SOCIÉTÉ GENEVOISE

POUR LA CONSTRUCTION

d'Instruments de Physique

GENEVA

PRICE LIST 1912

FASCICLE I

Double refractor 340 millimetres aperture, constructed for the federal Observatory at Zurich.

□ □ □

GENERAL INSTRUMENTS OF MEASURES

1912

ILLUSTRATED PRICE LIST

OF

PHYSICAL AND MECHANICAL INSTRUMENTS

MADE BY THE

SOCIÉTÉ GENEVOISE

POUR LA CONSTRUCTION

D'INSTRUMENTS DE PHYSIQUE

ET DE

MÉCANIQUE

GENEVA (Switzerland)

OFFICES : 8, RUE DES VIEUX-GRENADIERS. WORKS : 5, RUE GOURGAS

Gold Medal at the Paris Universal Exhibition 1868
Hors concours at the Vienna Universal Exhibition 1873
Gold Medal at the Paris Universal Exhibition 1878
Awards at the Swiss National Exhibition, Zürich 1883
Hors concours, member of the Jury of the Paris Exhibition 1889
Awards at the Chicago Exhibition 1893
Hors concours, member of the superior Jury of the Swiss National Exhibition, Geneva 1896
Hors concours, member of the Jury of the Paris Exhibition 1900
Gold Medal, Special Mention of the Chambre de Commerce de Milano 1906
Hors concours, member of the Jury of the Milano Exhibition 1906
Grand Prix at the Bordeaux Maritime Exhibition 1907
Grand Prix at the Marseilles Electricity Exhibition 1908

This catalogue cancels all previous ones.

ADVICE

This catalogue contains, in addition to the edition of 1909 the following apparatus :

Nos 0066. Small dividing machine for circles, automatic.
0087. Circular platform, new model.
0151. Standard ends.
0152. Invar ribbons.
0206. Rapid comparator for verification offices.
0207. Universal comparator.
0208. Standard comparator, longitudinal movement.
0209. Comparator for astrographic stereotype plates.
0211. Comparator for spectrographic stereotype plates.
0212. Geodesic comparator for the verification of invar ribbons.
0302. Measuring machine S. G. 1910.
4133. Distension comparator for rules up to 1.50 metres.
4134. Large geodesic comparator for rules up to 4.10 metres.

REMARKS

The charges for packing and carriage are to be defrayed by the purchaser.

The forwarding is also at his risk and peril; but, on the other hand, the Société Genevoise undertakes to see that everything is carefully packed.

We beg all persons, when giving us orders, to state the means of transport they prefer, and to communicate to us whatever causes of complaint they may have, as well as the informations they may desire.

ORDERING OF INSTRUMENTS BY WIRE

In order to avoid a useless loss of time, the Société Genevoise accepts orders by telegraph when they come from distant countries.

In this case, the telegram must be composed in the following manner :

1° Address : **PHYSIQUE, GENEVA.**

2° The text of the dispatch will be composed of the word : **Order**, followed by the N^{os} corresponding to the instruments ordered in our catalogue. These N^{os}, each composed of 4 figures should appear in the dispatch in their order of size.

3° As verification the amount of the order should be added in francs.

4° The author of the order, must also, through the medium of his banker, open a credit account for the Société Genevoise in a Geneva bank : the amount of this credit must be at least $^2/_3$ that of the order, and the name of the bank in which the credit account is opened must be mentioned in the telegram.

5° If several specimens of the same instrument are required, several groups should be formed in the telegram, each group corresponding to the same number of specimens, the number of specimen wanted being **written in full** and preceding each group. The N^{os} in each group should appear in their order of size.

6° Lastly the telegram must be signed and the sender should confirm the order by mail giving all necessary informations.

Thus, let us suppose that Mr. A. R. Smith living at Tokio, Japan, wishes to give the following order :

Four standard metres in invar., N° 0131 at fr. 370	fr. 1480
One reflection goniometer, N° 0455	» 380
With adjunction of a complem. object glass, N° 0457	» 20
Two mineralogist's microscopes with box, N° 2430 at fr. 1000	» 2000
With adjunction of an eye-piece with Nicol's prism, N° 2442	» 38
Two telescope levels, 33 mm. aperture, N° 1251 at fr. 250	» 500
A compression pump, N° 7610	» 550
Total	fr. 4968

the credit being opened at the bank of Messrs. Lombard, Odier and C°, Geneva, the text of the telegram will be as follows :

PHYSIQUE GENEVA

Order 0455, 0457, 2442, 7610, two 1251, 2430, four 0131, francs 4968. Bank Lombard.

Smith.

N. B. — The dispatch might be considerably simplified giving only the part of the order the execution of which requires the more time, the rest being indicated in the letter.

The Company declines all responsability if the numbers should not be transmitted correctly by the telegraph-office; besides the execution of the order will be put off if the amount of the latter does not correspond exactly with the number of francs stated in the telegram.

Besides this special code, the Société Genevoise makes use of **Lieber code and A. B. C. 4th Edition**, for telegraphic purposes.

Contents of the Fascicles 2 and 3.

FASCICLE 2

Mathematics, Geodesy, Astronomy.

FASCICLE 3

Optics, Magnetism and Electricity, Heat, Acoustics, Experimental Mechanics, Technical Mechanics, Accessories for laboratories and Industry.

FASCICLE 1

GENERAL MEASURING INSTRUMENTS

§ 00. Dividing Machines.
01. Standard Meters, Scales etc.
02. Comparators, Cathetometers, Micrometers.
03. Measuring machines, Callipers etc.
04. Measurement of angles, Areas and Volumes.
05. Dynamometers.
06. Analytical Balances. Standard Weights.
07. Manometers.
08. Pendulums.
09. Metronomes, Tuning forks, Chronographs, Chronometers.

The units of measure adopted are those of the system C. G. S. **(centimetre, gram, second)** *to which may be added.*

the **degree** *or 360th part of the circumference,*
the **grade** *or 400th » » » »*
the **micron** *or 10.000th part of the centimetre.*

§ 00. Dividing Machines.

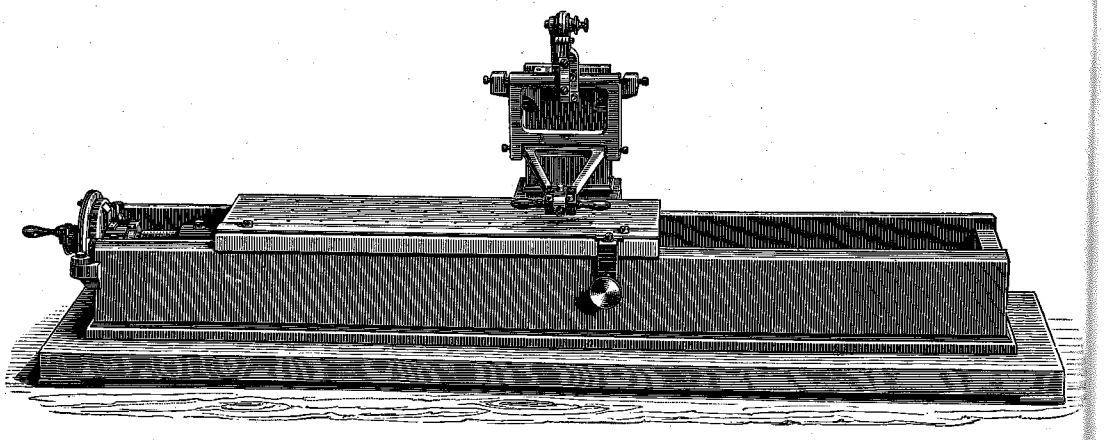
Dividing machine for straight lines. — The Société Genevoise pour la construction d'instruments de physique possesses in its work-shops two machines for dividing straight lines, to the construction of which all the improvements suggested by modern technology have been applied. The reputation of those machines, which may be considered as one of the most complete at present existing, have brought the Société Genevoise orders for metrical standards and dividing machines from many Governements in different parts of the world.

The machine is driven automatically, that is, all the work of dividing is done mechanically. Thus, we avoid not only the errors due to the temperature of the operator's body, but also those resulting from his inattention or fatigue. The machinery offers the advantage of being more regular, since its action is always constant. A special contrivance

Nos | Francs

permits the correction of errors due to changes of temperature and thus a division can be made at one temperature, which will be correct at another given temperature.

By the same means any kind of length can be made, even when the ratio of the pitch of the main-screw to the length of the division required should be irrational.



0001

The error curve of the screw has been conscientiously studied and corrected, in order to guarantee the exactitude of $^1/_{100}$ of millimetre on the whole length of the metre and $^1/_{1000}$ of millimetre in the intervals of the division.

Dividing machine for circles. — The machine for dividing circles of the Société Genevoise gives a maximum of error of division inferior to 2 seconds when it works automatically and for the divisions made by hand this limit of errors is still reduced.

0000. **Dividing machine for straight lines.** — Same model as N° 0001, simpler, the ratchet wheel is replaced by a tambour divided into 100 parts permitting to execute any division, tracelet fig. 0001. . 575

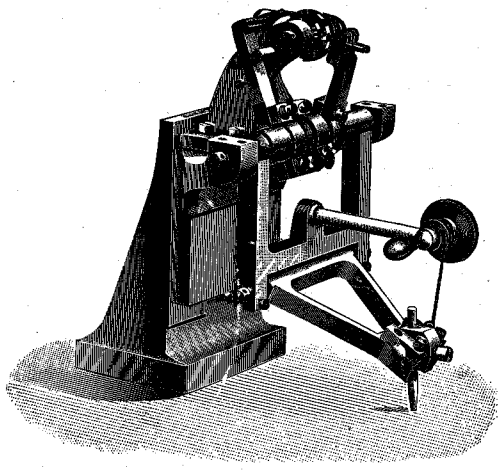
0001. **Dividing machine for straight lines.** — Laboratory model. The screw has 1 millimetre thread and divisions can be made directly by a ratched wheel in $^1/_{200}$ of millimetre. The tracelet is stationary and arranged so that lines of different lengths are made mechanically; it permits the tracing of transversals, the object to be divided is

