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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 1155 Press
~~Mis.~~
15-16

Dated 2-5- 1870.

Not to be folded or roughly handled

No. 15. Read the following letter from A. P. DE CLOSETS, Esq., C. E., to the Secretary to Government, Public Works Department, dated Madras, 31st January 1870 :—

Report on the Incline or "Self-acting plane" proposed for the Coonoor Pass.

IN accordance with Government Order, dated 11th of December 1869, I have the honour to submit the following Report in connection with my letter dated 30th of November 1869, with the purpose of explaining more fully the particulars of the Incline I propose for the Coonoor Ghaut, and of eliciting its practicability under an engineering point of view, as well as its chance of paying returns.

2. This subject is divided into three heads, viz. :—

1*st*—Description of the Incline.
2*nd*—Working of do.
3*rd*—Traffic available, cost of construction, and yearly returns.

I.—*Description of the Incline.*

3. The length of the ascent from Kulhur to Coonoor is seven miles, and I propose to construct on the whole length an Incline divided into distinct portions or intermediate inclines, in order—

1*st*—Not to introduce too ong ropes.
2*nd*—To deal with more facility with the curves.
3*rd*—To render the supervsion and general working of the line less difficult.

4. Each of those partial Inclines will be connected to the next either below or above, by level platforms of sufficient length, where small stations would be constructed; a light railway would be laid on the total length of these Inclines, that is, about seven miles.

5. I propose to adopt a gauge of three feet with rails of thirty to thirty-five pounds per lineal yard (Contractor's rails). It would be less expensive to adopt a gauge of 2 feet; but on account of the interline of pulleys supporting the cable, as will be explained hereafter, and of the passage of the axles of the waggons over these pulleys, the wheels of the waggons must be at least 2 feet in diameter, and this size, with a gauge of 2 feet, will cause less stability than with a wider gauge. I think, then, that 3 feet is the smallest gauge which could be safely adopted, and the more so, as some of the curves would be rather sharp, in order to avoid expensive works in the construction of the line.

6. Another reason, which is not to be omitted, is that the traffic, although small now, will increase in a certain ratio, owing to the construction of the Madras Railway extension, and to the facilities afforded to traffic by the construction of the Incline itself.

7. The rails are intended to be fixed upon flat cast-iron sleepers, 48 inches long by 6 inches broad, and about 1 inch thick, with a longitudinal and parabolic under-rib; they would be provided also with two double ledges for securing the rails by means of wedges; the rails besides would be fastened together as usual by fishing plates and bolts. An advantage of using the sleepers I propose is that

they could be fastened upon vertical and braced piles; thus avoiding the necessity of embanking so frequently, or of constructing culverts for drainage, which in hill tracts is one of the most difficult parts to deal with.

8. I have said that the total length of the ascent would be divided into several partial Inclines: I think that the total number of these would be seven or eight; each of these Inclines would consist, for the lower half, of a single line of railway branching at the middle into a double line for nearly fifty or sixty yards, and then reduced upon the upper half to three rails, forming two ways, and, in fact, a double line of railway. At the top and foot of the Incline there would be a level of a sufficient length.

9. At these levels, and a little below the rails, would be fixed into a frame horizontally a large drum or pulley equal in diameter to the gauge of the Railway; a wire-rope $1\frac{1}{2}$ inch in diameter wil be passed round over this pulley, and have a total length exceeding, by a few yards, that of the partial Incline; one end of this rope would be fastened to the train of waggons at the top, and the other end to a similar train at the foot of the incline.

10. To lessen the friction, this wire-rope would be supported at every six or seven yards upon broad flangel cast-iron pulleys or rollers, about 1 foot in diameter, supported by shoes, the whole forming, inside the way, a line parallel to the rails.

11. This stated, supposing the two trains mentioned above loaded, the train at the top a little more than the other, in order to overcome the resistance produced

First, by the load of the train at the foot;
Second, by the friction of the rope; and
Third, by the resistance due to the gradient.

If the train at the top is let down on the Incline, it will draw the rope and cause the train at the foot to move up the Incline.

12. This up-train will then follow the single line of railway till the junction at the middle, where both trains will meet and cross each other by means of the double line, and the down-train following its course up will take the single line of railway, whilst the ascending train will take one side of the three rails way, following the rope, and at last will reach the top level at the same moment that the descending train will arrive at the foot of the Incline upon the platform established there.

