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MADRAS RECORD OFFICE.

Government of Madras.

Revenue. DEPARTMENT.

G.O. No.	123	Press Mis.
Dated	18	1871

Not to be folded or roughly handled

No. 255. Read the following Proceedings of the Board of Revenue, dated 7th December 1870, No. 6,976:—

Read the following letters:—

From the Acting Collector of Chingleput, to the Acting Secretary to the Board of Revenue, dated Saidapet, 14th September 1870, No. 377.

I HAVE the honour to forward, for the consideration of the Board, a letter, in original (to be returned), from the Salt Deputy-Collector Mr. Smith, proposing a modification of Mr. Grainger's plan for lifting salt from the boats and weighing it at the Madras Cotaur.

2. I beg to recommend that Mr. Smith's letter should be referred to Mr. Grainger for his opinion, and that the value of Mr. Smith's proposal should be tested by actual experiment.

ENCLOSURE No. 1.

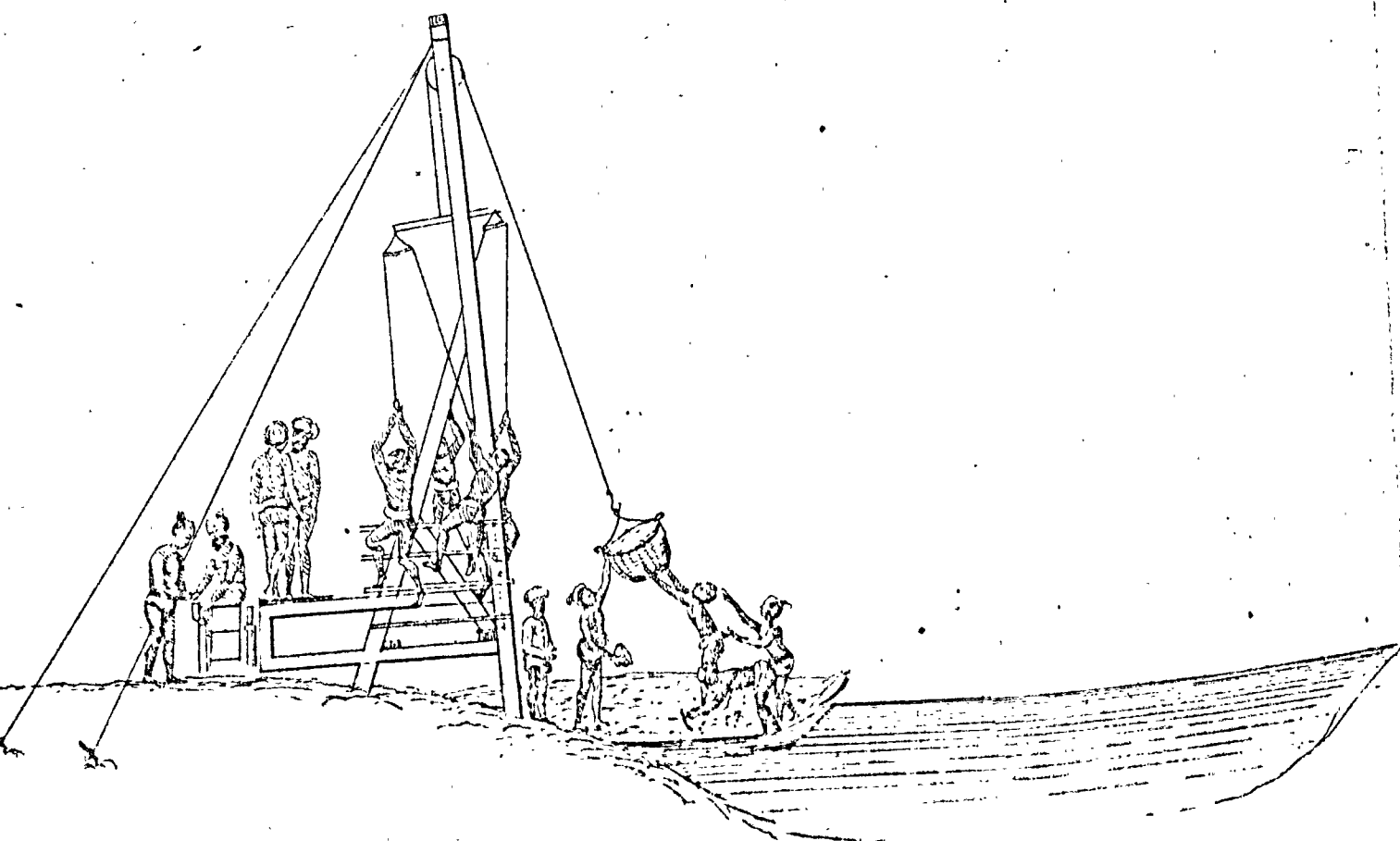
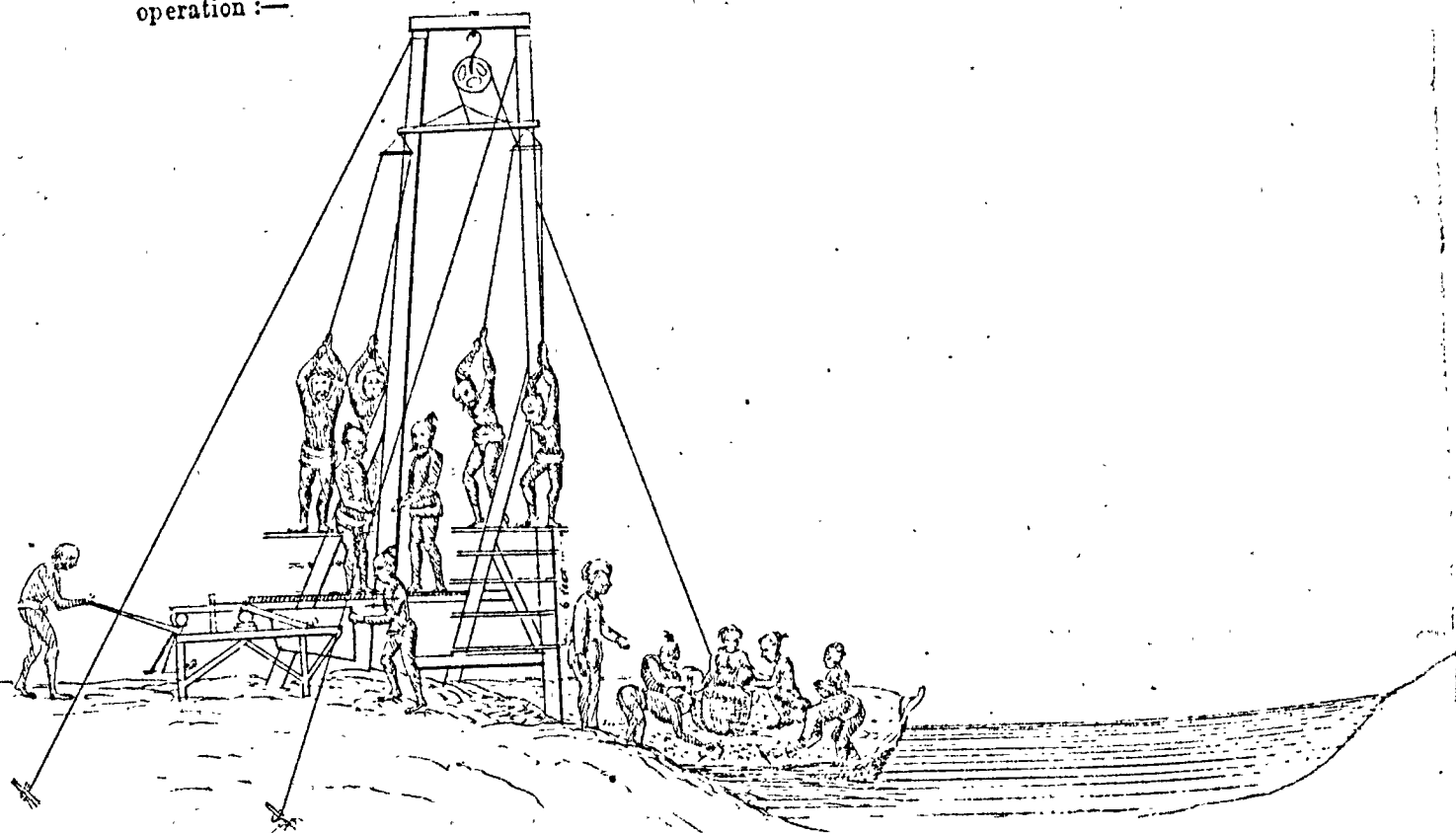
From the Deputy-Collector in charge of Salt, to the Acting Collector of Chingleput District, dated 13th September 1870, No. 237.

It is, I believe, under the consideration of the Board of Revenue to do away with the present salt weighing machines at the Madras Cotaur, and to substitute a new contrivance, with crane attached, devised by Mr. Grainger, General Superintendent, Public Works Workshops.

2. The new weighing machine appears to be well adapted to fulfil the object for which it has been made ; but the crane or gear for raising the salt from the boat seems to be a clog and an encumbrance upon the weighing capacities of the proposed machine.

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3. I subjoin two sketches of the machine and gear; the one exhibiting the contrivance as it stands with its complement of coolies ready for work, the other representing it in actual operation:—



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4. I may here state that thirty coolies* have been allotted by Mr. Grainger to work the machine and gear and remove the salt to the place of store. It will be seen that four of these coolies have really hard work, and such as they cannot sustain at a time for more than an hour or two. These are the four Jumpers; and since the gear cannot be continuously worked without their services, it has been considered necessary to employ a set of four additional Jumpers, in order that they may relieve the other party from time to time. These thirty coolies, Mr. Grainger states, should weigh 16 garce of salt per diem; but actual trial has shown that no more than 12 garce can be so weighed.

- * 8 Jumpers.
- 2 Catchers.
- 6 Fillers of salt in baskets in the boat.
- 1 Serang to superintend do.
- 1 Do. at the bank.
- 1 Do. at the machine.
- 3 Fillers of salt in baskets after it has been weighed by the machine and shot out.
- 8 Carriers of weighed salt to the place of store.

5. Admitting, however, that Mr. Grainger is right, and that 16 garce can be weighed per diem, the cost of the operation will be Rs.9-2-0, as will be presently shown. Now, if I can prove that double the quantity of salt, or 32 garce per diem, can be weighed with Mr. Grainger's machine but *without* the gear, and *with* the advantage of a reduction of cost and saving of unnecessary fatigue, is it too much to ask the Board, before they decide on adopting Mr. Grainger's gear, to be so good as to witness the operation and to judge for themselves?

6. The plan that I would respectfully propose, in modification of Mr. Grainger's design, is to dispense with the gear altogether. According to that gentleman's plan, the salt after being filled in baskets is raised from the boat by means of the gear; and being emptied and weighed in the machine alongside, is shot out and carried in baskets on women's heads to the place of store. In lieu of this, I would suggest that, dispensing with the gear, the salt be conveyed in baskets from the boat itself direct to the storing ground, and be there weighed in Mr. Grainger's machine and received into store. This operation, as before observed, can be performed at less cost with less fatigue, and consequently with quicker despatch than with the aid of the gear.

