

1103.1

JAN 24 1935

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

January 8, 1934.

JAN 12 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

WW	1-9	PH	1-11
mm	JAN 11 '34	1717	
TF	JAN 12 '34	52	
DWS	JAN 12 '34	1717	
WWB	JAN 12 '34	1717	

ack. 2-1-35
WW: mho: WW

Dr. Warren Weaver,
Rockefeller Foundation,
Rockefeller Center,
49 West 49th Street,
New York, N. Y.

My dear Warren:

The mold for the 200" is taking form and the other accessories needed for the casting of the disc are being rushed with all possible speed. It is our expectation to cast this disc the 28th. We may be ready the 21st but there is some question of our being able to have things ready for the earlier date.

I hope that your other plans will not interfere with your being able to come to Corning when the disc is poured. Mrs. Gage and I are both anxious to have you and Mary as our guests and are looking forward to the great pleasure of having you with us for that week end.

Cordially yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
In Charge

O. A. Gage

OAG:FMM

FEB 28 1934

1103.1

(see mm
17
24
WNB)

January 11, 1934

My dear Sir:

Permit me to acknowledge, in Mr. Weaver's behalf, your letter of January 8. Mr. Weaver is at present traveling in the middle west, and does not return to the New York office until the morning of the 19th.

I have forwarded to him the information you send, and have also informed Mrs. Weaver of the possible trip and of your kind invitation.

Yours truly,

Paula Hagen
Secretary to Mr. Weaver

Mr. O.A. Gage
Corning Glass Works
Corning, New York

PH

MAR - 1 1934

1103.1

CARNEGIE INSTITUTION OF WASHINGTON

Geophysical Laboratory

WASHINGTON, D. C.

ARTHUR L. DAY

DIRECTOR

January 13, 1934.

ADDRESS

2801 UPTON STREET

Doctor Max Mason, President,
Rockefeller Foundation,
61 Broadway,
New York, N. Y.

Dear Dr. Mason:

You will be interested in the following exchange of telegrams which took place yesterday between Dr. Hale and me.

"Corning finding it practically impossible to hold back publicity now that one hundred twenty inch disc has leaked out. Stop. Prefers authentic publicity to present sniping. Stop. Recommend authoritative publicity to begin with pouring large disc using Pathe Blakeslee and Corning publicity man. Please wire reply to me in Washington. (Sgd.) Arthur L. Day."

"We fully appreciate the situation and request you or Corning to prepare authoritative statement and supervise the entire procedure. Kindly send me a copy in advance if possible and let me know when the large disc will be poured. (Sgd.) George E. Hale."

For your information also I will add that I was in Corning yesterday and went over the situation with those more immediately concerned. No one among the officials of Corning Glass Works knows the origin of the leak on the 120" disc. It appeared first in a local paper in the nearby city of Elmira. Since then the pressure has come in an avalanche from all directions. With this background the telegrams will probably be self-explanatory.

The only defense we have had against this avalanche has been to withhold the date of pouring the 200" disc. As a matter of fact no date has been set; partly in order that no date might leak out and partly in order that we might complete in proper deliberation the detailed arrangements for the pouring. With things as they are, even with arrangements made in advance to admit Pathe and the Associated Press and with a considerable amount of publicity material prepared in advance, defensive tactics are still necessary now that the 200" disc has become a national issue.

Let me add that there is no present plan for anyone to come on from Pasadena to see the pouring. Quite apart from the spectacle which is of a kind and magnitude to be worth witnessing, I would like very much if

MM	JAN 15 '34	1/17
WW	FEB 28 '34	WW
TA	MAR - 1 '34	Ja.
WWB		1/1/3

Dr. Max Mason - 2.

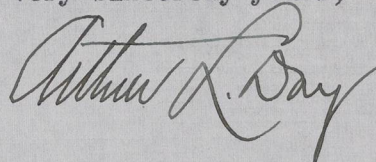
you could arrange to attend. May I therefore ask you what is the minimum notice which you might require in order to insure your attendance, assuming that the pouring date falls in the first half of February.

Doubtless you know that Dr. Pease, of Mt. Wilson Observatory, recently spent a day in Corning examining the 120" disc. I was not present and did not see Pease afterwards, but Corning men report that he was very much pleased with what he saw and said that he was now assured that the 200" disc would be successfully built and that he would now proceed to construct the framework for it.

Beyond this I have no information of interest later than your own contact with Corning in the autumn. Whether the 120" disc will be shipped out of Corning before the 200" is poured, I do not know. It depends in part upon decisions from Pasadena. The disc is crated now and Dr. Pease has given his approval to the manner of crating. However, the top and bottom covers of the disc have been left off until the last moment so that it can be studied to any extent necessary before shipment. Examinations of strain thus far made at points deemed more or less critical reveal none of any magnitude worth considering.

With best wishes for the New Year, believe me,

Very sincerely yours,

A handwritten signature in cursive script, reading "Arthur L. Day". The signature is written in dark ink and is positioned to the right of the typed name "Arthur L. Day".

ALD/jao

WW	JAN 18 '34	WW
TA	JAN 21 '34	ga
hwb		
FBW	1-31	FBH

January 17, 1934.

Dear Doctor Day:

Thank you for sending me the information regarding publicity and the large disk. I have been surprised that you have been able to work in quiet as long as this. With the great interest in this remarkable development, it seems to me inevitable that publicity will now occur, and I am very glad that you are handling it so well.

I was delighted to learn that the 120" shows no strain of disturbing magnitude. I had not known of this before, and it is fine news.

My plans are not definite for the first half of February, but I shall be in New York most of the time, and if possible I should very much like to see the pouring of the 200", and shall arrange to come if that prove possible. I shall appreciate it if you will be kind enough to let me know when the date is set.

With hearty congratulations on the continued success of the work, and the best of wishes to you personally,

Cordially yours,

MAX MASON

Dr. Arthur L. Day,
Geophysical Laboratory,
2801 Upton Street,
Washington, D.C.

MM:AEB

FEB 28 1934

1103.1

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

January 16, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

Dr. Warren Weaver,
Rockefeller Foundation,
Rockefeller Center,
49 West 49th Street,
New York, N. Y.

WW	JAN 17 '35	WW	1-17
mm	JAN 22 '35	PH	1717
TA	JAN 23 '34	Ja	

My dear Warren:

There has been a delay in assembling the necessary equipment to cast the 200" and this makes it impossible to pour the disc in January. It is now Dr. McCauley's hope to do the casting on February 11th but this is a purely tentative date.

I will let you know just as soon as I can when a definite time has been selected.

Cordially yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
In Charge

OAG:FMM

FEB 28 1934

1103.1

January 17, 1934

My dear Sir:

Permit me to acknowledge, in Mr. Weaver's behalf, your letter of January 16 advising of the postponement of the pouring date for the 200". He will see it, together with your earlier letter, when he returns next week.

Yours truly,

Paula Hayden
Secretary to Mr. Weaver

Mr. O.A. Gage
Corning Glass Works
Corning, N.Y.

PH

MAR - 1 1934

CARNEGIE INSTITUTION OF WASHINGTON

Geophysical Laboratory

WASHINGTON, D. C.

ARTHUR L. DAY
DIRECTOR

January 19, 1934.

ADDRESS
2801 UPTON STREET

Dr. Max Mason, President,
The Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

Personal

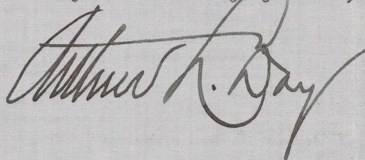
Dear Dr. Mason:

I am indebted to you for your kind letter of January 17 and am glad that you appreciate the situation into which Corning has been forced regarding publicity and approve the proposal made to meet it. Dr. Hale will be kept advised of publicity material before it is issued in order that he may not be embarrassed by unexpected inquiries such as were showered upon him after the General Electric publicity campaign got under way.

I have also advised Corning to send you word direct as soon as the date for pouring the 200" disc is fixed, in the hope that you will be able to be present. The purpose of this is merely to save time and to give you as much advance notice as possible.

I wonder if you would be able to spare me sufficient time one day within the next few days or weeks to talk over certain phases of the situation which may arise in case a 200" disc is successfully cast. My wish would be to talk with you personally of certain matters and relations which can not well be set down on paper and which so far as you and I are concerned will be entirely unofficial. Fundamentally I am seeking advice for my own guidance in reaching a constructive solution of a problem which contains some personal factors and which carries ramifications in many directions. You have all the background and your interest in the problem is as completely constructive as is mine,- which is the reason for my asking this privilege.

Very sincerely yours,



ALD/jao

MAR -1 1934

1103.1

January 23, 1934.

Personal

Dear Dr. Day:

I shall be delighted to talk over any of the phases of the situation on the telescope as you suggest at almost any time. So far as I know I shall be in town, except possibly at the week-ends, for the next few weeks, with the exception of February 6th to 8th.

Cordially yours,

MAX MASON

Dr. Arthur L. Day,
Geophysical Laboratory,
2801 Upton Street,
Washington, D.C.

MM:AEB

MAR - 1 1934

1103.1

THE ROCKEFELLER FOUNDATION
INTER-OFFICE CORRESPONDENCE

From MM's interviews.

WW	FEB-3 '34	WW	
FB* TA	FEB-5 '34	FBH za	
WWB		MMB	
Files	FEB-6 '34	✓	

January 30, 1934.

Dr. A. L. Day.

Discussion of the aims for utilization of the 200" telescope and circumstances surrounding the project when initiated by the IEB. MM assured ALD that the project was entered into by the IEB under circumstances explicitly stated, insuring cooperative effort between Cal. Tech., which will be the legal owner of the Observatory, and the Carnegie Institution and Mt. Wilson Observatory staffs. Before applying formally for a grant Millikan requested of Merriam the cooperation of the Carnegie Institution, and particularly of Mt. Wilson, in the enterprise. The response of Merriam was made after a vote by his Executive Committee, and was entirely favorable to participation. It is clearly the spirit of the undertaking that this largest telescope be available for qualified astronomers generally who have problems worthy of attack through the telescope, and in particular that the Mt. Wilson staff shall have opportunities for its use.

There was some discussion of possible difficulties. It was agreed by ALD and MM that while not demanded by any previous commitment it would seem to be desirable at this time that overlapping staffs between the new Observatory and Mt. Wilson should be formed. ALD is to keep MM informed if in his judgment operational procedures are planned which would be out of accord with the understandings held for the use of the telescope.

FEB 28 1934

1103.1

mm	JAN 27 '34	7:17
ww	JAN 29 '34	ww
FBK TA	JAN 31 '34	FBH ju
wwB	JAN 30 '34	////

In reply refer to:
Dr. G.V. McCauley

January 26, 1934.

Dr. George E. Hale,
Astrophysical Observatory,
California Institute of Technology,
Pasadena, Calif.

Dear Dr. Hale:-

Relative to your letters of January 16 and 17 there appear to be several items which require further consideration.

The routing of the 120" disc recommended by the Regional Manager of the American Railway Association in Portland, seems to us to require unnecessary transfers from one line to another. Our Transportation Department assures us that we can transfer directly from the New York Central to the Santa Fe at Streator, Illinois, and thus avoid the transfer to the Wabash at Buffalo and ferry or tunnel route from Canada at Detroit. The New York Central route direct to Streator avoids Chicago. This is merely a suggestion from us, however. We do not wish to urge this change in the route mentioned in your letter. We will await your further advice. Perhaps in your conference with Dr. Pritchett other suggestions will arise. No shipment of the disc will be made without giving you due notice of the date so that any final preparations which you may wish to make in regard to personal supervision of the transportation can be attended to.

We will be glad to send some one with the disc if it is the wish of the Observatory Council. We do not believe, however, that this will be necessary. We have every confidence in the railroads to handle carefully a shipment of this kind when requested before hand.

The insurance rates which we have quoted cover the insurance from the time the disc is loaded on the car until it arrives at its destination. It does not cover loading or unloading. Your quotation from Lloyd's therefore, appears to be the more favorable.

I fear that my letter of January 11 unduly emphasized the difficulties of transporting the 120" disc from our plant to a seaport. I was speaking however, only of trucking. There would be no difficulty whatever by rail to Albany.

As regards the shipment of the 200" disc our Transportation Agent assures us that we have a clearance of 18 ft. 8 in. over the New York Central from Corning to Albany. This is ample for us to transport the 200" disc in what is known as a "well-hole" car. In fact we received from Harvey, Illinois, a point in the Chicago district, the top of the large locomotive lifting hoist which we are now using for the casting of these discs. The largest section of the top as it arrived here was 25 ft. long and 18 ft. high. This came in a "well-hole" car such as we propose to use for the transportation of the 200" disc. We have the assurance of the New York Central Railroad that the 200" disc can be successfully transported from Corning to Albany. It may be necessary to modify the crating somewhat at Albany after unloading from the "well-hole" car to prepare the disc for safe shipment on board the steamer. This would not be a major change in crating and could no doubt be accomplished at the transfer point.

Out of Albany two steamship lines, The Shepard S.S. Company and the Quaker Line operate direct to Los Angeles harbor. Both of these lines can carry the 200" disc. Therefore, we feel that there should be no alarm as to the possibility of transporting the large blank nor any reason for withholding operations that are now fairly well completed for its casting. We trust that the members of the Observatory Council will feel assured and that we may have their consent to proceed.

While Dr. Pease was in Corning he stated that it would be desirable to have specimen blocks of glass containing the full size supporting holes in which the grooves are to be ground at Pasadena for the supporting system. The enclosed blueprint #10659-421 shows a plan and sectional elevation of these parts of the 200 and 120" discs. For the 120" disc these cavities will be all of the same dimension, while in the 200" disc the clearance above the groove to be ground to the under side of the disc proper will vary depending upon the location of the support from the center of the disc. Dr. Pease suggested that you have two or three of each size in order to develop a grinding technique before actually starting the work on the disc. Accordingly we are asking at this time for information as to just how much glass stock should be furnished around the hole in which the grinding is to be done. We have shown on the blue print a portion of the ribs surrounding the hole. These extend about 4" beyond the rib comprising the hole proper.

To make these pieces actual size as they appear on the disc would require considerable time for annealing inasmuch as we have no kiln available for annealing more than one at a time. It would be an advantage

therefore, if we could furnish these with something like 2 or 3" of glass above the cavity and cut down the rib depth to 1 or 2" below the under side of the groove to be cut. In other words we would furnish full sized holes and ribbed thicknesses in a piece of glass that was only 8 or 9" overall thickness instead of the total thickness of nearly 26" for the 200" disc and nearly 17" for the 120" disc. This would enable us to give to these blocks the degree of annealing which we feel they should have in order that no breakage would occur in the grinding process. Furthermore this degree of annealing could be accomplished in a relatively short time in our small kiln. To make them full depth and anneal safely we would probably be forced to wait for the larger kilns or construct some other furnace in which to anneal these if they were to be gotten out in time to be of service before you are ready to begin work on the 120" disc.

We would like also to know how many of these pieces from each disc you would require and also whether in the case of the 200" whether you care particularly for the pieces corresponding to different positions in the blank. Those out near the rim of the blank as you know, will be some 4" thicker overall than those near the center. Consequently if there is no choice those near the center of the disc would represent less glass to handle and would occupy less space in the annealing kiln.

The work of cleaning the mold from the 120" is still in progress and may require several weeks longer before final inspection is completed.

We had planned to cast the 200" disc about February 25. Because of our available space we find it almost necessary to do work of this kind on Sunday so that if we are delayed for any reason we put off the casting date a whole week at a time. We wish therefore, to have everything in readiness before the glass is melted so that we can time the melting of the glass with a definite Sunday date for casting.

May we have the early consideration of these matters by the Observatory Council so that we may proceed without delay?

Very truly yours,

Physical Laboratory.

MD.

cc: Dr. Max Mason
Dr. F.G. Pease
Dr. J.A. Anderson
Dr. A. L. Day

JAN 24 1935

1103.1

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

February 12, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

	ww	2-13	ww	2-15
	FBH		FBH	
	mm		mm	

Dr. Warren Weaver,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

My dear Warren:

We are faced with another unfortunate delay in the casting of the 200" disc. Yesterday we had planned to make a 61 1/2" disc for Harvard University. When the tank was opened we found the condition of the glass such that it was inadvisable to use it.

This means that we will have to allow the tank to cool down, dig out the unsatisfactory glass, and again bring the furnace up to temperature. This necessitates a delay of probably a month so that we now expect to cast the 200" late in March.

Very truly yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
In Charge

OAG:FMM

JAN 24 1935

FBH	2-19	FBH
mm	FEB 19 34	1717

1103.1

February 15, 1934

FEB 24 1934

Dear Dr. Gage,

May I thank you for your letter of February 12, as well as for the previous note concerning the casting of the 200" disc. From a purely personal and quite unimportant viewpoint, I am a little glad that the pouring has been delayed, because there was a strong probability that I would not have been able to come on the earlier date. I have noted that you now expect the casting to occur sometime late in March. As soon as the date becomes more definite, I will greatly appreciate your letting me know, so that I can definitely plan, if possible, to save the time.

It is exceedingly kind of you to ask both of us to come over. We will do so if it is in any way possible -- in fact, since the pouring will occur on a weekend and somewhat later in the spring, there is a fair chance that we will drive over and bring Nip along.

Very cordially,

WARREN WEAVER

Dr. O. A. Gage
Corning Glass Works
Corning, New York

WW:PH

JAN 24 1935

CORNING GLASS WORKS
CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

February 20, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

MAR 2 - 1934

web-ww-2-24
akn.

Dr. Warren Weaver,
Room 5500,
49 West 49th Street,
New York, N. Y.

My dear Warren:

It now appears that our schedule of casting has been delayed just one month and a tentative date of March 25th has been set for the making of the 200".

We certainly hope that the three of you will be able to visit Corning at that time.

Cordially,

O. A. Gay.

OAG:FMM

JAN 24 1935

FBH		FBH

MAR 2 - 1934

February 24, 1934

Dear Dr. Gage:

I have noted the new date for the pouring of the 200", and you may be sure that we will make every effort to be present and to take the added opportunity of a visit with you.

Very cordially,

Dr. C.A. Gage
Corning Glass Works
Corning, New York

WARREN WEAVER

WW:PH

APR - 7 1934

1103.1

JAN 24 1935

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

March 5, 1934

*Ans in
committee*

Preesident Max Mason
Rockefeller Foundation
49 West 49th Street
New York City.

MM	MAR 12 '34	17.7
WW	APR - 6 '34	WW FBK
TA	APR - 6 '34	Ja.
WWB		WWB

My dear Mason:

I enclose copy of my last letter from Hostetter.
Millikan was delighted with all he saw at Corning, especially the
polariscopic tests of the 120-inch disc. These reveal a perfection
of annealing which is really extraordinary.

At the request of Dr. Day, we have agreed that they may release
a certain amount of publicity regarding the mirror discs, provided that
they take every possible precaution to avoid sensational or exaggerated
statements of any kind. We had hoped to defer any such publicity, at
least for the present, but Day wrote that stories regarding the 120-inch
disc had somehow leaked out, in spite of their efforts to avoid them.
We are especially endeavoring to avoid wild statements regarding great
magnifying power (which we never use), life on Mars, etc. But it is im-
possible to prevent unauthorized stories.

I will send you soon a reprint of papers describing the new process
of coating mirrors with aluminum, as developed for us in our Optical Shop
at the California Institute by Dr. Strong, who has applied it on mirrors up
to 36 inches in diameter (the Crossley Reflector of the Lick Observatory).
We were glad to have tests made with this mirror at Mount Hamilton. From
Dr. Wright's article, which will accompany that of Dr. Strong, you will
see photographs illustrating the important gain made in the ultra-violet,
and a statement of the fact that the general reflectivity of the Crossley
mirror has been increased about fifty percent. In daily practice, the
gain should be greater than this, because silvered mirrors quickly tarnish,
while those coated with aluminum change very slowly indeed.

So we are getting some real results, though the whole project is nec-
essarily slow and tedious in its development.

With best regards,

Yours very sincerely,

GEH:G

George E. Hale

APR - 7 1934

C O P Y

CORNING GLASS WORKS
Corning, New York

February 28, 1934

Dr. George E. Hale
Astrophysical Observatory
California Institute of Technology
Pasadena, Calif.

Dear Dr. Hale,

Replying to your letter of February 21, we enjoyed having Dr. Millikan with us even though he could be here only a few hours. His visit would have been short under normal conditions, and due to the lateness of his train his time was even more limited. However, he did have an opportunity to see the 120-inch disc, the mold for the 200-inch, and, of course, all of the equipment used on this project.

Our delay of one month in the casting date was due to an accident on our melting unit which burned up a portion of the iron frames binding together the refractory doors. This introduced some iron scale, as we call it, into the glass and, while we do not consider that this would have been serious, nevertheless we felt that it was the conservative thing to do to let out the melting unit and remove this contaminated glass. The large job is too important to jeopardize in any possible manner. The tank is now being brought up to temperature and we are quite confident that we will cast the large disc on March 25.

Referring to your comment on publicity, I have forwarded this information to Mr. Quigley and I am sure that he will heed your advice. As Dr. Millikan pointed out, the usual person has a very confused idea as to magnification and resolving power. We will make every effort to meet your wishes in this respect, although, as you know, it is sometimes difficult to change the ideas of a newspaper reporter.

I trust that you and some of your colleagues may be with us on March 25.

With kind personal regards, I remain,

Sincerely yours,

(Signed) J. C. Hostetter
Director, Development & Research

JCH:FRF
cc - GVM

MAR 20 1934

1103.1

CORNING GLASS WORKS
CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

March 12, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

ww	MAR 13 '34	ww 3-14
TA		TA 3/16

Dr. Warren Weaver,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

My dear Warren:

Yesterday we cast a 61 1/2" disc for Harvard and will make an 86 1/2" for Michigan on the 18th. Unless the unforeseen happens, we will cast the 200" on March 25th.

We are arranging a list of guests for this occasion and it has just occurred to me that we have not included anyone from the International Education Board. We would be very glad if you would suggest the men on this board whom you feel should be included.

We are looking forward with the greatest of pleasure to a visit from you and Mary.

Cordially,

D. A. Gage

OAG:FMM

MAR 20 1934 FBH

FBH

1103.1

TA	MAR 15 34	Ja
NWB		—
mm		mm

March 14, 1934

Dear Professor Gage,

I am particularly glad to get your note of March 12, especially since I was about to write you to inquire whether the March 25 date for the pouring of the 200" was to stand.

The International Education Board is no longer an active agency, those of its functions which were not discontinued having been absorbed into the program of this Board. There are still officiating, however, Mr. Trevor Arnett, President, and Mr. W.W. Brierley, Secretary, who hold corresponding offices in the General Education Board. I am taking the liberty of passing along your inquiry to them since they will be in better position to offer suggestions.