13. To provide for curves, as the cable will have a tendency to run off the grooves of the pulleys, they would be inclined, the grooves towards the curve, or else flanged rollers would be fixed, combined together with the pulleys, so as to keep the rope concentric with the rails throughout the entire length of the curve.

14. Upon such an Incline, where the speed could be constantly accelerated, brakes would be applied on the drums and on the waggons to regulate the speed; I am of opinion that even ten miles per hour could be, under all circumstances, adopted with safety for the hauling up of the trains.

15. The above arrangement, simple and economical, is frequently employed abroad for hoisting up steep hills, empty waggons. I have the honour to refer to the following examples of similar methods for overcoming ascents: these methods are applied very extensively in Scotland, Wales, on the Continent of Europe, as

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2nd May 1870.

well as in America. The only difference which arises here is that, as the whole traffic is going up, provision must be made for securing the necessary gravity. Of the Inclines constructed in England I will mention—

1*st.*—Some very extensive "self-acting planes" near Newcastle, putting in communication the coal mines with the ships loading in the Tyne. At the time I visited these inclines (in 1840) they were worked by hemp ropes; the trains were composed of six waggons, loaded with about two tons of coals each.

2*nd.*—Near Sunderland, at the Hetton colleries, there was a long incline composed of several sections (partial), the longest portion, that which has the least gradient (0·02) was about half a mile in length and in a straight line; the trains were composed of seven waggons.

3*rd.*—A very long incline with no brake and upwards of one mile in length was established at Portreath (Wales), carrying copper and other ores from the mines to the port of embarkation; this incline was not taking passengers.

4*th.*—A similar one in Cornwall joining the Tresavean mine with the Redruth and Hayle Railway; no passengers.

5*th.*—A very steep self-acting plane called the "Plain and gwarry" incline between Camborne and Hayle, carrying traffic and passengers.

16. I have had occasion to meet in Madras gentlemen who have travelled on such railways. Captain Edgcome, R.E., has mentioned to me a long and steep incline at Pickering, Yorkshire, where passengers are daily conveyed.

Mr. Church, Traffic Manager of the Madras Railway, told me that he has often seen such lines, and Mr. Cardoza, of the Ordnance Office, still in Madras, has travelled upon the Cornish Railway mentioned above, about twenty years ago. I never heard that any accident has occurred on these inclines, and the only one possible would be the parting of the cable; but I have explained hereafter how to I never heard that any accident has occurred on these inclines, and the only one prevent its effects.

17. I propose then to adopt this mode of communication with some difference as to the motive power; as in the Neilgherries very nearly all the traffic is going up the ascent, the gravity from the few descending goods cannot alone be used, and it is to meet that deficiency that I propose the means explained in the following part of this report.

II.—Working of the Incline.

18. Coonoor being 5,880 feet above sea-level, and Kullaur 1,180, the average gradient for the length of seven miles (distance from Kullaur to Coonoor) will be 0·122, or in other words 1 in 8·09; but for the calculations, it is well to take a ruling gradient of say 1 in 6, with a length of incline of 1,760 yards or one mile.

19. I will state that the Incline is to be worked by trains of five waggons loaded with one ton each, and that the weight of each waggon will be about 0·75 tons. The slope being 1 in 6, that is 0·16, the working strains produced upon the wire rope will be equal to:

		Tons.
1*st.*	Resistance of five waggons to motion on rails, or friction, and equal to 5 × 1·75 tons × 0·0015 = ...	0·04
2*nd.*	Resistance of the above due to the slope equal to 5 × 1·75 × 0·16 = ...	1·40
3*rd.*	Friction of the cable upon the pulleys and their axles: the cable being 1½ inch diameter, is 14·94 pounds weight per lineal yard, therefore one mile would have a weight of 11·75 tons, and the coefficient of friction being 0·10, the friction of the cable = 11·75 tons × 0·10 = ...	1·17
4*th.*	Resistance of cable due to the slope, at 11·75 tons × 0·16 =	1·88
	Total Resistance, Tons...	4·49
	And for two trains...	8·98

20. The strain or total working tension on the cable being 8·98 tons, say in round numbers ten tons, the weight of the wire rope, according to practice (see Rankine) should be per running foot $\frac{1}{4500}$ = 0·00022 of the greatest working tension, and, in this case, equal to 10 tons × 0·00022 equal to 0·002 tons, or 4·48 pounds. The diameter being 1½ inch, gives 4·98 pounds per running foot, and is therefore safely to be relied upon.

