J. C. Bose

ON THE DETERMINATION OF THE

Wave Length of Electric Radiation

BY DIFFRACTION GRATING.

By Jagadis Chunder Bose, M. A. (Cantab.), B. Sc. (Lond.),

Professor of Physical Science, Presidency College, Calcutta.

ON THE DETERMINATION OF THE WAVE LENGTH OF ELECTRIC RADIATION BY DIFFRACTION GRATING.

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While engaged in the determination of the Indices of Refraction of various substances for the Electric Ray (*Vide* Proceedings of the Royal Society, Vol. 59, p. 160), it seemed to me that the results obtained would be rendered more definite if the wave length of the radiation could at the same time be specified. Assuming the relation between the dielectric constant K and the index μ as indicated by Maxwell, to hold good in all cases, it would follow that the index could be deduced from the dielectric constant and *vice versâ*. The values of K found for the same substance by different observers are however found not to agree very well with each other. This may, to a certain extent, be due to the different rates of alternation of the field to which the dielectrics were subjected. It has been found in general that the value of K is higher for slower rates of alternation and the deduced value of μ would therefore be higher for slow oscillations, the longer waves being thus the more refrangible. The order of refrangibilities would in such a case appear to be somewhat analogous to that in an anomalously dispersive medium like iodine vapour.

With exceedingly quick ethereal vibrations which give rise to light, there is an inversion of the above state of things, *i.e.*, the shorter waves are generally found to be the more refrangible. It would thus appear that there is a neutral vibration region at which this inversion takes place, and where a transparent medium produces no dispersion.

It would be interesting to be able to determine the indices of refraction corresponding to different wave lengths, chosen as widely apart as possible, and plot a curve of refrangibilities. A curve could thus be obtained for rock salt, which is very transparent to luminous and obscure radiations, and fairly so to electric radiation. Carbon bisulphide, which is very transparent to all but the ultra-violet radiation, would also be a good substance for experiment.

For the construction of a curve of refrangibility for electric rays, having different vibration frequencies, the indices could be determined by the method of total reflection referred to above. The determination of the corresponding wave lengths, however, offers great difficulties. Hertz used the interference method for this purpose. The positions of nodes and loops of stationary undulation produced by perpendicular reflection were determined by means of tuned circular resonators.

Sarasin and De la Rive subsequently repeated these experiments with different sized vibrators and resonators. They found that the apparent wave length depended solely on the size of the resonators. The wave length found was approximately equal to eight times the diameter of the circular resonator. From these experiments it was supposed that the radiator emitted a continuous spectrum consisting of waves of different lengths, and that the different receivers simply resonated to vibrations with which they happened to be in tune. If this supposition be true the emitted radiation should, by the action of a prism, or better still, a diffraction grating, spread out in the form of a more or less continuous spectrum. If, on the contrary, the radiation is monochromatic, the spectrum should be linear. The experiments to be described below may throw some light on this question.

Professor J. J. Thomson, referring to the above case, is of opinion that the hypothesis of a continuous spectrum is highly improbable. It is more likely that owing to the oscillation being of a dead-beat character, the resonator is set in vibration by the impact of incident electric waves. Each resonator vibrating at its particular free period, measures its own wave length. There is however one difficulty in reconciling the theoretical value with that actually obtained. According to theory, the wave length should be equal to twice the circumference or $2\ \pi$ times the diameter of the circular resonator. The value actually obtained by Messrs. Sarasin and De la Rive is, as has been said before, eight times the diameter of the circle.

Rubens, using a bolometer and Lecher's modification of the slide bridge, determined the nodes and loops in a secondary circuit in which stationary electric waves were produced. A curve obtained by representing the bolometer deflections as ordinates and the distances of the bridge from one end as abscissæ, shows the harmonic character of the electric disturbance in the wire. It was found that the wave length obtained by this method did not depend on the period of the primary vibrator; the wave length measured was merely that of the free vibration started *in the secondary circuit* by the primary disturbance.

Hertz's method is therefore the only one for the measurement of electric waves in air, and the result obtained by this method is vitiated by the influence of the periodicity of the resonator. It was therefore thought desirable to obtain the wave length of electric radiation in free space, by a method unaffected by any peculiarity of the receiver.

I have succeeded in determining the wave length of electric radiation by the use of curved gratings and the results obtained seem to be possessed of a considerable degree of accuracy. Rowland's method of using the curved grating for obtaining diffraction light spectra was also found well suited

for the production of pure spectra of electric radiation. The focal curve *f* in this arrangement is a circle, having as a diameter the straight line joining the centre of curvature C with the apex M of the grating.

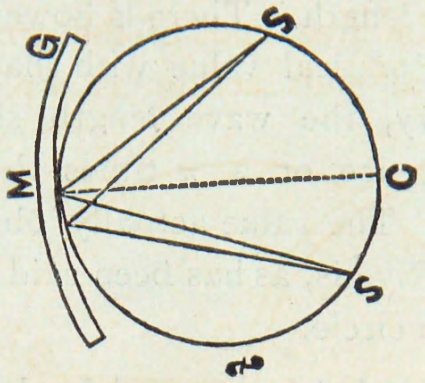

Fig. 1 G the Grating; M, its apex ; f. the focal curve.

A source of radiation situated on this curve will give a diffracted spectrum, situated on the same curve defined by the equation.

$$(a+b)\,(\text{Sin } i \overset{+}{-} \text{Sin } \theta) = n\lambda.$$

where $a+b$ is the sum of breadths of strip and space in the grating, i = angle of incidence, θ = angle of diffraction. The sign of θ is taken positive when it lies on the same side of the normal as the incident radiation.

In the above equation there are two interesting cases :—

(1) When the receiver is placed at C, $\theta = 0^\circ$

$$(a+b)\,\text{Sin } i = n\lambda$$

(2) When the deviation is minimum $i = \theta$

$$2\,(a+b)\,\text{Sin } i = n\lambda$$

Arrangement of the apparatus.

On a wooden table, the grating, which is cylindrical, is placed vertically, with its centre at C, occupied in the diagram by the spiral spring coherer S. With the radius, which joins the centre to the apex of the grating, as a diameter, a circle is engraved on the table—the focal curve—on which the radiator and the receiver are always kept. A pin is fixed immediately below the apex, and a graduated ring sunk in the table with this pin as the centre. The graduated circle is used for

he measurement of the angles of incidence and diffraction. Two radial arms revolving round the pin carry the radiator and the receiver. The ends of the arms near the pin have narrow slits through which the pin projects. The slits allow the necessary sliding for placing the radiator and the receiver on the focal curve. It would be better to have the sliding arrangement at the free ends of the arms, the pin passing through the central ends acting as a pivot. The circle is

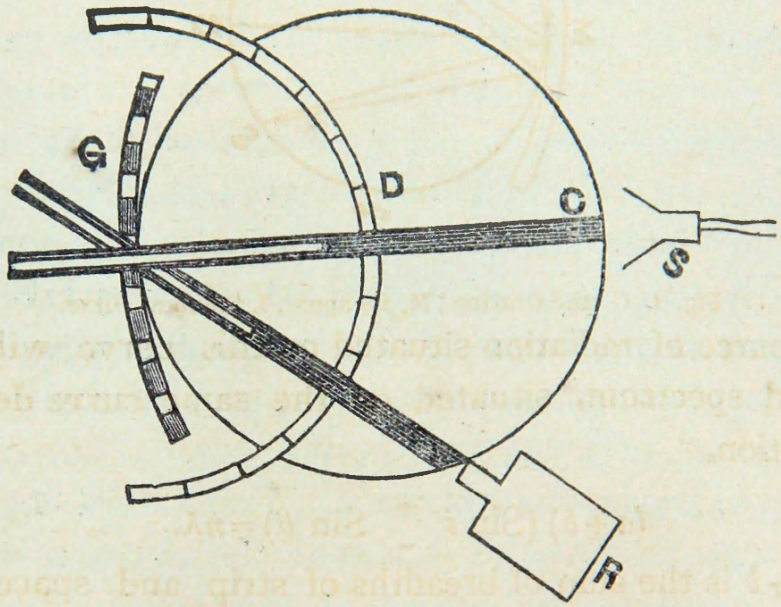

Fig. 2. The Radiator R, and the Receiver S. revolve round a pivot vertically below the apex of the Greating, along the focal curve. The angles are measured by the graduated circle D.

graduated into degrees, but one-fourth of a degree may be estimated.

