ask me now for an estimate for an 8 inch Photographic Equatorial of a portable form.

I have carefully considered this matter and I would recommend that you should have for the Equatorial itself, one similar in construction to that which you require for the visual telescope, the general form of which is shown on page 8 of the catalogue, and some details of

which you will better be able to understand by the drawings which I herewith enclose. I should mention however that these drawings have not been specially prepared for your work, they are in fact drawings of a telescope which I erected lately at Paisley in Scotland, and we are at present at work making some improvements on this design more especially with regard to obtaining greater accuracy in the clock movement with a view to these instruments being used for photography. We are introducing a toothed sector or arc of longer radius, which we find of very great advantage, and altogether, we are re-modelling this instrument to bring it more in accordance with the very latest instruments which we have made for the International Photographic Survey.

I send however these drawings as giving a general idea of the construction of the instrument, and will be prepared to send you perfect drawings when the new designs are complete.

To adapt this telescope for photographic work it would be necessary to apply electrical control to the clock which in this case I would probably carry out on Mr, Russells system, some details of which are shown on the drawing (B).

It will also be necessary to attach to the photographic telescope (of 8 inches aperture,) a visual telescope as a "guider", and this should be of about 6 inches aperture

I would recommend that the focus of both these telescopes should be about 80 inches which gives the usual proportion of aperture to focus for photographic object glasses, viz:- 10 to 1.

This 6 inch visual breech piece should be supplied at its breech end, or eye-end, with a micrometer arrangement carried upon slipping pieces in both directions, precisely similar but smaller than those supplied to the International Photographic Survey telescopes; and the 8 inch photographic telescope should be supplied with all the requisite arrangements for accurate focussing, orientation, recording &c exactly similar to the International Photographic Survey Telescopes, but proportionate in size.

This installation so far as I have described it would form, I consider, the minimum of what would be required, and for this I gave an estimate on form (A) enclosed.

As, however, this instrument will not be used, of course, for the same purpose (mapping) as those of the International Survey telescopes, you would probably desire to have the means of taking photographs embracing a larger angular field than is possible with this class of object-glass. I mean that you would like probably to be able to take photographs of the same character as that which is

illustrated in my catalogue (Plate II) in which the field is more than double that of the International Survey telescopes. You will observe on examination of this ~~plate~~ that the definition of the stars is exquisitely good almost up to the edge of the field, and since making the objective with which this photograph was taken we have still further improved the construction, and can guarantee even better results still.

I would ~~therefore~~ therefore suggest for your consideration whether it would not be well to mount upon the same instrument, a third telescope carrying a 6 inch photographic Doublet lens of this construction with the necessary camera, dark slides &c for taking such plates.

The Equatorial I supply will be amply strong for this purpose, in fact that which we lately put up at Paisley carries 3 such instruments, the visual telescope being 10 inches aperture and about 12 feet focus, so that your instrument would be amply sufficient to carry this photographic doublet lens as well as the 8 inch photographic telescope and 6 inch "guider".

I would also suggest that there be supplied for the 6 inch "guider" an ordinary visual breech piece such as we will supply to your 8 inch visual telescope, but of corresponding size in case you may desire at some time to use this 6 inch telescope for visual observations, and for which it would be well suited; the breech pieces would be made interchangeable. I have, therefore, on a supplementary estimate form (B) given you an additional price for supplying a 6 inch photographic Doublet with its camera and all accessories, and the additional visual breech piece should you think it necessary.

If I understand you correctly, you now desire to have the instruments mentioned in your earlier letters, and, in addition, an 8 inch photographic telescope & Equatorial the estimate for which I now send, and that all this work should be done in good time to enable you to use the instruments for the coming Eclipse in May 1900.

I would ask your permission to point out that the time for getting the work executed will be extremely short, and that under the circumstances it will be necessary for me to use great exertions and probably to work the men in my workshops at night as well as day so as to have all done in good time; therefore I would ask you as soon as poss-

ible to let me know definitely exactly what you desire to have. One of the great delays sometimes in this work is the obtaining of the optical glass necessary for making the object glasses. Fortunately I have optical glass in my possession out of which I could make one 8 inch object glass and a 6 inch for the "guider" but I have not sufficient to make the second 8 inch obj-glass and this I would have to order from the glass makers. Kindly let me know as soon as you possibly can whether two 8 inch obj-glasses will be required. With a view to saving time I have already sent enquiries to Paris about the optical glass and when I get your answer I would telegraph to have these put in hands at once; it is only by the greatest possible exertions that the work can be executed in time. If you should require an objective prism I will also have to order the glass for this.

In a very few days I hope to be able to send you particulars of at least some of the instruments we propose to make specially for the Eclipse, meanwhile I desire to thank you for the information you so kindly gave me in the postscript of your letter which I read to Our Committee yesterday. We are very much obliged to you for this and thank you in anticipation for the further information which you propose to send us.

Faithfully yours  
Hermann Gull

C O P Y.

Daramona.

Oct 20th 1899.