Very cordially,

WARREN WEAVER

Prof. O.A. Gage
Corning Glass Works
Corning, New York

WW:PH

MAR 20 1934

MM MAR 16 '34 17.7

1103.1

WWB	MAR 16 '34	MMB
WW	MAR 19 '34	WW
AMJ	MAR 20 '34	✓

March 16, 1934

Dear Professor Gage:

Dr. Warren Weaver has referred to me your letter of March 12th with regard to the casting of the 200" disc on March 25th. I understand that he himself is planning to be present, and that probably Dr. Max Mason will also be there. Dr. Mason is a trustee of the International Education Board. These gentlemen will fully represent the Board on that occasion. You know of their deep interest in this entire enterprise.

Needless to say that I am greatly pleased to learn of the progress which has been made by the Corning Glass Works on this project. Please accept my sincere wishes for the complete success of your undertaking.

With kindest regards, I am

Sincerely yours,

TREVOR ARNETT

Professor O. A. Gage
Corning Glass Works
Corning, New York

JAN 24 1935

Corning 1103.1
Page

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

March 15, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

Dr. Max Mason,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.



APR 6 1934

My dear Dr. Mason:

As Warren has probably told you, everything is arranged to cast the 200" disc on Sunday, March 25th. Of course, the unexpected may happen and we may have to delay but we are reasonably confident that the work will be done on that day. The operation will start about 8 o'clock in the morning and will probably last until 4 or 6 in the afternoon.

We are looking forward with great pleasure to seeing you and Mrs. Mason in Corning and hope that it will be possible for you to arrange your plans.

Cordially yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
In Charge

O. A. Gage

OAG:FMM

JAN 24 1935

THE ROCKEFELLER FOUNDATION
INTER-OFFICE CORRESPONDENCE

From MM's interviews.

1103.1

	WW	APR 18 '34	WW	
7	TA	MAY -7 '34	Ja	
	WWB FBH	APR 23 '34	WLB FBH	
	Files	MAY -7 '34		

March 20, 1934.

MAY 7 - 1934

Dr. George E. Hale,

Discussion of the progress of the 200", and particularly a detailed

reexamination of the circumstances leading to the grant, especially as it affects the understanding regarding cooperation between the Carnegie Institution and Cal. Tech. Merriam objected to Adams' taking a membership on the Trustees of Cal. Tech. Hale thinks this very desirable and Adams was elected, but up to the present has not accepted. Merriam was initially opposed to any cooperative understanding, but members of the Executive Committee forced the matter, and a unanimous vote was obtained in favor of cooperation. Hale thinks Merriam is not fundamentally opposed in any way, but wishes to proceed along different lines from those Hale thinks advisable.

In case of a desire for consultation, Hale advises, always, Root, if available, and Pritchett.

Hale referred to a complete memorandum in his desk at Pasadena in regard to all negotiations of the past, which is available if desirable.

MAR 29 1934

WW

DHS

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ya
11/11/34

1103.1

Tuesday, March 27, 1934

O.A.Gage (Corning Glass Works) by telephone

To report what has actually happened in the pouring of the 200".

By 11 o'clock last evening, after five hours of heating subsequent to completion of the pouring, approximately 20 of the "islands" of the mould had floated to the surface. Most of these were the cylindrical "islands", this being significant since calculations show that the interior of these cylindrical "islands" reach a temperature considerably above the interior of the triangular "islands".

The Corning experts have decided to make another pouring, which can probably be done before May 1. The immediate cause of the failure of the mould is now known. The 1/4" tie rods which bolted down the "islands" corroded through near their upper end. They are covered with a brown corrosion product the analysis of which is already under way. The presumption is that the combustion gases found their way inside the islands and attacked the metal. In the case of the 120" disc no corrosion was observed after the rods were removed. This was probably due to the fact that the preheating period for the 120" was only 5 hours as compared with only 24 for the 200", while the pouring and post-heating periods differed by corresponding amounts. The corrosion and failure apparently proceeds rather rapidly after it has once started. There is fairly good evidence that it had not reached a serious stage at the time the pouring began, since none of the "islands" failed which were immediately in front of the pouring doors. These were apparently protected by the first few ladles of glass so that the gases did not continue to penetrate these sections of the mould.

Macauley is entirely confident that this mechanical defect can be completely eliminated in the next pouring. They will probably use rods which are protected with a non-corrosive layer, and ventilation will probably also be used on the hollow interior of the "islands".

Copy EB
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MAY - 2 1934

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ww	APR 30 '34	ww
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wwB	MAY -1 '34	7/1/34

April 26, 1934

Dr. George E. Hale
Astrophysical Observatory
California Institute of Technology
Pasadena, Calif.

Dear Dr. Hale,

Our plans in regard to the 200-inch disc project have been considered from every possible angle, and as a result there is very little to add to what I conveyed to you by telegram early this month.

We are constructing the ceramic cores for a new mold, and while this work is being done, Dr. McCauley is developing a modified anchoring system that should guarantee the integrity of the mold during the casting operation. In the meantime also the disc cast on March 25 is being annealed, and at present this disc is in the cooling stage. We believe that it will have cooled sufficiently to permit inspection on or about May 20. Our plans in regard to this particular disc must, therefore, await the results of our inspection.

We learned much of value in carrying out the operations on March 25. We will learn considerably more that will be of direct value in future operations if we may continue work on this particular disc. Perhaps it is not necessary to go into further detail at this time as to what we would expect to gain by continuing experimentation on the present disc. Suffice it to say that we believe any experience that we may obtain by practice operations on the present disc will be the best possible insurance for one hundred per cent success when another disc is poured. Just as soon as we can inspect this disc we will be able to submit to you a definite recommendation based on our best judgment.

MAY - 2 1934

Dr. George E. Hale, Page 2, April 26, 1934

All of us were happy to learn that the 120-inch disc was delivered safely in Pasadena and now reposes in your optical shop. We certainly wish you every possible success in your figuring operations. We have only the greatest praise for the fine manner in which the New York Central Railroad officials worked with us on the packing and loading of the disc and the subsequent care that they gave the disc while on their lines. I have every reason to believe also that the officials of the Santa Fe were equally interested and did everything humanly possible to insure the safe delivery of the disc to you.

With kind regards, I remain

Sincerely yours,

J.C. Hostetter
Director, Development & Research

JCH:FRF

cc- Dr. A.L. Day
Dr. Max Mason ✓

JUN -1 1934

1103.1

THE ROCKEFELLER FOUNDATION
INTER-OFFICE CORRESPONDENCE

WW	MAY 28 '34	ww	
FBH TA	MAY 29 '34	FBH ga	
WWB	MAY 31 '34	WWB	
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From MM's interviews.

May 1, 1934.

Mr. Frank B. Jewett, Mr. W.E.S. Strong, and WW.

Jewett described the background for our consultation. Hale asked Jewett sometime ago to suggest a good mechanical engineer who would look over the present tentative design for the telescope mounting and give his criticism, particularly as to stresses. Jewett suggested Strong, and Adams gave Strong the latest blue prints. Strong reported to Jewett emphasizing the major points: (1) The design seems made by people unfamiliar with manufacturing processes for this type of structure (2) There is no machinery in the West to take care of this work - the proper procedure would be to manufacture the mounting complete in the East and ship as a whole. Strong then on his own initiative worked up a design for a mounting which avoided the cantilever principle, and thereby reduced

the weight of the mounting. He has ideas on correcting inaccuracies of drive, etc. Jewett stated that he had informed Hale of the general tenor of Strong's opinion. Hale had asked Jewett to see MM in view of approval of Strong's activity in the situation. MM stated that he would be glad to talk over the general situation because of personal interest, but that none of us could be in a position of determining procedures, and we would take no part in this. Strong explained his comments in detail and showed his design.

Subsequently MM made an attempt to clarify the present position, trying to discover whether Strong had been engaged professionally to carry on the work. It appeared that no arrangement had been made in the past. It is not known whether Hale engaged him, or had the thought that Strong was donating his advice. Hale's suggestion that Strong go to the West and discuss the matter of the telescope was not approved by Strong, who said he did not wish to get in a "dog fight", and that it would be better for representatives of the Observatory Committee to come to the East. He subsequently stated that if this were done he thought it would be advisable to have the preliminary consultation limited to the general aspects of manufacture in the East and criticism of the Pasadena design, without disclosure of his design. He stated that if he were engaged by Pasadena to supervise the work he considered \$1250 a month a proper fee, in view of the fees that he was accustomed to receive. MM made no comment on the general situation except to say that he thought it very necessary that it be thoroughly clarified in the minds of all before proceeding.

Strong subsequently wrote MM a letter, a copy of which was sent to Hale, and further discussion with Jewett in regard to the situation was carried on by telephone, in which MM stressed again the desirability of making arrangements definite before proceeding, and questioned Strong's familiarity with the facilities and amount of past studies at Pasadena. The major features of Strong's design for the mounting are the same as those of the previous mounting design at Pasadena, in avoiding the cantilever construction of the tube and thus reducing weight.

AMERICAN RADIATOR COMPANY

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

40 WEST 40TH STREET
NEW YORK

OFFICE OF THE VICE PRESIDENT

May 1, 1934

Mr. Max Mason
Rockefeller Foundation
Rockefeller Center
49th Street
New York, N. Y.

Dear Mr. Mason:

While the matter is fresh in my mind, it seemed to me best to put in writing what I believe is the best plan in guiding future proceeding as regards the manufacture and design of the 200" telescope and with which plan I believe you agree.

That you ask Dr. Hale and such other of his associates to come to New York for a joint conference with Dr. Jewett, yourself, Mr. Weaver and myself and this discussion to be solely on three points:

1st: The ^{2d} design of the mounting and, too, the design to build or have built for this telescope;

2nd: A full statement as to the facilities that exist or they expect to provide for the manufacture of this mounting on the Pacific Coast;

3rd: How much of this equipment will they have to buy for this particular work and to what extent will they use outside facilities.

As I stated to you, to me the fundamental principle involved in this work is whether the construction of the mounting shall take place on the Pacific or in the East and the discussion should turn solely upon the adequacy of the mounting they propose to build to meet the conditions required for the telescope and economy in building.

If it is found as a result of this conference that they agree that it is advisable that this construction and design be done in the East, then some suitable arrangement for representation is to be made by them with me on the understanding that after such arrangement is made, I will present to them a design and method of manufacture for their consideration but no disclosure of the design which I presented to you today is to be made by Dr. Jewett, Mr. Weaver, you or myself until after such an agreement has been made and they acquiesce in the fact that the design and construction is to be done in the East.

I am writing at the American Radiator Company on their letterhead as I will not have time to go to my office at 31 Nassau Street. Trusting that this places the matter fully before you, I remain

Yours very truly,

N. E. S. Thayer

for sent Dr. Hale

MAY 29 1934

MAY -2 '34

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WW	MAY 18 '34	WST WW
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May 8, 1934.

MAY 29 1934

Dear Mr. Strong:

Thank you for sending me your letter of May 1st written after our talk, as well as for your courtesy in giving so much of your time to a discussion of this important enterprise.

I think I explained to you at our meeting how completely outside the region of decision I must be in this whole matter. This does not, however, mean that I have not the greatest personal interest in the progress of the work. I greatly appreciate opportunities such as we had to keep in touch with the general developments.

Sincerely yours,

MAX MASON

Mr. W.E.S. Strong,
31 Nassau Street,
New York, New York.

MM:AEB

Copy sent Dr. Hale

TBA

W W	MAY 18 '34	W W.
TA	MAY 28 '34	S. A.
W W B	MAY 28 '34	W W B
FBH		FBH

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MAY 29 1934

May 8, 1934.

Dear Hale:

The other day I talked with Frank Jewett regarding some suggestions which Mr. W.E.S. Strong had made to him on the design and manufacture of the mounting for the 200-inch. Later, at Jewett's suggestion, Strong, Jewett, Weaver and I had a talk on the subject.

I made it clear to Frank that we played no part in determining decisions or procedures, and that our participation in the discussion was based on personal interest in the project.

I was not quite clear as to the status of Mr. Strong in the enterprise, whether the discussion was between persons interested in giving advice or whether Mr. Strong had been definitely engaged as a consultant by the Observatory Council. I gathered that he had been requested to comment on the tentative design submitted.

Mr. Strong expressed himself at the meeting as being unwilling to go to California to discuss the matter there, and said he thought it preferable to have some representatives come to the East. He stated to me that if it were desired to have him take charge of the manufacture of the mounting he would suggest a salary for himself of \$1250 a month, as being in keeping with his past experience in engineering fees.

He had not made detailed calculations as to the stresses in the design submitted. He made the point that such a design

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May 8, 1934.

#2

should be drawn up by one familiar with manufacturing processes and available materials, in the interest of economy. He was firmly of the opinion that the desirable mode of manufacture for the mounting was to have it all done in the East, where large machinery is available, and shipped as a whole to Pasadena. Following his study of the design submitted to him he had engaged himself with the problem and had prepared a drawing of a telescope mounting with various special features, the general idea being somewhat similar to the design which is embodied in the models which were made at Cal.Tech.

After this interview Mr. Strong sent me a letter, a copy of which I enclose, together with my answer to him.

Cordially yours,

MAX MASON

Mr. George E. Hale,
Astrophysical Observatory,
California Institute of
Technology,
Pasadena, California.

MM:AEB

copy to Mr. F. B. Jewett

201103.1

JUN 8 - 1934

FRANK B. JEWETT
195 BROADWAY
NEW YORK

May 18, 1934.

mm	MAY 21 '34	M. 17	5/23

DR. MAX MASON, President,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

My dear Max:

Herewith for your information are copies of two letters from Hale, together with copy of my letter of May 17th and of my telegram of today sent after receipt of his last letter.

While it is obviously none of my business, my own past experience leads me strongly toward Strong's point of view as to the fundamental necessity of bringing in the experience of those who would be called upon to manufacture, during the formulation of the final designs. However, I can't help but feel that the Pasadena crowd, through lack of the type of experience Strong and I have had, tend to underestimate this point and that, failing properly to estimate it, they run the risk of not getting the best or most economical apparatus in the end. However, this is their problem and not mine.

The whole thing illustrates the difficulty of attempting to solve this sort of problem at arms length and through an intermediary. In my judgment what Hale and Adams should have done when they were here in New York was to have gotten down to brass tacks with Strong on the basis of his cooperation, if they wanted it, rather than to do what they did, namely, talk a lot of generalities and shy off from anything concrete.

As ever, sincerely yours

FBJ:AS

F. B. Jewett

Frank F-56

X

May 18, 1934.

G. E. HALE,
Mount Wilson Observatory,
Pasadena, California.

Your letter May 16th just received stop
Wrote you long letter yesterday by airmail on Strong
matter suggest you defer making final decision until
receipt this letter.

F. B. JEWETT

C O P Y

Carnegie Institution of Washington

Mount Wilson Observatory

Pasadena, California

May 16, 1934.

DR. FRANK B. JEWETT,
195 Broadway,
New York City.

My dear Jewett:

I wrote in haste yesterday, as I had suddenly heard that some of the members of the Observatory Council are going out of town for a stay of such length that immediate action must be taken. A meeting of the Council was therefore called for today.

While I have received no final opinion from you, I thought it safe to assume from Strong's letter to Mason that no solution in harmony with the views of the Observatory Council could possibly be found in his case. I ought to have added, however, that as yet we have made no approach to Warner & Swasey, and we have not seen nor heard any description of any designs made by Strong. So, if we decide that his conditions prevent us from employing him, we shall certainly not be guilty of poaching in his fields. The whole question will be discussed by the Observatory Council this afternoon.

With best regards,

Yours ever,

(Sgd.) GEORGE E. HALE

May 17, 1934.

DR. G. E. HALE,
Mount Wilson Observatory,
Pasadena, California.

My dear Hale:

I was on the point of writing you further about the telescope mounting matter when your letter of the 15th with its enclosures came to hand.

While the program outlined in your letter apparently disposes of the matter in a way that is satisfactory to you and will relieve me of the somewhat anomalous and embarrassing position in which I have been placed (which relief I am happy to have), I think I will not advise Strong finally until you have had opportunity to receive this letter. In what I am about to write I have not consulted Mason, although I am sending him a copy of the letter for his information. I am handling the matter in this way so as to avoid any embarrassment to Mason and the Rockefeller Foundation people. Mason's position throughout has been a hundred percent correct and in fact the only position which he could take.

Now as to Strong and his position. From the several conversations I have had with him I think I understand his point of view thoroughly, and in justice to him I should like to leave the record of an abortive incident clear.

Strong was brought into the picture at my suggestion following your request for suggestions as to outside advice. After reviewing the whole field of my acquaintanceship it seemed to me that he was the one best qualified by experience

and, particularly from his wide personal contacts with manufacturing organizations, most likely to be helpful in manufacture.

After his talks with you and with Adams at Corning he became very much interested in the problem of the heavy parts of the mounting, purely from the standpoint of what should be done to insure the best possible end product. In all of his consideration of the matter I think that he never lost sight of the fact that the astronomical requirements were the controlling factors and that the experience already gained in the building of large telescopes would have to be given full weight. At the same time he considered the design and construction of the telescope and its mounting as a mechanical problem which required not only skillful design but a thorough understanding of manufacturing facilities and methods and which, whatever the design finally agreed upon, would tax existing manufacturing facilities to the limit.

I think the thing that somewhat appalled Strong, as it did me, after the talk with you and the talk with Adams at Corning, was the apparent relegation of place, facility and experience in manufacture to a secondary position to be decided upon after the design had been decided upon. Put another way, Strong has felt that the place of manufacture and the concerns to be asked to undertake the several parts were of primary rather than secondary concern in working out the final design, and that having decided upon the concerns best qualified to undertake different parts of the work, their experience should be brought to bear in the working out of the final design.

He has expressed himself to me as being of the opinion that irrespective of the design finally decided upon, the character of some of the parts would be such that the only adequate machinery and experience available for manufacture is here in the east, such for example as with the Bliss Company, the American Bridge Company and some such concern as the Otis Elevator Company on the intricate control electrical mechanism for operation. He feels that any scheme of manufacture which requires the setting up of special manufacturing machinery for this single job will be unsatisfactory both from the standpoint of the end result and from the cost of obtaining that result.

While I have not personally had experience in this particular field, I am fain to confess that Strong's reasoning appeals to me as being in the right direction when it comes to the matter of obtaining the best possible realization of a desired objective at the lowest possible cost. In other words, my experience has been that when one has a specialized job to do, when he knows the requirements of the finished apparatus as to mechanical perfection and functioning, the best thing to do is to enlist the cooperation of manufacturers who already have facilities adapted to the work in hand and who have had long experience with the handling of those facilities and know pretty well what can and cannot be done with certain types of designs. That is exactly the procedure which is being followed at the present time in connection with a complicated enciphering equipment for the Navy. Here the Navy people themselves had done enough work to know what the end requirements were and had gone a considerable

distance in attempting to design an electromechanical apparatus to produce the desired results. When it became apparent that they were headed for mechanical and expense difficulties in their attempt to secure apparatus through their own manufacture or through attempting to have their own designs duplicated, they came to us and almost immediately, out of our past experience and a knowledge of what existing manufacturing facilities were capable of, a modified design was evolved in cooperation which was cheaper to manufacture and which produced better results than anything they had conceived of.

Strong has, I think, never been averse to going to Pasadena for consultation and study, on the mountain, of the requirements which are to be imposed on the new telescope. In fact he has expressed himself to me as agreeing that this would have to be done. What he has expressed himself as being averse to was going out for an uncertain discussion before a general principle for design and manufacture, which he considered really basic to success, had been decided upon. He has said all along that if the design work was to be done in Pasadena and not in intimate cooperation with those who were to be called upon to do the manufacturing, so that their experience might be incorporated, or if manufacture was to be done on the west coast where he lacks experience and where he has reason to believe there are not adequate facilities, he did not see that he could be of any particular help to you. I think that he has felt that his greatest chance of being helpful was not in his doing detailed design work but in his knowledge of where experience and manufacturing facilities

were to be found and in his wide personal contact in the several fields where these facilities were known to exist.

In a way the whole thing appears to me to be a sort of case of which comes first, the hen or the egg, since obviously there would have to be a meeting of minds. As I told you at the time of our last telephone conversation, which followed the previous one in which you urged me to have Strong go to Pasadena, he told me that while he felt strongly that the matter which he considered of primary importance could best be settled here in New York by some of your people with authority coming here and conferring with him and such manufacturers as might be most likely to be involved, he was nevertheless willing to go to Pasadena on my assurance that he would not become involved in a cat-and-dog fight about designs already worked out.

Following our last telephone conversation and after talking with Mason, I had a telephone talk with Strong. In it I guess I gave him the impression that Mason had gotten the idea that he (Strong) was set on having his own ideas as to type of design, and where that design should be made, prevail. At any rate Strong told me that such had never been his intention but that what he had tried to impress both on Mason and on me was his firm belief in the course of procedure which I have attempted to outline as being basically best in the interests of good and satisfactory manufacture. Later on he called me up to say that he was so perturbed at the thought that Mason might have gotten the wrong impression that he had called Mason to tell him that he had become very much interested in the job and that the one

thing he had had in mind was to insure you people getting the very best end result which it was humanly possible to produce at the lowest possible cost.

After you have had time to receive this letter I will call you up and if nothing has arisen to change the point of view expressed in your letter under reply I will simply pass the word along to Strong to forget the whole episode.

I have not attempted to discuss the remuneration side of the matter as that is a relatively insignificant thing and one in which I think there would have been no difficulty in reaching a satisfactory arrangement with Strong after what he considered the more basic considerations were out of the way.

With kind personal regards,

Yours sincerely,

FBJ:AS

C O P Y

Carnegie Institution of Washington
Mount Wilson Observatory
Pasadena, California

May 15, 1934.

DR. FRANK B. JEWETT,
195 Broadway,
New York City.

My dear Jewett:

I have given you so much trouble about the design of our mounting that I am very sorry to bother you further. I think, however, that you ought to know just how we feel regarding the situation.

I enclose a copy of a letter from Strong to Mason, together with a copy of Mason's reply to Strong. In his letter to me Mason said that they "played no part in determining decisions or procedure", and confined himself to an outline of his talks with Strong, without expressing his preference for any particular design or policy. I got the impression, however, that he felt a different procedure would be preferable, as he had previously felt in the case of Dunn's designer, Jones.

At this end of the line I have discussed Strong's letter with most of the members of the Observatory Council, and will present it to the others at our meeting tomorrow. Four out of five have already indicated that Strong's proposals could not be adjusted to the modes of procedure we have always found most effective here.

We think it absolutely necessary that the designer should know from some personal experience the exact requirements of large telescopes in practice, and that it would therefore be essential for Strong to spend enough time on Mount Wilson to see our instruments in use for several very different types of work, in which the demands on the mounting differ materially.

