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# WEIGHTS & MEASURES REGULATIONS

AND

## INSTRUCTIONS TO INSPECTORS

AND

## THEIR ASSISTANTS

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# WEIGHTS & MEASURES REGULATIONS

AND

INSTRUCTIONS TO INSPECTORS

AND

THEIR ASSISTANTS.

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# WEIGHTS AND MEASURES ACT OF 1879.

## ARRANGEMENT OF SECTIONS.

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2. Commencement of Act.

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3. Uniformity of weights and measures.

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## Section.

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22. Exception for contracts in metric weights and measures.
23. Exception for sale of articles in vessels not represented as being of Dominion measure.

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## 42 VICTORIA.

### CHAP. 16.

An Act to amend and consolidate the laws relating to  
Weights and Measures.

[Assented to 15th May, 1879.]

**H**ER Majesty, by and with the advice and consent of the Preamble.  
Senate and House of Commons of Canada, enacts as  
follows:—

#### *Preliminary.*

1. This Act may be cited as the "*Weights and Measures* Short title.  
*Act of 1879.*"

2. This Act shall not come into operation until the first Commence-  
day of July, one thousand eight hundred and seventy-nine, ment of Act,  
which day is hereinafter referred to as the commencement  
this Act.

#### I. THE LAW OF WEIGHTS AND MEASURES.

##### *Uniformity of Weights and Measures.*

3. Except as herein otherwise provided the same weights To be the  
and measures shall be used throughout the Dominion of same through-  
Canada. out Canada.

##### *Standards of Measure and Weight.*

4. The bronze bar and the platinum weights more par- Standards  
ticularly described in the first part of the first schedule to prepared  
this Act, and at the passing of this Act deposited in the under 36 V.,  
Department of Inland Revenue in the custody of the c. 47, to be  
Minister of Inland Revenue, as provided in the Act the Dominion  
passed in the thirty-sixth year of Her Majesty's reign, standards.  
intituled "*An Act respecting Weights and Measures,*" shall  
continue to be the Dominion standards of measure and  
weight. The said bronze bar shall continue to be the  
Dominion standard for determining the standard yard for the

Dominion of Canada; and the said platinum weights shall respectively continue to be the Dominion standards for determining the standard pound and the standard troy ounce for the Dominion of Canada.

Parliamentary copies.

5. The two copies of the standards of measure and weight, described in the second part of the first schedule to this Act, and deposited as therein mentioned, shall be deemed to be Parliamentary copies of the said Dominion standards.

Renewal of Dominion standards in case of loss.

6. If at any time either of the Dominion standards of measure and weight is lost, or in any manner destroyed, defaced or otherwise injured, the Department of Inland Revenue may cause the same to be restored by reference to or adoption of any of the Parliamentary copies of that standard, or of such of them as may remain available for that purpose.

Renewal of Parliamentary standards.

7. If at any time any of the Parliamentary copies of either of the Dominion standards is lost, or in any manner destroyed, defaced or otherwise injured, the Department of Inland Revenue may cause the same to be restored by reference either to the corresponding Dominion standard, or to one of the other Parliamentary copies of that standard.

Secondary or Departmental standards.

8. The Departmental standards of measure and weight which, having been derived from the Dominion standards, are at the commencement of this Act in use under the direction of the Department of Inland Revenue, and are mentioned in the second schedule to this Act, and no others (save as hereinafter mentioned), shall be secondary standards of measure and weight, and shall be called Departmental standards.

Renewal in case of loss.

If at any time any of such standards be lost, or in any manner destroyed, defaced or otherwise injured, the Department of Inland Revenue may cause the same to be restored by reference either to one of the Dominion standards or to one of the Parliamentary copies of those standards.

Standards of new denominations.

The Department of Inland Revenue shall, from time to time, cause such new denominations of standards, being either equivalent to or multiples or aliquot parts of the Dominion weights and measures ascertained by this Act, as may be required in addition to those mentioned in the second schedule to this Act to be made and duly verified, and such new denominations of standards, when approved by the Governor in Council, shall be Departmental standards in like manner as if they were mentioned in the said schedule.

Cancellation of a

It shall be lawful for the Governor in Council to declare that a Departmental standard for the time being of any



denomination, whether mentioned in the said schedule or Departmental approved by Order in Council, shall cease to be such a standard. standard.

9. The standards of measure and weight which are, at Local the commencement of this Act, legally in use by inspectors standards. or deputy inspectors of weights and measures, for the purpose of verification or inspection, and all copies of the Departmental standards which, after the commencement of this Act, are compared with those standards and verified by the Department of Inland Revenue, for the purpose of being used by inspectors of weights and measures under this Act, as standards for the verification or inspection of weights and measures, shall be called local standards.

*Dominion Measures of Length.*

10. The straight line or distance between the centres of Standard the two gold plugs or pins (as mentioned in the first schedule yard defined. to this Act) in the bronze bar by this Act declared to be the Dominion standard for determining the Dominion standard yard, measured when the bar is at a temperature of sixty-one degrees and ninety-one hundredths of Fahrenheit's thermometer, and when it is supported on bronze rollers placed under it in such manner as best to avoid flexure of the bar and to facilitate its free expansion and contraction from varying temperature, shall be the legal standard measure of length, and shall be called the Dominion standard yard, and shall be the only unit or standard measure of extension from which all other measures of extension, whether linear, superficial or solid, shall be ascertained.

11. One-third part of the Dominion standard yard shall Standard be a foot, and the twelfth part of such foot shall be an inch, foot, inch, rod, and the rod, pole or perch in length, shall contain five such link, furlong yards and a half, and the chain shall contain twenty-two and mile. such yards, and the link shall be the one hundredth part of the chain, the furlong shall contain two hundred and twenty such yards, and the mile, one thousand seven hundred and sixty such yards.

12. The rood of land shall contain one thousand two hundred and ten square yards, according to the Dominion Standard standard yard, and the acre of land shall contain one hundred thousand square links, being four thousand eight hundred and forty such square yards, or one hundred and sixty square rods, poles, or perches. rood and acre.

13. Provided, that in the Province of Quebec the measures Proviso as to of length and superficies for all lands comprised in those seigniorial parts of the Province originally granted under the seigniorial lands in the tenure, shall be French measures, the ratio and propor- Province of Quebec.

tion of which shall be to the Dominion standard measures as follows. that is to say :—

- French foot      1. The foot—" French measure " or " Paris foot "—shall be held to contain twelve inches and seventy-nine hundredths of an inch, standard measure ;
- Arpent.            2. The " Arpent," when used as a measure of length, shall be one hundred and eighty French feet ; and when used as a measure of superficies, shall contain thirty-two thousand four hundred square French feet ; and the " Perch," as a measure of length, shall contain eighteen French feet, and as a measure of superficies, three hundred and twenty-four square French feet :
- Perch.
- French measure to be used only for such lands.      3. Provided, that the provisions of this section shall apply only to territorial measurement ; and the French measures " Toise " and " Ell " (*Aune*), shall not be used hereafter as standard measures, but the standard yard, as described in the tenth section of this Act, shall be used instead thereof.

*Dominion Measures of Weight and Capacity.*

- Standard pound.      14. The Imperial pound, as established by the Act passed by the Parliament of Great Britain and Ireland, in the forty-first and forty-second years of Her Majesty's reign, intituled " *The Weights and Measures Act of 1878*," as represented by the platinum iridium weight mentioned in the first schedule to this Act, and hereby declared to be the Dominion standard for determining the Dominion standard pound, shall be the legal standard measure of weight and of measure having reference to weight, and shall be called the Dominion standard pound, and shall be the only unit or standard measure of weight from which all other weights, and all measures having reference to weight, shall be ascertained.
- Standard ounce, dram and grain.      15. One-sixteenth part of the Dominion standard pound shall be an ounce, and one-sixteenth part of such ounce shall be a dram, and one seven-thousandth part of the Dominion standard pound shall be a grain ;
- Cental or cwt. and ton.      One hundred standard pounds shall be a cental or hundred weight, and twenty centals or two thousand pounds, shall be a ton ;
- Troy ounce.          Four hundred and eighty grains shall be an ounce Troy :
- All other weights avoirdupois.      All the foregoing weights, except the ounce Troy, shall be deemed to be avoirdupois weights.
- Standard gallon.      16. The unit or standard measure of capacity, from which all other measures of capacity, as well for liquids as for dry

goods, shall be derived, shall be the gallon containing ten Dominion standard pounds weight of distilled water weighed in air against brass weights with the water and the air at the temperature of sixty-two degrees of Fahrenheit's thermometer, and with the barometer at thirty inches ;

The quart shall be one-fourth part of the gallon, and the pint shall be one eighth part of the gallon ;

Quart and pint.

Two gallons shall be a peck ; eight gallons shall be a bushel, and twenty-five gallons shall be a barrel :

Peck, bushel and barrel.

2. Provided always, that until the first day of May, one thousand eight hundred and eighty, the wine gallon of two hundred and thirty-one cubic inches may be used in any case by special understanding between the parties to any contract or agreement for the measurement of liquids, and the ratio or proportion which such measure shall bear to the standard gallon shall be as follows: six wine gallons shall be equal to five standard gallons.

Proviso: for use of wine gallon by agreement, until 1st May, 1880.

17. In contracts for the sale and delivery of any of the undermentioned articles, the bushel shall be determined by weighing, unless a bushel by measure be specially agreed upon—the weight equivalent to a bushel being as follows:—

Bushel of certain articles determined by weight.

Wheat, sixty pounds ;  
 Indian Corn, fifty-six pounds ;  
 Rye, fifty-six pounds ;  
 Peas, sixty pounds ;  
 Barley, forty-eight pounds ;  
 Malt, thirty-six pounds ;  
 Oats, thirty-four pounds ;  
 Beans, sixty pounds ;  
 Clover seed, sixty pounds. ;  
 Timothy seed, forty-eight pounds ;  
 Buckwheat, forty-eight pounds ;  
 Flax seed, fifty pounds ;  
 Hemp seed, forty-four pounds ;  
 Blue grass seed, fourteen pounds ;  
 Castor beans, forty pounds ;  
 Potatoes, turnips, carrots, parsnips, beets and onions,  
 sixty pounds.

18. In using a Dominion measure of capacity the same shall not be heaped, but either shall be stricken with a round stick or roller straight and of the same diameter from end to end, or if the article sold cannot from its size or shape be conveniently stricken, shall be filled in all parts as nearly to the level of the brim as the size and shape of the article will admit.

Heaped measure forbidden.

*Metric equivalents of Dominion Weights and Measures.*

Table 3 in schedule to be used for equivalents in metric system.

**19.** The table in the third schedule to this Act shall be deemed to set forth the equivalents in Dominion weights and measures of the weights and measures therein expressed in terms of the metric system, and such table may be lawfully used for computing and expressing in weights and measures, weights and measures of the metric system.

*Use of Dominion Weights and Measures.*

Contracts to be by standard weights and measures, all others void.

**20.** Every contract, bargain, sale or dealing made or had in the Dominion of Canada for any work, goods, wares or merchandise, or other thing which has been or is to be done, sold, delivered, carried or agreed for by weight or measure, shall be deemed to be made and had according to one of the Dominion weights or measures ascertained by this Act, or to some multiple or part thereof, and if not so made or had shall be void, except only when made according to the metric system; and all tolls and duties charged or collected according to weight or measure, shall be charged and collected according to one of the Dominion weights or measures ascertained by this Act, or to some multiple or part thereof:

"Trade," what to be deemed.

Such contract, bargain, sale, dealing and collection of tolls and duties, as is in this section mentioned, is in this Act referred to under the term "trade."

Local weights, &c., unlawful.

No local or customary measures, nor the use of heaped measures, shall be lawful:

Penalty for using other than Dominion weights and measures.

Any person who sells by any denomination of weight or measure other than one of the Dominion weights or measures, or some multiple or part thereof, and any public weigher or measurer who uses any weight or measure, or who uses, in any certificate as to the weight or measure of any article weighed or measured by him, any other than one of the Dominion weights or measures, or some multiple or part thereof, shall be liable to a fine not exceeding twenty dollars for every such sale, weighing or certificate.

Weight to be avoirdupois;—

**21.** All articles sold by weight shall be sold by avoirdupois weight, except that,—

Except certain articles which may be sold by troy weight.

Gold and silver, platinum and precious stones, and articles made thereof, may be sold by the ounce troy or by any decimal part of such ounce, and all contracts, bargains, sales and dealings in relation thereto shall be deemed to be made and had by such weight, and when so made or had shall be valid;

Penalty for contravention.

And every person who acts in contravention of this section shall be liable to a penalty not exceeding twenty-five dollars for each offence;

**22.** Provided always, that a contract or agreement shall not be invalid or open to objection on the ground that the weights and measures expressed or referred to therein are weights or measures of the metric system, or on the ground that decimal subdivisions of Dominion weights and measures, whether metric or otherwise, are used in such contract or dealing.

Proviso as to metric weights or measures, or decimal divisions of Dominion ones.

**23.** Nothing in this Act shall prevent the sale, or subject a person to a penalty under this Act for the sale of an article in any vessel, such vessel being included in the sale, when such vessel is not represented as containing any amount of Dominion measures, nor subject a person to a penalty under this Act for the possession of a vessel when it is shown that such vessel is not used nor intended for use as a measure.

As to sales of articles in vessels.

### *Unjust Weights, Measures and Weighing Machines.*

**24.** Every person who uses or has in his possession for use in trade any weight, measure, scale, balance, steelyard or weighing machine, which is false or unjust, shall be liable to a fine not exceeding twenty-five dollars, or, in the case of a second offence, fifty dollars; and any contract, bargain, sale or dealing made by the same shall be void, and the weight, measure, scale, balance, steelyard or weighing machine shall be liable to be forfeited.

Penalty for having false or unjust weights, scales or measures.

**25.** When any fraud is willfully committed in the using of any weight, measure, scale, balance, steelyard, or weighing machine, the person committing such fraud, and every person party to the fraud, shall be liable to a fine not exceeding twenty-five dollars, or, in the case of a second offence, fifty dollars, and the weight, measure, scale, balance, steelyard or weighing-machine shall be forfeited.

Penalty for fraud by the use of false weights, &c.

**26.** Every person who wilfully makes, or sells, or causes to be made or sold, any false or unjust weight, measure, scale, balance, steelyard or weighing-machine, shall be liable to a penalty not exceeding fifty dollars, or, in the case of a second offence, one hundred dollars for each offence.

Or for making or selling the same.

### *Stamping and Verification of Weights and Measures.*

**27.** Every weight, except when the small size of the weight renders it impracticable, shall have the denomination of such weight stamped or engraved on the top or side thereof in legible figures and letters. Every measure of capacity shall have the denomination thereof stamped or engraved on the outside of such measure in legible figures and letters. Every beam, steelyard or weighing-machine shall have marked upon some essential part of it the maximum weight which it is constructed to weigh, and also on

Lawful weights, measures, scales and weighing contrivances to be stamped.

And no other. the weights or poises used with it their actual weight when truly adjusted, in parts or multiples of the avoirdupois pound. A weight or measure not in conformity with this section shall not be stamped with such stamp of verification under this Act, as is herein mentioned.

Penalty for using un-stamped weights or measures or weighing-machines, in business.

**28.** Every trader, manufacturer, carrier, public weigher, gauger, measurer, surveyor, or other person, who uses, for any purpose of buying, selling, or charging for the carriage of any goods, wares, merchandise or thing, or of measuring any land, goods, materials or other thing, for the purpose of charging for or ascertaining the price to be paid, or the charge to be made therefor, any weight or measure, or weighing-machine which has not been duly inspected and stamped according to this Act, shall be guilty of an offence against this Act, and shall, on conviction, incur a penalty of not more than fifty nor less than five dollars for each such offence; and every such unstamped weight, weighing-machine or measure so used, found in his possession, shall, on being discovered by the inspector, or his assistant, be forfeited and forthwith seized and broken by him, without suit or other authority than this Act :

Forfeitures, &c.

Exception as to makers or dealers in weights, measures, &c.

**2.** Except that the manufacturer of or dealer in weights, measures or weighing-machines who has in his possession for sale, any weight, measure or weighing-machine, shall not be bound to have the same inspected and stamped according to this Act, so long as the same remain in his manufactory or warehouse; but no such weight, measure or weighing-machine shall be removed from his premises, sold or taken into use for trade without having been inspected and stamped :

Penalty on trader having unlawful weights, &c., in possession.

**3.** Any trader not being a manufacturer of or dealer in weights, measures or weighing-machines, having in his possession any unstamped weights, measures or weighing-machines, shall be liable to a penalty of twenty-five dollars for the first offence, and for each subsequent offence to a penalty of fifty dollars; and the inspector or his assistant shall forthwith seize such weights, measures or weighing-machines, which shall be forfeited.

Forfeiture.

As to weights of lead or pewter.

**29.** A weight made of lead or pewter, or of any mixture thereof, shall not be stamped with a stamp of verification, or used for trade, unless it be wholly and substantially cased with brass, iron or copper, and legibly stamped or marked "*cased*."

Proviso as to plugs.

But nothing in this section shall prevent the insertion into a weight of such a plug of lead or pewter as is *bonâ fide* necessary for the purpose of adjusting it, and of affixing thereto the stamp of verification :

A person guilty of any offence against, or disobedience to the provisions of this section, shall be liable to a penalty not exceeding twenty-five dollars, or in case of a second offence, fifty dollars.

Penalty for  
contraven-  
tion.

**30.** If any person forges or counterfeits any stamp used for the stamping, under this Act, of any measure, weight, balance or weighing machine, or used before the commencement of this Act for the stamping of any measure, weight, balance or weighing-machine under any enactment repealed by this Act, or wilfully increases or diminishes any weight or measure so stamped, or in any way alters or tampers with any balance or weighing-machine which has been so stamped, so as to cause it to weigh unjustly, he shall be liable to a penalty of forty dollars for the first offence, and for each subsequent offence he shall incur a penalty of one hundred dollars and two months imprisonment :

Penalty for  
forging or  
counterfeit-  
ing stamps  
used under  
this Act.

Any person who knowingly uses, sells, utters, disposes of, or exposes for sale, any measure, weight, balance or weighing-machine, with such forged or counterfeit stamp thereon, or any weight, measure, balance or weighing-machine so increased, diminished, falsified or tampered with, shall be liable to a penalty for the first offence not exceeding fifty dollars, and for each subsequent offence one hundred dollars.

Or for  
knowingly  
using coun-  
terfeits.

## II — ADMINISTRATION.

### *Central.*

**31.** The Department of Inland Revenue shall have the custody of the Dominion standards of measure and weight, and of the Departmental standards, and of all balances, apparatus, books, documents and things used in connection therewith or relating thereto.

Inland Revenue Department to have custody of standards, &c.

**32.** The Parliamentary copies of the Dominion standards of measure and weight, mentioned in part two of the first schedule to this Act, shall continue to be deposited as therein mentioned :

Deposit of Parliamentary standards.

The Department of Inland Revenue shall cause the Parliamentary copies of the Dominion standards of measure and weight to be compared with each other once in every five years, and once in every ten years with Dominion standards of measure and weight.

Periodical comparison of such standards.

**33.** Once, at least, in every five years the Department of Inland Revenue shall cause the Departmental standards, for the time being, to be compared with the Parliamentary copies of the Dominion standards of measure and weight made and approved in pursuance of this Act, and with each other, and to be adjusted or renewed if requisite :

And of Departmental standards.

Record of verification.

A record shall be kept by the Department of Inland Revenue of all standards verified or re-verified, showing full particulars of the results of such verification or re-verification.

Copies of metric standards and their use for lawful purposes.