Nos | Francs

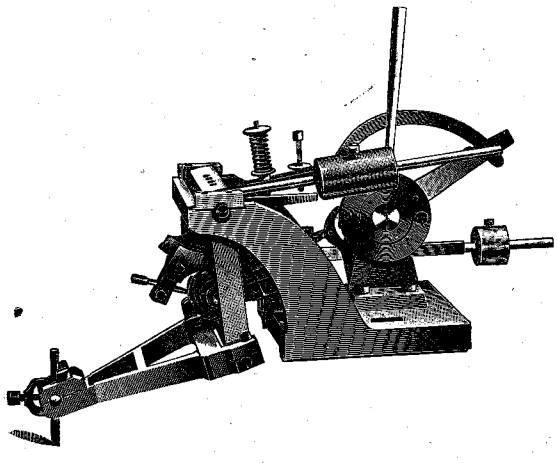
moved automatically without reading. A scale 350 mm. long can be graduated without interruption. The total length of the machine is 85 centimetres, tracelet fig. 0001 a 675

0002. **Adjunction** of a microscope with support adapted to the machine . 150

0003. **Dividing machine for straight lines.** — Same model as N° 0001 with improved tracelet *(fig. 0003 a)* allowing to trace divisions of unequal length by means of the oscillation of one lever . . . 825



0001 a



0003 a

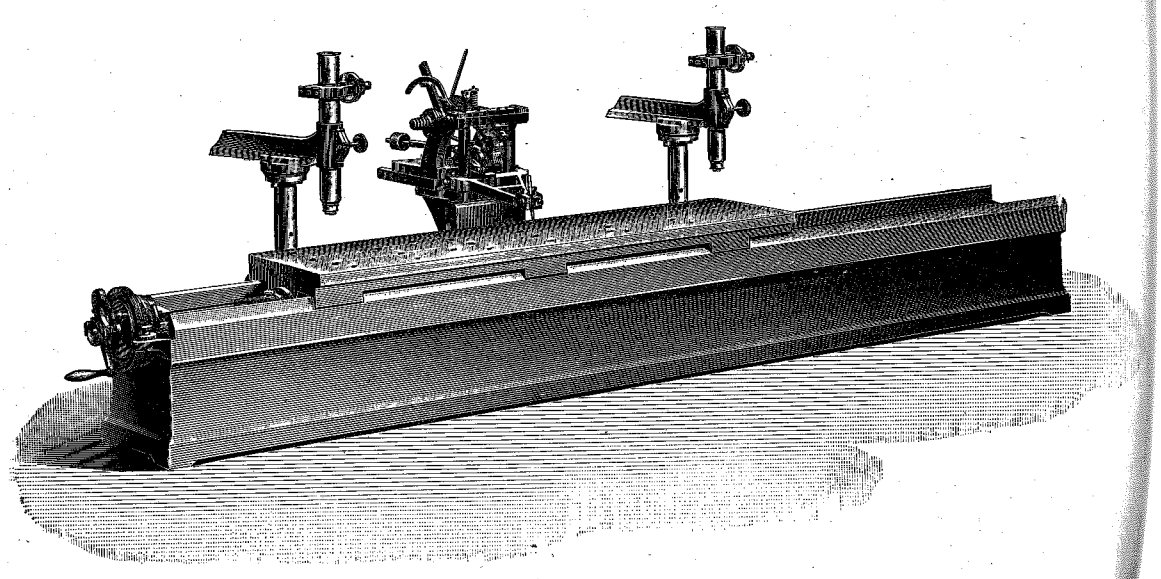
Nos | Francs

0005. **Dividing machine for straight lines.** — Same model as N° 0001. The tracelet is easily removed. Two micrometer microscopes slide over the whole length of the machine. This contrivance enables one to employ the machine as comparator. With two micrometer microscopes 975

0006. **Dividing machine for straight lines.** — Same construction as N° 0001 dividing directly lengths as far as 11 centimetres, tracelet 0001 a 450

0010. **Dividing machine for straight lines.** — Same construction as N° 0001, capable of dividing directly a length of 55 centimetres, the length of the machine is 130 centimetres with two micrometer microscopes and tracelet 0001 a 1150

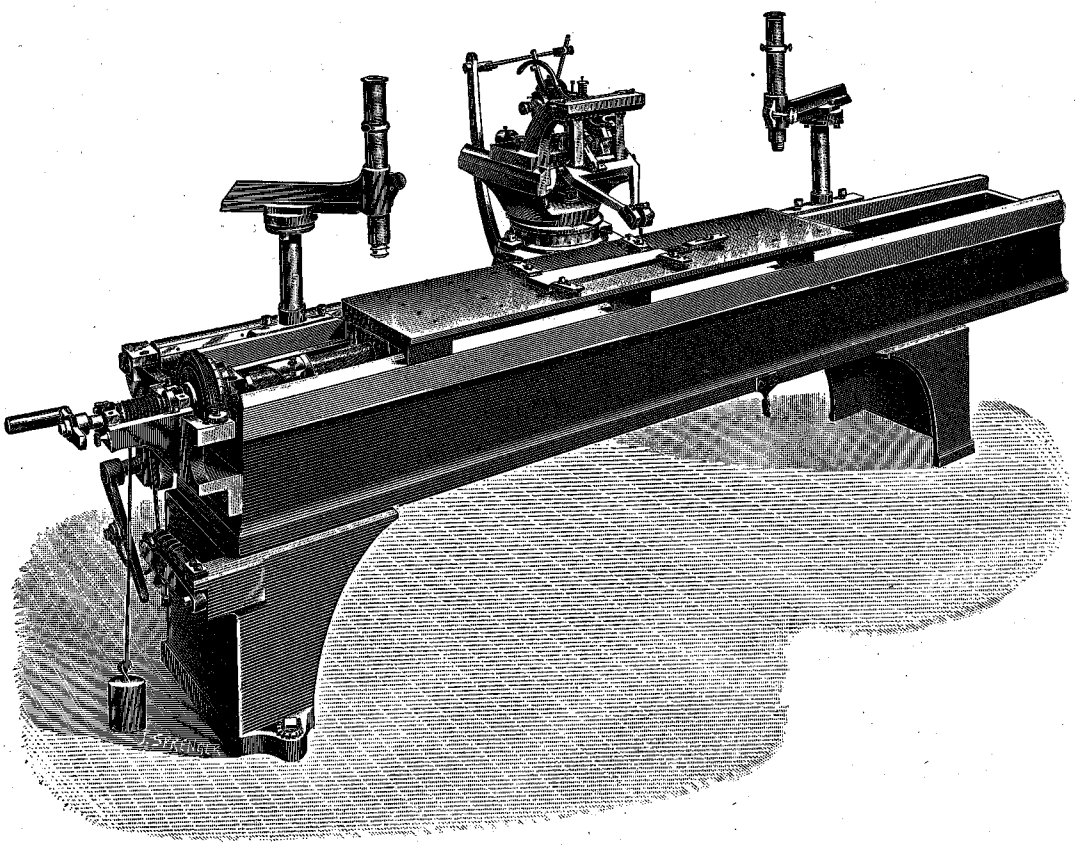
0015. **Do.** with a more perfect tracelet *(fig. 0003 a)*. 1250



0015

0016. **Dividing machine for straight lines.** — Capable of dividing directly a length of 55 centimetres, with automatic movement by transmission, with two micrometer microscopes sliding on the whole length of the machine, which is 130 centimetres *(fig.)*. 1750

Nos Francs



0016

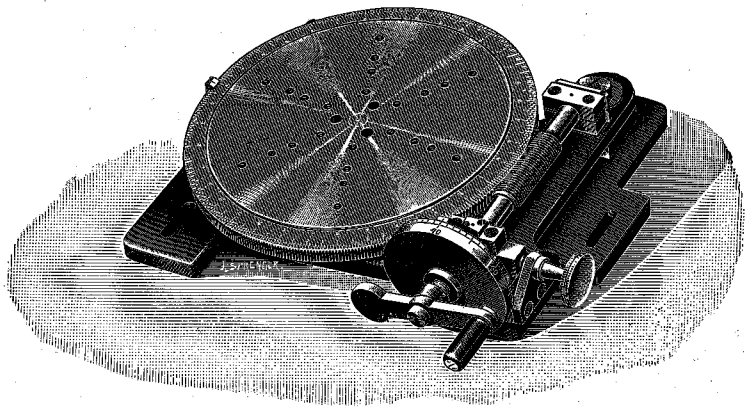
0025. **Dividing machine for straight lines,** capable of dividing directly a length of 50 centimetres, stronger construction, more perfected tracelet *(fig. 0025 a)*. Contrivances for applying a correction curve to the screw and executing an exact division at any given temperature. The machine is delivered with an approximately determined correction curve only, two micrometer microscopes sliding on the whole length of the bench which is 140 centimetres 2700

0030. **Do.** The same machine designed to make divisions automatically by transmission of a continuous circular motion *(fig.)* 3200

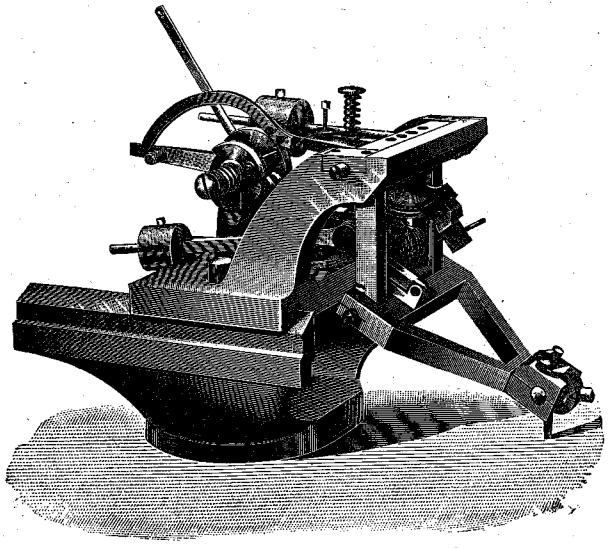
0031. **Do.** The same machine with carefully finished correction curve 3500

Nos | Francs

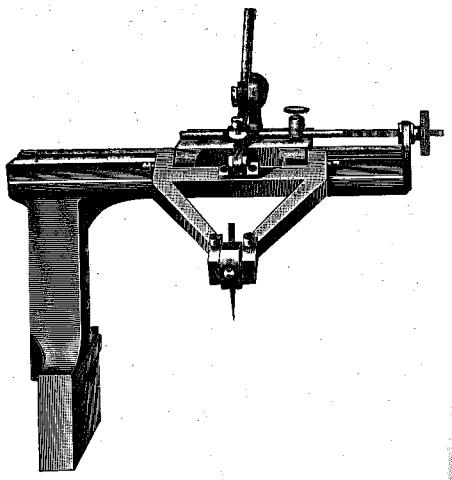
0032. **Adjunction** to the two preceding models of a platform with a tangent screw, for making circular divisions up to 17 centimetres in diameter and also gratings either circular or with crossing straight lines *(fig.)* . 260