In the second place, instead of choosing between Strong's design and the several alternative designs we have made here, we would pool our ideas with our consulting engineer, and evolve a design containing the best features of all. This could only be done in Pasadena.

Finally, without troubling you with more details, a word should be said regarding salary. The amount asked by Strong is probably not more than his time and experience are worth, but in comparison with our own scale, even before the recent reduction caused by the depression, such a payment would be likely to cause some heart-burnings here.

On the whole, then, to my personal regret, it seems impossible to carry through this plan. I have perfect confidence in your judgment, and have no doubts regarding Strong's ability. I sincerely hope you will both recognize this.

After studying all sides of the question, there seems to us one very promising solution. This is to make a deal with Warner & Swasey. Mr. Burrell, their chief engineer, came out here several years ago and made one design for us, developed in consultation with our entire group. I hope he may soon be able to return, and make another design, embodying all the new features we have since devised. Warner & Swasey is the only firm in the country which has had nearly fifty years of experience in designing and building large telescopes. While their shop tools are not large enough to handle the largest parts of the 200-inch mounting, they could have them built in other eastern shops, just as Strong would have done. They know all the astronomical requirements, after building and installing such telescopes as the great Victoria reflector and scores of other large instruments. In fact, no firm in the world can compare with them in such experience. Working jointly with us, as they have shown that they can do, they could surely produce a mounting of the highest quality and efficiency.

With repeated thanks for all your assistance, which has helped greatly to clarify our views, I am,
as ever

Yours very cordially,

(Sgd.) GEORGE E. HALE

P.S. You will be glad to know that the other matter I wrote to you about has been very satisfactorily settled.

AUG 7 1934

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

Confidential

President Max Mason
Rockefeller Foundation
49 West 49th Street
New York City.

		MAY 23 '34	
		May 18, 1934	
MM			
WW	JUN 18 '34		WW
NWB	JUN 20 '34		FBH
FBH			J.A.
TA	JUN 22 '34		

My dear Mason:

I was glad to receive your letter of May 8, with enclosed copies of correspondence with Mr. W.E.S. Strong. I do not think that Jewett was aware of the conditions laid down by Strong in his letter to you, both because of what Jewett had said to me and also because he has not since recommended that we engage Strong. In view of the confidential nature of your telephone talk, I have not told Jewett what you said to me, but wrote that I got the impression from your letter that you thought a different procedure might be preferable. The enclosed copy of my letter to Jewett will show exactly what I said. I saw no harm in sending Jewett a copy of Strong's letter to you, as this was not marked confidential, and merely stated the conditions made by him.

I ought to add that Jewett telephoned me (I think on May 7) saying that he would call me up the next morning and also let Strong talk with me at that time. I could not quote you, but said I was not sure of your views and requested him to telephone you before he called me up again. He said he would do so, and afterwards telegraphed that he was not convinced that Strong would make a satisfactory arrangement. After waiting for further information regarding Strong's attitude, I wrote Jewett the enclosed letter of May 15.

I am surprised that Strong took such an unbending attitude, as he had given me a favorable impression when I talked with him and Jewett in New York on March 20. But at that time he made no reference to the precise conditions under which he would undertake the work in case we should decide to engage him.

At a meeting of the Observatory Council on May 16 I presented the enclosed statement, with Millikan, Adams, Robinson and Anderson present. They emphatically and unanimously agreed that Strong's conditions made his engagement inadmissible (as Noyes had previously done), and authorized me to write to Warner & Swasey, as there is no question regarding their qualifications for the job. I wrote them yesterday asking if their Chief Engineer, Mr. Burrell, could come here about July 1, to work out with us a design embodying the best principles of all the designs before us. I hope we can make with them a mutually satisfactory arrangement. Of course we shall not proceed with the construction of the mounting without your authorization.

The 120-inch disc is safely in our optical shop, and we have no doubt whatever of the ability of the Corning group to make an equally satisfactory 200-inch disc. The polariscopic tests of the 120-inch disc show it to be

May 18, 1934

far superior to any large telescope disc previously made. Transportation from Corning to Pasadena was very quickly and easily accomplished, and the vibration recorders carried with the disc on the through car showed a surprising freedom from shock. We are indebted to the Presidents of the New York Central and Santa Fé Railroads for the special precautions taken in handling the disc and to the Corning Works for their care in packing and loading it. We carried insurance (for replacement cost) through Lloyds at less than one-sixth of the charge proposed by any other company.

The copies of correspondence with Dr. Merriam in the enclosed statement call for a word of comment. I have felt during the past year that Adams should be made a regular member of the Observatory Council, but for some unknown reason Merriam opposed this. However, when the case came before the Executive Committee of the Carnegie Institution, they fully agreed with the unanimous action of the California Institute trustees, which had been taken on my motion, but suggested to us through Senator Walcott that we ask Merriam's approval. It had never occurred to me (or to Dr. Pritchett, Chairman of the Executive Committee of the Carnegie Institution) that he could object, but we were of course perfectly willing to appease Merriam in this way. Hence the exchange of telegrams and letters.

The success of the aluminum process of coating mirrors, described by our Dr. Strong and by Dr. Wright of the Lick Observatory in the articles I sent you and also by Dr. Spencer Jones, Astronomer Royal, in a recent number of "Nature", should mean a gain of 50 percent in the brightness of the images given by the 200-inch telescope. We have therefore decided to try it on a larger scale, and to loan the apparatus to observatories that want to use it, such as Mount Wilson, the new University of Texas - University of Chicago Observatory, etc. In this way we can make sure of the possibility of applying the process to the 200-inch mirror and also help other institutions, at no additional cost to the 200-inch fund.

With best regards,

Yours very cordially,

GEH:G

G. E. Hale

1103.1
AUG 7 1934

C O P Y

May 15, 1934

Dr. Frank B. Jewett
195 Broadway
New York City.

My dear Jewett:

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At this end of the line I have discussed Strong's letter with most of the members of the Observatory Council, and will present it to the others at our meeting tomorrow. Four out of five have already indicated that Strong's proposals could not be adjusted to the modes of procedure we have always found most effective here.

We think it absolutely necessary that the designer should know from some personal experience the exact requirements of large telescopes in practice, and that it would therefore be essential for Strong to spend enough time on Mount Wilson to see our instruments in use for several very different types of work, in which the demands on the mounting differ materially.

In the second place, instead of choosing between Strong's design and the several alternative designs we have made here, we would pool our ideas with our consulting engineer, and evolve a design containing the best features of all. This could only be done in Pasadena.

Finally, without troubling you with more details, a word should be said regarding salary. The amount asked by Strong is probably not more than his time and experience are worth, but in comparison with our own scale, even before the recent reduction caused by the depression, such a payment would be likely to cause some heart-burnings here.

On the whole, then, to my personal regret, it seems impossible to carry through this plan. I have perfect confidence in your judgment, and have no doubt regarding Strong's ability. I sincerely hope you will both recognize this.

Dr. Frank B. Jewett

-2-

May 15, 1934

After studying all sides of the question, there seems to us one very promising solution. This is to make a deal with Warner & Swasey. Mr. Burrell, their chief engineer, came out here several years ago and made one design for us, developed in consultation with our entire group. I hope he may soon be able to return, and make another design, embodying all the new features we have since devised. Warner & Swasey is the only firm in the country which has had nearly fifty years of experience in designing and building large telescopes. While their shop tools are not large enough to handle the largest parts of the 200-inch mounting, they could have them built in other eastern shops, just as Strong would have done. They know all the astronomical requirements, after building and installing such telescopes as the great Victoria reflector and scores of other large instruments. In fact, no firm in the world can compare with them in such experience. Working jointly with us, as they have shown that they can do, they could surely produce a mounting of the highest quality and efficiency.

With repeated thanks for all your assistance, which has helped greatly to clarify our views, I am, as ever,

Yours very cordially,

George E. Hale

GEH:G

P.S. You will glad to know that the other matter I wrote to you about has been very satisfactorily settled.

C O P Y

May 16, 1934

Dr. Frank B. Jewett
195 Broadway
New York City.

My dear Jewett:

I wrote in haste yesterday, as I had suddenly heard that some of the members of the Observatory Council are going out of town for a stay of such length that immediate action must be taken. A meeting of the Council was therefore called for today.

While I have received no final opinion from you, I thought it safe to assume from Strong's letter to Mason that no solution in harmony with the views of the Observatory Council could possibly be found in his case. I ought to have added, however, that as yet we have made no approach to Warner & Swasey, and we have not seen nor heard any description of any designs made by Strong. So, if we decide that his conditions prevent us from employing him, we shall certainly not be guilty of poaching in his fields. The whole question will be discussed by the Observatory Council this afternoon.

With best regards,

Yours ever,

George E. Hale.

GEH:G

Copy for Dr. Merriam
AUG 7 1934

Report of the Chairman of the Observatory Council
at Meeting of May 16, 1934

The Observatory Council, placed by the Trustees of the California Institute in full charge and control of the location, design, construction and operation of the 200-inch telescope and Observatory in all its departments and relationships, has recognized from the outset the heavy responsibility involved in this extensive undertaking. Beginning with an officially approved scheme of cooperation with the Carnegie Institution of Washington, from which it has profited greatly, the Council immediately enlisted the active cooperation of other leading men of science and engineers in this country and abroad. A report on the invaluable assistance rendered by the Mount Wilson Observatory has recently been sent to the President of the Carnegie Institution by a special committee of which Dr. Adams is chairman, and reports from the Observatory Council have been made from time to time to the Board of Trustees of the California Institute on the various phases of the project and the progress accomplished in each of them. The Rockefeller Trustees have also been kept informed.

In view of recent developments and the necessity of making early decisions regarding important questions now pending, it was decided several months ago that Dr. Adams, who has met with the Council from the beginning and has taken part in all its discussions, should be elected a regular member of this body. This decision was adopted by the Board of Trustees of the Institute, and has now been formally approved by the President of the Carnegie Institution, as shown by the following telegrams and letters:

Pasadena, California
May 7, 1934

President John C. Merriam
Carnegie Institution of Washington
Washington, D.C.

Referring to the letter of Senator F. E. Walcott to Henry M. Robinson dated April twenty-fifth and in accordance with it the California Institute of Technology, wishing to promote the success of the project in which both institutions are so deeply interested asks your further cooperation by your approval of the appointment of Dr. Walter S. Adams, Director of the Mount Wilson Observatory as a member of the Observatory Council.

Robert A. Millikan
Chairman of the Executive Council
A. C. Balch
President of the Board of Trustees.

May 9, 1934

Dr. John C. Merriam
Carnegie Institution of Washington
Washington, D.C.

My dear Dr. Merriam:

As you know, the California Institute of Technology is anxious to continue and extend the cooperation which it has long enjoyed with the Carnegie Institution, especially in connection with the 200-inch project. This project has now reached an advanced stage of development, and several

important questions are coming up for immediate action. For this reason it is desirable to have a representative of the Carnegie Institution, officially approved by yourself, as a member of the Observatory Council.

Because of his official position and his technical knowledge and experience, it seems to us peculiarly fitting that Dr. Walter S. Adams, Director of the Mount Wilson Observatory, should serve in this capacity. As a member of the Council he would afford a direct means of communication between the Council, the Mount Wilson Observatory, and the administration of the Carnegie Institution.

At a meeting of the Executive Council of the California Institute held on May 7th, the appreciation of the members of the Council for the cooperation of the Carnegie Institution was unanimously expressed and the request for your approval of the appointment by the Trustees of the Institute of ^{Dr.} Walter S. Adams' membership on the Observatory Council was made. A copy of this telegram is herewith enclosed. You will note that it follows the form suggested by Senator Walcott in his letter of April 25th to Mr. Robinson, a letter with which you are doubtless already familiar.

Cordially yours,

Robert A. Millikan

Washington, D.C.
May 9, 1934

Robert A. Millikan, Chairman Executive Council
A. C. Balch, President Board of Trustees
California Institute of Technology
Pasadena, California

Acknowledging your joint telegram of May seventh may I express appreciation of your statement relating to cooperation of Carnegie Institution in connection with development of the program for the two hundred inch telescope and for your suggestion regarding appointment of Doctor Walter S. Adams Director of Mount Wilson Observatory as a member of the Observatory Council established for control of this project. Appreciating the significance of this proposed relationship I am writing you today to the effect that I approve the proposal that Dr. Walter S. Adams Director of Mount Wilson Observatory and also Chairman of the Committee which the Carnegie Institution of Washington has set up for the special purpose of planning aid in this project be appointed a member of the Observatory Council.

John G. Merriam, President
Carnegie Institution of Washington

Washington, D.C.
May 9, 1934

Dr. Robert A. Millikan, Chairman of Executive Council
Dr. A. C. Balch, President Board of Trustees

Washington, D.C.
May 9, 1934

Dr. Robert A. Millikan, Chairman of Executive Council
Mr. A. C. Balch, President Board of Trustees
California Institute of Technology
Pasadena, California

Gentlemen:

Let me thank you for your telegram of May seventh, in reply to which you will already have my telegram of May ninth. I appreciate your statement relating to cooperation of Carnegie Institution with California Institute in development of the program for the 200-inch telescope and for your suggestion regarding appointment of Dr. Walter S. Adams, Director of Mount Wilson Observatory, as a member of the Observatory Council established for control of this project.

Appreciating the significance of this proposed relationship, I am glad to approve the proposal that Dr. Walter S. Adams, Director of Mount Wilson Observatory and also chairman of the committee which the Carnegie Institution of Washington has set up for the special purpose of planning aid in this project, be appointed a member of the Observatory Council. You may be sure of our giving such aid as is possible through all of the activities of the Carnegie Institution.

Expressing again my appreciation of your communication, I am

Very truly yours,

John C. Merriam, President
Carnegie Institution of Washington.

Henceforth we shall therefore have the advantage of Dr. Adams' membership in an official capacity.

has

The Council understands and approved the plan of the Corning Glass Works to cast a second 200-inch disc, as soon as the first disc (injured during the operation of casting by certain breaks in the mold) has cooled sufficiently to permit optical tests to be made (about June 1). The principal question now calling for action is the procedure to be followed in the design and construction of the telescope mounting.

As the Council is aware, much study has already been given to this problem. In harmony with the policy followed in all other branches of this undertaking, we decided at the outset to supplement our strong local group of men of science and engineers by leading experts elsewhere. In the case of the mounting we have consulted Messrs. Dunn and Jones of the J. G. White Engineering Corporation, Messrs. Swasey, Bliss and Burrell of the Warner and Swasey Company, the late Sir Charles Parsons of London, Dr. Frank B. Jewett, President of the Bell Telephone Laboratories, and Mr. W.E.S. Strong of New York. In 1929 Mr. Burrell, in consultation with Dr. Pease and other members of our Pasadena group, designed

an acceptable fork mounting, of which a small model was built. This left no doubt as to the feasibility of solving the problem, but as much time was at our disposal during the development of the mirror disc, Dr. Anderson and others continued the search for possible improvements. In consultation with Mr. R. Edgar of Los Angeles, Dr. Anderson initiated a new and promising solution, which was embodied in a definite design by Mr. Mark Serrurier, and built in our shop as a small working model. This contained several new features appearing in no previous type of telescope mounting, besides reducing materially the size and cost of the necessary dome. Our committee on the telescope mounting considered these features to be so valuable that it voted to include them in the final design. Dr. Pease then undertook a new study of the fork type of mounting, in the hope of modifying it so as to embody these features.

Meanwhile, on the advice of Dr. Jewett, Mr. W.E.S. Strong, an experienced engineer whose previous work had fitted him for an undertaking of this nature, was consulted informally. His proposed plan of procedure, as stated in a recent letter does not, however, meet with the approval of the members of the Observatory Council hitherto consulted. It is now offered for your consideration, with a statement of our needs, as explained in a letter to Dr. Jewett.

If this view of the case is accepted, we must evidently make another choice, as the Observatory Council has previously voted that we should not assume the task of designing the huge 200-inch telescope mounting solely with local talent. After consideration of the problem with Dr. Adams and Dr. Anderson, it is recommended that we attempt to make a satisfactory arrangement with the Warner and Swasey Company, the most experienced designers and builders of large telescopes in the world. The plan in view involves a visit of Mr. Burrell to Pasadena for consultation with our local group, the preparation of a new design embodying the best features of the several designs hitherto considered, and the construction of the telescope mounting under the supervision of Warner & Swasey Company. Machine tools large enough for this purpose apparently do not exist in this vicinity, and therefore it would be desirable to have the work done under expert supervision in eastern shops. Moreover, as Mr. Strong has rightly insisted, advantage must be taken of the design of all the progress made in recent years in methods of electric control, clock-drive, etc., which involves close cooperation of the designers with the best authorities in other eastern companies. From their headquarters in Cleveland and their acquaintance with all forms of modern engineering practice, the Warner & Swasey Company, long familiar with the astronomical requirements, would be very favorably situated to carry out our purpose in the most efficient possible manner.

George E. Hale.

May 16, 1934.

JUL 19 1934

1163.1

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

May 21, 1934

President Max Mason
Rockefeller Foundation
49 West 49th Street
New York City.

MM	MAY 23 '34	M.7
WW	JUN 18 '34	WW
EBH	JUN 21 '34	FBH
WWB	JUN 21 '34	J.A.
TA		

Dear Mason:

Just after I had written you my letter of May 18 I received a telegram from Jewett saying that he had written me a long airmail letter, of which he had sent you a copy. I decided, therefore, to postpone mailing my letter to you until after its receipt.

Jewett's letter arrived on Saturday and I enclose a copy of my reply to him, written Sunday after consultation with Millikan and Robinson. I read it over to both of them before mailing by air last night, and they both approved it.

I am very sorry that we all seem to disagree with Jewett regarding the choice of Strong, because Jewett is one of our best friends and we have the greatest respect for his judgment. What you told me over the telephone is precisely in harmony with the impressions we have each formed of Strong, whose lack of acquaintance with the innumerable special requirements and idiosyncracies of large telescopes, and underestimate of the value of the knowledge acquired by long familiarity, seem to offset his undoubted ability as an engineer.

Nevertheless, our interchange of views, which cost the 200-inch fund nothing, has been very useful. I trust that Warner & Swasey will make us a satisfactory proposal, and agree heartily to join us in developing, with the aid of much expert advice from such sources as Jewett mentioned, a thoroughly efficient mounting at the lowest possible cost.

We appreciate very much the time and trouble given by you and Weaver to this problem and the value of the suggestions received from you.

With warmest regards and thanks,

Yours ever,

GEH:G

George E. Hale

MAY 19 1934

1103.1

May 20, 1934

Dr. Frank B. Jewett
195 Broadway
New York City.

Dear Jewett:

Please excuse pencil as this is Sunday and I want to keep a carbon copy.

I received your letter of May 17 yesterday and read it to Robinson and Millikan yesterday afternoon, following a meeting of the Huntington Library trustees. I wanted to get once more their independent views before attempting to explain our feeling regarding Strong.. The fact is that their opinion was chiefly determined by the conditions he stated in his own letter. After hearing them on Wednesday they (and Adams, now out of town, and Noyes, laid up at home, as well as Anderson and myself) were each convinced that Strong could hardly work in the necessary intimate and effective cooperation with our group, which includes many astronomers, physicists and skilled engineers and designers of instruments and machinery, both large and small.

But I must first make clear to you that your point of view and ours do not differ in any material way. I am sure you would agree, if you could go over all our reports and records during the last 35 years and more, that we have always followed the policy of getting the best obtainable advice and assistance, both in this country and abroad. This policy applies, not only to securing the cooperation in research of such men as Michelson, Kapteyn, Russell and many others of the first order who have worked at Mount Wilson, and the many eminent men of science who have joined in the research of the California Institute, but also to the design of instruments and machinery of the greatest variety. I think it only reasonable to say that no similar institutions have gone farther in this respect than those which are centered here.

Since the 200-inch telescope project was started we have intensified this policy, with notable results. Thus, as the sharply defined fields of short-focus reflectors are very small, we induced Ross of the Yerkes Observatory to develop his "zero corrector", a lens which will be simply invaluable with the 200-inch, as it has already proved its unique merits on Mount Wilson. The extremely short-focus camera lens, which has so greatly increased the range of the 100-inch telescope and has given Hubble and Humason the apparent velocities of the remote nebulae, resulted from a suggestion made by Anderson to Rayton of the Bausch & Lomb Co. This embodies the new principle of using a greatly enlarged microscope objective as a camera lens. The British Scientific Instrument Research Association is carrying this idea another step forward for us, using an immersion objective in actual contact with the film of the plate (using, of course, a suitable immersion fluid between the film and the surface of the rear lens).

These will serve as examples of our methods of developing new auxiliary apparatus. As for the telescope itself, we have enlisted many authorities

at home and abroad, and have developed the process of aluminizing the reflecting surface in our own optical laboratory, with a gain in total reflectivity of 50 percent. All of these cases represent team-work and the utilization of the best available men and facilities, wherever they can be found. Thus, the photoelectric amplifier with which Stebbins has doubled the known ~~width~~ width of the Andromeda Nebula was due to a combination of his long experience with photoelectric cells and the ideas of a graduate student at the University of Wisconsin (now a National Research Fellow in Millikan's Laboratory).

After such an experience, you can hardly suppose that we mean to take a narrower view in the design and construction of the 200-inch mounting. The first thing required in this task is the long acquaintance with the performance of telescopes for every particular class of work acquired by astronomers, especially with our large instruments on Mount Wilson. A designer who proposes to undertake a design without an intimate personal acquaintance with this experience can hardly be regarded as appreciating fully the nature of the undertaking. Take, for example, the matter of supporting the 200-inch mirror. Even in the case of much smaller mirrors the designer ought to be familiar with the work done since the days of Herschel, including not merely the mechanical questions involved, but also the optical effects of temperature changes, etc. So it is with many other details of the whole problem. Two or three of us, meeting with Strong in New York, could not replace the advantages to be gained by repeated conferences with our Committee on the Mounting and other groups here, following at least a few nights on Mount Wilson. We were thus rather bewildered by Strong's proposal, and his subsequent expression of willingness to come here does not seem to offset completely the seeming lack of appreciation of the task he had previously shown.

As for the necessity of doing the work in eastern shops and taking advantage of mechanical and electrical experience of many eastern firms, we are in agreement with you and Strong. My father organized the present Otis Elevator Company: more accurately, he had the organization nearly completed just before he died, after a lifetime in the elevator business. My own interest in mechanical and scientific problems and my constant touch with science abroad was partly due to his work and to the fact that he had offices in London and Paris. Thus we are sure to take advantage while making the design, of the splendid improvements in elevator control made by the Otis Company in recent years. So with all other factors entering into the whole design.

