PROPOSAL *lating to the introduction of NEW STANDARDS of WEIG* *nd MEASURE in BRITISH INDIA, by* COLONEL R. STRACHE. E., F. R. S., *President of the Committee appointed by the Governme.. of India. Dated* SIMLA, *1st October*, 1867.

1. The diversity among the Weights and Measures used in various parts of India is as great as is well possible. In this, however, India in no respect differs from other countries in which uniformity has not been prescribed by authority.

2. Throughout India the old standard of weight seems almost universally to have b he current coin of the locality, and the multiplicity of coinages has been, s still, accompanied by an equal or even greater multiplicity of weights. Not only do the weights vary from province to province, but from town to town, and even within the same town or rural district. D ent weights are used in va trades in the sale of different commoditie. nd in wholesale and retail t. actions.

3. In Northern dia, the usual unit of weight is the Tola, which is the weight of the cur. Rupee coin. The Seer is a given number of Tolas [illegible] 70 to 105. The Man [illegible] ttacks. The Rupee of the British government weighs 180 Grains; the S of the British government being 80 Tolas is equal to $2\frac{6}{35}$ lbs Avoirdupois, the government Maund is $82\frac{2}{7}$ lbs Avoirdupois, or 100 lbs Troy. Local Seers and Maunds vary on either side of 2 lbs Avoirdupois, and 80 lbs Avoirdupois.

4. In Southern India, the original unit of weight commonly used was the la, a coin no longer current. The common cutcha Seer was 80 Pagodas uivalent to 24 current Rup The Maund of Southern India s 40 such Seers, and is d nly divided into 8 Viss or five r We Pollums. The C of 20 Maunds is another Weight rdinary use. Governm , some years back, endeavoured stablish a local sy o e basis of the Rupee weighing 180 Grains. The Seer was in this system, but would be 0·617 lbs. The Viss was 3·086 lbs Maund 24·686 lbs. This system owever never came into use. In practi e commercial Maund in the town of Madras is taken 5 lbs Avoirdupoi the Viss and Candy are modified ccordingly; but l d the municipa ts other weights are employed The weight in con use in Burmal lled Viss also; it is 3·65 lbs, a is sub-divided into l als each of 25 ns.

In Guzerat, a Seer of 40 local es weight, a Maund of s, and a Candy of 20 Maunds, are mmon weights. The ry from 37 to 44 lbs, and the Seers are lb.

6. In Malwa, a Seer of 80 local Rupees weight and a Maund of 20 such Seers, are common. This Maund is approximately the same as the Guzerat Maund, the Seer being about 2lbs, as in Northern India.

7. At Bombay, the old Seer was about 10 or 12 oz. Avoirdupois, being reckoned as equal to 30 Pice. The Bombay Maund being 40 such Seers is nearly 28lbs, at which it is now commonly reckoned. This Maund is the usual one also on the Malabar Coast, south of Bombay; but the Seer is the Madras one of 24 Rupees weight, so that the Maund consists of 46 to 48 Seers instead of 40. At Bombay and in the Deccan, the sub-division of the Seer is into 72 parts called Tank. The Deccan Seer is commonly 80 of the local Rupees, or about 2 lbs; the Maund varies greatly. In the Deccan, the weights seem to merge into the Madras systems on the one side, and into the systems of Malwa and Northern India on the other.

8. Measures of Capacity are hardly known in Northern India. In Bengal and Southern India they are more frequently used, and, as a rule, are intended to be equivalent to certain determinate weights of Gr[illegible]. In Burmah, grain is universally sold by measure. There is, however, such great variation among measures having the same name, that it would be useless to refer to them in detail.

9. The usual Lineal Measures are the Cubit or Hath, and the Yard or Guz, the latter being divided in Upper India into 16 Girahs or 24 Tussoos. The Hath varies from 14 to 20 Inches; the Guz from 28 to [illegible] Inches. Thirty-three Inches is the length assumed for the Guz in fixing the [illegible] Land Measures in the North West Provinces. [illegible] 4,500 Yards, or 2½ Miles, would seem to have been the old Coss of North-Western India.

10. Measures of Area are [illegible] only based on the Hath or Guz, but vary so exceedingly from one district to another, that no general account can be given of them. Frequently the denomination of the Land Measures is the same as that of the Grain Measures, it being understood that the quantity of grain in a given measure will sow the area of land having the same name. This is common in Southern India [illegible] and the land measure of the [illegible] differ considerably according as the crops are irrigated or [illegible]. For all Government purposes the British Acre has now [illegible] been adopted, and the Revenue records, I believe, [illegible] were drawn out on this basis, though the local measurements [illegible] time still recognized.

11. The immediate conclusion [illegible] us, on a review of such a condition of things, is, that to establish uniformity it would become necessary to set aside what may practically be said to be the whole of the existing weights and measures of all sorts. It might [illegible] and possible to devise new systems which [illegible] in their main features be [illegible] mony with the existing systems of certain parts of India; but in detail, almost the whole of the weights and measures in actual use would have to be replaced by [illegible] ones, whatever plan adopted. Even if the British government Seer and Maund were taken as standards, this would [illegible] hold good; for, although their use is [illegible] more than that of any other descriptions of weights, yet it is [illegible] when we regard the whole extent of British India.

12. To some persons it will no doubt appear questionable whether, under present circumstances, the introduction of uniformity in the weights and measures of India should be attempted, and whether, if attempted, it could be enforced. But into any detailed discussion on these subjects I shall not here enter, nor indeed could such discussion be properly undertaken until a clear idea had been first obtained of the nature of the changes that would be required, and of the best manner of making them. It will, therefore, be sufficient in this place if I assume that the attempt shall be made, and that we have only to consider in what way it may be best made. I may, however, state my own conviction that, with suitable arrangements and due perseverance, the ultimate attainment of uniformity may be regarded as quite feasible. But I must guard this expression of opinion by adding that the practical importance of establishing uniformity of weights seems to me to stand on a decidedly different footing from that on which rests the expediency of reforming the measures of Length, Area, or Capacity; also, that there is much to be said in favor of not attempting too much in this direction at one time, whether regard be had to the probable difficulty of commanding the common consent of Englishmen interested in the matter, or of overcoming the passive resistance of the people of India.

13. Both in respect to the internal convenience of India itself, and to its external relations with the rest of the civilized world, the determination of the standard of weight is of far greater importance than that of Length, Area, or Capacity. The retail transactions of every-day life bring home to the whole population the nature of the [illegible] by which commodities [illegible] where [illegible] under circumstances which do not immediately affect the ordinary business of life. Where measures of capacity are practically based on weight, as I believe is almost universally the case in India, the former are entirely subsidiary and ancillary to the latter.

14. I shall, therefore, commence with the consideration of the Weights. In doing this, I am fully aware that a scientific treatment of the abstract question of the most convenient metrical system must begin with a discussion of the Unit of Length. But I do not concern myself with any such abstract treatment of the subject. Whatever conclusion is come to, it is certain that it will not lead to the adoption of an absolutely new Unit of Length or Weight; all that we have to do is to select for India some one of the existing Standards which have already obtained the sanction of custom. All Standards of this sort are essentially arbitrary, and have very little in them to recommend one rather than another. The reasons that induce me to select a particular one from among them, are, as I shall point out in the sequel, of a purely practical nature.

15. It will first be convenient to say a few words on the existing Government system of weights, established under Regulation VII of 1833, referred to in para. 3. This was introduced on the advice, I believe, of the late Mr. James Prinsep. Following the old native idea, it is based on the Rupee coinage. Even as a system for permanent use exclusively in India, there would be little to recommend it, but no serious attempt has ever been made to bring

it into use in the country at large, and it may in general terms be said to be unknown out of the chief towns near which a large English society has grown up.

16. This system of weights in its relation to English commerce is inconvenient in the extreme. It is founded on Troy weights, which are only used for the sale of Drugs in retail, and of Gold and Silver, and it has no exact equivalents in Avoirdupois weight, which is exclusively used in commercial transactions. Both in the ascending and descending scale, it adopts the old cumbrous native method of division.

17. In a primitive state of society, where the adjustment of the weights of commerce is not under control, a system which adopts a fixed number of a common current coin as the standard of weight, has sensible advantages. But as soon as the State interposes and prescribes a standard, it becomes essential, if the adoption of that standard is to be enforced, to establish the means of giving official authenticity to the weights used by dealers, of eliminating incorrect weights, and of supplying in their places those known to be correct. The rude checks which in a simpler state of society customers may desire to exercise for their own protection, will then soon become obsolete; and all questions will be referred to the proper authority, whose business it will be to supervise the weights and measures of the place.