Cost of weighing and heaping with the proposed machine and gear in a day of 8 working hours.			Cost of weighing and heaping with the proposed machine without the gear in a day of 8 working hours.			Cost of weighing 32 garce at Rs. 9-2-0 for 16 garce, as shown in columns 2 and 3.	Deduct the amount in column 6 from that in column 7. The difference being the saving effected without the gear on every 32 garce as shown below.
Number of Coolies.	Quantity that may be weighed.	Amount of hire.	Number of Coolies.	Quantity that can be weighed.	Amount of hire.		
1	2	3	4	5	6	7	8
	GARCE.	RS. A. P.		GARCE.	RS. A. P.	RS. A. P.	RS. A. P.
30	16	9 2 0	30	32	7 6 0	18 4 0	10 14 0

7. It will thus be seen that while the cost of weighing 32 garce of salt according to Mr. Grainger's plan is Rs. 18-4-0, the cost of conducting the operation in the way I propose is only Rs. 7-6-0, showing a saving of Rs. 10-14-0 on every 32 garce weighed, as suggested by myself.

8. There is another point of view in connection with which I fear that the proposed substitution of the new machine and gear has not been sufficiently considered. As they are now fixed,

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salt can be weighed for the supply of only that portion of the platform which lies directly opposite; and hence, it will be necessary to set up the new machine and gear in different parts of our extensive platforms to facilitate storage. It is calculated by Mr. Grainger that twenty of these machines, with gear, will be sufficient. If so, as they will be set up at different platforms and different parts of even the same platform,

Establishment required for 20 machines and gear.					Rs.
3 Clerks on 35	Rs. each	...	...	...	105
3 Do. 30	" do.	...	...	...	90
3 Do. 25	" do.	...	...	...	75
3 Do. 20	" do.	...	...	...	60
8 Do. 15	" do.	...	...	...	120
20 Peons 7	" do.	...	...	...	140
					590

Deduct present Storage Establishment.					Rs.
2 Clerks on 35	Rs. each	...	...	...	70
1 Do. 30	" do.	...	...	...	30
1 Do. 25	" do.	...	...	...	25
2 Clerks 20	" each	...	...	...	40
2 Do. 15	" do.	...	...	...	30
8 Peons 7	" do.	...	...	...	56
					251
Per mensem ...					339

the establishment noted in the margin, amounting to Rs. 339 per mensem, will be required to superintend the weighing of the salt into store. Is this establishment likely to be sanctioned, when the results expected can be achieved at a smaller expenditure, with quicker despatch, and less wear and tear of body, in the manner in which I have shown it can be done by dispensing with the gear? I have no predilection for, or prejudice against, the proposed machine and gear. On the contrary, what appeared to me worthy of adoption I have recommended, to wit, the machine itself; but the gear being in my opinion ill adapted to the object in view, as involving greater pecuniary expenditure in its working, with no compensating advantage as regards despatch, I have ventured respectfully to advise its rejection as not suited to the requirements of this department.

9. I may here state that, with the exception of seven boat-loads of salt which will this day be weighed into store, no salt is available for experiments.

From the Acting Collector of Chingleput, to the Acting Secretary to the Board of Revenue, dated Saidapet, 23rd September 1870, No. 392.

In continuation of my letter of the 14th instant, No. 377, I have the honour to enclose, for the information of the Board, a copy of Mr. Smith's letter reporting the completion of the heap under storage this morning.

ENCLOSURE No. 1.

From the Deputy-Collector in charge of Salt, to the Acting Collector of the Chingleput District, dated Madras, 23rd September 1870, No. 214.

I HAVE the honour to inform you that I finished the weighing of the Voyalur salt so far as the completion of the heap under storage before the Board was concerned at 5 minutes past 9 A.M.

2. The weighing commenced at 5 minutes to 7 and concluded as abovesaid at 5 minutes past 9.

3. The quantity weighed during this time was 6 garce and 79 maunds, being at the rate of 3 garce 8½ maunds per hour.

* 18 Men.
12 Women.
—
30

4. It must be borne in mind that these weighments have been made with the eighteen women and nine men coolies, being three men less than those* allowed for the weighing of the salt with Mr. Grainger's gear.

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5. The withdrawal of the assistance of three able-bodied men must, of course, tell largely upon the results of the operation.

6. The remainder of the salt, 1 garce, was weighed in 17 minutes, with the reduced number of men.

7. I have not the least doubt that an average of 20 garce per day can be weighed with Mr. Grainger's machine in the way in which I propose to conduct the operation.

From the General Superintendent, Public Works Workshop and Stores, to the Acting Secretary to the Board of Revenue, dated Chepauk, 21st October 1870, No. 1,275.

I HAVE the honour to acknowledge receipt of the Board's Proceedings, Miscellaneous No. 967, dated 23rd September 1870, enclosing, in original, letter (herewith returned) from Mr. Smith, Deputy-Collector in charge of Salt at Madras, proposing a modification of the plan for unlading and storing salt verbally proposed by me to the Board, and which plan has been experimented on at the Madras Cotaurs.

2. This plan consisted in the unlading of the salt from the boats by means of a "whipping frame" and the weighing of the salt *net*. The promised advantages by this arrangement were—

1st.—The saving of Rs. 8 per heap of 20 garce stored.

2nd.—Increased accuracy and speed in weighing.

3rd.—The correct and simple determination of the quantity of water in excess in the salt.

These will be treated of in their order, under the heads of "Unlading," "Weighing," and "Correction for water."

3. UNLADING.—The whipping frame or, as Mr. Smith styles it, "crane," having been illustrated and described in that gentleman's letter, a repetition here is unnecessary. It has proved the correctness of the views entertained of its efficiency for a saving of Rs. 3-0-10 in its favour alone, *vide* Extract A., and a saving of Rs. 8-8-9, *vide* note at foot of Table II., when working with "whipping frame" and weighing machine together, and which fully proves the correctness of first promised advantage will be shown by comparing extracts (herewith enclosed) from Tables I., II., and III., which tables were given me by the Superintendent of Salt as a correct Statement of working. Table I. relating to previous working up to this date. Table II. being a Statement of working with the whipping frame and new pattern weighing machine under that officer's supervision, and Table III. a Statement of working in a manner which Mr. Smith proposes and calls his modification in his letter, though that gentleman was well aware that it was the first method adopted when the new weighing machine was sent to the Cotaurs. The weighing machine was afterwards employed with the "frame" for reasons stated in paragraph 11 of this letter.

B

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Extract A.

From Table I.		From Table II.	
	RS. A. P.		RS. A. P.
Remarks column B., hire for unloading.	42 0 0	Jumpers...	3 0 0
A. and B. forming ...	4 15 3	Catchers ...	0 8 0
Total per heap of 80 garce ..	46 15 3	Fillers in basket at boat ...	1 8 0
		*Serang...	
		† Do. at the bank ...	0 4 0
		‡ Carriers of salt to the heap ...	1 8 0
		Total per heap of 16 garce...	6 12 0
		Therefore for heap of 20 garce.	8 7 0
		§ Hire for 1 cooly at Annas 4 for heaping...	0 4 0
Therefore for heap of 20 garce ...	11 11 10	Total...	8 11 0
		Balance in favour of "whipping frame" alone ...	3 0 10
			11 11 10

Note.—* The Serang was the man in charge of my people whilst they were at work at the Cotaurs, and would not have been required could dependence have been placed on them.

† This charge, though admitted here, could be avoided if the "catchers" were to throw the basket back properly into the boats.

‡ By the former method unloading was not completed until the salt was delivered near the site of heap, whilst these carriers deliver the salt on the heap, thus dispensing with part of the labour required in heaping salt.

§ One cooly for 4 Annas by the help of the carriers† is sufficient to heap the salt which was observed by the Board.

4. Apart from these advantages, the "whipping frame" has been the means of exciting a spirit of competition, which has shown beyond a doubt the extravagantly high rates that have been paid for cooly-labour up to the present time; for in the table, columns 4 and 5, in paragraph 6 of Mr. Smith's letter, he says that, with thirty coolies, he can raise and weigh 32 garce of salt per day, and as six of these coolies are allotted by him to the weighing machine, though three only are required, the 32 garce can be raised by twenty-four coolies only. Now referring to column 1 of Table I., it is shown that, for every garce of salt taken from the boats, the labour of two coolies was charged, and, therefore, in raising 32 garce, the labour of sixty-four coolies was formerly charged; but Mr. Smith says he can now do the same work with twenty-four coolies, so that it is evident that the labour of forty coolies has been charged in excess for every 32 garce of salt unloaded, which amounts to the labour of (150) one hundred and fifty coolies per diem for six months in the year, being charged in excess of a correct and easily calculated estimate.

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Extract B.

From Table I.	Garce.	COLUMNS 4 AND 5 OF TABLE IN PARAGRAPH 6 OF MR. SMITH'S LETTER.			
			Number of coolies.	Quantity that can be weighed.	
1	2	3	4	5	6
				Garce.	
Quantity that can be taken from boats by 100 coolies per day ...	50		30	32	
Or 2 coolies for ...	1				
So that 64 coolies are required for ...	32				
64					30
24					6
					24

Difference of 40 coolies per heap of 32 garce, or one hundred and fifty coolies for 120 garce, which is the average quantity stored daily, as per column 9 of Table I.

5. These results cannot be explained away by Note 3 in the column of remarks attached to Table III., for, if the platform weighing machine could not be worked so quickly as the new weighing machine, a greater number of the former machines were employed to weigh the average quantity of 120 garce per day, than will be required of the latter machine, and as the number of machines employed in the weighing of the salt can have no effect whatever in the cost of labour for unloading it, these operations being separate and quite distinct from each other, and charged for as such, as shown in Notes A. and B., in the remarks column of Table I. Under these circumstances, an explanation of such a result should certainly be demanded from those officers concerned.

6. The saving of Rs. 10-14-0 on every 30 garce of salt unloaded and weighed as mentioned in paragraph 7 of Mr. Smith's letter is not the only saving effected by the new machine, but only the difference of saving effected when working with and without the whipping frame.

Extract C.

From Table I.		From columns 5 and 6 of table in paragraph 6 in Mr. Smith's letter.	
	RS. A. P.		RS. A. P.
Remarks Column.			
B. Hire for unloading ...	42 0 0	Cost of weighing and heaping without the gear for a heap of 32 garce ...	7 6 0
" do. weighing ...	30 0 0		
A. and B. do. forming ...	4 15 3	Total...	7 6 0
Total per heap of 80 garce as per column 6 ...	76 15 3	Therefore for heap of 20 garce ...	5 9 9
Therefore for heap of 20 garce ...	19 3 10		
Total...	19 3 10		4 9 9

Difference or saving per heap of 20 garce in Rs. 14-10-1.

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Of the estimated cost of Rs. 7-6-0 per heap of 32 garce, or Rs. 4-9-9 per heap of 20 garce, when working with the new machine, as per Extract C., not more than 10 per cent. should be allowed for contingencies, such as delay of boats, wet weather, etc.

7. The difficulties and extra expense shown in paragraph 8 of Mr. Smith's letter are imaginary, and arise from that gentleman's unappreciability of the advantages derivable from the employment of the "whipping frame." Mr. Smith in this paragraph having introduced the subject of *increase* of establishment, I would respectfully remark *en passant* the *reduction* of establishment that should now be effected by the introduction of the new weighing machine, as no doubt Mr. Smith will agree to its possibility for the greater efficiency of the new machine compared with the platform machine, will permit of a reduction in the number of machines employed by about one-half, and consequently the number of persons necessary to tabulate the weighments should be reduced in like manner, as *the same number of machines* in both cases can be allotted to one person.