*Letter from W. E. Wilson FRS  
to W. G. L. Stoney FRS*

Dear Dr, Stoney,

I am thinking of going out to Spain or Algiers next May to see the Eclipse and I thought of getting an instrument made on the following lines. I wish to get a complete photographic record of the spectrum of the solar atmosphere from the "Flash" region at the base, and then upwards into the higher region. I think it would be most important to ~~xxxx~~<sup>be</sup> able to compare the bright lines of the "flash" not only with the spectrum of the edge of the photosphere, but also with the spectrum of the regions which lie above the "Flash" layer. I propose to throw an image of the Sun of say 4 inches diameter on the slit of a large grating spectroscope, and instead of the Coelostat being rated to keep the edge of the solar image on the slit, I would have it rated to keep the edge of the advancing side of the dark moon. The slit would be made very short, in fact like a pin hole. The spectrum would thus be a very thin streak, and this would be received on the photographic plate. This plate is to be moved by clock-work across the

streak of the spectrum during the time of totality. The result will be that you will get a broad photograph of the spectrum on the plate which will give the ordinary solar spectrum at the bottom of the "Flash", and above it the spectrum of the upper regions. There would be a pin hole in the camera near one edge of the plate, and this hole would be opened and shut every half second by a pendulum. This would make a row of dots on the plate which would enable me to know afterwards the time the "Flash" lasted, or the height the edge of the Moon had advanced above the photosphere, &c., &c.,

I would be greatly obliged if you will tell me if you think such an instrument would work. I would much like to have your opinion about it.

Yours very sincerely,

s/d W.E.Wilson.



Oct 20

(1).

Small Coelostat attached to tripod stand as shown in diagram ( ) driven by a simple form of escapement clock; suitable for using with photo camera to take large field photos of the eclipse, embracing 10 to 20 degrees angle. The Coelostat supplied with a silver on glass optical plane of about 5 inches in diameter..... £35. 0. 0

*See print A*

(2).

Long Focus Objective for taking large image pictures of the Sun similar to that taken by Prof Michie Smith and shown in Catalogue 1899.

4 inches aperture & from 20 to 40 ft focus.... £25. 0. 0

6 .. .. . £70. 0. 0

*See print V*

(3).

Coelostat suitable for work with the above long focus objectives; constructed for latitudes between 36 and 39 degrees N; supplied with silver on glass optical plane of 8 inch diameter and best form of clock work for such purposes, long radius sector &c, as per Diagram (B) ..... £90. 0. 0

(4).

*on disc*

Automatic enlarging Diaphragm for use with long focus objectives (No 2) for graduating the exposure of different zones of the Corona supplied with clock work arrangement..... £10. 0. 0  
*See print - C*

(5).

Spectroscope with long slit and short focus 0.6 forming image of Sun on slit, mounted as a Polar telescope with optical plane in front; supplied with 2 compound prisms and photographic camera..... £40. 0. 0

(6).

Automatic apparatus for photographing the spectra of the different layers of the "Flash" area, as figured in design (D). Supplied with a compound reflecting prism available for a pencil of light of 3½ inches in diameter.....£150. 0. 0  
 For pencil of light of 2 inches diameter.....£100. 0. 0

(7).

Polar Telescope of 3 inches aperture supplied with silver on glass optical plane complete in box as per diagram (E)..... £30. 0. 0



Description of apparatus No 6.

While the apparatus described by Mr Wilson seems admirably suited for registering the spectra of the "Flash" layer as compared with other zones of the Corona, the following apparatus has been devised to attempt if possible to differentiate between the spectra of the upper and lower layers of the "Flash" area.

An image of the sun of about 16 inches diameter is formed on the plane of the slit spectroscope, which slit is about one inch in height. Assuming the "Flash" layer to be in thickness =  $1/1000$ ths part of the Sun's diameter, if the centre of the slit be placed tangentially on the lower layer the edges will about cross the higher layer of same.

In the form of spectroscope figured which has the back surface of the prism silvered, the spectra can be thrown (by a slight tilt of the prism) upon the pair of optical planes placed at 90 degrees to each other and figured at p.p. one of them reflecting the upper part of the spectrum (that corresponding to the light entering the lower part of the slit,) on to the photo plate in the carrier on top of the metal box, b.b., ~~b.b.~~:- the other reflects the lower part of the spectrum on to the photo plate in carrier below the metal box, while a narrow band in the centre is received on a prismatic eye-piece<sup>2</sup> by which it can be viewed with the eye at any time during exposure.

*Shan on end view at top of drawing*  
A sliding diaphragm with a parallelogram cut

out of it of the shape shown in Fig ( ) is driven backwards and forwards by clockwork in front of the slit at such a rate as will be found best to give the necessary exposure. As the sliding diaphragm is drawn to one side or the other it gradually shuts off the image of the spectra from one of the plates and opens the other to its full.

An arrangement is provided on each slide by which at the extreme end of the stroke that photo <sup>frame</sup> which is not being exposed is shifted forward a certain definite quantity bringing it into position for the next photo.

The result is a succession of photos of the spectrum, the 1st, 3rd, 5th & 7th being on one plate and the 2nd, 4th 6th & 8th on the other.

If now the edge of the Moon be kept on the slit (by means of the little central finder & the slow motions) at some instant the spectrum photographed must represent the lower layer of the "Flash" area in the centre, and the upper layer at top & bottom.

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

28th of October 1899

Monsieur F. Iniguez.

Director of

The Madrid Observatory.

Dear Sir,

I have to thank you, both from myself and in the name of our Committee, for your kindness in sending me the valuable maps connected with the Eclipse, which will be most useful to us, and for the information you have given me.

I have now the pleasure to send you a memorandum containing a rough description of the various instruments which have been, up to the present, proposed for use with our Expedition, and for convenience sake I have appended the estimated cost of each.

I would remark on these, that with regard to No.(I). This is only intended for the use of photographers taking large pictures of the Sun and surroundings to the extent of from 5 to 10 degrees, and cannot be expected to be by any means an instrument of precision.

No (2) is of course similar to what has been used before and the results of which are well known.

No (3) is a Coelostat of the very best form for its size in which particular attention has been devoted to the accuracy and smoothness of the clock driving, and this would be suitable for the most delicate work,.

No (4) is a suggestion which has never been tried before but which I hope may prove to be an improvement in the producing of large pictures.