**34.** The copies of the metric standards mentioned in the fourth schedule to this Act having been obtained and deposited in the custody of the Department of Inland Revenue, the said Department may cause to be compared with the said standards and verified, all metric weights and measures which are submitted to them for the purpose, and which are of such shape and construction as may be, from time to time, directed by an Order in Council in that behalf, and which the Minister of Inland Revenue is satisfied are intended to be used for the purpose of science or of manufacture, or for any lawful purpose within the meaning of this Act.

Comparisons, verifications, &c., how made.

**35.** All comparisons, verifications and other operations with reference to standards of length, weight and capacity, shall be conducted under the supervision of the Commissioner of Inland Revenue; and generally he shall have such powers and duties in relation thereto as may be assigned to him by Order in Council. It shall also be the duty of the Commissioner of Inland Revenue to conduct all such comparisons, verifications and other operations with reference to standards of measure and weight in aid of scientific researches or otherwise, as the Minister of Inland Revenue may deem expedient; and in consideration of the special qualifications and knowledge necessary for the proper discharge of such duties, the said Commissioner may be paid, in addition to his salary as Commissioner, such further allowance out of any moneys voted by Parliament for the purposes of this Act, as may be directed by the Governor in Council.

Duty of Commissioner of Inland Revenue with respect to them, and as to standards generally.

Compensation for such service.

### *Local.*

Inspectors, appointment and duties of, and of Assistants.

**36.** The Governor may, from time to time, appoint one or more inspectors of weights and measures for each Province, and such number of assistants to each inspector as may, from time to time, be found necessary, and may, from time to time, assign them inspection divisions, and their powers and duties shall be as defined by this Act, by the regulations made under it, and by instructions from the Minister of Inland Revenue; and may assign to each inspector or assistant so appointed such remuneration or salary, not exceeding what may have been voted by Parliament, as may be deemed expedient; and may also allow to each inspector or assistant such further sum as will suffice to meet his actual expenses in the performance of his official duties.

Remuneration.



**37.** The Governor may, in his discretion, appoint any officer of the Inland Revenue Department to the office of district inspector under this Act, and such officer shall discharge the duties assigned to him under this Act, in conjunction with and in addition to his other official duties, —anything in any Act or law to the contrary notwithstanding:

District  
Inspectors

2. Each inspector or assistant on appointment, shall take an oath for the faithful discharge of his duties, and shall give bonds in a sum to be fixed by Order in Council for the safe custody and preservation of the standard weights and measures and other apparatus intrusted to him, for their delivery over to his successor in case of his resignation or removal from office, and for duly accounting for all moneys collected by him :

Oath of office.

3. Each inspector shall be furnished by the Minister of Inland Revenue with one or more sets of standards, to be called "The Local Standards," carefully verified and authenticated by comparison with the Departmental standards in the custody of the Department of Inland Revenue, and with such apparatus as may be requisite to enable him to perform his duties under this Act.

To be provided with  
Local  
Standards.

**38.** No officer appointed under this Act shall be a maker or seller of weights, measures or weighing-machines, but by special departmental instructions in that behalf, he may be allowed to adjust, or alter, or cause to be adjusted or altered, any weight verified by him or submitted to him for verification, collecting such compensation for the value of such adjustment or alteration as may be authorized by Order in Council :

Officers not  
to be makers  
or sellers of  
weights or  
measures, &c.

2. The "Standards" and other apparatus shall be used by the inspector or assistant into whose custody they are given solely for the purpose of comparing and verifying weights, measures, balances and weighing-machines used for purposes of trade.

Sole use of  
standards by  
Inspectors.

**39.** The inspector or his assistant shall perform such duties incident to the verification of weights and measures, and of beams, scales, steelyards and other weighing-machines, comparing and trying the same with the standard weights and measures, and other apparatus in his possession, as may be assigned to him by Departmental regulations :

Duties of In-  
spectors and  
Assistants.

2. He shall, at all proper times, carefully examine and compare all weights and measures, and all beams, scales or other weighing-machines of any kind presented to him within his division ; and when found correct and just he shall mark, stamp or brand the same in such manner as may, from time

Examination  
and marking  
of weights,  
&c.

to time, be directed by the Minister of Inland Revenue, who shall furnish such stamps, brands and implements as he may think proper for that purpose.

Times and places of inspection and verification.

**40.** Each inspector or his assistant shall, upon such day or days, and at such place or places within his district as he may, from time to time, appoint in pursuance of such Departmental regulations as may be made in that behalf,—and of which day or days, place or places, public notice shall be given in the manner to be provided by such regulations,—attend with his inspection standards and other apparatus, for the purpose of inspecting all weights, measures and weighing-machines, and shall then and there inspect and verify, and if found correct, shall stamp and certify all weights and measures, scales and other weighing-machines.

Stamping, &c., when found correct.

Power of inspectors to enter shops, &c.

**41.** The inspector or his assistant may, at all reasonable times, without notice, enter any shop, store, warehouse, stall, yard or place whatsoever, within his division, where any commodity is bought, sold, exposed or kept for sale, or charged for carriage or conveyance by weight or measure, and there examine all weights, measures, beams, scales, steelyards or other weighing-machines, and compare and try the same with the local standards of weight and measure in his possession; and it shall be his duty to do so from time to time, and without previous notice, so as best to ensure compliance with the provisions of this Act, and the discovery and punishment of any infractions thereof; and it shall be his duty to attend at any reasonable time and place, and when not otherwise engaged in the performance of his duties, for the purpose of inspecting and verifying any fixed and non-portable weighing-machine in his division; and he may also, subject to regulations made by Orders in Council in that behalf, at any time when not so engaged, as aforesaid, inspect, verify, stamp and certify any weights, measures or weighing-machines, at the request of the owner thereof, and at any place in his division.

Without previous notice.

To inspect when called on if not otherwise on duty.

Subject to regulations.

To keep a record of inspections, &c.

**42.** The Inspector shall keep a book in which he shall enter minutes of all verifications made by him, or his assistant, and at the time of every inspection he or his assistant shall deliver to the owner of any weights or measures, or weighing-machines verified, or to the person procuring the verification, a certificate under his hand, setting forth the fact and date of such verification, and enumerating the weights, measures or weighing-machines inspected.

Re-inspection at certain periods.

**43.** Within four months after the expiration of two years from the first verification and stamping, and within a period of two years after each subsequent verification, every weight, measure and weighing-machine shall be again inspected and

verified, and a new certificate of such inspection and verification obtained from the proper inspector; and the production of the certificate shall be *prima facie* evidence of the verification, or stamping, or re-verification having taken place within the period prescribed by law.

44. Any person, not being a manufacturer or dealer in weights, measures and weighing-machines, who refuses to produce for inspection when required to do so by any inspector or inspector's assistant appointed under this Act, all weights, measures and weighing-machines in his possession, and used for any purpose of trade, or—

Penalty for refusing to produce weights, &c., for inspection.

2. Any manufacturer of or dealer in weights, measures or weighing-machines, who refuses to permit the inspection, when required in the manner herein provided, of any weights, measures or weighing-machines about to be removed from his premises to be used for purposes of trade, or who permits any such weights, measures or weighing-machines to be so removed without having been first inspected and stamped as herein required,—

Or refusing to permit inspection.

Shall, on conviction, forfeit and pay a sum not exceeding twenty dollars for the first, and forty dollars for the second or any subsequent offence.

The penalty.

45. No weight or measure or weighing-machine duly stamped by any inspector, or other person hereby legally authorized to examine and stamp the same, shall be liable to be re-stamped, although the same be used beyond the limits of the inspection division within which it was originally stamped, but shall be considered as a legal weight or measure or weighing-machine throughout Canada, unless found to be defective or unjust on any subsequent periodical or other inspection, to which it shall remain subject as provided by this Act, by the inspector or his assistant for the division in which it may then be.

As to weights and measures, &c., stamped in any division and used in another.

46. If any inspector or inspector's assistant stamps or marks any balance, beam, weight or measure, or weighing-machine, without having first duly compared and verified the same with the standard or other authorized instrument in his possession for the purpose, he shall, on conviction, incur a penalty not exceeding fifty dollars for each offence.

Penalty for stamping any weight, &c., without verifying it.

47. If any inspector or inspector's assistant knowingly stamps any balance, beam, weight or measure, or weighing-machine, belonging to any person residing within the limits of any inspection division for which another inspector has been legally appointed, he shall, on conviction, incur a penalty not exceeding five dollars for every weight or measure, or weighing-machine so stamped.

Or for stamping it out of the proper division.

## III—MISCELLANEOUS.

Regulations by Governor in Council for certain purposes.

**48.** The Governor in Council may, from time to time, make, repeal or amend regulations consistent with this Act, for or concerning any or all of the subjects herein mentioned :—

1. The guidance of the inspectors and their assistants in performance of their duties ;

2. The replacement and use of the standards ;

3. The methods of verifying local standards or weights and measures, weighing-machines and balances, and of certifying such verification ;

4. The amount of error that may be tolerated in weights, measures, balances and weighing-machines ;

5. The shapes, dimensions and proportions to be required in weights, weighing-machines and measures, and the material of which they may be made ;

6. The marking on weights and measures authorized under this Act of their several denominations :

Publication.

And such regulations shall be published in the *Canada Gazette*.

Governor in Council may make tariff of fees for inspection.

**49.** The Governor in Council may, from time to time, make, repeal or amend a tariff of fees to be paid to the inspectors or their assistants for inspecting and stamping weights and measures, balances, beams and other weighing-machines, under this Act ; and the Order in Council containing such tariff and regulations, and any repeal or amendment thereof, shall be published in the *Canada Gazette* ; and the said fees shall form part of the Consolidated Revenue Fund of Canada.

Publication.

Application of fees.

When and how such fees are to be paid.

**50.** Such fees shall be paid at the time of the inspection, stamping or verification, to the Inspector or his assisnant, who shall affix to the certificate given by him an adhesive stamp or stamps to the amount of such fee, and shall, at the time of affixing the same, write or mark thereon, in such manner as may be directed by departmental regulations, the date at which it is affixed ; and no certificate shall be valid or avail for any purpose whatsoever unless the requisite stamp or stamps have been duly affixed and remain affixed thereto and cancelled.

Stamp to be affixed to certificate.

Adhesive stamps for use under this Act.

**51.** The Governor in Council may, from time to time, direct adhesive stamps to be prepared for the purposes of

this Act, and bearing such device as he thinks proper, and may defray the cost thereof out of any unappropriated moneys forming part of the Consolidated Revenue Fund :

The device on such adhesive stamp shall express the value thereof, that is to say, the sum at which it shall be reckoned in payment of the duty hereby imposed. Device thereon.

52. Separate accounts shall be kept of all expenditure incurred and of all fees and duties collected and received under the authority of this Act; and a correct statement of the same up to the thirtieth day of June, then last past, shall be laid before Parliament within the first fifteen days of the then next session thereof. Accounts under this Act.

#### IV.—LEGAL PROCEEDINGS.

53. All forfeitures and penalties imposed by this Act, or by any regulation made under its authority, shall be recoverable, with costs, before any civil court of competent jurisdiction, or before any Justice of the Peace for the district, county or place in which the offence was committed, if such forfeiture or penalty does not exceed fifty dollars, and before any two such justices, or any magistrate having, by law, the power of two such justices, if it exceeds fifty dollars, upon proof by confession, or by the oath of one credible witness,—and may, if not forthwith paid, be levied by execution of distress and sale of the goods and chattels of the offender, by warrant, under the hand and seal of such justice, justices or magistrate—by whom also any imprisonment to which the offender is liable may be awarded; and to all such cases the Act passed in the session held in the thirty-second and thirty-third years of Her Majesty's reign, and intituled "*An Act respecting the duties of Justices of the Peace out of Sessions in relation to summary convictions and orders,*" shall apply, subject to the provisions of this Act: Recovery of penalties and forfeitures.

32-33 V., c 31.

2. One-half of any penalty so recovered shall belong to the party suing for the same, not being an inspector or an inspector's assistant, and the other half, or (if the party suing is an officer acting in pursuance of this Act) the whole penalty shall belong to Her Majesty for the uses of the Dominion: Appropriation of penalties.

3. Every such suit shall be instituted in the name of the inspector acting in pursuance of this Act, who shall account for the penalty to the Department of Inland Revenue: In whose name suits shall be brought.

4. All false weights, beams, balances and weighing machines seized as forfeited under this Act, shall be delivered to the District Inspector, for the district in which the offence is committed, in whose custody they shall remain, subject to the order of the Department of Inland Revenue: Forfeiture of false weights, &c.

Remedy of  
party  
aggrieved by  
false weights,  
&c.

5. Any person aggrieved by the use of any weight or measure, or weighing-machine, which has not been duly inspected and stamped according to this Act, or which may be found light, deficient or otherwise unjust, may recover treble damages and costs.

Limitation of  
suits.

54. No action or prosecution shall be brought against any person for any forfeiture or penalty imposed by this Act, unless the same is commenced within three months after the offence is committed.

#### V.—REPEAL OF PREVIOUS ACTS.

Acts  
repealed :  
36 V., c. 47.  
40 V., c. 15.

Proviso, as to  
things done  
under re-  
pealed Acts.

38 V., c 36,  
to remain in  
force.

As to penal-  
ties under it.

55. The Act passed in the thirty-sixth year of Her Majesty's reign, and intituled "*An Act respecting Weights and Measures*," and the Act passed in the fortieth year of Her Majesty's reign, and intituled "*An Act to amend the Act respecting Weights and Measures*," are hereby repealed: Provided always, that all Acts or enactments repealed by either of the said Acts shall remain repealed, and that all things lawfully done under them or either of them shall remain valid, and all penalties incurred under them or any of them may be enforced and recovered, and all proceedings commenced under them or either of them may be continued and completed under this Act, which shall not be construed as a new law but as a consolidation and continuation of the repealed enactments with and subject to the amendments hereby made: And provided also, that the Act passed in the thirty-eighth year of Her Majesty's reign, and intituled "*An Act to compel persons delivering certain merchantable liquids in casks, to mark on such casks the capacity thereof*," shall remain in force, and all penalties incurred under it before the passing of this Act shall be recoverable and appropriated under the Act first above repealed, but all penalties incurred under it after the passing of this Act shall be recovered and appropriated in the same manner as penalties imposed under this Act.

## SCHEDULES.

### FIRST SCHEDULE.

#### PART I.

#### DOMINION STANDARDS.

The following standards were constructed under the direction of the Commissioner of Inland Revenue:—

The Dominion standard for determining the length of the Dominion standard yard is a solid square bar, thirty-eight inches long and one inch square in transverse section, the bar being of bronze or gun metal (known as Baily's metal); near to each end a cylindrical hole is sunk (the distance between the centres of the two holes being thirty-six inches) to the depth of half an inch; at the bottom of each hole is

inserted in a smaller hole a gold plug or pin, about one-tenth of an inch in diameter, and upon the surface of each pin are cut, a fine line transverse to the axis of the bar, and two lines at an interval of about one-hundredth of an inch parallel to the axis of the bar; the measure of length of the Dominion standard yard is given by the interval between the transverse line at one end and the transverse line at the other end, the part of each line which is employed being the point midway between the longitudinal lines; and the said points are in this Act referred to as the centres of the said gold plugs or pins, and such bar is marked "Mr. Baily's metal," "Standard Yard" "A," "Troughton and Simms, London." There are also, on the upper side of the bar, two holes for the insertion of the bulbs of suitable thermometers for the determination of temperature.

The Dominion standard for determining the weight of the Dominion standard pound is of platinum-iridium, the form being that of a cylinder nearly 1.35 inch in height and 1.15 inch in diameter, with a groove or channel round it, whose middle is about 0.34 inch below the top of the cylinder, for insertion of the points of the ivory fork by which it is to be lifted; the edges are carefully rounded off, and such standard pound is marked "A." The weight of this standard in terms of the Imperial standard is 6999.97694 grains when both are weighed *in vacuo* and 6999.98387 grains when both are weighed in air at the temperature of 62° of Fahrenheit's thermometer, the barometer being at 30 inches, and for which due allowance is to be made when comparing other standards.

The Dominion standard for determining the weight of the Dominion standard troy ounce is of platinum-iridium, the form being that of a truncated cone, with a knob, nearly  $\frac{1}{16}$ ths of an inch in height, including the knob, the knob being nearly  $\frac{1}{4}$  inch and the base of the cone  $\frac{1}{2}$  inch in diameter, respectively, and such standard troy ounce is marked "A." The weight of this standard in terms of the Imperial standard is 479.99197 grains when both are weighed *in vacuo* and 480.03648 grains when both are weighed in air at the temperature of 62° of Fahrenheit's thermometer, the barometer being at 30 inches, for which due allowance is to be made when comparing other standards.

## PART II.

### PARLIAMENTARY COPIES OF DOMINION STANDARDS.

The following copies of the standards above mentioned in part one of this schedule were constructed at the same time as the above standards. They are of the same construction and form as the above standards, and they are respectively marked and deposited as follows:—

(1.) One of the copies of the Dominion standard for determining the Dominion standard yard, being a bronze bar marked "Mr. Baily's metal," "Standard Yard," "B,"

"Troughton and Simms, London," one of the copies of the Dominion standard for determining the Dominion standard pound, marked "B," and one of the copies of the Dominion standard for determining the Dominion standard troy ounce marked "B," have been deposited with the Speaker of the Senate. This copy of the standard yard is standard at a temperature of 62.16° of Fahrenheit's thermometer and the weight of this copy of the standard pound, in terms of the Imperial standard, when both are weighed *in vacuo*, is 6999.98312 grains.

(2.) One of the copies of the Dominion standard for determining the Dominion standard yard, being a bronze bar marked "Mr. Baily's metal," "Standard Yard" "C," "Troughton and Simms, London," one of the copies of the Dominion standard for determining the Dominion standard pound, marked "C," and one of the copies of the Dominion standard for determining the Dominion standard troy ounce, marked "C," have been deposited with the Speaker of the House of Commons. This copy of the standard yard is standard at a temperature of 61.45° of Fahrenheit's thermometer, and the weight of this copy of the standard pound, in terms of the Imperial standard, when both are weighed *in vacuo*, is 6999.98367 grains.

**SECOND SCHEDULE.**  
**DEPARTMENTAL STANDARDS.**

Measures of Length.		Measures of Capacity.	
No. of each.	Denomination of Standard.	No. of each.	Denomination of Standard.
			<i>Set marked "a."</i>
1	100 feet.		Bushel.
1	66 feet, or chain of 100 links.		Half-bushel.
2	10 feet end measures, with bed.		Peck.
1	6 feet end measure, with bed.		Gallon.
1	3 feet, or 1 yard.		Half-gallon.
1	1 inch divided into 10 decimal parts, one of which is again divided into ten subdivisions of $\frac{1}{100}$ th of an inch each.		Quart.
			Pint.
			Half-pint.
			Gill.
			Half-gill.
			<i>Set marked "b."</i>
			Bushel.
			Half-bushel.
			Peck.
			Gallon.
			Half-gallon.
			Quart.
			Pint.
			Half-pint.
			Gill.
			Half-gill.