I am afraid that I did not make this clear in my letter of May 15. In saying that the design must be made in Pasadena, I actually meant that its general character should be determined here, in consultation with the Mount Wilson and California Institute group. After a complete understanding of the requirements, thus determined on the ground, the actual drawings can probably be made to the best advantage in the east, in contact with such companies as you mention. Thus we have no intention of relegating the "place, facility and experience in manufacture to a secondary position, to be decided upon after the design had been decided upon". The point here turns upon the meaning of

Dr. Frank B. Jewett

-3-

May 20, 1934

"design". Probably I should have said "complete specifications or requirements from the astronomical and physical point of view". I think you would agree, if you could see the drawings, computations of stresses, models and other material available here that these will be of no small value, not to speak of the opportunity to see our present telescopes in action and to debate the special needs of the 200-inch with our Mt.W.—C.I.T. group. Of course we have no idea of setting up special manufacturing machinery other than that in daily use in our instrument ~~shop~~ and optical shops. This is precisely adapted, however, to cover all of the optical work (there is no other equipment anywhere for this purpose) and to produce the ~~necessary~~ accessory apparatus and many of the smaller parts of the mounting with higher precision and at lower costs than in other shops.*

I found the Observatory Council unanimously in favor of Warner & Swasey, for several reasons, including long experience (they have built several of the largest and most successful telescopes since Swasey's retirement); proved ability to cooperate with our group; wide acquaintance with eastern shops and equal facility to cooperate with them in the design and construction; and the insurance (especially in the scientific world) that their reputation would give to the undertaking. We agreed again last night that Strong's disadvantage lies in his lack of background and experience in telescope design, which would be hard to overcome.

You have given an immense amount of time and trouble to this uninviting task, and I wish I could sit down with you and give you a clearer idea of our point of view. Please ~~remember~~ remember, at least, that it is held by each member of the Observatory Council, and not merely by myself personally.

Yours very cordially and gratefully,

George E. Hale

* Note for Dr. Warner - A recent job, on which we had an outside quotation of \$2.00 per hour, actually cost us 90 cents per hour in our shop. This makes an allowance for overhead, but in our case there was no increase of cost on this account.
G.E.H.

781

21103.1
Bureau of the Army
May 23, 1934

WW	JUN -5 '34	WW
TA	JUN -7 '34	Ja
WWB	JUN -8 '34	MB
FBI		FBI

May 23, 1934.

JUN 8 - 1934

Dear Frank:

Thank you for sending me copies of your correspondence with Hale.

Strong called me after you had talked with him. I hope I made my position clear to him. I believe it is practically the same as yours: (1) a high appreciation for the common sense of bringing in the experience of manufacturing during design, and (2) a feeling that relationships should be made specific in advance of any procedures. Failure of this in the past has made it difficult for you, but I consider it very fortunate that you have been able to stress to them the viewpoint that you have.

I am enclosing a copy of my letter to Hale.

Sincerely yours,

MAX MASON

Dr. Frank B. Jewett,
196 Broadway,
New York, New York.

MM:AEB

1103.1

FRANK B. JEWETT
195 BROADWAY
NEW YORK

May 24, 1934.

JUN 1 - 1934

DR. MAX MASON, President,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

MM	MAY 25 '34	1717
WW FBH T A	MAY 28 '34	WW FBH J a.
WWB	MAY 31 '34	WWB

My dear Max:

Merely in order that your personal file may be complete, I am sending you herewith copy of a longhand letter of May 20th received from Hale yesterday, together with copy of my reply thereto.

I think with these letters the Strong-telescope-mounting affair can be relegated to the realm of ancient history.

Yours sincerely,

F. B. Jewett

FBJ:AS

MADE IN U.S.A.

JUN - 1 1934

1103.1

May 24, 1934.

DR. G. E. HALE,
Mount Wilson Observatory,
Pasadena, California.

My dear Hale:

Your longhand letter of May 20th was received yesterday. Apparently the airmail service from Los Angeles is still a bit slow.

As soon as I had read the letter and found that there was nothing in it which was not in line with our telephone conversation on Monday, I got hold of Strong and advised him of the decision of the Observatory Council and the plan to go ahead with Warner & Swasey. He is quite content with the outcome and both he and I wish you all the best possible luck in the work ahead.

As ever, sincerely,

E. B. JEWETT

FBJ:AS

JUN - 1 1934
COPY OF LONGHAND LETTER

1103.1

CALIFORNIA INSTITUTE OF TECHNOLOGY

Pasadena

May 20, 1934.

Dear Jewett:

Please excuse pencil, as this is Sunday and I want to keep a carbon copy.

I received your letter of May 17th yesterday and read it to Robinson and Millikan yesterday afternoon, following a meeting of the Huntington Library trustees. I wanted to get once more their independent views before attempting to explain our feeling regarding Strong. The fact is that their opinion was chiefly determined by the conditions he stated in his own letter. After hearing them on Wednesday they (and Adams, now out of town, and Noyes, laid up at home, as well as Anderson and myself) were each convinced that Strong could hardly work in the necessary intimate and effective cooperation with our group, which includes many astronomers, physicists, and skilled engineers and designers of instruments and machinery, both large and small.

But I must first make clear to you that your point of view and ours do not differ in any material way. I am sure you would agree, if you could go over all our reports and records during the last thirty-five years and more, that we have always followed the policy of getting the best obtainable advice and assistance, both in this country and abroad. This policy applies,

not only to securing the cooperation in research of such men as Michelson, Kapteyn, Russell and many others of the first order who have worked at Mount Wilson, and the many eminent men of science who have joined in the researches of the California Institute, but also to the design of instruments and machinery of the greatest variety. I think it only reasonable to say that no similar institutions have gone farther in this respect than those which are centered here.

Since the 200 inch telescope project was started we have intensified this policy, with notable results. Thus, as the sharply defined fields of short-focus reflectors are very small, we induced Ross of the Yerkes Observatory to develop his "zero corrector", a lens which will be simply invaluable with the 200 inch, as it has already proved its unique merits on Mount Wilson. The extremely short-focus camera lens, which has so greatly increased the range of the 100 inch telescope and has given Hubble and Humason the apparent velocities of the remote nebulae, resulted from a suggestion made by Anderson to Rayton of the Bausch and Lomb Co. This embodies the new principle of using a greatly enlarged microscope objective as a camera lens. The British Scientific Instrument Research Association is carrying this idea another step forward for us, using an immersion objective in actual contact with the film of the plate (using, of course, a suitable immersion fluid between the film and the surface of the rear lens).

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After such an experience, you can hardly suppose that we mean to take a narrower view in the design and construction of the 200 inch mounting. The first thing required in this task is the long acquaintance with the performance of telescopes for every particular class of work acquired by astronomers, especially with our large instruments on Mount Wilson. A designer who proposes to undertake a design without an intimate personal acquaintance with this experience can hardly be regarded as appreciating fully the nature of the undertaking. Take, for example, the matter of supporting the 200 inch mirror. Even in the case of much smaller mirrors the designer ought to be familiar with the work done since the days of Herschel, including not merely the mechanical questions involved, but also the optical

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Yours very cordially and gratefully,

(Sgd.) GEORGE E. HALE

OCT 4 1934

205 110.3.1

Mount Wilson

Observatory

Adams

W W	JUN -4 '34	W W
T A	OCT -4 '34	ga
W W B	OCT -4 '34	W W B
W W B	OCT -4 '34	

June 1, 1934.

Dear Dr. Adams:

Section copied for
RF files

In your letter of May 24th you bring up the question of the possibility of a grant for Dr. Minkowski^o to enable him to work at Mt. Wilson. I shall turn the letter over to Mr. Weaver for his consideration.

I am glad to learn that you have accepted membership upon the Observatory Council. In making the grant to the California Institute of Technology for the 200" and the development of astrophysical work, the Trustees of the Rockefeller boards acted on the understanding that full cooperation would obtain in the enterprise between the Carnegie Institution, through its staff at Mr. Wilson, and the California Institute of Technology. Recognition of the cooperative spirit of the work by cross appointments, such as this one, would seem to be quite in keeping with the undertaking.

It will be most interesting to learn what examination of the 200" disk will show. While of course disappointing, the mishap was after all a minor one, and the past work of the Corning group makes it perfectly clear that early success is practically certain.

With cordial greetings,

Sincerely yours,

Dr. Walter S. Adams,
Mount Wilson Observatory,
Pasadena, California.

MAX MASON

MM: AEB

Copy sent
W W B files



LIBRARY
OF THE
BOSTON
PUBLIC
LIBRARY

1917

OCT 4 1934

20

CARNEGIE INSTITUTION OF WASHINGTON
MOUNT WILSON OBSERVATORY
PASADENA, CALIFORNIA

May 24, 1934

Dr. Max Mason
49 West 49th Street
New York City

Dear Dr. Mason:

*Section copied for
RF files*

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<i>W W</i>		<i>W W</i>	<i>6-7</i>
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<i>12 B plus</i>		<i>W B</i>	
<i>2 B</i>		<i>W B</i>	

A short time ago I had a letter from Dr. Ladenburg of the Physical Laboratory at Princeton suggesting that it might be possible under the changed conditions to secure a grant from the Rockefeller Foundation to enable Dr. Minkowski to carry on some astronomical investigations at Mount Wilson. A year or more ago I wrote to the Paris office of the Foundation about Dr. Minkowski, but was informed at that time that the Foundation was not considering the cases of men who still held their scientific positions in Germany. Since that time Minkowski has lost his place at Hamburg, and Dr. Ladenburg suggests that it might be possible for the Foundation to do something for him.

COPY SENT TO WET

Dr. Baade of our staff worked with Minkowski in Germany and has a very high opinion of his ability and skill as an investigator. If it were possible to bring him to Mount Wilson, Baade would like to extend the investigation on the photometry of the Orion nebula which they carried on together some years ago. It is a research which is very well worth while, and of course it could be carried on admirably with the large instruments at Mount Wilson.

I do not wish to urge this matter too strongly, however, for I know the great demands upon the Foundation and the difficulties which you must be meeting constantly, especially in connection with the Jewish scientists of Germany. I simply wish to let you know, in case a grant could be made, we should be very glad to have Dr. Minkowski at Mount Wilson. Dr. Ladenburg and Professor Otto Stern have volunteered to write you in Minkowski's behalf.

*Copied for
Mr. Mason*

No doubt you know that the Trustees of the California Institute of Technology have elected me to membership upon the Observatory Council, the

*R7v
4/15
5/15*

Dr. Max Mason

-2-

May 24, 1934

body in charge of the plans for the 200-inch telescope. My election has been approved by Dr. Merriam. I wish, however, to be certain that you have no objection to my serving upon the body, since I feel that it is essential that the Rockefeller Foundation approve thoroughly of any such action. As you know, I shall be glad to contribute in any way I can to the success of the project without being associated with it in any official capacity.

With best wishes,

Sincerely yours,

Walter S. Adams

WSA:B

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

1103.1
Hale
JUN 20 1934
June 6, 1934

Dr. Max Mason
President, Rockefeller Foundation
49 West 49th Street
New York.

mm	JUN 11 '34	mm	6/12

Dear Mason:

I enclose copy of a recent letter from Dr. Day, which you may not have seen. From this it appears that we may confidently count upon the completion of a satisfactory 200-inch mirror disc, either by the use of the present disc or by casting another.

We are therefore conferring with the Warner & Swasey Company regarding the design of a mounting, utilizing all the experience available here, besides that of experts in such special features as electric control, clock-drive, and best methods of construction. We hope to obtain in this way a thoroughly satisfactory design, but we shall make no contract for its construction without the approval of yourself and your associates.

With best regards,

Yours very sincerely,

George E. Hale

GEH:G

COPY OF TELEGRAM

Corning, New York, May 30, 1934

Dr. George E. Hale

California Institute of Technology

Pasadena, California.

Preliminary examination big disc today very satisfactory no cracks
discovered Stop Outstanding questions mainly economic Stop Success
seems assured.

Arthur L. Day.

C O P Y

GEOPHYSICAL LABORATORY
Washington, D.C.

Arthur L. Day
Director

June 2, 1934

2801 Upton Street

Dr. George E. Hale,
California Institute of Technology,
Pasadena, California.

Dear Dr. Hale:

On returning to my office this morning I received your wire of June 1, as follows:

"Thanks for telegram delighted disc shows no cracks but Adams and I suppose from your letter to him that it contains mold fragments making it unfit for use and rendering further annealing unnecessary kindly wire reply and give probable date of new casting and approximate cost second disc if needed."

to which I replied:

"Situation corresponds accurately to forecast in letter April twenty-five except that glass much freer from clay fragments than expected. Stop. Two weeks needed to erect rigging for more careful examination. STOP. Until then cannot forecast whether cost of completing this disc or pouring new one greater. Stop. Corning will supply these data immediately after this examination."

There is not much to be added to the rather full account of the situation which I sent to Dr. Adams under date of April 25 and to which your telegram refers. Following the pouring which Dr. Adams witnessed, projecting fragments of floating mold parts were knocked off in order to fit the disc into the annealer. As soon as possible thereafter (1:30 A.M.), the disc was safely lodged in the annealer and an annealing schedule of about 10° per day agreed upon. When a temperature of about 200°C had been reached, all controls were turned off and the disc allowed to cool slowly in the annealer until it should be in condition to examine. Of course, no one saw the disc until May 30, when it was lowered sufficiently for preliminary examination. The temperature at that time was about 120° F.

Of course, under those conditions only the most superficial examination could be made. It consisted in shooting shafts of light about wherever possible to determine (1) whether we had actually succeeded in bringing down a disc of that size in one piece. To the glassmaker and indeed to all of us, this was the most important single consideration. It had never been done and until this evidence was before us, no positive assurance existed that a 200-inch glass disc was possible. We were, therefore, overjoyed to find that notwithstanding the rapid cooling schedule and the somewhat unsymmetrical distribution of clay blocks, the disc remained completely intact. Accordingly, this is the assurance we give you that a 200-inch glass disc can be successfully made.

(2) The quality of the glass appeared excellent. Even with our crude lighting facilities, we were able to penetrate the 26 inches of glass

June 2, 1934

effectively and we did not certainly identify any suspended small fragments. There were, of course, many large ones, but these can be removed by sand-blasting as has already been indicated to you. If we could regard this examination as adequate, it would then be possible to say to you that the disc can be completed as is. However, recognizing the critical character of such a decision, it was not deemed safe to make it without a more complete examination with the disc out in the open and with suitable facilities for the examination of every part. Inasmuch as such an examination was not originally contemplated before January 1, necessary tracks and rigging for moving the disc into the open and turning it up edgewise were not ready. These arrangements will take about two weeks' time, after which it should be a short matter to estimate the relative cost of completing this disc (supposing the glass to be ~~free~~ as free from defects as our preliminary examination indicated) or pouring a new one. A full report upon this point will be furnished by Corning after this examination.

Of course, if this glass upon close examination proves unfit for use, this question will not arise and you will be so advised.

During the last two months construction of a new mold has gone forward and it lacks perhaps a week of completion. Also, experimental work has been carried on to insure the competent anchorage of the blocks in the new mold. Several refractory alloys have been studied at appropriate temperatures and times of exposure and a satisfactory conclusion reached. The anchorage rods will be made up from the alloy selected (in place of ordinary iron), will be larger than before and will be air-cooled. Experiment shows that if the temperature of the pouring operation is in the neighborhood of 1250°C, the proposed rods with air-cooling will not encounter temperatures higher than 530°C. This arrangement affords complete assurance of properly anchored parts.

One further point has interest for you out of our preliminary examination. No bubbles were found adhering to the mold parts. The glass surfaces appeared to be everywhere clean and most satisfactory. The contact zone would, therefore, appear to be as perfectly taken care of as is possible in such glass casting.

It is my understanding that if Corning can assure you that you will receive an equally good disc, whether it is obtained by finishing the present one or pouring a new one, the choice will be left to you upon the basis of relative cost or such other considerations as you may regard as of consequence. If on the other hand any sufficient reason appears for regarding the glass of the present disc as unfit for the purpose, Corning will advise you of that fact and will furnish an estimate of cost of a new one and will proceed with it when directed to do so.

There may also be the possibility that you would wish to do both things and so to have a spare disc, though I know of no particular purpose to be served thereby save that it would be much cheaper to make it now than at some future time. Should you elect to consider this alternative, of course two full annealing periods come into the program, which would mean roughly two years' time. Whether the present disc is completed or a new one substituted, the full annealing period must be carried out to free the disc from strain.

Sincerely yours,

ARTHUR L. DAY

ALD/jao
Copies to -
Dr. E. C. Sullivan
Dr. J. C. Hostetter
Dr. G. V. McCauley

JUN 28 1934

1103.1

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

AMS JUN 27 34
June 15, 1934
WWB

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	Y.J.B.		Am.	Files
	AGA	1934	AMH	

Mr. Trevor Arnett
President General Education Board
49 West 49th Street
New York.

Dear Mr. Arnett:

Note on ledger M.P.N.

I am glad to report that our negotiations with the General Electric Company have been settled, in a manner which seems very satisfactory to all of us. They have sent us a check for \$36,161.00 in payment for the equipment left at West Lynn. In addition to this, we have received through them the additional sum of \$3,000. for several transformers they sold on our account.

Considering the fact that we were able to use at Corning other transformers and electrical equipment previously at Lynn, and that a careful appraisal by an able electrical engineer showed the amount paid us to be fully adequate, we trust you will be satisfied with the outcome.

I may add that the prospects for the complete success of the 200-inch telescope project never seemed so promising as they do today.

With kindest regards and best wishes,

Yours very sincerely,

George E. Hale

GEH:G

39,161
38,518.83
642.17

341452

copy to [unclear]

JUN 28 1934

1103.1

June 20, 1934

Dear Dr. Hale:

It is a pleasure to learn from your letter of June 15th of the settlement which you have arranged with the General Electric Company. I think this is a satisfactory outcome of the matter.

I am delighted to hear that the prospects are so rosy for the completion of the 200" telescope. I certainly hope that the expectations will be fully realized.

Trusting that you and Mrs. Hale will have a pleasant summer, I am

Cordially yours,

TREVOR ARNETT

Dr. George E. Hale
California Institute of Technology
Pasadena, California

341452

**AN ANSWER
IS EXPECTED**

BY THE SENDER OF THIS
MESSAGE. PLEASE GIVE
IT TO THE MESSENGER
OR TELEPHONE IT TO

WESTERN UNION
2477-D-
PRESIDENT

WE WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

JUN 28 1934

WESTERN UNION

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

J. C. WILLEVER
FIRST VICE-PRESIDENT

1103 1201-S

SIGNS

DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time as shown in the date line on full-rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

Received at

1934 JUN 27 PM 11 39

SB709 49 NL=PASADENA CALIF 27

TREVOR ARNETT, PRESIDENT GENERAL EDUCATION BOARD

49 WEST 49 ST NYK:

MINUTES IN TRANSIT	
FULL-RATE	DAY LETTER

KINDLY WIRE YOUR ADDRESS OR MASONS JULY SECOND TO SIXTH
WISH TO SEND PROVISIONAL AGREEMENT WITH WARNER AND SWASEY
FOR IMMEDIATE DESIGN TWO HUNDRED INCH TELESCOPE MOUNTING
STOP POSSIBLE FUTURE CONSTRUCTION IS ALSO MENTIONED BUT NOT
EFFECTIVE WITHOUT SPECIFIC REQUEST LATER STOP ENTIRE
AGREEMENT SUBJECT TO CANCELLATION ANY TIME=

GEORGE E HALE.)

TA JAC copy sent to him
a RAE 6/28 wire
MM MM: copy sent to him
AAJ

WESTERN UNION GIFT ORDERS SOLVE THE PERPLEXING QUESTION OF WHAT TO GIVE

1103.1
Mm - 1717
Hale FBIH
WW - WW

June 29, 1934

Dr. George E. Hale
Astrophysical Observatory
California Institute of Technology
Pasadena, Calif.

Dear Dr. Hale,

Referring to Dr. Day's letter of June 2, we were to send to you additional information about the 200-inch disk, based on a thoro examination, and an estimate of costs of possible procedures in this project.

Our track extensions were completed and the 200-inch disk moved out into the finishing building on June 13th. The pieces of ceramic cores were removed from the surface and we then had an opportunity to further examine the disk. We were very fortunate in having Dr. Pease here on June 15th, and subsequently, to assist in this examination and take part in our discussions.

Our recent inspection confirmed in every way the result of our first examination on May 30th. There were no checks nor any large blisters adhering to the sides of the cores. The glass quality as regards stones and large blisters is very good. The enclosed blueprint shows the portion of the rib structure which was destroyed by the dislocation of the cores. In all, 22 of these came loose and floated to the surface. Of the total, 14 were cores forming the round holes for the supporting system and five were of the large triangular shapes. The remaining 3 were small irregular shapes at the edge. The general appearance of the disk is shown in the enclosed photograph.

Strain measurements were made in 2 positions on the rim of the disk. One of these at a point where the rib structure was intact by the failure of the cores and the other at the place where the complete rib structure was destroyed. Measurements could not be made at identical points with respect to the edge of the disk because of irregularities on the surface at these points. Within

Dr. Hale, Page 2, June 29, 1934

the limits of measurement, however, the strain in the 2 points was found to be of the same order of magnitude and slightly less than 100 m birefringence per cm. This agrees closely with the calculated strain to be expected from a cooling rate which was 10 times greater than would have been used for the precision annealing schedule, an interesting confirmation of Dr. McCauley's calculations.

To produce the 200-inch blank requested from us we must proceed to either cast the disk anew or to finish the present one. To do the latter we would bore holes as indicated by the red circles on the print through the disk from its top surface as it now stands in the mold. This would permit of replacing all the missing cores and would remove sufficient glass from the disk so that when reheated the level would fall to approximately the tops of the cores at the periphery. In other words, approximately 6 inches of new glass could then be added to complete the disk. This would permit of grinding and figuring without danger of cutting through the layer separating the first and second pourings of glass.

Our estimated cost of a new disk (not including annealing) is a maximum of \$13,160. To complete the present disk, as outlined above, we estimate a minimum cost of \$11,220, again not including annealing. The cost then of reconditioning the present disk is thus seen to be of the same order of magnitude as that for casting a new one. Under these conditions there seems to be no alternative but to cast a new disk and we are proceeding with this program.

As to the disposition of the present disk, which has a high inherent value, we wish to use this for necessary experimental work and in so doing recondition it for possible future use. Essentially, we propose to reheat the disk, without further work on the cores, sufficiently to soften the surface and thus make it level but about 1" less than the specified thickness. This operation, followed by a quick annealing of 1 month's duration, would yield a flat disk which later could be used as a laboratory disk at constant temperature without drilling to complete the ribbed structure. Or, possible, this disk, with a certain amount of drilling, could be used as a parabolic mirror for a telescope provided the performance of the finished 200-inch disk indicates that a blank somewhat less thick would have sufficient rigidity.

Dr. Hale, Page 3, June 29, 1934

Of course, if it were decided to use this disk in the future it would then be given a precision annealing.