No (5). I would not like to speak definitely about this at present, as Mr, Newall of Cambridge Observatory who attempted this in the Indian Eclipse failed completely to get any result, and before recommending that instrument I hope to have an opportunity of consulting him as I am going over to London for a week and intend to take the opportunity of consulting him and perhaps devising something better afterwards as a result of his failure in India.

As regards No (6). It is also a part of my business to consult with Professor Schuster, Dr, Johnstone Stoney and others regarding this instrument, as you will see that Mr Wilson proposes one form and I propose one slightly different but I believe either form will give exceedingly good results. It appears to me that Mr, Wilson's form will give

the best results for differentiating the spectra in the various part of the Corona, but mine is more particularly adapted for differentiating the spectra in the "flash" area itself.

No (7). This has been devised more for the use of amateurs or those who want to get a comfortable and satisfactory telescopic view of the Eclipse, and it is intended to be a substitute for the ordinary telescope mounted upon a tripod stand. The position of the observer is so much more comfortable & easy that it is hoped that the results will be far more satisfactory.

In order that you may be fully acquainted with the relative advantages of the two instruments referred to under head No (6) I have obtained Mr, Wilson's permission to send a copy of his letter <sup>addressed</sup> to Dr, Stoney which will describe his apparatus; I also send a short description of the apparatus according to my design.

I have hopes of hearing from you shortly as regards the instruments you have ordered as the time for preparing will be exceedingly short and we shall have to use all our energies to get the work done in time.

Truly yours  
Harvard Phillips

# Optical and Mechanical Works.

Office.  
57, RATHMINES ROAD.  
Goods Entrance.  
TO  
OBSERVATORY  
AND  
ASTRONOMICAL  
INSTRUMENT WORKS.  
BY  
OBSERVATORY LANE.  
RATHMINES.

RATHMINES.

Dublin 31st of October 1899

The Director of the Madrid Observatory. MADRID.

To Sir Howard Grubb, D<sup>r</sup>

8 inch Equatorial telescope (visual) as estimated I/9/99	£500	0	0
Spectroscope "H" .. .. .	70	0	0
Unifilar micrometer .. .. .	15	15	0
Bifilar micrometer .. .. .	24	0	0
Electric illumination for circles &c .. .. .	5	0	0
Electric Hand Reader .. .. .	1	0	0
Combined polarising & "Dawes" solar eye-piece .. .. .	8	8	0
Objective prism .. .. .	60	0	0
Star Position Finder .. .. .	12	0	0
	£ 696	3	0
8 inch Photographic Telescope as estimated I9th Oct /99	£ 625	0	0
6 inch Doblet lens, camera & attachments. .. .. .	£ 135	0	0
Extra Breech piece .. .. .	£ 20	0	0
	£ 1476	3	0
Packing & Delivery f.o.b. Dublin			
2½ % on Optical work (£460) .. .. .	£10.10.	0	
55 % on Mechanical work (£1016) .. .. .	£50.16.	0	0
	£ 62	6	0
	£ 1538	9	0
GRAND TOTAL.....			
Deduct 2/3rds payable at future dates.....	£ 1025	12	8
	£ 512	16	4
Amount now payable with order.....			



57, RATHMINES ROAD.

Goods Entrance  
TO  
OBSERVATORY & ASTRONOMICAL WORKS.  
BY  
OBSERVATORY-LANE, RATHMINES.



GOLD MEDAL, PARIS EXHIBITION, 1867.  
CUNNINGHAM GOLD MEDAL, 1881.

HIGHEST AWARDS AT ALL EXHIBITIONS TO WHICH EXHIBITS WERE SENT.

Packing and Delivery in Dublin charged 5 per cent. Mechanical, and 2½ per cent. Optical Goods.  
Tin-lined Cases for India, &c., extra.  
No allowance for returned Empties.  
All Optical Work must be tested before leaving the Works in Dublin.

# Estimate

FROM

SIR HOWARD GRUBB,  
ASTRONOMICAL INSTRUMENT MAKER,

To the British and Colonial, German, Austro-Hungarian, Belgian, Russian, Mexican, Italian, and Spanish Governments, and to the Principal Public and Private Observatories of Great Britain and Colonies,

DUBLIN.

1st of November 1899

For Monsieur F. Iniguez

The Madrid Observatory, MADRID.

## I propose to Supply

£

Dome roof complete with revolving machinery of very best form and with Segmental "Ope" and shutter

of 15 feet diameter 180

of 18 feet diameter 230

Dome roof complete with revolving machinery of very best form and with "Gill" shutter opening up to and beyond Zenith

of 15 feet diameter 210

of 18 feet diameter 275

Dome roof complete with revolving machinery on the canted roller system and with segmental ope

of 15 feet diameter 160

of 18 feet diameter 220

Dome roof complete with revolving machinery on the canted roller system and with Gill shutter opening up and beyond Zenith

of 15 feet diameter 180

of 18 feet diameter 250

*Howard Grubb*  
Nov. 29

### CONTRACT TERMS.

In the case of orders of £100 and upwards payment is required in instalments—one-third with order, one-third when work is well advanced, and one-third on completion.



TELEGRAMS FOR HOTEL "GRANOTEL, LONDON"  
 TELEGRAMS FOR VISITORS "GRAND HOTEL, LONDON"

TELEPHONE N° 2723, GERRARD.

GRAND HOTEL,

LONDON, November 1st, 1899.

W.C.

THE GORDON HOTELS, LIMITED.

THE GRAND HOTEL, LONDON.  
 THE HÔTEL MÉTROPOLE, } BRIGHTON.  
 AND CLARENCE ROOMS, }  
 THE CLIFTONVILLE HOTEL, MARGATE.  
 THE HÔTEL MÉTROPOLE, FOLKESTONE.