Description of the Apparatus.

The Radiator.—Electric oscillation is produced between two metallic beads and an interposed sphere ·78 c.m. in diameter. The beads and the interposed sphere were at first thickly coated with gold, and the surface highly polished. This worked satisfactorily for a time, but after long continued action, the surface of the ball became roughened, and the discharge ceased to be oscillatory. After some difficulty in obtaining the requisite high temperature, I succeeded in casting a solid ball and two beads of platinum. There is now no difficulty in obtaining an oscillatory discharge, and the ball does not require so much looking after.

As an electric generator, I at first used a small Ruhmkorff's coil, actuated by a battery. I however soon found that the usual vibrating arrangement is a source of trouble; the contact points soon get worn out, and the break becomes irregular. The oscillation produced by a single break is quite sufficient for a single experiment, and it is a mere waste to have a series of useless oscillations. But the most serious objection to the continuous production of secondary sparks is their deteriorating action on the spark balls. Anyone who has tried to obtain an oscillatory discharge, knows how easily the discharge becomes irregular, and the most fruitful source of trouble is often traced to the disintegration of the sparking surface. In my later apparatus I have discarded the use of the vibrating interrupter. The coil has also been somewhat modified. A long strip of paraffined paper is taken, and tin foil pasted on opposite sides; this long roll is wound round the secondary to act as a condenser, and appropriate connections made with the interrupting key. This arrangement secures a great saving of space. Two jointed electrodes carry the two beads at their ends; the distance between the beads and the interposed ball can thus be adjusted. This is a matter of importance, as the receiver does not

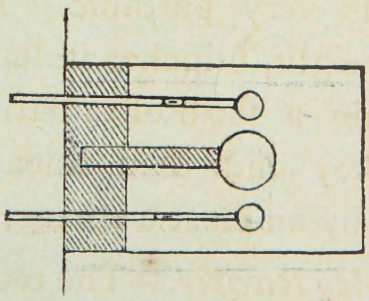

Fig. 3. The Radiator.

properly respond when the spark length is too large. Small sparks are found more effective with the receiver uesd. After a little experience it is possible to tell whether the discharge is oscillatory or not. The effective sparks have a smooth sound, whereas non-oscillatoy discharges give rise to a peculiar cracked sound, and appear jagged in outline.

The wires of the primary coil are in connection with a small storage cell through a tapping key. The coil, a small storage cell and the key are enclosed in a tinned iron box. It must be borne in mind that a magnetic disturbance is produced

each time the primary circuit of the induction coil is made or broken; a sudden variation of the magnetic field disturbs

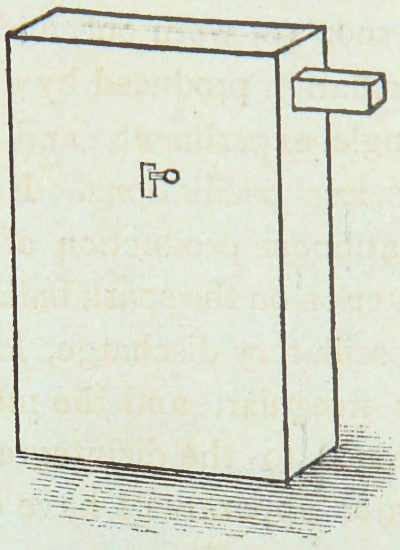

Fig. 4. The Radiating box, one-fifth natural size.

the receiver. The iron box in which the coil is enclosed screens the space outside from magnetic disturbance. On one side of the box there is a narrow slit, through which the stud of the press-key projects. In front of the box is the radiator tube, which may be square or cylindrical. The radiating apparatus used in the following experiments has a square tube, one square inch in section. The apparatus thus constructed is very portable. The one which I often use is 7 inches in height, 6 inches in length, and 4 inches in breadth. To obtain a flash of radiation, it is merely necessary to press the key and then release it. The break is made very sudden by an elastic spring.

The Spiral Spring Receiver.—The receiving circuit consists of a spiral spring coherer in series with a voltaic cell and a dead-beat galvanometer of D'Arsonval type. An account of this form of receiver has already been given (*vide* "On the Indices of Refraction of various substances for the Electric Ray." Proc. Roy. Soc., Vol. 59, p. 163). The receiver is made linear by arranging bits of steel spiral springs side by side, the sensitive surface being 3 m. m. broad and 2 c. m. in length. An electrical current enters along the breadth

of the top spiral and leaves by the lowest spiral, having to traverse the intermediate spirals along the numerous points of contact. The resistance of the receiving circuit is thus almost entirely concentrated at the sensitive contact surface,

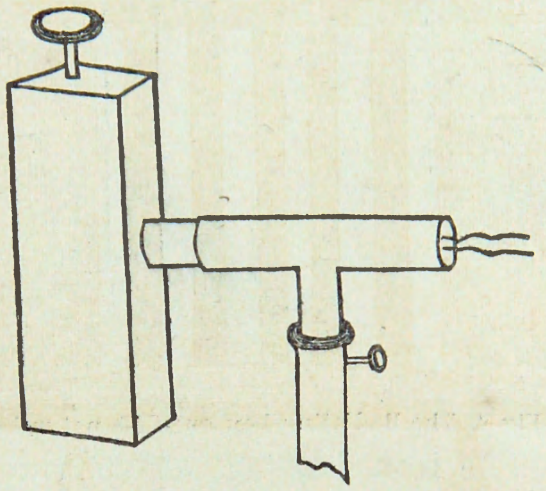

Fig 5. The Spiral Spring Coherer.

there being little useless short circuiting by the mass of the conducting layer. When electric radiation is absorbed by the sensitive surface, there is a sudden diminution of the resistance, and the galvanometer in circuit is violently deflected. By adjusting the electromotive force of the circuit, the sensitiveness of the receiver may be increased to any extent desirable. The receiver at each particular adjustment, responds best to a definite range of vibration lying within about an octave. The same receiver could, however, be made to respond to a different range, by an appropriate change of the electromotive force acting on the circuit. Very careful adjustment of the E. M. F. of the circuit is necessary to make the receiver respond at its best to a particular range of electric vibration.

The Cylindrical Grating.—The source of radiation—the spark gap—being a line, the curved diffraction grating is

made cylindrical. The spark gap is always kept vertical; the grating is made of equi-distant metallic strips, which are vertical and parallel. A piece of thin sheet ebonite is bent in the shape of a portion of a cylinder and

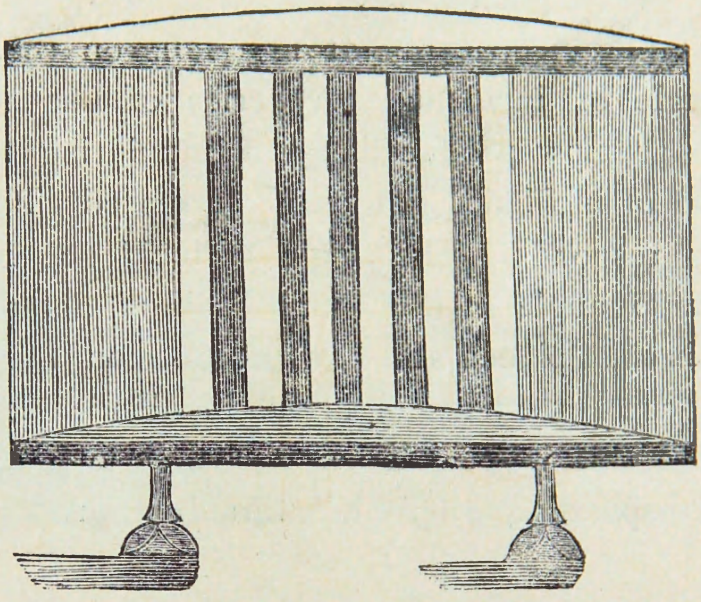

Fig. 6. The Cylindrical Diffraction Grating.

kept in that shape by screwing against upper and lower circular guide pieces of wood. Against the concave side of the ebonite are stuck strips of rather thick tin-foil at equal intervals. Five different gratings were thus made with strips or spaces equal to 3 c. m.; 2·5 c. m.; 2 c.m.; 1·5 c.m., and 1 c.m., respectively.