18. On this ground it seems of no special importance to retain any exact proportion between the weight of the current coin and of the unit of weight for [illegible] has some advantag[illegible] perfect [illegible] and Measures would, no doubt, make the weights of the coins exact multiples or sub-multiples of the Unit of Weight, and the diameters of the coins exactly commensurable with the Unit of Length. But it must be borne in mind that in practice current coins, after ordinary use, vary so much in weight as to make them incapable of serving as exact standards; so that a test such as they can supply is far more rough than it might at first sight appear to be.

19. As regards the existing Rupee weight or Tola, I can attach no value to it as a permanent standard of weight. I feel satisfied that Gold is destined to become the Standard of the Indian Currency, as it has become in almost all civilized countries, and when this happens, the fixity of the Rupee becomes very doubtful. The permanence of the Rupee is made questionable on other grounds also. The tendency among civilized nations to adopt a common monetary unit becomes daily more manifest, and that this end will eventually be arrived at I cannot doubt. A movement is now going on, under the sanction of the Emperor of the French, to effect this object. As regards England, the very small difference that exists in the quantity of pure gold in the Sovereign and in 25 Francs of the French gold currency, amounting to a little less than 1 Grain of pure gold, the value of which is about two pence, indicates that the change might there take place at any time. Should it be carried out, the advantage of extending to India the conveniences of the arrangement might probably be pressed on the Government of this

country in a manner which it would be difficult to withstand, and if the common monetary unit of Europe were adopted in India, it must almost certainly lead to the modification of the Rupee.

20. On the whole, therefore, I conclude that the system of British Indian Weights based on the Tola, has no very strong claims to consideration, derived from any special convenience of importance, and that it is decidedly objectionable in not being commensurable either with the English weights of commerce, or with those of any other country with which India has commercial relations.

21. The Reports of the Local Committees appointed to consider the subject of Indian Weights and Measures are unanimous in rejecting the British Indian system as it now stands, and I am not aware that any authority has pronounced in its favor. The general opinion seems to be that a Seer of 2 lbs Avoirdupois should be substituted in place of the existing Seer, with a Maund of 50 Seers equal to 100 lbs. The sub-division of the Seer into sixteenths is generally advocated.

22. Of proposals of this class it may be said that there seems no special convenience to the people of India in adopting a Seer of 2 lbs in preference to any other weight of nearly that amount; and that the English Avoirdupois Pound, being essentially the unit of retail and not of wholesale trade, is not a convenient unit for the commercial transactions between India and England. For these the Hundredweight of 112 lbs, and the Ton of 2,240 lbs, are almost exclusively used. A system of weights which should be decimally arranged with the Pound as a unit, would practically be as incommensurable with the weights of English [illegible] British [illegible] and for [illegible] as necessary in every merchant's office as they are at present.

23. If it be admitted, as it seems to me that it must be, that it would not be more difficult to introduce into use in India by authority, any one Unit of Weight rather than another, provided they be equally convenient on general considerations, then it would follow that it is chiefly to considerations of general convenience that we must look in making our choice of a unit. So long as the amount of the change, which under any circumstances will have to be made in the weights of the country, is restricted within certain limits, its precise quantity is not imporant. It cannot make any appreciable difference to the natives of India whether, for instance, the Seer which at any place is now say 1 lb 10 ozs shall be altered to 2 lbs, or to 2 lbs 1 oz, or *rice versâ*. The proposal to assume the Seer to be 2 lbs, which has so generally been made, in fact admits this view to be correct.

24. Hence, so far as I can judge, the only important consideration which should influence us in our conclusion as to the precise unit to be adopted, is that the system of weights we select for India should conform to the systems in use in the rest of the world, and in particular to those in use in countries with which India has the largest commerce.

25. This conclusion would at once indicate that it is to the com[illegible]l weights of England to which we should first look in seeking a new [illegible] for

India. As I have before remarked, the Pound, though the nominal unit of English weight, is not practically the unit of wholesale dealings, with which alone commerce concerns itself in an important degree. The Ton being 2,240 lbs, and the Hundredweight 112 lbs, the expediency of adopting as the new unit a weight of 2·24 lbs Avoirdupois, which is one-thousandth part of the Ton, and one-fiftieth of the Hundredweight, readily suggests itself. For the purposes of practical retail dealings this weight would be equal to 2¼ lbs. It would, on the whole, more nearly approximate to an average Indian Seer, I believe, than a weight of 2 lbs, and so be more acceptable to the people of India. It would also be not greatly different from the French Kilogramme, which is 2·205 lbs Avoirdupois, and for small quantities might be regarded as an equivalent. The difference between the Kilogramme and 2·24 lbs being about 1½ per cent., larger quantities would require a correction.

26. But the question arises, when we have got thus far, whether it is possible to regard the present English system of weights as likely to continue in force for such a length of time as to preclude the necessity for considering in what direction it is likely to be modified. If India is to be kept dependent on England in respect to its weights, and if we are now to come to a conclusion regarding the Indian system, it seems essential to look forward to the probabilities of the English system in the future. It would be most objectionable to enter upon so important an operation as the fixing a standard for the weights of India, with the conviction that what is now done is not likely to be lasting. In such a matter the convenience of the people of India cannot with justice be set aside. One change is as much as

change made in the English system of weights, would, in my opinion, be utterly unjustifiable, and rather than accept such a result, I should prefer to see the present confusion prolonged. This consideration should have the more force if the precise character of the change first proposed were determined, as would be the case under the supposition made, not by any consideration of the convenience of the people of India, but exclusively in the interests of English merchants.

27. I ask, therefore, is it likely that the present English system of weights will last indefinitely? My reply is that I do not believe that it will so last. The conclusion seems unavoidable that before long the French weights and measures must be adopted in England. Even at the present time the greater part of Europe has adopted them. Portugal, Spain, France, Italy, Belgium, Holland, and parts of Switzerland have accepted the entire system. The Zollverein, which includes all commercial Germany, also Denmark and Norway, have adopted the Half-Kilogramme as the unit of weight. In Austria the same unit is said to be used in all great commercial operations. Several of the minor States of America have also adopted this weight. The weight of the German Union Dollar (Vereinsthaler) is based on the Zollpfund, or Pound of Zollverein, which is half a Kilogramme, and the Austrian Gulden is also commensurable in weight with the Union Dollar. Under such circumstances, and ... regard also to the constantly increasing intimacy of the relations

between the various countries of Europe, arising from the vastly improved communications and enlarged commercial transactions, I cannot but think that it is a mere question of time when the weights of England are assimilated to those of France and the rest of Europe. It is right to remark, however, that some of the Indian writers on this subject have given opinions to the effect that England is likely to adopt a Hundredweight of 100 lbs Avoirdupois, and decimal scale of weights based on the Pound. But I cannot admit that there is the smallest probability of a change being made in such a direction; if any alteration takes place, it will assuredly be of a much more sweeping nature.

28. On these grounds I cannot avoid the conclusion that if any attempt be made to introduce uniformity of weights in India, we should at once adopt the French unit and take the Kilogramme as the basis of the new system—a proposal already put forward by the Bengal Committee, and accepted by the Lieutenant Governor of Bengal, Sir C. Beadon. As I have already observed, the Kilogramme, which weighs 2·205 lbs, is quite sufficiently near the existing Seer weight of Northern India to be as acceptable as a 2 lb weight, and is probably more convenient so far as the people are concerned. The average Seer is in excess of 2 lbs, and a change which somewhat increases a weight is more popular than one which reduces it; the majority of the people being purchasers, and the sellers being comparatively few in number.

29. To the English merchants settled in India, having dealings with England, the conversion of English weights into the new or French equivalents, would in fact call for no more trouble than is now needed, or than would

... adopted ...

Kilogrammes, the former being 2,240 lbs, and the latter 2,205 lbs, giving a difference of only 35 lbs, or about $1\frac{6}{16}$ per cent., that the one might be accepted for the other, or that the simple addition or deduction of that percentage would be considered sufficient in converting English to French Tons. The same remarks would apply to the Hundredweight, which being 112 lbs would closely approximate to 50 Kilos. or 110·23 lbs. To English merchants in England, having dealings with India, the change proposed would only have the effect of extending to those dealings the system of conversion of weights which is already required in their transactions with the commercial nations of Europe, and therefore quite familiar to them; instead of requiring a change of a novel character, involving the creation of new standards, and adding a further load to the burden already put upon them by the existing diversity and complications of the weights they are forced to recognize.