8. **WEIGHING.**—The new pattern weighing machine is shown in the sketch attached, and requires two coolies to attend the filling and discharging of the salt from the scale-pan. The women filling the scale-pan by walking up a plank and emptying their baskets into it. The third cooly attends to the correctness of weighment, and to take the strain off the knife edges by means of the lever shown. Simplicity, accuracy, and non-liability to get out of order are the points obtaining in its construction. The hanging of the scale-pan from the lever by hooks or links is a new feature, and should be applied to all the *copper cup scales* now in use, which application would give more accurate results in their employment.

9. This improvement to the cup scales can be effected in the districts, the necessary parts being supplied from the workshops.

10. The question of constructing the pans of the new machines of sheet copper should stand over, until they have been brought well into use, for, whilst not necessitating renewal as often as the sheet iron, it will certainly involve a larger amount of expense than would at present be expedient.

11. The method of employing the new machines that Mr. Smith proposes in paragraph 6 of his letter is that intended when using the machine in the district, and was the one adopted when the new machine was first sent to the Cotaurs; but as I could not then obtain a greater efficiency in weighing than 3·2 compared with the platform weighing machine, whilst an efficiency of 2·1 was obtained with the "frame" and machine together, it was, therefore, more advantageous to work with the frame; but as Mr. Smith has *now* been able to get more work from the coolies than I could, and as he promises a continuance of such, it is certainly unnecessary to employ the "whipping frame."

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12. The cost of weighing by the old and new method is shown in the following:—

Extract D.

From Table I.		Paragraph 8 of this letter.	
<i>Remarks Column.</i>	RS. A. P.		RS. A. P.
B		Three coolies only are required to work the new machine at a cost of 4 Annas each per day...	
Hire for weighing 80 garce...	30 0 0		0 12 0
or for			
Heap of 20 garce ...	7 8 0		
Cost per heap of 20 garce by new method ...	0 7 6		
Balance of saving effected per heap of 20 garce...	7 0 6		

This amount of Rs. 7-0-6 is included in the saving of Rs. 14-10-1 shown in Extract C. of this letter, from which the value of the extra cooly-labour that has been paid for, according to Extract B., is shown in the following extract:—

Extract E.

	RS. A. P.
Saving per heap of 20 garce for unlading and weighing, etc., as per Extract C.	14 10 1
Saving effected per heap of 20 garce in weighing only as shown by Extract E.	7 0 6
Difference or saving in the cost of unlading a heap of 20 garce, between the former method and what Mr. Smith now says in his letter can be done	7 9 7
Taking the average quantity stored to be 120 garce daily, as per column 9 of Table I., the daily excess of payment for cooly hire is...	45 9 6

13. **CORRECTIONS FOR WATER.**—That the salt received for storage is not generally of the standard quality is already known to the Board, and I believe it is their intention to rectify it as soon as it can be done on correct principles. I therefore respectfully submit the following arrangement to the Board for their opinion—

14. The per-centage of water in the salt whilst being stored is ascertained by the following arrangements:—The pan of the scale having been made of the capacity of 28 merkals, and 28 merkals of salt when fairly measured is equivalent to a weight of 8 Indian Maunds of standard salt. These are, I believe, the equivalents already established by the Board; the scale-pan having been filled with salt is struck off level with the edges, it is then weighed, and if the salt is of standard quality, the weight would be 8 Indian Maunds exactly; but it will generally be found to weigh more, according to the excess of water, and if three such weighments are made when unlading each boat, say, one at the commencement, one at about the middle, and one at the end of the unlading, and the mean of these excess weights taken, a very fair average may be obtained of the condition of the salt

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received. The salt raised between each such weighments should be simply weighed in 8 Maund quantities on to the heap.

In the first column of Table IV., attached to this letter, the number of pounds in the above mean of excesses should be sought, opposite which, in column 2, will be found the number of pounds of salt that should be put into the heap to complete the quantity of 20 garce. Column 3 shows the per-centage of water in excess in the salt. Should, however, the salt be so dry that the scale-pan when struck off weighed less than 8 Indian Maunds, then the mean of the number of pounds required to complete the 8 Maunds weighments should be sought for in column 1, opposite which, in column 2, will be found the number of pounds that should be taken from the heap, to make a correct storage of 20 garce.

In illustration, three cases are shown in the following Statement F:—

	Pounds.	Mean.	Remarks.	
<i>1st Case.</i>				
Excess of 1st weighment	+35	+ 40 lbs. correction should be added.	to be added to the heap being positive.	
Do. 2nd do.	+40			
Do. 3rd do.	+45			
	3/120			
	+40			
In column 1 opposite	40			
Is found in column 2	12,000			
Per-centage of water in column 3	5,728			
<i>2nd Case.</i>				
Deficiency in 1st weight	—12	—7 lbs.		to be taken from the heap being negative.
Do. 2nd do.	—7			
Do. 3rd do.	—2			
	3/21			
	—7			
In column 1 opposite	7			
Is found in column 2	2,100			
Per-centage of water in column 3	1,052			
<i>3rd Case.</i>				
Deficiency in 1st weighment	—3	+19 lbs.	to be added to the heap being positive.	
Excess in 2nd do.	+19			
Do. 3rd do.	+41			
	3/57			
	+19			
In column 1 opposite	19			
Is found in column 2	5,700			
Per-centage of water in column 3	2,805			

15. These corrections necessary to complete the heaps of 20 garce should each be made by the Superintendent or other officer in charge of a Salt Depot; that officer and the writers employed in storing may each be supplied with a similar table to Table IV. If the Board approve of this method, a revised table will be

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submitted, in which the pounds figures in column 2 will be converted into maunds for general use. This method will not increase the duties of the Salt Superintendents, the average daily number of heaps stored at the Madras Cotaurs being six, whilst the *maximum* will not be more than twelve or fifteen heaps, and, therefore, the same number of corrections will be all that is required, whilst it will of course increase slightly the responsibility of those officers; but as they are, to a considerable extent, responsible at present, and from the anomalous result obtaining in the Salt Department, which give rise to suspicions of fraud committed by the employes,* this question should certainly be solved in all fairness to those officers, for the quantity of water in excess in salt when being stored, will, in some cases, exceed 5 per cent. and a deficiency of at least 3 per cent. will be shown, when the same heap is weighed again after being stored for some time, and the salt has been dried, which deficiency will, and does, give rise to grave suspicions, but by adopting the above system, the cause for such suspicion will soon be brought to the test.

* Vide paragraph 9 of Board's Proceedings, No. 8,514, of 18th November 1869.

16. The salt manufacturers will also have to give more attention than they do at present to the drying of the salt, and to a much better mode of transport from the salt-pans than in the boats which require water to be thrown out of them, at the same time the salt is being taken to the weighing machines, the manufacturers of course being paid for water as well as salt.

17. The principles upon which these corrections are based are *correct weighing*, tested by *correct measurement*, provided the Board consider that the scale-pan of a capacity of 28 merkals, and filled by the emptying of baskets into it, is a fair equivalent for 28 merkals of salt. By this means, the unfairness of the *deep strike* of the merkals measure into a heap of salt is avoided. The question of the variation in size of the salt crystals must enter into this consideration, for if salt composed entirely of large crystals, and salt composed entirely of small crystals, were separately measured and weighed in the above manner bulk for bulk, there will be found to be a slight difference in the weights, the small crystals being heavier, or there is more salt in the measure when it is small than when large, a result, I believe of experiments, made in these extreme and well known cases; but in the salt as generally stored, these extremes do not obtain, for the salt then consists of a mixture of the two sizes, and in such cases, the variations in weight of equal bulks of equally dried salt will be found inappreciable.

18. In the foregoing paragraphs of this letter, the advantages derivable from the proposed method of dealing with the salt-question have been stated and compared with the former method, some remarks on Mr. Smith's second letter† will now enable me to complete a State-

† A copy with Board's Proceedings, Miscellaneous, No. 987, dated 27th September 1870.

ment of the *actual saving* that can be effected.

19. Mr. Smith in paragraph 3 of his second letter states that the quantity unladed and weighed during the experiment of the 23rd September was 3 garce and 8½ maunds per hour, and that this work was done by eighteen women and nine men as per paragraph 4, and it is also stated in paragraph 5 that "the withdrawal of the assistance of three able-bodied men must of course tell heavily

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upon the result of the operation." Now Mr. Smith has continually persisted in allotting six men-coolies to work the new machine, whilst three only are required, which, was so obvious to the Board during that experiment that Mr. Smith was requested by the Board to send the three men-coolies away, who were giving *no assistance* at the time, and consequently entailed *no loss* in the result of the operation, but showed really a *saving* of their hire.

20. From paragraph 3 of Mr. Smith's second letter, $3\frac{1}{2}$ garce per hour was unladed and weighed, and from paragraph 6 of the same letter, the unlading and weighing was one garce in 17 minutes, or rather more than $3\frac{1}{2}$ Garce per hour; so that in these experiments we may say that 3 garce per hour was the work done; this would give 24 garce per day of eight working hours, allowing $16\frac{2}{3}$ per cent of this for contingencies, 20 garce per day, as per paragraph 7 of Mr. Smith's letter to be the average quantity unladed, weighed, and heaped, the cost of which is shown in Statement G.

Particulars.	RS.	A.	P.
The daily hire of thirty coolies first employed by Mr. Smith was as per table in paragraph 6 of his first letter	7	6	0
Deduct for three men-coolies at 4 Annas each sent away	0	12	0
Daily hire of the twenty-seven coolies, who unloaded, weighed, and heaped, <i>vide</i> heading to columns 4, 5, and 6 of table, in paragraph 6 of Mr. Smith's first letter	6	10	0

The difference between the cost shown in this statement and the former rates shown in Statement C. extracted from remarks column of Table I. will be the real saving effected, as shown in the following Statement II:—

Table I.	RS.	A.	P.		RS.	A.	P.
REMARKS COLUMN B.							
Hire for unlading	42	0	0				
Do. for weighing	30	0	0				
Do. for forming this Item is obtained by taking the proportion of coolies in A. required for forming or 24-44 of Rupees 9-1-4.	4	15	3	Cost of unlading, weighing, and heaping a bed of 20 garce.	6	10	0
Total for heap of 80 garce ...	76	15	3				
Therefore for heap of 20 garce ...	19	3	10	Real saving effected by new machine.	12	9	10
				Total ...	19	3	10

21. In the generality of good seasons about 20 lacs of maunds of salt are stored at the Madras Cotaurs alone, and if the new machine is employed in the storing of this amount, a net saving of Rs. 10,512-2-4 would be effected *every year* at this Salt Depôt.

22. One machine will be required for the storing of a heap of 20 garce per day, and six such heaps or 120 garce, *vide* column 9 of Table I. are stored on

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average daily, the *maximum* number of machines in use on any day will be about twelve; and allowing three more in store in case of accident, fifteen machines will be sufficient for the requirements of the Madras Cotaurs. The outlay for fifteen machines at Rs. 140 each will be Rs. 2,100.

23. This year about 18 lacs of maunds have been stored at the Madras Cotaurs, and had the new weighing machine been used at the commencement of the season, a clear saving of Rs. 7,360-15-0 would have resulted, after the new machine had been paid for, as shown below:—

	RS.	A.	P.
Saving on 18 lacs of maunds, at Rs. 12-9-10 per 20 garce...	9,460	15	0
Cost of fifteen machines, at Rs. 140 each	2,100	0	0
Saving ...	7,360	15	0

24. A similar saving will also be effected in the *weighing at least* in the districts, the probable amount of which can be easily ascertained by the Board from the above data.