The diameter of the cylindrical grating is 100 c.m. It would perhaps have been better to use a grating with a less curvature, but it must be remembered that the intensity of radiation is very feeble, and I was apprehensive of the receiver failing to respond when placed at too great a distance. I find from the sensibility of the receiver used, that it would be possible to increase the diameter of the cylinder to about 150 c.m., and this size I intend to use in the construction of my next grating. The aperture of the grating is in the following experiments reduced to the smallest practicable limit.

Account of the Experiments.

The receiver being placed at a suitable position on the focal curve, the radiator is moved about on the same curve till the diffracted rays falling on the receiver produce response in the galvanometer. The procedure adopted is as follows. The receiver is placed, say, at the centre of the grating ($\theta = 0°$). The electric ray at first falls on the grating at a large angle of incidence. A series of flashes of electric radiation are now produced by manipulating the key, and the angle of incidence gradually decreased till the receiver suddenly responds. The angle of incidence corresponding to the zero angle of diffraction is thus determined. The receiver is then placed at a new position on the focal curve, and the corresponding angle of incidence determined as before. In this way a series of angles of incidence, with their corresponding angles of diffraction, are found for each grating.

It should be remarked here that numerous difficulties were encountered in carrying out the experiments. The reflections from the walls of the room, from the table, &c., were at first sources of considerable trouble. By taking special care, I succeeded in eliminating these disturbances. The radiating balls were placed about 1 c. m. inside the square tube. This prevented the lateral waves acting on the receiver. The receiver was provided with a guard tube, which stopped all but the diffracted radiation reaching the sensitive surface. The insulated wires from the ends of the receiver were protected by thick coatings of tin-foil, and led to the galvanometer, which was placed at a considerable distance. The cell and the galvanometer were enclosed in a metallic case with a narrow slit for the passage of light reflected from the galvanometer.

In spite of all these precautions, I was baffled for more than six months by some unknown cause of disturbance, which I could not for a long time account for. It was only recently, when nearly convinced of the futality of further

perseverance, that I discovered the usual mistake in supposing tolerably thick sheets of tinned iron to be perfectly opaque to electric radiation. The metal box which contains the radiating apparatus, does transmit a small amount of radiation through its walls, and if the receiver happens to be in a very sensitive condition, it responds to the feeble transmitted radiation. I then made a second metallic cover for the radiating box, which precaution was found effective, provided the receiver was not brought very close to the radiator. The receiver is still affected if placed *immediately above* the radiator tube, though two metallic sheets be intervening. For this reason I have to postpone taking the reading for minimum deviation till I had made a radiation-proof box. A soft iron box (to prevent magnetic leakage), enclosed in a second enclosure of thick copper, would, I expect, be found impervious to electric radiation.

With the second protective enclosure, all the difficulties were practically removed. As a test for the absence of all disturbing causes, I observed whether the receiver remained unaffected when the grating was "off." There is a further test for the absence of external disturbances. The response, if only due to the diffracted beam, depends on the position of the radiatior on the focal curve. If this angle of incidence is decreased, there should then be no action on the receiver. I found the positions of the radiator on the focal curve producing action on the receiver, to be well defined, and I experienced no further disturbance due to stray radiations.

The grating is fixed vertically on the table, so that its centre is at the same height as that of the middle of the receiving and radiating tubes. A small mirror is fixed at the middle of the central strip. The observer, placing his eye at the same height as that of the radiator, levels the grating till the image of the eye is seen reflected by the mirror.

I first obtained an approximate value of the wave length with a 2 c. m grating, and then took careful and systematic readings with the different gratings. By different gratings is meant the same curved piece of ebonite, on which strips of different breadths were successively applied. The grating was found fairly adjusted, and the readings taken on the right side of the grating agreed well with the corresponding ones on the left side. I did not, therefore, think it necessary to take double readings, but took the various readings alternately on the right and on the left side. In one case only I found the grating on one side giving slightly better reading than the other. When the incident angle is too oblique, the diffracted image is not sharp, and I therefore did not extend the reading above 40° of incidence. Spectra of the first order only were observed. The response in the receiving circuit was fairly strong, when 1 c. m or 1·5 c. m. grating was used. But a 2 c. m. grating gave stronger indications. With 2·5 and 3 c. m. gratings the definition of the spectrum was beyond anything I couldexpect. The diffracted images were very sharply defined. For example, when the receiver was kept fixed, and the angle of incidence gradually varied, there was an abrupt and strong response produced in the receiving circuit, as soon as the angle of incidence attained the proper value A slight variation of this angle, even of less than quarter of a degree, produced displacement of the diffracted image, and there was then no further action on the receiver. Had my graduated circle permitted it, I could have got more accurate readings. The radial arms carrying the receiver and radiator were of too primitive a design to make it worth while to attempt greater accuracy. I give below the readings of the angles of incidence and the corresponding angles of diffraction obtained with the different gratings, and the wave length deduced from them.

GRATING A.—BREADTH OF STRIP = 1 c.m.

i	θ	λ	Mean λ for A.
38°	18°	1·849	1·843
35°	20°	1·831	
37°	19°	1·854	
38·75°	17°	1·837	

GRATING B.—BREADTH OF STRIP = 1·5 c.m.

i	θ	λ	Mean for B.
38°	0°	1·847	1·844
26°	10°	1·836	
28·5°	8°	1·849	

GRATING C.—BREADTH OF STRIP = 2 c.m.

i	θ	λ	Mean for C.
27°5°	0°	1·846	1·849
22°	5°	1·847	
20°	7°	1·855	

GRATING D.—BREADTH OF STRIP = 2·5 c.m.

i	θ	λ	Mean for D.
21·5°	0°	1·832	1·845
29·5°	−7°	1·852	
33°	−10°	1·854	
34°	−11°	1·841	

GRATING E.—BREADTH OF STRIP = 3 c.m.

i	θ	λ	Mean for E.
18°	0°	1·854	1·848
23·25°	−5°	1·845	
25·5°	−7°	1·851	
31°	−12°	1·843	

It would thus be seen that the different values of wave length obtained from the above experiments are very concordant, the mean value being 1·846 c.m.

I then carefully removed the electrical vibrator and measured approximately the size of the sparking balls. The radiator, it must be remembered, was placed vertically, inside a square tube, each of whose side is 2·5 c.m. The radiator was about 1 c.m. inside from the free end of the tube.

The diameter of the central ball = ·78 c.m.
„ each side bead = ·3 „

Distance between the outer surfaces of the beads = 1·5 c.m.
„ „ inner (sparking) surfaces „ = ·9 „

The wave length, 1·84, is almost exactly equal to twice the distance between the sparking surfaces of the beads. Without further experiments with different sized radiators, it is difficult to say whether the above simple relation is accidental or not. The following rough determinations made with a second radiator may be of same interest in connection with the above. I took off the central sphere from the radiator used in the last experiment, and substituted a larger ball. The distance between the inner sparking surfaces is then 1·2 c.m.

BREADTH OF STRIP = 3 c.m.

i	θ	λ	Mean
23°	0°	2·34	
29°	−5°	2·38	2·36
34·5°	−10°	2·36	

The wave length found is approximately equal to 2.36 c.m., and twice the distance between the sparking surfaces is 2·40 c.m.