THE HÔTEL MÉTROPOLE } LONDON.  
 AND WHITEHALL ROOMS, }  
 THE BURLINGTON HOTEL, EASTBOURNE.  
 THE ROYAL PIER HOTEL, RYDE, I of W.  
 THE LORD WARDEN HOTEL, DOVER.

THE FIRST AVENUE HOTEL, LONDON.  
 THE HÔTEL MÉTROPOLE, MONTE CARLO.  
 THE HÔTEL MÉTROPOLE, CANNES.  
 THE HÔTEL VICTORIA, LONDON.  
 THE GRAND HOTEL, BROADSTAIRS.

Monsieur F. Iniguez,  
 The Director, of  
 The Madrid Observatory. MADRID.

Dear Sir,

I am stopping here for a few days, having come over to consult with our Astronomical friends who are organizing eclipse expeditions from here in connection with the Royal Astronomical Society and the British Astronomical Association, but my Secretary has forwarded to me your kind letter of the 26th ult., ordering the photographic Equatorial, the 6 inch Doublet lens and attachments, and the extra breech piece, all in exact accordance with the estimates sent you on the 19th inst, for which I am very much obliged.

I note that you desire to have the objective prism and I shall order the glass for this as soon as I hear from you what particular angle you wish it to be. I have made them of various angles 15°, 20°, 25°. I would suggest 20 degrees as a suitable angle, and of course I shall make it of extra dense flint glass.

As regards the domes - I would suggest 18 feet in diameter as a suitable size. Less than this would not do for the visual telescope - 15 feet might suffice for the photographic telescope,



GRAND HOTEL,

LONDON,

W. C.

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THE HÔTEL MÉTROPOLE } LONDON.  
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THE GRAND HOTEL, BROADSTAIRS.

TELEGRAMS FOR HOTEL "GRANOTEL, LONDON"  
TELEGRAMS FOR VISITORS "GRAND HOTEL, LONDON"

TELEPHONE N° 2723, GERRARD.

but if possible it is much better to have a little room to spare, and I would recommend 18 feet for both.

As to the rolling machinery: I send you estimates for our very best form, such as we use for large domes, and an alternative estimate for the "canted roller" system, which we find quite satisfactory for sizes up to 20 feet.

As to covering: I have estimated for covering of papier maché, which we almost universally use now, and which we find very satisfactory for all climates.

As to the opening and shutter for same: There are two forms in general use.

1. The segmental "ope" or opening with a shutter pivotted on centre of dome, which is simple but has the disadvantage that it is difficult and sometimes impossible to view objects at, or near the Zenith.
2. The "Gill" shutter which is pivotted at the base of dome at side opposite to "ope", and allows free access to Zenith. This, I strongly recommend, and in case of the Photographic Equatorial, is really necessary. However, I give estimates



TELEGRAMS FOR HOTEL "GRANOTEL, LONDON"  
 TELEGRAMS FOR VISITORS "GRAND HOTEL, LONDON"

TELEPHONE N° 2723, GERRARD.

-3-

GRAND HOTEL,

LONDON,

W. C.

THE GORDON HOTELS, LIMITED.

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 THE HÔTEL VICTORIA, LONDON.  
 THE GRAND HOTEL, BROADSTAIRS.

for both.

If you would kindly say what class you desire to have,  
 I shall have full estimates and drawings sent to you.

Meanwhile I have now the pleasure to send you my account

£512. 16. 4

being the first instalment on account of the Instruments ordered in  
 your kind letter of the 26th ult., due ( as you will see by printed  
 notice on estimate) with the order.

My Bankers are The Royal Bank of Ireland, Dublin, but  
 the most usual and most convenient method of remittance is by  
 draft on demand, or 7 days bill on a London Bank (preferably London  
 & Westminster)

Am I to understand that all orders received to present  
 time are required for eclipse work?

I hope shortly to be able to give you more definite  
 information about our eclipse arrangements.

Thanking you for your kindness

I am,

Yours faithfully,

*Thomas Gubb*

17th of November 18 99

Instruments ordered.

Monsieur F. Iniguez.

The Director of,

The Madrid Observatory.

Madrid.

Dear Sir,

I have to acknowledge receipt of your kind letter of the 8th November specifying the instruments which you have ordered and which are in accordance with my specification. I have put these in hands, and I note that I am to receive from your Government the sum of £513 as a first instalment which I suppose I may expect shortly. As I proceed with the work I shall probably have some questions to ask.

With regard to the obj-glass prism. I should be glad to have your ideas as to the best angle for this. I could make it up to 20 degrees for you at the price mentioned but if you want it of an extraordinary angle I would be obliged to charge extra.

Not knowing exactly what purpose

you require this prism for I can hardly advise as to the best angle but no doubt you will be able to decide this yourself.

*Very truly yours,  
G. H. P. H.*

MADE IN U.S.A.

BEFORE THE SENATE AND HOUSE OF REPRESENTATIVES

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

17th of November 1899

Monsieur F. Iniguez,  
Director of,  
The Madrid Observatory,  
Madrid.

Dear Sir,

As I promised to keep you acquainted with the proposals of our Eclipse Committee, I have to inform you that on consultation with a number of others who have been engaged in former Eclipse Expeditions, we have decided to make a slight change in our proposed programme.

On investigation we find that the particular instrument which is mentioned under the head No 5 in my letter of the 28th October, (that is to say, the spectroscope with a long slit for photographing the spectra of the Corona on each side of the Sun, and comparing same to ascertain if there be any motion in the line of sight) is one from which it is hardly likely that definite results would be obtained, more particularly at this eclipse which will be of short duration. We have therefore determined to abandon it and

to adopt in its place a prismatic camera with which we will obtain photographs of the flash spectra with a slitless spectroscope, the photographic plate carriers being arranged in the same way as I have shown in my proposed arrangement No 6:- that is to say, a series of photographs would be obtained on 2 plates, Nos 1, 3, 5, & 7 on one plate, and Nos 2, 4, 6 & 8, on the other plate. Besides this we propose to adopt Mr, Wilson's plan of a spectroscope with a slit following the edge of the Moon and imprinting upon an automatic movable plate the spectrum of the successive portions of the ~~Mercury~~ Corona &c which pass across the slit.