21. Now this being settled, I suppose a train of five waggons at the top, empty or nearly so, and the same number of waggons at the foot of the same incline, loaded each with one ton. These waggons would be of the following dimensions: 15′ long × 5′ broad, with wheels of 2′ diamater, or thereabout; each of these waggons besides would be supplied underneath the floor or platform with a cistern or tank in two parts, one above the wheels 15′ × 5′ × 1′ = 75 cubic feet, the other under the first and between the wheels down to the level of the axles, and measuring 5′ × 5′ × 1′ = 25 cubic feet. Such a tank would therefore hold about 100 cubic feet of water, or about 2·75 tons, and would be furnished with two cocks or valves, one for filling, the other for discharging water.

22. The working of the Incline is then easily understood. The waggons at the top are filled with water from any stream at hand, and the rope being fastened to the trains below and above, that at the top is moved by coolies, and let down on the incline; its gravity thus causes the train at the foot to run up the incline; the two trains meet and cross each other, and their waggons reach simultaneously the top and bottom levels where they stop,—there the driving cable is being disengaged, and the cables from the next inclines are fastened to the trains. All these platform movements of the train will be accomplished by trained coolies, and proper sidings and crossings would be laid for that purpose.

23. The up and down trains being then fastened to the other cables, a signal will be made, the upper train let down on the incline, and so on; the same manœuvre is repeated at each intermediate incline, till the waggons reach the lowest and highest levels; at the former water is discharged to be replaced by goods, and at the latter goods are unloaded and replaced by water.

24. It is to be observed that except, in particular cases, water will be poured into the waggons at the highest level only, and will be delivered at the foot of the

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ghaut only; the working power of the process could be then estimated by that of a body of water falling from a height equal to the difference of level of the two final stations.

25. But to prevent the acceleration of speed which would be created on this incline, strap-brakes would be adjusted round pulleys fixed on the axles of each waggon, and also around the pulleys on the levels; these brakes for waggons could be arranged in such a way as to be loosened by the tension of the cable, and tightened by counterpoises in case of the parting of the cable; thus stopping immediately the rotation of the wheels. Besides, as the gradient is greater than required for equalizing the coefficient of friction, which we will admit for iron upon iron to be 0·10, it would only be necessary, in order to prevent all sliding motion, to adjust hanging props, or else rail catchers, which, acting at the point of cable rupture, would prevent all further motion of the waggons down the incline.

26. It is easy to perceive the great economy which must result from such an arrangement as is proposed. The advantages are—

1*st*—No skilled labour required.
2*nd*—Inexpensive motive power.
3*rd*—Few officials and a limited number of Overseers and Clerks.
4*th*—Impossibility of collision.
5*th*—Cheap transport.
6*th*—Finally, the facility of applying the system to any given hill tracts where water is procurable.

III.—*Available traffic in the Coonoor Ghaut; Estimate of Construction of the Incline; Receipts and Expenditure.*

27. During the year, from June 1865 to June 1866, the number of vehicles and cattle that passed through the Burliar gate, and that have been registered by order of Government, amounted to the following total, not taking account of the empty vehicles or animals of burden unloaded.

	No.			Pounds
Four-wheeled carriages	37	@ 250 lbs.	load each	9,250
Two wheeled do.	77	„ 250	„	19,250
Common carts	7,726	„ 250	„	1,931,500
Bullocks	88,049	„ 50	„	4,402,450
Donkeys	23,626	„ 40	„	749,040
Sheep	47,827	„ 50	„	2,494,350
Pigs	876	„ 100	„	87,600
			Total Pounds...	9,889,440

giving a gross load of 4,415 tons yearly, that is, 12 tons about for one day. No account of coolies loaded, horses or passengers, has been entered; the number of coolies however would be of a certain importance, as well as the number of passengers.

28. Since the above data have been recorded, I have been able, through the kindness of Mr. H. Sullivan, Collector of Coimbatore, to get information as to the number of vehicles or animals that passed the Burliar gate from the 1st of April

1866 up to the 30th of November 1867, or during a period of twenty months, as follows:—

	No.				Pounds.
Four-wheeled carriages	95	@	250 lbs.	each ...	23,750
Two-wheeled do.	800	,,	do.	,, ...	2,00,000
Common carts	10,764	,,	do.	,, ...	2,690,000
Bullocks	1,74,711	,,	90	,, ...	8,735,550
Donkeys	38,409	,,	40	,, ...	1,536,200
Sheep	60,408	,,	50	,, ...	3,020,400
Pigs	1,284	,,	100	,, ...	128,400
				Total Pounds...	16,334,300

giving a gross load of 7,292 tons for twenty months, that is, 13·35 tons for one day. The above shows that in the period of one year the traffic has increased by one ton daily.