Conclusion.—The experiments described above seem to prove that the diffracted spectrum is not continuous, but linear. The radiation is mono-chromatic, and gives rise to bright line spectrum. The method of determining the wave length of electric radiation by diffraction grating is seen to give results which are concordant. The determinations are not affected by the periodicity of the receiving circuit, the receiver being simply used as a radioscope. With a better mounting and a finely graduated circle, it would be possi ble to obtain results with a far greater degree of accuracy. I hope to send in a future communication the results obtained with a better form of apparatus, with which I intend to study the relation of the wave length with the size of the radiator, and the influence of the enclosing tube on the wave length. I shall at the same time sen an account of transmission gratings.

PHYSICAL LABORATORY,
PRESIDENCY COLLEGE, CALCUTTA,
The 8th May, 1896.

P. L. Form No. 28H.
[Approved in letter No. 19097, d. 19-10-1908.]

Despatch
14.1.15

No. 1017

Education Department, Bengal.

Received
13/1/15

Calcutta, the 14 January 1915.

THE undermentioned document is forwarded to the

Principal, Presy College, Calcutta, for info. in continuation of this office letter No. 9032 of the 29.4.14.

Flagged "A"

~~for information~~

D.P.I.

P.U.S. Copy of Govt order No 4688 of the 5.12.14.

P Barr 8/12

O.C. 8/12/14

Press—A 447—29-10-1908—32180—60,000

Pv

All Communications to Government should give the Number, Date, and Subject of any previous Correspondence, and be addressed to the Secretary of the Department concerned.

25/51/14

Reply P. 7/12

GOVERNMENT OF BENGAL

GENERAL DEPARTMENT.

Education BRANCH.

Education Department. 25/51.

File No

No in file 4

Date of receipt 5. DEC. 1914

Secretary No. G1326

No. 4688

FROM R. B. Steele, Esq., I. C. S.,

Under-Secretary to the Government of Bengal,

TO

THE Director of Public Instruction, Bengal.

Calcutta . the 5th December 1914.

SIR.

W.P. 7/12

Reg T.

With reference to your letter No. 631, dated the 22nd September 1914, I am directed to say that Government sanction the re-appropriation suggested by you to provide for the second half (Rs.9000/-) of the newly sanctioned research grant of Rs. 18000/- to Dr. J. C. Bose and the usual grant of Rs. 2500/- to him for Scientific research. The charge amounting to Rs.11,500/- should be met as shown below :-

(1) A sum of Rs.6,000/- from the provision for stipends in the current year's Education Budget under the head "Government Schools Special"-"Guru Training Schools"

(2) A sum of Rs. 5,500/- from the lump provision for reforming the system of training in Eastern Bengal under the same head.

I have the honour to be,

Sir,

Your most obedient servant,

R B Steele

Under-Secretary to the Govt. of Bengal.

B. S. Press—17-10-1914—978F—1,000--S. C. R.

2.-3-12-1914.

Public Instruction Form No. 28B.
[Approved in letter No. 16349, d. 3-9-08.]

R.R.	Education Dept. {191 } Bengal.	File number.	
Enclosures.	To D.O. 17/9	Number in File.	7.
Maps or plans.	SUBJECT: Immediate	Issue Number.	631
Spare Copies.		Date of letter.	22/9/14
		Date of despatch.	22/9/14

Reminders issued— 16/9/14

A.

B.

C.

Recd today
Asm
22/9/14

To Budget clerk for note
Asm
22/9/14
Flag

To

THE Secy. Govt
Thro' the A.G. Bengal

SIR,

With ref. to para 3 of your letter no. 1530, dt the 31.3.14, I have the honor to submit herewith, ~~in duplicate~~, a reappn statement, in duplicate, for the second half of newly sanctioned the research grant of Rs. 18,000, ~~to Dr. J.C. Bose~~ stat and for the usual grant of Rs. 2,500 (two thousand five hundred) for Scientific research ~~to Dr. J.C. Bose~~.

I have &c

W.W. 16/9

PC 16/9/14 adm

F. B. Form No. 346.

[Approved in letter No. T.M.—765, d. 25-1-04.]

Re-appropriation Statement to meet additional Charges on account of Research grant ~~in the Office of the~~ to Dr. J. C. Bose of the Presidency College

Major, minor and detailed heads under which the charge falls.	Budget grant for the detailed head under which the charge falls.	Amount of extra charge.	Re-appropriation proposed by the officer making the application out of grants at his disposal.		Re-appropriation proposed by head of department out of grants under his control.			Re-appropriation suggested by Accountant-General.			
			Heads under which savings will be effected.	Amount.	Office or offices in which savings will be effected. (a)	Heads to be reduced.	Amounts.	Major head out of the savings of which the extra charge may be met.	Budget estimate.	Expenditure up to last completed account being for month.	Anticipated savings at the end of the year.
1	2	3	4	5	6	7	8	9	10	11	12
22. Education — 1914-15					Govt. Schools Spl.			There will be savings under these heads sufficient to cover the charge in Erection.			
Govt. Colleges, Genl.					Govt. Training Schools						
Arts Colleges for boys					(1) Stipends	—	6000 — —	(1) Budget Grant	1,92,232	—	—
								Reappn.	11,743	10-0	
Supplies and services					(2) Lump provision for reforming the system of training in E.B.	—	5500 — —	(2) Budget Grant	24,000	—	—
								Reappn.	13,456	4-11	
Grant to Dr. J.C. Bose for Scientific Research —	9000 — —	11500 — —					11.500 — —				

(a) The Controlling Officer may propose re-appropriation either by making an allotment out of the undistributed grants, kept as a reserve in his hands, or by transferring portion of a grant from one office under his control to another, if any savings are anticipated in the former.

Note.—Any further explanation should be given on the reverse, where also, if no re-appropriation is possible, the urgency and necessity for the expenditure should be fully explained.

P. J. Press—A 475—6-10-1909—20624—3,500—639

U. 1658 A.G.

Instruction Form No. 28B.
(Approved in letter No. 16349, d. 3-9-08)

R.R.	Education Dept. {1914} Bengal.	File number.	25/51 pt
Enclosures.	To 3/4	Number in File.	6
Maps or plans.	Subject:	Issue Number.	9032
		Date of letter.	29/4/14
Spare Copies.		Date of despatch.	29/4/14.

Reminders issued—

A.

B.

C.

The under mentioned document is forwarded

with Principal, Presidency College for I & q and for communication to Dr J. C. Bose Professor, Presidency College Calcutta.

W. W.
24/4

A copy of letter no 1693 of 11th April 1914 from the Govt. of Bengal, General Dept. (Education)

22/4/14

Instruction Form No. 28B.
Approved in letter No. 16349, d. 3-9-08.

R.R.	Education Dept. {191 } Bengal.	File number.	
Enclosures.	To S.D. 17/9	Number in File.	7.
Maps or plans.	SUBJECT: Immediate 16/9/14	Issue Number.	631
Spare Copies.		Date of letter.	22/9/14
		Date of despatch.	22/9/14

Reminders issued—
A.
B.
C.

Recd today
Asst
22/9/14

To Budget clerk for note
Asst
22/9/14
Clas

To

THE Secy. Govt
thro' the A.G. Bengal

SIR,

With ref. to para 3 of your letter no. 1530, dt the 31.3.14, I have the honour to submit herewith, ~~in duplicate~~, a reappn statement, in duplicate, for the second half of the newly sanctioned research grant of Rs. 18,000, ~~to Dr. J.C. Bose~~ stet, and for the usual grant of Rs. 2,500 (two thousand five hundred) for Scientific research ~~to Dr. J.C. Bose~~.

I have &c

W.W. 16/9

16/9/14

asst

Public Instruction Form No. 28B.
[Approved in letter No. 16349. d. 3-9-08.]

R R.	Education Dept. 191 Bengal.	File number.	
Enclosures.	To Copied 1873	Number in File.	2
		Issue Number.	6373
Maps or Plans.	SUBJECT: Copy 17/3	Date of letter.	19/3/14
Spare copies.	Urgent	Date of despatch.	19/3/14

Reminders issued—

A.

B.