## WEIGHTS.

Denomination of Standard.	Denomination of Standard.	Denomination of Standard.
Avoirdupois Weights.	Troy Billion Weights.	Decimal Grain Weights.
<i>Set marked "a."</i>	<i>Set marked "a."</i>	<i>Set marked "a."</i>
50 pounds.	500 ounces.	1,000 grains.
30 do	300 do	600 do
20 do	200 do	300 do
10 do	100 do	200 do
5 do	50 do	100 do
3 do	30 do	60 do
2 do	20 do	30 do
1 pound.	10 do	20 do
8 ounces.	5 do	10 do
4 do	3 do	6 do
2 do	2 do	3 do
1 ounce.	1 do	2 do
8 drams.	.5 do	1 do
4 do	.3 do	.6 do
2 do	.2 do	.3 do
1 dram.	.1 do	.2 do
$\frac{1}{2}$ do	.05 do	.1 do
.5 pound.	.03 do	.06 do
.3 do	.02 do	.03 do
.2 do	.01 do	.02 do
.1 do	.005 do	.01 do
.05 do	.003 do	
.03 do	.002 do	
.02 do	.001 do	
.01 do		
.005 do		
.003 do		
.002 do		
.001 do		
<i>Set marked "b."</i>	<i>Set marked "b."</i>	<i>Set marked "b."</i>
50 pounds.	500 ounces.	1,000 grains.
30 do	300 do	600 do
20 do	200 do	300 do
10 do	100 do	200 do
5 do	50 do	100 do
3 do	30 do	60 do
2 do	20 do	30 do
1 pound.	10 do	20 do
8 ounces.	5 do	10 do
4 do	3 do	6 do
2 do	2 do	3 do
1 ounce.	1 do	2 do
8 drams.	.5 do	1 do
4 do	.3 do	.6 do
2 do	.2 do	.3 do
1 dram.	.1 do	.2 do
$\frac{1}{2}$ do	.05 do	.1 do
.5 pound.	.03 do	.06 do
.3 do	.02 do	.03 do
.2 do	.01 do	.02 do
.1 do	.005 do	.01 do
.05 do	.003 do	
.03 do	.002 do	
.02 do	.001 do	
.01 do		
.005 do		
.003 do		
.002 do		
.001 do		

## THIRD SCHEDULE.

TABLES of the Value of the principal denominations of Measures and Weights of the Metric System, expressed in terms of the Standard Measures and Weights of Canada :

## 1.—MEASURES OF LENGTH.

Metric Denominations and Values.		Equivalents expressed in terms of the Standard of Canada.		
—	Metres.	In Standard yards and decimal parts of a yard.	In feet and decimal parts of a foot.	In links and decimal parts of a link.
Miriametre.....	10000	10939·444444	32818·333333	49724·74747
Kilometre.....	1000	1093·944444	3281·833333	4972·47475
Hectometre.....	100	109·394444	328·183333	497·24747
Decametre.....	10	10·939444	32·818333	49·72475
Metre.....	1	1·093944	3·281833	4·97247
Decimetre.....	$\frac{1}{10}$	·109394	·328183	·49725
Centimetre.....	$\frac{1}{100}$	·010939	·032818	·04972
Millimetre.....	$\frac{1}{1000}$	·001094	·003282	·00497

## 2.—MEASURES OF SURFACE.

Metric Denominations and Value.		Equivalents expressed in terms of the Standard of Canada.		
—		Square Metres.	In square yards and decimal parts of a square yard.	In square links and decimal parts of a square link.
Hectare.....	100 ares.	10000	11967·1444	247255·0511
Decare.....	10 do	1000	1196·7144	24725·5051
Are.....	1 do	100	119·6714	2472·5505
Centiare.....	$\frac{1}{100}$ do	1	1·1967	24·7255

## 3.—WEIGHTS.

Metric Denominations and Value.		Equivalents expressed in terms of the Standard of Canada.	
—	Grams.	In pounds Avoirdupois and decimal parts of a pound.	In grains and decimal parts of a grain Troy.
Millier.....	1000000	2204·62125	
Quintal.....	100000	220·46212	
Myriagramme.....	10000	22·046212	
Kilogramme.....	1000	2·204621	
Hectogramme.....	100	·220462	
Decagramme.....	10	·022046	
Gramme.....	1	·002204	15·4323487
Decigramme.....	$\frac{1}{10}$	·0002204	1·5432349
Centigramme.....	$\frac{1}{100}$	·0000220	·1543235
Milligramme.....	$\frac{1}{1000}$	·0000022	·0154323

## 4.—MEASURES OF CAPACITY.

Metric Denominations and Value.		Equivalents expressed in terms of the Standard of Canada.	
—	Cubic Metres.	Litres.	In Imperial gallons and decimal parts of an Imperial gallon.
Kilolitre.....	1	1000	220·2443
Hectolitre.....	$\frac{1}{10}$	100	22·0244
Decalitre.....	$\frac{1}{100}$	10	2·2024
Litre.....	$\frac{1}{1000}$	1	·2202
Decilitre.....	$\frac{1}{10000}$	$\frac{1}{10}$	·0220
Centilitre.....	$\frac{1}{100000}$	$\frac{1}{100}$	·0022

## FOURTH SCHEDULE

## METRIC STANDARDS.

List of Metric Standards in the custody of the Inland Revenue Department.

## MEASURES OF LENGTH.

## METRE.

The Dominion standard for determining the length of the metre is a solid square bar, forty-one and a-half inches long, and one inch square in transverse section, the bar being of bronze or gun metal (known as Baily's metal); near to each end a cylindrical hole is sunk (the distance between the centres of the two holes being one metre or thereabout) to

the depth of half an inch; at the bottom of each hole is inserted in a smaller hole a gold plug or pin, about one-tenth of an inch in diameter, and upon the surface of each pin is cut a fine line transverse to the axis of the bar, and two lines at an interval of about one hundredth of an inch parallel to the axis of the bar. The measure of length of the metre is given by the interval between the transverse line at one end and the transverse line at the other end, the part of each line employed being the point midway between the longitudinal lines; and the said points are in this Act referred to as the centres of the said gold plugs or pins, and such bar is marked "Mr. Baily's metal," "Standard Metre," "Troughton & Simms, London." There are also on the upper side of the bar two holes for the insertion of the bulbs of suitable thermometers for the determination of the temperature. This standard is shorter than the French standard "Metre des archives" by  $\cdot 00147$  of a millimetre at  $0^{\circ}$  Centigrade, or  $32^{\circ}$  Fahrenheit, or is standard at  $32\cdot 16^{\circ}$  Fahrenheit.

## WEIGHTS.

### KILOGRAMME.

The Dominion standard for determining the weight of the Kilogramme is of bronze, the form being that of a cylinder with a knob, the cylinder having a groove cut in it at about two-thirds of its height. Its value as compared with the French Standard Kilogramme is 1000002 $\cdot$ 45 milligrammes, or 1 $\cdot$ 00000245 of a Kilogramme.

### METRIC WEIGHTS.

No. of each.	Denomination.	No. of each.	Denomination.
1	20 Kilogrammes.	1	5 Decigrammes.
1	10 do	1	2 do
1	5 do	2	1 Decigramme.
2	2 do	1	5 Centigrammes.
1	1 Kilogramme.	1	2 do
1	500 Grammes.	2	1 Centigramme.
2	200 do	1	5 Milligrammes.
1	100 do	2	2 do
1	50 do	1	1 Milligramme.
2	20 do		
1	10 do		
1	5 do		
1	2 do		
2	1 Gramme.		

# INLAND REVENUE, CANADA,

## STANDARDS' BRANCH.

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REGULATIONS AS TO THE DESCRIPTION OF WEIGHTS, MEASURES, BALANCES AND WEIGHING MACHINES THAT WILL BE ADMITTED TO VERIFICATION, AND FEES TO BE CHARGED THEREFOR, AS PER ORDER IN COUNCIL OF 14TH AUGUST, 1879.

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The following balances are to be admitted to verification:—

- A.** BALANCES HAVING EQUAL ARMS AND ON WHICH THE LOAD IS SUSPENDED BELOW THE FULCRUMS.
  - B.** BALANCES COMMONLY KNOWN AS STEELYARDS, OR ROMAN BALANCES, HAVING UNEQUAL ARMS.
  - C.** WEIGH BRIDGES.
  - D.** BALANCES WITH EQUAL ARMS AND ON WHICH THE LOAD IS PLACED ABOVE THE FULCRUMS.
- 

**A.** Balances with equal arms are only to be admitted to verification when:—

1. The beam shows no material difference as regards the form or magnitude of the two arms.

2. It is provided with a tongue pointing upwards or downwards from its centre, at right angles with a line joining the extreme bearings, or with some equivalent arrangement for indicating the position of equilibrium.

3. It is in equilibrium when a line joining the extreme bearings is perfectly horizontal, and returns to that position after being put into vibration.

4. Its arms are equal within the specified limit of error.

5. The balance is sufficiently sensitive to be turned decidedly and promptly by the addition or withdrawal of so much of the load as represents the error tolerated by regulations in a commercial weight representing the load.

6. No balance balls or detached parts other than the pans and the connections necessary for attaching them to the beam are used for adjusting the balance.

7. The balance, as a whole, is of sufficient strength, and on a sufficiently stable base, to secure it against change of form or position under the maximum load it is to carry.

8. The beam will carry its maximum load without deflection.

9. The maximum load for the weighing of which it is to be used is distinctly engraved or marked on the beam.

10. The knife edges are permanently fixed to the beam.

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**B.** Balances commonly known as *Steelyards*, or Roman Balances, having unequal arms, are only to be admitted to verification when:—

1. There is sufficient room for oscillation, and the knife edges on which the beam oscillates are sufficiently fine to permit it to move freely.

2. The beam is sufficiently strong to carry its load without deflection.

3. The bottom of the notches by which the divisions of the long arm of the lever are indicated, and from which the weight is suspended, are in close approximation to a right line drawn through the knife edges forming the points of suspension, and when such straight line passes near to and a little above the centre of gravity of the whole apparatus:—

4. The divisions on the long arm of the lever are equal among themselves.

5. The weight used with the lever—if it is changeable or can be readily detached therefrom—is some multiple or sub-multiple of the pound avoirdupois, and has distinctly marked on it its true weight.

6. The maximum weight intended to be weighed on it is either distinctly marked on the beam or indicated by its construction.

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**C.** Weigh Bridges, Hay Scales and Platform Scales will only be admitted to verification when:—

1. The foundation or supporting base is sufficiently firm, and capable of carrying without change of level or of form or other disturbance, the maximum load for which it is to be used.

2. If moveable from place to place, some satisfactory arrangement, such as a level or plummet is provided and permanently attached, for indicating whether the machine is perfectly level.

3. The platform is so arranged that any obstruction to its free movement can be easily detected.

4. All the beams, levers and other parts are of sufficient strength to carry the maximum load to which they will be respectively subjected without deflection.

5. The knife edges are firmly and permanently fixed in the levers, have sufficient room to permit free oscillation, and are sufficiently firm.

6. The knife edges and fulcrums of each set of levers are in the same plane.

7. The oscillations are sufficiently evident.

8. The weights used with the instrument are equal to the avoirdupois pound or to multiples or authorized sub-multiples of the avoirdupois pound, or special weights for the barrel of flour or for the bushel of wheat, their actual weight and the weight or special quantity they are intended to indicate on the scale, being plainly marked thereon.

9. The weights used as above are a decimal sub-multiple, as  $\frac{1}{10}$ ,  $\frac{1}{100}$ ,  $\frac{1}{1000}$ , or a binary sub-multiple as  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ , etc., of the load indicated by them.

10. There are no moveable balls or detached parts for the adjustment of the balance accessible, or so placed that they can be used for fraudulent weighing.

11. The apparatus indicates the same weight, whether the load is placed in the centre of the platform, on one side of it, or at either corner.

12. The maximum load which the apparatus is intended to weigh is conspicuously marked on some essential part of it.

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**D.** Balances with equal arms, and on which the load is carried above the fulcrums will only be admitted to verification when : --

1. There is no material difference as to the magnitude or arrangement of the two arms.

2. Its arms are of equal length within a limit of error equivalent to that tolerated in commercial weights.

3. There are no balance balls, loose counterpoises or detached parts other than the pans necessary for carrying the load weighed, and the weights used for weighing it.

4. Its parallel rods, guides, levers and pivots, by which the adjustment of the scale is effected, are so constructed that they can not be put out of adjustment without the use of violence, which may be readily detected on inspection.

5. The knife edges or fulcrums of each set of levers or guide-rods are in the same plane.

6. The balance is sufficiently sensitive to turn decidedly and promptly by the addition and withdrawal of so much of the load as is equivalent to the error tolerated in commercial weights.

7. When there is a tongue or pointer, or some equivalent arrangement for showing when the balance is in equilibrium.

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No balances other than such as will come within the conditions under one or other of the heads, A, B, C or D, are to be verified or stamped.



## DEPARTMENT OF INLAND REVENUE,

OTTAWA, 2nd January, 1880.

The undersigned has the honour to submit, for the approval of Your Excellency, under the Act 42 Vic., cap. 16, sec. 48, the following regulations respecting the Inspection of Weights and Measures, in continuation of the regulations established by the Order in Council of the 14th August, 1879.

**E. VERIFICATION AND STAMPING OF WEIGHTS, MEASURES AND WEIGHING MACHINES** on the premises of the manufacturer, and their removal therefrom.

1. For the first verification and stamping of weights, measures and weighing machines at the place where they are manufactured, the fees may be paid at once, or payment may be postponed at the option of the manufacturer, on the following conditions:—

- (a.) The article shall bear the name of the maker, and a consecutive "shop number" or other marks whereby it may be designated for identification, with the certificate of verification.
- (b.) The verification and stamping may take place before the articles are packed for removal, and at that state of completion at which they are finally adjusted by the manufacturer, or at such future time as may be convenient.
- (c.) If the manufacturer pays the fees at once, the ordinary black stamp expressing the amount of such fees is to be affixed to the certificate of verification, and such certificate must be packed with, or otherwise attached to the article to which it relates, so as to accompany it.
- (d.) If the manufacturer elects to postpone the payment of the fees, a special *red stamp* is to be attached to the certificate of verification, upon which the amount of fees will not be stated, but the amount will be stated in the certificate as usual. This certificate must also be packed with, or attached to the article to which it relates, so as to accompany it.

(e.) When articles verified and stamped as above provided for are packed, the packages containing them must bear on the outside :—

(1.) A duplicate of the “shop number” or other marks by which the article contained in it is identified.

(2.) The words “Fees paid” or “Fees unpaid,” as the case may be.

2. Articles verified and stamped as above provided may be taken for use in trade, or may pass from the premises of the manufacturer to the premises of dealers in such articles, or from the premises of one dealer in such articles to the premises of another, but:—

3. Such articles as are accompanied by a certificate bearing a red stamp or which are not accompanied by any certificate wherein they are identified, will be subject to re-verification and to the payment of fees on the first occasion on which they are found in use for trade purposes by an Inspector or Inspector's assistant.

4. When a manufacturer of weights, measures or weighing machines desires to remove any of the products of his manufactory to the premises of any dealer in such articles without submitting them for verification, he may do so on the following conditions :—

(a.) They shall bear the name of the maker and a consecutive “shop number” or some other marks by which the articles may be identified.

(b.) If packed, the package shall bear the “shop number” or other marks by which the articles may be identified; the name of the manufacturer and the word “*Uninspected.*”

(c.) The manufacturer shall notify the Inspector of the Division from which the uninspected articles are sent of such removal, on a form which will be supplied by the Department.

**F. WEIGHTS, MEASURES AND WEIGHING MACHINES** imported into Canada are to be dealt with as follows :—

1. The Collector of Customs at the ports where such articles are imported will notify the nearest Inspector or Assistant Inspector of Weights and Measures of the entry for consumption of any weights, measures or weighing machines at his port, which notice will state the number and description of such articles as are invoiced, and the names and residence of the parties to whom they are delivered.

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2. So long as such articles remain in the original packages they may be removed from the Custom House or from a Customs Warehouse to the premises of the importer, and from the premises of one dealer in such articles to the premises of another without inspection, on the following conditions:—

- (a.) When any such goods are about to be removed, the owner shall notify the nearest Inspector of Weights and Measures or assistant on a form supplied by the Department, of the number and description of such articles to be removed.
- (b.) The packages containing the articles removed shall be legibly marked with the words "Weights," "Measures" or "Weighing Machines," as the case may be, and the word "Uninspected."

3. When any weights, measures or weighing machines are imported for direct delivery to a person who intends to use them for purposes of trade, they must be sent direct from the Custom House at which they are entered for consumption, to the office of the Inspector or Assistant Inspector of Weights and Measures nearest to the Custom House, or nearest to the person to whom they are to be delivered for trade purposes, as may be the most convenient, and there verified and stamped before they are delivered to the party by whom they are to be used in trade.

4. If an importer or dealer in weights, measures or weighing machines desires to send any such article from his warehouse before it has been verified direct to any person who intends to use it for trade, he may do so, provided such arrangements are made as will cause the article to be taken to the office of the Inspector or Assistant Inspector of Weights and Measures nearest to the place where it is to be used, at which office it must be verified before it is delivered for use for trade purposes.

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G. Nothing in these supplementary regulations, nor in any previous regulations is to be construed as preventing the importation, manufacture or removal of and setting up, before they are verified, of dormant scales or weigh-bridges of any description, coming within the requirements of the law, but which cannot be used nor properly verified until they are placed on a fixed foundation. But the use of such weighing machines for trade purposes is illegal until they have been verified and stamped.

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H. 1. IRON WEIGHTS OF THE DENOMINATION OF HALF A POUND OR UNDER may be admitted to verification, provided they are of such substance that a soft metal plug

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on which the stamp may be impressed, can be securely fixed therein, and when such soft metal plug is so fixed in them by the parties who present them for verification. But,—

2. When any iron weight is presented for verification or when any such weight is found in use from which a soft metal plug has been lost, it shall not be adjusted or re-stamped until the hole in which the plug was inserted has, in the presence of the Inspector, been enlarged at the bottom, so that the expansion of the lead used for adjusting it will prevent its subsequently falling out.

## Schedule A.

## OF WEIGHTS TO BE ADMITTED TO VERIFICATION.

DOMINION WEIGHTS.				WEIGHTS TO BE TOLERATED TILL 1ST JULY 1880.		
A VOIRDUPOIS WEIGHTS.			Troy or Bullion Weights.	A VOIRDUPOIS WEIGHTS.		
In Bronze or White Metal of equal hard- ness.	In Iron.	In Soft Metal Cased.	In Bronze Only.	In Bronze.	In Iron.	Soft Metal Cased.
60 lbs.	60 lbs.	60 lbs.	500 ozs.	56 lbs.	56 lbs.	56 lbs.
50 "	50 "	50 "	300 "	28 "	28 "	28 "
30 "	30 "	30 "	200 "	14 "	14 "	14 "
20 "	20 "	20 "	100 "	7 "	7 "	7 "
10 "	10 "	10 "	50 "	4 "	4 "	4 "
5 "	5 "	5 "	30 "	2 "	2 "	2 "
3 "	3 "	3 "	20 "	1 "	1 "	1 "
2 "	2 "	2 "	10 "			
1 "	1 "	1 "	5 "			
8 ozs.			3 "			
4 "			2 "			
2 "			1 "			
1 "			.5 "			
8 drs.			.3 "			
4 "			.2 "			
2 "			.1 "			
1 "			.05 "			
1/2 "			.03 "			
1000 grs.			.02 "			
600 "			.01 "			
300 "			.005 "			
200 "			.003 "			
100 "			.002 "			
60 "			.001 "			
30 "						
20 "						
10 "						
6 "						
3 "						
2 "						
1 "						
.6 "						
.3 "						
.2 "						
.1 "						
.06 "						
.03 "						
.02 "						
.01 "						

Schedule B. OF THE FORMS OF WEIGHTS THAT WILL BE ADMITTED TO VERIFICATION.