The Report of our Committeee was yesterday presented and adopted by the Council of the Royal Dublin Society, and will be presented to the Council of the Royal Irish Academy next Monday. Immediately this is in print I shall send you a copy, meanwhile, I may mention that the Joint Committee have passed a resolution expressing their gratitude to you for the very valuable information you have sent, and which I laid before them, and this resolution will be coveyed to you officially by the Officers of the Society.

I would expect that within the next 3 or 4 weeks the exact form of the instrumentsfor each line of work will be finally determined upon, and will duly inform you of the results.

*Wm. Stanley Jones*  
*Harvard College*



SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

24th of November 1899

Monsieur F. Iniguez.

Director of the

Madrid Observatory

Dear Sir,

I write a line for fear some of my letters may have gone astray as I have been hoping to hear from you before this, more especially on the subject of the obj-glass prism which it will be necessary to order immediately that we may have time to work the surfaces and get it finished for the Eclipse. I will be much obliged if you would kindly let me have a reply on this one point at once.

I have not as yet had any communication directly or through the Banks as regards the remittance due. Fearing the matter may have been forgotten perhaps you will kindly take steps to see that this has been sent.

*Truly Yours*  
*Howard Grubb*

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

28th of November 1899

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I am at present engaged in designing the breech piece of the photographic Telescope and it's "Guider" breech piece, which according to the specification are to be constructed on the model of the International Survey Telescopes. It occurs to me however to consult you as to the exact size of photographic plate you would desire to use. In all the International Survey Telescopes we supplied dark frames to carry plates of 160 millimetres square, or in English measures, say, 6.3 inches square.

In proportion, (as your obj-glass is 8 inches in diameter, and the focus about 80 inches) the size of plate ought to be about  $3\frac{3}{4}$  inches square. I would suggest about 4 inches but if there be any commercial size of plate which it would be easier for you to obtain, it might be more con-

venient if I made the dark slide to suit that particular commercial size. Perhaps you would kindly consider this point and let me know as soon as possible, as I need not tell you the time being so very short it will be necessary to put every part of the apparatus in hands at once.

Very truly  
Yours  
H. G. Gullab

29th of November 1899

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Madrid.

Dear Sir,

I have been anxiously awaiting replies to my letters of the 6th, 17th and 24th of this month and I am somewhat anxious that some of my letters or some of yours may have gone astray, the more so as there were several points in my letters which required an answer in order to enable me to get on with the work, and moreover, because in your letter of the 8th Nov you mentioned that you had given an order to the Directors of the Treasury to send immediately to me the sum of £513 of which I have heard nothing since; therefore it was that I sent you a telegram to-day as follows:-

"Still awaiting your letters & remittance. Grubb."

Understanding that I would be in receipt of the money

shortly after the arrival of your letter I have pushed the work on as rapidly as possible, and indeed began it some weeks before your definite order, as it is only by taking these energetic steps that such a large amount of work can be got through in the time.

You will understand that our Workshops are very full of work at present, not only on very large instruments but also on work which must be finished intime for the Eclipse all of which is very pressing. For all this class of work the deposit money has been paid and naturally I feel bound to press this work forward. I am sure you are fully aware of this and you are probably under the impression that the money has been paid, but there has evidently been some delay in the Treasury Offices, or some letters have gone astray and therefore I thought it right to inform you at once by telegram.

You will also please note that I have not as yet got instructions about the prism, so I have not been able to order the glass altho' I have already communicated with the glass manufacturers and they are ready to proceed with the work the moment I give them instructions as to the angle of the prism. Perhaps you would be so kind as to impress upon the Officials at the Treasury that this matter is really pressing as the time for the completion of the work is so extremely short and leaves no margin for any delay whatever.

*Very truly yours,  
G. B. Airy*

Porte gratuito

# TELEGRAMA

Número .....

Indicaciones de servicio

Recibido de *Rif*

Hilo núm. ....

Res.  
Telegra

*Sr. D. Director Astronómico Observatorio Madrid*

En los telegramas impresos en caracteres romanos, el primer número que figura después del punto de origen es el número de orden, el segundo indica el de palabras tasadas y los siguientes la fecha, mes y hora del depósito.

El Estado no acepta responsabilidad alguna respecto al servicio de la Telegrafía. *026*

*Recibido*  
\* TELEGRAMA MADRID \*  
29 NOV - 99  
\* MADRID \*  
Para *Madrid*

de *Sueben* Núm. *79* Palabras *11* Depositado el *29* á las *11 30m*

*Still awaiting your letters and remittance goods*

Imprenta y C. Barcelona

Módelo núm. 33

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

1st of December 1899

Monsieur F. Iniguez.

The Director of  
The Madrid Observatory.

Dear Sir,

I have to acknowledge receipt of your kind letter of the 28th Nov. and to thank you for the exertions you are making to hasten the payment of the first instalment.

I note that you desire to have the objective prism of 20 degree angle and I am ordering the glass in accordance with this.

I assume that you will desire to have this mounted in front of the obj-glass of the photographic telescope, and at the angle of minimum deviation, but I shall be glad to hear from you whether you desire that the plane of refraction should be in the direction of Declination or in the direction of Right Ascension. Should you have any difficulty

in coming to a decision on this point we could, of course, mount it for you so that it might be used in either position.

very shortly I shall have some matters to write about regarding details on the two Equatorial instruments which you were kind enough to order, and at the same time I will bear in mind your remarks respecting any valuable additions for these instruments.

