M.R.O. 1—10,006—28-2-50.

(1) Number of pages_____

(2) Date of repair_____

(3) Initials of the Referencer_____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 2773-74 Press

B.P. No. Mis.

217-218-219

Dated 15. 11. 1873. 195 ..

Not to be folded or roughly handled

No. 217. Read the following endorsement of the District Engineer, Presidency, dated Fort St. George, 27th October 1873, No. 3,542 :—

From Mr. F. DODERET, Government Mathematical Instrument Maker, Public Works Department, to Lieutenant-Colonel J. GODDARD, R.E., District Engineer, Presidency, dated Chepauk, 24th October 1873.

WITH reference to your endorsement No. 3,372, dated 17th October 1873, on C. O., dated 9th October 1873, No. 2,477, calling for a full and early report on the opinion I have formed of Messrs. Cook and Sons' Levels, I beg to state that the levels made by Messrs T. Cook and Sons of York have now been in use since the year 1866, in which year 64 were received, and in 1871, 93 were received, making a total of 157, out of which 120 have been issued to the Public Works Department and others. Forty levels by the same makers were supplied to the Mysore Government by Messrs. P. Orr and Sons.

2. As up to this time no complaints have been received, and as I have altered many levels, both Dumpy and Y Levels, as nearly as possible after Cook's pattern, which have met with approval from the officers using them, I must believe that they agree with me that Cook's levels are equal, if not superior, to any other maker. Taking into consideration that Messrs. Troughton and Simms as well as Elliott Brothers and other makers have more or less adopted the improvements made by Messrs. T. Cook and Sons, which, I believe, were proposed to them after very careful consideration and trial by Colonel Strange, the Scientific Examiner of Instruments to the India Government, I am fully convinced that instruments now made by Messrs. Troughton and Simms are equal, but certainly not superior to those made by Messrs. Cook and Sons.

3. The improvements made by Messrs. Cook and Sons to levels are, *first*, the axes which in former levels rested on a base of about one inch diameter, giving friction of about $\frac{1}{16}$ to $\frac{1}{32}$ of an inch, are now made to revolve on a base of 2 to $2\frac{1}{2}$ inches diameter, the inner part of the base having been underturned so as to give the friction on the outer rim of the base of about $\frac{1}{8}$ of an inch, thus giving a larger base and not more friction than in the former axes. It will be apparent that an instrument revolving on such a small base as one inch, and not being in perfect counterpoise, could not be made perfectly steady, especially if the instrument has been for some time in use.

4. The levels made by Messrs. Troughton and Simms and other makers have six screws below the support of the telescope, to enable the instrument to be adjusted for horizontal collimation error. This has always been considered a tedious adjustment, and by many ordinary Surveyors it has not been understood for what purpose those screws are intended. In Cook's level this has been omitted, as that adjustment is practically made correct, and the level is consequently independent of this adjustment. The screw foot plate and triangular base plate is another improvement on the old parallel plate screws, as the instruments can be adjusted quicker and the screws are not so easily worn out. The stand, although

more cumbersome than the old pattern, is infinitely more steady and trustworthy and does not get so easily out of order.

5. With reference to the remark about the adjusting screws for level and collimation, I am of opinion that the arrangement is perfect; I must observe however that the screws are often screwed so much home that the spring between the screw and the socket loses its elasticity or breaks. I would strongly recommend that this mode of adjusting be discontinued, and the one adopted which the levelling instruments had when first received in this country in 1866, as I have altered many; and with reference to the mode in which Cook and Sons fasten the object glasses, I beg to say that, but for one drawback, I would prefer it to the method adopted by other makers in fastening the object glasses. Both means of securing the object glass in the cell, however, have their benefits and drawbacks, but of the two methods, I am of opinion that that of Cook's is the best.

6. The drawbacks of objects glasses fastened into their cells by a screwed ring are: *First.*—Although each glass is marked with notches to indicate their relative surfaces, yet they have been frequently received by me put together quite promiscuously, no notice having been taken of the notches when doing so. *Second.*—Taking into consideration that some of the object glasses are triplets, it can easily be imagined in how many different wrong ways they can be put into their cells, some of them have in consequence been broken, others have had their flint glass turned to the object instead of to the eyepiece, and the object consequently could not be defined. *Third.*—Some telescopes have been received without any crown glass, which had perhaps been taken out and used as a magnifier and forgotten to be returned to its fellow flint glass. Often the screwed ring is lost.

7. The only benefit I could see that this mode of securing the glass has is, that it can easily be cleaned by any one noticing how to put them together again, which is, in the other method, the only drawback; but considering that all object glasses have to be cleaned after arrival from England, and very seldom if ever after (between the two surfaces lying together,) I think I should prefer to have them burnished in. I came only lately to this conclusion for reasons above given, as I had altered all object glasses belonging to Cook's levels from being burnished to having a screw.

8. I beg to append a statement showing the number of levels by Cook and Sons received by the Public Works Department since 1866, and their distribution, from which it will be seen that every district has some in use. I am so fully persuaded that these levels are highly appreciated, for, when these instruments are sent for repair by district officers, they always ask that the instruments should be returned to them.

9. In conclusion, I beg respectfully to say that it is my firm opinion, looking at the time that these instruments have been in use, and that only a few were received for repair, and those repairs consisting for the the most part of having spirit bubbles and spider lines inserted, and as no one has complained of the levels by Cook and Sons, they are, if not superior, quite equal to any other makers I know who have supplied this Presidency with levels.

Proceedings of the Madras Government, Public Works Department, 15th November 1873.

Statement of Issues of Cook and Sons Levelling Instruments from the 22nd March 1866, the date in which they were first received in Madras, to 23rd October 1873.