DOMINION WEIGHTS.	
AVOIRDUPOIS WEIGHTS.	TROY WEIGHTS.
<p>From 50 lbs. down to one pound, cylindrical, with knob.</p> <p>The same with ring.</p> <p>Rectangular block, with ring or handle-cast solid.</p> <p>Truncated square pyramid.</p> <p>From 5 lbs. down to one-half dram. Any of the above forms; also flat discs in nests.</p> <p>A 60 lb. weight for the bushel of wheat, of some form sufficiently distinct from the forms herein described to prevent the one being mistaken for the other.</p>	<p>From 500 ounces down to one ounce, Truncated cone with knob.</p> <p>From 5 ounces down to .001 ounce, flat square plates.</p> <p>The denomination to be engraved or stamped on the top of the knob of each weight, in as large numerals as the size of the weight will admit; and, also, on the face of the smaller weights.</p>
GRAIN WEIGHTS.	
<p>From 1,000 grains down to ten grains, Cylindrical, with a small rising stem and knob.</p> <p>Six grains and under. Bent platinum or aluminium wire so bent as to represent the number of grains or decimal parts of a grain.</p>	
<p>In every case the denomination of the weights, when of sufficient size, must be cast, engraved, or stamped on them in bold legible numerals, of a size duly proportioned to the size of the weight.</p>	

Schedule C. OF FEES TO BE COLLECTED FOR VERIFICATION OF WEIGHTS.

DOMINION WEIGHTS.						Weights to be tolerated till 1st July, 1880.					
Avoirdupois Weights.				Troy Weights.		Avoirdupois Weights.					
Denomination.	Verification Fees.			Denomination.	Veri- fica- tion Fees.	Denomi- nation.	Verification Fees.				
	Bronze.	Iron.	Cased.				Bronze only.	Bronze.	Iron.	Cased.	
60 lbs.	cts. 25	cts. 25	cts. 30	500 oz.	cts. 50	56 lbs.	cts. 30	cts. 30	cts. 35		
50 "	20	20	25	300 "	40	28 "	25	25	30		
30 "	20	20	25	200 "	35	14 "	20	20	25		
20 "	20	20	25	100 "	30	7 "	15	15	20		
10 "	10	10	15	50 "	20	4 "	10	10	15		
5 "	5	5	10	30 "	20	2 "	5	5	10		
3 "	5	5	10	20 "	20	1 "	5	5	10		
2 "	5	5	10	10 "	20						
1 "	5	5	10	5 "	15						
8 oz.	5	5	10	3 "	10						
4 "	5	Not admitted.	Not admitted.	2 "	10						
2 "	5			1 "	10						
1 "	5			.5	10						
8 drams	5			.3	10						
4 "	5			.2	10						
2 "	5			.1	10						
1 "	5			.05	10						
½ "	5			.03	10						
Set as above from 50 lbs. down to 1 lb...	75			1.00	1.20	.02	10				
						.01	10				
				.005	10						
				.003	10						
				.002	10						
				.001	10						
Do. do. from 8 oz. to ½ dram ....	30			Set as above from 500 oz. to 1 oz	2.50						
Set of grain weights, from 1000 grs. down to .01 of a grain, in authorized series .....	90			Do. from 5 oz. down to .001.	1.50						

**Schedule D. OF THE DOMINION MEASURES OF CAPACITY THAT MAY BE ADMITTED TO VERIFICATION.**

DENOMINATIONS.	MATERIALS.
<p>A.—BUSHEL.            HALF BUSHEL.            PECK.            GALLON.</p>	<p>May be made of—</p> <ol style="list-style-type: none"> <li>1. Bronze or Brass, cast.</li> <li>2. Hammered Sheet Brass or Copper, strengthened by rims of similar metal, and upright straps.</li> <li>3. Sheet Iron, when of sufficient strength to retain the form of the measure under ordinary usage, either with wood or iron bottoms.</li> <li>4. Wood of any suitable quality— with iron or hardwood rim. When of wood, the edge to be sufficiently thick to receive the band.</li> </ol>
<p>B.—GALLON.            HALF GALLON.            QUART.            PINT.            HALF-PINT.            GILL.            HALF GILL.</p>	<p>May be made of—</p> <ol style="list-style-type: none"> <li>1. Bronze or Brass, cast.</li> <li>2. Hammered Sheet Brass or Copper, with suitable rim of similar metal.</li> <li>3. Hard Pewter.</li> <li>4. Stout tin plate of approved thickness.</li> </ol>

No measure of capacity, of which the sides or bottom are indented, battered, or knocked out of the regular form, will be admitted to verification, nor any whose bottoms are not sufficiently strong to carry the contents without changing their form.

**Schedule E. OF THE FORMS OF MEASURES OF CAPACITY THAT MAY BE ADMITTED TO VERIFICATION.**

**DOMINION MEASURES—CYLINDRICAL.**



## Schedule F. Of Fees to be collected for verification of Measures of Capacity.

DOMINION MEASURES.					
DENOMINATIONS.	MATERIAL.				
	Bronze Cast.	Sheet Brass or Copper.	Sheet Iron or tin plate.	Hard Pewter.	Wood.
	Cts.	Cts.	Cts.	Cts.	Cts.
Bushel .....	30	30	20	...	10
$\frac{1}{2}$ Bushel .....	25	25	15	...	7
Peck .....	20	20	15	...	5
Gallon.....	15	10	10	15	5
$\frac{1}{2}$ Gallon.....	10	10	10	10	5
Quart.....	10	10	5	10	...
Pint .....	5	5	5	5	...
$\frac{1}{2}$ Pint .....	5	5	5	5	...
Gill.....	5	5	5	5	...
$\frac{1}{2}$ Gill.....	5	5	5	5	...
Set from Bushel to Gallon.....	75	75	50	...	20
Set from Gallon to $\frac{1}{2}$ Gill .....	40	40	30	40	...

**Schedule G. OF FEES TO BE CHARGED FOR THE VERIFICATION OF WEIGH-BRIDGES, PLATFORM SCALES, WEIGHING MACHINES, BALANCES AND STEELYARDS.**

BALANCES WITH EQUAL ARMS, whether the load is carried above or below the fulcrums:

To weigh not more than 5 lbs. in each pan.....	\$00 30
To weigh not more than 50 lbs. in each pan.....	00 50
To weigh not more than 100 lbs. in each pan .....	00 75
To weigh over 100 lbs. in each pan	1 00

STEELYARDS WITH DIVIDED ARM—

To weigh not more than 500 lbs.	\$00 50
“ “ 1,000 lbs.	00 75
“ “ 2,000 lbs.	1 00
“ over 2,000 lbs.....	1 50

To be verified at the Inspector's Office. If verified elsewhere cost of carriage of weights used for verification to be charged extra.

BALANCES WITH UNEQUAL ARMS,  
NOT DIVIDED—

To weigh not more than 1,000 lbs.	\$00 75
“ “ 2,000 lbs.	1 00
“ “ 4,000 lbs.	1 50

Same as above as to cartage.

WEIGH-BRIDGES OR PLATFORM SCALES—

To weigh not more than 250 lbs.	\$00 50
“ “ 500 lbs.	00 75
“ “ 2,000 lbs.	1 00
“ “ 4,000 lbs.	1 50
“ “ 6,000 lbs.	2 00
And for each additional ton.....	00 50

And in addition to these rates the cost of carting the weights used for verification.

## Schedule H. OF LINEAL MEASURES THAT MAY BE ADMITTED TO VERIFICATION.

DENOMINATION.	MATERIAL.	
10 feet measures,	These measures may be made of any suitable metal, or of straight grained wood. When of wood, the ends must be protected by metal tips well secured.	
6 " "		
5 " "		
3 " " or yard.		
$\frac{1}{2}$ yard "		
2 feet, "		
1 foot "		
$\frac{1}{2}$ foot "		
Chain or Riband, 100 ft.	The chains of iron or steel with solid joints.	
" " 50 "		
Divided into feet.		
" Riband, 66 "		The Ribands may be of steel, or of metal wire woven with other fibre.
" " 33 "		
Divided into links.		
Common tape lines are not to be verified.		

## Schedule I. OF FEES TO BE CHARGED FOR VERIFICATION OF LINEAL MEASURES.

	Of Metal.	Of Wood.
10 feet.....	25 cts.	20 cts.
6 " .....	25	20
5 " .....	25	20
3 " or yard.....	8	5
$\frac{1}{2}$ yard.....	8	5
2 feet.....	2	2
1 foot.....	2	2
$\frac{1}{2}$ " .....	2	2
Chain or Riband, 100 feet .....	\$1.50	The fees charged for the verification of any Lineal Measure shall include the charge for the verification of its subdivisions.
" " 50 " .....	1.00	
" " 66 " .....	1.00	
" " 33 " .....	.75	

If upon a second or any subsequent verification the Weights, Measures and Weighing Machines submitted are found to be correct within the tolerated error, one fourth of the fees hereby imposed shall be remitted upon the production of satisfactory evidence of the former verification.

## WEIGHTS AND MEASURES.

## Schedule K.—Of Remedy or Allowance for Error.

## AVOIRDUPOIS WEIGHTS.

STANDARDS.			TRADE WEIGHTS.		
Denomination of Weights.	Actual Allowance in excess.	Actual Allowance in deficiency.	Denomination of Weights.	Actual Allowance in excess.	Actual Allowance in deficiency.
lbs.	Grains.	Grains.	lbs.	Grains.	Grains.
50	5.0	2.5	50	50	20
30	"	"	30	30	10
20	"	"	20	20	8
10	2.0	1.0	10	10	5
5	"	"	5	5	3
3	"	"	3	3	1
2	0.25	0.125	2	2	1
1	"	"	1	2	1
8 oz.	"	"	8 oz.	1	1
4 "	"	"	4 "	1	1
2 "	"	"	2 "	0.5	0.5
1 "	0.05	0.025	1 "	"	"
8 drm.	"	"	8 drm.	"	"
4 "	"	"	4 "	"	"
2 "	"	"	2 "	"	"
1 "	"	"	1 "	0.25	0.25
$\frac{1}{2}$ "	"	"	$\frac{1}{2}$ "	"	"

## BULLION WEIGHTS.

Troy oz.	Grains.	Grains.	Troy oz.	Grains.	Grains.
500	1.0	0.5	500	1.0	0.5
400	"	"	400	"	"
300	"	"	300	"	"
200	"	"	200	"	"
100	0.25	0.125	100	0.25	0.125
50	"	"	50	"	"
40	"	"	40	"	"
30	"	"	30	"	"
20	"	"	20	"	"
10	0.025	0.0125	10	0.025	0.0125
5	"	"	5	"	"
4	"	"	4	"	"
3	"	"	3	"	"
2	"	"	2	"	"
1	0.005	0.0025	1	0.005	0.0025
0.5	"	"	0.5	"	"
0.3	"	"	0.3	"	"
0.2	"	"	0.2	"	"
0.1	"	"	0.1	"	"
0.05	"	"	0.05	"	"
0.04	"	"	0.04	"	"
0.03	"	"	0.03	"	"
0.02	"	"	0.02	"	"
0.01	"	"	0.01	"	"
0.005	"	"	0.005	"	"
0.004	"	"	0.004	"	"
0.003	"	"	0.003	"	"
0.002	"	"	0.002	"	"
0.001	"	"	0.001	"	"

DECIMAL GRAIN WEIGHTS.

STANDARDS.			TRADE WEIGHTS.		
Denomination of Weight.	Actual Allowance in excess.	Actual Allowance in deficiency.	Denomination of Weight.	Actual Allowance in excess.	Actual Allowance in deficiency.
Grains.	Grains.	Grains.	Grains.	Grains.	Grains.
4000	0.05	0.025	4000	0.05	0.0025
2000	"	"	2000	"	"
1000	"	"	1000	"	"
500	0.04	0.02	500	0.4	0.02
300	"	"	300	"	"
200	"	"	200	"	"
100	"	"	100	"	"
50	0.02	0.01	50	0.02	0.01
30	"	"	30	"	"
20	"	"	20	"	"
10	"	"	10	"	"
5	0.01	0.005	5	0.01	0.005
3	"	"	3	"	"
2	"	"	2	"	"
1	"	"	1	"	"
0.6	0.005	0.0025	0.6	0.005	0.0025
0.3	"	"	0.3	"	"
0.2	"	"	0.2	"	"
0.1	"	"	0.1	"	"
0.06	0.0025	0.00125	0.06	0.0025	0.00125
0.03	"	"	0.03	"	"
0.02	0.002	0.001	0.02	0.002	0.001
0.01	"	"	0.01	"	"

MEASURES OF LENGTH.

Measure.			TRADE MEASURES		
10 feet.....	Inch.	Inch.	10 feet .....	Inch.	Inch.
6 " .....	0.05	0.05	6 " .....	0.05	0.05
3 " .....	"	"	3 " .....	"	"
2 " .....	0.01	0.05	2 " .....	0.01	0.01
1 " .....	"	"	1 " .....	"	"
1 nch.....	0.001	0.005	1 " .....	0.005	0.005
	"	"	1 Inch.....	"	"

MEASURES OF CAPACITY.

	Grains weight of water.	Grains weight of water.		
Bushel.....	280	280	Bushel.....	} In reference to these measures the Inspector will reject them when upon ordinary test the error is obvious to the eye.
$\frac{1}{2}$ Bushel .....	140	140	$\frac{1}{2}$ Bushel.....	
Peck .....	70	70	Peck .....	
Gallon.....	50	50	Gallon.....	
$\frac{1}{2}$ Gallon.....	25	25	$\frac{1}{2}$ Gallon.....	
Quart.....	10	10	Quart.....	
Pint.....	10	10	Pint.....	
$\frac{1}{2}$ Pint.....	8	8	$\frac{1}{2}$ Pint.....	
Gill.....	8	8	Gill.....	
$\frac{1}{2}$ Gill.....	4	4	$\frac{1}{2}$ Gill.....	
$\frac{1}{4}$ Gill.....	2	2	$\frac{1}{4}$ Gill.....	

PLATFORM SCALES, WEIGH BRIDGES AND BALANCES WITH  
UNEQUAL ARMS.

All these weighing machines will be rejected :

1st. When with a full load and truly balanced, the movement of the lever weight one "notch" or division on the graduated lever, in either direction, does not cause the lever to turn decidedly in accordance with such movement;

2nd. When with a full load, or with any less load, and with the balance in equilibrium, the addition or removal of one two-thousandth part of the load, to or from the load, does not turn the lever decidedly in accordance with such addition or removal.

# Circular No-188A.

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DEPARTMENT OF INLAND REVENUE,  
OTTAWA, August 22, 1879.

SIR,—Herewith you will receive several documents, which are for your instruction in relation to your duties as Inspector of Weights and Measures.

1. You are to understand at the outset that all former Departmental instructions to Deputy Inspectors, except in so far as they are embodied in the accompanying documents, are cancelled.

2. In order to prepare yourself for the intelligent performance of your duties, it is necessary that you should:—

- (a.) Carefully study and acquire a thorough knowledge of the Act 42 Vic., cap. 16;
- (b.) Make yourself thoroughly master of the regulations made by the Order in Council of the 14th August, 1879;
- (c.) You will then carefully study the Departmental regulations as to the manner of testing and verifying weights, measures, and weighing machines, and as to the manner of using the instruments, standards, and other apparatus supplied to you for that purpose.

3. You will, at as early a date as possible, submit to this Department, a report as to what duties you propose to assign to each of your assistants, and with reference to such of them as, by the terms of their appointment, are directed to reside at a distance from your office you will report what portion of your division you propose to place under their immediate survey, bearing in mind, however, that all your assistants are to be available at all times to assist you in the performance of any duties you may require of them within your division, and that the Department may find it expedient to assign to some one or more of your assistants the survey of some portion of an adjacent Division, of which, however, you will be advised.

4. Before proceeding on the duties of inspection at any considerable distance from your office, or from the residence of your assistants, you will receive from this Department an itinerary showing the routes of travel to be followed, the order in which each place is to be visited, the mode of conveyance to be used, and the estimated expense necessary for each journey.

5. You will bear in mind that you are not to incur any expenses for travelling, nor for any other service, without having first submitted the proposed expenditure to the Department, and obtained either a special approval in each case, or such general authority as will justify you in incurring the expenses referred to.

6. Having made yourself master of the details of your duties, and received authority thereto, you and your assistants will proceed to visit the places where weights and measures subject to inspection are used or kept, arranging your visits so as to complete your tour within the period—two years—prescribed by the Act.

7. The large centres of business will almost exclusively occupy your time during your first year of office, and to these places you will first give your attention so as to carry out the inspection first at the most important places.

8. Although the Inspector and his assistants must inspect weights, measures and weighing machines when presented at the office, it is the intention of the Department that they shall be inspected, as far as possible, at the places of business where they are in use, and for this purpose the portable kit will be sufficient for all weights, measures, &c., which are within its compass, as explained in the accompanying description; but whenever any dispute arises as to the result of such test, or when any error so great as to indicate fraud is discovered, or any grave doubts arise as to the accuracy of the test so applied, either the articles tested should be removed to your office or to the nearest Inland Revenue office where standards and apparatus are kept in working order, and compared with the principal standards, or the standards and apparatus for applying them should be taken to the place where the articles to be tested are in use, the course taken being in each case that which will cause the smallest expense. When the articles so tested are ascertained to be false, as alleged by the Inspector, the owner must bear the expense incurred in addition to the fees; but if they are found to be correct within the tolerated error, the cost incurred for removing them or the standards will be borne by the Department.

9. For testing weigh-bridges, dormant scales and heavy platform scales the standards will necessarily be carried to the places where they are in use. The iron fifty-pound standards are issued for this service, and the number used for testing this description of weighing machine should be as large in proportion to the full capacity of the machine tested as circumstances will permit.

10. If there are in your division any wholesale dealers in, or manufacturers of weights or weighing machines, you will endeavour to meet, as far as possible, their convenience as to the time at which their articles shall be inspected, and at places where the number of such articles manufactured or sold is considerable, standards, balances, &c., will, on requisition, be supplied by the Department to remain continuously for use at each of such places, if the proprietor will provide a safe place wherein they may be kept under crown lock when not in use by you or your assistants; provided also, that such other reasonable precautions are taken as the Department may consider necessary for their safety.

11. Your attention is especially directed to section 41 of the Act herein referred to, by which you will observe that you and your assistants, not only have the power to enter premises where weights, measures and weighing machines are used, but that, in addition to the regular visits made once in two years, it is the duty of yourself and your assistants to visit such places at uncertain times, and without previous notice, in order to insure compliance with the provisions of the Act; but you are not to charge any verification fees on such occasions, except when the articles verified are tested for the first time, or when such articles are verified at the request of the owner. In making these visits you will take care to act discreetly and in such manner as will give no just cause for offence.



12. If when making the occasional inspection referred to in the preceding paragraph, you discover any fraudulent or unjust weights, measures or weighing machines, you will seize them, and at once communicate all particulars to the Department.

13. By section 33 of the Act, Inspectors are permitted to adjust weights when authorised to do so by Departmental instruction, but you are on no account to attempt the adjustment of balances, platform scales or weigh-bridges, nor are you to undertake the adjustment of weights until special Departmental instructions are issued and a tariff of fees established for that service.

14. As you are responsible to the Department for the safety of the standards, balances and other apparatus placed in your charge, you are not, on any pretence whatever, to allow them to pass from under your control, or to be used for any purpose whatever by any one except yourself or the assistants appointed under the Act, and you are required to be exceedingly careful with all the standards and apparatus, bearing in mind that in cleaning them no other means are to be used than an oiled rag, chamois skin or other similar appliance, which will be supplied on requisition, and you are especially cautioned against the use of emery paper, sand paper, rotten stone or any like article. When oil is used for cleaning any of the standards, it must be carefully wiped off to prevent its oxidizing or drying on the standards. This precaution is especially necessary with reference to the standards of weight.