0032



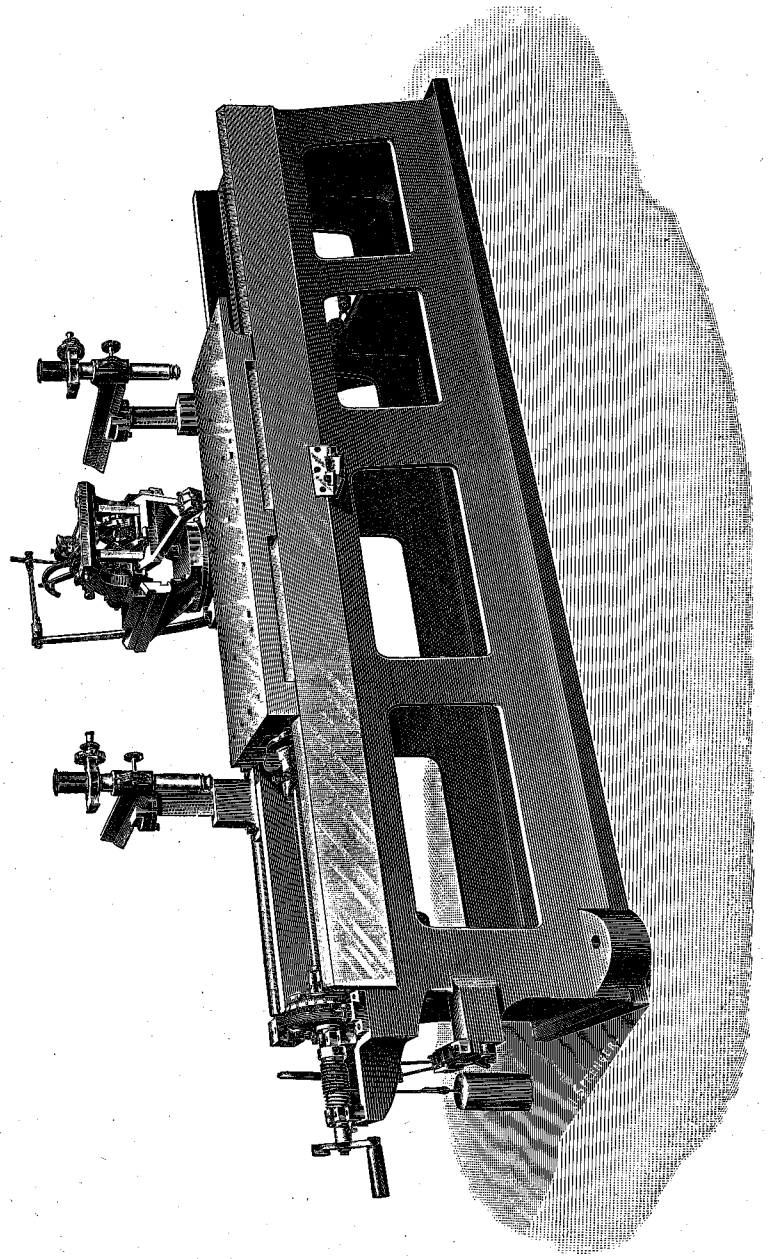
0025 a



0033

0033. **Adjunction** of a tracelet designed to make parallel lines to the bench of the machine. (Gauge lines of one division) *(fig.)*. 180

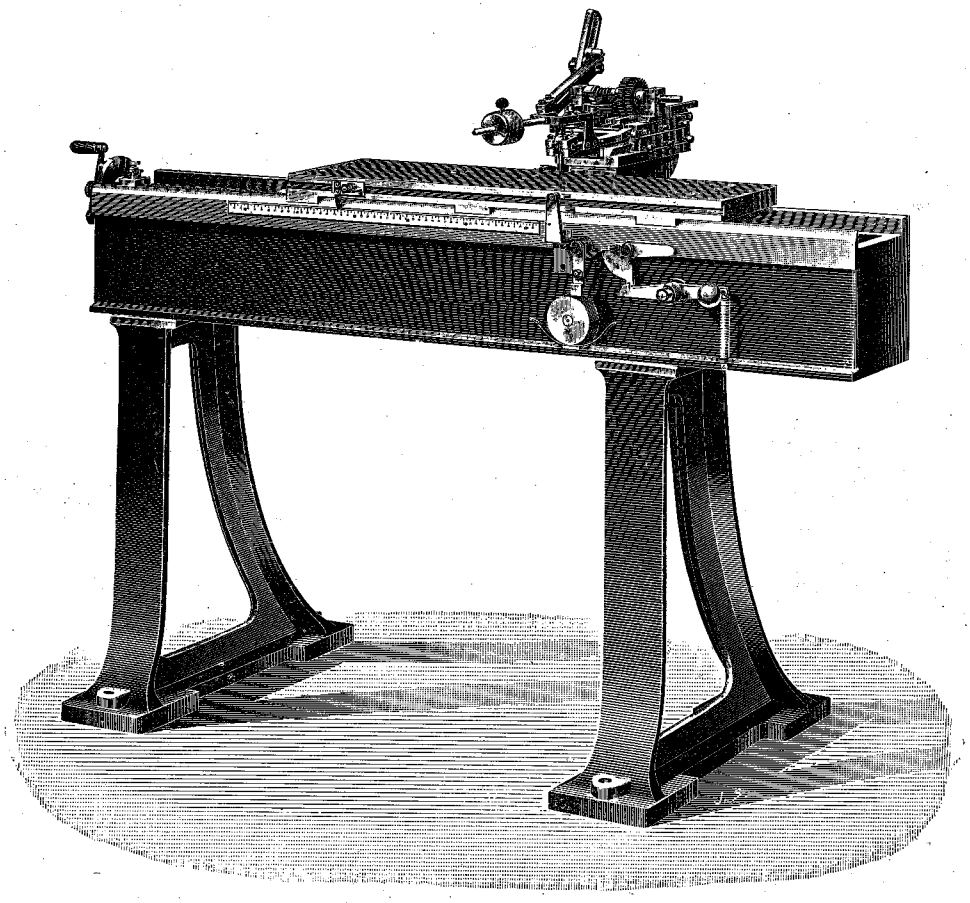
0036. **Industrial dividing machine for straight lines.** — *Rapid Type*, for lengths up to 50 centimetres; the smallest interval possible between two consecutive strokes of the division is $^1/_{10}$ of the



0030

Nos | Francs

millimetre, the biggest of 2 millimetres. The tracelet is of a very simple setting; it is very strongly built in order to execute *deep divisions* on the steel in *only one time*. This machine, can trace divisions on brass with a rapidity of 50 lines in one minute and 20 lines in one minute on steel. This latter indication depends naturally of the deepness of the divisions, for light lines the speed can be increased. The machine is intirely automatical and must work by transmission 2800



0036 A.

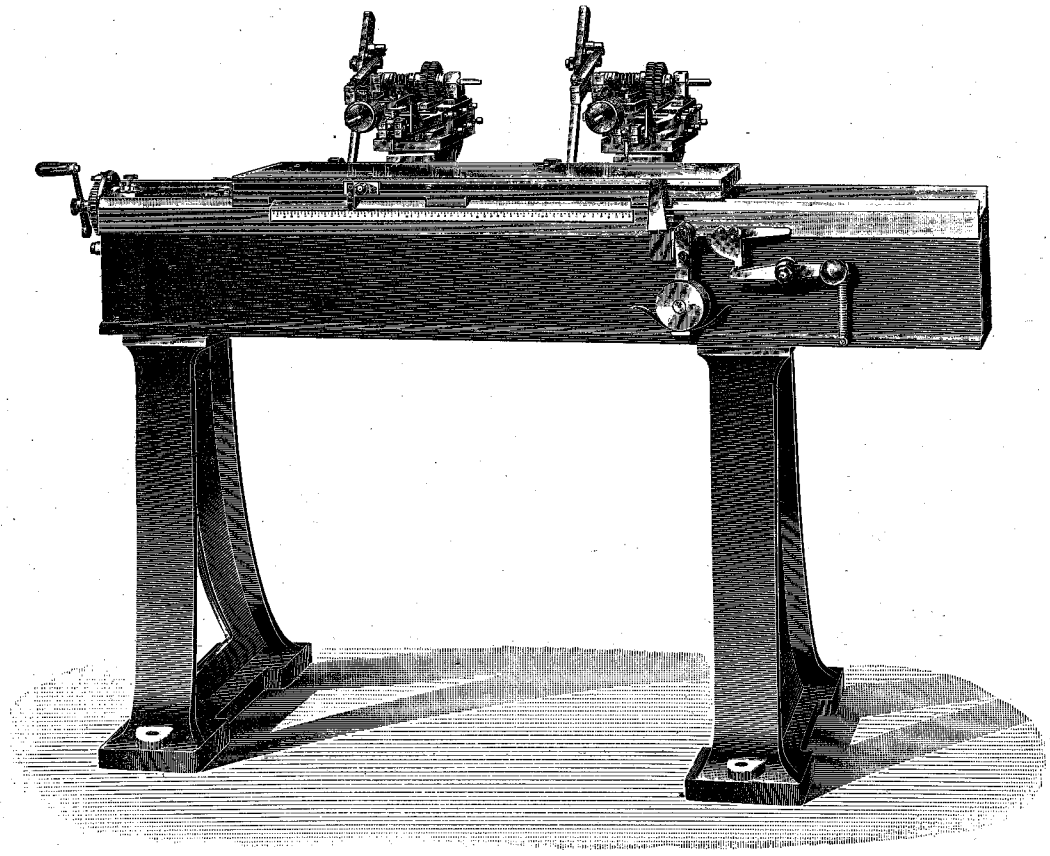
0036 A. **Industrial dividing machine for straight lines.** — The same machine acting automatically. The machine stops by itself when a division of any length regulated by the operator is finished, thus the operator may be occupied with an other work during the operation *(fig.)* 3300