The reheating operation mentioned above must be done in any case. It is necessary to test out and adjust the burner system on the "Beehive" oven so that higher temperatures can be attained during the next casting operations. Preferably, this should be done with "full load" of mold and disk. It is seen, therefore, that the cost of making a 200-inch flat is actually only the cost of a quick annealing - approximately \$1200. Furthermore, removing this flat from the transfer table would be an excellent test of hoisting equipment and technique, and good insurance for our future work. We hope that you will agree with this program.

The other phase of the situation to be considered is that of time. The above suggestion to recondition the present disk as a flat will really add very little, if any, to the time of delivering a new disk since we are encountering delays in delivery of material. As Dr. Day wrote to you, Dr. McCauley has developed an entirely new and trustworthy anchoring system for the cores which utilizes alloys cooled by circulating air. Unfortunately, however, these alloy castings will require some weeks for delivery as they must be made up special. Work on the mold assembly cannot proceed until the metal parts are received. And, in addition, we must also await delivery of alloy for the baffle plate in the annealer. Originally designed for two annealing periods the present plate must now be replaced and as a matter of insurance it seems best to make this of alloy rather than steel. Again we find that this must be rolled specially for our job. These time elements control largely the date of casting a new disk. We are proceeding with all possible speed. Due to the unavoidable delays just mentioned, however, our present estimate for casting the new disk is late September or early October. You may depend upon us to expedite the casting operation of humanly possible to do so.

Dr. McCauley sends his best regards.

With best wishes, I remain

Sincerely yours,

J.C. Hostetter
Director, Development & Research

JCH:FRF

cc- Messrs. A.L. Day, F.G. Pease, Max Mason

JUL 23 1934

COPY FOR: Messrs. E.C. Sullivan
Amory Houghton
A.L. Day
Max Mason
G.V. McCauley

1103.1
Mount Wilson Observatory
Hale
FBH - FBH
WW - WW
mm - 177

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

July 3, 1934

Dr. J.C. Hostetter
Corning, N.Y.

Dear Dr. Hostetter:

Thank you for your letter of June 29, which reached me yesterday. It has been read by Dr. Adams and will be presented to the Observatory Council as soon as possible.

Dr. Adams and I are in complete agreement with you as to the inadvisability of reconstructing the present disk. As you state, there is no alternative but to cast a new disk, and we count on you to push forward this work without delay.

As for the present disk, we do not wish to undertake the figuring of a 200-inch flat, which would be a very long and expensive process. From our point of view, therefore, the best thing to do is merely to retain the first disk in its present condition, for possible use at some future time in case of accident. We do not feel able to make further expenditures upon it, and we certainly do not wish to delay in the slightest the casting of the second 200-inch disk. We therefore trust that the operations suggested in the first paragraph of your page 3 will not be necessary.

Assuring you of our appreciation of anything you can do, without extra expense, to expedite the casting of the second disk, and with kindest regards to you all,

Yours very sincerely,

Sgd. George E. Hale

GEH:G

COPY

WESTERN UNION

PASADENA, CALIF.

July 9, 1934

Dr. J.C. Hostetter
Corning, N.Y.

AFTER FURTHER CONSIDERATION WE APPROVE PLAN SUGGESTED IN YOUR
LETTER OF JUNE TWENTY NINTH PROVIDED THAT YOU REGARD THIS
PROCEDURE ESSENTIAL TO ASSURE THE SUCCESS OF THE NEXT TWO
HUNDRED INCH DISK BEST REGARDS

GEORGE F HALE

205
Mount Wilson
Observatory
Hale

July 9, 1934

Dr. George E. Hale
Astrophysical Observatory
California Institute of Technology
Pasadena, Calif.

Dear Dr. Hale,

We are pleased to learn from your letter of July 3rd, and your telegram received this morning, that you concur in our suggestion to cast a new 200-inch disc and, while awaiting delivery of alloys, do our experimentation on the beehive oven and in so doing level off the present disc. I wish to again assure you that this program is the result of our serious consideration as to how to guarantee the successful outcome of this important project and we are proceeding along these lines.

Thanking you for your continued cooperation, and with kind regards, I remain

Sincerely yours,

J.C. Hostetter
Director, Development & Research

JCH:FRF

cc- ECS
AH
ALD
Max Mason
GVM
OAG

JUL 23 1934

1103.1

INTERVIEWS:

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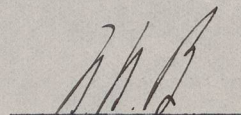
Mr. A.H. Fleming, Trustee,
California Institute of
Technology, with W.W. Brierley -
July 10, 1934

Mr. Fleming left with me a copy of a letter written by Doctor Robert A. Millikan to Mr. A.C. Balch on March 12, 1934, with reference to the pledge of \$1,000,000 by the Rockefeller Foundation to the California Institute of Technology. Mr. Fleming would like Mr. Arnett and Mr. Mason to read the letter.

Again, Mr. Fleming spoke of a conversation he had with Mr. Rockefeller several years ago to the effect that Mr. Rockefeller told him that whenever the Institute needed funds, it should come to the Rockefeller boards and would not be disappointed.

I told Mr. Fleming, as I have done on several occasions, that all proposals submitted by the Institute would have to go before the Board of Trustees of either the Board of Foundation for consideration.

I promised to show the letter to Mr. Arnett and Mr. Mason.



WWB:KEO

CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena

Norman Bridge Laboratory of Physics

March 12, 1934.

Mr. A. C. Balch,
708 Union Bank Building,
Los Angeles

Dear Mr. Balch:

With reference to the correspondence which has passed between Mr. Fleming and yourself of date March 8th, copy of which I have, I can only express to you the judgment that I have already expressed to Mr. Fleming, namely, that it would be worse than futile for our Board to ask the Rockefeller Foundation to change its official commitment to the Institute in the matter of adding a million to our endowment on condition that we, before a fixed date, secure \$3,000,000 in endowment and buildings.

The reasons for this judgment are that if and when we can go to the Rockefeller Foundation with the assurance that our \$3,000,000 has been secured we shall be in very much better position than we are now to induce them to raise their contribution from \$1,000,000 to \$3,000,000, a result which all of us would desire quite as devoutly as does Mr. Fleming. If, on the other hand, the policy of the Foundation has changed since it made its commitment to us, and it has decided to direct its future benefactions more toward the social than toward the physical sciences - and I understand this supposition to be in accordance with the facts - then its officers might welcome an opportunity to get release from the commitment they have already made to us, and our withdrawal of the request already made and an attempt to substitute another would certainly prejudice our situation with them and would be more than likely to result in the cancellation of the present contract rather than in its replacement by one that is better from our point of view. I feel quite sure that from this consideration alone if the Board of Trustees were called together their judgment would be adverse to taking such action as Mr. Fleming proposes. The foregoing is merely such analysis as I or anybody else can make of the probable results of the proposed action.

My second reason for thinking it unwise is more specific, for I have actually had conversations with both Mr. Arnett and Mr. Mason on this matter, and am altogether certain that whatever their personal feelings are they would not dare to recommend to their Board entering into such a new contract with the California Institute as Mr. Fleming proposes, for they have told me that they feel confident that with the present temper of their Board they could not get it through, and it would only destroy their influence with the Board if they got behind such a proposal.

I am sure that every member of the Board, including Mr. Fleming, will realize the cogency of these arguments against the cancellation of the contract we already have and the endeavor to substitute for it one of the type which every one of us would be quite as eager as Mr. Fleming to see substituted if it were possible.

Sincerely yours,

(Signed) Robert A. Millikan.

RAM: IH

SEP 21 1934

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AM. J. OCT 16 34

July 27, 1934

Dr. George E. Hale
Astrophysical Observatory
California Institute of Technology
Pasadena, Calif.

Dear Dr. Hale,

On Monday of this week we succeeded in leveling off the surface of the 200-inch disk and at present the disk is in the annealer. The operation of heating up and leveling the surface took place without mishap, and the experience gained from this experiment gave us definite information in regard to our burner system.

The enclosed photograph shows a view through the beehive oven door while the disk was at a temperature of probably 800°C.

We are making every effort to expedite delivery of parts and the assembly of the mold for the next casting. We are confident now that we have all details well in hand and that the next pouring will be entirely successful.

Sincerely yours,

J.C. Hostetter
Director, Development & Research

JCH:FRF
cc- ALD
MM/

MAR 4 1935

1103.1
California
Zephyrus
Observatory
ENCLOSURES:

NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY

HOMER L. FERGUSON,
PRESIDENT AND GENERAL MANAGER

IN REPLY REFER TO
No.

NEWPORT NEWS, VIRGINIA

October 3 1934

AIR MAIL

Dr George E Hale
Carnegie Institution of Washington
Astrophysical Observatory
Pasadena California

My dear Hale:

On arrival found your letter of September 24, 1934, and material enclosed. Your letter of September 29th came October 1st.

The Newport News people have taken a once-over look at the material forwarded and after discussion this morning, I think I am in position to say

First, that as they understand it, the heavy work can all be done here; and

Second, that the tolerances allowed can be met; in fact, probably improved.

If you are to be in New York next week, they will have one or two of their people meet you there and get further data from you.

They are of the opinion that the two narrow points in the operation would be, first, because of the large amount of heavy work the Yard is doing now for the Government, it would be nearly a year before they can undertake the actual construction work. It is their opinion that the proper designing and other questions involved would take nearly a year before they should start the construction. Fortunately, no new machinery would be required provided the diameter of the track is held within thirty-five feet. They have a thirty-five foot boring mill.

The other narrow point would be the limitations at your end of the line for moving the larger and heavier parts up the mountain; that is to say, they are not disturbed about the size of the parts and the weights here and they can be put in the ship and delivered at San Pedro, but you will have to determine out there how large and how heavy parts can be taken up the mountain.

They are of the off-hand opinion here, in accord with your designers, that it would be preferable that the cone be structural rather than cast.

This would have to be a cost plus contract, and their methods are these. They charge all materials to the job, and they charge all wages to the job, plus one hundred percent (of the wages only) to include all overhead. To the sum of these three items, material, labor and overhead, is added a percentage of ten percent as profit on the job.

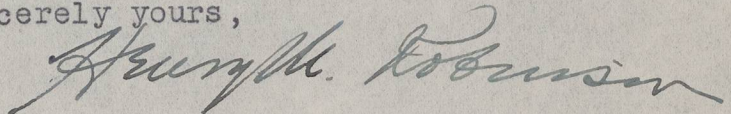
I am wiring you today that I have written you at length. In view of this, when you get to New York if you will call Mr Roger Williams, Newport News Shipbuilding and Dry Dock Company, 90 Broad Street (Telephone: Bowling Green 91141) he will arrange to have some of the Yard people come up and discuss further details with you.

I am returning the Warner & Swasey agreement and the notes on the construction of the fork.

I am fearful that I will not be in New York when you are there, as I expect to have to be in Washington or Ohio, but I assure you that you can rely on the Shipyard people in every way, and it may be a method of solving your problem without dividing up the job too much.

With very kind regards, I am

Sincerely yours,

A handwritten signature in dark ink, appearing to read "Henry M. Robinson". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

HMR/NMT-3

THE WESTERN UNION TELEGRAPH COMPANY

CONFIRMATION OF TELEGRAM FROM

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

NEWPORT NEWS, VA.

DAY LETTER

Newport News Virginia October 3 1934

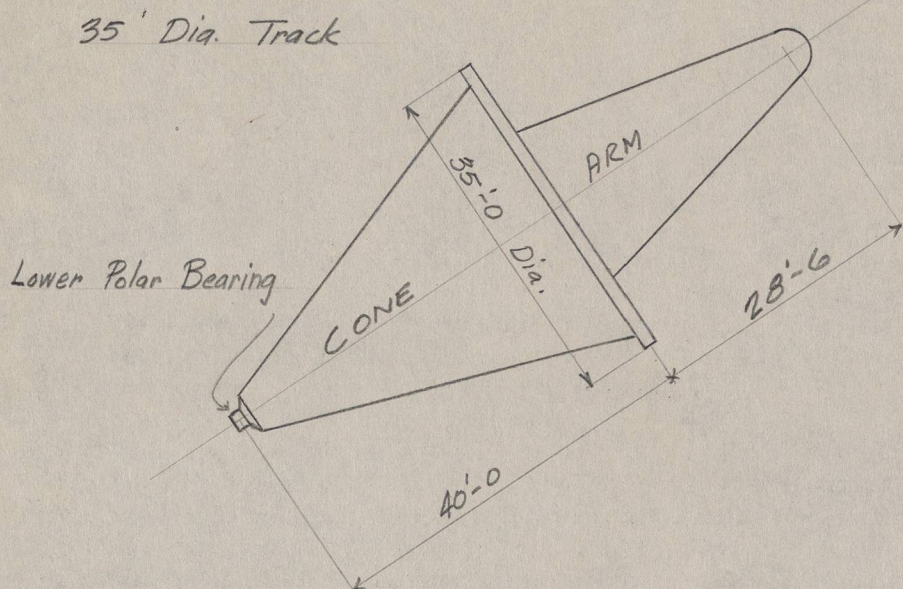
Dr George E Hale
California Institute of Technology
Pasadena California

Returning by air mail today proposal of Warner and Swasey and
plans for construction of fork Have written you at length to
the effect that heavy parts of job can be done here without
any new machinery

Henry M Robinson

HMR/NMT-4 Charge Shipyard

NOTES ON THE CONSTRUCTION OF THE FORK FOR THE 200-INCH TELESCOPE



Sketch No. 1.

Three methods of building the fork have been investigated. Each arm can be built up as a shop unit and field bolted to the cone. This is common to all three methods. The methods differ as to the manner of building and erecting the cone. These methods will be discussed later in these notes: briefly, they are:

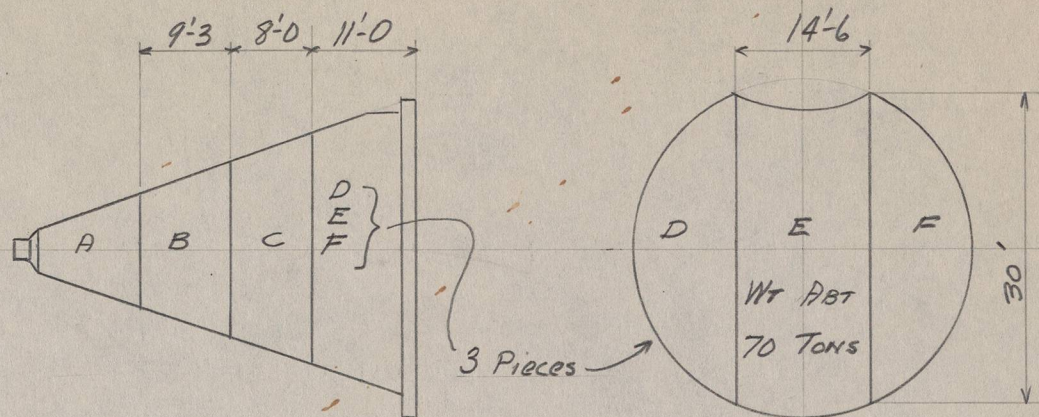
- I. The conical part can be built up from 6 large steel castings.
- II. This is the same as method I, except that the pieces are built up from plates and angles.
- III. The conical part can be built up from a large number of pieces, rivetted and welded together in place at the site.

The requirements of the fork are as follows: When finished, the 35-ft. diameter track and the seat for the lower polar bearing (see Sketch No. 1) must be concentric within $1/8$ ". The track does not need to be perfectly circular, but the variations from the circular must not exceed say $1/32$ " and the transitions must be very gradual.

A Discussion on the Methods of Building the Cone

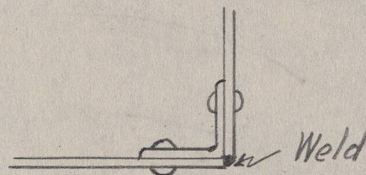
Method I This method appears to be impracticable because of the difficulty in obtaining satisfactory steel castings of the size required.

Method II The cone is divided into shop units as shown in Sketch No. 2.



Sketch No. 2.

The shop units are built up from plates and angles. If all welded construction is used the units will necessarily have to be stress relieved in a furnace. The only furnace in the West large enough to take these units is the one at Boulder Dam. A combination of rivetting and welding can be designed which would make stress relieving ~~xxx~~ in a furnace unnecessary. The shop units can be made as an ordinary rivetted job, except that a few less rivets need be used, and then the joints welded so that the rivets cannot slip.



Sketch No. 3.

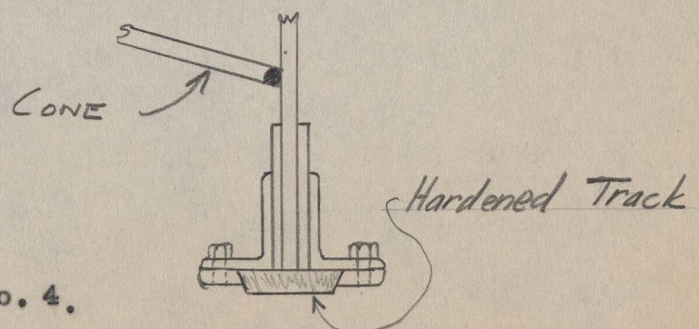
The plates are rigidly held in position by the rivets. The weld metal is deposited in layers, and each layer hammered or peened so as to stretch the weld metal and relieve the welding stresses. (A pipe line 90 inches in diameter was welded together in the field and stress relieved solely by peening - L. A. Water Dept.).

The contact surfaces of the shop units are very large; therefore the surfaces would be machined and made to fit together. The most difficult piece is Unit E, which is about 11 ft. x 14 ft. 6 in. x 30 ft. long, and which has to be finished on 3 sides and one end (for the 35-ft. diam. track). There is no equipment in the West which could handle this part of the work in a normal manner.

The machining of the 35-ft. diam. track can be divided into three steps:

1. Rough machining of cone.
2. Finish " "
3. Finish grinding and polishing of hardened track (see Sketch No. 4).

The rough machining of the cone can be done in the shop. The finish machining can also be done in the shop provided the shop units are dowelled and bolted together with sufficient accuracy. It may be economical to do less accurate shop work and do the



Sketch No. 4.

finish machining after the cone is assembled on the mountain. If the pieces were roughly handled during transportation this might be necessary anyway. The finish grinding of the track will have to be done after the cone is assembled.

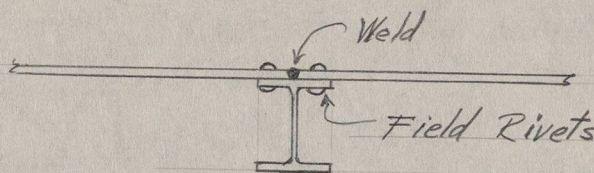
The seat for the lower polar bearing can be finished in the shops.

The advantage of this method is simpler field erection.

The disadvantages are:

1. The difficulty and cost of machining the contact surfaces of the shop units and of bolting them together. A great number of large fitted bolts will be required.
2. Extra weight due to the extra metal required at the contact surfaces.
3. The joints between the shop units may slightly increase the deflections.
4. It may be rather difficult to transport the larger pieces.

Method III. The frame-work of the cone can be built up from plate girders and beams. This frame-work will be covered with a conical plate skin composed of rolled plates. These plates will be fastened to the frame, as shown in Sketch No. 5.



Sketch No. 5.

The plates would be bolted and then rivetted to the beams. The welding would be done after the entire cone is assembled and rivetted. The rivets will hold the plates in place. The weld is made in layers and each layer hammered or peened so as to stretch the weld metal and relieve the welding stresses. The amount of peening necessary can be determined experimentally on samples. This method of stress relieving is much used and is very satisfactory. Stress relieving by heating is unnecessary, especially in view of the fact that the joint is thoroughly rivetted, and because the maximum stresses in the plate are very low - on the order of 6000 lbs. per sq. inch.

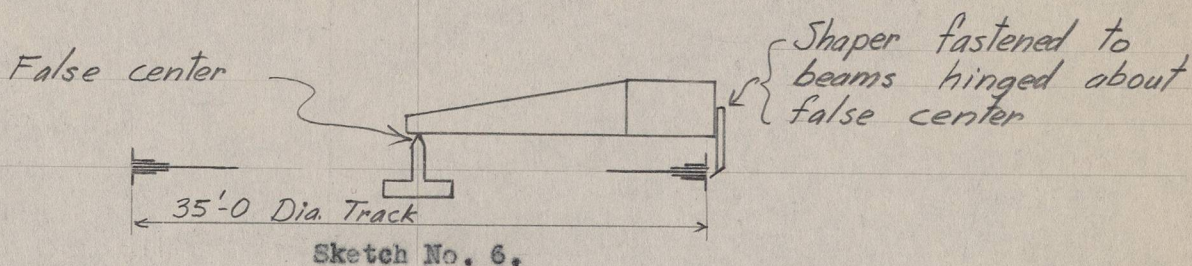
There is more field work involved in this method of construction, but none of it is at all difficult, nor does it involve anything that a structural steel erector has not done before. The frame-work is composed of about 20 large pieces and about 45 small pieces. The skin is divided into 21 plates. The shop work is ordinary structural steel work, such as is involved in building a rolling lift bridge. It can be handled with equipment now available in Los Angeles.

The machining of the 35-ft. track is again divided into three steps:

1. Rough machining of the cone.
2. Finish " "
3. Finish grinding of the track.

The rough machining of the cone can be done in the shops.

The finish machining of the cone would have to be done after the cone is all assembled and welded. Since no boring mill is available for rough finishing in the shops, the following set-up can be used handily.



This set-up could also be used when the cone is in place on the mountain, if it should prove desirable.

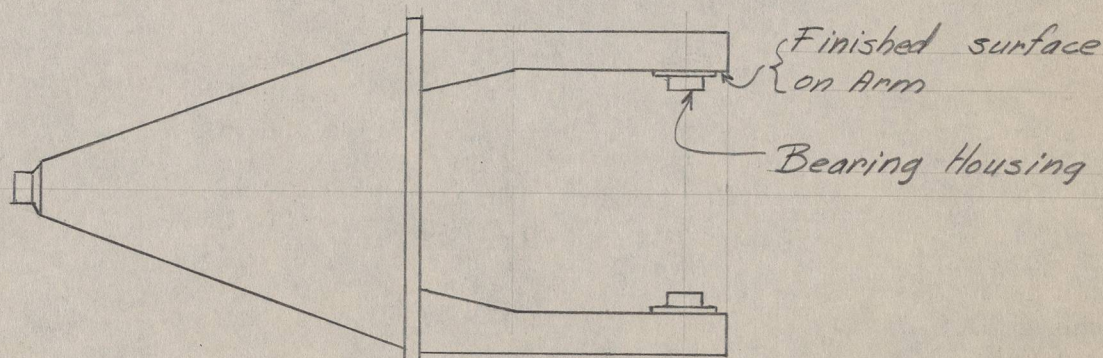
The seat for the lower polar bearing will have to be machined after the cone is welded and the center of the 35-ft. track determined. This involves no particular difficulty.