C.

~~To~~

Copy of THE ~~undermentioned document~~ ~~is forwarded to~~ ~~Dr. J. C. Bose,~~ ~~SIR, C. S. I. C. I. E., Professor of Physics, Presy. College, Calcutta~~ ~~through~~ to the Principal of the Presy. College, Cal. for information and for comment to Dr. J. C. Bose ~~~~

WW 17/3.

~~A. D. P. I.~~
10.3.14

Memo. no 996 of 4. 3. 1914, with enclosures [redacted] from the Under Secy to the Govt of Bengal, Genl Deptt.

281

4/3/14 C

Endorsement from the Financial Department No. of this Government No. 1167-F dated the 17th February, 1914, and enclosure.

Education Department
File No. 25/5/14
No. in Bk. 1
Date of receipt 4 MAR 14
Diary No. 9212

No 996

4/3.

Copy forwarded to the Director of Public Instruction, Bengal, for information.

By order of the Government in Council.

Calcutta.
General Department
(Education).
The 4th February 1914.

Under-Secretary to the Government of Bengal.
26. 2. 14.

No. 1167-F

Government of Bengal.

Financial Department.

Finance Branch.

Dated the 17th February 1914.

The undermentioned document is forwarded to the General (Education) Department for information and for communication to the Director of Public Instruction for information and necessary action.

By order of the Governor in Council.

Sd/-S. K. Sawday,

Under-Secy.to the Govt.of Bengal.

List of papers accompanying.

Copy of letter from the Government of India, Finance Department No. 250F, dated the 10th February 1914.

No. 260-F

Government of India.

Finance Department

Dated Delhi, the 10th February 1914.

From

E. M. Cook, Esq., I. C. S.,

Under-Secretary to the Government of India.

To

The Secretary to the Government of Bengal,

Financial Department.

Sir,

I am directed to refer to the letter cited in the margin and to state that the Government of India sanction an assignment of Rs. 9,000/- a year for three years from Imperial to the Provincial revenues of Bengal through the Land Revenue head with effect from the Financial year 1914-1915, to meet the expenditure in connection with the grant of further facilities for scientific research to Dr. J. C. Bose, C. S. I., C. I. E., Professor of Science at the Presidency College, Calcutta.

Letter from the Government of India in the Education Department to the address ~~of the address~~ of the Secretary to the Govt. of Bengal, General (Education) Department, No. 165, dated the 26th January 1914.

I have etc.,

Sd/- E. N. Cock,

Under-Secretary.

Copy, with a copy of the letter replied to forwarded to the Comptroller and Auditor General and the Accountant General, Bengal, (in continuation of endorsement No.61-E.B., dated the 15th January 1914).

Rec'd. at 5-30 P.M. 31/3/14

All communications to Government should give the Number, Date, and Subject of any previous Correspondence, and be addressed to the Secretary of the Department concerned.

Rd. 2 P.M. 1/4/14

GOVERNMENT OF BENGAL.

General DEPARTMENT.

Education BRANCH.

No. 15-30

Dated 1/4/14

FROM

The Hon'ble Mr. H. F. Samman, I. C. S.,

Secretary to the Government of Bengal,

File No. 4 / 1 APL.1914 5373

TO

THE Director of Public Instruction, Bengal.

Calcutta, *the* 31st March *1914.*

SIR,

I am directed to forward for your information the accompanying copy of a letter from the Government of India Department of Education, No.165 dated the 26th January 1914 and enclosures, sanctioning the grant from Imperial revenues of a sum of Rs.9,000/- a year, to Dr. J. C. Bose, Professor, Presidency College for a period of three years in the first instance, with effect from the financial year 1914-1915. I am also to convey the sanction of this Government to a similar grant of Rs.9,000/- a year to Dr. Bose from provincial revenues.

2. I am to say that Dr Bose is permitted to draw on the 1st April 1914 a sum of Rs.9,000/- being half of the total grant of Rs.18,000/-. A further communication will be made regarding the nature of the audit and disbursements of the remainder of the grant.

3. The expenditure of Rs.9,000/- will be met from the provision made for the purpose in next year's Education Budget.

4.

B. S. Press—24-10-1913—1040F—1,000—S. C. R.

No. 165.

Government of India,

Department of Education.

(Education).

Delhi, the 26th January 1914.

From

The Hon'ble Mr. H. Sharp, C. I. E .,

Joint Secretary to the Government of India,

To

The Secretary to the Government of Bengal,

General (Education) Department.

Sir,

In continuation of this Department letter No. 2134, dated the 5th November 1913, I am directed to forward, for the information of the Governor in Council, a copy of the despatches noted in the margin, regarding the grant of further facilities for scientific research to Dr. J. C. Bose, C.S.I., C.I.E., Professor of Science at the Presidency College, Calcutta.

To the Secretary of State No. 318-Finance, dated the 30th October 1913.	:
From the Secretary of State No.316-Public, dated the 26th December 1913.	:

2. I am to convey the sanction of the Government of India to the grant from Imperial revenues for the purpose of a sum of Rs. 9,000 a year, for a period of three years in the first instance, with effect from the financial year 1914-15.

I have &c.,

Sd/- H. Sharp,

Joint Secretary to the Government of India.

N.-29-1-1914.

4. I am to ask that Dr. Bose may be informed accordingly.

I have the honour to be,

Sir,

Your most obedient servant,

H. Sharma.

Secretary to the Government of Bengal.
26-3-14.

B.M.S.
31-3-14.

No.318 of 1913.

Government of India.

Finance Department.

Salaries, Establishments, Etc.,

To

THE MOST HONOURABLE THE MARQUESS OF CREWE, K.G.,

His Majesty's Secretary of State for

India.

Simla, the 30th October 1913.

My Lord Marquess,

We have the honour to address you regarding a proposal to place certain further facilities for research at the disposal of Dr. Jagadish Chandra Bose, C.S.I., C.I.E., Professor of Science at the Presidency College, Calcutta.

2. The proposal is fully explained in letter No.1274-T.G. dated the 14th July 1913, from the Government of Bengal. It will be observed that Dr. Bose already draws a scholarship of Rs.2,000 a year and an annual subsidy of Rs.2,500 for the prosecution of his scientific studies. He now asks for Rs.24,000 a year in addition, with a view to prosecuting his researches into the sensitization of plants. The Bengal Government consider that a sum of Rs.18,000 a year might profitably be utilized by the professor in this work, and suggest that the Government of India should contribute Rs.9,000 a year towards this sum. The grant is requested for a period of five years.

3. Dr. Bose is distinguished as a man of science. We do not think that, as suggested in the letter from the Government of Bengal, Dr. Bose's experiments are likely to produce results of practical value to Indian agriculture; but from the point of view of research pure and simple, we consider that Dr. Bose's labours should receive the support of the State. We are accordingly prepared to sanction from the special grants from Imperial revenues for educational purposes, a sum of Rs.9,000 a year for a period of three years, to be continued for a further period should the results of Dr. Bose's experiments merit such a course. The Government of Bengal would contrib

contribute a like amount from provincial revenues at their disposal.

4. The expenditure cannot be said to be devoted to an object within the ordinary work of administration; and under rule III (1) of our Audit Resolution No.368-Gl. (E.A.) of the 15th March 1913 we deem it right to submit the matter for Your Lordship's orders.

We have the honour to be,

My Lord Marquess,

Your Lordship's most obedient, humble servants.

Sd/- R. W. Carlyle.

Sd/- Harcourt Butler.

Sd/- S. A. Imam.

Sd/- W. H. Clark.

Sd/- R. H. Craddock.

Sd/- W. S. Meyer.

P. I. Form No. 28E.
[Approved in letter No. 19097, d 19-10-08.]

File No. 2S 51

1914.

Education Department, Bengal.

a grant of Rs. 9000/- a year for 3 years to meet the expenditure in connection with the grant of further facilities for scientific research to Dr J. C. Bose

No.

REFERENCE TO FORMER CASES.

REFERENCE TO LATER CASES.