1 Ton English = 1016·05 Kilos.
1 Tonne (1,000 Kilos.) = 98421 Tons = (1—0·1579) Tons.

1 Cwt. English = 50·80 Kilos.
50 Kilos = (1—0·1579) Cwt.

30. The British Indian Seer weighing 2·057 lbs is 0·9331 Kilos. This is very nearly $\frac{15}{16}$ths of the Kilogramme, which would be 0·9375 Kilos. The difference amounts to 4·4 Grammes or ½ per cent. If the Kilogramme ... adopted as the new unit of weight, and divided into sixteen parts or Ch...,

as the old Seer is divided, fifteen of these could therefore, with sufficient exactness, be regarded as equivalent to the present British Indian Seer.

31. It has been pointed out by the Calcutta Committee that it would be possible to adjust the weight of the Rupee so as to make it exactly commensurable with such a new unit of weight. The Rupee weights 11·66381 Grammes, of which $\frac{1}{12}$th part, or 0·97115 Grammes, is alloy (Copper). By adding to the alloy 0·83619 Grammes, the weight of the Rupee would become $12\frac{1}{2}$ Grammes, or 80 would still go to the new unit of weight. Perhaps this proportion of alloy, about 17 per cent., or rather more than $\frac{1}{6}$th of the pure Silver, might be thought objectionable, but it would at all events be easy to increase the weight to 12 Grammes if it was thought worth while to have the Rupee an exact number of Grammes.

32. I have purposely proposed to take the Kilogramme as the unit of weight in preference to the Gramme. The latter is, I think, generally admitted to be inconveniently small. But the distinction between taking a unit and sub-dividing it into 1,000 parts, and taking the thousandth part of that weight as the unit and multiplying it decimally, is not one of much ultimate importance.

33. And here I would observe that, while advocating the adoption of the French standard of weight, and looking forward to the future introduction of the decimal system of sub-division, I yet feel assured that it is not expedient to attempt to carry out the latter part of the arrangement at first, at all events in the ordinary dealings of the people.

tual course of events in France in the progress of the introduction of the Metrical system there. The new weights and measures were first adopted in 1793; but it was found very difficult to get them taken into common use, and the compulsory carrying out of the change did not in fact take effect till 1840. The time fixed in the original law of the National Convention in 1793 for the introduction of the new weights and measures was successively extended at various intervals, and in 1812 a decree of Napoleon legalized for retail trade a bastard system called the "Système Usuel," which retained most of the old weights and measures in their main characteristics, but assigned to them new values based on the units of weight and length of the "Système Métrique." For other transactions the decimal system was retained. But much inconvenience arose from both systems having been legalized for retail business, and in 1816 the "Usuel" weights, &c., were made obligatory for retail trade, and the "Métrique" for other business. For retail trade the use of weights or measures decimally divided was absolutely prohibited. In 1837 a law was passed, to take effect in 1840, by which the "Usuel" system was finally abolished, and the "Système Métrique" has since been in force for all transactions of every description in full integrity.

The system of "Usuel" Weight was as follows:—

1 Livre = 500 Grammes or $\frac{1}{2}$ Kilogramme.

This was sub-divided into 16 Ounces, and these into various other parts on a binary or ternary system, thus:—

1 Livre = 16 Onces = 9216 Grains.
1 Once = 8 Gros = 576 Grains.
1 Gros = 3 Deniers = 72 Grains.
1 Denier = 24 Grains.

Again, the Lineal Measures were the "Toise Usuel" equal to 2 Metres, divided into 6 Feet, and each of these into 12 Inches, and further into Lines, &c., on the old plan. The "Aune" was also preserved, being made 1·2 Metre. The Measures of Capacity were similarly modified.

36. I am disposed to think that even in a civilized country the adoption of some such intermediate scale of weights between an existing system and a new one based upon a different unit which it is desired to introduce, is almost essential in order to habituate the people to the change of standard. This change having once been made, under cover of the old denominations and systems of sub-division, the full introduction of a purely decimal system of multiples and sub-multiples of the new unit becomes comparatively easy. It is the duty of the Government, in making any change of the sort contemplated, to carry it out in the manner most likely to be convenient to the people of India, and having regard to their general extreme ignorance, it is I believe only by help of this artifice that the change could be brought about in a satisfactory manner.

37. It will probably facilitate the complete apprehension of this proposal if I illustrate it by suggesting the sort of changes which its adoption would render necessary in the chief provinces of India.

38. In the first place, for Upper India, the Kilogramme could be adopted as the new Seer, with a sub-division into 16 Chittacks, each of $62\frac{1}{2}$ Grammes. The Chittack might be divided into 5 Siccas of $12\frac{1}{2}$ Grammes; or if the Rupee weight were altered to $12\frac{1}{2}$ Grammes, the name Tola might still be retained instead of Sicca. For the purposes of ordinary trade no lower sub-division than the Chittack would be needed. For Goldsmiths and Jewellers the Gramme might probably be substituted for the Masha, now $\frac{1}{12}$th of the Tola, with a further sub-division into 10 Ruttees.

39. This Seer would answer for all Bengal, for the North-Western Provinces, and probably for the Punjab and Central India.

The Half-Kilogramme would be nearly the Seer of Guzerat.

A Maund of 10 such Seers would be suitable for Bengal and Northern India, 25 Maunds going to the Ton of 1,000 Kilos.; and a Maund of 20 such Seers for Guzerat and Malwa, 50 going to the Ton of 1,000 Kilos. For the town of Madras, the Viss might become $1\frac{1}{4}$ Kilogramme; the Madras small Seer would then be $\frac{1}{4}$ of a Kilo., and the Maund 10 Kilos., the Candy 200 Kilos., 5 Candies going to the Ton. Or the Maund might be made to agree with the Bombay Maund of $12\frac{1}{2}$ Kilos.; in which case the Viss would be $1\frac{9}{16}$ Kilos., the Seer $\frac{5}{8}$ Kilo., and the Candy 250 Kilos., 4 going to the Ton.

The Bombay Maund might be taken to be 12½ Kilos., unless it were made 10 Kilos., so as to assimilate it to the half of the Maund of Guzerat, and the quarter of the Maund of Northern India.

40. Thus everywhere the Kilogramme would be found at the base of the modified system of weights, and a definite proportion would be created between the old denominations and the new unit. When the people had become habituated to the change, the old names could be dropped, and the elementary new unit would, without difficulty, become the general standard.

41. It would, of course, be expedient to reduce the number of local weights as much as possible, and, so far as it could be done, to make the local weights of different provinces exact multiples or sub-multiples of one another, and, if practicable, decimal multiples or fractions of the Kilogramme. The relation between the various local Seers and Maunds could perhaps be indicated by some suitable modification of the local names. For example, the Maund of Bengal of 40 Kilos. might be called simply *Mun*; the Maund of Guzerat of 20 Kilos., *Mun-adhelee* (*i. e.*, Maund halved); and the Maund of Madras of 10 Kilos., *Mun-powah* (*i. e.*, Maund quartered). Instead of these Hindoostanee affixes, it would be easy to substitute similar terms in the local vernacular language. It must be understood that the suggestions I have above made as to the modification of the existing local weights are only intended to illustrate my proposal, and not to show exactly the best local systems. The determination of the precise denominations of weights to be adopted in the provisional systems must be left for future careful consideration, as also the local limits within which each such system would be applicable.

42. Though not indicated by the history of the introduction of the new weights and measures in France, I should also think that it would be expedient to make the use of the complete decimal system based on the new unit obligatory from the outset on all Government establishments, on all Railways, on all Joint Stock Companies, and in all wholesale transactions in the chief towns or sea-ports. The use of the new local weights would be made obligatory in all retail transactions in the chief towns, and beyond those towns in all transactions, excepting those of the Government, the Railway, and other large Companies.

43. These suggestions, if adopted, would lead to the declaration by a law applicable to all India, that the Kilogramme, under some name to be specially chosen, should henceforth be the standard of weight.

That, for all Government establishments, and for all Railways and Joint Stock Companies, and in all wholesale transactions in the chief towns to be named in the law, the decimal multiples and sub-multiples only should be used, the necessary provision being made for assigning suitable names to such multiple and sub-multiple weights.