TABLE I.

STATEMENT showing the number of coolies required for storing 80 garce heap and the cost for the same.

Quantity that can be taken from boats by 100 coolies per day.	Cost.	Whether salt is dried before storing into heaps.	Distance from the required position of the finished heap if salt is spread.	Time.	Number of coolies required to store a heap of 80 garce in a day.	Cost.	Time of storage.	Quantity daily stored.	Remarks.
1	2	3	4	5	6	7	8	9	10
50 garce or 6,000 Maunds.	Rs. A. P. 26 4 0	No.	As the salt is not dried before storage, the distance cannot be stated.	Cannot be stated.	Total number of coolies required is A. 284, as particularized in the Remarks column.	Rs. A. P. B. 126 1 4	Six months commencing April 14, 1900 exclusive of six days (Sundays and holidays) in each month.	120 garce or 14,400 Maunds on average.	A. For unloading 160 coolies: weighing 80 " forming 24 " covering 20 " 284 B. Hire for unloading " weighing " forming and covering 9 1 4 Sundries " 3 0 0 Value of palmyra leaves " 42 0 0 Total... 126 1 4

MADRAS,
8th July 1870.

(True Copy.)

(Signed) M. CHINNASAWMY,
Superintendent of Salt.(Signed) J. N. GRAINGER,
Genl. Supt. P. W. Workshop and Stores.

ENCLOSURE No. 2.

TABLE II.

Present system of weighing 16 garce of salt with the gear.

Description of coolies required.	PARTICULAR OF COOLIES.			Rate per cooly.			Total amount.
	Men.	Women.	Total.	RS.	A.	P.	
Jumpers ...	8	...	8	0	6	0	3 0 0
Catchers ...	2	...	2	0	4	0	0 8 0
Fillers in basket at the boat	6	...	6	0	4	0	1 8 0
Do. Serang ...	1	...	1	0	6	0	0 6 0
At the bank ...	1	...	1	0	4	0	0 4 0
At the scale ...	1	...	1	0	4	0	0 4 0
Fillers in baskets the weighed salt at the scale...	3	...	3	0	4	0	0 12 0
Carriers of salt to the heap ...	...	8	8	0	3	0	1 8 0
Total ...	22	8	30	...	...	...	8 2 0
Note.—Former rate for 16 garce is Rs. ...							14 6 4
Deduct present for 16 garce ...							8 2 0
Saving ...							6 4 4
Saving for a heap of 20 garce ...							7 13 5
Deduct hire for four coolies, at 4 Annas each, for heaping salt. ...							1 0 0
* Net saving ...							6 13 5

* or a saving of ... 8 8 9

per heap of 20 garce.

(True Copy.)

(Signed) J. N. GRAINGER,
General Supt. P. W. Workshop and Stores.

Proceedings of the Madras Government, Revenue Department,
18th January 1871.

ENCLOSURE No. 3.

TABLE III.

Proposed system for weighing 32 garce by placing the new scale on the spot where the salt is to be stored, and getting it filled with salt by coolies from the boat without the gear.

Description of coolies required.	PARTICULAR OF COOLIES.			Rate per cooly.			Total amount.		
	Men.	Women.	Total.						
For unloading ...	...	18	18	0	3	0	3	6	0
For filling baskets at the boat.	6	...	6	0	4	0	1	8	0
For weighing and filling the scale with salt.	6	...	6	0	4	0	1	8	0
Total ...	12	18	30				6	6	0

Remarks.

1. Two garce could be weighed in an hour per day, with the gear.

2. Four garce could be weighed in an hour, or 32 garce per day, by placing the new scale on the spot where the salt is to be stored, and getting it filled with salt by coolies without the gear.

3. The considerable saving and expeditious weightment are attributable to the new scale invented by Mr. Grainger.

4. Out of the savings of Rs. *21.6.9 for 32 garce, a reasonable allowance is to be made for the delay in storing the salt for want of boats or inclemency of weather.

Note—Former rate for unloading and weighing 32 garce is Rs. 23 12 9

Deduct present hire 6 6 0

Saving 22 6 9

Deduct hire for coolies, at 4 Annas each, for heaping salt. 1 0 0

Net saving for every 32 garce. *21 6 9

(True Copy.)

(Signed) J. N. GRAINGER,
General Supt. P. W. Workshop and Stores.

Proceedings of the Madras Government, Revenue Department,
18th January 1871.

ENCLOSURE No. 4.

TABLE IV.

Correction for Water.

1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	Remarks.
1	300	00-151	17	5,100	2-517	33	9,900	4-772	49	14,700	6-928	65	19,500	8-999	The figures in column 2 are obtained by multiplying the corresponding figure in column 1 by 300.
2	600	00-303	18	5,400	2-662	34	10,200	4-911	50	15,000	7-058	66	19,800	9-112	
3	900	00-453	19	5,700	2-805	35	10,500	5-048	51	15,300	7-190	67	20,100	9-238	
4	1,200	00-604	20	6,000	2-948	36	10,800	5-185	52	15,600	7-321	68	20,400	9-363	
5	1,500	00-753	21	6,300	3-091	37	11,100	5-322	53	15,900	7-450	69	20,700	9-487	
6	1,800	00-903	22	6,600	3-233	38	11,400	5-458	54	16,200	7-581	70	21,000	9-601	
7	2,100	1-052	23	6,900	3-376	39	11,700	5-593	55	16,500	7-711	71	21,300	9-736	
8	2,400	1-200	24	7,200	3-518	40	12,000	5-728	56	16,800	7-839	72	21,600	9-859	
9	2,700	1-349	25	7,500	3-659	41	12,300	5-863	57	17,100	7-969	73	21,900	9-982	
10	3,000	1-556	26	7,800	3-799	42	12,600	5-997	58	17,400	8-173	74	22,200	10-105	
11	3,300	1-643	27	8,100	3-939	43	12,900	6-132	59	17,700	8-225	75	22,500	10-228	
12	3,600	1-790	28	8,400	4-079	44	13,200	6-265	60	18,000	8-352	76	22,800	10-350	
13	3,900	1-936	29	8,700	4-219	45	13,500	6-398	61	18,300	8-481	77	23,100	10-472	
14	4,200	2-083	30	9,000	4-360	46	13,800	6-531	62	18,600	8-607	78	23,400	10-594	
15	4,500	2-228	31	9,300	4-497	47	14,100	6-664	63	18,900	8-733	79	23,700	10-725	
16	4,800	2-373	32	9,600	4-636	48	14,400	6-796	64	19,200	8-861	80	24,000	10-835	

(Signed) J. N. GRAINGER,
General Supt. P. W. Stores and Workshop.

*Proceedings of the Madras Government, Revenue Department,
18th January 1871.*

ENCLOSURE No. 5.—One Plan.

This letter will be submitted to Government in continuation of the Board's Proceedings, No. 4,770, dated 9th July 1870, and with reference to paragraph 5 of those dated 13th September 1870, No. 5,700. Mr. Grainger has proved conclusively the superiority of his weighing machine both in respect to economy and accuracy in weighing, and this fact is admitted by all who were present at the experiments made with it. The Board have therefore no hesitation in recommending Government to substitute machines of this pattern for those at present in use

Board's Procs.,	2nd May 1862,	No. 2,798.
"	23rd Aug. "	" 5,591.
"	2nd April 1864,	" 1,921.
"	15th " "	" 2,297.
"	19th May " "	" 3,061.
"	28th March 1866,	" 2,222.
"	23rd May " "	" 3,591.
"	18th Jan. 1868,	" 401.
"	3rd April " "	" 2,478.
"	8th " 1869,	" 2,366.
"	12th " "	" 2,467.
"	1st Nov. " "	" 8,107.
"	18th " "	" 8,514.
"	16th March 1870,	" 1,811.
"	9th July " "	" 4,770.

throughout the Presidency. The Board need only refer to the correspondence noted in the margin to show how frequently complaints have been made of the inaccurate and untrustworthy character of the platform machines; but it has always been considered impossible to discover any form of machine better adapted to what were described to him as the peculiar requirements of the Salt Department "under the present method of weighing salt," that is in baskets.

2. The adoption of Mr. Grainger's plan for testing and correcting the dampness of salt (which the Board also strongly recommend) renders it the more essential to have a machine which shall contain the correct equivalent of 8 maunds of what is called "standard" salt when *fairly* measured. It is only necessary to point out the manifest injustice that may be done to the employes of the department where salt that has been stored wet is found on being weighed again to have diminished in bulk simply from its having become more thoroughly dried, in order to show how necessary it is that some allowance should be made for the condition of the salt when stored. It is equally obvious that Government are bound to take every possible precaution to ensure to the wholesale purchaser the full weight of *standard* salt as nearly as it can be done; and, on the other hand, it is right to avoid giving a premium to the manufacturer for bad wet salt, paying him, in fact, (as Mr. Grainger says) for water as well as salt.

3. The Board therefore resolve to request *early* sanction for an expenditure of Rs. 7,000 for the purchase of 50 machines at Rs. 140 each. The charge can be met from the general savings under Salt and from the sale of the old platform machines, and the Board believe that Mr. Grainger is right in estimating that the cost of the machines will be more than saved in the first year. They have ascertained from Mr. Grainger that he will probably not be able to provide more than 50 before the close of the official year. Sanction for a further expenditure of Rs. 27,160 for the remaining 194 required may therefore be deferred till next year.

4. Should Government see fit to accede to this proposal, the sanction granted for an expenditure of Rs. 3,172 on the alteration and improvement of the old machines in Government Order, No. 1,218, of the 10th August 1870, may be cancelled and the amount therein sanctioned will be applied to the present purpose.

*Proceedings of the Madras Government, Revenue Department,
18th January 1871.*

5. In paragraphs 3 to 7, 12, and 19 to 21 Mr. Grainger enters into calculations which tend to show that the rates paid for unloading and storing at the Madras stores, even under the present system, have been most exorbitant.

6. The Collector will be requested to call upon Mr. Smith for a full explanation of those parts of the letter which reflect upon the administration of the Salt Department, and in the meantime the Board will refrain from comment. Mr. Smith should be careful to distinguish in his report between the two distinct operations of unloading and weighing, and should avoid entering upon irrelevant subjects confining himself closely to Mr. Grainger's statements and depending as much as possible on *figures only* for his explanation.

No. 256.

ORDER THEREON, 18th January 1871, No. 123.

Separate Revenue, No. 20.

Salt.

THE proposed purchase of 50 machines is sanctioned.

2. The Deputy-Collector's explanation which has been called for will

in due course be submitted to Government.

(True Extract.)

(Signed) W. HUDLESTON,

Secretary to Government.

To the Board of Revenue.
,, the Accountant-General.

Exd. F. R. Bantleman.

Gr 3349/73

Salt Weighing Machine.—Proposed purchase of 50 machines sanctioned. Bound to submit Salt Deputy-Collector's explanation with reference to the administration of the Salt Department.

G.O. 18th January 1871, No. 130.	
JANUARY.	
Nos. 255-256.	
THE BOARD OF REVENUE,	
Madras.	
Dated January 18th.	
Recd.	
G.O. 18th January 1871, No. 130.	
Salt Weighing Machine.	
Proposed purchase of 50 machines sanctioned.	
Bound to submit Salt Deputy-Collector's explanation with reference to the administration of the Salt Department.	