15. You will see that each of your assistants is in possession of a copy of these instructions, and of the documents which accompany them, and you will communicate to them, from time to time, copies of all explanations or additional instructions that may be communicated to you by the Department.

16. It will be your duty to report promptly to the Department any failure of duty on the part of your assistants, that may come to your knowledge.

17. Your attention is especially [directed to the accompanying documents in reference to :—

- (a.) The transmission of money to the Department;
- (b.) The use of the stamps and keeping accounts thereof;
- (c.) The manner of conducting your correspondence with the Department.

18. The instructions as to the manner of keeping the books and of using the forms issued to you, will be found attached to the books, etc., issued, but should you require any additional instructions in relation thereto, you are to apply to the Department for the information you require, unless you can at once and more conveniently obtain it from the Chief or District Inspectors of Inland Revenue, who will also act as Chief and District Inspectors of Weights and Measures.

I beg to remain,  
Your obedient servant,

*A. Brownell*

Commissioner.

## DESCRIPTION OF THE PORTABLE KIT.

*The Portable Kit is supplied for facilitating the inspection of Weights and Measures during the annual tour of the Inspector or his Assistant. It is also to be used when visiting any place for the purpose of ascertaining whether light weights, short measures or illegal weighing machines are used.*

*It weighs about 26 lbs. and contains all that is necessary for local inspection of Legal Weights and Measures. Its use, however, requires both care and intelligence, and Inspectors will not be competent to use it until they fully understand the following description and instructions, which will be sufficiently clear to those who carefully study them, and at the same time, examine the parts of the Kit referred to.*

Before unstrapping the cover of the KIT, or before attempting to open it, place it firmly with its bottom side—i. e., the side to which the buckles and brass rings are attached—on a strong level table or counter. Stress is laid on this direction, because if opened wrong side up, the nest of weights may be scattered about, and the smaller ones may be lost. Be very careful, also, not to move the Kit without first closing the case and buckling the straps.

When opened, the Kit will be found to contain :

1. *Apparatus for weighing up to 50 lbs, consisting of:—*

- (a) Balance-beam, made to be used either as an equal or unequal balance.
- (b) Two small pans for the *equal* balance.
- (c) Platform or large steel pan to be used on the short end of the unequal balance.
- (d) Four links or hooks, with  $\nabla$  bearings. The largest one for suspending the beam to the bracket; the next in size for suspending the large steel pan or platform to the beam, and the two smaller ones for suspending the small pans to the ends of the beam.
- (e) An iron bracket or frame upon which the beam is to hang.
- (f) A nest of weights, viz. :
  - 2 of 2 lbs., each.
  - 1 each of 1 lb., 8 oz., 4 oz., 2 oz., 1 oz., 8 drachms, 4 drachms, 2 drachms, 1 drachm, and 2 of  $\frac{1}{2}$  drachm each.
- (g) A box containing a small balance, with its pans, standard, and a set of grain weights, consisting of :
  - 6 gr., 3 gr., 2 gr., 1 gr.
  - .6 gr., .3 gr., .2 gr., .1 gr.

2. *A folded standard yard, subdivided into feet and inches.*

3. *A guage-rod for testing legal measures of capacity.*

~~Before~~ *Before moving any of the pieces, carefully observe how each of the pieces is disposed in the case, so as to be able to restore them to the same position after using them.*

An examination of the KIT will show that the balance-beam has four knife-edges or fulcrums:—

- A central one which fits into the large link and serves to suspend it from the bracket.
- One at each end, from which the small brass pans are suspended when used as a balance, with equal arms.
- One at a distance from the centre, equal to one-tenth of the distance between the centre and the end fulcrums.
- The links are placed on these knife-edges or fulcrums as previously described. They must be examined, so as to ascertain their proper positions, and carefully handled so as to avoid injury to the bearings.

*When setting up the balance for use :*

First set up the bracket by placing its end in the socket attached to the bottom of the case, and secure it there by inserting in the hole provided for that purpose the small pin attached by a chain, to the bottom of the case.

Then take the large link and hook it into the eye at the top of the bracket. Next take the balance-beam and place its centre knife-edge in the last mentioned link, the fulcrum of the short arm to the right.

If it is to be used as an equal balance-beam, place one of the small hooks on the knife-edges at each end of the beam, and hook one of the brass pans to each of them. *Observe that the angular ends of these hooks go on the knife-edges.* It is then ready for use, and, if properly set up, will, with five pounds in each pan, turn decidedly with two grains, and as the toleration of error in commercial weights, from excess to deficiency, is eight grains for five pounds, the balance will weigh with sufficient accuracy.

**NOTE.**—*When using this beam always keep the box containing the small balance in its place, so that it may serve as a rest for the right hand pan.*

If the beam is to be used as an unequal balance, remove the pan and hook from the right hand end of the beam.

Place the second size hook on the knife-edge next the centre.

Hook on the steel pan or platform. The balance should then be in equilibrium, but to determine whether it is so or not, steady it with the hand in a level position, and observe whether it has a decided tendency to turn one way or the other. If there is a decided tendency one way or the other, it must be counteracted by the addition of counterpoise weights in the light side till it exactly balances.

To test a twenty-pound weight, place it in the large pan, and place a two-pound standard in the small one. If the weight is exact, ten grains on the large pan will turn the beam, and as the toleration of error for commercial weights from excess to deficiency is 28 grains for twenty pounds, the weight can be tested within that remedy.

~~is~~ *The testing of weights by the unequal arm demands great care. The weight must be placed exactly in the centre of the large pan. This should be done by actual measurement. The pan must be steadied by the hand, so as to place the tongue of the beam upright, and the tendency in either direction must be carefully observed, as well as the number of grains necessary to counteract the tendency. Observe, also, that the number of grains placed in the large pan with the weight, to be verified, count at their nominal value, while the number placed in the small pan must be multiplied by ten. Thus:*

*If ten grains are required in the large pan to produce an equilibrium, the weight is ten grains light; but if it is found necessary to place five grains in the small pan, then the weight in the large pan is fifty grains too heavy.*

Although the balance is made to weigh up to fifty pounds, and will do so with sufficient accuracy, if proper care is used, it will not be necessary; nor is it desirable, to use it for the verification of greater weights than 20 lbs. When in equilibrium, with 30 lbs., in the large pan, the beam will turn very decidedly by the addition of ten grains in the large, or one-tenth of a grain in the small pan, in cases of emergency, therefore, 30 lb. weights may be verified in the balance, but great care is necessary in doing so.

For the verification of fifty and thirty-pound weights, or the 56 and 28 lb. weights tolerated till 1850, it will be desirable to use the trader's balance, provided he has one that can be admitted to verification under the regulations. If he has no such balance, it will not be necessary to verify his heavy weights, as he could not legally use them. But if he has a suitable balance, after testing his weights of the lower denominations, such of them as are admitted to verification may be used with the verified balances for testing his weights of the higher denominations.

In testing the tolerated weights, that of 7 lbs. may be tested with the equal arms, but the 14 lb. weight must be tested with the unequal arms, and the counterpoise for it will be 1 lb. 6oz. 6 drachms and 11 grains.

The Kit also contains a brass gauge-rod for testing Dominion measures of capacity.

On reference to the Order in Council of the 14th. Aug. 1879, it will be observed that all Dominion measures of capacity are required to be truly cylindrical, and such measures may be tested with sufficient accuracy for ordinary trade transactions by this gauge-rod, but when extreme accuracy is required, the standard measures must be used.

Instructions as to the use of the the gauge-rod are engraved on its edges. They are extremely simple, and can hardly be misunderstood.

- (a) On the side marked "diameter," measure the diameter of the vessel in two directions crossing each other at right angles, and if there is any difference, the mean of the two is to be used.
- (b) On the side marked "depths," measure the depth of the vessel. This in large vessels should be done in several places, laying a straight edge across the rim for taking the depth near the centre. If there is any difference in the depths so taken, the mean is to be used.

~~For~~ *If the measures are made in the proportion as to depth and diameter given in the Schedule of Dimensions, issued by the Department, they will exactly correspond with the divisions on the rod. These dimensions are not imperative and may be varied without affecting the accuracy of the result arrived at by the gauge-rod if the vessel is truly cylindrical. When they do not exactly correspond with the division lines on the rod the fractions of the division may be estimated with sufficient accuracy.*

If the measures are correct, the depth added to the diameter, as shown by the gauge-rod, will be:

For a $\frac{1}{2}$ gill.....	10
“ gill.....	20
“ $\frac{2}{3}$ pint.....	30
“ pint.....	40
“ quart.....	50
“ $\frac{1}{2}$ gallon.....	60
“ gallon.....	70
“ peck.....	80
“ $\frac{1}{2}$ bushel.....	90
“ bushel.....	100

The other instrument contained in the Kit is the standard yard of brass. This is subdivided into feet, inches and tenths of an inch. Its use does not require any special instructions.

**ART. I.—INSTRUCTIONS FOR VERIFICATION OF BALANCES WITH EQUAL ARMS.**

*The Officer will first make himself thoroughly acquainted with the following Section of the Order in Council of August 14th, 1879 :*

“**A.** Balances with equal arms are only to be admitted to verification when :

1. The beam shows no material difference as regards the form or magnitude of the two arms.

2. It is provided with a tongue pointing upwards or downwards from its centre, at right angles with a line joining the extreme bearings, or with some equivalent arrangement for indicating the position of equilibrium.

3. It is in equilibrium when a line joining the extreme bearings is perfectly horizontal, and returns to that position after being put into vibration.

4. Its arms are equal within the specified limit of error.

5. The balance is sufficiently sensitive to be turned decidedly and promptly by the addition or withdrawal of so much of the load as represents the error tolerated by regulations in a commercial weight representing the load.

6. No balance balls or detached parts other than the pans and the connections necessary for attaching them to the beam are used for adjusting the balance.

7. The balance, as a whole, is of sufficient strength, and on a sufficiently stable base, to secure it against change of form or position under the maximum load it is to carry.

8. The beam will carry its maximum load without deflection.

9. The maximum load for the weighing of which it is to be used is distinctly engraved or marked on the beam.

10. The knife edges are permanently fixed to the beam.

Then proceed to determine whether the balance submitted to verification complies with the above conditions.

1. As to §§ 1, 2, 6, 7, 8, 9, 10, by a careful examination.

~~As~~ With reference to the conformity of the balance with the requirements of §§ 1, 7, 8, 10, the Inspector must necessarily rely upon his technical knowledge.

2. As to § 3:

(a) Observe whether the beam, with the pans suspended to it, is in equilibrium without any load.

(b) Place a load in each pan equal to about half the load which the balance is designated to carry, and carefully adjust the loads, so that the beam is in perfect equilibrium.

(c) Determine by means of a plummet and string whether the pointer or tongue is vertical.

(d) Make the balance vibrate through a considerable arc, say about 20 degrees, and observe whether it recovers itself readily, and then determine by means of the plummet as before, whether it returns to the same position when in equilibrium.

If these tests are satisfactory, it may then be tested—

3. As to its conformity with § 4, as follows:

(a) Change the loads from one pan to the other; observe whether the beam remains in equilibrium with the loads thus transposed.

(b) Cause the beam to vibrate, and observe whether it returns to the same position of equilibrium as before. If it does, it complies with this §. If it does not return to equilibrium:—

(c) Determine by use of the grain weights how much it requires in either pan to restore equilibrium.

(d) Make a similar test with the full load the beam is marked to carry.

If the weight added to the load in either pan, in order to restore equilibrium, is more than  $\frac{1}{3000}$ th of the load, the beam must be rejected.

If the balance is not rejected under the preceding test, it must then be tested—

4. *With reference to its conformity with the requirements of § 5, as follows :*

- (a) Place a load in each pan equal to the full weight which the beam is marked to carry, and adjust the loads so that the beam is in equilibrium.
- (b) Place, with the load in the left hand pan, the weights equal to the remedy of error allowed for weights equal to the load then in the pan, as per "*Schedule of remedy*," and observe whether the balance turns quickly and decidedly.
- (c) Remove the *Remedy Weights* from the left to the right hand pan, and observe whether there is a quick and decided corresponding turn of the beam.

If the beam fails to turn decidedly under these conditions in either direction, it must be rejected.

#### ART. II.—INSTRUCTIONS FOR THE VERIFICATION OF STEELYARDS.

The Inspecting Officer must first make himself fully acquainted with the following Section of the Order in Council of August 14th, 1879 :

"**B.** Balances commonly known as STEELYARDS or Roman balances having unequal arms, are only to be admitted to verification when—

1. There is sufficient room for oscillation, and the knife edges on which the beam oscillates are sufficiently fine to permit it to move freely.

2. The beam is sufficiently strong to carry its load without deflection.

3. The bottom of the notches by which the divisions of the long arm of the lever are indicated, and from which the weight is suspended, are in close approximation to a right line drawn through the knife edges forming the points of suspension, and when such straight line passes near to and a little above the centre of gravity of the whole apparatus.

4. The divisions on the long arm of the lever are equal among themselves.

5. The weight used with the lever—if it is changeable or can be readily detached therefrom—is some multiple or sub-multiple of the pound avoirdupois, and has distinctly marked on it its true weight.

6. The maximum weight intended to be weighed on it is either distinctly marked on the beam or indicated by its construction.

The graduated arm of the common Steelyard usually consists of a square bar, with notches in the upper and lower angles to define the divisions. The beam has usually two points of suspension, and two tongues or pointers for indicating its equilibrium pointing in opposite directions.

One of the angles of the graduated arm is divided so as to weigh the lower denomination of weights; the other, for the higher denomination. The divisions as also the pointer in use will, of course, always be on the upper angle or side.

This instrument may be made to indicate weights with sufficient accuracy, but generally it is very roughly made, and as a necessary consequence it is very unreliable. There should, therefore, be no hesitation in rejecting it when its indications are not within the tolerated remedy.

Steelyards are, however, in use which have been made in a very superior manner, and a careful and experienced weigher can obtain with them results which approximate very closely to the truth.

It is mainly with reference to these last mentioned weighing machines that the following regulations as to the verifications of "*Balances with unequal arms*" have been prepared:—

1. *The Inspecting Officer must satisfy himself, by careful examination, that the requirements of section B above quoted are complied with. This as to §§*

- 1, 5, 6, may be done by examinations only; but with reference to the other paragraphs the following tests must be applied.
2. The strength of the beam will be tested as follows:
    - (a) Suspend from the short arm of the lever the heaviest load which the beam is made to carry, and place the counterpoise at the division line representing such load.
    - (b) Stretch a fine thread along the side of the lever when unloaded and again when loaded, and observe if the beam has changed its form.

For this test of beams made to carry one or more tons, the short arm of the lever may be fastened by means of a small chain or sufficiently strong wire to some fixed object beneath it as a beam in the floor or other suitable object of sufficient stability, and the counterpoise may then be moved to the extreme end of the long arm of the lever.

3. The beam may be tested with reference to § 3 of the Regulations as follows:

- (a) Stretch a fine thread along the beam, so as to coincide as nearly as possible with the bottom of the notches or other bearing points to which the counterpoise is suspended, and extend it beyond the edge of the knife-edge on the short arm of the lever. Then note how nearly the thread coincides with the main point of suspension and the knife-edge that carries the load.

4. With reference to § 4 of the Regulations proceed as follows:

- (a) Compare the principal divisions with each other, so as to determine whether they are equal among themselves. This may be most conveniently done by means of a pair of steel bow-dividers with very fine points, taking care to place the points opposite to, but not in the bottom line of the divisions. The sub-divisions may be compared in the same way with the points of the dividers, so far open as to embrace several divisions.

5. When the counterpoise, with its supports are so attached to the long arm of the beam that it cannot be removed without breaking or cutting some part of the metal, the beam may be tested as follows, after the previous tests have been completed:

- (a) Suspend from the short arm of the beam a weight equal to about three fourths of the full load the beam is made to carry; place the beam in equilibrium by means of the counterpoise and observe whether it oscillates freely, and whether after putting it in oscillation it returns to a horizontal position.

- (b) Remove the load, and if the beam is not provided with a scale pan to which it is properly adjusted, some suitable means must be provided for suspending the standards from the short arm of the beam—for small beams, an ordinary scale pan will do—but whatever is used, it should be exactly balanced by a small weight used as a counterpoise on the extreme end of the long arm of the beam, or if this can not be conveniently done, the scale pan or other appliance may be so adjusted as to weigh the exact weight indicated by one or more integral divisions on the beam. In the latter case, allowance for the weight of the scale pan, &c., must be made in every comparison.

- (c) Place standards in the pan and test the accuracy of the beam by noticing whether it weighs them accurately.


6. If the beam is made to weigh a greater weight than there are standards to represent or than can be conveniently attached to it, the test may be made

as far as possible in the manner above directed, and continued in the following manner :

- (a) Load it with a 50 lbs. standard, and note if it weighs it correctly.
- (b) Add another 50 lb. standard to the load and again note whether the additional load is truly indicated.
- (c) Measure with the dividers, as above directed, the distance between the two divisions indicating the 50 lbs. and 100 lbs., and compare this distance with the divisions indicating additional fifties along the whole length of the arm.

If the distances for each additional 50 lbs. of load are equal among themselves, the beam may be assumed to be correct.


7. *When the counterpoises can be readily removed from the beam, or when more than one counterpoise is used with it.*

 *In this case the maximum weight the beam is made to carry must be legibly inscribed on it and :—*

The actual weight in avoirdupois pounds or authorized multiple or sub-multiple thereof of each counterpoise, must be marked on it in the same manner as is required with reference to weights used with platform scales.

When the beam conforms to the regulations in the above mentioned particulars the verification of it may be proceeded with as follows :—

- (a) Verify the weight of the moveable counterpoise.
- (b) Verify the weights of the additional counterpoises and see that they are multiples of each other, and that their weights are properly marked on them.
- (c) Place the counterpoise at zero on the graduated arm of the beam which should then be in equilibrium. If the zero mark does not come within the range of the graduations, place the counterpoise on a division mark that indicates a pound, or some multiple of the pound, represented by the standard as 1 lb., 2lb., &c., then by suspending a corresponding standard to the short arm of the lever, the beam should be in equilibrium.
- (d) Add to the load such additional standards as may be convenient, as 20, 30 or 50 lbs., and note whether the beam weighs the standards correctly.

 *When in addition to the counterpoise moveable on the beam, there are other counterpoises, each representing a definite weight when attached to the extreme end of the graduated arm of the beam—*

- (e) Place on the short arm of the beam a load of standards (or a load of which the exact weight is known) equal to the weight represented by the smallest of the additional counterpoises, and note whether the beam is then in equilibrium.
- (f) Note whether the larger counterpoises are exact multiples of the smaller ones, and whether they are marked as weighing exact multiples of the load weighed by it.

If it is found that by the above tests the beam weighs correctly, and is in all respects in accordance with the regulations prescribed under the law, it may be stamped and a certificate may be issued.

It is, however, to be understood that the above expedients for *estimating* the approximate correctness of beams of this description, are not intended to relieve the Inspector of the duty of testing such beams with loads of standards equal to their full capacity, when sufficient standards are available, and it is possible to use them without incurring an unreasonable cost in moving them. And the inspecting officer



will bear in mind that tests made in the manner above described, can only be equivalent to tests made with full loads of standards, when the utmost care and accuracy are observed in making such tests.

As a rule when making tests with the beams loaded to less than their full capacity, not less than  $\frac{1}{10}$  (one-tenth) of the load should be used.

### ART. III.—INSTRUCTIONS FOR THE VERIFICATION OF WEIGH BRIDGES, HAY SCALES AND PLATFORM SCALES.

The Inspecting Officer must first make himself master of the following sections of the Order in Council of the 14th August 1879.