With regard to the instruments for the Eclipse generally. May I enquire if you received my letter of the 28th Oct which contained drawings and information about the instruments that were devised for our Committee here, as I do not see in any of your letters reference to this, and it occurs to me that possibly that letter may have gone astray.

Should you require such an instrument as a Coelostat it would be well that I should know soon as I will probably be putting two of these in hands for our Committee here.

*Very truly yours  
A. G. P. 66*



4th of December 1899

Monsieur F. Iniguez.

The Director of  
The Madrid Observatory. Madrid.

Dear Sir,

Your kind letter of the 30th Nov came to hand yesterday (Sunday) morning. I had already written to you in reply to your former letter before you received my telegram.

Permit me to explain that my anxiety arose from the fact that I had received no letters from you in answer to mine and I feared some letter of mine had gone astray, or, that I had through my lack of knowledge of the French language misinterpreted some of your letters, and therefore it was, that becoming anxious I telegraphed to you for a reply and a corroboration of the order. At the same time I wish to tell you that from the date on which I wrote you to say that, the time being short, I would put your work in hands at once, I have not ceased to push forward energetically the instruments which you have since ordered; in fact

I have given your work the preference in all our departments over other work knowing that you required the instruments for the Eclipse, and I have never ceased to give that work the preference as only by so doing can the work be done in good time.

We are ordering the glass now for the prism of 20 degrees.

As mentioned in my last letter I shall soon have occasion to write about some details of the instruments, meanwhile it only remains for me to thank you for the exertions you are making to have the money remitted without delay.

*Wm. Brewster*

7th of December 1899

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I am obliged to you for sending me the telegram which arrived last evening and which read as follows:-

"Gerada cantidad, Banco Londres. Iniguez".

which I take to mean that the money has been sent in the form of a Bill of Exchange on a London Bank, which will be quite satisfactory.

I have again to thank you for the exertions you have made to hasten this matter, also your proposal to send me a second instalment shortly.

My last two letters will, I think, reassure you as to the progress of the work, as you will see we have not in any way relaxed our efforts to push everything forward as rapidly as possible.

So far as the optical part is concerned, we had a

pair of discs which we will use for the visual 8 inch O.G and we are working at this at present. The manufacturers are preparing for us as quickly as possible another pair of 8 inch discs for the photographic obj-glass, and very soon we shall have a disc in hands for the 8 inch prism.

I am about to put two Coelostats in hands according to the design which I sent you in one of my letters of last October; I am not quite sure that this letter reached you safely. If you require one of these instruments I shall be happy to put it in hands at the same time.

I am preparing some drawings of details of portions of the instruments on order copies of which will be sent you in due course.

Truly yours  
R. W. G.

.....11th of .....December.....18.....99

Monsieur F. Iniguez,  
The Director of  
The Madrid Observatory.

Dear Sir,

Your kind letter of the 7th to hand from which I inferred that the £513 had been sent to some Bank in London, presumably whatever Bank was Agent to the Bank of Spain, but on telegraphing to Messrs Rothschild who are the Agents for the Bank of Spain they have replied that no credit has been opened there in my name. I am therefore still without the money, and I do not know how to proceed to claim it, so I wired you to-day as ~~perxxxxxxxx~~ follows:-

" What Bank shall I apply to".

If I read your letter rightly it means that credit has been opened in my name at some Bank in London, but not having the name of that Bank I cannot get the money.

If I receive a telegram in answer to this letter stating the name of the Bank I shall then be in a position to draw the money.

On other matters in your letter I shall write further on.

*Very truly yours  
H. Grubb*

Porto gratuito

Indicaciones de servicio

# TELEGRAMA

Número .....

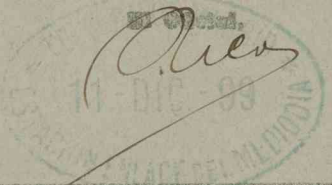
Recibido de Edl

Sr. D. Giriquier  
Astronomical Obser

R.  
R.  
S.

Alto núm. ....

Tele. ....



En los telegramas es en caracteres romanos el primer número que figura del punto de origen es el número que indica el de palabras usadas y los siguientes la fecha, mes y hora del día.  
El Estado no acepta responsabilidad alguna respecto al servicio de telegrafía.

Para Madrid de Dublin Núm. 261 Palabras 10 Depositado el 11 á las 2 25

What bany shall y apply to

Henrich y C. - Barcelona

Modelo núm. 9

SIR HOWARD GRUBB, F.R.S.  
RATHMINES,  
DUBLIN.

Optical and Mechanical Works,

14th of December 1899

Monsieur F. Iniguez.

The Director of

The Madrid Observatory.

Dear Sir,

I am happy to tell you that the difficulties about the money have now been surmounted and I have received this morning a cheque for the £513, the formal receipts for which I have sent back to Messrs F. Huth & Co.

On the receipt of your last telegram we wrote to Messrs Huth who promptly replied by wire and sent us the cheque to-day. You will understand that until we knew the name of the Firm in London who had the money it was impossible for us to take any action about it; however, this is now satisfactorily settled and everything has been done here that was possible to forward the work, and in a few days I hope to send you some drawings of the breech pieces of the "Guider" and photographic telescopes and other matters that may interest you; meanwhile if you requiring a Coelostat I shall be glad to know at once as we are putting two in hands at the present moment.

*Very truly yours,  
H. Grubb*

29th of December 18 99

Monsieur F. Iniguez;  
The Director of  
The Madrid Observatory.

Dear Sir,

I am very much obliged by your kind letter and telegram which latter arrived last evening.