0038. **Dividing machine for straight lines.** — *Rapid Type,*

Nos | Francs

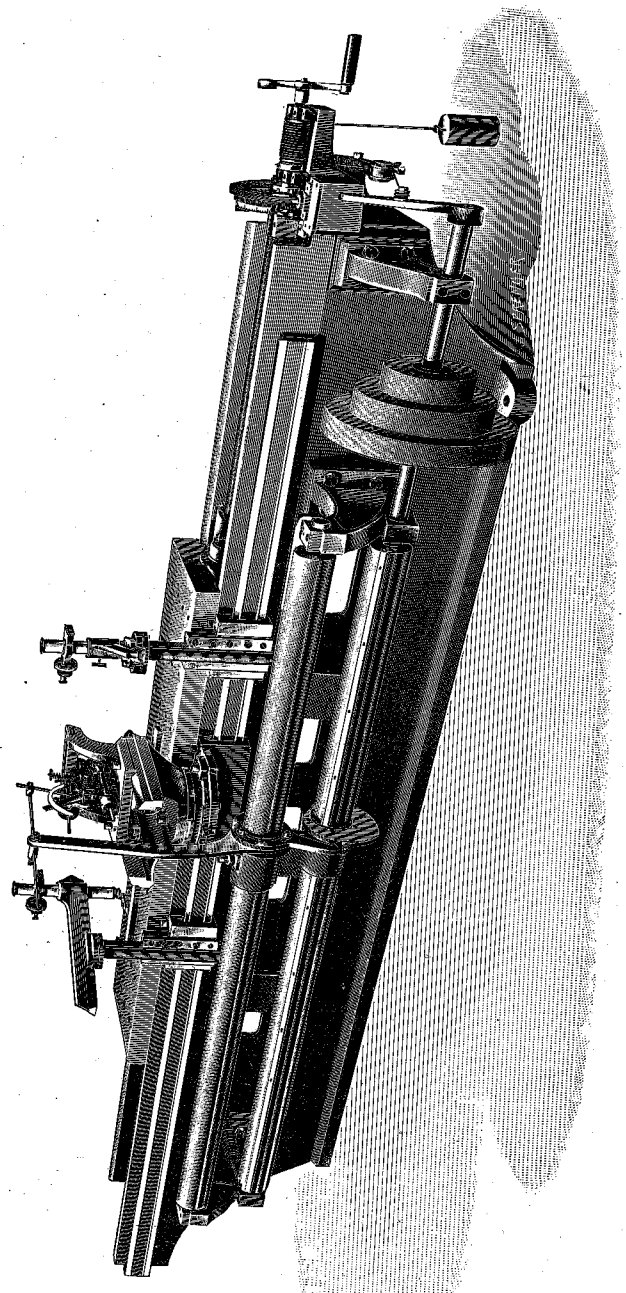
two tracelets, same advantages as N° 0036 A but permitting the simultaneous division of two scales of 35 centimetres each. One can easily disengage a tracelet and trace a division of 55 centimetres of length without renewal 4000

0038 A. **Dividing machine for straight lines.** — The same acting automatically *(fig.)* 4500



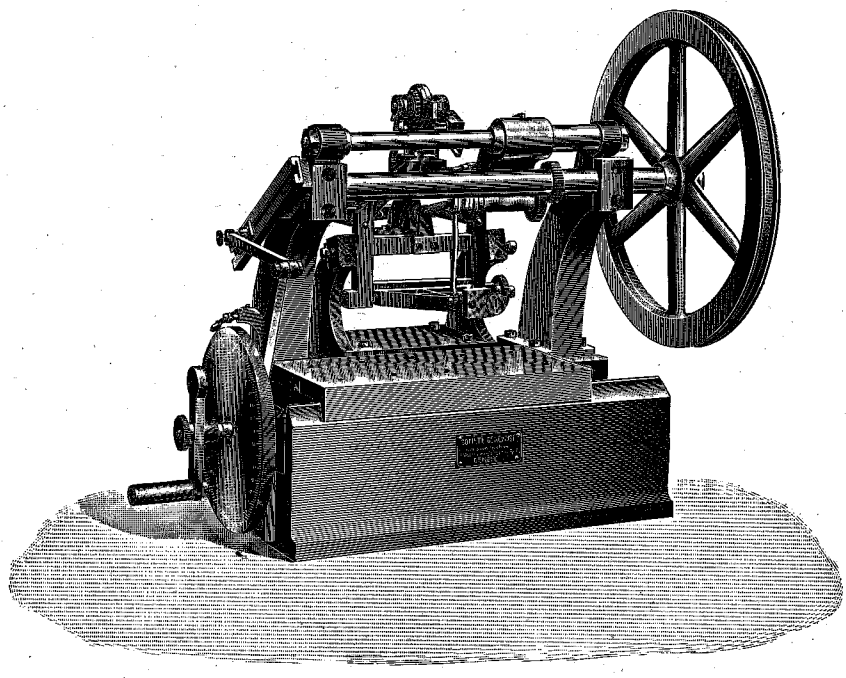
0038 A.

0040. **Dividing machine for straight lines** up to 50 centimetres of length. Machine of great precision acting automatically, with carefully corrected curve screw, giving the approximation of $^1/_{200}$ of millimetre on its whole length; the pitch of the screw is 1 millimetre, this permitting to modifiate the pitch of the screw of 2.6 $^0/_0$ and trace divisions of any kind of measures. It is the machine employed by the Société Genevoise for tracing its standards of length 4500



Nos | Francs

0045. **Dividing machine** for lengths up to one meter Machine of great precision entirely automatic, correction curve of the screw carefully done; for tracing exact divisions at any temperature, with two micrometer microscopes *(fig.)* 5500



0055

0050. **Dividing machine** for graduating lengths up to one meter without interruption. Similar to N° 0001, but with tracelet 0025 *a*, moved by hand. The pitch of the screw is 1 or 2 millimetres, the diameter 35 millimetres. The length of the machine is 220 centimetres; it is provided without correction curve and with a micrometer microscope sliding over the whole length of the machine. Approximate exactness $^1/_{100}$ millimetre 2800

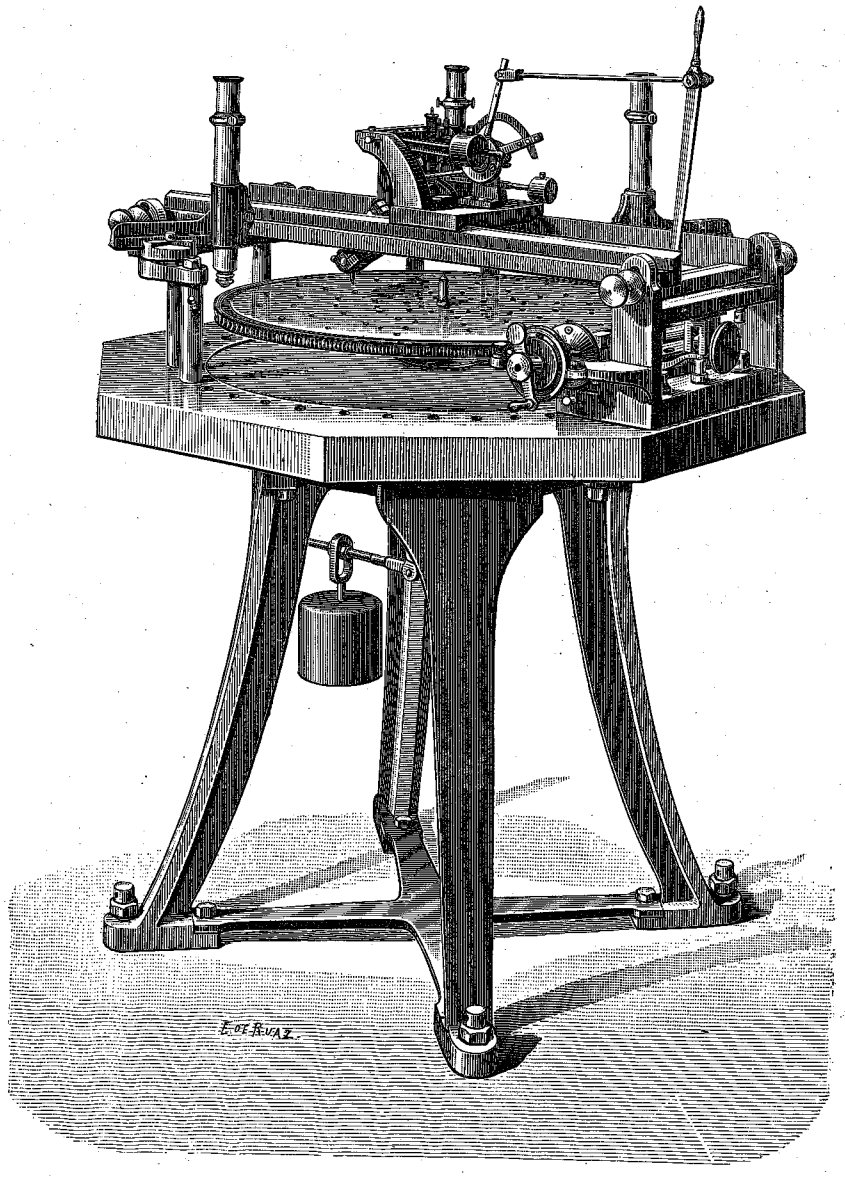
0051. **Do.** Industrial, up to the length of one metre. *Rapid Type*, same advantages as N° 0036, with tracelet, permitting to variate the height of the pitch of the screw of 2.6 milliemes 4400

0051 A. **Do.** The same acting automatically 5000

0055 **Small dividing machine** for executing automatically micrometric divisions on glass or metal. The greatest length that can be divided is 35 millimetres, the greatest length of stroke obtainable is 5 millimetres *(fig.)* 850

Nos

Francs

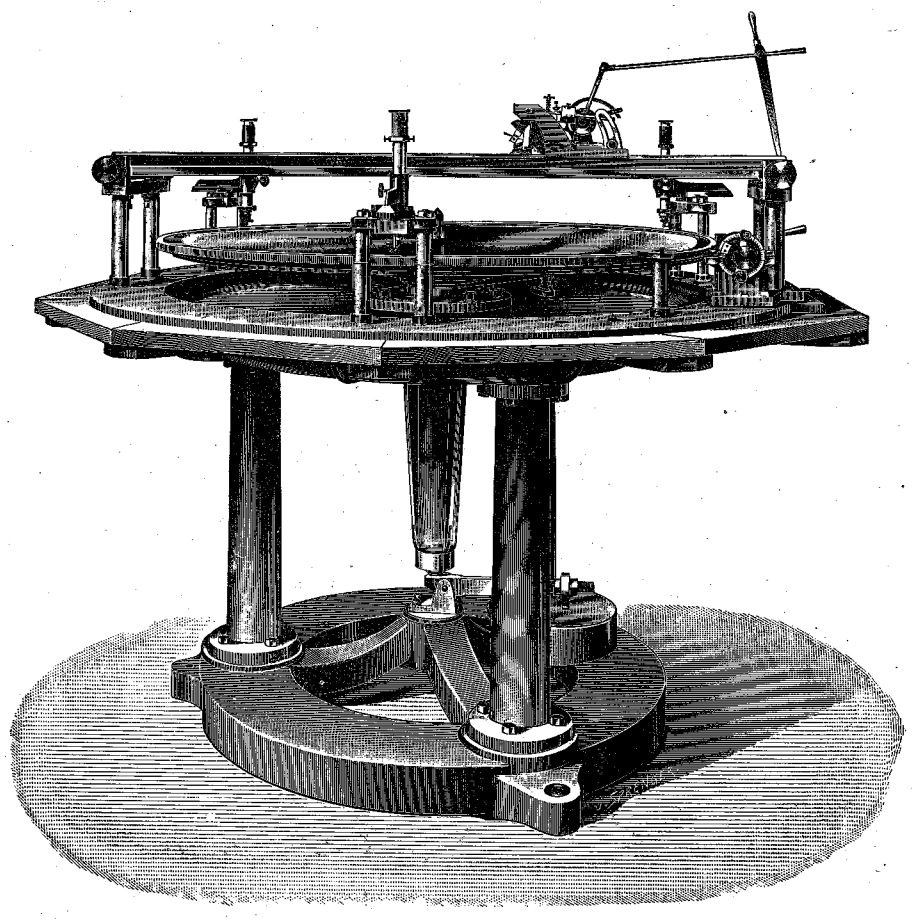


0060

Dividing Machines for circles.