That, for all retail transactions, and for all transactions not above provided for, new local weights should be introduced, to be fixed as follows:—

That the principal old denominations of weights should be retained, but that new values should be assigned to them, so as to make them, as nearly

as possible, either exactly equal to the Kilogramme, or exact decimal multiples or sub-multiples of it. That in the descending scale a binary, or, if thought desirable, a ternary sub-division might be followed.

That the determination of the exact denominations of new weights to be adopted should be left to the local Governments, as also the definition of the districts to which the new local weights should apply. A general power of revision would be reserved to the Government of India, with the intention of harmonizing the various local systems and weights with one another, and of reducing the number of distinct weights as much as possible.

44. The only exception that appears likely to be necessary to such a general scheme as the above is in the case of the dispensing of medicines, for which I presume that the existing English Apothecaries' weights must be tolerated so long as they remain in ordinary use in England. But the exception is not one of any practical moment.

45. I purposely avoid any discussion as to the precise names to be given to the new weights. Whether the French names should be used, or whether Oriental names should be given on a similar principle, are questions of detail. I am inclined to think, however, that old Indian names should not be given to any of the new denominations of weights which would form a portion of the permanent system, and that these old Indian names should be regarded as destined to be eventually entirely extinguished, when the use of the new scale had become sufficiently familiar to the people. They would remain as a scaffolding on which the new system was supported on its first introduction, to be removed when that system was capable of standing by itself.

46. I also defer, to a later part of this Memorandum, the consideration of the time and manner of giving effect to the changes suggested. These points will be more conveniently dealt with after having discussed the other new Standards to be adopted.

47. I now proceed to the Standard of Length. For reasons analogous to those already given in relation to the weights of India, I conclude that if any present attempt be made to introduce a new uniform unit, the Metre will be the best standard of length to adopt. But, as I have before said, the expediency of taking such a step in the case of measures rests on different grounds from those which support the argument in relation to weights, and each must be judged on its own merits. What these merits are may better be appreciated, as regards the standard of length, after the perusal of the suggestions which I shall proceed to offer on this part of the subject.

48. It is sufficiently notorious that all existing Indian ideas in relation to distances are extremely vague, and even the estimation of length in matters of retail trade is very lax. It must have occurred to most people having even a moderate experience of India to see cloths measured by the forearm of the seller. The Metre of 39·37 Inches, and the Half-metre of 18·68 Inches, will be perfectly good substitutes for the Guz and Hath. As to distances, the necessity for an exact standard is practically only felt in

occupations having some relation to European civilization, and in these the English Mile and Yard are of course the present accepted units. Now, it so happens that the relation between the Metre and the Yard is such as to render the transition from English to French measures of length remarkably easy, at least within the practical amount of accuracy required for the ordinary concerns of life.

49. The Metre is 1·09363 Yards. This differs from $1\frac{1}{10}$ Yards by very little more than $\frac{1}{2}$ per cent. of the entire length, or $\frac{1}{20}$th part of an Inch. Now, a Mile being 1,760 Yards, is 1,600 times 1·1 Yards, and therefore differs very little from 1,600 Metres. An illustration may be given of the practical effect of considering the Mile to be 1,600 Metres. The exact difference between them is 10·19 Yards. This, on such a distance as that by Railway from Calcutta to Delhi, 1,020 Miles, only involves a difference of about 6 Miles. If, therefore, for the present Mile was henceforth substituted a Mile of 1,600 Metres, it would only lead to a difference of charge for the whole distance of 9 Annas for a first class, and one-half an Anna for a third class passenger; this is about $1\frac{1}{2}$ Pence in the Pound.

50. The transition from a provisional Mile of 1,600 Metres to the Kilometre and Myriametre is obviously easy. The new Mile could be divided into 16 parts, each of which would be 100 Metres. Two and a half such Miles would be 4,000 Metres or 4 Kilometres; a good approximation to the Coss of the Moghul Emperors.

51. For retail trade in Northern India, the Metre or Guz might be divided, as at present, into 16 parts called Girahs, and into 24 parts called Tussoos. Each Girah would be divided into 3 Anguls, and each Tussoo into 2 Anguls.

If in any part of India the use of Feet and Inches has become so habitual that their recognition would be desirable for the convenience of the people, there would be no objection to dividing the Metre into 3 parts, and each of these again into 12, to take the places of the Foot and Inch.

52. With the exception of the Calcutta Committee, all the authorities consulted agree in advocating the adoption of the English Yard or Foot as the new standard of length. I do not at all conceal from myself that very strong opposition may be expected to the adoption of the French standard of length, which would not arise in the case of the standard of weight. Practically, the English in India have been forced to accept more or less completely the native systems of weight. But as regards measures of length, this has not at all happened. The truth rather lies the other way; the English Foot and Inch being very generally known in all parts of India, and even being in common use in many trades. The English Yard is also widely used as a measure for woven fabrics.

53. It cannot be denied, then, that the adoption of the English Foot as a general standard of length, with a Guz of 3 Feet, would be much easier and more popular, both with the European and Native communities, than what I have advocated. Also I admit that my proposal rests on what may, to some

extent, be termed theoretical considerations of symmetry, as opposed to t which are practical. But I have so firm a conviction that the French t of length will eventually be adopted generally, that I should not hesitate fix it as the new standard for India, if it were determined to introduce or uniform standard, and if the decision rested entirely with myself as to wha the new unit should be.

54. The really important point is, whether a uniform standard of length can now in any sense be said to be so necessary or so desirable as to call for present action. On this I cannot say that I have strong convictions, and I am ready to acquiesce in the conclusion that action should be deferred till some future time, if opinion be generally expressed in that sense. I am however inclined to think that the change, as I have suggested it, might be made without any present inconvenience of importance. But I should distinctly object to the general introduction by authority of the Foot as a standard, because I believe it would eventually have to be given up.

55. If the Metre were adopted as the new unit, the only exception that seems necessary in introducing the change is in the case of English Mechanical Engineering, in which it is probable that, for the present at least, the English Foot and Inch must be permitted. Otherwise the same general rules might be adopted with reference to the new standard of length as those which have been proposed in regard to the standard of weight. For all purposes of retail trade, local measures, based on the Metre, or sub-divisions of the Metre, would be made to suit the existing customs of the people, the decimal subdivision of the Metre being used under all other circumstances. The retention of a modified Mile of 1,600 Metres would probably be convenient as a transitional measure for all classes.

56. So far as any special Solid or Cubic measures were needed, they would naturally follow the standard of length. I doubt the existence of such a want in India, however, unless in Ship measurement, for which some special definition of a Ton might be desirable. The English Ship-builder's Ton of displacement is 35 Cubic Feet, and therefore very nearly (0·991) a Cubic Metre. It is approximately the quantity of sea water which weighs 1 Ton. The Ton of measurement of 100 Cubic Feet is a purely arbitrary standard, for which might quite readily be substituted the Cubic Metre also.

57. The next subject for consideration is the Standard of Superficial measure. Of course this must follow the standard of length, and all that is here needed is to show what would be the probable practical result of the adoption of the Metre unit.

58. In the same way that the Mile is an exact multiple of 1·1 Yards, it curiously happens that the Acre is an exact multiple of a Square having a side of 1·1 Yards, being 4,840 Square Yards, or 4,000 times 1·21 Square Yards. Therefore, an English Acre does not differ greatly from 4,000 Square Metres or 40 Ares of the French scale, and $2\frac{1}{2}$ Acres is nearly 1 Hectare or 100 Ares.

59. The exact difference between 1 Acre and 4,000 Square Metres is 55·87 Square Yards, which is about 1·15 per cent., the Acre being the smaller.

For all the ordinary purposes of life, such a difference is inappreciable. Few fields are more than 10 Acres, so that in any single field the adoption of an Acre of 4,000 Square Metres would not involve a change of more than $\frac{1}{10}$th of an Acre, or one Chain in the nominal area. Such an error would lead to an error of say $1\frac{3}{4}$ Annas, on a payment of rent, or land revenue, amounting to 10 Rupees; or $2\frac{1}{2}$ Pence in the Pound. Looking to the larger holdings of land, a village will not often be more than 500 Acres, and on such an area the difference would only be $5\frac{3}{4}$ Acres. It is not to be understood, when I speak thus, that I mean to imply that the old measures are arbitrarily to be converted into the new ones. Naturally, a proper allowance would have to be made, to the extent of about 1 per cent., in all reckonings of areas, rent, &c., but the practical inconvenience and liability to loss consequent on such a change in ordinary transactions would evidently be very small.