C.J.P.—A 752—18-12-1914—6353—5,000

191 .

CONTINUOUS NOTE SHEET.

_____ DEPARTMENT, _____ BRANCH.

FILE No. OF 191 .

FILE-SUBJECT.

~~Re-sigmoundoff~~ Special grant of ~~Rs~~ 9000/- a year for three years to Dr. J.C. Bose, C.S.I. in connection with ~~for~~ Scientific researches

Serial No. in File.

NOTES AND ORDERS.

(*The larger portion of each page to be used for noting*).

Memo no 996 of 4.3.14. from the Under Secy to the Govt of Bengal, Genl Deptt.

A.2.8.2

For information

A copy of the order may perhaps be sent to Dr. J.C. Bose, through the Principal, Presy College.

A draft below for approval.

S.C.24.
10.3.1914

10/3

17/3

a. D. no. 637 9/9/3/14

Board's Office Form No. 103.
[Approved in letter No. 6255B., d. 23-12-06.]
P. J. Press—A 440—15-8-1912—19671—70,000

Serial No. in File.

The sanction may perhaps be noted by the Budget Assistant.

S.M.
19.3.14

To Secretary Babu for Note

[illegible]
19/3/14

noted

[illegible]
19/3/14

A.D.P.I.

~~For information.~~

A copy ~~of the~~ correspondence may be forwarded direct to Dr. J. C. Bose at once as he is permitted to draw Rs 9000 to-day.

~~A~~ copy may also be forwarded to the Principal of the Presy College ~~for information~~.

Letter no. 1530 of 31.3.14 from the Secy. to the Govt of Bengal, Genl Deptt.

~~A draft.~~

S.C.D.
1/4/14

(a copy of Govt. endorsement no 996 of 4.3.14. has already been forwarded to Dr. Bose through the Principal, Presy College).

flag J

[illegible]
1/4

W.[illegible]
1/4

[illegible] 7518/7519
21/4/14

1914.

CONTINUOUS NOTE SHEET.

Education DEPARTMENT, ______________ BRANCH.

FILE No. 25/51 Part OF 1914.

FILE-SUBJECT.

Allowances granted to the research assistants of Dr J.C. Bose, Prof: Presidency College, Calcutta

Serial No. in File.	NOTES AND ORDERS. (*The larger portion of each page to be used for noting*).
Letter no 1693 d/ 11.4.14 from the Govt. of Bengal General Dept (Edn)	A.P.P.d/
	The main file on the subject is under submission. A copy of the Govt. order may be forwarded to the Pl, Presy College for I & G.
	A draft submitted for approval.
	[initials] 22/4/14
	W.W. 24/4
	O. I. no. 9032 d 29/4/14

Board's Office Form No. 103.
[Approved in letter No. 6255B., d. 22-12-06.]
P. J. Press—A 594—27-9-1910—4022—1,00,000—58

Serial No. in File.

D.P.I's office note sheet.

A.D.P.I./

Our file on the subject of the research grant to Dr Bose is under submission. H.M's notes at A in page 14 of the note sheets in the B.O file linked may be seen. The Principal, Presidency College may perhaps be consulted with regard to the question of audit and disbursement of the grant raised by the A.S.B.

N.B.
23/4/14

Re. Pres y College

Have you any news?

Mr Wordsworth

I Return the File. W.W. 30/4
I am referring the matter to Dr Bose by D.O. & will inform your office later.

E.S. Harm
1/5/14.

Mr. Turner

You might look into this case and see whether there is anything

Board's Office Form No. 10a
(Approved in letter No. 2068, d. 13-8-02.)
Alipore (N. C.) J. Press—A 474—28-8-1915—2000—0.150.

Serial No. in File.

that you can suggest. I see that a D.O. has been sent to Dr Bosley but I do not suppose that this will help us much. What is, I think, desirable is that we should work out a reasonable form of procedure and then ask Dr Bose whether that will not do. We shall never settle the matter at the present rate.

W.W.H
3/5/14

D.P.I.

I think this is a matter in which ~~no advance should be~~ should be observed with very great caution. As far as I can see from the papers before me, there is no precedent for the grant to Dr Bose. At the present rate of progress in higher education in particular in advanced Scientific Education there are certain to be, during the next 10 or 15 years say, a number of applications from students for Special

NOTES AND ORDERS—continued.

Serial No. in File.

facilities for research. Whatever is done in Dr Bose's case will be appealed to as a precedent and unless rules are carefully laid down there will be trouble in the future.

Dr Bose has heretofore drawn two allowances in addition to his pay as ~~Professor~~, Presidency College

(1) Rs 2000/- a year as a Research Scholarship. This was definitely granted him as a means to enable him to free himself from personal financial difficulties & to devote himself exclusively to his scientific pursuits.

(2) Rs 2500/- a year for the prosecution of scientific researches at the Presidency College. In making this grant the Government of Bengal in their letter of 1st June 1896 (Flag 44) definitely stated that a detailed account should be submitted annually to the D.P.I. through the Principal, Presidency College.

In his D.O. letter to Mr Lyon of April 4th 1913 (Flag 21) Dr Bose has outlined the manner in which the grant of Rs 24000 per annum, for which he asks, will be spent. It would probably be unfair to confine the expenditure under

Board's Office Form No. 104.
[Approved in letter No. 236B., d. 12-8-02.]
P. J. Press—A 440—15-3-1912—19073—100,000

Serial No. in File.

the various heads is what legitimately falls under those heads. The proposal is obviously a very rough Estimate and he would merely be placed under the necessity of Coming up to you from time to time for permission to re-appropriate. But I think at the same time that the Expenditure of so large a sum as Rs 160001- should be subjected to audit by the A.G. in all its details. It would probably be convenient to Consider the seven officers mentioned under head (1) of Dr Bree's Statement of expenditure as well as the malis & other menials whom he will have to Engage as government servants in temporary Employ. ~~In the same way~~ The rent of the various gardens which Dr Bree proposes to utilize, the Capital outlay on temporary buildings, purchase of new apparatus, and work done in Elaboration of Dr Bree's own inventions, are all items of Expenditure which should be Covered by vouchers & submitted to the audit of the A.G. There will remain a balance for contingencies but I do not think this will be large if the items I have

Serial No. in File

Enumerated above are kept out of it. I do not think the office work involved in making out the bills will be large. As far as I can see Dr Bose will have to keep a clerk in any case

Perhaps Dr Bose might be asked to draw up a Budget under three heads :-

(1) Salaries

(2) Rent, buildings, purchase & Elaboration of apparatus

(3) Contingencies.

G.C.

5.5.14

P.T

Dr Bose receives an annual grant of Rs 2,500 and before reference to the expenditure of this amount he is required to submit an account to the D.P.I through the Principal of the Presidency College. The A.G points out that this account never reaches his office

Serial No. in File.

as it most certainly should.
Do these accounts ever reach our Office and if so, what is done with them? This office is not an audit office and strictly the expenditure of all amounts granted by Govt for the purchase of things is audited by the A.G.
What is done with regard to the various college grants for the purchase of apparatus.
I want a clear account of the procedure followed with reference to the audit of this grant of Rs 2,500.
Showing how this differs from the procedure adopted with regard the various grants for the purchase of apparatus at Colleges if it does differ
& why it was adopted.

Govt
8/15/14

Serial No. in File.

Pa.

D.P.I.'s orders on pages 5 & 6 of the noteshee[illegible].

The statement made by the Accountant-General that the detailed accounts submitted by Dr Bose in respect of the grant of Rs. 2500 never reaches this office does not appear to be correct. It would appear from this office letters nos. 9453, dd 22/6/1909 and 7358, dd 3/5/10 that the detailed accounts for the years 1908-09 and 1909-10 were forwarded by this office to the Accountant-General after A.D.P.I.'s counter-signature. Papers shewing the disposal of the detailed accounts of the other years could not be traced by the Regd Branch. The Accountant-General, on receipt of the account for 1913-14 returned the same to this office saying that "the account is not required to be submitted to this Office" (A.G.'s Office).