0060. **Dividing machine for circles** up to 50 centimetres in diameter. Three micrometer microscopes help to read or verify the division. A tangent screw with a pitch corresponding to $^1/_3$ degree, serves to

Nos Francs



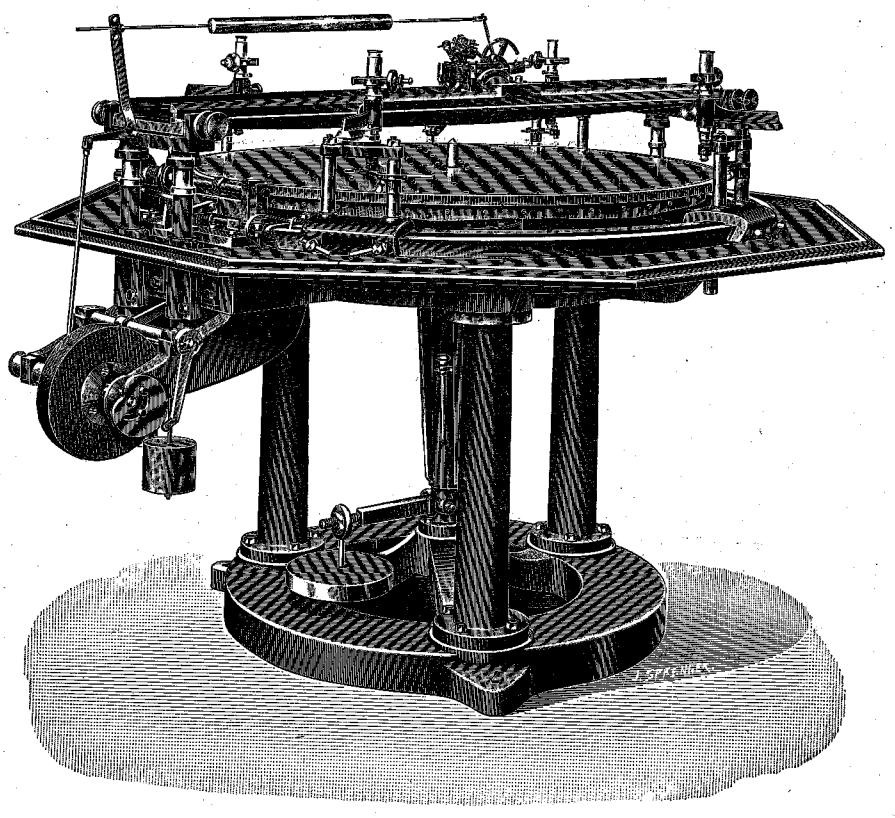
0062

adjust the division traced on the circular platform of the machine under the microscope, or to make divisions rapidly with a maximum of error of 15 secondes. This screw is provided with a certain number of ratchet wheels for making other divisions than those the inlaid silver circle bears in the circular platform. Built of cast-iron with 4 legs connected together and surmounted by a glass case *(fig.)* 4800

0061. **Dividing machine for circles.** Same model for acting automatically by transmission of a continuous circular motion 5400

0062. **Do.** capable of dividing circles up to a diameter of one meter. The circular platform is made of cast-iron and bears two divided circles made of inlaid silver. The cast-iron frame work is mounted on

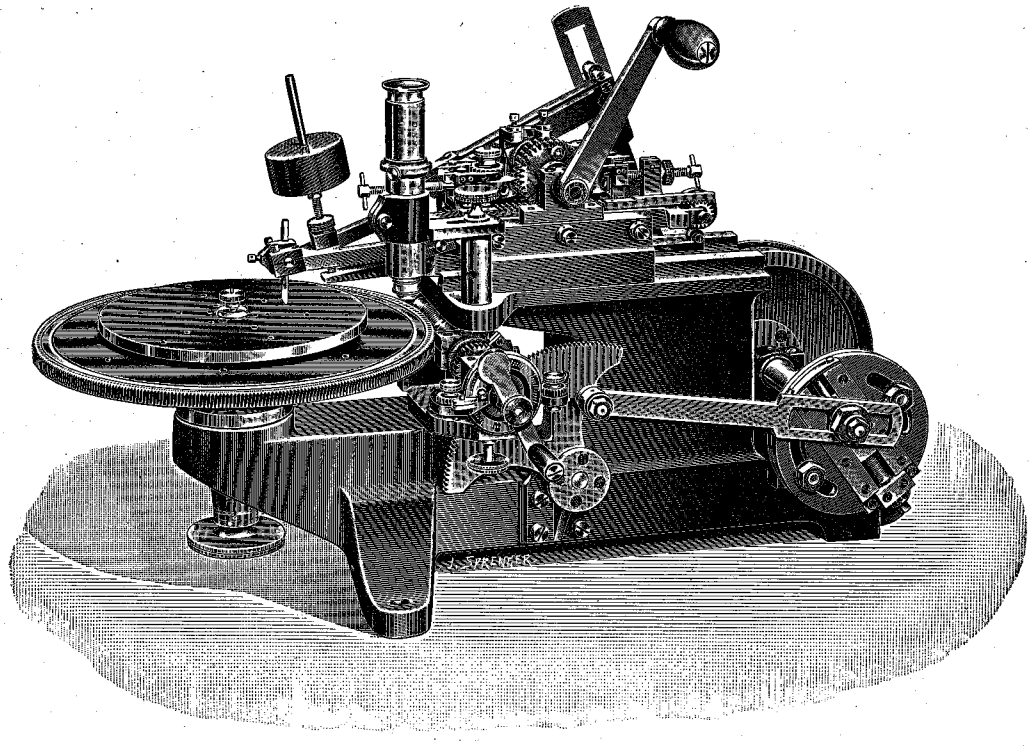
Nos		Francs
	3 legs; the machine is worked by hand and is provided with a glass case *(fig.)*	6300
0063.	**Dividing machine for circles.** Same model but entirely automatic, for transmission of a continuous circular motion	7300
0064.	**Do.** Same model as N° 0063, but with the correction curve of the circular platform carefully corrected. Errors are brought back at 2 or 3 secondes *(fig.)*.	7700



0064

0066.	**Dividing machine for circles,** « *Rapid Type* ». Platform with diametre of 27 centimetres, very strong tracelet, entirely automatic *(fig.)*	2000
0070.	**Dividing machine for circles.** Platform 35 centimetres in diametre; two micrometer microscopes. The machine is built without leg in order to be put on a table *(fig.)*.	2000
0071.	**Do.** Platform 36 centimetres in diameter; each turn of the tangent screw correspond to half a degree; the tracelet is supported by	

Nos		Francs
	a bench placed across the machine, allowing thus to trace divisions on inclined planes, up to 25 degrees. This *(fig.)* machine is delivered with one micrometer microscope only	2200
0072.	**Dividing machine for circles.** Same model as N° 0071, but entirely automatic *(fig.)*	2600



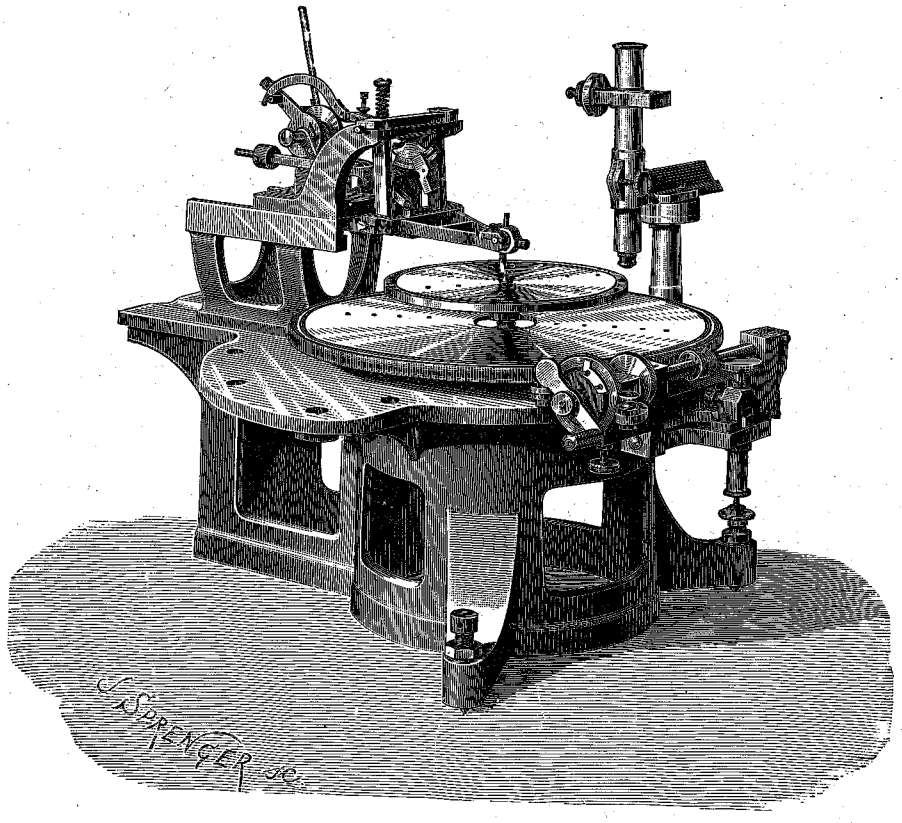
0066

0075.	**Do.** Platform of 25 centimetres in diameter, with a division on silver to sixths of degrees and one division for tracing verniers; the machine is provided with a microscope for exact adjustment of divisions, tangent screw with divided head permitting to execute rapidly common divisions or to make a division according to any number *(fig.)* . . .	800
0080.	**Do.** As the preceding one, with the adjunction of special ratchet wheels in order to get mechanically the advancement of the platform for a great number of divisions	950
0081.	**Do.** The same with a platform of 30 centimetres in diameter	1050