No. 6,976.

PROCEEDINGS OF THE BOARD OF REVENUE, dated 7th December 1870.

Read the following letters:—

From W. T. BLAIR, Esq., Acting Collector of Chingleput, to the Acting Secretary to the Board of Revenue, dated Saidapet, 14th September 1870, No. 377.

I HAVE the honour to forward, for the consideration of the Board, a letter in original, (to be returned,) from the Salt Deputy Collector, Mr. Smith, proposing a modification of Mr. Grainger's plan for lifting salt from the boats and weighing it at the Madras Cotaour.

2. I beg to recommend that Mr. Smith's letter should be referred to Mr. Grainger for his opinion, and that the value of Mr. Smith's proposal should be tested by actual experiment.

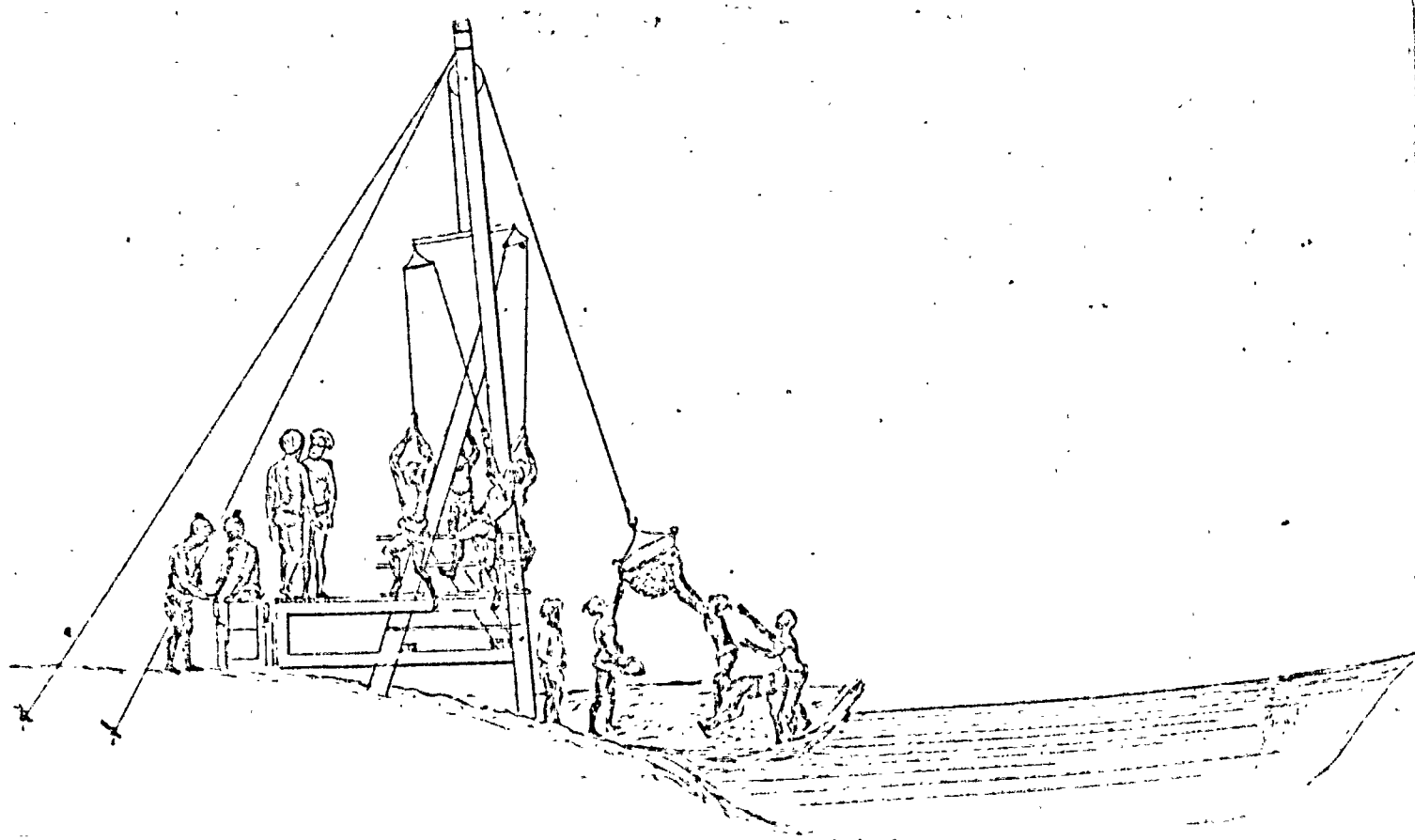
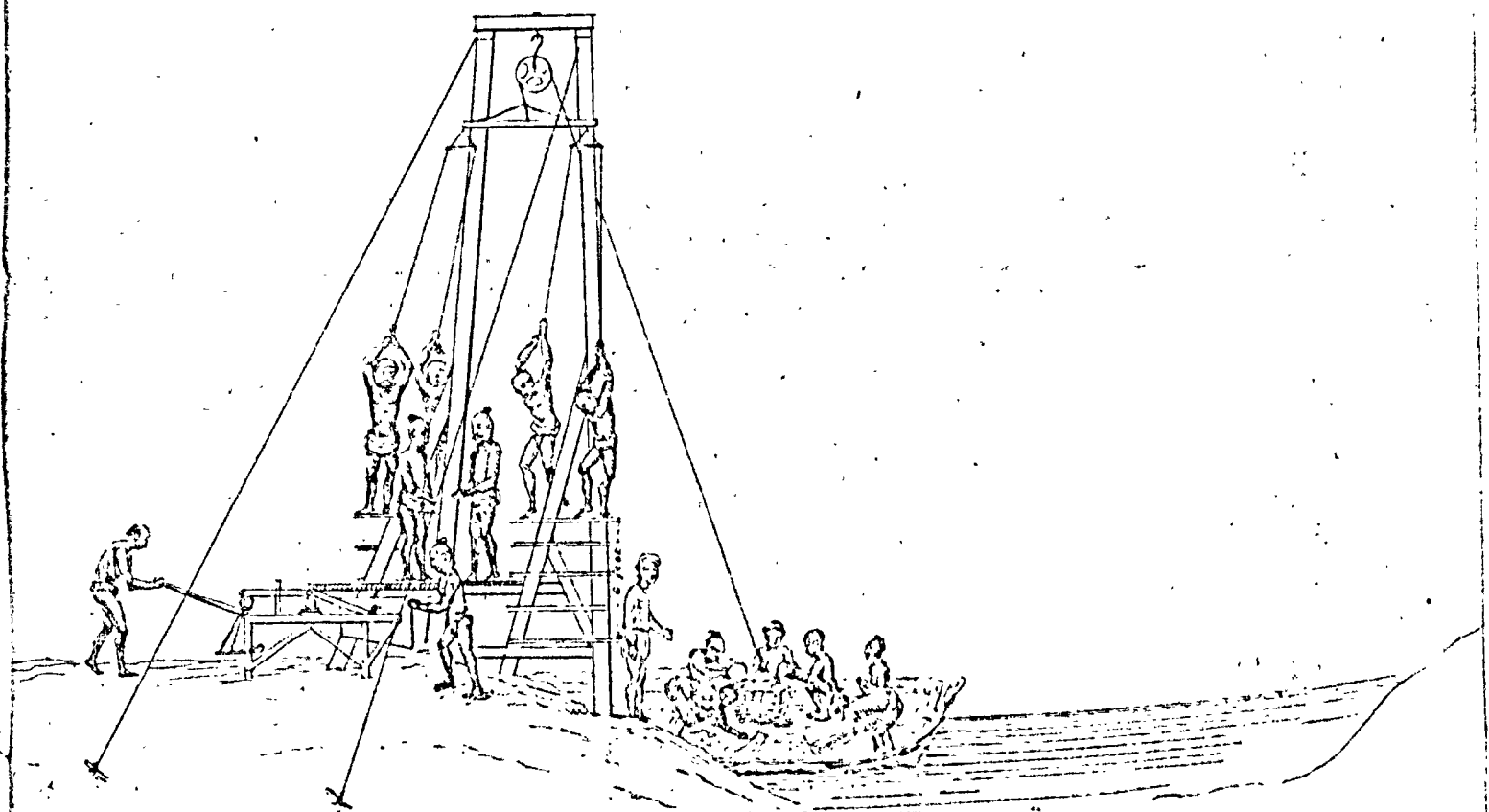
ENCLOSURE No. 1.

From A. SMITH, Esq., Deputy Collector in charge of Salt, to the Acting Collector of Chingleput District, dated 13th September 1870, No. 237.

It is, I believe, under the consideration of the Board of Revenue to do away with the present Salt Weighing-machines at the Madras Cotaour, and to substitute a new contrivance, with crane attached, devised by Mr. Grainger, General Superintendent Public Works Workshops.

2. The new Weighing-machine appears to be well adapted to fulfil the object for which it has been made; but the crane or gear for raising the salt from the boat, seems to be a clog and an encumbrance upon the weighing capacities of the proposed machine.

3. I subjoin two sketches of the machine and gear; the one exhibiting the contrivance as it stands with its complement of coolies ready for work, the other representing it in actual operation :—



4. I may here state that thirty coolies* have been allotted by Mr. Grainger to work the machine and gear and remove the salt to the place of store. It will be seen that four of these coolies have really hard work, and such as they cannot sustain at a time for more than an hour or two. These are the four Jumpers; and since the gear cannot be continuously worked without their services, it has been considered necessary to employ a set of four additional Jumpers, in order that they may relieve the other party from time to time. These thirty coolies, Mr. Grainger states, should weigh 16 Garce of salt per diem; but actual trial has shown that no more than 12 Garce can be so weighed.

80

5. Admitting, however, that Mr. Grainger is right, and that 16 Garce can be weighed per diem, the cost of the operation will be Rs. 9-2-0, as will be presently shown. Now, if I can prove that double the quantity of salt, or 32 Garce per diem, can be weighed with Mr. Grainger's machine but *without* the gear, and *with* the advantage of a reduction of cost and saving of unnecessary fatigue, is it too much to ask the Board, before they decide on adopting Mr. Grainger's gear, to be so good as to witness the operation and to judge for themselves?

6. The plan that I would respectfully propose, in modification of Mr. Grainger's design, is to dispense with the gear altogether. According to that gentleman's plan, the salt after being filled in baskets is raised from the boat by means of the gear; and being emptied and weighed in the machine alongside, is shot out and carried in baskets on women's heads to the place of store. In lieu of this, I would suggest that, dispensing with the gear, the salt be conveyed in baskets from the boat itself direct to the storing ground, and be there weighed in Mr. Grainger's machine and received into store. This operation, as before observed, can be performed at less cost, with less fatigue, and consequently with quicker despatch than with the aid of the gear.

Cost of weighing and heaping with the proposed machine and gear in a day of 8 working hours.			Cost of weighing and heaping with the proposed machine <i>without</i> the gear in a day of 8 working hours.			Cost of weighing 32 Garce at Rupees 9-2-0 for 16 Garce, as shown in Columns 2 and 3.		Deduct the amount in Column 6 from that in Column 7. The difference being the saving effected without the gear on every 32 Garce as shown below.	
Number of Coolies.	Quantity that may be weighed.	Amount of hire.	Number of Coolies.	Quantity that can be weighed.	Amount of hire.				
1	2	3	4	5	6	7	8		
	GARCE.	RS. A. P.		GARCE.	RS. A. P.	RS. A. P.	RS. A. P.		
30	16	9 2 0	30	32	7 6 0	18 4 0	10 14 0		

7. It will thus be seen that while the cost of weighing 32 Garce of salt according to Mr. Grainger's plan is Rupees 18-4-0, the cost of conducting the operation in the way I propose, is only Rupees 7-6-0, showing a saving of Rupees 10-14-0 on every 32 Garce weighed, as suggested by myself.