60. In the North of India the ordinary sub-division of Land measures is by Twentieths, Biswahs, and Biswansees. This at once suits itself to the adoption of a decimal scale of sub-division of the modified Acre. The Biswah being the twentieth part of the Acre would be 200 Square Metres, and the Biswansee the twentieth part of the Biswah becomes 10 Square Metres. The Madras sub-division of Land Measure is in fortieths, which is quite similar in its adaptability to the division of the Acre of 4,000 Square Metres.

61. If the Metre unit were adopted, then the best practical course to pursue in regard to the Land measures would probably be to take the Square Metre as the ultimate unit, but by way of transition to keep an Acre of 4,000 Square Metres, divided into four parts (Decares) for Government purposes, below which decimal sub-division would be followed. For the people their customary division into twentieths or fortieths might be permitted.

62. So far as Beegahs, Cottahs, Cawnies, Valies, or other local denominations of area were to be retained, they should be declared to be equivalent to a given definite number of Square Metres, taking, if possible, decimal multiples.

63. On this part of the subject I need further only add that from considerations such as have already been sufficiently explained, I should not be disposed to assent to any change in the Land measures of India short of the general introduction of the Square Metre as the unit. But if for any reason this complete step be not taken, it will, I think, be very desirable that the Government, *for its own purposes*, shall everywhere adopt the English Acre as the standard of Land measure, and very strictly prohibit the use of, or reference to, Beegahs or other local measures in all public documents. The confusion now arising from the use of the term Beegah, when it in fact means all sorts of areas, from 2 Acres to $\frac{1}{4}$ of an Acre, is beyond bearing.

64. The Measures of Capacity alone remain to be noticed. The French Litre is within an extremely small fraction, which practically may be neglected, the thousandth part of a Cubic Metre. It is the volume of one Kilogramme of pure water of maximum density and at the standard barometric pressure. If this unit be accepted, it will naturally fall in with the Kilogramme as a standard of weight.

65. As to Dry Measures, it may be easy to adjust a measure which holds *exactly* 1 Kilogramme of pure water, so as to serve also as a measure for 1 Kilogramme of grain, which is the chief article sold by measure. The weight of a given volume of grain is about $\frac{8}{10}$ths only of the same volume of water. If, therefore, the Litre were filled with grain and the measure "struck," the weight contained would only be $\frac{8}{10}$ths of a Kilogramme. But by "heaping" the grain, it will, of course, be possible to add to the capacity of the measure. What would be necessary, therefore, would be to adjust the relative depth and diameter of the Litre for grain measurement, in such a way as to make the "heaped" portion which stands above the true surface of the measure compensate for the inferior weight of the grain as compared to water. I reckon approximately that to make this adjustment the height of the measure should be about $\frac{2}{3}$rds of the diameter. But the exact proportions could be regulated by law in accordance with the result of actual experiment.

66. It will be observed that Mr. Bayley has proposed to follow the English system of recognizing only "struck" measure. But if, as he says, the people always use "heaped" measure, it seems better to follow the present custom as regards the sale of grain at least, and, so far as I can see, the accuracy of the measurement will be quite sufficiently secured in the manner suggested, without abandoning the precise standard dimensions of the measure, a result which cannot be accomplished in any other way.

67. In respect to Fluid Measures, the Litre which contains 61·0266 Cubic Inches is about $\frac{1}{16}$th more than the old Wine Quart, which contains 57·75 Cubic Inches. It is equal to ·220215 Imperial Gallons, and about $\frac{1}{50}$th less than the Imperial Quart of 69·281 Cubic Inches. The Hogshead of 54 old Beer Gallons contains nearly 55 Imperial Gallons, and differs from 250 Litres or $2\frac{1}{2}$ Hectolitres, by a trifle less than an Imperial Pint, or hardly more than $\frac{1}{6}$th per cent. It is probable that for ordinary purposes, in the conversion of English Fluid Measures into the new standard, the Litre might be assumed as equivalent to the Wine Quart, and the Beer Hogshead as equal to 250 Litres.

68. The same general system might be followed in the introduction of new measures of capacity as of the other new standards. The retail and country dealers might have special local measures assigned to them commensurable with the Litre, but adapted to the existing local measures. The wholesale dealers in the chief towns, and the Government establishments, might be restricted to the decimal system based on the Litre.

69. As to the general question of the necessity for dealing with measures of capacity at present, it may be said that if the introduction of new standard weights be determined on, then new fixed measures of capacity for grain or other dry goods, conformable to the new weights, will be essential for the convenience of the people. This being the case, it will, in the event supposed, be at least as convenient to adopt the Litre as the unit for Dry measure as any other standard. For liquids, the necessity for any measures hardly arises as regards the mass of the people. With reference to the English community,

although a change to French measures would perhaps be distasteful at first, there is little doubt that, for the purposes of ordinary life, they would in a very short time be universally found and admitted to be actually more convenient than the English Imperial Measures, which in fact are not in common use. If such a view were generally accepted, the Litre might be taken as the new standard of capacity for India. Otherwise I should consider that the proper course to follow would be to deal exclusively with the Dry Measure in the manner that has been suggested.

70. These are all the observations which seem necessary with respect to the standards of weight and measure. It remains for me to refer to the manner in which they may be brought into use.

71. As regards Government Establishments, Railways, and probably the Presidency Towns, I think that after a period of three years the use of such new weights and measures as it was determined to adopt might be made compulsory. I believe that not less than this time would be found necessary to provide the needful new weights and measures; this operation, and its probable cost, will be found much more serious than may at first sight seem likely.

72. It appears proper to arrange for facilitating the supply of traders with the new weights, &c., on the first introduction of the new system. Notice might be given that applications would be received up to a certain date for the new weights and measures, and that on such applications new weights and measures would be given in exchange for old ones, article for article, at cost prices.

After that date, payment should be required at such an advance over cost price as would give a fair trade profit, and so not lead to interference with private dealers. These arrangements might readily be carried out under the Municipal authorities, or through the agency of private dealers, if that were thought to be preferable to making direct Government sales.

73. To ensure the authenticity of weights and measures purporting to represent the new standards, they should be marked with special stamps, the use of which should be restricted to Government Inspectors, or certain licensed manufacturers. Unless properly marked, no such weights or measures should be allowed to be used in trade or business, or sold. The introduction into India of unstamped weights, &c., purporting to represent the new standards, should be prohibited, and the Officers of Customs allowed to seize them, giving the importer the opportunity of having them inspected, and if correct, stamped by a proper Officer; otherwise, they should be confiscated, and, if not capabl of being made use of by the Government, broken up.

74. To facilitate the manufacture of weights, &c., the Government might give licenses to persons, residing out of India, to use the proper stamps, and such weights might be admitted without further examination. The French Government would certainly assist in the provision of the new standards, and of the first supply of new weights and measures; and the co-operation of French manufacturers would greatly facilitate the introduction into India of the large number of correct weights which would be needed at the outset.

75. The same rules must be made to apply to weighing machines, and robably also to the beams of balances, as to weights and measures. There is uite as much fraud practised in India by means of false balances as of false eights, or even more. A fraudulent balance is much less easily detected than false weight. To give an effectual remedy against the use of false balances, ooden beams should be absolutely prohibited for purposes of trade wherever he new weights were introduced by law.

76. The prohibition of wooden balance beams may appear a strong measure for adoption at first. No doubt the first thing to be done is to introduce he new weights, and it would be a great step in advance to accomplish this lone. If the reform of balances were thought to be a measure better taken p separately in a later stage of affairs, provision could easily be made for his.

77. Inspectors should be appointed wherever the new weights were rought into use, whose duty it would be to verify all weights and beams hen brought to them as occasion required, according to standards entrusted o them—suitable fees being payable by private persons for such verification, nd for making weights and beams, &c., correct. Proper rules should be laid own for the verification, at fixed periods, and of the Inspectors' Standards, and f weights, &c., used by Government establishments.

78. A penalty should be attached to the use of weights, &c., not properly tamped for purposes of trade; and all traders or persons engaged in any busi ess, requiring the use of weights, &c., should be bound to have their weights c., tested at stated intervals by the Inspector. To facilitate inspections, they ight be allowed to be made at traders' places of business on the payment f a higher rate of fee. A register of inspections should be kept, and certifi ates granted by the Inspector after the periodical inspections.

79. The special marks used for weights, &c., should be protected as pro erty marks of Government Officers under the Penal Code (Section 484).

80. The Police should be authorized to search for unmarked weights, as ow authorized to search for false weights, under the Code of Criminal Pro edure (Section 129).