The advantages of this method are:

1. The difficult machining of the shop units is eliminated.
2. It can be done with equipment now in use in Los Angeles.
3. The cone, when welded, is one unit, which is the most rigid possible construction. There is no possibility of getting other than ~~sine~~ elastic deflections.
4. The pieces are small enough so that they can be easily handled and transported.

The disadvantage is that a little more field work will be required.

Adjustment of Position of Declination Axis



Sketch No. 7.

If Method II is used, the holes for bolting the arms on to the cone can be drilled in the shops: then when the arms are erected on the mountain the position and inclination of the finished surfaces on the arms can be determined by actual measurement. The bearing housing, which supports the declination bearing can then be made in the shop, the end bevelled and lengthened or shortened, so that the bearing will be in its proper position.

If Method III is used, the holes for bolting the arms will have to be drilled at the site after the cone has been welded. The arms can be supported in their proper positions on a temporary wood frame and the holes drilled to match. Then the position of the finished surface can be determined by actual measurement and the housing made accordingly.

Mark Serrurier.

June 19, 1934.

MAR 4 1935

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California Inst. of
Technology - Bluff

OFFER AND PROPOSAL

OF

THE WARNER & SWASEY COMPANY OF CALIFORNIA
A California Corporation

UNTO

THE CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California

July, 1934

Los Angeles, California

TO THE CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA

Gentlemen:

The Warner & Swasey Company of California, a California corporation (hereinafter called "Swasey"), is a subsidiary company of The Warner & Swasey Company, of Ohio, which has its principal place of business at Cleveland, Ohio. We are hereinafter sometimes referring to you as The Observatory Council, by which name we mean The California Institute of Technology, or The Observatory Council which has been duly authorized by The California Institute of Technology to act for it in all matters relating to the 200-inch telescope.

For a long period of time there has been under frequent conference and discussion between the representatives of The Observatory Council and The Warner & Swasey Company, of Ohio, the project contemplated by The California Institute of Technology of designing, locating, constructing and installing in a suitable observatory a 200-inch reflecting telescope. The plans for this observatory and enormous telescope have progressed so far that The Observatory Council desires to enter into a temporary agreement with Swasey, and Swasey desires, on its part, to enter into said agreement with The Observatory Council (provided mutually satisfactory terms can be arranged) for the designing, constructing, testing, acceptance, disassembling and preparation for shipment of the instrument consisting of the mounting and all mounting equipment,

as designated by The Observatory Council, for said 200-inch reflecting telescope, and - if so designated at a later date by The Observatory Council - for the dome over said installed telescope forming the top of said observatory, but not including the large mirror of said telescope or any other optical features or equipment, a part of or connected with said telescope.

It is fully recognized by both parties hereto that a 200-inch reflecting telescope is so much larger than any telescope heretofore designed or constructed that the mounting and details involved in constructing the instrument (apart from the optical features) must be carefully worked out, step by step, and cannot be completely designed all at one time, and that there may be changes which cannot now be foreseen or provided for,- and the best plan which can be devised is to employ the skill and long experience of The Warner & Swasey Company, of Ohio, in all matters of design, fabrication and construction of said mounting and other equipment (to the extent that this can properly be done at Cleveland, Ohio), in conjunction with the advice and experience of The Observatory Council and its advisory and technical committees. All major questions of a technical or commercial nature which may arise shall be submitted by Swasey to The Observatory Council and its reply in writing will be final and conclusive.

Swasey, for the purpose of accomplishing the objects above referred to, hereby makes the following offer and proposal to The Observatory Council:

FIRST: That so much of the proposed agreement hereinafter outlined as can be carried out and performed by The Warner & Swasey Company, of Ohio, at its Cleveland office and plant may be, and on the written request of The Observatory Council shall be, assigned and transferred by Swasey to said Ohio corporation,- and in any event Swasey shall and will obtain the services, counsel and advice of the chief engineer and principal experts of said Ohio corporation in carrying out this proposed agreement; and that when said mountings and other things to be designed and furnished for said telescope shall have arrived in California, Swasey, if requested in writing by The Observatory Council, shall and will procure the personal presence and services in California of a sufficient number of disciplined and experienced engineers and technical men from said Ohio corporation properly to advise, direct or control the handling, erecting, installing and completing of the portions of said telescope and equipment to be furnished by Swasey hereunder.

In case, however, that said Ohio corporation should elect to qualify to do business in California as a foreign corporation, then the agreement herein proposed to be made may be assigned as an entirety by Swasey to said Ohio corporation.

SECOND: The Observatory Council shall select the site for said observatory (which it is understood will probably be located either in California or in Arizona), and shall at its own expense procure title to the land required and the approaches or rights-of-way thereto, and erect and construct the

foundations, walls, floors and all other parts of said observatory intended to house said telescope,- excepting the dome and the portion of the electrical equipment, provided these were constructed and erected by The Warner & Swasey Company, of Ohio, and/or The Warner & Swasey Company of California, all of such equipment being hereinafter referred to; and shall furnish at its own cost all necessary heat, water, light and power required by Swasey in connection with the work to be done or furnished by Swasey under the terms hereof at said observatory.

THIRD:

On its part, Swasey shall send to Pasadena, California, at a date to be agreed upon between The Observatory Council and Swasey, the chief engineer of said Ohio corporation, who shall confer with The Observatory Council and its associates concerning the preliminary determination of the design or designs of said mounting for said telescope and the details and accessories and equipment connected therewith, and also concerning the dome and its construction and design which is intended to be operated in conjunction with said telescope; and said chief engineer shall also confer with it and them with regard to the details of the electrical equipment to be designed and furnished by Swasey if so designated in writing by The Observatory Council; and said chief engineer shall also assist The Observatory Council and its associates in arriving at a determination of the approximate cost of the Swasey part of the project, - but in so doing, neither said chief engineer nor Swasey nor said Ohio corporation shall be obligated to deliver the portion of the project to be furnished pursuant hereto for such

a sum as shall be estimated by said chief engineer, nor shall he or they incur any responsibility of any character by reason of such estimate.

FOURTH: After said conference of said chief engineer with The Observatory Council and its associates, Swasey shall procure said Ohio corporation to work out and submit plans and designs covering in a preliminary way -

(a) The mounting of said telescope and the subsidiary and other equipment which may be incidental thereto;

(b) If requested in writing by said The Observatory Council, the design, material and equipment of said dome of said observatory, including the machinery and appliances to be furnished and installed for operating the same in conjunction with said telescope; and

(c) If requested in writing by said The Observatory Council, the electrical equipment for operating and handling said telescope or mounting and said dome.

The written approval and/or consent or direction of said The Observatory Council shall be sufficient for all purposes if signed by a person officially and in writing designated by The Observatory Council to sign its name as its act.

These preliminary plans and designs shall be accompanied by a detailed report which shall explain any changes made from the design agreed upon at Pasadena, and the reasons for such changes. The immediate objective of said report and said preliminary plans and design will be -

First: to invite the criticism of The Observatory Council and its associates;

Second: to enable them to figure more accurately on the costs involved; and

Third: so that said preliminary design may be submitted to materialmen and other parties dealing in equipment or materials, with a view of obtaining their expert advice as well as arriving at the items of cost. For that purpose the report shall furnish such information as shall be available regarding costs.

Following the receipt of such preliminary plans and designs and such detailed report, Swasey shall cooperate with The Observatory Council in the manner and to the extent directed by The Observatory Council in making a survey of the probable cost of materials and equipment and an estimate of the probable total costs involved in the completion by Swasey of all things required to be done by it hereunder. It is understood that such survey and such estimate are for the purpose only of further determining and verifying approximate cost figures so that The Observatory Council may more definitely arrange for the financing thereof, and that such approximate cost so arrived at shall not be binding upon Swasey or limit its right to receive its actual costs and compensation as herein provided.

FIFTH: The Observatory Council shall designate experts who shall have authority to confer with Swasey on all scientific and/or expert questions or problems involved in this proposed agreement.

Swasey shall likewise designate one person experienced in commercial and business matters who shall be fully authorized to represent Swasey in all the business or commercial details which may arise under this proposed agreement.

Swasey shall work out with said scientific and technical representatives of The Observatory Council the designs and plans which shall be provisionally adopted; and if and when said The Observatory Council shall have given its written approval to said provisional plans and design or either or any of them, then Swasey shall go forward, as hereinafter provided, with the carrying out of said plans and designs; provided that the chief engineer of said Ohio corporation shall keep in close touch with The Observatory Council, and any change or modification of either or any of said plans or designs which shall be approved in writing by both of them shall be put into force and followed by Swasey.

SIXTH: As soon as said plans and designs shall have been settled and approved as in item FIFTH provided, Swasey shall procure said Ohio corporation to go forward diligently with the work of fabricating, constructing, manufacturing, procuring, assembling and (for the purpose of testing) erecting at Cleveland, Ohio, and there testing said mounting for said telescope. Provided that said The Observatory Council reserves the right itself to purchase and furnish all or any part of the necessary motors and/or other electrical equipment required in carrying out said plans and designs so approved by them. But said The Observatory Council shall have full right to require Swasey to purchase and furnish all or any part of said motors and/or other electrical equipment so required. At the final testing of said mounting at Cleveland, the said technical representatives of The Observatory Council shall be present

And Swasey shall not be entitled to nor receive on the motors & equipment

the 17% provided to be paid in the direct cost of the other parts of the mounting

and shall have full access to all records in the premises and full opportunity to participate in and observe all said final tests. If and when said final tests shall be found satisfactory and shall be approved in writing by said The Observatory Council, said Ohio corporation shall cause said mounting to be disassembled and prepared for shipment, and, except as may be herein otherwise provided, all responsibility or liability on Swasey's part or on the part of The Warner & Swasey Company, of Ohio, shall cease and determine; provided, however, that in case The Observatory Council shall determine to engage Swasey to design and construct and/or fabricate the dome and its operating mechanisms and other appurtenances, then Swasey shall do all things proper and necessary to carry out such instruction, but subject to the foregoing provisions and restrictions.

Swasey shall go forward with said work with the written approval of The Observatory Council until all of the said mounting and its appurtenances and accessories so to be furnished by Swasey shall have been fully erected, tested, accepted at Cleveland, Ohio, disassembled, prepared for shipment, and delivered on board cars, ready for shipment, at Cleveland, Ohio. Swasey, however, shall have nothing whatever to do with the handling, transporting or installing of the large mirror and/or other optical equipment of said telescope; and when Swasey has completed what is required as aforesaid with reference to said mounting and with respect to said dome and its operating mechanisms, if Swasey be designated by The Observatory Council to construct the same, and all the incidents and accessories to be furnished by Swasey, and the same have been tested and have

been approved in writing by The Observatory Council (said The California Institute of Technology),- then any balance which may be owing Swasey under said agreement shall be immediately due and payable and shall be paid by The Observatory Council, and all further obligations of Swasey in the premises shall cease, except that to the extent Swasey is thereafter required to furnish the presence and services of experts as provided in paragraph designated "FIRST" of this contract, in which case Swasey is entitled to be paid its direct costs, expenses and commission in respect of such services.

SEVENTH:

It is fully understood and agreed that The Observatory Council shall have the full benefit of the long experience and skill of said Ohio corporation and its disciplined staff in connection with all of the work contemplated hereunder; and Swasey agrees that all of the work done and/or furnished and/or equipment fabricated, procured or furnished by Swasey shall be made in a thoroughly workmanlike and scientific manner. Neither Swasey nor said Ohio corporation, however, shall be liable for any loss or damage which may occur to any of the equipment or things so to be furnished by them or either of them, but The Observatory Council shall, at its own cost and expense, procure such insurance as it deems advisable, and subject to such insurance protection said items and articles shall be at its risk as to damage or injury; provided that Swasey and/or said Ohio corporation shall be at the sole risk as to the injury or death of any of its servants or employees in the progress of said work.

EIGHTH: All of the services rendered and work done and materials, equipment, articles and things constructed, procured and/or furnished either by Swasey or by said Ohio corporation hereunder shall be paid for by The Observatory Council on monthly reports and estimates made in writing on the basis of all of the cost and expense of every nature and character which Swasey and/or said Ohio corporation may incur, as outlined and determined under a schedule furnished by Ernst & Ernst, Public Accountants, in conference with and to the approval of Price, Waterhouse & Company, Public Accountants, acting for The Observatory Council - a copy of which, initialed by Price, Waterhouse & Company so as to indicate such approval, is hereto attached, marked Exhibit "A" and made a part hereof - to which cost and expense shall be added and paid a percentage of seventeen percentum (17%) computed upon said direct costs and expenses. By agreement administrative expenses are excluded, except to the extent directly chargeable as set forth in Exhibit "A" hereto attached and made a part hereof.

The Observatory Council may require Swasey, from time to time, at its discretion, to secure and provide for its reports to be made by consultants of various kinds, legal approval of sub-contracts, if any, performance bond, services of general and cost accountants, and such other and similar things as it may elect, but all at the expense of The Observatory Council. The Observatory Council, however, reserves the right to have its own accountant or accountants,- employed and designated by said The Observatory

Council,- fully examine and make such extracts and/or copies as they may desire,- of and from all books of account, agreements and/or records of Swasey and/or said Ohio corporation relating to this agreement and/or what shall be done or furnished hereunder. Said examinations may be made either quarterly or at such other times as said The Observatory Council may direct.

It is fully understood that it may become advisable to enter into one or more supplemental contracts or a final contract in order to set forth therein certain additional details which at the present time have not been fully developed, in which event either party to this agreement may prepare and submit to the other such supplemental contracts or such final contract so deemed to be necessary or advisable, it being understood and agreed that any such supplemental or final contract shall be prepared on the basis and principles set forth herein and shall not without the mutual consent of the parties hereto contain any provision inconsistent in principle or substance with the provisions hereof. To the extent that the parties go forward under this proposed agreement, however, both parties shall be bound hereby; and whatever expense Swasey and/or said Ohio corporation may have incurred to and including the time of signing any such final contract - or the refusal of either party to sign the same - shall be paid to Swasey or said Ohio corporation, as the case may be, together with said percentage of seventeen percentum (17%) based upon all such costs and expenses as hereinbefore provided and as shown by said Exhibit "A"; and in the event of the refusal of either party to sign, The Observatory

Council shall additionally assume all commitments or other liabilities which Swasey or the Ohio corporation may have incurred hereunder in The Observatory Council's behalf.

NINTH: If the parties hereto shall go forward under this provisional agreement for more than thirty (30) days, Swasey shall have the right to submit for payment and The Observatory Council shall be obligated to pay, on monthly statements, the cost and expense incurred under this contract,- together with the said agreed percentage of seventeen percentum (17%),- which may be due to and including the time of presentation of such monthly statements.

TENTH: The Observatory Council shall have full right and power for reasons which it may deem satisfactory and sufficient to it, to terminate this agreement and all future work and/or expenditures of Swasey hereunder - by giving Swasey three (3) days' written notice, either by telegram or by registered air mail, special delivery, addressed to the Cleveland address of The Warner & Swasey Company, of Ohio; provided that The Observatory Council shall thereafter promptly pay upon demand all items of cost and expense for which Swasey and/or The Warner & Swasey Company, of Ohio, would be entitled to reimbursement or payment under this agreement and which has not been theretofore paid (including commitments for which they may have become liable), together with the said agreed seventeen percentum (17%), computed as hereinbefore provided. In the event of such termination ^{and/or on completion of the contract} The Observatory Council shall be entitled to receive and hold as its own property all

designs, patterns, materials or other property acquired by Swasey in the course of its procedure under this agreement and paid for by The Observatory Council.

ELEVENTH: In the event this offer and proposal shall be accepted in writing hereon by The California Institute of Technology at Pasadena, California, then concurrently with such acceptance there shall be furnished to Swasey written assurance, satisfactory to Swasey, that said The California Institute of Technology has been and is dependably financed so as to be able to go forward and comply with its undertakings under said agreement, and that said financing is by commitment of some dependable financial body or institution.

Upon the written acceptance by The Observatory Council of the foregoing proposal, the same shall constitute a valid and binding obligation between the parties, subject to its being modified, supplemented or superseded by supplemental agreement or a final contract as hereinbefore provided for.

It is fully recognized that the situation under which this contract is made is most unusual, and that to carry out the spirit and purpose contemplated a very thorough and high degree of cooperation between the parties is essential.

DATED this 6th day of July, 1934.

Yours very truly,

THE WARNER & SWASEY COMPANY OF CALIFORNIA

By (Signed) J. E. Bliss
Its Contracting Agent.

In duplicate
original

THE CALIFORNIA INSTITUTE OF TECHNOLOGY, of Pasadena,
California, referred to in the foregoing proposal as The
Observatory Council, hereby accepts and confirms the foregoing
offer and proposal and constitutes the same a binding agreement
between the said THE WARNER & SWASEY COMPANY OF CALIFORNIA,
a California corporation, and the undersigned.

DATED this 6th day of July, 1934.

Signed The Observatory Council of the California Institute
of Technology. by George B. Hale Chairman

EXHIBIT A

Outline of the manner of computing costs as referred to in the contract dated July 6, 1934 between The Warner & Swasey Company of California and The California Institute of Technology for the design and construction of the mounting and design of the dome for a two hundred (200) inch telescope.

It is contemplated that the costs chargeable against this contract shall include only the direct costs and expenses of every kind and nature incurred by The Warner & Swasey Company of California and/or The Warner & Swasey Company of Ohio directly attributable to this contract, including among other items the following:

- (1) Designing and engineering costs, including salaries of engineers, draftsmen and others, fees paid consultants and experts especially employed, traveling expenses, telegraph and telephone tolls, supplies, insurance, light, heat, water, rental or purchase of special equipment and other expenses directly chargeable against a separate department of engineering and design especially provided and maintained for this contract.
- (2) It is contemplated that a major portion of the assembly and testing work in connection with this undertaking will be performed in structures and with equipment and facilities especially constructed or acquired therefor. The direct cost of the work will include salaries and wages paid to all employees directly engaged on this work, all materials purchased for and/or consumed therein, the cost of constructing or acquiring the buildings, equipment and facilities referred to and all other costs incurred in carrying on the work related to this contract within the separate department devoted thereto, including power, light, supplies, rent or cost of special equipment, tools, casualty insurance and similar items.

To the extent existing plant facilities of The Warner & Swasey Company are utilized for this work, direct costs shall include material and labor directly chargeable thereto plus \$1.30 per direct labor hour representing general factory expenses other than labor.

It is understood that if special equipment not already owned by The Warner & Swasey Company is acquired or rented for the purposes of this contract the cost thereof shall be chargeable to this contract regardless of where used or located.

Direct costs shall also include subcontracts, purchases of completed parts, breakage or spoilage of work directly related to the contract, packing materials, traveling expenses, telephone and telegraph charges, miscellaneous supplies purchased for and/or consumed in the work; legal fees for preparation of contracts or other services, accountants' fees, advertising for special materials or services, royalties and rents paid, bond premiums; salaries or wages of executives and of other employees covering time directly devoted to this work, and any other items of cost or expense properly and directly chargeable thereto.

- (3) At the conclusion of the work under the contract any amounts realized by the company as salvage value of structures and equipment, the cost of which was previously charged to the contract, will be applied by the company as a payment on the contract or refunded to The Observatory Council if all amounts due the company under the contract have been paid. If the amounts thus realized are greater than any balance due on the contract by The Observatory Council, the difference between such amount realized and the amount owing will be refunded.
- (4) Subcontracts made with or purchases from any corporate subsidiary of The Warner & Swasey Company shall be made on a basis to exclude intercompany profit.

The Observatory Council,
The California Institute of Technology, and
The Warner & Swasey Company of California.

Gentlemen:

We have considered the foregoing Exhibit A and it is our opinion that the outline of costs therein set forth is fair and reasonable and that the application thereof will result in limitation of the charges against the contract (to which this exhibit is to be attached) to those costs directly attributable to the contemplated work.

July 6, 1934.

Prue Waterhouse Co.

Ernst + Ernst

MINUTES OF SPECIAL MEETING OF
THE BOARD OF DIRECTORS OF
THE WARNER & SWASEY CO. OF CALIFORNIA

A special meeting of the Board of Directors of THE WARNER & SWASEY CO. OF CALIFORNIA was held at the office of The Warner & Swasey Company, 5701 Carnegie Avenue, in the City of Cleveland, State of Ohio, on the 1st day of June, 1934, at 3:00 o'clock P. M.

There were present and acting the following members of the Board:

Messrs. C. J. Stilwell and
C. A. Cowdrey

being a quorum of the Board.

Absent: Mr. L. R. Hawkins

Mr. Stilwell presided and Mr. Cowdrey acted as Secretary.

The Secretary presented and read a written waiver of notice and of the place of the meeting, signed by all of the Directors of the Company, which was directed to be filed with the records of the Company.

The reading of the minutes of the last meeting of the Board was dispensed with.

Mr. Stilwell stated that the purpose of the meeting was to make Mr. P. E. Bliss a contracting agent for the Company for the purpose of negotiating a contract with the California Institute of Technology for work to be done in connection with an observatory project. Whereupon, upon motion duly made, seconded and unanimously carried, it was

RESOLVED, That P. E. Bliss be and hereby is made Contracting Agent for The Warner & Swasey Co. of California, for the purpose of negotiating and executing a contract or contracts with the California Institute of Technology with respect to astronomical observatory work.

There being no further business to come before the Board at this time, the meeting adjourned.