29. If proper account were taken of the coolies ascending the ghaut with loads, it would be found that at least one or two tons more of traffic would be daily noted, as according to returns from the Municipal Commissioners at Coonoor transmitted to me by Major C. G. Hodgson, it appears that the toll gate contractor at Burliar pays now 500 Rupees per mensem for his contract, and this supposes a heavy traffic up the ghaut.

30. If an incline were to be constructed in connection with the extension of the Madras Railway to Kullaur, I have no doubt the traffic would increase immediately to 25 tons daily, and would go on increasing every year following the development of the Neilgherries.

31. In order to ascertain as nearly as possible the returns which may be expected from such a scheme, I will enter into some details of the price of construction, and of the capital required, finally establishing the receipts and expenditure.

Estimate.

32. Admitting a length of ten miles of railway for seven inclines, including sidings and crossings, we will have per mile of 3' gauge.

	Rs.
Rails of 35 pounds per yard lineal, 55 tons each, 125 Rupees per ton on the spot	6,875
Formation levels and embankments	3,000
Cast-iron sleepers 72 pounds each, 150 Rupees per ton on the spot	8,900
Laying permanent-way	1,500
Allowance for culverts and bridges	5,000
Cast-iron pulleys and shoes, 342 per mile, at 15 Rupees each in place...	5,130
Total per mile ...	30,405
For ten miles of railway	3,04,050
Seven large Drums and Brakes each in a wooden frame, at 500 each complete	3,500
Seven miles of wire rope $1\frac{1}{2}$" diameter, 14·94 pounds per lineal yard or 11·75 tons per mile, for seven miles, 82·22 tons each 200 per ton	16,450

	Rs.
Nine Stations, including huts, etc., each 2,000	18,000
Forty waggons and trucks, with brakes, etc., at Rupees 500 each...	20,000
Purchase of land, tools, and machinery...	40,000
Superintendence and staff for two years' construction.	60,000
Contingencies...	38,000
Estimate, Total...	5,00,000

33. For establishing the returns, I think it would be better to charge for transport of goods or loads passing now through the ghaut, and to reduce the charges paid now to such a limit as to induce the traffic available to pass upon the Incline in preference. We see by tariffs published by several carrying agencies that from Kullaur to Coonoor the rates paid now are:

	Rs.	A.	P.
Per maund of 82 lbs. for luggage or Passengers' goods.	0	15	0
One Cooly	0	10	0
One Bullock...	0	12	0
One Donkey	0	8	0
One Horse or Pony	8	0	0
A Common Cart and one pair of Bullocks	10	0	0

34. From this we could say that a general charge of 8 annas per cwt. passing on the Incline from Kullaur to Coonoor would be considered as moderate. Accounting then upon 25 tons daily, we will have the following returns of receipts and expenditure:—

Receipts yearly.

	Rs.
Twenty-five tons of goods, at 8 annas per cwt., or 250 Rupees per day	91,250
Passengers one year	12,000
Total Receipts...	1,03,250

Expenditure.

For working the Incline, the expenditure would be yearly as follows:—

	Rs.
Wear and tear of rolling stock and apparatus, ten per cent. on its value 39,990	3,995
Maintenance of the permanent-way	7,000
Staff and Superintendence	12,000
Workmen and coolies	8,000
Sundries	2,000
Total Expenditure ...	32,995
The balance of profit would be equal to	70,255

or 14·05 per cent. interest.

35. In ending this report, I will show the economy which would result from the application of gravity on the proposed Incline. In supposing that stationary steam engines should be erected upon every platform for hauling up the cables,

and taking the data above for calculations, that is, five waggons loaded one ton each, and a speed of five miles an hour, the strain on the cable being for one train 4·96 tons, it would be necessary to have each steam engine of ($\frac{4\cdot96 \text{ tons}}{37 \text{ m}}$) 137 horse-power; these engines would be in same number as that of the Incline, and it is easy to perceive that besides the cost of erection which would alone perhaps reach 80,000 rupees, the price to be paid for fuel would be such as to prevent any profitable attempt to use steam-power.