I am writing to-day to Messrs, Mildred Goyeneche & Co and expect to receive a satisfactory reply from them; meanwhile I thank you very much for the trouble you have taken in this matter.

I am preparing some drawings to send you in connection with your instruments.

*Very truly yours,  
Howard Grubb*



(Minute)

Madrid le 27 août 1899.

M. Howard Grubb.  
Dublin.

Monsieur,

M. le Directeur de l'Observatoire de Madrid m'a chargé de vous faire la commande de quelques instruments astronomiques, choisis parmi ceux que vous construisez dans vos ateliers, et destinés en premier terme à l'observation de la prochaine éclipse du Soleil de 1900, totale en Espagne. En examinant votre Catalogue illustré (1899) que nous venons de recevoir, son attention a été principalement attirée sur les suivants, dont il désire l'acquisition :

Portatif équatorial, de la meilleure qualité, de 8 pouces d'ouverture (p. 8. du Catalogue)  
Spectroscope H (p. 27), qui puisse s'adapter au même équatorial;  
Microscopie unifilaire (p. 28) pour le même instrument;

H. bipilaire " " "  
Star position finder " "  
Electric Illumination " "

Electric Illuminator and Hand Magnifier for Reading Grids and Scales;  
Combined Polarising and "Dewar's" Polar Eye-piece (p. 28)

Il est à désirer que vous nous renseigniez sur le prix du spectroscope plus haut précité.

Je vous prie également de nous informer si vous construisez des équatoriaux photographiques portatifs (portable), car ceux que comprend votre Catalogue ont des dimensions trop considérables pour notre but actuel. Dans le cas affirmatif nous vous serions fort obligés de nous en marquer le prix. Nous souhaitons en outre de savoir, car on ne trouve dans le Catalogue aucune indication, si l'on pourrait acquiescer dans vos ateliers des prismes-objectifs, qui ont été utilisés avec succès dans les dernières éclipses du Soleil pour en photographier le spectre.

En regard au peu de temps qui nous sépare déjà de l'époque où aura lieu le phénomène, je vous prie instamment de vouloir bien me donner de réponse le plus tôt possible à ces questions. En attendant de vos nouvelles, veuillez, Monsieur, agréer l'assurance de ma considération plus distinguée.

P.O.  
Le Premier Astronome  
M. Ventura

Madrid le 2 ~~de~~ October ~~de~~ 1899.

M. H. Soubb

Cher Monsieur

Monsieur: Votre lettre du 19 Septembre nous a  
elle montré votre désir de vaincre les difficultés que  
nous nous ici pour l'observation de prochaine  
éclipse. Je crois que nous aurons de l'argent dans  
quelques jours, car la réhabilitation du crédit dont  
je vous informais dans une autre lettre est elle  
par bon chemin.

Je trouve bon et vous suis gré que vous vous  
par les pièces de l'équatorial applicable à  
d'autres instruments dans le cas que nous  
échouions dans nos desirs, ce que je ne crois pas  
à présent, mais il faut prévoir les choses telles que  
elles sont.

Je vous voudrais aussi l'équatorial photographique  
que pour l'observation de l'éclipse.

Je vous ~~informe~~ enseignerai si tout que cet  
affaire soit arrivée à ~~un~~ but, ce que ne  
hardera pas et j'espère, heureusement.  
Recevez moi mes salutations respectueuses

Madrid le 3 octobre 1899.  
Mr. H. Smith

Dublin

Monsieur:

J'ai compris par votre lettre du 19 September, le desir que vous avez de nous faire la construction des instruments, pour les obtenir promptement. A present j'ai la presque sûreté d'obtenir le credit necessaire dans quelques jours; c'est ce q'on m'a promis et j'ai l'esperance de que la promesse sera elle tenue. Cependant, je ne puis pas affirmer avec ~~et~~ evidence le resultat, jusqu'à le moment ou j'aurai l'argent à ma disposition; je crois, avec solide fondement que cela sera très prochainement, et sitot que ça arrive je vous l'annoncerai. En attendant, si vous voulez construire les parts des instruments applicables à d'autres dans le cas d'un fracas — ce que je ne crains pas le moment — je vous serais gré du gain de temps obtenu par ce moyen.

vous voulez aussi l'équatorial photographique pour la utiliser dans l'éclipse. En comptant dans la prompte et heureuse terminaison de cet affaire, je

vous respects le ~~sermon~~ sermone de ma  
consideration

(\*) INIGUEZ

Madrid le 14 octobre 1899.

Monsieur Howard Grubb  
Dublin

Monsieur: Le crédit pour l'acquisition des instruments vous a été accordé par le Gouvernement. Je vous prie en conséquence de m'adresser le prix de l'équatorial photographique ~~de~~ 8 inch, dont nous ~~vous~~ <sup>vous</sup> sommes ~~occupés~~ dans nos lettres, ~~antérieurement~~ pour que j'aie le montant total, et puisse vous libérer de la quantité voulue. ~~Je vous prie de~~

Les équatoriales, bien entendues, doivent être transportables, et pouvant être installées dans les latitudes variables entre  $36^{\circ}$  et  $44^{\circ}$ .

Je vous serai gré de toutes les renseignements que vous ayez la bonté de m'en communiquer à propos des appareils convenables pour l'observation de l'éclipse de 1900.

Veuillez, Monsieur, agréer mes salutations respectueuses.

Le Directeur

Madrid le 26 de' Octobre 1897.

M. Howard South

Sublin.

Monsieur: En rependant à votre lettre du 19 je commence par vous envoyer mes remerciements pour ~~et~~ votre vehement desir de nous donner votre ~~aide~~ puissante aide à l'effet de construire oportunement nos instruments et de les faire avec tous les perfectionnements desirables.