81. The use of false weights, &c., is already sufficiently punished by the enal Code, Chapter 12.

82. The standard weights, &c., in charge of an Inspector, should be eceived as authentic until proved to be erroneous.

83. The extension of the new system beyond the Presidency Towns ight best be left to local arrangement. Its adoption at any place should be otified under a proclamation by the Local Government, giving at least three ears' notice. The extension might be made by degrees to particular districts r towns, beginning with the chief towns and cantonments. In every case he same facilities should be given for supplying traders with the new eights, &c., on their first introduction, as already mentioned, and until reparation was made to provide the new weights in sufficient numbers the ttempt should not be made to introduce the change.

84. On the expiry of a certain period after the introduction of the new system, a penal fee should be required on any document produced as evidence in a Court of Civil Justice which referred to any weights, &c., not sanctioned by law, and until such fee was paid the document should not be received.

85. It would be left entirely for decision in the future when the local systems of weights should be given up, and the decimal system of notation introduced in its integrity. Such an event could probably not be looked forward to before 20 or 30 years at earliest.

86. I have thought that it may be convenient to suggest in a definite form the provisions which might be made in a law for carrying out the reform of the weights and measures of India. In doing this, I have consulted the French Code and that of New York, which I have had an opportunity of seeing. It will be seen that my draft provides for the adoption of all the measures that have been advocated. If on further discussion it should be thought inexpedient to deal with the standards of length or area at present, or otherwise to introduce a less complete change at first, any requisite omission could be made without altering the general form of the Bill. The same result might be obtained if the complete Bill were adopted, under the Section which empowers the Governor General in Council to suspend the operation of the new law, either in respect to any description of trade or calling, or any description of weight or measure.

87. Part I would contain all the permanent legislation on the subject. The rules for making the provisional modifications of the old weights and measures, so as to adapt them to the new Standards, are placed in Part II. In Part III are the provisions for introducing the new standard weights, &c., and for introducing and eventually putting an end to the provisional scales. Part IV declares how the obsolete denominations of weight, &c., are to be dealt with in Courts of Civil Justice.

88. Sections 1 to 9 define the new Standard Units, and the legal denominations of Weights and Measures; their sub-division; provide for the regulation of their dimensions when necessary, and the materials of which they may be made; and require that the value of every weight or measure shall be marked on it when possible.

89. The French Units have, for simplicity, been adopted as by law fixed in France, without attempting to define them otherwise. But if it were thought more proper, they might be defined with reference to English Standards.

90. I have not thought it necessary to retain all the French denominations; and it will be understood that the question of giving Indian names to the whole series is left open.

91. Sections 10 and 11 provide for the preparation of Standards to be deposited with each Government or Province, to serve as types for the future.

92. I have left it to the Executive Government to regulate the provision of the Standards, and in whose custody they shall be kept.

93. The pattern weights and measures named by me are merely those which seem likely to be most convenient for purposes of verification, and it will be understood that it is not intended to limit the public to the use of these particular descriptions of weights and measures. So long as the legal standards are followed, any larger or smaller measures or weights may of course be used.

94. Sections 12 to 25 relate to the appointment and duties of Inspecting Officers of weights and measures. The mode of their appointment would be regulated under orders of the Government of India; they will have charge of copies of the standards for comparison; will supervise the weights, measures, and weighing machines, and balances in their districts; will mark correct weights and balances with a stamp to be fixed by the Government; will adjust incorrect articles; for which services suitable fees will be paid. The use of balance beams not of metal will be prohibited. Provision will be made for marking and authenticating weights, &c., made beyond the limits of India, and for prohibiting the importation of articles not marked. The sale of articles not marked will be prohibited, and the imitation of stamps made penal. The weights, &c., of Public departments will be tested and marked under proper rules.

95. Sections 26 to 29 make rules for the use and inspection of weights, &c., for purposes of trade or business. The use of unmarked articles will be prohibited under a small penalty if correct, and under a larger penalty if incorrect, though not used with fraudulent intent. All weights, &c., used in trade to be tested once in two years. The Police may make a search for unstamped articles on the requisition of an Inspecting Officer, under the powers given them by the Code of Criminal Procedure to search for false weights, &c.

96. Part II authorizes certain provisional modifications of the new Standards named in Part I to facilitate the changes contemplated.

97. Sections 30 and 31 authorize certain provisional denominations of weights and measures for general use, subject to a power to discontinue them vested in the Government of India.

98. Sections 32 and 33 provide for the adoption of local provisional weights and measures, the use of which shall be obligatory in the class of business excluded from the operation of Sections 34 and 35, and may include dealings in land; such local provisional system must be approved by the Governor General in Council.

99. Part III provides for introducing the changes contemplated, and for discontinuing the provisional systems, and for exempting special persons or things from the operation of the Act.

100. Sections 34 and 35 declare that for Public Departments and Companies, and the Presidency towns, excepting retail trade, Part I shall come into operation on the 1st January 1871, unless a longer time is allowed by the Government of India.

101. Section 36 provides for the operation of Part I being extended to other places, by proclamation of the Local Government with approval of the

Government of India, not sooner than 1st January 1874, and always excluding all business of trade, wholesale or retail, excepting Joint Stock Companies.

102. Sections 37 to 39 empower the Local Government to bring the provisional local systems into operation after they shall have been approved by the Governor General in Council, but not till 1st January 1874, nor till three years' notice has been given, in any specified place; Part I of the Act will then be deemed to take effect in that place, but with the substitution of the provisional system of weights and measures for the Standards of Part I.

103. Section 40 authorizes the Local Government, with the sanction of the Governor General in Council, to discontinue the use of the provisional Standards, but not before 1877, nor without three years' notice, and thereupon the Standards of Part I will come into exclusive use.

104. Section 41 authorizes the Governor General in Council to exempt special callings or trades, or weights, &c., from the operation of the Act, subject to withdrawal of exemption with one year's notice.

Part IV deals with the obsolete denominations of weights and measures.

105. Sections 42 and 43 require that documents produced in Courts of Civil Justice referring to Weights or Measures not authorized, shall not be received in evidence till a penal fee has been paid under certain conditions.

106. Section 44 authorizes the Local Governments to publish Tables of equivalents of old and new Weights and Measures, which shall be deemed the true equivalents.

SKETCH OF A BILL TO REGULATE THE WEIGHTS AND MEASURES OF BRITISH INDIA.

PART I.

PERMANENT PROVISIONS.

I.—Subject to the provisions herein contained as to the manner in which, and the time when, this Act shall come into operation, the use in British India of all other Weights or Measures than those hereafter authorized is prohibited. The authorized Standards of Weight and Measurement shall be as follows:—

STANDARD OF LENGTH.

II.—The Unit of Length shall be the Metre, as by Law determined in France.

Besides the Unit, the following superior and inferior denominations of Measures of Length shall be lawful:—

1 Millimetre equal one-thousandth part of a Metre.
1 Centimetre equal one-hundredth part of a Metre.
1 Decimetre equal one-tenth part of a Metre.
1 Kilometre equal 1,000 Metres.

STANDARD OF AREA.

III.—The Unit of Area or Superficial Measurement shall be the Square Metre.

Besides the Unit, superior or inferior denominations of Measures of Area corresponding with those of Length shall be lawful.

For Land Measurement, besides the Unit, the following superior denomination shall be lawful:—

1 Are equal 100 Square Metres.
1 Hectare equal 10,000 Square Metres.

STANDARD OF SOLIDITY.

IV.—The Unit of Solidity shall be the Cubic Metre.

Besides the Unit, superior and inferior denominations of Measures of Solidity corresponding with those of the Measures of Length shall be lawful.

For purposes of trade, besides the Unit, the following superior denomination shall be lawful:—

1 Kilostere equal 1,000 Cubic Metres.

STANDARD OF WEIGHT.

V.—The Unit of Weight shall be the Kilogramme, as by Law determined in France.

Besides the Unit, the following superior and inferior denominations of Measures of Weight shall be lawful:—

1 Milligramme equal one-thousandth part of a Gramme.
1 Gramme equal one-thousandth part of a Kilogramme.
1 Ton equal 1,000 Kilogrammes.

Standard of Capacity.

I.—The Unit of Capacity shall be the Litre, as by Law determined in France.

Besides the Unit, the following superior denomination of Measures of Capacity shall be lawful:—

1 Centilitre equal one-hundredth part of a Litre.
1 Decilitre equal one-tenth part of a Litre.
1 Hectolitre equal 100 Litres.

Sub-division of Units.