Flag A (in the file behind)

Flag B (in the file behind)

I remember that these detailed bills have all along been sent to the D.P.I. for adjustment of accounts duly countersigned by this office

Flag C (in the file behind)

20-5-14

The

Board's Office Form No. 104.
Approved in letter No. 236B., d. 12-3-09.]
Bhowe (E. C.) J. Press—A 474—23-8-1912—3803—50,000

The detailed accounts are regularly submitted by Dr Bose to this office thro' the Principal of the Presidency College and are transmitted after check to the Accountant General only Countersigned.

When grants for apparatus are drawn by Principals on abstract bills, detailed bills in respect thereof are submitted to the A.G. thro' this office. But if the grants be drawn by Principals on fully-vouched bills, then it is not necessary for the College authorities to submit detailed bills in connexion with the grants.

Difference in the ~~matter~~ procedure followed with reference to the amount of the ordinary College grants for apparatus and the Rs 2500 grant given to Dr Bose is explained below:-

(i) In the case of ordinary College grants for apparatus, ~~(x) in~~ the detailed bills

are

Serial No. in File.

Qa.

D.P.I.'s orders on pages 5 & 6 of the noteSheets.

The Statement made by the Account-General that the detailed account submitted by Dr Bose in respect of the grant of Rs. 2500 never reaches his office does not appear to be correct. It would appear from this office letters nos. 9453, dt 22/6/1909 and 7358, dt 3/5/10 that the detailed accounts for the years 1908-09 and 1909-10 were forwarded by this office to the Accountant-General after A.D.P.I.'s Countersignature. Papers shewing the disposal of the detailed accounts of the other years could not be traced by the Regd Branch. The Accountant-General, on receipt of the account for 1913-14 returned the same to this Office saying that "the account is not required to be submitted to this Office." (A.G.'s Office). The

Flag A (in the file herewith)

Flag B (in the file herewith linked)

I remember that these detailed bills have all along been sent to the A.G. for adjustment of accounts duly Countersigned by this office

Flag C (in the file herewith linked)

29-8-14

Board's Office Form No. 104.
[Approved in letter No. 236B., d. 12-8-09.]
Mysore (M. C.) J. Press—A 474—23-8-1913—5503—4,00,000

Serial No. in File.

are submitted to the A.G. thro' this office (if money be drawn on abstract bills); but if money be drawn on fully-vouched bills, detailed bills are not required, the fully vouched bills being sent to the A.G. direct (and not thro' this office). Bills in this connexion are audited by the A.G.

(ii) In the case of the grant in exemption of Rs. 2500,

the money is always drawn on abstract bills and the detailed bills are submitted by Dr Bose to this office thro' the Principal. The Govt. order does not intend that the detailed accounts shd be sent to the A.G. (altho' we have been submitting them to the A.G.).

Bills in this connexion are intended to be audited by this office.

The Govt. order alluded to above has made this difference.

Submitted.

R 23/5/m

T.G. the G.O. no. 159, S. the 1.6.1896. filed in the file below-cited

NOTES AND ORDERS CONTINUED

Serial No. in File.

O.T.

I am orders at pp. 5 & 6.

The Budget clerks note clearly explains the position. We have caught the A.G. tripping - vide his letter marked by the orange slip in which he says that the detailed a/c of the research Grant of Rs 2500 in favour of Dr Bose is never submitted to him. The accounts have actually been submitted on the last occasion (vide flag C in our file 25/51/14) we were asked to discontinue sending the accts to A.G.

Cancelled

B.F. 24/5

P.A.

Bring up Peace'

W. W. 27/5

Serial No. in File.

Bo files
6R/1 & 6R/3 114

Proceedings 1916

General Department.

Dr. Bose has heretofore drawn two allowances in addition to his pay as Professor, Presidency College.

(1) Rs. 2,000 a year as a Research scholarship which was definitely granted to him as a means to enable him to free himself from personal financial difficulties and to devote himself exclusively to his scientific pursuits.

(2) Rs. 2,000 a year for the prosecution of scientific researches at the Presidency College. In making this grant the Govt. of Bengal definitely stated in their letter No. 159 T-C., dated 1-6-1896 that a detailed account should be submitted annually to the D.P.I. through the Principal, Presidency College.

The S. of S. had recently sanctioned a new grant of Rs. 16,000.

It is not clear from the correspondence whether this last grant is in addition to the two grants mentioned above or whether it includes both or either of them. I take it that the absence of any statement to the contrary may be regarded to mean that the grant is an additional one. I may however remark that the budget provision made for the current year belies this interpretation.

The point has been raised as to the procedure which should be adopted with regard to the rendering of accounts in respect of the grant of Rs. 16,000 and

Board's Office Form No. 104.
[Approved in letter No. 233B., d. 13-8-02.]
Alipore (N. C.) J. Press—A 474—23-8-1912—3303—4,00,000

Serial No. in File.

and the audit thereof. I am of opinion that the expenditure of the grant should be subjected to audit by the A.G.B. in all its details. Whether the accounts should be submitted through my office or direct to the A.G.B. is a minor consideration but it seems to me that it would tend towards expedition if the accounts were submitted to the A.G.B. direct. The check which my office can exercise is but a formal one and it is the A.G. after all who must decide when and in what precise form the account is to be submitted and how its audit is to be undertaken. It may be desirable for instance to ask Dr. Bose to draw up a budget under three main heads :-

(1) Salaries.

(2) Rent, buildings and purchase and elaboration of apparatus.

(3) Contingencies.

But as I have said above the matter is one in which the A.G.B. is the best officer to advise. The question as to the intervals at which accounts shoul be submitted by Dr. Bose is also one which shoul be left to the A.G.B. to determine. I quite agree that the procedure should be so designed as to hamper Dr. Bose as little as possible but I am not competent to advise how the accounts procedure is to be applied or relaxed to effect this consummation.

I do not see any point in laying down that accounts

Board's Office Form No. 104.
[Approved in letter No 236B., d. 12-8-02.]
Alipore (N. C.) J. Press—A 474—23-5-1912—2202—4.00.00

Serial No. in File.

accounts rendered by Dr. Bose for this grant should be submitted through the Principal, Presidency College. It is unnecessary and circuitous. I understand Dr. Bose himself desires to deal direct with the A.G.B. and I cannot help thinking that this would be the best course.

As regards the statement made by the A.G.B. in his D.O. letter without No. dated 26th February that the account of the Rs 2,500 grant never reaches his office as in his opinion, it should, I may point out that A.G. is apparently unaware that the accounts were, after countersignature by the D.P.I., regularly submitted for his scrutiny and that it was in accordance with the directions of his office in his office endorsement No. P/0136, dated 16-4-1914 that the submission to him of Dr. Bose's accounts was discontinued.

Sd. W. W. H.
17. 6. 14.

19/6/14

Board's Office Form No. 104.
[Approved in letter No 236B., d. 12-8-02.]
Alipore (N. C.) J. Press—A 474—22-8-1913—3000—4,00,000

Serial No. in File.

Notes from page 19 may be read. I do not think the General Department's view can be accepted; Dr. Bose asked for 24,000/- in addition to his grant of Rs 2,500/-, but it was all for the same work. In addressing India this Govt. said "it is considered that a sum of Rs 18,000/- a year might be profitably utilised by the Professor in his work," and I take it that must be read as meaning that the 18,000/- includes the existing 2,500/-.

Moreover when a grant of Rs 2,500/- is increased to one of Rs 18,000/- this is certainly placing further facilities for research at Dr. Bose's disposal and Secy. of State's despatch does not therefore justify the argument that the 18,000/- is in addition to the 2,500/-

2. As to reappropriation for 9,000/- Education Department should suggest a reappropriation in their own budget.

Sd: E. M.

31.7.14.