8. There is another point of view in connection with which I fear that the proposed substitution of the new machine and gear has not been sufficiently considered. As they are now fixed, salt can be weighed for the supply of only that portion of the platform which lies directly opposite; and hence, it will be necessary to set up the new machine and gear in different parts of our extensive platforms to facilitate storage. It is calculated by Mr. Grainger that twenty of

these machines, with gear, will be sufficient. If so, as they will be set up at different platforms and different parts of even the same platform, the establishment noted in the margin, amounting to Rupees 339 per mensem, will be required to superintend the weighment of the salt into store. Is this establishment likely to be sanctioned, when the results expected can be achieved at a smaller expenditure, with quicker despatch, and less wear and tear of body, in the manner in which I have shown it can be done by dispensing with the gear? I have no predilection for, or prejudice against, the proposed machine and gear. On the contrary, what appeared to me worthy of adoption I have recommended, to wit,

Establishment required for 20 machines and gear.		
	Rs.	As.
3 Clerks on 35 Rupees each	105	
3 Do. on 30 " do.	90	
3 Do. on 25 " do.	75	
3 Do. on 20 " do.	60	
8 Do. on 15 " do.	120	
20 Peons on 7 " do.	140	
	590	
Deduct present Storage Establishment.		
	Rs.	As.
2 Clerks on 35 Rupees each	70	
1 Clerk on 30 " "	30	
1 Clerk on 25 " "	25	
2 Clerks on 20 " each	40	
2 Do. on 15 " do.	30	
8 Peons on 7 " do.	56	
	251	
Per mensem	339	

the machine itself; but the gear being in my opinion ill adapted to the object in view, as involving greater pecuniary expenditure in its working, with no compensating advantage as regards despatch, I have ventured respectfully to advise its rejection as not suited to the requirements of this department.

9. I may here state that with the exception of seven boat loads of salt which will this day be weighed into store, no salt is available for experiments.

From W. T. BLAIR, Esq., Acting Collector of Chingleput, to the Acting Secretary to the Board of Revenue, dated Sydapet, 23rd September 1870, No. 392.

In continuation of my letter of the 14th instant, No. 377, I have the honour to enclose, for the information of the Board, a copy of Mr. Smith's letter reporting the completion of the heap under storage this morning.

ENCLOSURE No. 1.

From A. SMITH, Esq., Deputy Collector in charge of Salt, to the Acting Collector of the Chingleput District, dated Madras, 23rd September 1870, No. 244.

I HAVE the honour to inform you, that I finished the weighment of the Voyalur salt, so far as the completion of the heap under storage before the Board was concerned, at 5 minutes past 9 A. M.

2. The weighment commenced at 5 minutes to 7, and concluded as abovesaid at 5 minutes past 9.

3. The quantity weighed during this time was 6 Garce and 79 Maunds, being at the rate of 3 Garce 8 1/2 Maunds per hour.

* 18 Men.
12 Women.
30

4. It must be borne in mind that these weighments have been made with the eighteen women and nine men coolies, being three men less than those* allowed for the weighment of the salt with Mr. Grainger's gear.

5. The withdrawal of the assistance of three able-bodied men must, of course, tell largely upon the results of the operation.

6. The remainder of the salt, 1 Garce was weighed in 17 minutes, with the reduced number of men.

7. I have not the least doubt that an average of 20 Garce per day can be weighed with Mr. Grainger's machine, in the way in which I propose to conduct the operation.

(True Copy.)

(Signed) W. T. BLAIR,
Acting Collector.

From J. N. GRAINGER, Esq., General Superintendent, Public Works Workshop, to the Acting Secretary to the Board of Revenue, dated Chepauk, 21st October 1870, No. 1275.

I HAVE the honour to acknowledge receipt of the Board's Proceedings, Miscellaneous No. 967, dated 23rd September 1870, enclosing in original, letter (herewith returned) from Mr. Smith, Deputy Collector, in charge of Salt at Madras, proposing a modification of the plan for unloading and storing salt verbally proposed by me to the Board, and which plan has been experimented on at the Madras Cotaurs.

2. This plan consisted in the unloading of the salt from the boats by means of a "Whipping frame," and the weighing of the salt *net*. The promised advantages by this arrangement were—

- 1st.—The saving of Rupees 8 per heap of 20 Garce stored.
- 2nd.—Increased accuracy and speed in weighing.
- 3rd.—The correct and simple determination of the quantity of water in excess in the salt.

These will be treated of in their order, under the heads of "Unloading," "Weighing," and "Correction for water."

3. UNLOADING.—The Whipping frame, or, as Mr. Smith styles it, "Crane," having been illustrated and described in that gentleman's letter, a repetition here is unnecessary. It has proved the correctness of the views entertained of its efficiency for a saving of Rupees 3-0-10 in its favour alone, *vide* Extract A, and a saving of Rupees 8-8-9, *vide* note at foot of Table II. when working with "Whipping frame" and Weighing-machine together, and which fully proves the correctness of first promised advantage will be shown by comparing extracts (herewith enclosed) from Tables I., II., and III. which tables were given me by the Superintendent of Salt, as a correct Statement of working. Table I. relating to previous working up to this date. Table II. being a Statement of working with the Whipping frame and new pattern Weighing-machine under that officer's supervision, and Table III. a Statement of working in a manner which Mr. Smith proposes and calls his modification in his letter, though that gentleman was well aware that it was the first method adopted when the new Weighing-machine was sent to the Cotaurs. The Weighing-machine was afterwards employed with the "Frame" for reasons stated in paragraph 11 of this letter.

Extract A.

From Table I.	From Table II.	RS. A. P.
		3 0 0
Remarks Column B, Hire for unloading.	Jumpers	0 8 0
A and B Forming	Catchers	1 8 0
	Fillers in basket at boat	
	* Serang	0 4 0
Total per heap of 80 Garce...	† At the Bank	1 8 0
	‡ Carriers of Salt to the heap	
	Total per heap of 16 Garce...	6 12 0
	Therefore for heap of 20 Garce...	8 7 0
	§ Hire for 1 Cooly at Annas 4 for heaping...	0 4 0
	Total...	8 11 0
	Balance in favour of "Whipping frame" alone	3 0 10
		11 11 10
Therefore for heap of 20 Garce		11 11 10

Note.—* The Serang was the man in charge of my people whilst they were at work at the Cotaurs, and would not have been required, could dependence have been placed on them.
† This charge, though admitted here, could be avoided if the "catchers" were to throw the basket back properly into the boats.
‡ By the former method unloading was not completed until the salt was delivered near the site of heap, whilst these carriers deliver the salt on the heap, thus dispensing with part of the labour required in heaping salt.
§ One cooly for 4 Annas by the help of the carriers in ‡ is sufficient to heap the salt which was observed by the Board.

4. Apart from these advantages, the "Whipping frame" has been the means of exciting a spirit of competition, which has shown beyond a doubt the extravagantly high rates that have been paid for cooly labour up to the present time, for in the Table, Columns 4 and 5, in paragraph 6 of Mr. Smith's letter, he says that, with thirty coolies, he can raise and weigh 32 Garce of salt per day, and as six of these coolies are allotted by him to the Weighing-machine, though three only are required, the 32 Garce can be raised by twenty-four Coolies only. Now referring to Column 1 of Table I., it is shown that, for every garce of salt taken from the boats, the labour of two Coolies was charged, and, therefore, in raising 32 Garce, the labour of sixty-four coolies was formerly charged; but Mr. Smith says he can *now* do the same work with twenty-four coolies, so that it is evident that the labour of forty coolies has been charged in excess for every 32 Garce of salt unladed, which amounts to the labour of (150) one hundred and fifty coolies per diem for six months in the year, being charged in excess of a correct and easily calculated estimate.

Extract B.

From Table I.	Garce.	Columns 4 and 5 of Table, in paragraph 6 of Mr. Smith's letter.			
1	2	3	Number of Coolies.	Quantity that can be weighed.	6
Quantity that can be taken from boats by 100 Coolies per day ...	50			Garce.	
Or 2 coolies for ...	1		30	32	
So that 64 Coolies are required for ...	32	Number of Coolies employed ...			30
64		Weighing Machines ...			6
24					24

Difference of 40 coolies per heap of 32 Garce or one hundred and fifty coolies for 120 Garce, which is the average quantity stored daily, as per Column 9 of Table I.

5. These results cannot be explained away by Note 3 in the Column of Remarks attached, to Table III., for, if the Platform Weighing-machine could not be worked so quickly as the new Weighing-machine, a greater number of the former machines were employed to weigh the average quantity of 120 Garce per day, than will be required of the latter machine, and as the number of machines employed in the weighing of the salt can have no effect whatever in the cost of labour for unlading it, these operations being separate and quite distinct from each other, and charged for as such, as shown in Notes A and B, in the Remarks Column of Table I. Under these circumstances, an explanation of such a result should certainly be demanded from those officers concerned.

6. The saving of Rupees 10-14-0 on every 30 Garce of salt unladed, and weighed as mentioned in paragraph 7 of Mr. Smith's letter, is not the only saving effected by the new machine; but only the difference of saving effected when working with, and without, the whipping frame.

From Table I.		From Columns 5 and 6 of Table, in paragraph 6 in Mr. Smith's letter.	
Remarks Column.	RS. A. P.		RS. A. P.
B. Hire for unlading ...	42 0 0	Cost of weighing and heaping without the gear for a heap of 32 Garce ...	7 6 0
do. weighing ...	30 0 0		
A. and B. do. Forming ...	4 15 3	Total...	7 6 0
Total per heap of 80 Garce as per Column 6 ...	76 15 3	Therefore for heap of 20 Garce ...	4 9 9
Therefore for heap of 20 Garce ...	19 3 10		
Total...	19 3 10		4 9 9

Difference or saving per heap of 20 Garce is Rupees 14-10-1.

Of the estimated cost of Rupees 7-6-0 per heap of 32 Garce, or Rupees 4-9-9 per heap of 20 Garce, when working with the new machine, as per Extract C, not more than 10 per cent. should be allowed for contingencies, such as delay of boats, wet weather, etc.

7. The difficulties and extra expense shown in paragraph 8 of Mr. Smith's letter are imaginary, and arise from that gentleman's unappreciability of the advantages derivable from the employment of the "whipping frame." Mr. Smith in this paragraph, having introduced the subject of increase of establishment, I would respectfully remark *en passant*, the reduction of establishment that should now be effected by the introduction of the new Weighing-machine, as no doubt Mr. Smith will agree to its possibility for the greater efficiency of the new machine compared with the platform machine, will permit of a reduction in the number of machines employed by about one-half, and consequently the number of persons necessary to tabulate the weighments should be reduced in like manner, as the same number of machines in both cases can be allotted to one person.