APPROVED:

C. A. Cowdrey
Secretary

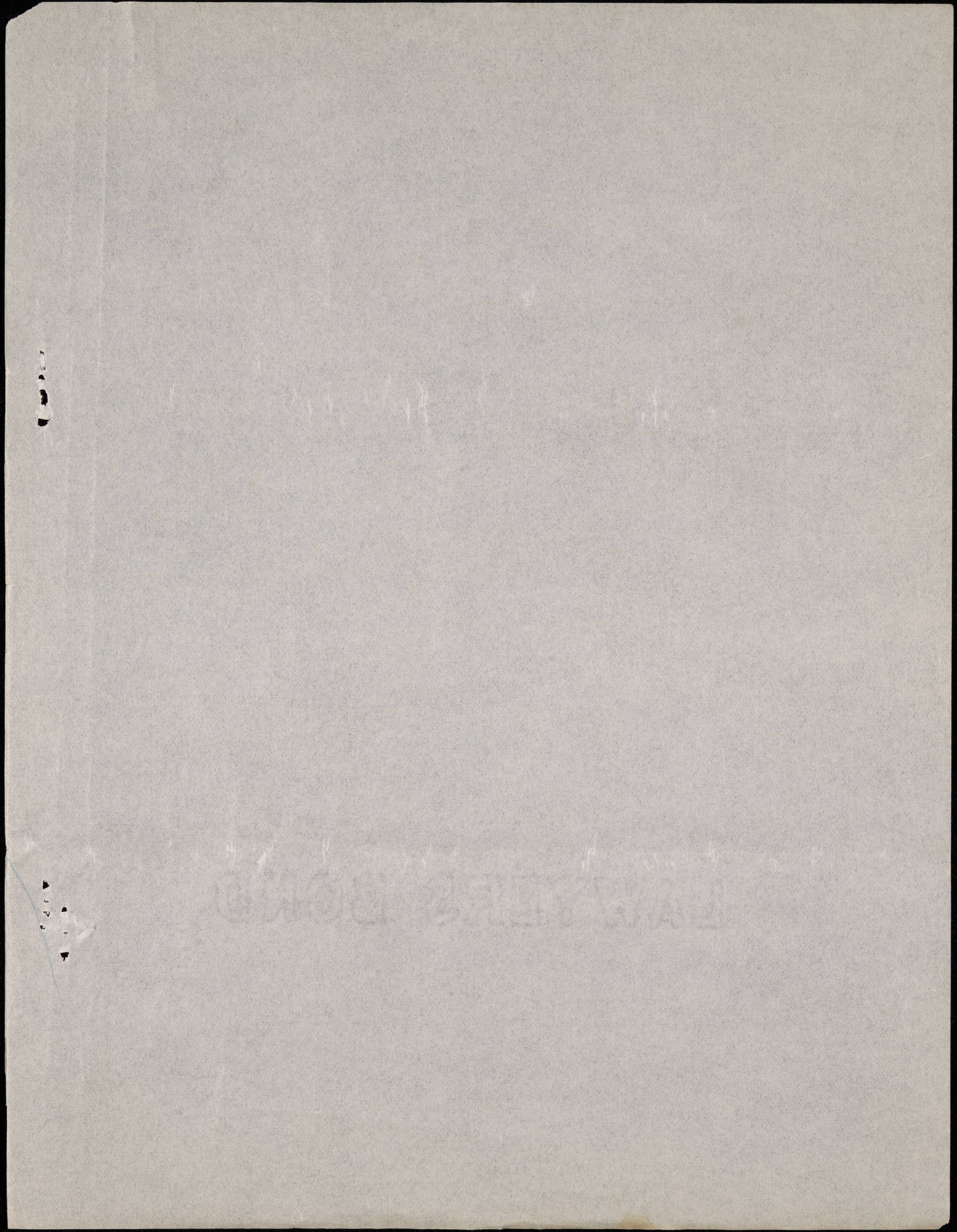
C. J. Stilwell
President

The undersigned hereby certifies that he is the Secretary of The Warner & Swasey Co. of California; that the above and foregoing minutes are a true and correct copy of the minutes of a special meeting of the Board of Directors of said Company held on June 1, 1934; that C. J. Stilwell and C. A. Cowdrey are duly elected, qualified and acting directors of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said corporation this 1 day of June, 1934.

C. A. COWDREY (Seal)
Secretary

(Corporate Seal)



OCT 23 1934

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CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

OFFICE OF THE SECRETARY

October 8, 1934

OCT 15 34

Mr. Arthur G. Askey, Assistant Auditor,
General Education Board,
49 West 49th Street,
New York, N. Y.

RS		WPH	
GJB		WPH	
AGA		AGA	10/20
WW		WW	

My dear Mr. Askey:

This will acknowledge with thanks the receipt of your letter of October 2nd enclosing the check of the General Education Board for \$7,501.83 in reimbursement for expenditures from February 1 to August 31, 1934, on the 200-inch telescope project.

In answer to your inquiry in regard to the credit of \$38,518.83 for equipment sold, the account is as follows:

Equipment sold to the General Electric Company	\$ 36,161.00
15 Transformers sold to Stephen Hall & Company through J. L. Hemphill & Co., Inc.	<u>3,000.00</u>
	\$ 39,161.00

Against this there were the following charges:

Commission to J. L. Hemphill & Co., Inc.	\$ 210.00
Payment to R. W. Sorensen for services in connection with adjustment with the General Electric Company	400.00
Traveling expenses, R. W. Sorensen	29.65
Telegram	<u>2.52</u>
making a total of	\$ 642.17

With respect to the commission paid to J. L. Hemphill & Co., Inc. I would say that they asked a 10% commission. Our people originally proposed 5% and the payment of 7% was a compromise.

In making the adjustment with the General Electric Company, Professor Sorensen spent a considerable amount of time both in New York and at West Lynn in extended negotiations and in going over the whole situation in detail with the officers of the General Electric Company. In view of the amount of time he put in and what our people considered a very satisfactory settlement reached, the Observatory Council felt that he should be compensated in the amount named.

Trusting this will make the matter clear, I am

Very truly yours,

Edward Charnett

ECB:E

OCT 27 1934

OCT 27 1934

WW
MM
TA

1103.1
WW
7-7
Ja

CORNING GLASS WORKS

CORNING, NEW YORK



October 11, 1934

SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

Dr. Warren Weaver
Rockefeller Foundation
Rockefeller Center
49 West 49th Street
New York, N.Y.

My dear Warren:-

The 200" disc has been lifted from the platform of the locomotive hoist and work is now started upon re-assembling a new mould. A tentative date of November 18 has been selected for the pouring of the disc. We certainly hope that your plans are such that you will be in Corning at that time and that we shall have the pleasure of entertaining you and Mary.

I hope it will also be possible for Dr. Mason to be in Corning at that time.

Yours very truly,

CORNING GLASS WORKS
Aviation and Optical Division

BY

O.A. Gage
In Charge

OAG:DVB

1103.1

October 12, 1934

ack	T. A.	OCT 15 1934	J. A.	10/15
	WW		ww	
	WMB		WMB	
	KEO		KEO	
	AMJ			

our budget for 1935, with ~~A-C~~ [✓] Budget item prepared

and outstanding balance. You

Docket item prepared

However, the problem of the mounting involves so many questions that I hope to discuss it with you and Dr. Mason and Dr. Weaver next week. We have studied it very fully here, but want your advice before adopting any particular form of procedure.

Yours very sincerely,

rely,
Gray. E. & Gale

~~100~~

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

October 12, 1944

ATLANTIC OCEANOGRAPHY

Mr. J. H. ...
Director, ...
42 East 42nd Street
New York

Dear Mr. ...:

I am writing to you regarding the ...

... and ...

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NOV - 7 1934

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GEB files -

From: MM's interviews

October 17, 1934.

Dr. George E. Hale, TA and WW.

Discussion of the ways and means of construction of the mounting for the 200". A contract has been approved with the Warner & Swasey Company. Hale questions whether it is advisable to sign this contract or whether other means of construction should be employed. Further discussion to follow.

OCT 18 1934

200 inch telescope project

AMJ 1103.1

*For files.
y.a*

COPY

GRANT DEED

WILLIAM BEACH and MARION B. BEACH, husband and wife, and KENNETH BEACH, an unmarried man, of San Diego County, California,

in consideration of TEN (\$10.00) - - - - - DOLLARS

to them in hand paid, receipt of which is hereby acknowledged, do hereby

GRANT TO CALIFORNIA INSTITUTE OF TECHNOLOGY, a non-profit corporation organized and existing under the laws of the State of California,

the real property in the County of San Diego, State of California, described as the SW 1/4 of SE 1/4 of Section 27, Twp. 9 S., Range 1 E., and the N 1/2 of the NE 1/4 of Section 34, Twp. 9 S., Range 1 E., S.B.B. & M.

RESERVING unto the grantors, their heirs and assigns, an easement consisting of a right of way over the herein conveyed property for a pipe line sufficient in size for a pipe line for the conveyance of waters from the NW 1/4 of Section 35, Twp. 9 S., Range 1 E., to the SE 1/4 of the SW 1/4 of Section 27, Twp. 9 S., Range 1 E., the definite location of said right of way over the herein conveyed property to be determined at a later date by agreement between the grantors and the grantee herein, but the location of said pipe line shall avoid the building site or sites of all buildings planned to be constructed by the grantee on said herein conveyed property, and said location to be otherwise mutually satisfactory to both parties.

SUBJECT to the first installment of general taxes for the fiscal year 1934-1935, and subject to an easement for a telephone line as granted to the United States of America by deed recorded.

(SEAL)

TO HAVE AND TO HOLD to said Grantee, its successors or assigns.

WITNESS our hands this 22nd day of September, 1934

William Beach
Marion B. Beach
Kenneth Beach

*original
returned to
Mr. Barrett
Oct 12/34*

120 acres - \$12,000.

FEB - 4 1935

1103.1

THE ROCKEFELLER FOUNDATION
INTER-OFFICE CORRESPONDENCE

From MM's interviews.

TA	JAN 23 '35	4.a.	
WW	JAN 24 '35	WW	
FBH		FBH	
GEB files		Q.M.S.	

October 18, 1934.

Dr. George E. Hale, Captain C.S. McDowell, and WW.

Discussion of the planning and construction of the mounting for the 200-inch. McDowell described Navy practice in the break-down of costs, and the hunting of firms capable of doing portions or all of an engineering construction job of this type. He would not recommend entering into contract until general features at least of design were agreed upon.

General discussion of desirability of getting competent opinion on design. The Pasadena group has been thinking in terms of the cantilever form design, but there has been no definitive discussion of the relative merits of this and the yoke.

Hale asked McDowell if he would be willing to serve as co-ordinator and planner for this work if he could be released from the Navy, and McDowell expressed his interest in the work and stated that he would be glad to take it on.

November 1, 1934.

Dr. R. A. Millikan.

Discussion of McDowell's appointment to engineer telescope mounting. Millikan considers McDowell uniquely fitted for the purpose.

January 2, 1935.

Captain C. S. McDowell.

General description of his progress in Pasadena. The situation seems favorable. McDowell is securing cordial cooperation from everybody except Pease, who has been absent from Pasadena.

McDowell will be in the East two months, and have many consultations with engineers and heads of construction firms. He reported Westinghouse group interested and cordial, and willing to help on volunteer basis in every way possible. The same holds good of all people whom he has seen.

DEC 11 1934

1103.1

ANSON PHELPS STOKES
2408 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C.

mm OCT 23 34 mm 10/24

TA

Za

October 19, 1934

My dear Dr. Mason:

I have been of course tremendously interested to read in the newspapers the accounts of the molding of the new 200-inch telescope at the Corning Works. I remember so well when Dr. Wickliffe Rose first proposed this plan for the expenditure of most of the remaining funds of the International Education Board, as the project seemed to me one of the greatest importance to science.

Since coming to Washington I have seen a good deal of Dr. George Willis Ritchey of the United States Naval Observatory, who has, I suppose, had more experience in connection with the designing and building of great reflecting telescopes than any one in this country, and I have been surprised to find on inquiry of him that he has not been consulted at all in connection with the new telescope. I presume that the reason is that he at one time had some rather serious difficulties with Professor Hale, but his experience is so great and his desire to be of help to the cause of science so keen that I thought I would just drop you a note with reference to him in the thought that possibly you or someone who represents you in this matter might see him in Washington as I think it not impossible that he could make suggestions that would save time and money and bring about the most successful results. He has the advantage, which so few astronomers have from the standpoint of constructing a great telescope, that he came into astronomy through the work of a teacher of manual training and later an optician. He was for years Superintendent of Instruction at the Yerkes Observatory and Superintendent of Instrument Construction of the Solar Observatory at the Carnegie Institute, and also astronomer and engineer in charge of the design and construction of both the 60-inch and 100-inch reflecting telescopes of Mount Wilson. He has just completed for the Government the design and construction of what is known as the Ritchey Chretien Reflecting Telescope at the Naval Observatory here.

Professor Ritchey is an extremely conscientious man who has had extraordinary success in the type of work which is being carried on on a larger scale in connection with the building of the new telescopes. It was because I found his tremendous interest in the success of your new venture, and because I found on inquiry, that he had not been consulted regarding it that I am taking the liberty on my own initiative of dropping you this note, thinking that it is quite possible that with his vast experience, he could be of very large service in insuring the success of the large expenditure which the Rockefeller Boards have made in this new project.

With kindest personal regards, I am

Sincerely yours,

Anson Phelps Stokes

Dr. Max Mason, President
Rockefeller Foundation
New York City

DEC 11 1934

1103.1

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TA	OCT 39 34	J. a
W W B		W W
FB 11 DEC 11	OCT 30 34	WCH. W W

October 24, 1934.

Dear Dr. Stokes:

It was kind of you to write me your letter of October 19th regarding Dr. Ritchey, and his past experience in the design and construction of the large telescopes.

I have no doubt that in many enterprises of this kind some more or less trivial personal difficulty has interfered with obtaining a complete set of opinions. I had not known of any in this particular case.

It happens that I have just been talking with Hale in regard to the carrying on of the project at the present time. This refers particularly to the design of the mounting, which is an engineering job of the highest order. The Pasadena group has been working on it intensively for some time, and have various alternative designs. We have talked the situation over and they have agreed enthusiastically to the suggestion that a capable entrepreneur be engaged for this phase of the work. We have an excellent man in mind, and I am very hopeful that his appointment will follow. If so, he would have no past history in the situation, and would furnish just the mechanism through which contact with Dr. Ritchey could be made, as well as with all others who have anything to suggest.

Incidentally the work has gone on very well. The Corning people, in spite of the failure at the first pouring of

the 200-inch, have done a remarkable piece of technological development, and at very moderate costs.

Thank you very much for your interest and your suggestion.

With cordial greetings,

Sincerely yours,

MAX MASON

Dr. Anson Phelps Stokes,
2408 Massachusetts Avenue, N.W.,
Washington, D.C.

MM:AEB

DEC 14 1994

1103.1
October 23rd

OFFICE OF THE INSPECTOR OF MACHINERY, U. S. N.

NEW YORK SHIPBUILDING CORPORATION

CAMDEN, N. J.

mm - mm

25 B files ✓

Dear Max

In accordance with note from your secretary I am enclosing a memo of expenses on my trip to New York last week.

You know it was a pleasure for me to see both yourself and Hale, regardless of anything else, and I am only putting this in because you asked for it.

As I understand it I am waiting to hear further from Hale or yourself before I make any arrangements to leave my job here. I imagine that I can get clear of this in two weeks time, possibly quicker if it is necessary.

I may have dwelt too much on the question of getting extended leave from the Navy. Actually if I know definitely that I am wanted on your job I can go ahead and make myself available

either by getting leave or by
retiring.

Best regards

Cordially

Sincerely

NOV 22 1934

1103.1

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT
J. L. PEDEN
DIRECTOR OF SALES

October 25, 1934

EXECUTIVE COMMITTEE
ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

WW	DEC 31	WW	
MM		17.7	
FSH		WCH (noted for FSH)	
TA	NOV 9 34	Za	
AMJ	NOV 22 34		

Dr. Warren Weaver,
Rockefeller Foundation,
49 West 49th Street,
New York, N. Y.

My dear Warren:

Again Dr. McCauley has been forced to change the date of the pouring of the 200" due to unexpected delays in securing material for molds. He now plans to pour the disc early in December.

Very truly yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
In Charge

O. A. Gage

OAG:FMM

CLASS OF SERVICE

This is a full-rate Cablegram unless its deferred character is indicated by a suitable sign preceding the address.

WESTERN UNION CABLEGRAM

R. B. WHITE
PRESIDENT

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

J. C. WILLEVER
FIRST VICE-PRESIDENT

SIGNS

	Full-Rate Cablegram
LC	Deferred Cablegram
NLT	Cable Night Letter
	Ship Radiogram

Received at 40 Broad Street, New York, N. Y.

L271 E LONDON 25 25

NLT MASON ROCKEFELLER FOUNDATION (49 WEST 49TH ST.)

NEWYORK

STANDLEY FAVORABLE MCDOWELLS DETAIL OR LEAVE FOR
TELESCOPE PROJECT OFFICIAL DECISION AWAITS MY VISIT
WASHINGTON SEE YOU NOVEMBER FIRST

MILLIKAN

Read to Dr. Hale over Telephone +
copy sent to him c/o Mr. Wm. B. Hale
120 W. Adams St
Chicago
copy sent Dr. Bowman

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

STATION	TO	FROM
NEW YORK	NEW YORK	NEW YORK
NEW YORK	NEW YORK	NEW YORK
NEW YORK	NEW YORK	NEW YORK
NEW YORK	NEW YORK	NEW YORK
NEW YORK	NEW YORK	NEW YORK

WESTERN UNION CABLEGRAM

THE
CABLEGRAM
IS
A
SERVICE
FOR
THE
TRANSMISSION
OF
MESSAGES
BY
CABLE

Oct 23 PM 11 10

Received at 40 Broad Street, New York, N. Y.

LETTE LONDON 23 23

NLT MASON ROCKEFELLER FOUNDATION

NEW YORK

STANDLEY FAVORABLE MCDOWELLS DETAIL OR LEAVE FOR

TELESCOPE PROJECT OFFICIAL DECISION AWAITS MY VISIT

WASHINGTON SEE YOU NOVEMBER FIRST

MILLIKAN

DEC - 6 1934

1103.1

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

November 14, 1934

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

Dr. Max Mason,
Rockefeller Foundation,
Rockefeller Center,
49 West 49th Street,
New York, N. Y.

My dear Dr. Mason:

The work of preparing for the casting of the 200" disc is progressing most satisfactorily and, unless something unexpected happens, the disc will be poured on December 2nd.

All of us at Corning sincerely hope that your plans are such that you can be with us at that time for we regret it exceedingly that you could not be at the plant last March.

Cordially yours,

CORNING GLASS WORKS
Aviation & Optical Division

By

O. A. Gage
O. A. Gage
In Charge

OAG:FMM

CORNING GLASS WORKS
CORNING, NEW YORK



RECEIVED AT
NEW YORK
JANUARY 10, 1900

RECEIVED AT
NEW YORK
JANUARY 10, 1900

TO THE
HONORABLE
COMMISSIONER OF THE
LAND OFFICE

NEW YORK
JANUARY 10, 1900

DEC - 6 1934

1103.1

W W	NOV 28 34	W W
T A	DEC - 3 34	J. A
FBH		FBH
AMT		

November 27, 1934.

Dear Mr. Gage:

Thank you for your letter of November 14th, with the information that the new disk will be poured on December 2nd.

I wish very much that I could come to Corning for the pouring. However, this is such a busy season that there is no possibility that I can make it.

With cordial greetings,

Sincerely yours,

MAX MASON

Mr. O. A. Gage,
Corning Glass Works,
Corning, New York.

DEC 14 1934

1103.1

ANSON PHELPS STOKES
2408 MASSACHUSETTS AVENUE, N.W.
WASHINGTON, D.C.

mm	mm	12/5
November 23,	1934	

Dr. Max Mason, President,
The Rockefeller Foundation,
49 West 49th Street,
New York City

My dear Dr. Mason:

Under date of October 24th you wrote me that a capable entrepreneur was about to be engaged to consider the design of the mounting and similar matters connected with the new telescope. If he has been chosen and I might have his name and address I would appreciate it as it is possible that Dr. Ritchey might like to get in touch with him. You will remember that I wrote you about Dr. Ritchey and the remarkable telescope which he has just designed and set up for the United States Naval Observatory after his long experience at Mount Wilson and other places. If by any chance the person that you had in mind could not be secured possibly you will think well of having Dr. Ritchey's name put on the list of those under consideration for the position. I do not know whether he could accept this position if chosen and I am writing without his knowledge, but impartial persons who have looked into the matter very carefully tell me that they think that Dr. Ritchey's experience is so well known in the matter of the actual construction and mounting of telescopes, that it would be too bad if those responsible for the new 200-inch telescope did not have the advantage of his advice in some way.

I am, with kindest regards,

Sincerely yours,

Anson Phelps Stokes

APS:m

Charge Rockefeller Foundation, 49 W. 49th St.

1207-A

1103.1

CLASS OF SERVICE DESIRED	
DOMESTIC	CABLE
TELEGRAM	<input checked="" type="checkbox"/> FULL RATE
DAY LETTER	DEFERRED
NIGHT MESSAGE	NIGHT LETTER
NIGHT LETTER	SHIP RADIOGRAM

Patrons should check class of service desired; otherwise message will be transmitted as a full-rate communication.

WESTERN UNION

R. B. WHITE
PRESIDENT

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

J. C. WILLEVER
FIRST VICE-PRESIDENT

CHECK
ACCT'G INFMN.
TIME FILED

Send the following message, subject to the terms on back hereof, which are hereby agreed to

November 23

19 34

To Dr. George E. Hale

Street and No. California Institute of Technology,

Place Pasadena, California

In view McDowell's appointment do you wish change item three budget submitted

Please wire answer if possible by Monday.

Max Mason

Sender's address
for reference

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY
IS BY TELEGRAPH OR CABLE.

Sender's telephone
number

ALL MESSAGES TAKEN BY THIS COMPANY ARE SUBJECT TO THE FOLLOWING TERMS:

To guard against mistakes or delays, the sender of a message should order it repeated, that is, telegraphed back to the originating office for comparison. For this, one-half the unrepeatable message rate is charged in addition. Unless otherwise indicated on its face, this is an unrepeatable message and paid for as such, in consideration whereof it is agreed between the sender of the message and this company as follows:

1. The company shall not be liable for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the unrepeatable-message rate beyond the sum of five hundred dollars; nor for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the repeated-message rate beyond the sum of five thousand dollars, *unless specially valued*; nor in any case for delays arising from unavoidable interruption in the working of its lines; nor for errors in cipher or obscure messages.

2. In any event the company shall not be liable for damages for mistakes or delays in the transmission or delivery, or for the non-delivery, of any message, whether caused by the negligence of its servants or otherwise, beyond the sum of five thousand dollars, at which amount each message is deemed to be valued, unless a greater value is stated in writing by the sender thereof at the time the message is tendered for transmission, and unless the repeated-message rate is paid or agreed to be paid, and an additional charge equal to one-tenth of one percent of the amount by which such valuation shall exceed five thousand dollars.

3. The company is hereby made the agent of the sender, without liability, to forward this message over the lines of any other company when necessary to reach its destination.

4. Domestic messages and incoming cable messages will be delivered free within one-half mile of the company's office in towns of 5,000 population or less, and within one mile of such office in other cities or towns. Beyond these limits the company does not undertake to make delivery, but will, without liability, at the sender's request, as his agent and at his expense, endeavor to contract for him for such delivery at a reasonable price.

5. No responsibility attaches to this company concerning messages until the same are accepted at one of its transmitting offices; and if a message is sent to such office by one of the company's messengers, he acts for that purpose as the agent of the sender.

6. The company will not be liable for damages or statutory penalties in any case where the claim is not presented in writing within sixty days after the message is filed with the company for transmission.