VII.—The sub-division of all the Units, and of all the higher or lower denominations of Weights or Measures, shall be according to the decimal scale of notation.

VIII.—The Governor General in Council may, from time to time, regulate by Notification in the *Gazette of India*, the proportions of the dimensions to be given to any Weights and Measures and the materials of which they may lawfully be made.

IX.—The value of every Weight or Measure shall be marked thereon, unless it be too small to admit thereof.

X.—There shall be provided, under the orders of the Governor General in Council, for each of the chief Provinces of British India—

A set of Standard Measures and Weights as follows, namely:—

New Standards.	*Equivalents in English Units.*
A Metre divided into 100 equal parts, each of such parts being 10 Millimetres	39·3708 Inches divided into parts of 0·39 Inches nearly.
A Half-Metre or 500 Millimetres divided into Millimetres	19·6854 Inches divided into parts of 0·039 Inches nearly.
A Measure of 25 Metres divided into 100 parts of 0·25 Metres each	82·028 Feet divided into parts of 9·84 Inches nearly.
A Weight of 25 Kilogrammes	55· 12 Lbs. nearly.
Ditto 20 „	44· 09 „
Ditto 10 „	22· 05 „
Ditto 5 „	11· 02 „
Ditto 4 „	8· 81 „
Ditto 3 „	6· 61 „
Ditto 2 „	4· 41 „
Ditto 1 „	2· 20 „
Ditto 500 Grammes	1· 10 „
Ditto 250 „	8· 82 Ounces.
Ditto 100 „	3· 53 „
Ditto 50 „	1· 76 „
Ditto 20 „	0· 35 „
Ditto 1 „	15· 43 Grains.
Ditto $\frac{1}{10}$ „	1· 54 „
Ditto $\frac{1}{100}$ „	·154 „
Ditto 1 Milligramme	·015

New Standards.	*Equivalents in English Units.*
A Measure of 25 Litres	0·102 Hogsheads (Beer Measure).
Ditto 20 „	0·55 Bushels, or 0·122 Barrel (Beer Measure).
Ditto 10 „	1·10 Pecks (Imperial).
Ditto 5 „	1·10 Gallons (ditto).
Ditto 1 „	0·88 Quarts (ditto).
Ditto 5 Decilitres	0·88 Pints (Imperial), or 16·91 Fluid Ounces (Apothecaries' Measure).
Ditto 25 Centilitres	0·44 Pints (Imperial), or 8·45 ditto.
Ditto 10 ditto	0·176 Pints (ditto), or 3·38 ditto.
Ditto 1 Decilitre divided into 100 equal parts ...	3·38 Fluid Ounces divided into parts of 0·27 Fluid Drachms.
Ditto 1 Centilitre divided into 100 equal parts ...	2·71 Fluid Drachms divided into parts of 1·62 Minims.

XI.—These Standards shall be deposited in the charge of such Officer as the Governor General in Council shall direct, and shall be deemed the Standard Weights and Measures contemplated by this Act for the Province in which they may be deposited; and the Governor General in Council shall make Rules for the custody and use of such Standards.

XII.—Officers shall be appointed, under such Regulations as the Governor General in Council shall deem fit, for the inspection and supervision of the Weights and Measures in the several Provinces, and for the purposes of this Act the Governor General in Council may define the boundaries of such Provinces.

XIII.—The Chief Inspecting Officer in each Province shall maintain a complete set of copies of the original Standards to be used for the adjustment of local Standards, and in no case shall the original Standards be used excepting for the adjustment of this set of copies and for scientific purposes under the sanction of the Local Government. A comparison of these copies with the original Standards shall be made at least once in ten years.

XIV.—Under the orders of the Local Government, copies of such of the Standard Weights and Measures as shall be thought necessary, shall be furnished to serve as local Standards in any district or town where it may be thought desirable to deposit such copies. Such local Standards shall be deemed to be correct until proved to be otherwise, and shall be compared with the copies in the charge of the Chief Inspecting Officer at least once in ten years.

XV.—Local Inspecting Officers shall be appointed by the Local Governments to take charge of the local Standards, and to see that the Weights and Measures, Weighing Machines, and Balance Beams, in use in the district or town to which they are appointed, agree with those local Standards, and are correct and lawful.

XVI.—The Governor General in Council shall fix a device to be impressed by Inspecting Officers on the Weights and Measures, Weighing Machines, and Balance Beams, which shall have been tested and found conformable to the Standards, and correct and lawful.

XVII.—The Local Inspecting Officers shall compare with the local Standards all Weights and Measures brought to them, and when they find them correct or make them correct, they shall mark such Weights and Measures with the appropriate devices.

XVIII.—In like manner, all Weighing Machines or Balances shall be tested, and when found to be lawful and correct, or being lawful when made correct, shall be marked.

XIX.—The use of Balance Beams for purposes of trade or business made of any material but metal is prohibited, and no beam, excepting it be made of metal, shall be marked by an Inspecting Officer.

XX.—There shall be paid, as the Local Government shall direct for the testing, correcting, and marking of Weights, Measures, Weighing Machines, Balances, or Balance Beams by the owner thereof, such fees as shall from time to time be appointed on that account by the Local Government.

XXI.—It shall be lawful for an Inspecting Officer to deface, or to render incapable of use, or to refuse to correct or mark, any Weight, &c., brought to him for testing, which shall to him appear to be unfit for correction, or to be unlawful: provided that if the person bringing such Weight, &c., shall require it, the article condemned shall be taken before a Magistrate, and his decision in respect to it shall be final; also, that in all such cases the proper fee for testing, or adjusting, as the case may be, shall be paid by the said person whatever be the decision of the Magistrate.

XXII.—The Governor General in Council may authorize the use, under such Rules as shall be thought proper, by any specially appointed person beyond the limits of British India, of a device to be impressed on Weights, Measures, and Weighing Machines intended to indicate the Weights and Measures authorized to be used under this Act; also on Balance Beams. Weights, &c., so marked shall be held to be authorized under this Act. All Weights, &c., as aforesaid imported into British India, not marked with such device, and not proved to have been marked with such device by proper authority, shall be detained by the Officers of Customs, and shall not be delivered up until they shall have been properly tested and marked by a qualified Inspecting Officer at the expense of the Importer. Weights, &c., so detained and not marked and removed within three months of the date of importation shall be confiscated.

XXIII.—The sale of Weights, Measures, or Weighing Machines intended to indicate the Weights and Measures authorized under this Act, and of Balance Beams, unless such Weights, &c., shall have been tested and marked in the manner aforesaid, is prohibited, under a penalty not exceeding Rs. 10 on every article sold without such mark.

XXIV.—The devices fixed by the Governor General in Council for marking Weights, &c., shall be regarded as marks used by public servants under Section 484 of the Indian Penal Code, and the unauthorized fabrication or possession of Stamps bearing such devices, the marking of Weights, &c., with such unauthorized Stamps, shall be punishable as though such devices were marks used by public servants as aforesaid.

XXV.—The Governor General in Council shall make Rules for the proper inspection, testing, and marking of all Weights, Measures, &c., used by Government or Municipal Offices or Departments, and such Rules shall be binding on all Government or Municipal Officers, and neglect thereof shall render them liable to a fine not exceeding Rs. 50 for each offence.

XXVI.—Whoever uses or has in possession, for any purposes of trade or business, any Weight, Measure, Weighing Machine, or Balance Beam, not properly marked, shall, if such unmarked article be correct or conformable to the Standards, be liable to a fine not exceeding Rs. 10 for each offence. The convicting Magistrate may order any such unmarked articles to be marked by the proper Officer at the expense of the offender.

XXVII.—Whoever uses or has in possession, for purposes of trade or business, any Weights, &c., not properly marked and not conformable to the Standards, or not correct, or not lawful, but who shall, by reason of a fraudulent intent not being proved in respect to such use or possession, not be punishable under Chapter XII of the Indian Penal Code, shall be liable to a fine not exceeding Rs. 50.

XXVIII.—Every person engaged in retail trade, or in any business requiring the use of Weights, &c., shall be bound to have the Weights, &c., used in such trade or business tested once in two years, at such times as the Local Government may appoint, and for such testing to pay the fee fixed for testing and marking, under a penalty not exceeding Rs. 50. The Inspecting Officer shall, if so required, perform the Biennial testing of Weights, &c., at the places of business of traders and others, but in such cases such additional fees shall be paid as the Local Government shall approve. The Inspecting Officer shall also keep such Register of all such testing, and if so directed by the Local Government shall furnish such certificate thereof, as the Local Government shall order.