“C. Weigh Bridges, Hay Scales, and Platform Scales, will only be admitted to verification when :

1. The foundation or supporting base is sufficiently firm and capable of carrying without change of level or of form or other disturbance, the maximum load for which it is to be used.

2. If moveable from place to place, some satisfactory arrangement, such as a level or plummet is provided and permanently attached, for indicating whether the machine is perfectly level.

3. The platform is so arranged that any obstruction to its free movement can be easily detected.

4. All the beams, levers and other parts are of sufficient strength to carry the maximum load to which they will be respectively subjected without deflection.

5. The knife edges are firmly and permanently fixed in the levers, have sufficient room to permit free oscillation, and are sufficiently firm.

6. The knife edges and fulcrums of each set of levers are in the same plane.

7. The oscillations are sufficiently evident.

8. The weights used with the instrument are equal to the avoirdupois pound or to multiples or authorized sub-multiples of the avoirdupois pound, or special weights for the barrel of flour or for the bushel of wheat, their actual weight and the weight or special quantity they are intended to indicate on the scale, being plainly marked thereon.

9. The weights used as above are a decimal sub-multiple, as  $\frac{1}{10}$ ,  $\frac{1}{100}$ ,  $\frac{1}{1000}$ , or a binary sub-multiple as  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ , &c., of the load indicated by them.

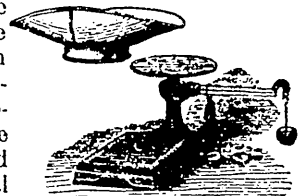
10. There are no moveable balls or detached parts for the adjustment of the balance accessible, or so placed that they can be used for fraudulent weighing.\*

11. The apparatus indicates the same weight, whether the load is placed in the centre of the platform, on one side of it, or at either corner.

12. The maximum load which the apparatus is intended to weigh is conspicuously marked on some essential part of it.

1. *The Inspector will observe that there are several varieties of portable weigh bridges and platform scales in use, which under the regulations above cited, cannot be admitted to verification. The following may be mentioned as examples :*

- (a) The scale represented in this cut is made to weigh on two platforms which give indications in relation to each other in the proportion of one to eight. In addition to the platform, a “scoop” is provided, which may be placed on the smaller platform. A weight is provided which is to be used as an additional counterpoise, as an equivalent to the weight of the “scoop.”



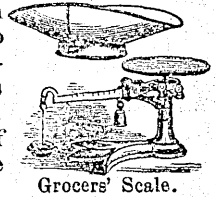
Improved Union or Family Scale.

This additional counterpoise is of the nature of a “moveable or detached part for the adjustment of the balance.” The scale will, therefore, be rejected under § 10 of the section of the Order in Council above cited, it being obvious that a serious error

\* See special instructions as to this paragraph.

might be made either intentionally or accidentally by omitting to place the counterpoise of the scoop in its place when required.

- (b) The scale represented in this cut, when constructed with a "Scoop" in addition to the attached weighing platform, and requiring an addition to the counterpoise, is liable to the same objections as are stated in (a), and will be rejected under § 10 of the section of the Order in Council above cited.



Grocers' Scale.

There are so many kinds of Platform Scales that it would be difficult to give specific instructions as to each, but the above will serve as a general guide. When any variety not clearly covered by these instructions is presented, and as to which the Inspector has doubt, he is to apply to the department for instructions, sending with his application such a description of the scale as will enable the Department to arrive at a proper decision.

2. When verifying a Portable Platform Scale or Weigh Bridge, the Inspector must:

- (a) See that the maximum weight which the scale is to weigh is plainly inscribed on it in legible letters and figures of a size proportioned to the scale, and that the weights to be used with it are in conformity with §8 of the section of the Order in Council above quoted.

If they are—

- (b) Verify them by the standards as directed in Sections 1, 2, 3, 4, Art. IV. with reference to other weights:
- (c) The weights being verified, they are to be stamped on the places prepared for that purpose.
- (d) The counterpoise and moveable weight attached to the graduated arm are not to be stamped until the whole process of verification is complete.

*Great care must be exercised in the verification of weights used with platform scales and weigh bridges. The importance of this will be seen, when it is considered that whatever error there may be in the weight, it is exaggerated in the load weighed in the proportion which the load bears to the weight. Thus, if the weight indicates a multiple of 100, an error of .01 in the weight will cause an error of 1. in the load.*

If the weights are approved, the owner must next cause the scale to be taken apart sufficiently to permit the Inspector to examine all its working parts, and the Inspector will:

- (a) Carefully examine all the beams and supports so as to ascertain whether they are of sufficient strength; whether the knife-edges for each series of levers are in the same horizontal plane, and are substantially and firmly fixed; whether there is ample room in the carrying links or other supports of the knife-edges for their oscillation; whether all the bearing surfaces are intact, and in good order, and generally, whether the apparatus is sufficiently well made to work freely. The owner will then put it together and—
- (b) The Inspector will see that it is placed on a level platform, and that it is provided with the necessary means for determining whether it is level.
- (c) Ascertain whether with the counterpoise on the end of the graduated arm, and with the moveable weight at zero, the scale is in perfect equilibrium, that is:
- (1) The tongue on the graduated arm must be vertical, or, in the absence of the tongue, the beam must be horizontal.

- (2) The graduated arm must vibrate freely, and when disturbed, it must return to its normal and horizontal position.
- (d) Place on the platform a standard weight equal to the minimum load which it is intended to weigh, and note :  
 (1) Whether the weight of such load is correctly indicated, within the requirements of the Schedule of Remedy or allowance for errors.
- (e) Add to the load on the platform additional standards until its maximum load is placed on it, noting the result at several (from three to five) stages of the additions as described in (d).
- (f) Remove the load and test the results "backwards," noting whether the results are the same as in the previous testing, as a check.
- (g) Place as much as possible of the full load on each corner of the platform in succession, and observe whether the scale still indicates the weight on it correctly, within the limits of error tolerated, make the same tests with a reduced load.
- (h) Place the load (as in g) on the ends or sides of the platform nearest to the graduated beam or pan which carries the weight, and observe results. Then change the load to the opposite end or side of the pan, and note whether the results indicated are the same in both cases.
- (i) The same process of testing will be followed when the platforms are carried on levers or beams, or a combination of them equivalent to a balance with equal arms.

2. If the Inspecting Officer has not in possession a sufficient weight of standards to make the full load of the scale inspected, the following method of testing may be resorted to:—

- (a) Proceed as directed in §§ 1 and 2 of Art. III, as far as the weight of standards available will permit.
- (b) Remove the standards from the platform, and without disturbing the counterpoise or weights on the graduated arm, replace the standards by any other suitable weights, or load until the scale is again in exact equilibrium.
- (c) Again add the standards to the load, and observe results as before.

This process will be repeated until the maximum load is reached. For scales or weigh bridges to weigh from one to two thousand pounds, pig iron will be the best material wherewith to replace the standards, but any heavy material may be used as masses of stone or small boulders.

When the whole process of verifying the scales has been so far completed—

- (a) Examine the counterpoise and see that the aperture, if any, left for the introduction or withdrawal of shot or other material for adjusting its weight has been effectually closed and sealed by a plug of soft metal. If this has been properly done, impress the stamp upon it.
- (b) Examine the moveable weight carried on the graduated arm, and deal with it in the same manner as with the counterpoise.

Finally :—

If the scale has the maker's consecutive number incised on any essential part of it, that number is to be used for identification in the certificate and no stamp will be necessary. If it has no such number, some essential part of it—as the graduated arm—must be stamped. In stamping, great care must be taken to avoid bending or in any way changing the form of the arm.

4. The inspection of Hay Scales, Grain Scales, and large Weigh Bridge, such as are used by railway companies, and which are attached to fixed foundations, will be

governed by instructions given in § 3, in so far as they are applicable. The following additional instructions must also be followed :

- (a) The foundation must be carefully examined as to its strength and general fitness to carry the proposed load and the possibility of its settling out of level.
- (b) Ascertain whether the foundation is truly level.

5. The counterpoise or weight permanently attached to the end of the graduated arm, and the moveable or sliding weight carried on that arm for the indication of fractional parts of the load, must, when they can be separated from the arm without breaking or cutting any of the links, rings, or collars by which they are carried, have their exact weight marked or engraved on them, that is :

- (a) On the counterpoise, its weight, when it places the balance in equilibrium.
- (b) On the sliding or moveable weight, its exact weight, when duly adjusted.

6. If there are any apertures in the counterpoise or in the moveable weight by which shot or other matter can be removed or introduced, such apertures must be closed by a soft metal plug, upon which the verification stamp is to be impressed after they have been verified.

7. With reference to the soft metal plug for receiving the stamp, it will be sufficient if the stamping of Iron Weights is provided for by removing the hard skin of the iron from a sufficient space, say  $\frac{3}{4}$  of an inch in diameter, so that the stamp may be impressed on the softer metal below.

8. The verification fee for Platform Scales and Weigh Bridges includes the scale and all the counterpoise and other weights thereto belonging.

9. The actual weight in avoirdupois pounds, or parts of a pound, is to be legibly marked on all weights belonging to platform scales or weigh bridges, as well as the weight of the load they are to indicate. This may be done on weights belonging to scales and weigh bridges already in use, and not so marked by stencilling or painting ; but whenever the stencil or paint wears off, it must be renewed. No weights belonging to platform scales or weigh bridges, made or sold, or offered for sale after the date of these instructions, are to be admitted to verification unless their actual weight and the weight they are to represent in the load are cast, or plainly incised on them.

**D.** Balances with equal arms, and on which the load is carried above the fulcrums will only be admitted to verification when : —

1. There is no material difference as to the magnitude or arrangement of the two arms.
2. Its arms are of equal length within a limit of error equivalent to that tolerated in commercial weights.
3. There are no balance balls, loose counterpoises or detached parts other than the pans necessary for carrying the load weighed, and the weights used for weighing it.
4. Its parallel rods, guides, levers and pivots, by which the adjustment of the scale is effected, are so constructed that they can not be put out of adjustment without the use of violence, which may be readily detected on inspection.
5. The knife edges or fulcrums of each set of levers or guide rods are in the same plane.
6. The balance is sufficiently sensitive to turn decidedly and promptly by the addition and withdrawal of so much of the load as is equivalent to the error tolerated in commercial weights.
7. When there is a tongue or pointer, or some equivalent arrangement for showing when the balance is in equilibrium.

- (a) The scale shown in this cut having in addition to the attached weighing pans with which the scale is in equilibrium, a scoop, with a separate counterpoise to be used with the scoop is also to be rejected under paragraph 3 of section D of the Order in Council above cited.



Grocers' Trip Scale.

And generally—

~~When~~ When a scoop for holding goods is used with any scale or balance, it must be an integral part thereof; that is, it must be necessary for putting the unloaded scale in equilibrium, and there must be no mode of using the scale without it.

- (b) The scale represented in the last illustration is a *Roberval balance*, and all scales of this description not in use previous to the issue of these regulations must be rejected unless the lower bar is either in one piece, or, if in two lengths, the central pivot is so constructed that it cannot be displaced or changed without using violence.

No balances other than such as will come within the conditions under one or other of the heads, A, B, C or D, are to be verified or stamped.

#### ART. IV.—INSTRUCTIONS FOR THE VERIFICATION OF WEIGHTS.

1. Examine the weights carefully and see that they are in conformity with Schedule A of the Order in Council of 14th Aug. 1879.

2. If the weighing is to be performed with the official balance, proceed as follows:—

- (a) Place the standard in the left hand pan.
- (b) Place a counterpoise in the right hand pan, which may consist of any available weights, among which should be a small tin cup with a quantity of small shot in it. This shot may be added to, or deducted from, until the balance exactly indicates zero.
- (c) Remove the standard from the left hand pan and in its place put the weight to be compared.
- (d) If the balance does not remain at zero, add grain weights to one pan or the other until it does. If they are required in the left hand pan with the compared weight, the number of grains added will show how much the weight is lighter than the standard, and will be designated by the sign— (or minus.) If, on the other hand, they are required in the right hand pan, the number of grains by which the standard is heavy, and will be designated by the sign+ (or plus.)

3. By adopting the above method of verification, errors due to any difference there may be in the length of the arms of the balance will be avoided. Any balance, therefore, which is sufficiently sensitive, may be used.

4. Although the method above described is somewhat tedious, it should always be used when accuracy is aimed at, or when there is any doubt as to the accuracy of the balance. But, with good balances, such as are supplied to its officers by the Department, ordinary commercial weights undergoing verification, may be compared by direct weighing against the standards.

NOTE (a).—In all cases when placing weights in the pan of the balance supplied by the Department, or removing them from it, the balance must be raised from its bearings. If the trader's balance is used as suggested in the instructions for using the portable kit, it must first be verified under Article I.

NOTE (b).—With reference to the balance-ball on platform-scales and weigh-bridges referred to in § 10 of Section C of the Order in Council of 14th August 1879, as the expediency of modifying this regulation is under consideration pending the issue of other regulations, the balance-ball is not to be interfered with, nor is the platform scale or weigh-bridge on which it is used to be rejected unless such balance ball is of an unusual character.

## ART. V.—INSTRUCTIONS AS TO THE DEPOSIT OF COLLECTIONS.

1. The Inspector will deposit his collections in the Bank of Montreal or such other Bank as may be directed. He will take the money to the Bank with a specification thereof stating it to be on account of weights and measures inspection, and make a requisition for a draft in favour of the Receiver General.

2. Attached to the draft which will be given by the bank to the depositor, will be a bank receipt in triplicate: one copy of the receipt called the "original," will be filed in the Inspector's office for reference; the draft and the remaining copies of the receipt must be immediately forwarded to this Department.

3. Deposits are to be made weekly, or as much oftener as the amount collected reaches fifty dollars.

4. The collections of each month are to be kept distinct, and on the first of each month a draft is to be transmitted for a sum, however small, which will exactly close the transactions of the previous month.

5. Except when post office money orders are used for remittances, each draft is to represent the collections of a certain day or days.

6. No portion of the money collected is to be expended by the Inspector or Assistant Inspector, or applied by him to any purpose whatever, the payment of his salary and authorized contingencies being otherwise provided for.

7. In divisions where no bank is available, and where there is a money order post office the remittance may be made by a P. O. order in favour of the Commissioner of Inland Revenue; but, in such cases, the depositor will take care that all his remittances, except that to close a month, are in even amounts of 10, 20, 40, 60, 80, or 100 dollars.

8. If the Inspector is prevented by duties of inspection from making his weekly deposits at the usual place, he will for this purpose take advantage of any money order office on his line of travel.

9. The commission charged for money orders will be repaid to the depositor by this Department and must not be deducted from the amount of the deposit.

## ART. VI.—INSTRUCTIONS AS TO THE ISSUE OF CERTIFICATES AND AFFIXING STAMPS THERETO.

1. A certificate must be issued for each Weigh Bridge, Platform Scale or Steelyard, such certificate to include the Weights belonging to the scale to which it refers. It is usual for manufacturers of scales to designate them by a progressive number. When this is done, and when such number is engraved or impressed upon an essential part of the apparatus, no other stamp will be necessary, as the progressive number can then be inserted in the certificate with the name of the maker and will be a sufficient identification.

2. A separate certificate will also be issued for any set of Weights, Measures or Weighing Machines when verified for manufacturers or dealers, or when demanded by the owners; but, when verified for traders, who use the weights, &c., after they are verified, a number of them may be included in the same certificate. Care must always be taken, however, that no more are grouped together than can be represented by stamps for which there is room on the space set apart for them.

3. It is not necessary to apply a stamp for each article. But the total value of the stamps attached to the certificates must exactly represent the fees chargeable on the articles covered by the Certificate. This being kept in view, the largest available stamps are to be used.

4. In all cases the state of weights, measures and weighing machines, when first presented for verification, is to be entered in the Registers, and the fees are then to be collected, and the fees must be collected every time the articles are verified, whether they pass or not.

*Regulations as to the supply and use of Weights and Measures stamps.*

Supply of Stamps.—Adhesive stamps will be supplied by the Department on requisition being made by the Inspector of Weights and Measures, who will be careful to make requisition sufficiently in advance to insure having at all times a supply on hand to meet the demands of his Division.

The stamps for Weights and Measures inspection are of the following denominations:

Value	1 cent.	Value	30 cents.
"	2 cents.	"	50 "
"	5 "	"	\$1.00 "
"	10 "	"	1.50 "
"	15 "	"	2.00 "
"	20 "		

On receipt of a parcel of stamps from the Department the Inspector is immediately to count them, and if they are found to be in accordance with the form of receipt accompanying the parcel, he is to sign, date and return the receipt by the next mail, and enter the stamps on the debit side of the account hereinafter mentioned, if they are not correct he must immediately advise the Department of the error and enter the exact number received by him to the debit of his stamps account. A separate account of each denomination of stamps is to be kept by each Inspector of W. & M. by way of debit and credit, in book O. 4, stating on the Dr. side the number received, and on the Cr. side the number issued.

An assistant Inspector will observe the same rules on receiving stamps from the Inspector of his Division.

Use of Stamps.—After filling up a certificate of verification, and after the fees for such verification have been paid, a stamp or stamps, representing the amount of fees chargeable for such verification, will be securely affixed by the Inspector or Assistant Inspector on each certificate of verification, form O. 6; the certificate will then be delivered to the party owning the Weights and Measures or Balances. On no account are the sheets of stamps to be irregularly broken, the stamps must be used in the regular sequence of their number and so accounted for on all forms where entries of stamps are made.

The cancellation of stamps is to be effected by the Inspector or Assistant Inspector of W. M. immediately after affixing them to the certificate of verification, writing across the blank space in the middle of each stamp his initials and the date as shown in samples.

ART. VII.—INSTRUCTIONS AS TO CORRESPONDENCE.

You will in future govern yourself by the following instructions in carrying on your official correspondence:

1. Official letters are to be written on foolscap paper, leaving a convenient margin—*i. e.*, from half to one fourth—on the inside of the paper.
2. When the letter does not extend beyond one page, only half a sheet is to be used. If the letter cannot be written on one page leaving a quarter margin, a second half sheet is to be used.
3. For convenience in using the press copying book, cut sheets will in future be issued, which are to be written on, only on one side.
4. Each letter is to relate to *one subject only*, and must contain as full and complete information on that subject as possible.
5. Each paragraph is to be numbered as shown in this circular.
6. If there are any inclosures they must be described in the margin or designated by letter thus: \* (\*Inclosure A). The transmission of unnecessary inclosures is to be avoided.
7. All official letters are to be folded in four folds and forwarded in official envelopes, "E. 2." Plain Envelopes are to be used by officers who are not supplied with the above mentioned official envelopes.

In addition to the above you are directed to address all letters and memoranda on Departmental business, for which special Envelopes are *not* provided, to the "Commissioner of Inland Revenue."

It is not necessary, nor is it desirable, to use the name of the officer who may happen to have charge of the Department for the time being, nor the name of the clerk to whose branch the letter or memorandum may be supposed to refer.