36. It is true that the load and consequently the strain could be lessened, but supposing even one ton strain on the cable, the power required with the same speed would be ($\frac{1\cdot00 \text{ tons}}{37 \text{ m}}$) 27 horse-power, and we must arrive at the conclusion that with even a minimum of strain and speed, steam-power cannot be applied profitably upon a gradient such as that we have to deal with.

37. I will go further, and suppose that steam-power and gravity should be applied in combination; it would be proved that the outlay for one engine and the cost of fuel, etc., would preclude any attempt to work the proposed Incline under favourable circumstances.

38. I come now to the last information required by Government. As Civil Engineer, and not a financial speculator, my object is limited to the professional part of the project; considering this scheme as one of great utility to the public, and one which has chances of being a good investment, I come forward to ascertain whether Government would allow private parties undertaking such an enterprize, and would grant the lands necessary, the use of stream water, a guarantee against parallel competition, and the right of extension further; but I will leave to Bankers, or such competent persons, the financial arrangements they may deem necessary for carrying out the scheme. I think, however, that for the construction and working of the Incline, it would be well to form a Company, provided Government have no intention of constructing and working the line.

39. The funds or capital I think could be raised in India and England, and I confidently expect that this capital would be readily subscribed, if it were known that Government were taking a favourable view of the scheme.

40. I have the honour, Sir, to forward this report with a hope that Government will consider it favourably; the time has not come yet when regular railways could be laid for ascending the Neilgherries, but I think that a step should be made to afford more facility to the development of the resources of this tableland, and am of opinion that the subject is worthy the attention of Government.

No. 16. ORDER THEREON, 2nd May 1870, No. 1,155.

RAILWAY, No. 4.

IN this paper Mr. De Closets submits the explanations which, in Proceedings, No. 3,593, dated 11th December 1869, the Government called for to enable them to come to a definite decision on the merits of his scheme for constructing and working a self-acting narrow gauge railway incline from Kullaur, where the Neilgherry Branch of the Madras Railway will terminate, to Coonoor, with a possible extension of the line to Ootacamund at some future time.

Proceedings of the Madras Government, Public Works Department,
2nd May 1870.

2. Mr. DeClosets asks no pecuniary assistance either in the form of a subvention or a guarantee of interest on the Capital to be expended on the undertaking. All he asks is that he may have the countenance of Government so far as to be permitted to lay his railway on the slope of the hill between his terminal points; that he may have the right to use so much of the water of the Coonoor stream as may be necessary for his purpose, and finally that an assurance should be offered him that similar encouragement shall not be given to any rival enterprize.

3. Under the explanations furnished by Mr. De Closets the Government are willing to give the project, as now brought forward, their support to the extent sought, the required guarantee against competition being restricted to a limited period.

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To Mr. A. P. DeClosets, C. E.
To the Superintending Engineer, 7th Division, with G. O., No. 3,893, of the 11th Dec. 1869.

Exd. E. C. Shunker.

Govt. of {1870} Madras.

PUBLIC WORKS.

To

Mr. A. P. DeCLOSETS. C. E.

&c. &c. &c.

Dated May 2nd.

Recd. Encl.

G. O., 2nd May 1870, No. 1,155.

MAY

Nos. 15-16

Mr. DeClosets' self-acting narrow Gauge Railway.—Intimating that the Government are willing to support Mr. DeClosets' project to the extent sought; the required guarantee against competition being restricted to a limited time.

11

935

For Orders.

In this paper Mr. de Closets brings again forward his scheme for constructing and working a self acting narrow guage railway in- clive from Kullar, where the Neilgherry branch of the Madras Railway will ter- minate, to Coonoor, with a possible extension of the line to Ootacamund at some future time.

Mr. de Closets asks no pecuniary assistance either in the form of a sub-

subvention or a guarantee
of interest on the capital
to be expended on the un-
dertaking. All he asks is
that he may have the
countenance of Government
so far as to be permitted to
lay his railway on the
slope of the hill between
his terminal points, that
he may have the right
to use so much of the
water of the Coonoor stream
as may be necessary for
his purpose, and finally
that an assurance should
be offered him that
similar encouragement

Shall

shall not be given to any
rival enterprize.