Divisions.	Districts.	Issues from the 22nd March 1866 to 30th November 1872.	Issues from the 1st December 1872 to the 23rd October 1873.
1st Division...	Ganjam	17	...
	Vizagapatam		3
	Godavery		6
2nd do.	Kistna	20	...
	Nellore		...
3rd do.	Bellary	1	5
	Cuddapah		2
	Kurnool		1
4th do.	Presidency	5	...
	Chingleput		...
	North Arcot		1
	South Arcot		1
5th do.	Salem	6	...
	Bangalore		...
6th do.	Tanjore	6	1
	Trichinopoly		...
7th do.	Coimbatore	7	...
	Malabar		...
	Wynaad		...
	South Canara		...
8th do.	Madura	7	...
	Tinnevelly		...
R. F. Chisholm, Esq., Executive Engineer, Presidency		1	...
W. Fraser, Esq., Special Executive Engineer		2	...
Public Works Workshops		1	...
Principal Civil Engineering College		7	...
Chief Engineer of Mysore		2	3
Executive Engineer, Bangalore Division		1	...
1st Assistant, Great Trigonometrical Survey		1	...
Irrigation Department, Calcutta		8	...
Superintending Engineer, Central Provinces		4	...
Analyst of Water, Mysore and Ceded Districts		1	...
	Total...	97	23

CHEPAUK,
24th October 1873.

(Signed) F. DODERET,
Govt. Mathematical Instrument Maker, P.W.D.

SUBMITTED, in original, to the Chief Engineer and Secretary to Government, Public Works Department, with reference to G. O., No. 2,477, dated 9th October 1873.

(Signed) J. GODDARD, Lieut.-Colonel, R.E.,
District Engineer, Presidency.

No. 218. ORDER THEREON, 15th November 1873, No. 2,773.

ACCOUNT, No. 15.

ORDERED that this report be forwarded for the information of the Government of India.

(Here enter No. 2,774, dated 15th November 1873.)
(True Extract.)

Colonel, R.E.,
Secretary to Government.

Exd. S. T. Austin.
Spare Copies

PUBLIC WORKS DEPARTMENT,
OOTACAMUND, 15*th November* 1873.

No. 219.

No. 2,774.

FROM

COLONEL G. W. WALKER, R.E.,
Secretary to the Government of Madras,
Public Works Department.

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
Public Works Department.

ACCOUNT, No. 16.

SIR,—Adverting to your letter No. 595 I, dated 6th September 1873, I am directed to forward the accompanying report, by the Mathematical Instrument Maker to the Madras Government, on the comparative efficiency of the levelling instruments supplied by Messrs. Cook and Sons and Messrs. Troughton and Simms.

I have the honour to be,
Sir,
Your most obedient servant,

Colonel, R.E.,
Secretary to Government.

Exd. S. T. Austin.

Spare Copies

Govt. of Madras.

PUBLIC WORKS.

To

THE SECRETARY TO GOVERNMENT

MADRAS

Dated November 1873.

Read. Encl.

G. O., 15th November 1873 No. 1274

NOVEMBER.

No. 219

No 3542

Submitted in originals to the Chief Engineer & Sec: to Govt: P.W.D. with reference to G. O. No. 2477 of 9th October 1873.

for Secretary

Lt. Col. R.E.

Dist. Engr. Presy

at St. Thomas Mount

27 October 1873.

Letter

From
The Government Mathematical Instrument Maker's P.W.D.
To
The District Engineer
Presidency.

Dated 24 } October 1875
Recd }

Enclosures One

Report his opinion on the efficiency of the Levelling Instruments supplied by Messrs. Cook and Sons of York.

P.W. Dept.

No 2773

Proceedings of the Madras Government.

Under date the October 1873.

Read the following

From the District Engineer

Presidency. (Secretary No 3542 of 27 October 1873)

Ordered that the Report be forwarded for the information of the Government of India.

H.E. No 7.

No 2774

To The Secretary to the Government of India.

Sir,

I am directed by the Madras Government to forward herewith, for the information of the Government of India, a report from the District Engineer, Presidency, No 3542 of 27th October 1873, on the subject of the Levelling instruments supplied by Messrs J. Cook & Sons of York.

I have the honor to be,
Sir,
Your most obedient servant,
Secretary to Government.

P.W. 1873 Department
From Govt No 5830
The District Engineer
Presidency

To The Chief Engineer
Secy Govt P.W.D.

Dated 27th October 1873.
Rec'd 28th October 1873.
From 1 No 3542

Forwards in original Mr Dodgson's report on the efficiency of the Levelling instruments supplied by Messrs J. Cook & Sons of York.

No 217
Received in Office 28 Oct 73

No 2773-2774-15-10-73

letter No 595 I dated 6th
September 1873 I was directed
to forward the accompanying
report, by the Mathema-
-tical Instrument Maker
to the Madras Govern-
-ment, on the Comparative
efficiency of the levelling
instruments supplied by
Messrs. Cooke and Sons
and Messrs Troughton
and Simms.

Lynn

S.C. sent 21/11/73
with the plans
R.S.

No 217-19

Rec'd 6 Oct 73

Cp. 5830

Govt. of India Madras.

PUBLIC WORKS.

The Secretary to the
Govt of India

15 Nov 2773.
2774.

Nos 217-218 219

Submitting a Report on the comparative efficiency of the levelling instruments supplied by Messrs Cooke & Sons and Messrs Troughton & Simms.

Levelling Instruments.

Report, Submitted by the Supt., on the comparative efficiency of the instruments supplied by Messrs Cooke & Sons & Messrs Troughton & Simms.