XXIX.—Any Officer in charge of a Police Station may, on the application of an Inspecting Officer, exercise the powers described in Section 129 of the Code of Criminal Procedure, for the purpose of inspecting, searching for, seizing, and taking before a Magistrate, Weights, &c., kept for use in business or trade not being properly marked, as though such Weights, &c., were false Weights, &c.

PART II.

PROVISIONAL STANDARDS.

XXX.—For the purpose of facilitating the transition from the old Measures of quantities to the new Standards, the use of the following provisional denominations of Weights and Measures shall be lawful, in addition to those named in Part I of this Act, and while so in use shall be regarded as forming a portion of the Standards authorized in Part I. The discontinuance of such provisional denominations of Weights and Measures may be directed by a Notification in the *Gazette of India* by the Governor General in Council, or as provided in Section 36, by a Notification in the Local *Gazette* by the Local Government, provided that the time for such discontinuance shall not be less than three years from the date of the promulgation of such Notification.

PROVISIONAL DENOMINATIONS.

Measures of Length.

1 Mile equal 1,600 Metres.

Measures of Area.

1 Acre equal 4,000 Square Metres.

Measures of Capacity.

1 Ton displacement in Ship Measurement equal 1 Cubic Metre.

Measures of Weight.

1 Hundredweight equal 50 Kilogrammes.

Measures of Capacity.

1 Hogshead equal 250 Litres.

1 Barrel equal 125 Litres.

SUB-DIVISION OF MEASURES.

XXXI.—The sub-division of the provisional denominations aforesaid shall be in terms of the standard Unit in each case, or of an authorized superior or inferior denomination, or of the decimal sub-divisions of the same.

XXXII.—For the purposes of retail trade, within the Municipal limits of Calcutta and the suburbs thereof, Madras, and Bombay, and for all traders beyond those limits, not being Companies such as are named in Section 34, provisional systems of Weights and Measures shall be established as hereinafter provided in the several provinces, the use of which shall be obligatory on such traders from the time that this Act takes effect in such province, or in any town, locality or district thereof.

XXXIII.—The Local Government shall cause to be prepared for the purposes aforesaid, for such localities or districts within its jurisdiction as it shall think fit, provisional local systems of Measures and Weights, in which the more important of the old denominations shall be retained, new values being assigned to them, bearing exact proportions to the new Units or to the authorized superior or inferior denominations, or their decimal sub-divisions. And it shall be lawful, but not obligatory, to include Measures of Land in any such provisional system, and dealings in land according to such measures shall, for the purposes of this Act, be regarded as business of retail trade. And such local provisional system of Weights and Measures shall be submitted to the Governor General in Council for approval.

PART III.

INTRODUCTION OF NEW STANDARDS, AND DISCONTINUANCE OF PROVISIONAL STANDARDS.

XXXIV.—Subject to the further provisions hereinafter contained, Part I of this Act shall take effect from the 1st of January 1871:—First, within the Municipal limits of Calcutta and the suburbs thereof, Madras, and Bombay, with exception to the business of retail trade, which shall be exempt from its operation otherwise than as hereinafter declared. Second, in all dealings of Government departments or offices, and of Municipal bodies. Third, in the transactions of all Railway Companies, and of all Joint Stock Companies registered under Act of .

XXXV.—The Governor General in Council may, from time to time, postpone, by Notification in the *Gazette of India*, the [illegible] this Act shall come into operation as regards [illegible] departments, bodies, or companies.

XXXVI.—It shall be lawful for the Local Government, with [illegible] the Governor General in Council [illegible] the Local *Gazette* that P[illegible] th[illegible], subject to the provisions hereinafter co[illegible], sh[illegible] effect in any town, or locality, or district [illegible] yond [illegible] Municipal limits of Calcutta and the sub[illegible] th[illegible] Madras, and Bombay, from any day to be nam[illegible] [illegible]clamation not earlier than the 1st January 187[illegible] [illegible]s than three years' distant from the date of [illegible] [illegible]on, and such date may, from time to time, be [illegible] like Notification, provided that no busin[illegible] [illegible]olesale or retail, beyond the said Municipal lim[illegible] [illegible]ndered liable to the operation of the said Part [illegible]an is hereinafter declared.

XXXVII. [illegible] provisional local systems of Weights and Measures [illegible]ibed in Section 33 shall have been approved by the [illegible]overnor General in Council, it shall be lawful for the Local Government from time to time to declare by Notification in the Local *Gazette* that this Act shall take effect, and that the use of such provisional local Weights, &c., shall be obligatory for purposes of retail trade if within the Municipal limits of Calcutta and the suburbs thereof, Madras, and Bombay, and for all traders beyond those limits (not being Companies such as

are applied in Section 34), in any town, locality, district or p
ince, from such day as shall be named, but not before the
January 1874, and not less than three years from the dat
such Notification, and such date may from time to tim
postponed in like manner.

XXXVIII.—After the day on which the use of the said provisional syste
Weights and Measures shall so become obligatory in any pl
it shall, for the purposes of this Act, and so far as conc
that place, be regarded as substituted for the system
Standards established in Part I, but only for retail tra
within the Municipal limits aforesaid, and only for traders
being Companies as aforesaid beyond such Municipal lim
And with such substitution as aforesaid and as hereafter n
tioned, and such limitations, all the provisions of Part
this Act shall thenceforth apply in such place.

XXXIX.—So far as it shall be deemed necessary, the Local Government s
provide proper local Standards of the provisional system
Weights and Measures in addition to, or in lieu of, the set
Standards to be provided under Secton 14 of this Act, and s
local provisional Standards shall serve as the tests for all l
Weights and Measures on the provisional system.

The Local Government may also make Rules respecting such local Weig
&c., in substitution for the regulations referred to in Section 8; and may
a device to be impressed on such local Weights, &c., in substitution for
device referred to in Section 16.

XL.—It shall be lawful for the Local Government, subject to
previous approval of the Governor General in Council,
declare that after a period to be named, being not less t
three years from the date of Notification in the Local *Gaze*
nor before the 1st January 1877, the use of the provisio
denominations of Measures and Weights authorized in Secti
30 and 31, and the local provisional systems of Measures
Weights authorized and brought into operation under Secti
33 and 37, or any of such provisional denominations or syst
shall cease in any place to be named in such Notification,
to which place the provisions of Section 35 or Section 37 sl
have been applied. And thereupon, and to such extent as su
provisional denominations or systems shall be declared to ce
to be in force, the Standards laid down in Part I of t
Act shall come into exclusive use in such place.

—It shall be lawful for the Governor General in Council to Acc a
from time to time by Notification in the *Gazette of Indi*
that this Act shall not take effect in respect to any description
of office, body, company, calling, or trade, or in respect t
any description of Weight, Measure, Weighing M[illegible]pe

thought expedient, and in like manner to revoke such declaration, giving not less than one year's notice. And while such declaration shall remain unrevoked, every such person or thing shall be exempt from the operation of this Act, notwithstanding anything herein contained or any notification giving general effect thereto.

PART IV.

USE OF OBSOLETE DENOMINATIONS OF WEIGHTS AND MEASURES.

XLII.—From the date on which Part I of this Act shall take effect under Sections 34, 35, or 36 in relation to any place or to any Government or Municipal Department or Office, or to any Railway Company or Joint Stock Company as aforesaid, if any document shall be tendered in evidence in any Court of Civil Justice in respect of any suit in which any person not specially exempted by Section 34 or 36 shall be concerned as a party, which document shall relate to transactions subsequent to such date, and in which document the measures of quantities shall be stated otherwise than in conformity with the Standards authorized by this Act, such document shall not be admitted as evidence until a penal fee of [illegible] all have been paid to the Court by the party putting

XLIII.—In any suit instituted before any Court of Civil [illegible] ten years after the date from which the said Part I shall h been made applicable under any of the provisions hereof contained in the place at which such Court is held, if it shall be necessary to interpret any document by reason of the measures of quantities not being stated in conformity with the authorized Standards, the Court shall require the party in the suit or cause tendering such document, if such party cannot prove that he has been liable to the provisions of Part I for less than ten years, to pay a penal fee of Rs. 50 for each such document before admitting it in evidence.

XLIV.—It shall be lawful for the Local Government from time to time to make and publish Tables for the conversion of old Measures and Weighs tsinto the provisional local Measures and Weights, and into the Standard Measures and Weights, and the equivalents so declared after Notification in the Local *Gazette* shall be deemed to be the true equivalents in all Courts of Justice.