8. Official envelopes are supplied to all offices, and they are to be used as follows:

- |                                       |  |                              |
|---------------------------------------|--|------------------------------|
| E. 2.                                 | Commissioner I. R. Correspondence.....   | White, Cap and Large Cap.    |
| e. 2.                                 | do do do do  | White, Note.                 |
| e. 3.                                 | For deposits and Advice Notes; also for Forms<br>No. 13 and 0.18.....            | Blue, Note.                  |
| E. 6.                                 | For Official Returns; W. & M .....   | do Cap.                      |
| e. 6.                                 | For Requisitions and Receipts for supplies<br>from Department .....              | do Note                      |
| E. 8.                                 | To District Inspector of Inland Revenue....                                      | Manilla, Large.              |
| e. 8                                  | do do do do  | do Small.                    |
| E. 9.                                 | From District Inspector or Assistant In-<br>spector to the Local Inspector ..... | do Large.                    |
| e. 9.                                 | do do do   | do Small.                    |
| E. 11.                                | To Assistant Inspector of W. & M.....  | Buff, Cap.                   |
| e. 11.                                | do do  | do Small.                    |
| <i>E. 12 e. 12 To the Public.....</i> |  | <i>White Caps &amp; Note</i> |

One cent Post Bands are supplied for mailing Official Circulars, and are to be used for no other purpose; these bands must have no writing on them other than the name and address.

9. Reports on official references from Department are to be written on the folds of the official backing where there is room. It will be observed that these folds are numbered 1, 2, 3, 4. The report is to commence on the first vacant space and to be continued on each fold in regular sequence. The inside of the backing—which will be considered as No. 5—may be written on if necessary.

10. When there is not sufficient space on the backing, a separate half sheet of foolscap is to be used, and in such case no part of the report will be written on the backing; but generally, if the report is concisely written and all useless or formal verbiage avoided, there will be ample room.

11. In official correspondence and in reports, the most concise and explicit terms are to be used; formal and unnecessary quotations from previous letters, repetitions and mere speculative opinions unsupported by evidence are to be avoided, and in making statements the exact facts are to be rigidly adhered to, as the writer will be held strictly accountable for the accuracy of the information he forwards.

12. Copying presses and books are only supplied to the principal offices. When they are not supplied, the officers must keep manuscript copies of their correspondence.

13. Requisitions for stationery, forms and supplies of any kind are to be made on the printed forms issued for that purpose, and are not to be included in letters, except when referred to as enclosures.

14. Stationery, and forms of Requisition for the same will be supplied only to offices in which revenue is collected and transmitted to the Department.

15. Assistant Inspectors of W. & M. must look to the Inspector of the Division for all supplies of forms, stamps and stationery; the Inspector is instructed to make requisition for such supplies sufficiently in advance of requirements, to prevent delay.



## THE

# ROBERVAL BALANCE.

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*The following memoranda on the Roberval balance and ordinary equal arm balance are reprinted from the Third Report of the Commissioner of Inland Revenue on Weights and Measures, 1876, and should be carefully read by the Inspectors and their assistants, as the principles which affect the accuracy of balances generally are therein explained.*

87. I have at this moment, on my table, a scale in very common use; one of a description much eulogised as the very thing for small traders of limited means, as being very cheap, and as weighing with sufficient accuracy for all practical purposes. The degree of reliance that can be placed on these recommendations may be estimated by the fact that, with a common screw driver, this scale can, in one minute, be so altered that it will weigh either light or heavy to the extent of one ounce in the pound, according as the weights are placed on one side or the other of the pan; or if the weights are placed in the centre, it is capable of weighing with sufficient accuracy, while, without any load, it is in perfect equilibrium. The scale can, with almost as little trouble be restored to comparative accuracy.

88. It must, I submit, be evident that such a weighing machine as this is more dangerous to the public than light weights or short measures. It would require an expert in such matters to detect the fraud, and it is not difficult to see how, when used for selling, the weights would be placed on one side of the pan, and when used for buying their position would be reversed; or how quickly the scale would be restored to adjustment when the Inspector's visit appears as a near probability.

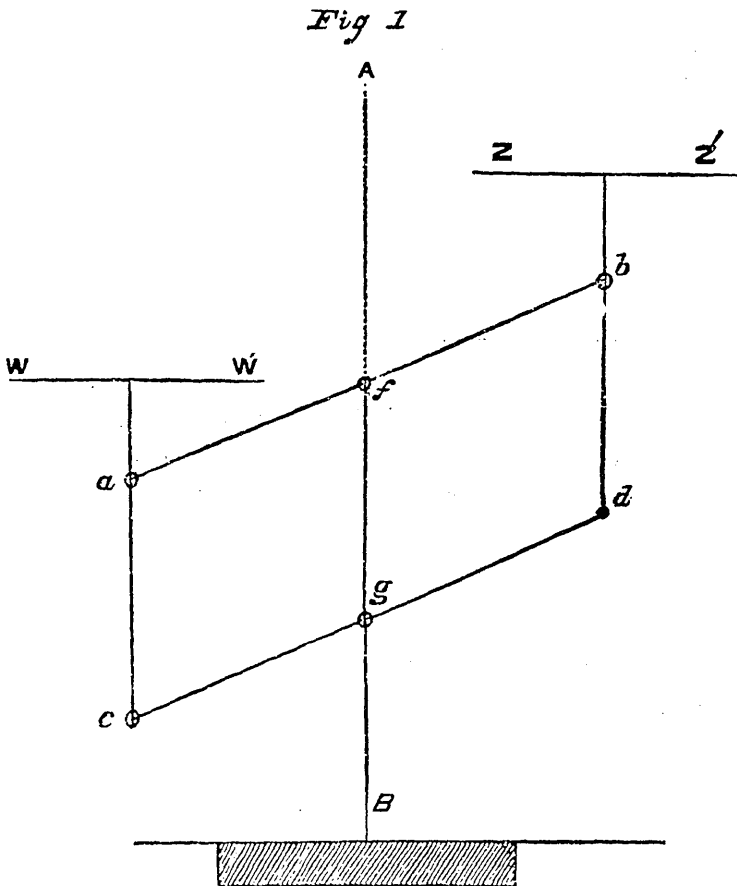
*Reprinted from the Fourth Report of the Commissioner of Inland Revenue on Weights and Measures, 1877.*

### APPENDIX K.

MEMORANDUM in relation to the "Roberval Balance," and the possibility of fraudulent weighing with it when out of adjustment.

In my third Report I directed attention to a description of a scale in very common use, and originally known as the "Roberval balance." I pointed out that as commonly made it could easily be distorted so as to produce false weighing either in excess or deficiency at the will of the person using it.

The principle of this balance is shown in the following diagram.



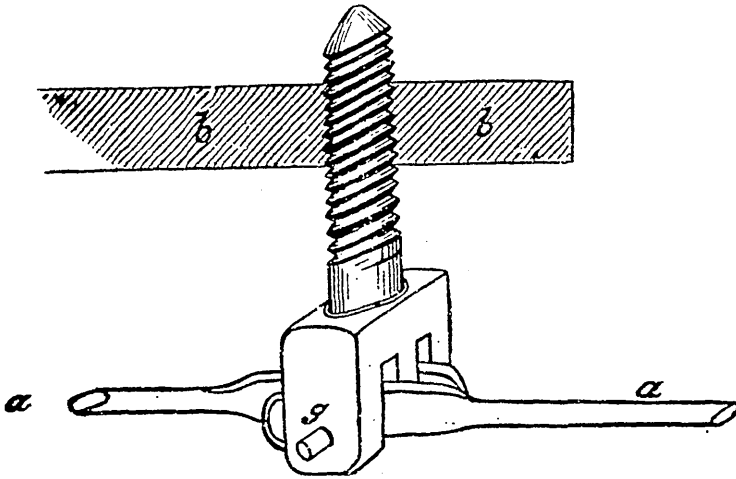
The accuracy of the balance depends on the bars  $ab$ ,  $cd$ ,  $ac$ , and  $bd$ , forming a true parallelogram, that is  $ab$  must be equal to  $cd$ , and  $ac$  to  $bd$ . The bar  $ab$  is suspended on a knife edge fulcrum at  $f$  as in an ordinary equal arm balance, while the lower side of the parallelogram  $cd$ , is pivoted at its exact centre upon a pivot  $g$ , which must be in a vertical line  $AB$  drawn through  $f$ , and the distance between  $f$  and  $g$  must be exactly equal to  $ac$  or  $bd$ .

When the arrangement above described is accurately worked out, the oscillation of the parallelogram on the fulcrum at  $f$  will always produce a truly vertical movement of the sides  $a$  and  $b$ , and whether the load in the pan is placed at  $Z$  or  $Z'$ , it will during the oscillation move through the same vertical space, and will therefore produce the same effect on the weight in the other pan, whether placed at  $W$  or  $W'$ .

It is obviously essential to the reliability of such a balance that it be so constructed that under ordinary usage the equality and adjustment of the several parts shall be maintained, and that there shall be no ready means for distorting them.

Manufacturers of this description of scale find it convenient to make the bar  $cd$ , in two parts, each equal to one-half the length of  $ab$ , each half being pivoted at  $g$ . In order that the balance may work accurately, the pivot at  $g$  must be in the same straight line as the pivots  $c$  and  $d$ . It is therefore necessary that the pivot  $g$  should be placed at the true distance from  $f$ , and that the construction be such as to prevent the possibility of changing the relative position of  $g$  and  $f$  without using so much violence as would be likely to attract the notice of an inspector, and as would prevent the rectification of the error except by a partial reconstruction of the balance.

Usually these balances are so constructed as to offer no security against being tampered with. The pivot at  $g$  is sometimes carried in a stud screwed into the main



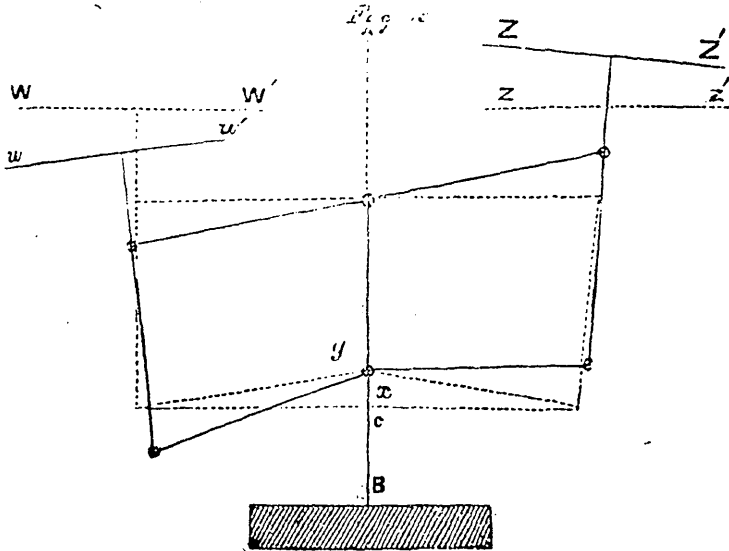
frame of the balance as shown in the figure, where  $bb$  is the frame of the scale and  $aa$  the lower side of the parallelogram, so that by removing the pivot  $g$ , which is only a piece of small steel wire, the stud can be screwed further in or the reverse. I have seen one balance in which this change can be carried so far as to make a difference of ten per cent. in the weighing, the change from one position to the other being the work of a few minutes.

But generally the pivot  $g$  is carried by a slender wrought iron bar inserted in the casting. This bar is from three to five inches long, and by the application of a very moderate degree of force it can be bent in either direction to an extent sufficient to produce a very material effect on the balance. This mode of construction is apparently intended to facilitate the adjustment of the position of the pivot during the construction of the balance.

Experimentally I have ascertained the extent to which the description of Roberval balance, most commonly used, can be affected without using so much violence, or

so far distorting it as to attract the notice of an ordinary observer. But as it appeared desirable to investigate the principles involved in the cause of error I submitted the problem to Professor Cherriman who has given me as the result of his investigation the formulæ presently stated whereby the percentage of error in the weighing may be computed when the dimensions of the balance and the amount of distortion at  $g$  are known.

The following diagram (No. 2.) is given in illustration of the manner in which these balances may be distorted for fraudulent purposes.



The dotted lines shew the position of the distorted balance when in equilibrium, the central pivot which should be at  $c$  having been forced up to  $g$ , thereby destroying the parallelogram on which the balance depends for its accuracy. The full lines show the position of the limbs of the balance when the left hand pan has been depressed. An inspection of the figure will show that if the weight has been placed at  $w$ , it will not have descended through a vertical trace, while it will have descended through a greater distance than a load placed in the opposite pan either at the centre of the pan or at its outer margin as at  $z'$ . These conditions give the weight at  $w$  a preponderance over an equal weight placed at  $z'$ .

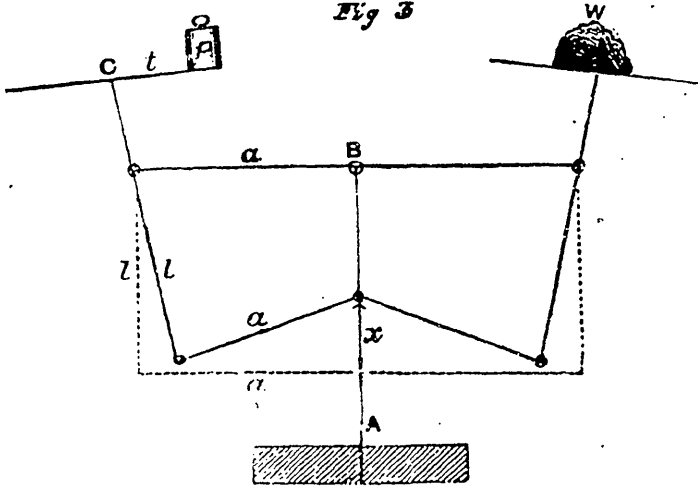
Reversing these conditions placing the weight at  $w'$  and the load at  $z$  the latter will for the same reason have a preponderance over the weight.

Or if the weight and load are each placed in the centre of the respective pans the weighing may be correct. Hence it will be seen that the weigher has it in his power to weigh, with a scale which has been thus tampered with, either correctly, in excess or in deficiency.

So much is evident from an inspection of the diagrams, but the geometry of the problem reveals other causes of error not so easily detected or explained, and as to which it is not necessary to enlarge here.

The following is Professor Cherriman's formula.

Fig 3



Let  $P$  be the weight, and  $W$  the load; then in general, that one of the two which is the nearer horizontally to the central vertical axis  $AB$  will be the greater. In the particular case where the distance  $x$  through which the pivot has been displaced is very small, suppose  $W$  to be at the centre of its scale, and  $P$  to be placed at a distance  $t$  from  $C$  the centre of its platform inwards the central axis, the approximate error is given by the formula,

$$\frac{P-W}{P} = \frac{t x}{a l}$$

where  $a$   $l$ , are the horizontal and vertical arms.

Putting  $a = 53$ ,  $l = 36$ ,  $x = 3$ ,  $t = 20$ , the error comes out

$$\frac{20 \times 3}{53 \times 34} = \frac{60}{1802} \text{ or nearly } \frac{1}{30} \text{ of } P.$$

Hence if the value of  $P$  is 30 lbs. the error would be one pound in deficiency.

If  $P$  were placed at the same distance  $t$  to the left of  $C$ , the same expression would apply for  $\frac{W-P}{P}$  and the error would then be in excess.

*Reprinted from the Fifth Report of the Commissioner of Inland Revenue on Weights and Measures, 1878.*

STANDARDS DEPARTMENT,  
BOARD OF TRADE, S.W.,

8th March, 1878.

DEAR MR. BRUNEL,—We have to thank you for your valuable memorandum (Appendix K., 4th Report, page 77) on the Roberval balance containing Prof. Cherriman's mathematical consideration and formula.

This is a balance in which we also are much interested, as complaints have been made here of its use.

The Roberval balance proper appears to me, however, to be so excellent a weighing instrument that I am anxious to save its good name.

The Roberval balance as stamped and used in France does not, so far as we can ascertain, possess the jointed lever shown as  $a, g, a,$  in the engraving, page 78, of your report, but it possesses only a single lever or rigid frame so locked at its centre

or fulcrum that any displacement of the balance is difficult. (See enclosed sketch *d*.) See Diagram No. 2.

Imitations of the Roberval balance as shown in the figure 154 (See Diagram No. 1) now enclosed, are largely used in this country. In event of any change in our law here, it is possible their use would be prohibited eventually, as it is possible to alter such imitations by substituting for the jointed lever *a, g, a*, the single rigid lever locked as shown at *d*. See Diagram No. 2.

Medhurst, of London, and Pfitzer, of Berlin, have improved on these imitations of the Roberval balance.

A good Roberval counter scale is now selling in London at a low price, 15 shillings, but it is not so convenient a form as the counter scale 154.

I remain,  
Faithfully yours,

(Signed,) H. J. CHANEY.

The following is the diagram reprinted from the Fourth Report and referred to in Mr. Chaney's letter. The diagrams included by Mr. Chaney are also given herewith.

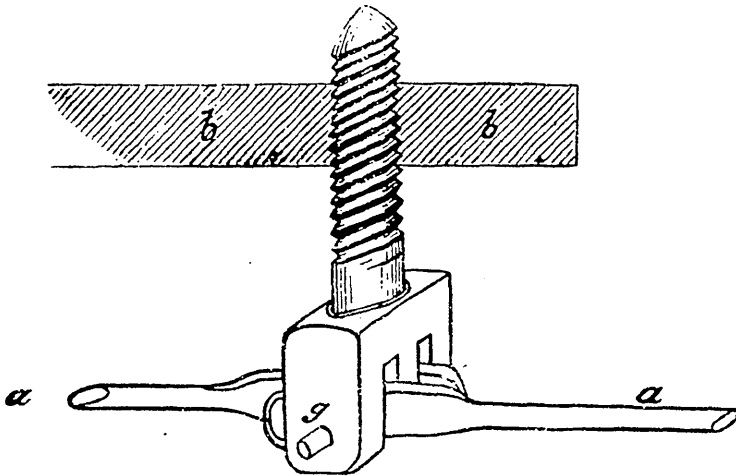
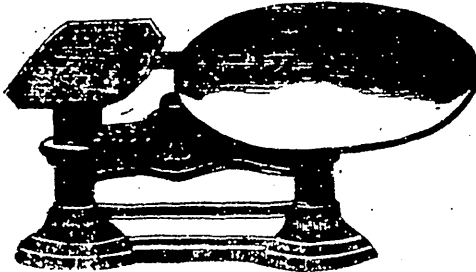


DIAGRAM No. 1.

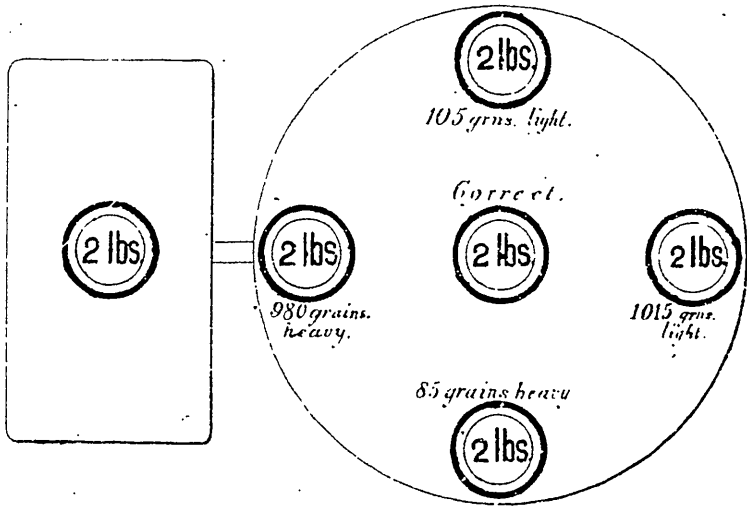


No. 154, Counter Weighing Machine.