Nos

Francs

0085. **Circular platform** for rapidly tracing circular divisions when very great precision is not necessary. Brass plate 25 centimetres in diameter with pointed alidade for fixing the plate in each position. Divisions marked by 360 and 400 dots; and verniers generally used with these numbers 500



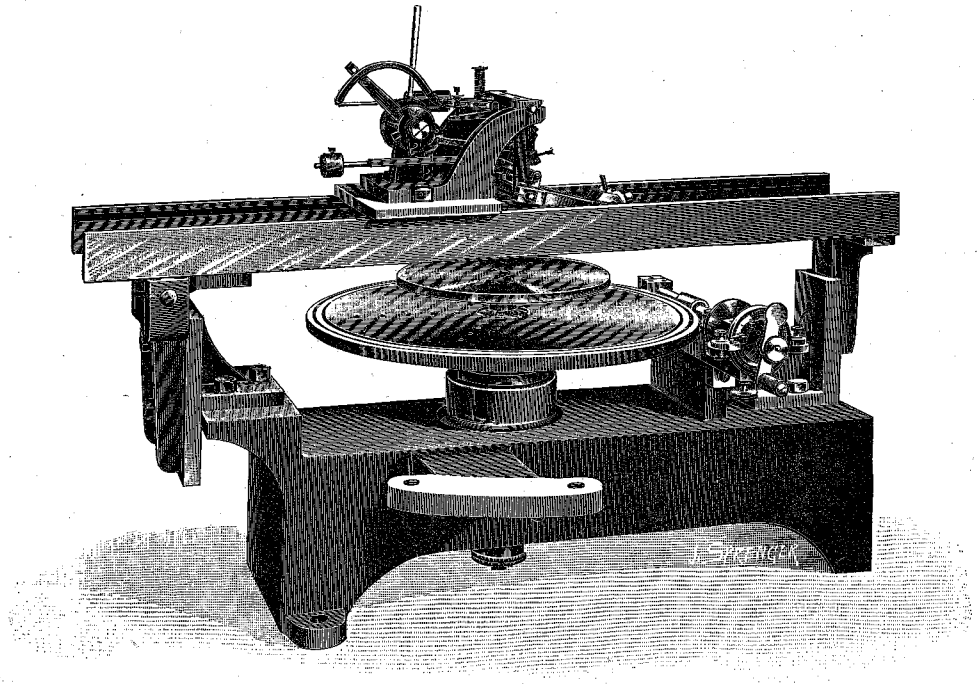
0070

0086. **Do.** The same platform, but of 30 centimetres in diameter. 650

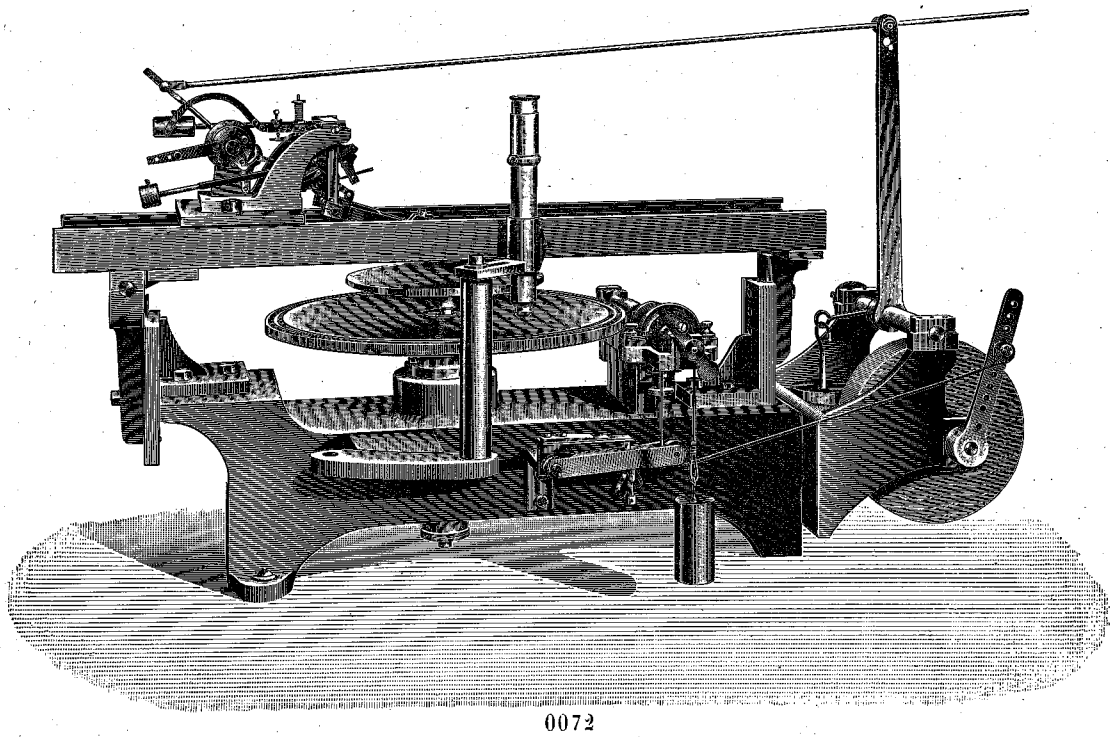
These platforms may be provided, to order, with any number of divisions; in that case, the above prices may be altered.

0087. **Do.** with strong tracelet, 26 centimetres in diameter; divisions in 360 and 400 dots with their usual verniers *(fig.)* . . . . .

0090. **Industrial dividing machine** capable of dividing circles up to two meters in diameter. The tracelet is borne by a movable arm



0071

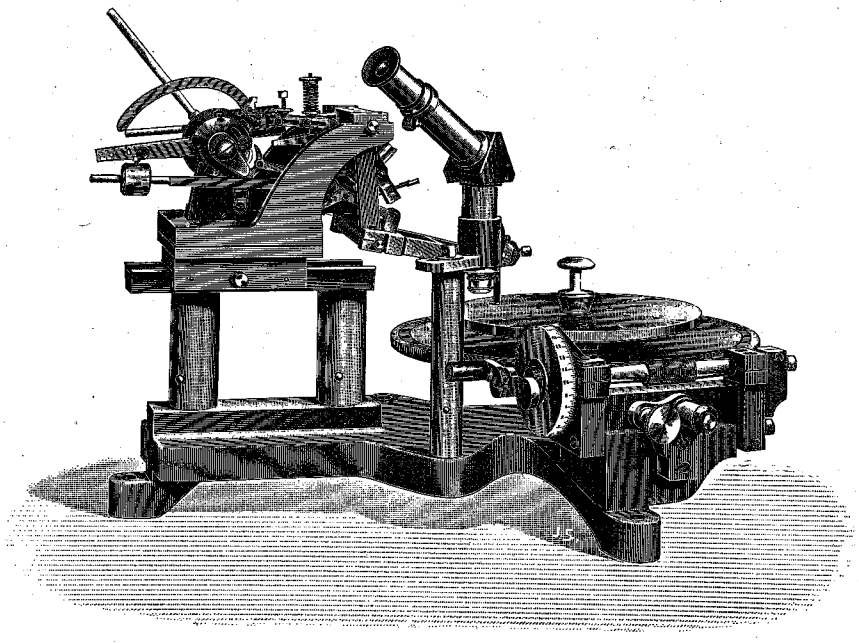


0072

Nos

Francs

allowing it to be shifted over the whole surface of the plate and to trace divisions not passing through the center of the circle but enveloping a concentric circle. The tracingpoint is so adapted to the tracelet as to be able to make conic divisions. For making thick strokes, the tracingpoint can be replaced by cutting tools of different widths; the cutting machine is driven by an electric motor, fixed on the movable arm *(fig.)* 15000