Nous avons considéré avec toute votre attention votre projet d'equatorial photographique; l'instrument, tel que vous l'imaginez avec ses deux lunettes photographiques et une lunette visuelle et avec la piece speciale à l'extrémité oculaire (cf brecche-piece) de la lunette visuelle est un instrument qui satisfait à toutes nos aspirations. Le montant total de l'instrument d'après votre estime est de sette cents quatre vingts livres, dont je prends note pour notre prochain acquittement.

Especiellement vous avez bien compris; nous voulons l'equatorial photographique et

l'équatorial visible pour les employes toutes  
deux dans l'observation du prochain eclipse  
de 1900.

Je voudrais aussi le prime objectif dont  
vous faites mention si vous savez en quel  
pour installer dans cet Observatoire les  
équatoriales depuis l'observation de l'eclipse  
se; je vous prie de nous donner a propos des  
renseignements, des prix, etc. Le temps n'est  
pas si pressant ici que pour les équato-  
riales.

Je desire enfin que vous indiquiez la pla-  
ce ou vous voulez qu'on vous livre le mon-  
tant de nos commandes, Dublin, Lon-  
dres, Paris etc.

Recevez Monsieur mes salutations res-  
pectueuses

Le Directeur.

Madrid le 8 novembre 1899.

Sir Howard Knubb  
Dublin

Monsieur: vous vous d'accord relativement  
aux commandes définitives de instruments qui devront  
être construits dans vos ateliers pour cet observa-  
toire. Ils sont les suivants  
8 inch Equatorial telescope as estimated 1/9/99 £ 500  
- - - - -  
- - - - -

Il donne l'ordre à la Direction del Tesoro  
à fin de q' on vous libere ~~pe~~ immediate-  
ment la quantité de £ 513 cinq cets  
treize livres destinée au payement de troi-  
siesme du montant total.

Il faut ~~que~~ effectivement que les  
dits instruments soient ils prêts pour être  
employés dans l'observation de l'écli-  
se.

Quant aux doues j'ai besoin de  
quelques jours à ~~de~~ prendre ma se-



solution définitive. à présent j'ai le plaisir  
de vous dire que les notices et desins dans  
votre lettre sur et 4<sup>e</sup> Novembre ont satisfait  
nos desirs.

Recevez, Monsieur, mes salutations respectue  
uses.

Madrid le 28 novembre 1879

Sir Howard Lubbock

Dublin

Monsieur: nous ~~avons~~ nous avons considérées, avec la nécessaire attention les conditions du prisonnier objectif, dont il est question dans vos dernières lettres, et sans doute un angle de 20° suffit il, à l'objection d'un spectre assez conu de à nos aspirations.

La dilation dans la remise des £513 ~~est~~ est seulement conséquence des formalités assez impliquées de notre administration: je soufre douloureusement d'un retard si grand, et je ~~fais~~ pourrais ~~être~~ la rapide administration de cet affaire. Je crois que c'est question de quelques jours seulement. Dans tout cas, soyez sur de recevoir la quantité dans breve terme et sitot que ce soit, j'adopterai un autre moyen à fin de que vous ayez

à votre disposition dans le courant de  
décembre ~~par~~ la seconde livraison ~~de~~  
correspondante.

Si vous avez quelque recommandation ou  
nous faire sur la convenance de l'  
adjonction de quelque instrument aux  
désormais ~~en~~ rejetés pour le travail avec les  
équatoriaux, je vous serais gré des indi-  
cations convenables.

J'ai l'honneur, Monsieur, de vous  
repetir l'expression de ma considé-  
ration la plus distinguée.

Madrid le 30 d'octre. 1839.

Monsieur Howard Grubb

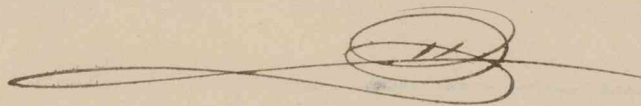
Dublin.

Monsieur: J'ai reçu votre avis télégraphique <sup>du 29</sup> et j'espère que vous aurez reçu ainsi ma lettre du 28. Le retard dans la remise des £ 573 est dû exclusivement à des complications, vraiment encombrantes, de notre administration; je fais le possible pour abréger les traités, et je vous répète l'expression de mon espoir ~~dans son prochain~~ de ~~leur terme~~ <sup>voir fini</sup> si cet affaire dans quelques jours; et toujours vous pouvez avoir la sécurité de recevoir le montant total de vos commandes dans leur terme. C'est tout ce que je peux faire; je comprends <sup>le droit</sup> ~~la raison~~ que vous aurez si vous retardez la livraison des instruments, car vous n'êtes pas responsable des déficiences de notre adminis-

tration, mais je vous prie de ne pas faire  
ça, car le retard ne sera pas très long, et  
très prochainement je pourrai de vous  
faire arriver une seconde livraison, dans decem-  
bre.

Quant au prisme objectif, je vous confirme  
ce que je vous indiquai dans ma lettre du 28;  
un angle au plus de  $20^{\circ}$  suffit il à vos aspira-  
tions.

Après avoir des choses ~~pour~~ certainement inex-  
plicables pour vous, je vous repète le témoigna-  
ge de ma considération la plus distinguée



El día 2 de Diciembre se dió orden al Banco de España de abrir en Londres un crédito á nombre de Sir Howard Kruhb de Dublin. ; A qué Banco de Londres se ha girado el crédito. ; Como se ha dado aviso de ello á Sir Howard Kruhb. ;

El crédito es de 513 libras esterlinas.

Con fecha 7 de corriente se dió orden por el Banco á un comisionado en Londres D. F. Heath y Compañía para el pago de £ 513-0-0