Diagram 2

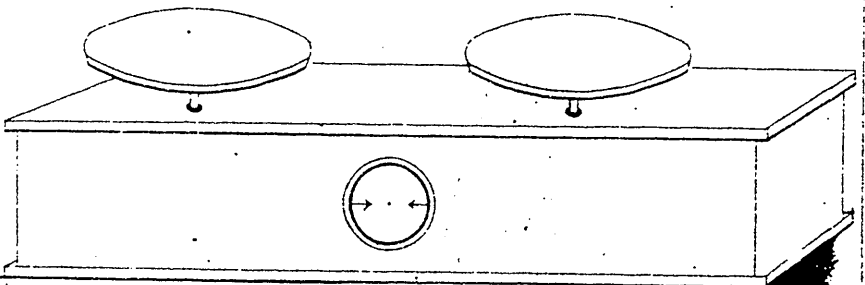
IMITATION OF ROBERVAL BALANCE  
*with double jointed levers*

CHEESEMONGERS SCALE  
*with Earthenware pan.*



*Load placed respectively at each of the five places marked*

FRENCH TOBACCONIST'S SCALE

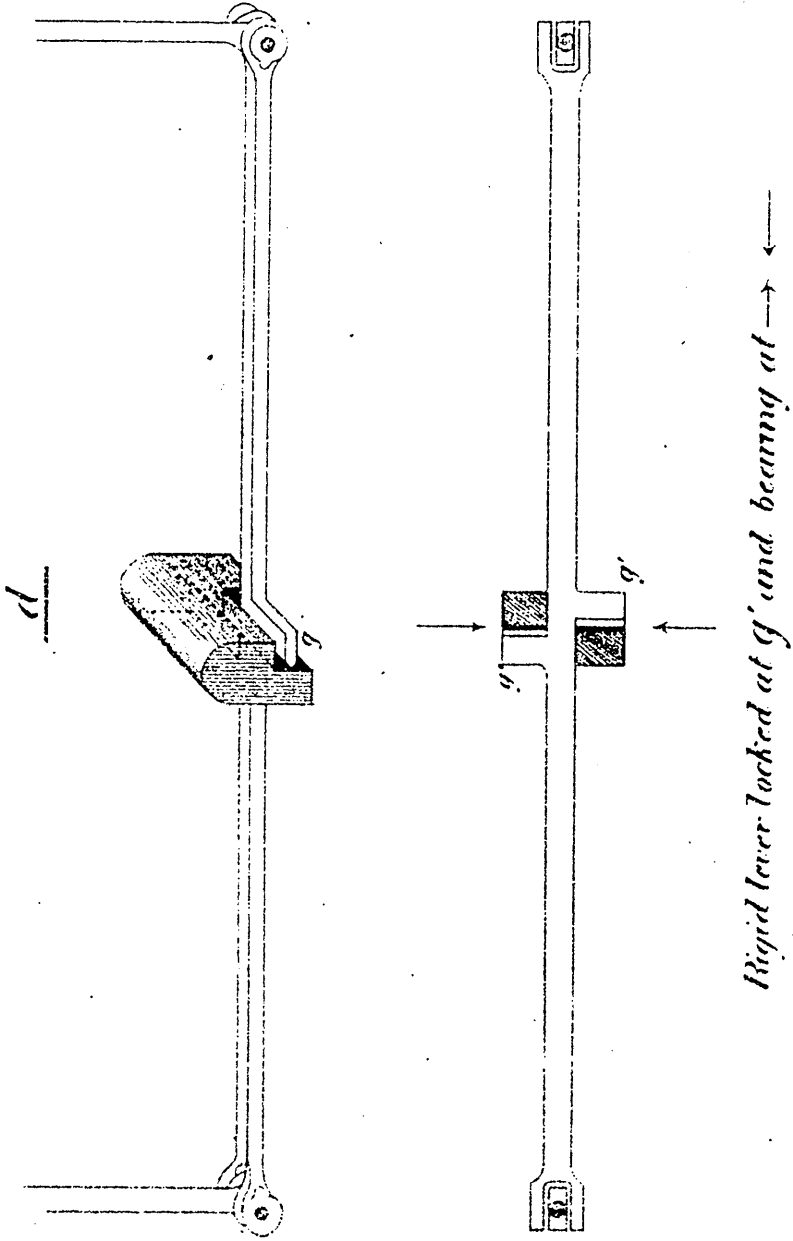


*the right pan is nearly one grain heavy but the position of the weights in the pan does not affect the balance*





Diagram 3.





## THE EQUAL ARM BALANCE.

The accompanying diagram will explain in a popular manner the principles on which a weighing beam, whose fulcrums are not in a straight line, may be applied to fraudulent weighing.

The heavy lines  $a B c$  show the skeleton form of the beam. It is of the nature of a bent lever, which, it is necessary to bear in mind, will always be used under a force or load, acting in a truly vertical direction,  $a W, c L$ .

This being the case, the true lengths of the arms of the lever are  $Ba' Bc'$ , and so long as  $Ba$  is equal to  $Bc$ , and the points  $a c$  are in a horizontal plane and the loads  $W L$  suspended therefrom equal to each other, the beam will be in equilibrium.

But let the beam be moved into the position  $x B y$ . It is now evident from an inspection of the diagram that, practically, and in so far as it is affected by a vertical force, the arm of the lever  $Ba$  has been lengthened by the distance  $a' x$ , while the opposite arm has been shortened by a distance equal to  $c' w$ .

The lever has now, for practical purposes, unequal arms; and assuming that  $a$  has been loaded to bring it into the position  $x B y$ , a greater load will be necessary at  $y$ —now the end of the short arm of the lever—to turn the beam than is carried at  $x$ , the end of the long arm.

These conditions will be reversed when the load at  $y$  has been made sufficient to turn the beam to the position  $e B d$ .

This description of balance is used for fraudulent weighing in the following manner:

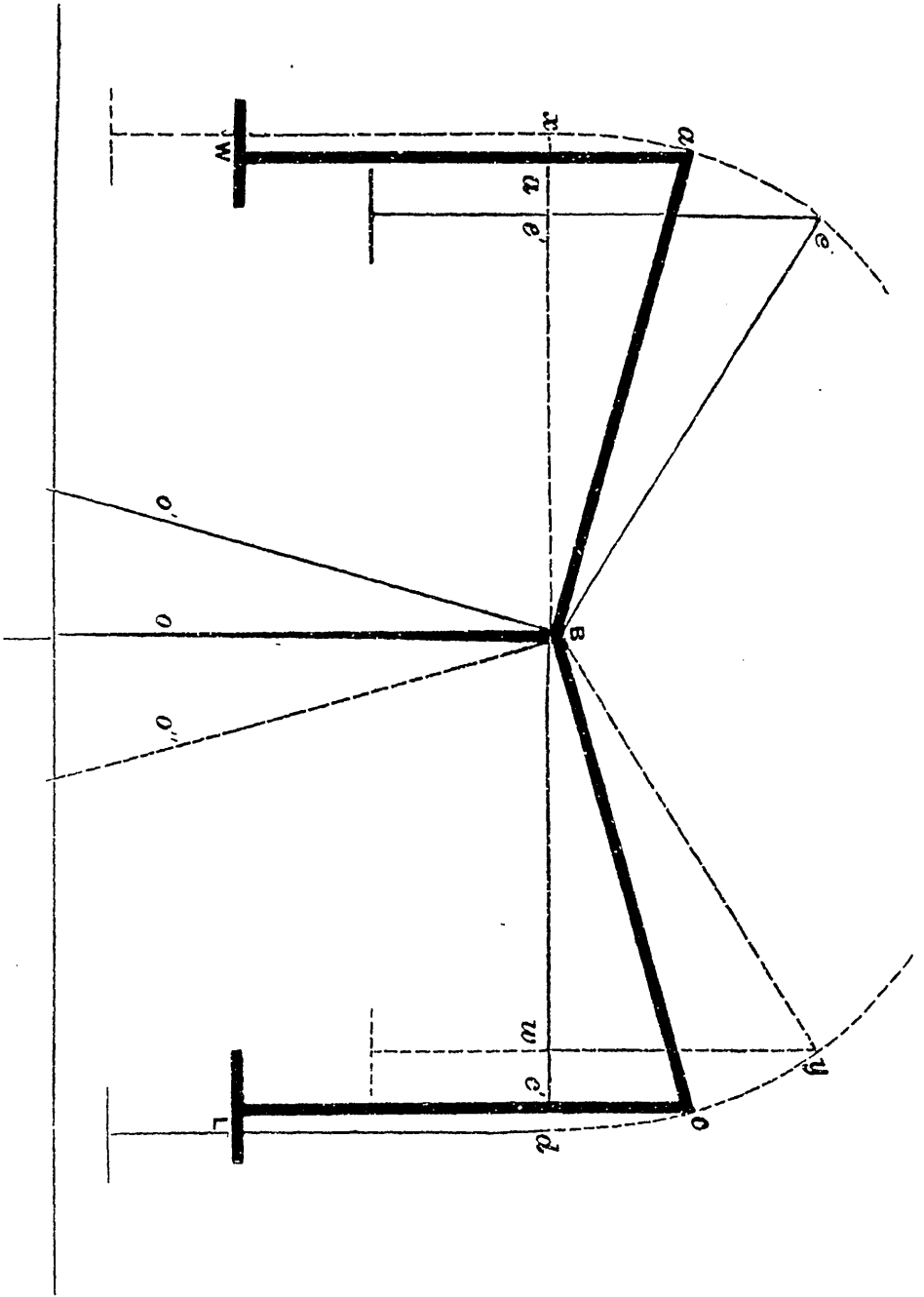
The weight is placed in the pan  $W$ , suspended at  $a$ , which at once brings the beam into the position  $x B y$ . The article to be weighed is then placed in the pan  $L$ , now suspended from  $y$ , and a greater quantity is thrown in than truly represents the weight  $W$  suspended at  $x$ ; the beam then, slowly at first, but with increasing velocity, reverses its position and assumes that indicated by  $e B d$ . The operator then removes part of the article being weighed—which is now suspended on the long arm of the lever—until by touching the opposite pan we find that the weight  $W$  has nearly regained its power to turn the scale, but takes care to stop before it has fully regained it. The purchaser sees that the weight kicks the beam, and is well satisfied, though he has been wronged in proportion to the difference in the distances between  $B d$  and  $B e'$ .

The diagram is drawn in exaggerated proportions, in order that the eye may the more readily discern the effect of the malformation of the balance.

From the above description, it will be evident that such a beam as we have been considering could not fulfil the conditions laid down in section A of the Order in Council, if tested in relation thereto by the regulations in article 1, of circular 134.

This condition could be tested by a straight line applied to the fulcrum of the beam, but in practice this is a difficult test to apply, and the "behavior" of the beam, under the conditions imposed by the circular, is believed to have a greater practical value, and besides, it tests other essential qualities at the same time.

A. BRUNEL,  
Commissioner.



# Government House, Ottawa.

PRESENT:

HIS EXCELLENCY THE GOVERNOR GENERAL IN COUNCIL.

THURSDAY, 17th day of July, 1879.

On the recommendation of the Honorable the Minister of Inland Revenue, His Excellency, by and with the advice of the Queen's Privy Council for Canada, has been pleased to order, and it is hereby ordered, that the Order in Council bearing date the 30th September, 1875, establishing Inspection Districts of Weights and Measures under 36 Vic., cap. 47, sec. 10, as well as the previous Order in Council, passed on the 17th May, 1875, thereon referred to, be and the same are hereby cancelled, and that under the authority of Act 42 Vic., chap. 16, sec. 36, the Inspection of Weights and Measures be as per schedule on following pages:—

MONDAY, 4th August, 1879.

HIS EXCELLENCY THE GOVERNOR GENERAL has also been pleased to appoint, under the provisions of the Act 42 Vic., Cap. 16, Sec. 36, the following gentlemen to be Inspectors and Assistant-Inspectors of Weights and Measures for the Divisions set opposite their names, as per schedule on following pages:—

## PROVINCE OF ONTARIO.

### BELLEVILLE.

To comprise the City of Belleville, and Counties of Durham, Hastings, Northumberland, Peterborough, Prince Edward and Victoria.	Win. Johnson, Inspector. Assistant Inspectors. J. A. Wilkinson, <i>Cobourg</i> . Thos. Cahill, <i>Peterborough</i> .
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### HAMILTON.

To comprise the City of Hamilton, and Counties of Haldimand, Halton, Lincoln, Waterloo, Welland, Wellington and Wentworth.	Assistant Inspectors. Thos. Beattie, <i>St. Catharines</i> . A. Young, <i>Guelph</i> .
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### KINGSTON.

To comprise the Towns of Brockville and Cornwall, City of Kingston, and Counties of Dundas, Frontenac, Glengarry, Leeds and Grenville, Lennox and Addington, and Stormont.	C. B. Chrysler, Inspector. Assistant Inspectors. W. Griffin, <i>Brockville</i> . W. Burrows, <i>Napanee</i> . W. Whitteker,
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### LONDON.

To comprise the City of London, and Counties of Brant, Elgin, Middlesex, Norfolk and Oxford.	James Egan, Inspector. Assistant Inspectors. G. W. Boggs, <i>St. Thomas</i> . A. Bogue, <i>Brantford</i> .
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### OTTAWA.

To comprise the City of Ottawa, and Counties of Carleton, Lanark, Prescott, Renfrew and Russell in the Province of Ontario, and the Counties of Ottawa and Pontiac, including City of Hull, in the Province of Quebec.	A. Code, Inspector. Assistant Inspectors. M. Gorman, <i>Pembroke</i> . R. S. Park, <i>Hawkesbury</i> . Chs. Leduc, <i>Ottawa</i> .
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### TORONTO.

To comprise the City of Toronto, and Counties of Algoma, Grey, Muskoka, Ontario, Peel, Simcoe and York.	G. T. Bolster, Inspector. Assistant Inspectors. Joshua Wright, <i>Port Perry</i> . J. Bowman, <i>Toronto</i> . D. Kennie, <i>do</i> Harry Piper, <i>do</i> J. Lyons, <i>Owen Sound</i> . Chs. Way, <i>Barrie</i> .
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### WINDSOR.

To comprise the Counties of Bruce, Essex, Huron, Kent, Lambton and Porth.	W. J. Hayward, Inspector. Assistant Inspectors. A. Marentotte, <i>Walkerton</i> . Albert Erb, <i>Stratford</i> .
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## PROVINCE OF QUEBEC.

### MONTREAL.

To comprise the City of Montreal, and the Counties of Argenteuil, Bagot, Beauharnois, Chambly, Châteauguay, Hochelega, Huntingdon, Jacques-Cartier, Laprairie, Laval, Napierville, Rouville, Soulanges, St. Hyacinthe, St. Johns, Terrebonne, Two Mountains, Vaudreuil and Verchères.

A. J. Whitton, Inspector.  
Assistant Inspectors.  
J. O. Chalut, *Montreal*.  
H. N. Tabb, *do*  
J. T. Dorion, *do*

### QUEBEC.

To comprise the City of Quebec, and Counties of Beauce, Bellechasse, Bonaventure, Charlevoix, Chicoutimi, Dorchester, Gaspé, Kamouraska, Labrador and Magdalen Islands, Levis, L'Islet, Lotbinière, Megantic, Montmagny, Montmorency, Portneuf, Quebec, Rimouski, Saguenay and Temiscouata.

A. Côté, Inspector.  
Assistant Inspectors.  
G. Grégoire, *Quebec*.  
P. E. Bourassa, *do*

### SHERBROOKE.

To comprise the Town of Sherbrooke, and Counties of Arthabaska, Brome, Compton, Drummond, Iberville, Missisquoi, Richmond, Shefford, Stanstead and Wolfe.

E. Clark, Inspector.  
Assistant Inspectors.  
H. J. Pannoyer, *Coaticoke*.  
P. Smith, *Waterloo*.  
J. U. Richard, *Drummondville*.

### THREE RIVERS.

To comprise the City of Three Rivers, and Counties of Berthier, Champlain, Joliette, L'Assomption, Maskinongé, Montcalm, Nicolet, Richelieu, St. Maurice and Yamaska.

F. Rocheleau, Inspector.  
Assistant Inspectors.  
R. Kittson, *Sorel*.  
A. M. Rivard, *Joliette*.

## PROVINCE OF NEW BRUNSWICK.

### ST. JOHN.

To comprise the City of St. John, and Counties of Charlotte, Queens and St. John.

John B. Wilmot, Inspector.  
Assistant Inspector.  
E. Cowan, *St. John*.

### FREDERICTON.

To comprise the City of Fredericton, and Counties of Carleton, Madawaska, Sunbury, Victoria and York.

E. C. Freeze, Inspector.

### KINGS.

To comprise the Counties of Albert, Gloucester, Kent, Kings, Northumberland, Restigouche and Westmoreland.

W. B. Scovil, Inspector, *Sussex*.

**PROVINCE OF NOVA SCOTIA.****HALIFAX.**

To comprise the City of Halifax, and Counties of Guysborough, Halifax, Hants, Kings and Lunenburg.	R. M. King, Inspector. Assistant Inspector. P. Tompkins, <i>Halifax</i> .
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**PICTOU.**

To comprise the Counties of Antigonish, Colchester, Cumberland and Pictou.	
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**YARMOUTH.**

To comprise the Town of Yarmouth, and Counties of Annapolis, Digby, Queens, Shelburne and Yarmouth.	
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**CAPE BRETON.**

To comprise the whole Island of Cape Breton.	L. E. Tremaine, Inspector, <i>North Sydney</i> .
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**PROVINCE OF PRINCE EDWARD ISLAND.****CHARLOTTETOWN.**

To comprise the whole Island of Prince Edward.	James Reddin, Inspector.
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**PROVINCE OF MANITOBA.****WINNIPEG.**

To comprise the whole Province.	R. T. Huggard, Inspector.
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**PROVINCE OF BRITISH COLUMBIA.****VICTORIA.**

To comprise the whole Province.	
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W. A. HIMSWORTH,  
Clerk, Privy Council.



LISTS OF BOOKS AND FORMS FOR USE IN THE  
WEIGHTS AND MEASURES SERVICE

THE NUMBERS PRINTED IN HEAVY TYPE INDICATE BOOKS.

*Weights and Measures Forms; New Series.*

No.	Title.
<b>0.1.</b>	Day-book.
<b>0.2.</b>	Cash-book.
<b>0.3.</b>	Register.
<b>0.4.</b>	Record of Stamps, &c.
0.5.	Monthly Returns.
<b>0.6.</b>	Certificates of Inspection.
<b>0.7.</b>	Assistant Inspector's Requisition for Supplies.
<b>0.8.</b>	Inspector's Advice of Supplies.
<b>0.9.</b>	Assistant Inspector's Receipt for Supplies.

*Old Forms retained in use, but which, when reprinted, will bear new numbers.*

New No.	Title.	Old No.
0.10.	Itinerary to accompany Contingent Account.....	0.20
0.11.	Seizure Report.....	0.21
0.12.	District Inspector's Report from Books.....	0.22
<b>0.13.</b>	Receipts on Contingent Account.	
0.14.	District Inspector's Report on Standards.	
<b>0.15.</b>	Assistant Inspector's Advice of Remittance, } New Forms.	
<b>0.16.</b>	Inspector's Receipt for Remittance, } Forms retaining the	
0.17.	Circulars to Traders to be mailed in posthands, } old numbers.	
<b>0.18.</b>	Inspector's Advice Note to Department, } old numbers.	
<i>0.19.2.</i>	<i>City Ward Lists 0.19.6. County Lists</i>	
	<i>General Forms used in all Branches of the Inland Revenue Service.</i>	

- No. **1.**—List of forms,—pamphlet.  
 “ **2.**—Requisitions for Supplies.  
 “ **8.**—Pay Lists.  
 “ **11.**—Contingent Account.  
 “ **11h.**—Subsidiary Contingent Account for Assistant Inspectors.  
 “ **13.**—Acknowledgment of Official Cheques.  
 For lists of envelopes, see page 54.