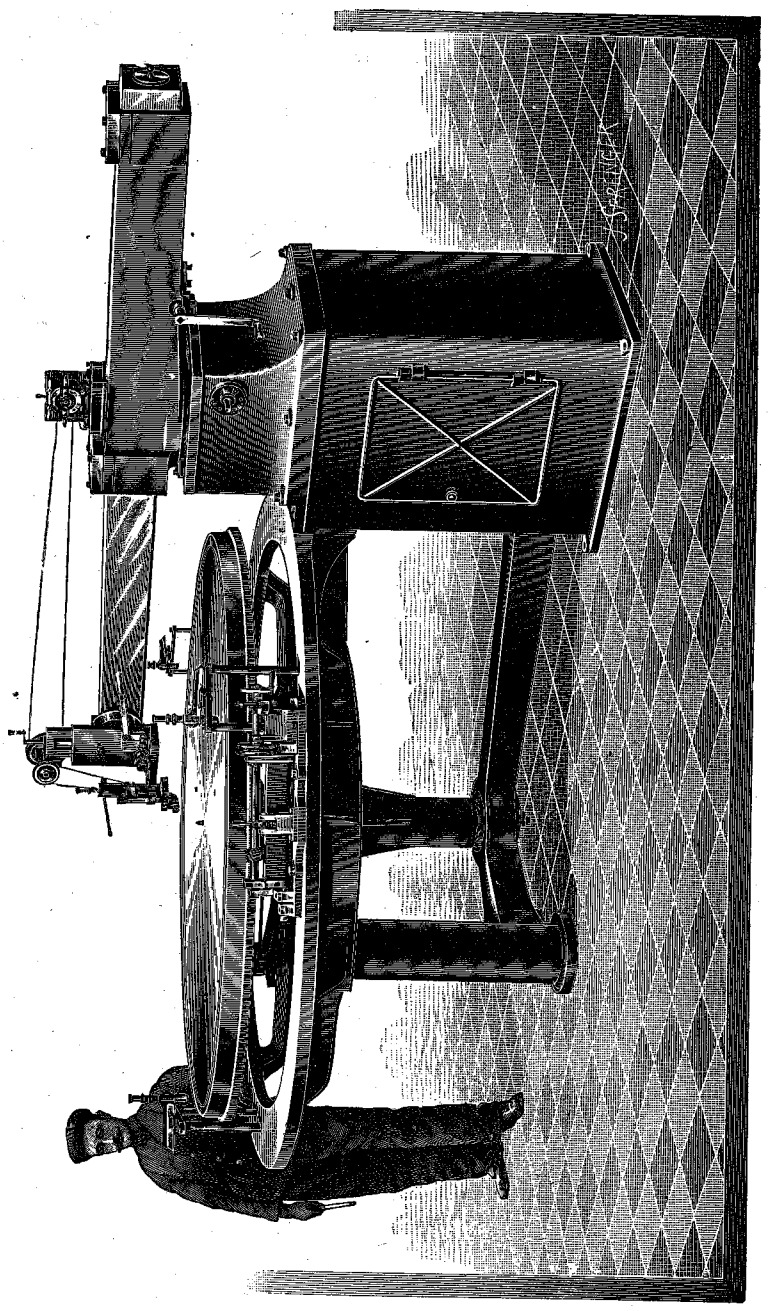


0075

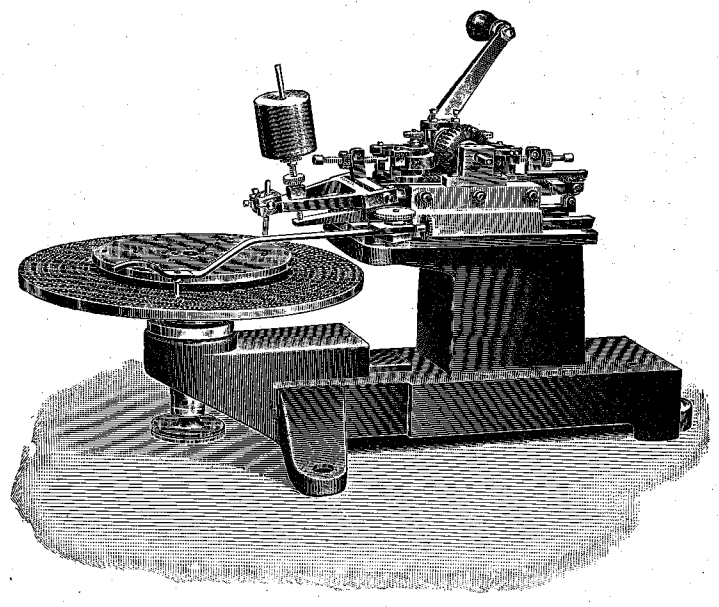
The machine N° 0090 may be provided with a prolongation for making divisions on arcs of circles with a diameter superior to two meters. Prices on demand.

Machine for dividing into unequal parts.

The « Société Genevoise » undertakes to construct these machines in all sizes and reserves the right of treating for construction and price, as the latter varies according to the exactness required, and with the kind of the machine.



0090



0087

§ 01. Standard metres, Scales, etc.

The « Société Genevoise » undertakes, on demand, to get the « Bureau international des Poids et Mesures » to verify the standard metres made in its shops; but it reminds its customers that these comparisons are subject to special regulations established by the International Bureau, from which we extract the following :

« ART. 2. — The tests to be executed at the International Bureau must « be strictly limited to standards of the highest order. Orders which do not « come from Governments may be addressed to the Director of the Interna- « tional Bureau at the pavillon of Breteuil, Sèvres *(near Paris)*. But they are « in all cases, submitted to the Board, who decide whether they can be « received and give the necessary authorization. »

« ART. 7. — *Measures of length.* — To be accepted, standards of length « must belong to the metrical system; their length may be 1, 2, 3 or 4 metres. « They may be end metres or line metres, of metal or hard stone. For end « standards the terminal surfaces must be sufficiently perfect and intact to « clearly define the length. For line standards the divisions must be traced « on the plane of the neutral fibres, they must be distinct and fine enough to « be well observable when magnified about 60 times. »

Nos

Francs

« Some of the preceding rules may, exceptionnally, be left in abeyance, for « instance the condition of the plane of the neutral fibres, for articles, pre- « senting an important historical value, geodesic rules, the fundamental « standards of the geodesic surveys, small scales constituting decimal subdivi- « sions of the metre (decimetre, centimetre, millimetre) and micrometric divi- « sions on glass or rock crystal. »

« For measures of length the owners may claim :

« *a)* a test in the local temperature;
« *b)* the complete equation with determination of the dilatation;
« *c)* for graduated scales, the testing of the subdivisions. »

« Art. 11. — The tests desired by the governments of States, which have « adhered to the Convention of the Metre, are made without charge. »

« Public or private institutions, as well as scientific men or constructors « from States, which participate in the Convention, shall pay the following « fees, as fixed by the Board, in virtue of article 15 of the Regulations « annexed to the Convention. »

« Metrical measures with subdivisions.

1. A test of the local temperature 60

2. Determination of the dilatation either by the method of the comparator or by Fizeau's method, when a sample prepared for this purpose has been furnished by the owner 150

3. Gauging the subdivision of a metre rule, i. e.: testing each centimetre and the millimetres of one centimetre (110 strokes) 400

« For standards belonging to other systems than the metric system, for end « measures and in general for the exceptional cases stated in the above cir- « cular, the fees shall be fixed by the Director of the Bureau, in agreement « with the Board, taking into account the work necessitated by each demand. »

« The governments of States which have not adhered to the Convention, « as well as their subjects or citizens, shall have to pay the double of these « fees, and the Bureau shall take no responsibility in case of delays in the « execution of the tests. »

« Art. 12. — The owners have besides to pay the cost of carriage, packing « and any other expenses resulting from the sending of the objects by mail « or railway. »

« The fees are payable on the delivery of the certificates, or on receiving « them by mail against payment. »

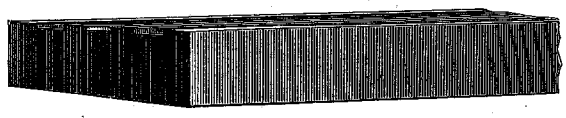
By virtue of this regulation, the standard metres Nos 0130, 0131, 0132, 0133, 0134, 0135 and 0151 are the only metre scales constructed by the « Société Genevoise » which may be submitted to the verification of the International Bureau.

0100. **Standard Metre Scale,** of brass. Very hard brass bar, 10 millimetres thick and 20 millimetres wide, divided into centimetres the first decimetre into millimetres; in case. 80

0105. **Standard Metre Scale,** of brass, divided into millimetres on silver, in a box *(fig.)*. 140

Nos | Francs

0110. **Standard Metre Scale of H-form,** of brass, divided in millimetres on silver, the first and last millimetres subdivided in tenths. The form of this model has been chosen because the divisions are on a surface in the neutral axis of the system and will not be affected by flexion. It also offers maximum resistance for minimum mass and maximum surface *(fig.)* 200

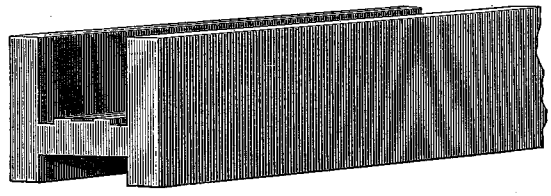


0105

0115. **Stand,** with all the adjustments necessary for suspending vertically and adjusting Nos 0105 and following ones *(fig.)*. 125

0120. **Standard Metre Scale of H-form,** larger size, phosphorous bronze divided on silver as the preceding one. Brass, according to the quantity of zinc it contains, undergoes in time molecular changes; phosphorous bronze is less liable to these changes, and the result is a greater fixity of the length of the metre. 280

0125. **42 % Nickel-Steel Standard Metre** divided on **platinum** inlaid in the whole length of the rule, section of H-form. The employing of steel is required by the dilatation coefficient of platinum. Price according to the rate of the platine about 1200



0110

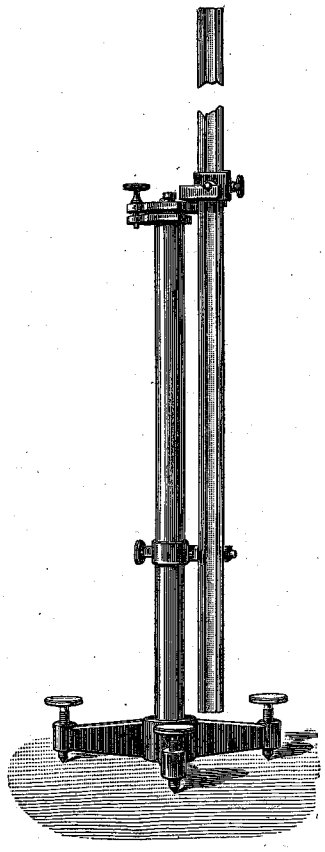
Standard Metres of Nickel-Steel.

Invar, alloy of steel containing 36 % of nickel, introduced into Metrology by the « Société de Commentry-Fourchambault et Decazeville », as the result of experiments made at the Sevres International Bureau of Weights and Measures, by Dr Ch.-Ed. Guillaume. The principal advantage of this alloy is its very slight dilatability. As the following alloys it takes a fine polish, is perfectly inoxydable in dry or moist air, but can get rusty by staying a long time in hot water; it is rather easily corroded by acids, which necessitates some precautions in using it;

Nos Francs

when speculary polished, the invar is susceptible of receiving divisions 2 or 3 microns wide.

The Society of « Commentry-Fourchambault et Decazeville » furnishes three different qualities of invar.



0115

Invar first category, the coefficient of dilatation does not exced 0.8 microns by metre and degree C.
Invar second category, whose coefficient varies from 1 to 1.6 microns.
Invar third category, the coefficient may reach 2.5 microns.

Nickel-Steel with 42 % of nickel has the advantage to be an alloy more stable in its length than the invar which seems to be under a molecular work very slow, coefficient of dilatation about 8 microns, may be polished as well as the invar.

Nickel-Steel with 58 % of nickel. — Same coefficient of dilatation than common steel, very convenient for standards

Nos | | Francs

very tough to the oxidation and destined to the verification of measures in hardened steel.

Prices below understood for invar of second category or Nickel-steel with 42 %; for invar of first category and Nickel-steel with 58 % price on demand.

Unless to ask for a special box, standard metres N° 0128 to 0134 are delivred in a polished wooden-box.