8. WEIGHING.—The new pattern weighing machine is shown in the sketch attached, and requires two coolies to attend the filling and discharging of the salt from the scale pan. The women filling the scale pan by walking up a plank, and emptying their baskets into it. The third cooly attends to the correctness of weighment, and to take the strain off the knife edges by means of the lever shown. Simplicity, accuracy, and non-liability to get out of order, are the points obtaining in its construction. The hanging of the scale pan from the lever by hooks or links, is a new feature, and should be applied to all the *Copper Cup Scales* now in use, which application would give more accurate results in their employment.

9. This improvement to the *Cup Scales* can be effected in the districts, the necessary parts being supplied from the workshops.

10. The question of constructing the pans of the new machines of sheet copper should stand over, until they have been brought well into use, for, whilst not, necessitating renewal as often as the sheet iron, it will certainly involve a larger amount of expense than would at present be expedient.

11. The method of employing the new machines that Mr. Smith proposes in paragraph 6 of his letter, is that intended when using the machine in the district, and was the one adopted when the new machine was first sent to the Cotnars, but as I could not then obtain a greater efficiency in weighing than 3.2 compared with the Platform Weighing-machine, whilst an efficiency of 2.1 was obtained with the "frame" and machine together, it was, therefore, more advantageous to work with the frame; but as Mr. Smith has *now* been able to get more work from the coolies than I could, and as he promises a continuance of such, it is certainly unnecessary to employ the "Whipping frame."

12. The cost of weighing by the old and new method is shown in the following :-

Extract D.

From Table I.		Paragraph 8 of this letter.
Remarks Column.	RS. A. P.	RS. A. P.
B.		
Hire for weighing 80 Garce	30 0 0	Three coolies only are required to work the new machine at a cost of 4 Annas each per day
or for		
Heap of 20 Garce... ..	7 8 0	
Cost per heap of 20 Garce by new method	0 7 6	
Balance of saving effected per heap of 20 Garce	7 0 6	

This amount of Rupees 7-0-6 is included in the saving of Rupees 14-10-1 shown in Extract C. of this letter, from which the value of the extra cooly labour that has been paid for, according to Extract B, is shown in the following extract:-

Extract E.

	RS. A. P.
Saving per heap of 20 Garce for unloading and weighing, etc., as per Extract C.	14 10 1
Saving effected per heap of 20 Garce in weighing only, as shown by Extract E.	7 0 6
Difference or saving in the cost of unloading a heap of 20 Garce, between the former method, and what Mr. Smith now says in his letter can be done	7 9 7
Taking the average quantity stored to be 120 Garce daily, as per Column 9 of Table I., the daily excess of payment for cooly hire is... ..	45 9 6

13. CORRECTIONS FOR WATER.—That the salt received for storage is not generally of the standard quality, is already known to the Board, and I believe it is their intention to rectify it as soon as it can be done on correct principles. I therefore respectfully submit the following arrangement to the Board for their opinion—

14. The percentage of water in the salt whilst being stored, is ascertained by the following arrangements—The pan of the scale having been made of the capacity of 28 Merkals, and 28 Merkals of salt when fairly measured is equivalent to a weight of 8 Indian Maunds of standard salt. These are, I believe, the equivalents already established by the Board, the scale pan having been filled with salt is struck off level with the edges, it is then weighed, and if the salt is of standard quality, the weight would be 8 Indian Maunds exactly; but it will generally be found to weigh more, according to the excess of water, and if three such weighments are made when unloading each boat, say, one at the commencement, one at about the middle, and one at the end of the unloading, and the mean of these excess weights taken, a very fair average may be obtained of the condition of the salt received. The salt raised between each such weighments should be simply weighed in 8 Maund quantities on to the heap.

In the first column of Table IV. attached to this letter, the number of lbs. in the above mean of excesses should be sought, opposite which, in Column 2, will be found the number of lbs. of salt that should be put into the heap to complete the quantity of 20 Garce. Column 3 shows the percentage of water in excess in the salt. Should, however, the salt be so dry that the scale pan when struck off weighed less than 8 Indian Maunds, then the mean of the number of lbs. required to complete

the 8 Maunds weighments, should be sought for in Column 1, opposite which, in Column 2, will be found the number of lbs. that should be taken from the heap, to make a correct storage of 20 Garce.

In illustration, three cases are shown in the following Statement F:—

In illustration, three cases are shown			
	lbs.	Mean.	Remarks.
1st Case.			
Excess of 1st weightment	+ 35	+ 40 lbs. correction should be added.	to be added to the heap being positive.
Do. 2nd do.	+ 40		
Do. 3rd do.	+ 45		
	3/120		
	+ 40		
	40		
In Column 1 opposite	12,000		
Is found in Column 2	5,728		
Percentage of water in Column 3			
2nd Case.			
Deficiency in 1st weight	- 12	- 7 lbs.	to be taken from the heap being negative.
Do. 2nd do.	- 7		
Do. 3rd do.	- 2		
	3/21		
	- 7		
	7		
In Column 1 opposite	2,100		
Is found in Column 2	1,052		
Percentage of water in Column 3			
3rd Case.			
Deficiency in 1st weightment	- 3	+ 19 lbs.	to be added to the heap being positive.
Excess in 2nd do.	+ 19		
Do. 3rd do.	+ 41		
	3/57		
	+ 19		
	19		
In Column 1 opposite	5,700		
Is found in Column 2	2,805		
Percentage of water in Column 3			

15. These corrections necessary to complete the heaps of 20 Garce should each be made by the Superintendent or other Officer in charge of a Salt Depôt; that officer and the writers employed in storing may each be supplied with a similar table to Table IV. If the Board approve of this method, a revised table will be submitted, in which the lbs. figures in Column 2 will be converted into maunds for general use. This method will not increase the duties of the Salt Superintendents, the average daily number of heaps stored at the Madras Cotaurs being 6 whilst the maximum will not be more than (12) twelve or 15 heaps, and, therefore, the same number of corrections will be all that is required, whilst it will of course increase slightly the responsibility of those officers; but as they are to a considerable extent responsible at present, and from the anomalous result

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obtaining in the Salt Department, which give rise to suspicions of fraud committed by the employés,* this question should certainly be solved in all fairness to those officers, for the quantity of water in excess in salt when being stored, will, in some cases exceed 5 per cent. and a deficiency of at least 3 per cent. will be shewn, when the same heap is weighed again after being stored for some time, and the salt has been dried, which deficiency will, and does, give rise to grave suspicions, but by adopting the above system, the cause for such suspicion will soon be brought to the test.

16. The salt manufacturers will also have to give more attention than they do at present to the drying of the salt, and to a much better mode of transport from the salt pans, than in the boats which require water to be thrown out of them, at the same time the salt is being taken to the Weighing-machines, the manufacturers of course being paid for water as well as salt.

17. The principles upon which these corrections are based, are *correct weightment*, tested by *correct measurement*, provided the Board consider that the scale pan of a capacity of 28 merkals, and filled by the emptying of baskets into it, is a fair equivalent for 28 Merkals of salt. By this means, the unfairness of the *deep strike* of the merkals measure into a heap of salt is avoided. The question of the variation in size of the salt crystals must enter into this consideration, for if salt composed entirely of large crystals, and salt composed entirely of small crystals, were separately measured and weighed in the above manner, bulk for bulk, there will be found to be a slight difference in the weights, the small crystals being heavier, or there is more salt in the measure when it is small than when large, a result, I believe of experiments, made in these extreme, and well known cases; but in the salt as generally stored, these extremes do not obtain, for the salt then consists of a mixture of the two sizes, and in such cases, the variations in weight of equal bulks of equally dried salt, will be found inappreciable.

18. In the foregoing paragraphs of this letter, the advantages derivable from the proposed method of dealing with the salt question have been stated and compared with the former method,

some remarks on Mr. Smith's second letter† will now enable me to complete a Statement of the *actual saving* that can be effected.

19. Mr. Smith in paragraph 3 of his second letter states, that the quantity unladed and weighed during the experiment of the 23rd September, was 3 Garce and 8½ Maunds per hour, and that this work was done by eighteen women and nine men, as per paragraph 4, and it is also stated in paragraph 5 that "the withdrawal of the assistance of three able-bodied men, must, of course, tell heavily upon the result of the operation." Now Mr. Smith has continually persisted in allotting six men coolies to work the new machine, whilst three only are required, which was so obvious to the Board during that experiment, that Mr. Smith was requested by the Board to send the three men coolies away, who were giving *no assistance*, at the time, and consequently entailed *no loss* in the result of the operation, but shewed really a *saving* of their hire.

20. From paragraph 3 of Mr. Smith's second letter, 3½ Garce per hour was unladed and weighed, and from paragraph 6 of the same letter, the unlading and weighing, was one garce in 17 minutes, or rather more than 3½ Garce per hour; so that in these experiments we may say that 3 Garce per hour was the work done; this would give 24 Garce per day of eight working hours, allowing 16½rds per cent. of this for contingencies, 20 Garce per day, as per paragraph 7 of Mr. Smith's letter to be the average quantity unladed, weighed, and heaped, the cost of which is shown in Statement G.

Particulars.	RS.	A.	P.
The daily hire of thirty coolies first employed by Mr. Smith, was as per table in paragraph 6 of his first letter	7	6	0
Deduct for three men coolies at 4 Annas each, sent away	0	12	0
Daily hire of the twenty-seven coolies, who unloaded, weighed, and heaped, vide heading to Columns 4, 5, and 6 of Table, in paragraph 6 of Mr. Smith's first letter	6	10	0

The difference between the cost shown in this Statement and the former rates shown in Statement C. extracted from Remarks Column of Table I. will be the real saving effected, as shown in the following Statement II—

Table I.	RS.	A.	P.	Table I.	RS.	A.	P.
REMARKS COLUMN B.							
Hire for unlading	42	0	0				
Do. for weighing	30	0	0	Cost of unlading, weighing, and heaping a bed of 20 Garce.	6	10	0
Do for forming this Item is obtained by taking the proportion of coolies in A. required for forming or 24-44 of Rupees 9-1-4.	4	15	3				
Total for heap of 80 Garce ...	76	15	3	Real saving effected by new machine. Total ...	12	9	10
Therefore for heap of 20 Garce ...	19	3	10		19	3	10

21. In the generality of good seasons, about 20 lacs of maunds of Salt are stored at the Madras Cotaurs alone, and if the new machine is employed in the storing of this amount, a nett saving of Rupees 10,512-2-4, would be effected *every year* at this Salt Depôt.

22. One machine will be required for the storing of a heap of 20 Garce per day, and six such heaps or 120 Garce, vide Column 9 of Table I. are stored on average daily, the *maximum* number of machines in use on any day will be about 12; and allowing 3 more in store in case of accident, 15 machines will be sufficient for the requirements of the Madras Cotaurs. The outlay for 15 machines, at Rupees 140 each, will be Rupees 2,100.

23. This year about 18 lacs of maunds have been stored at the Madras Cotaurs, and had the new Weighing-machine been used at the commencement of the season, a clear saving of Rupees 7,360-15-0 would have resulted, after the new machine had been paid for, as shown below:—

	RS.	A.	P.
Saving on 18 lacs of maunds, at Rupees 12-9-10 per 20 Garce	9,460	15	0
Cost of 15 machines, at Rupees 140 each	2,100	0	0
Saving...	7,360	15	0

24. A similar saving will also be effected in the weighing at least in the districts, the probable amount of which can be easily ascertained by the Board from the above data.

ENCLOSURE No. 1.
TABLE I.

Statement showing the number of Coolies required for storing 80 Garce heap and the cost for the same.