The question is not free from difficulty. The 2,500/- was originally granted for researches at the Presidency College and it was suggested that the students would take part in these, the present grant is of a different nature. But the letter of this Govt. to India certainly seem to me to bear only the interpretation that the 18,000/- is an amplification of the 2,500/- and not an addition. The letter of the Govt. of India is more doubtful and would seem to

Board's Office Form No. 104.
[Approved in letter No. 236B., d. 12-8-02]
Alipore (N. C.) J. Press—A 474—23-8-1913—362—4,00,000

Serial No. in File.

mean that the 18,000/- is in addition, and the A. G. appears inclined to accept this. The Education Department will have to find the money by re-appropriation.

Sd: H.L.S. 9/8.

We may ask the D.P.I. if he can meet the balance of the grant in the current year by re-appropriation (a reply to the A. G., B. is pending vide his reminders No. B.T/82 A dated 12th June 1914 and Bt.82/B dated the 10th July 1914.

Sd: H.G.D.
14.8.14.

Secy.

Financial Secy's note above. Apparently he agrees to the giving of 18,000/- in addition to 2,500/- if the money can be found by re-appropriation.

Sd: R.B.S.

16.8.14.

Consult D.P.I. as proposed.

Sd: H. F. S.

17.8.14.

Serial No. in File.

Copied from B.O. File No 11R of 1914 re Dr. Bose's Research grant.

Under Secretary, General Dept.

1. As I did not altogether understand the Financial Secretary's note above I went and spoke to him about it.

2. The following provisions are made in the budget :

	Rs
Grant to Dr.J.C.Bose for Scientific Research	9,000
Scholarship to Dr.J.C.Bose	2,000
	11,000

I understand that we are now asked to provide (1) a sum of Rs9,000 which represents the contribution ~~towards~~ which the Government of India have undertaken to pay towards the grant of Rs18,000. I gather that we should provide this by reappropriation from the current year's budget and to ask for its re-allotment next year i.e., that in the budget for 1915-16 we should provide Rs18,000 being the grant ~~of~~ for the next financial year plus Rs9,000 being the re-grant ~~from~~ of India's contribution paid out of the Education Budget for this year.

3. As regards the sum of Rs2,500 I understand that the Financial Secretary is not sure whether the sanctioning authorities ~~is~~ intended to sanction this amount in addition to the Rs18,000 or not. He thinks that before we suggest how this amount should be found by reappropriation, the A.G.B.

Board's Office Form No. 104.
[Approved in letter No. 236B., d. 12-8-02]
Alipore (N.C.) J. Press—A 474—23-8-1913—36 2—4,00,000

Serial No. in File.

should be asked whether he interprets the orders as sanctioning the continuance of the grant of Rs2,500 in addition to the grant of Rs18,000 or whether he regards the grant of Rs2,500 as included in the grant of Rs18,000.

(Sd) W. W. H

18-8-14

Serial No. in File.

Please see Secy's note at A in page 26 of noted and that of the Fincl. Secy. at B in page 29. We may now consult the A.G.B. through The Fincl. Dept. whether he accepts that Rs.18,000/- sanctioned by the S of S's despatch No.316, dated 12-1-14, is in addition to the grant of Rs.2,500.

From Dr. J.C. Bose dated the 31st July 1914. The question as to whether Dr. Bose will have to render an account of the sum placed at his disposal has not yet been finally disposed of. Dr. Bose's letter may be filed.

Sd.
21-8-14

Sy. D.P.I.'s note above. A.G.B. may be consulted (through fincl.) as proposed.

Sd. R.B.S.
Sd. H.F.S.
21-8-14

May be sent to the A.G. as ~~described~~ desired by the General Dept.

Sd. E.M.
27-8-14

I consider that the grant of Rs.18,000/- sanctioned by the Secretary of State is in addition to the grant of Rs.2,500/- previously granted to Dr. Bose, and that the latter grant still continues.

Sd. N.G. Basu
3-9-14.

Notes from page 28 will recall the case. This may now be returned to the General Dept.

Sd. E.M.
4-9-14.

Board's Office Form No. 104.
[Approved in letter No. 236B., d. 12-8-02]
Alipore (N.C.) J. Press—A 474—23-8-1913—38.2—4,00,000

Serial No. in File.

The case may now be sent to D.P.I. to suggest re-appropriation for the following sums during the current year.

Rs. 9,000/-, balance of the grant of Rs.18,000/- sanctioned by the Govt. of India and Rs.2,500/- sanctioned by this Govt. in G.O. No.159 T.G. of the 1st June 1896, a total of Rs.11,500/-. The question as to whether the D.P.I. should be permitted to provide for a regrant of Rs.9,000/- as proposed in page 30 of notes may be referred to the Fincl. Dept. Strictly speaking the Education Dept. is entitled to a refund of this amount as the corresponding Imperial grant has not been provided in the current year's budget and the deficit in the expenditure is going to be met from provincial revenues.

x D.P.I.'s note dt 18/8/14 -

This can be considered later.
Sd/ R.B.S.
7/9/14

Sd.
7-9-14
D.P.I.

Re-appropriation may now be suggested.

Sd. R.B.S.
7-9-14.

U.S.

The re-appropriation statement is being forwarded through A.G.B.

Sd. W.C.W.
8-9-14

A.G.B. / notes above.
A recapn. statt: with a forwdg draft

Serial No. in File.

draft submitted for appl.

P.C.
16/9/14

W.W.
16/9

a. D. no. 6310 d 22/9/14

No 46880 d the 5.12.14 from the U.S. to Govt.

A.D.P.I.

For perusal. Govt sanctions the re-appm proposed. The Govt order has been noted. A copy of the Govt order may be forwarded to the Principal, Presy College, for information. A draft submitted for appl

P. Basu
8/12

P.C.
8/12/14

W.W.
7/1

a. D. no. 1017 d 14/1/15—

Serial No. in File

A.Dr.2.

The Govt. order may be communicated to Dr. J.C. Bose through the Principal, Presidency College.

A draft for approval.

21/1

W.L.W. 23/1

a.2.mi No. 1738 & 27/1/15.

Govt. order No. 210 dy 14.1.15 from Govt. Secl. Deptt.

Public Instruction Form No. 28B.
[Approved in letter No. 16349, d. 3-9-08.]

R.R.	Education Dept. {191 } Bengal.	File number.	2S / 21
Enclosures.	To	Number in File.	11
Maps or plans.	SUBJECT:	Issue Number.	1738
Spare Copies.		Date of letter.	27/1/15
		Date of despatch.	27/1/15

Reminders issued—

A.

B.

C.

To

THE

~~SIR~~,

Letter No 210 Dy 14.1.15 from U.S. to the Govt. of Bengal, Jud. Deptt.,

Copy forwarded to the Principal, Presidency College, for information in continuation of this Office Memo: No 7519 Dy 1.4.14 and for favour of communication to Dr. J.C. Bose.

W.W. 23/1

A.S.P.I.

Draft 21/1

All Communications to Government should give the Number, Date and Subject of any previous Correspondence, and be addressed to the Secretary of the Department concerned.

GOVERNMENT OF BENGAL.

GENERAL DEPARTMENT

Education BRANCH

No. 210

FROM

R. B. Steele, Esquire, I.C.S.,
Under-Secretary to the Government of Bengal,

Education Department
File No. 25/51
No. in the Diary
Date of receipt 14 JAN. 1915
Diary No. 968

To

THE Director of Public Instruction, Bengal.

Calcutta, the 14 January 1915.

SIR,

I am directed to refer to this Department letter No.1530 dated the 31st March 1914, regarding the grant to Dr. J.C.Bose, Professor in the Presidency College, of a sum of Rs.18,000/- a year for a period of 3 years commencing from the year 1914-1915 for the prosecution of scientific researches and to say that pending the introduction of any new arrangements which may be made in the future Dr. Bose should furnish accounts of expenditure from the grant to the Accountant-General, Bengal, direct for purposes of audit. I am to request that he may be informed accordingly.

I have the honour to be,

Sir,

Your most obedient servant,

R B Steele

Under-Secretary to the Govt. of Bengal.

H.Chaudhury. 13.1.15.

B. S. Press—15-12-1914—1491F—2,000—B. B. S