7. It is agreed that in any action by the company to recover the tolls for any message or messages the prompt and correct transmission and delivery thereof shall be presumed, subject to rebuttal by competent evidence.

8. Special terms governing the transmission of messages according to their classes, as enumerated below, shall apply to messages in each of such respective classes in addition to all the foregoing terms.

9. No employee of the company is authorized to vary the foregoing.

THE WESTERN UNION TELEGRAPH COMPANY

INCORPORATED
R. B. WHITE, PRESIDENT

CLASSES OF SERVICE

TELEGRAMS

A full-rate expedited service.

NIGHT MESSAGES

Accepted up to 2:00 A.M. at reduced rates to be sent during the night and delivered not earlier than the morning of the ensuing business day.

Night Messages may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such night messages at destination, postage prepaid.

DAY LETTERS

A deferred day service at rates lower than the standard telegram rates as follows: One and one-half times the standard night letter rate for the transmission of 50 words or less and one-fifth of the initial rates for each additional 10 words or less.

SPECIAL TERMS APPLYING TO DAY LETTERS:

In further consideration of the reduced rate for this special Day Letter service, the following special terms in addition to those enumerated above are hereby agreed to:

A. Day Letters may be forwarded by the Telegraph Company as a deferred service and the transmission and delivery of such Day Letters is, in all respects, subordinate to the priority of transmission and delivery of regular telegrams.

B. This Day Letter is received subject to the express understanding and agreement that the Company does not undertake that a Day Letter shall be delivered on the day of its date absolutely, and at all events; but that the Company's obligation in this respect is subject to the condition that there shall remain sufficient time for the transmission and delivery of such Day Letter on the day of its date during regular office hours, subject to the priority of the transmission of regular telegrams under the conditions named above.

NIGHT LETTERS

Accepted up to 2:00 A.M. for delivery on the morning of the ensuing business day, at rates still lower than standard night message rates, as follows: The standard telegram rate for 10 words shall be charged for the transmission of 50 words or less, and one-fifth of such standard telegram rate for 10 words shall be charged for each additional 10 words or less.

SPECIAL TERMS APPLYING TO NIGHT LETTERS:

In further consideration of the reduced rates for this special Night Letter service, the following special terms in addition to those enumerated above are hereby agreed to:

Night Letters may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such Night Letters at destination, postage prepaid.

FULL RATE CABLES

An expedited service throughout. Code language permitted.

DEFERRED HALF-RATE CABLES

Half-rate messages are subject to being deferred in favor of full rate messages for not exceeding 24 hours. Must be written in plain language.

CABLE NIGHT LETTERS

An overnight service for plain language communications, at one-third the full rate, or less. Minimum of 25 words charged for. Subject to delivery at the convenience of the Company within 24 hours.

SHIP RADIOGRAMS

A service to and from ships at sea, in all parts of the world. Plain language or code language may be used.

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable sign above or preceding the address.

WESTERN UNION

R. B. WHITE
PRESIDENT

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

J. C. WILLEVER
FIRST VICE-PRESIDENT

SIGNS

DL = Day Letter
NM = Night Message
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

The filing time as shown in the date line on full-rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

Received at

SW302 58 NL=PASADENA CALIF 23

DR MAX MASON, PRESIDENT ROCKEFELLER FOUNDATION=
ROCKEFELLER CENTER NYK=

MINUTES IN TRANSIT

FULL-RATE DAY LETTER

THANKS FOR LETTER AND TELEGRAM KINDLY ADD TEN THOUSAND TO
BUDGET UNDER ITEM FOUR AND WIRE ME WHETHER YOU DISCUSSED
TWELVE THOUSAND HONORARIUM WITH MCDOWELL WHO ARRIVES HERE
TOMORROW THIS IS HIGHEST SALARY PAID TO ANYONE BY INSTITUTE
AND WE HAD HOPED THAT EIGHT THOUSAND PLUS TRAVELLING
EXPENSES MIGHT SUFFICE HOWEVER WE WILL OF COURSE FOLLOW
YOUR ADVICE=

GEORGE E HALE.

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

NYTC NOV 24 AM 1 11

1103.1
1228 A

Charge to the account of Rockefeller Foundation
49 West 49th Street

\$

CLASS OF SERVICE DESIRED	
DOMESTIC	CABLE
TELEGRAM	FULL RATE
DAY LETTER	DEFERRED
NIGHT MESSAGE	NIGHT LETTER
NIGHT LETTER	SHIP RADIOGRAM

Patrons should check class of service desired; otherwise message will be transmitted as a full-rate communication.

WESTERN UNION

R. B. WHITE
PRESIDENT

NEWCOMB CARLTON
CHAIRMAN OF THE BOARD

J. C. WILLEVER
FIRST VICE-PRESIDENT

CHECK
ACCT'G INFMN.
TIME FILED

Send the following message, subject to the terms on back hereof, which are hereby agreed to

November 26, 1934.

DR GEORGE E HALE
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA CALIFORNIA

Approved by T A
D H R

DISCUSSED GENERALITIES WITH MCDOWELL NO DEFINITE FIGURE NAMED STOP HAVE
DISCUSSED HERE AGAIN AFTER YOUR WIRE STOP WE FEEL NO NECESSARY PARALLEL
SALARY REGULAR STAFF MEMBER INSTITUTE AND HONORARIUM SHORT TIME SERVICE TAKING
MAN OUT OF NORMAL COURSE STOP WE STILL FEEL AS LETTER INDICATED
APPRECIABLY LESS UNFORTUNATE SOMEWHAT LESS POSSIBLE BUT BELIEVE PRECEDENT LAND
HAS WEIGHT

MAX MASON

WESTERN UNION GIFT ORDERS SOLVE THE PERPLEXING QUESTION OF WHAT TO GIVE.

ALL MESSAGES TAKEN BY THIS COMPANY ARE SUBJECT TO THE FOLLOWING TERMS:

To guard against mistakes or delays, the sender of a message should order it repeated, that is, telegraphed back to the originating office for comparison. For this, one-half the unrepeatable message rate is charged in addition. Unless otherwise indicated on its face, this is an unrepeatable message and paid for as such, in consideration whereof it is agreed between the sender of the message and this company as follows:

1. The company shall not be liable for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the unrepeatable-message rate beyond the sum of five hundred dollars; nor for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the repeated-message rate beyond the sum of five thousand dollars, *unless specially valued*; nor in any case for delays arising from unavoidable interruption in the working of its lines; nor for errors in cipher or obscure messages.

2. In any event the company shall not be liable for damages for mistakes or delays in the transmission or delivery, or for the non-delivery, of any message, whether caused by the negligence of its servants or otherwise, beyond the sum of five thousand dollars, at which amount each message is deemed to be valued, unless a greater value is stated in writing by the sender thereof at the time the message is tendered for transmission, and unless the repeated-message rate is paid or agreed to be paid, and an additional charge equal to one-tenth of one percent of the amount by which such valuation shall exceed five thousand dollars.

3. The company is hereby made the agent of the sender, without liability, to forward this message over the lines of any other company when necessary to reach its destination.

4. Domestic messages and incoming cable messages will be delivered free within one-half mile of the company's office in towns of 5,000 population or less, and within one mile of such office in other cities or towns. Beyond these limits the company does not undertake to make delivery, but will, without liability, at the sender's request, as his agent and at his expense, endeavor to contract for him for such delivery at a reasonable price.

5. No responsibility attaches to this company concerning messages until the same are accepted at one of its transmitting offices; and if a message is sent to such office by one of the company's messengers, he acts for that purpose as the agent of the sender.

6. The company will not be liable for damages or statutory penalties in any case where the claim is not presented in writing within sixty days after the message is filed with the company for transmission.

7. It is agreed that in any action by the company to recover the tolls for any message or messages the prompt and correct transmission and delivery thereof shall be presumed, subject to rebuttal by competent evidence.

8. Special terms governing the transmission of messages according to their classes, as enumerated below, shall apply to messages in each of such respective classes in addition to all the foregoing terms.

9. No employee of the company is authorized to vary the foregoing.

THE WESTERN UNION TELEGRAPH COMPANY

INCORPORATED

R. B. WHITE, PRESIDENT

CLASSES OF SERVICE

TELEGRAMS

A full-rate expedited service.

NIGHT MESSAGES

Accepted up to 2:00 A.M. at reduced rates to be sent during the night and delivered not earlier than the morning of the ensuing business day.

Night Messages may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such night messages at destination, postage prepaid.

DAY LETTERS

A deferred day service at rates lower than the standard telegram rates as follows: One and one-half times the standard night letter rate for the transmission of 50 words or less and one-fifth of the initial rates for each additional 10 words or less.

SPECIAL TERMS APPLYING TO DAY LETTERS:

In further consideration of the reduced rate for this special Day Letter service, the following special terms in addition to those enumerated above are hereby agreed to:

A. Day Letters may be forwarded by the Telegraph Company as a deferred service and the transmission and delivery of such Day Letters is, in all respects, subordinate to the priority of transmission and delivery of regular telegrams.

B. This Day Letter is received subject to the express understanding and agreement that the Company does not undertake that a Day Letter shall be delivered on the day of its date absolutely, and at all events; but that the Company's obligation in this respect is subject to the condition that there shall remain sufficient time for the transmission and delivery of such Day Letter on the day of its date during regular office hours, subject to the priority of the transmission of regular telegrams under the conditions named above.

NIGHT LETTERS

Accepted up to 2:00 A.M. for delivery on the morning of the ensuing business day, at rates still lower than standard night message rates, as follows: The standard telegram rate for 10 words shall be charged for the transmission of 50 words or less, and one-fifth of such standard telegram rate for 10 words shall be charged for each additional 10 words or less.

SPECIAL TERMS APPLYING TO NIGHT LETTERS:

In further consideration of the reduced rates for this special Night Letter service, the following special terms in addition to those enumerated above are hereby agreed to:

Night Letters may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such Night Letters at destination, postage prepaid.

FULL RATE CABLES

An expedited service throughout. Code language permitted.

DEFERRED HALF-RATE CABLES

Half-rate messages are subject to being deferred in favor of full rate messages for not exceeding 24 hours. Must be written in plain language.

CABLE NIGHT LETTERS

An overnight service for plain language communications, at one-third the full rate, or less. Minimum of 25 words charged for. Subject to delivery at the convenience of the Company within 24 hours.

SHIP RADIOGRAMS

A service to and from ships at sea, in all parts of the world. Plain language or code language may be used.

DEC 18 1934

1103.1

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

ASTROPHYSICAL OBSERVATORY

November 26, 1934

Dr. Max Mason
President Rockefeller Foundation
Rockefeller Center
New York.

Dear Mason:

NOV 28 1934

m m			m m	12/5

Many thanks for your letter and two telegrams, the second of which has just arrived.

McDowell arrived Saturday, and is lodged at the Athenaeum. I am quite as much delighted with your inspiration in suggesting him as I was in New York, and we all feel that this is the best possible solution of our problem. I hope that my telegram gave you no other impression, but we have tried to keep our expenses as low as we could, and as salaries have been reduced in all branches of the Institute we feared that a sum much higher than we discussed in New York (\$2000 plus his regular Navy pay) might become generally known, and cause discontent among some members of the faculty.

However, we recognize, as you do, that the cases are not parallel, and that payments for short-time service, in a field where commercial salaries have also to be considered, should be on a suitable scale. We are grateful for your advice, and I am sure we can make a perfectly satisfactory arrangement with McDowell. I did not discuss the question with him on Saturday, when he and Anderson and I mapped out a preliminary plan of procedure, but I will see him again in a day or two and make sure that he is fully satisfied.

McDowell is a splendid fellow and it will be a great pleasure to work with him. He is now studying the various preliminary designs, preparatory to a trip to Palomar on Friday, when the specifications for a suitable road up the mountain will be discussed with the San Diego County authorities. As they have agreed to build the road, the combined cost of road and site will be far below what it was at Mount Wilson, where we had to build our own road.

I thoroughly enjoyed our discussions in New York, and am glad that you could spare the necessary time. The contrast between my experiences with you and some other experiences I have had (not here) is certainly striking.

Please give my best regards to Arnett and Weaver, and believe me, as ever,

Yours very cordially,

G. E. Hale

GEH:G

DEC 18 1934

1103.1

WW		WW
TA		Ja

November 20, 1934.

Dear Hale:

I have been very busy since you left and have been a great deal away from New York, and have not had the opportunity of consulting with others of our group until recently, so I have not been able to write sooner regarding your request that I suggest a salary for McDowell.

In the first place, let me say that we are all delighted with the way the situation has turned out, which is far better with McDowell on leave. I went into the financial implications of his retirement at this time, and they were very heavy. If we had tried to reimburse him for the potential loss under retirement at a more advanced stage it would have run into very heavy figures.

The more we have thought over and talked over the situation the more it has seemed highly desirable that the salary of McDowell reflect the importance of the project and particularly of McDowell's place in the project, though we would wish to avoid getting into the high price commercial atmosphere. I was able to find out just to-day what was done in the case of a Navy man of similar rank - Admiral Land - who, when a Captain was given leave of absence by the Navy and took on the work for the Daniel Guggenheim Fund for the Promotion of Aeronautics for about eighteen months. It seems to me that the situations are about comparable, and it turns out that the amount, \$12,000, which was arranged as his salary, in addition to his Navy pay, was just about what Arnett, Weaver and I had thought fitting for these circumstances. McDowell will

receive \$3,000 from the Navy. This is half of basic pay, the commutation which Navy officers enjoy not being allowed when leave of absence on half pay has been granted. This is a higher amount, totaling \$15,000, than I had at first thought of. It is, however, less than one of the others of our group thought desirable, although all of us feel it is about right. Of course it goes without saying that this is a matter for determination by your group, and we are merely giving you this feeling on our part because you asked for it.

I had a talk with McDowell recently in Philadelphia, and am very much pleased with the way he is analyzing the situation.

I hope you had a good trip back and are feeling in good shape. It takes a long time for the benefit of operations to show themselves clearly, but this is bound to come, and I know how great a help it will be to you.

With cordial greetings,

Sincerely yours,

MAX MASON

Dr. George E. Hale,
California Institute of
Technology,
Pasadena, California.

MM:AEB

DEC 20 1934

JAN 24 1935

1103.1

CORNING GLASS WORKS

CORNING, NEW YORK



SALES DEPARTMENT

J. L. PEDEN
DIRECTOR OF SALES

EXECUTIVE COMMITTEE

ALANSON B. HOUGHTON
ALEXANDER D. FALCK
GEORGE B. HOLLISTER

December 5, 1934.

Dr. Warren Weaver,
Rockefeller Foundation,
Rockefeller Center,
49 W. 49th Street,
New York, N. Y.

ww	DEC 5 1934	ww	12-7

My dear Warren:

As you undoubtedly have read in the newspapers by this time the pouring of the 200" disc was successful.

Dr. Pease had a good opportunity to look it over before it was placed in the annealer and he was enthusiastic over it.

After it was installed in the annealer McCauley's method is to let it sink to an approximate temperature of 450 degrees then slowly bring it up in temperature to about 530 degrees and let it soak at this temperature for at least six weeks. Then will start the long cooling period.

Modifications which Dr. McCauley made in mould design were entirely successful and none of the cores were displaced by the pouring operation.

We all regret at Corning that you were not able to be present at the successful combination of this work.

Very truly yours,

CORNING GLASS WORKS
Aviation and Optical Div.
By

O.A. Gage.

In Charge.

OAG:JFM

JAN 24 1935

CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA

DEC 21 1934

1103.1

ASTROPHYSICAL OBSERVATORY

December 5, 1934

Dr. Max Mason
President Rockefeller Foundation
Rockefeller Center
New York.

Dear Mason:

MM	DEC-7 34	1717	148
TA		3a	
WFO			

I could not get a meeting of the Observatory Council until last Saturday, as Adams was at work on Mount Wilson. However, we voted unanimously to give McDowell a salary of \$12,000, with the title of Supervising Engineer for the 200-inch Telescope. He has been busily engaged on his work here, and everyone is pleased with him. I am confident, thanks to you, that we have found an ideal solution of our problem.

McDowell may be able to go east by Christmas time, to consult several engineers and collect information on all phases of the work. He will then give you a report on the whole situation.

The successful casting of the 200-inch mirror is good news. We also have the promise of an excellent road up Mount Palomar at no expense to us. The cost of land for the site amounts thus far to \$13,400 for 280 acres. We are negotiating for some neighboring land in order to assure adequate protection.

With our best wishes for Christmas and the New Year,

Yours ever,

George E. Hale

GEH:G

JAN 24 1935

TA	DEC 11 '34	sa
ww	DEC 18 '34	ww
FBH		FBH

December 8, 1934.

DEC 21 1934

Dear Hale:

I was very glad to get your letter of
 December 5th, and hope that the addition of
 McDowell's services to the project will prove to
 be what we all expect. It will be most in-
 teresting to see him when he comes east.

Cordially yours,

MAX MASON

Dr. George E. Hale,
 California Institute of
 Technology,
 Pasadena, California.

MM:AEB

DEC 20 1934

200

1103.1

FBH		FBH

JAN 24 1935

December 7, 1934

Dear Mr. Gage:

I very much appreciated your telegram on Sunday afternoon, with the good news that the pouring was successful. The telegram arrived so early in the afternoon that I could hardly believe that the pouring had been completed, although I felt very sure that no one of you would have sent such a message until it was clear that everything was all right.

In several newspaper articles which I have seen the announcement of the successful pouring has been coupled with an announcement that the disc originally poured has just now proved to be useful. It is not clear to me what this statement means. If the present estimate of the usefulness of the original disc differs materially from the view held several months ago, I would be glad to have this information. I suspect that the question is not a very significant one, but I ask it largely because some of the Trustees of our Boards will undoubtedly have seen the newspaper statement and may ask me what it means. We are to have our General Education Board and Rockefeller Foundation Trustees Meetings next week, so that a prompt reply would be helpful to me. Will you please address me at The Raleigh Tavern, Williamsburg, Virginia, where our meetings are to be held on Tuesday, Wednesday and Thursday.

Very cordially,

Mr. O.A.Gage
 Corning Glass Works
 Corning, New York
 WW:PH

WARREN WEAVER

DEC 14 1934

1103.1

2408 MASSACHUSETTS AVENUE, N.W. 10 34
WASHINGTON, D.C.

December 8, 1934

My dear Dr. Mason:

I am greatly obliged to you for your letter of December 5th telling me that Captain C. S. McDowell has been secured as a coordinator and entrepreneur in connection with the mounting of the new telescope. This gives me just the information which will be helpful to Dr. Ritchey's friend. As they are both connected with the Navy there will be no difficulty of Dr. Ritchey getting in touch with him.

Again thanking you for your kindness in this matter, I am

Sincerely yours,

Dr. Max Mason
The Rockefeller Foundation
49 West 49th Street
New York City

Carson Diefel Storer

APS:m

DEC 14 1934

1103.1

		NSA

December 5, 1934.

Dear Dr. Stokes:

The Observatory Council at the California Institute of Technology has engaged Captain C. S. McDowell for services in connection with the mounting of the new telescope. He has been granted a leave of absence by the Navy for the purpose.

Captain McDowell was chosen as a coordinator and entrepreneur, because of his general engineering ability and long experience in the Navy with managing involved construction projects, and as a man who had a thorough knowledge of the manufacturing possibilities in the United States. He is not of course a telescope designer, and will play no role in this except in the manner above indicated.

I believe Captain McDowell is already in the West, and I think could be addressed at the California Institute of Technology.

Sincerely yours,

MAX MASON

Dr. Anson Phelps Stokes,
2408 Massachusetts Avenue, N.W.,
Washington, D.C.

1103.1

NOLOGY	12/17	1/2/3
December 12, 1934		

GEH:G

DEC 18 1934

1103.1

WW FBH T A	DEC 14 '34	WW FBH JW
DEC 18 34	DEC 18 34	✓

December 5, 1934.

Dear Hale:

The news from Corning sounds fine, and, as in every other stage successfully passed in this great project, I feel like wiring you my congratulations at the rapid progress which is being made.

I wired you as I knew you desired our opinions here as individuals exactly as they were held, knowing that you would place no undue weight upon it, and that you would know that we here would be perfectly happy with any arrangement made with McDowell. I was really surprised myself to find how definitely after a number of days the figure named seemed to be indicated, and again surprised, when I had reached this conclusion, to get the independent judgments of Arnett and Weaver, and find that they were effectively the same. That does not mean that we are the best judges in any way, and it may well be that we have shot too high in our estimation. At any rate we are all very happy over the situation.

I think it would pay to have some of your group investigate the automatic curve following mechanisms which have been studied and produced at the Massachusetts Institute of Technology, largely I believe under the inspiration of Bush. Bush was here recently, and we talked briefly on the possibility of automatic following for the large telescope. Bush thought

this to be completely feasible and expressed his conviction that it would be found more accurate than manual control. He thought the problem of telescope following was not as difficult as the ones which they have solved.

I have noticed an article by one of their group on the "Theory of Servo-Mechanisms", in the Journal of the Franklin Institute, September, 1934, by Hazen, which contains a good bibliography.

Weaver, who has seen the instruments at Tech., is profoundly impressed by the ability of the group, and sees no reason why an automatic device should not be perfectly feasible. I am sure that Bush would be very willing to discuss the matter in detail.

With cordial greetings,

Sincerely yours,

Dr. George E. Hale,
Astrophysical Observatory,
California Institute of
Technology,
Pasadena, California.

MM:AEB

DEC 21 1934

1103.1

GJB	mail	PN
AGK		all
MPN.		mx

December 19, 1934.

My dear Dr. Hale:

At a meeting of the Executive Committee of the General Education Board held December 13, 1934, the officers presented your letter of October 12, 1934, submitted on behalf of the Observatory Council of the California Institute of Technology, requesting the release of funds for the Astrophysical Observatory for the period from January 1 to December 31, 1935. The Committee observed that the budget for this year would require approximately \$226,600, which, after deducting the balance on hand of \$98,252.67 from previous allocation, leaves \$128,347.33 to be provided for.

I have the honor to inform you that the Committee acted favorably on your request and released to the Board of Trustees of the California Institute of Technology a further sum of \$128,347.33, or as much thereof as may be needed, for this undertaking.

The Auditor will make arrangements for payment.

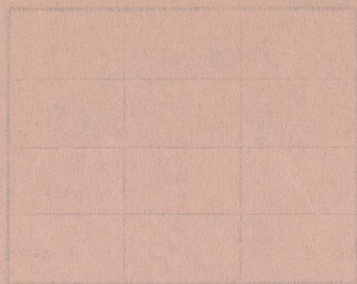
A copy of this letter is being sent to Dr. Millikan for his information.

Sincerely yours,

Dr. George E. Hale,
Chairman of the Observatory Council,
California Institute of Technology,
Pasadena, California.

W. W. BRIERLEY

WWB/GMC



THE
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