Quantity that can be taken from boats by 100 Coolies per day.	Cost.	Whether salt is dried before storing into heaps.	Distance from the required position of the finished heap if salt is spread.	Time.	Number of Coolies required to store a heap of 80 Garce in a day.	Cost.	Time of storage.	Quantity daily stored.	Remarks.
1	2	3	4	5	6	7	8	9	10
80 Garce or 8,000 Indian Maunds.	Rs. A. P. 25 4 0	No.	As the salt is not dried before storage, the distance cannot be stated.	Cannot be stated.	Total number of Coolies required is A. 234, as particulars are given in the Remarks Column.	Rs. A. P. B. 125 1 4	Six months commencing April exclusive of six days (Sundays) in each month.	120 Garce or 14,400 Indian Maunds on average.	A. For Unloading 160 Coolies. " Weighing 80 " " Fanning 24 " " Covering 20 " 234 B. Hire for Unloading ... 42 0 0 " Weighing ... 30 0 0 " Fanning and Covering ... 9 1 4 Sundries ... 3 0 0 Value of Palmyra leaves ... 42 0 0 Total... 125 1 4

MADRAS,
8th July 1870.

(Signed) M. CHINNASAWMY,
Superintendent of Salt.
(Signed) J. N. GRAINGER,
Genl. Supt. P. W. Workshop and Stores.

(True Copy.)

ENCLOSURE No. 2.
TABLE II.

Present system of weighing 16 Garce of salt with the gear.

Description of Coolies required.	PARTICULAR OF COOLIES.			Rate per cooly.	Total amount.
	Men.	Women.	Total.		
				RS. A. P.	RS. A. P.
Jumpers ...	8	...	8	0 6 0	3 0 0
Catchers ...	6	...	6	0 4 0	0 8 0
Fillers in basket at the boat ...	1	...	1	0 4 0	0 6 0
Do. Serang ...	1	...	1	0 4 0	0 4 0
At the bank ...	1	...	3	0 4 0	0 12 0
At the scale ...	3	...	8	0 3 0	1 8 0
Fillers in baskets the weighed salt at the scale ...	...	8	8	...	8 2 0
Carriers of salt to the heap ...	...	...	...	...	14 6 4
Total...	22	8	30	...	8 2 0
Note.—Former rate for 16 Garce is Rupees...					6 4 4
Deduct present for 16 Garce ...					7 13 5
Saving ...					1 0 0
Saving for a heap or 20 Garce ...					6 13 5
Deduct hire for four coolies, at 4 Annas each, for heaping salt...					* Net saving ...
* or a saving of ...					8 8 9

per heap of 20 Garce.

(True Copy.)

(Signed) J. N. GRAINGER,
General Supt. P. W. Workshops and Stores.

ENCLOSURE No. 3.
TABLE III.

Proposed system for weighing 32 Garce by placing the new scale on the spot where the salt is to be stored, and getting it filled with salt by coolies from the boat without the gear.

Description of Coolies required.	PARTICULAR OF COOLIES.			Rate per cooly.	Total amount.	Remarks.
	Men.	Women.	Total.			
				RS. A. A.	RS. A. P.	
For unloading ...	...	18	18	0 3 0	3 6 0	1. Two Garce could be weighed in an hour per day, with the gear.
For felling baskets at the boat.	6	...	6	0 4 0	1 8 0	2. Four Garce could be weighed in an hour, or 32 Garce per day, by placing the new scale on the spot where the salt is to be stored, and getting it filled with salt by coolies without the gear.
For weighing and filling the scale with salt.	6	...	6	0 4 0	1 8 0	3. The considerable saving and expeditious weightment are attributable to the new scale invented by Mr. Grainger.
Total...	12	18	30	...	6 6 0	
Note—Former rate for unloading and weighing 32 Garce is Rupees.						4. Out of the savings of Rupees *21-6-9 for 32 Garce, a reasonable allowance is to be made for the delay in storing the salt for want of boats or inclemency of weather.
Deduct present hire ...						6 6 0
Deduct hire for coolies, at 4 Annas each, for heaping salt.						Saving... 22 6 9 1 0 0
Net saving for every 32 Garce...						*21 6 9

(True Copy.)

(Signed) J. N. GRAINGER,
General Supt. P. W. Workshops and Stores.

ENCLOSURE No. 4.
TABLE IV.
Correction for Water.

																Remarks.		
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1	300	00-151	17	5,100	2-517	33	9,900	4-772	49	14,700	6-928	65	19,500	8-999	65	19,500	8-999	The figures in column 2 are obtained by multiplying the corresponding figure in column 1 by 300.
2	600	00-303	18	5,400	2-662	34	10,200	4-911	50	15,000	7-058	66	19,800	9-112	66	19,800	9-112	
3	900	00-453	19	5,700	2-805	35	10,500	5-048	51	15,300	7-190	67	20,100	9-238	67	20,100	9-238	
4	1,200	00-604	20	6,000	2-948	36	10,800	5-185	52	15,600	7-321	68	20,400	9-363	68	20,400	9-363	
5	1,500	00-753	21	6,300	3-091	37	11,100	5-322	53	15,900	7-450	69	20,700	9-487	69	20,700	9-487	
6	1,800	00-903	22	6,600	3-233	38	11,400	5-458	54	16,200	7-581	70	21,000	9-601	70	21,000	9-601	
7	2,100	1-052	23	6,900	3-376	39	11,700	5-593	55	16,500	7-711	71	21,300	9-736	71	21,300	9-736	
8	2,400	1-200	24	7,200	3-518	40	12,000	5-728	56	16,800	7-839	72	21,600	9-859	72	21,600	9-859	
9	2,700	1-349	25	7,500	3-659	41	12,300	5-863	57	17,100	7-969	73	21,900	9-982	73	21,900	9-982	
10	3,000	1-556	26	7,800	3-799	42	12,600	5-997	58	17,400	8-173	74	22,200	10-105	74	22,200	10-105	
11	3,300	1-643	27	8,100	3-939	43	12,900	6-132	59	17,700	8-225	75	22,500	10-228	75	22,500	10-228	
12	3,600	1-790	28	8,400	4-079	44	13,200	6-265	60	18,000	8-352	76	22,800	10-350	76	22,800	10-350	
13	3,900	1-936	29	8,700	4-219	45	13,500	6-398	61	18,300	8-481	77	23,100	10-472	77	23,100	10-472	
14	4,200	2-083	30	9,000	4-360	46	13,800	6-531	62	18,600	8-607	78	23,400	10-594	78	23,400	10-594	
15	4,500	2-228	31	9,300	4-497	47	14,100	6-664	63	18,900	8-733	79	23,700	10-725	79	23,700	10-725	
16	4,800	2-373	32	9,600	4-636	48	14,400	6-796	64	19,200	8-861	80	24,000	10-835	80	24,000	10-835	

(Signed) J. N. GRAINGER,
General Supt. P. W. Stores and Workshops.

ENCLOSURE No. 5.—One Plan.

This letter will be submitted to Government in continuation of the Board's Proceedings, No. 4,770, dated 9th July 1870, and with reference to paragraph 5 of those dated 13th September 1870, No. 5,700. Mr. Grainger has proved conclusively the superiority of his Weighing-machine both in respect to economy and accuracy in weighing and this fact is admitted by all who were present at the experiments made with it. The Board have therefore no hesitation in recommending Government to substitute Machines of this pattern for those at present in use throughout the Presidency. The Board need only refer

Board's Proceedings,	2nd May 1862,	No. 2,798.
Do.	23rd Augt. "	" 5,591.
Do.	2nd April 1864,	" 1,921.
Do.	15th " "	" 2,297.
Do.	19th May " "	" 3,661.
Do.	28th March 1866,	" 2,222.
Do.	23rd May " "	" 3,591.
Do.	18th Jan. 1868,	" 401.
Do.	3rd April " "	" 2,478.
Do.	8th " 1869,	" 2,366.
Do.	12th " "	" 2,467.
Do.	1st Nov. " "	" 8,107.
Do.	18th " "	" 8,514.
Do.	16th March 1870,	" 1,811.
Do.	9th July " "	" 4,770.

to the correspondence noted in the margin to show how frequently complaints have been made of the inaccurate and untrustworthy character of the Platform Machines; but it has always been considered impossible to discover any form of Machine better adapted to what were described to him as the peculiar requirements of the Salt Department "under the present method of weighing Salt" (that is in baskets.)

2. The adoption of Mr. Grainger's plan for testing and correcting the dampness of salt (which the Board also strongly recommend) renders it the more essential to have a machine which shall contain the correct equivalent of 8 Maunds of what is called "standard" salt when fairly measured. It is only necessary to point out the manifest injustice that may be done to the employes of the Department where salt that has been stored wet is found on being weighed again to have diminished in bulk simply from its having become more thoroughly dried, in order to show how necessary it is that some allowance should be made for the condition of the salt when stored. It is equally obvious that Government is bound to take every possible precaution to ensure to the wholesale purchaser the full weight of standard salt as nearly as it can be done; and on the other hand, it is right to avoid giving a premium to the manufacturer for bad wet salt, paying him, in fact, (as Mr. Grainger says,) for water as well as salt.

3. The Board therefore resolve to request early sanction for an expenditure of Rupees 7,000 for the purchase of 50 Machines at Rupees 140 each. The charge can be met from the general savings under salt and from the sale of the old Platform Machines, and the Board believe that Mr. Grainger is right in estimating that the cost of the Machines will be more than saved in the first year. They have ascertained from Mr. Grainger that he will probably not be able to provide more than 50 before the close of the official year. Sanction for a further expenditure of Rupees 27,160 for the remaining 194 required may therefore be deferred till next year.

4. Should Government see fit to accede to this proposal the sanction granted for an expenditure of Rupees 3,172 on the alteration and improvement of the old machines in Government Order, No. 1,218, of the 10th August 1870, may be cancelled and the amount therein sanctioned will be applied to the present purpose.

5. In paragraphs 3 to 7, 12, and 19 to 21 Mr. Grainger enters into calculations which tend to show that the rates paid for unloading and storing at the Madras stores even under the present system have been most exorbitant.

6. The Collector will be requested to call upon Mr. Smith for a full explanation of those parts of the letter which reflect upon the administration of the Salt Department, and in the meantime the Board will refrain from comment. Mr. Smith should be careful to distinguish in

his report between the two distinct operations of unloading and weighing and should avoid entering upon irrelevant subjects confining himself closely to Mr. Grainger's statements and depending as much as possible on figures only for his explanation.

(True Copies and Extract.)

J. Grainger
For Acting Sub-Secretary.

To the Secretary to Government, Revenue Department, with one Plan.
the Acting Collector of Chingleput.

Copy to the General Superintendent of Public Works Workshops and Stores.

Exd. G. A. Turton.

11. 2. 1871
18 Dec 1871

11. 2. 1871
18 Dec 1871

18 Dec 1871
18 Dec 1871

No. 3998

Per 1870. Receipt

Board of Revenue,

MADRAS.

PROCEEDINGS, 7TH DECEMBER 1870, No 6,976.

Dec 1871

Received

22

With Order

DECEMBER.

No. 6,976.

Salt Weighing Machine—of pattern proposed by Superintendent, P. W. Stores and Workshops, Government requested to sanction substitution of, for those at present in use throughout Madras Presidency and to authorize expenditure of Rupees 7,000 for purchase of 50 Machines.—Superintendent's plan for testing and correcting dampness of salt, recommended to be adopted.

Dec 1871 - 18 January 1871