As the Government de-
ferred the consideration of
Mr. de Closets proposals, as
at first submitted, on the
ground of their not being
sufficiently detailed, that
gentleman has now en-
tered into such full ex-
planations on all the points
on which information was
wanted, as are necessary to
enable the Government to
come to a definite decision
on the merits of the scheme.
The scheme is simple. It
embraces the construction
on the ascent between

between Killar and Coonoor,
of a line of 3 feet gauge
light railway on which, by
means of an endless wire
rope passing round a
drum suitably fixed at
the head of the incline,
ascending loads will be
hauled up by the weight
of descending trains, the
necessary preponderance
to effect this being given
to the latter by a small
quantity of water pumped
into a compartment of
the trucks fitted for the
purpose. As the line is

to be single, arrangements
for the crossing of the trains
midway will be made by
a well understood disposi-
tion of the rails at the point
of meeting.

The difference of level
between Killar and Coonoor
being 4700 feet, the incline,
if made in one section with
the gradient proposed to be
adopted by Mr. Desbœufs
of 1 in 6, would not require
to be quite 5½ miles in
length, but as so long a
rope would be inconve-
nient to work, it is pro-
posed to divide the ascent
into seven separate inclines,

each

each being worked by its own Rope independently of the others. This arrangement, with the doubling of the lines at the craping points and on the landing places, increases the length of rail to be laid, and Mr. Desclosets has consequently calculated upon requiring ten miles altogether, which appears to be more than an ample allowance. He has included in his estimate sufficient provision for all the works that seem to be necessary, as well as for plant and contingencies, and he arrives at the conclusion that the project may be carried out for a sum of about five lacs of Rupees.

For a return on a capital outlay of this amount Mr. Desclosets relies on all the traffic on the Coonoor Ghaut being transferred to the Railway incline in consequence of the reduction in the charge for transport which its construction will allow being effected. He has ascertained, on what appears to be pretty reliable data, that the traffic on the Ghaut averages at present about 12 or 13 tons per diem,

and

and on the assumption that it will rapidly extend under the facilities to be afforded to it by the Railway from Coimbatore to Kullar and by the Railway incline thence to Carroor, he bases his calculations on its reaching 25 tons per diem. This, at the very moderate charge of 8 annas per Cwt. for the ten miles of the ascent will, he estimates, yield Rupees 1,03,250 per annum, and, after deducting Rs. 32,995 for expenses, will leave Rs. 70,255 for division as profit.

These calculations are necessarily speculative, but there does not appear to be anything unreasonable in them.

Orders are requested.

under the explanation given by Mr. de Rosets I think that Govt. may at least atone to the publication of the scheme by promising the advantages required viz land water and security against competition. The last however I submit to Govt.

I still regard the project as one of a very speculative character and I conceive that the expenditure on the work is much underestimated. N.

A. J. D. S.

P. W. Dept 29

1755

Proceedings of the Madras Government.

Under date the 2 ~~May~~ 1870.

Read the following

A. De Clossets Esq.re C.E. Ferry Inter dated 31st January 1870.

In this paper Mr.
De Clossets submits the ex-
planations which, in Pro-
ceedings No. 3593 dated 11th Decr.
1869, the Government called
for to enable them to come
to ~~a definite~~ decision on the
merits of his scheme for con-
structing and working a self
acting narrow guage railway
incline from Kullar, where
the Neilgherry branch of the
Madras Railway will ter-
minate, to Coonoor, with

a

a possible extension of the line to Oakacamund at some future time.

Mr. De Closets asks no pecuniary assistance either in the form of a subvention or a guarantee of interest on the capital to be expended on the undertaking. All he asks is that he may have the countenance of Govt. so far as to be permitted to lay his railway on the slope of the hill between his terminal points, that he may have the right to use so much of the water of the Coonoor Streams as may be necessary for his purpose, and finally that an assurance should be offered him that similar encouragement shall not be given to any rival enterprize.

Under the explanations furnished by Mr. De Closets the Govt. are willing to bring the project, as now brought forward, their support to the extent sought, the required guarantee against competition being restricted to a limited period.

20

To Mr. A. P. de Closets C. E.
" the Supt. Engr., 7th Div. with
G. O. No. 3893 of the
11th Decr. 69.

Desp. 3/5/70.

C. No 935.

Govt. of {1870} Madras.

PUBLIC WORKS.

To Mr A. P. De Closets C. E

Dated

Recd. Rud.

G. O. 2 May 1870, No. 1155

Nos. 15-16

Mr. De Closets self-acting Narrow gauge Railways - Intimating that the Govt are willing to support Mr. De Closets' Project to the extent sought; the required guarantee against Competition being restricted to a limited time -