0127. **Nickel-Steel decimetre,** polished specularly with millimetric division, in a case. 45

0128. **Nickel-Steel Metre Scale,** of rectangular section without specular polish, divided in millimetres. 220

0129. **Do.** section of H-form, without specular polish, divided into millimetres 330

0130. **Do.** rectangular section, divided into millimetres, on specular polish. 270

0131. **Do.** section in H-form of 24 millimetres of height, divided in millimetres on specular polish 370

0132. **Nickel-Steel Metric Scale** of 2 metres of length, section in H-form of 30 millimetres high, divided into millimetres on specular polish 1000

0132. **Geodesic rule** of 3 metres of length, Nickel-steel, section of H-form of 35 millimetres high, divided on specular polish.

0133 *bis*. **Special Case of aluminium** for rule 0133, with shutter over each metrical stroke allowing of pointing the stroke without taking the rule out of its case, with two thermometres, the rule is borne by its normal points in the case, roller for compensing the relative dilatation of the rule as regard as the case which is provided with four strong handles, of one preparatory for keeping the rule steady in the case and of one spirit-level with divided limbe and vernier.

0134. **Geodesic rule of Nickel-Steel,** same than preceding one, but 4 metres in length, profil in H of 44 millimetres high, with strong case.

0134 *bis*. **Special aluminium case** for rule 0134, same construction as N° 0133 *bis*.

Prices on demand.

0135. **White bronze Metre Scale** (60 % copper, 40 % nickel) or pure nickel; cross section of H-form, large size, with divisions in millimetres on specular polish, with case 300

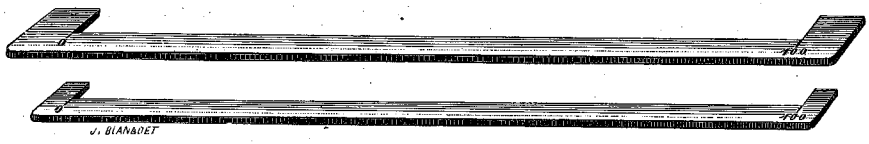
0136. **Do.** constructed on the model of N° 0105, with case . . 220

0140. **Double-Metre Scale of Steel** end metre, Bar 25 millimetres square or rectangular 35×13 millimetres, divided into millimetres on its whole length, with case 150

Nos | Francs

0145. **Brass Standard Metre with projecting extremities.** Brass bar 10 millimetres thick and 25 millimetres wide, divided into millimetres, and provided at each end with « nib » or « heel », with intervening distance exactly one metre for testing end metres, with case *(fig.)* 90

0150. **Steel Metre with projecting extremities.** Model adopted by the Swiss Confederation and Roumania, as the metre of control for trade and commerce, with case *(fig.)* 70



0145 and 0150

0157. **Nickel Metre with one projecting extremity,** divided into millimetres on its whole length. With case 150

0158. **Do.** of nickel-steel, with case 250

0151. **End Standards.**

The ending faces of the Standard are of spheric form, whose common curvature center is in the middle of the standard lengtn. In that way, if when measuring the standard is not exactly perpendicular to the ending faces of the piece to be measured, it does not bring any mistake in the measure.

The standards are constructed by the « Société Genevoise » either of Holtzer steel (mark double bell), or of invar second category; in the latter case, the ending faces of the standard are constituted by hardened steel spheric calottes.

		Invar	Steel
Length from 1 to 5 centimetres.	Fr.	50	40
» » 6 » 15 »	»	57	45
» » 16 » 30 »	»	65	50
» » 31 » 50 »	»	85	60
» » 51 » 75 »	»	105	75
» » 76 » 100 »	»	150	120

0153. **Invar ribbons for measuring;** these ribbons are ended by a buckle at each extremity, rolled on a metallic circle and delivered in a case; division from metre to metre, the first and last metre divided into centimetres.

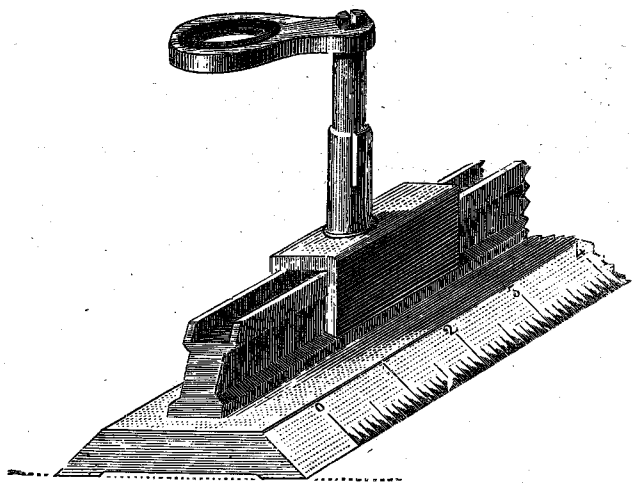
Length 8 metres	160
» 10 »	180
» 12 »	210
» 24 »	360

Different divisions on demand.

Nos | Francs

0153. **Invar threads** for geodesic measures; these threads are ended at each extremity by a small decimetric rule divided into millimetres provided with a buckle. A aluminium cylinder allows to roll them for transporting. Price on demand.

The Société Genevoise undertakes the construction of complete apparatus necessary to the determination of *geodesic bases*. Estimate on demand.



0160

0160. **Rule with German Silver Bevelling,** divided on one side into millimetres, on the other into fifths of millimetres down its whole length. Each stroke of the millimetres subdivision is of a different length. With two aplanetical magnifying glass sliding on the whole length of the rule, 70 centimetres long, with case *(fig.)* 160

0161. **Do.** same as N° 0160 but of 105 centimetres length, with case 200

0165. **Steel rule,** flat or with bevel divided into millimetres. One metre. . 60

0166. **Do.** 50 centimetres 30

0170. **Brass Scale, with bevel,** divided into millimetres, 125 centimetres long *(fig.)*. 46

0171. **Do.** 1 metre long 40

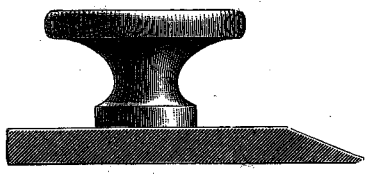
0172. **Do.** 50 centimetres long 20

0173. **Do.** 40 » » 15

0174. **Do.** 30 » » 9

For the above indicated price, rules are delivered without case.

Nos				Francs	
0175.	**Scale with two bevels,** graduated on one side for millimetres and on the other for half millimetres *(fig.)*.			Brass	German silver
		50 centimetres	long	32	40
0176.	**Do.**	40 »	»	20	25
0177.	**Do.**	30 »	»	14	18
0178.	**Do.**	20 »	»	—	9



0170

0175

0180. **Steel Metre for modeller,** with 3 divisions, a metrical one, the other two for keeping an account of the shrunk of the cast-iron and brass 60

0185. **Small scale of German silver** 11 centimetres in length, with bevel, divided on one side into fifths of millimetre and on the other into millimetres; in a case 16

0186. **Do.** graduated on one side for fifths of a millimetre on the other for tenths of a millimetre 20

0190. **Two brass scales,** each with two bevels, on one of the scale, the distance from 0 to 199.9 millimetrés on one bevel and from 0 to 200.1 millimetres on the other bevel, are divided into 200 parts. On the second scale it is respectively distances from 0 to 199.8 and from 0 to 200.2 millimetres which are divided into 200 parts, to allow for the average hygrometric state of surveyor's plans. 35

0195. **Scale with transverse lines.** Prices on demand.

It is impossible to mention all kinds of subdivisions and of non metrical measures nor all the variations of form and size that may be desired. The « Société Genevoise » undertakes to execute any kind of divisions at analogous prices to those stated above.

All our standard metres are compared with our normal metre verified by the International Bureau of Weights and Measures. We can therefore guarantee our customers the total error of every metre rule delivered, at the temperature at which it was divided.

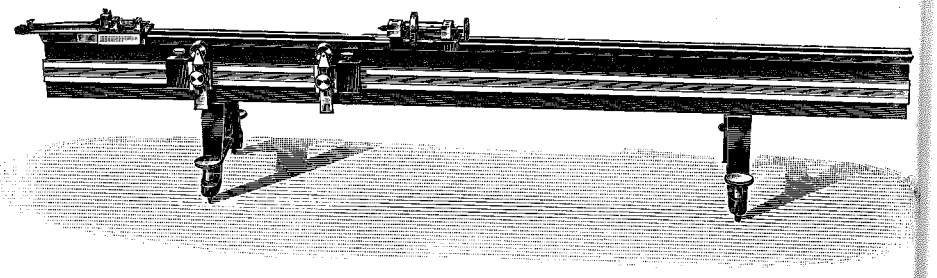
This error will not exceed 1 to $^{2}/_{100}$ millimetre for line metres. **Unless special demand, our rules are divided in order to be exact at a temperature of 0 degree C.**

Nos

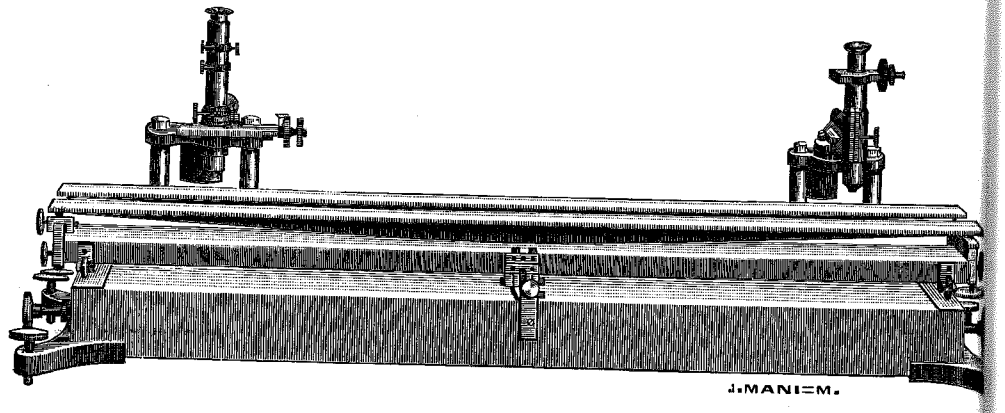
Francs

§ 02. Comparators, Measuring machines, Cathetometres, Micrometres.

0200. **Comparator for End Measures.** Contrivance for comparing all lengths up to one metre. Differences of length are shown by a millimetric scale divided on silver and showing $^1/_{100}$ of millimetre. A touch lever sensible to $^1/_{1000}$ of millimetre serves to verify the starting point of measures *(fig.)*. 600



0200



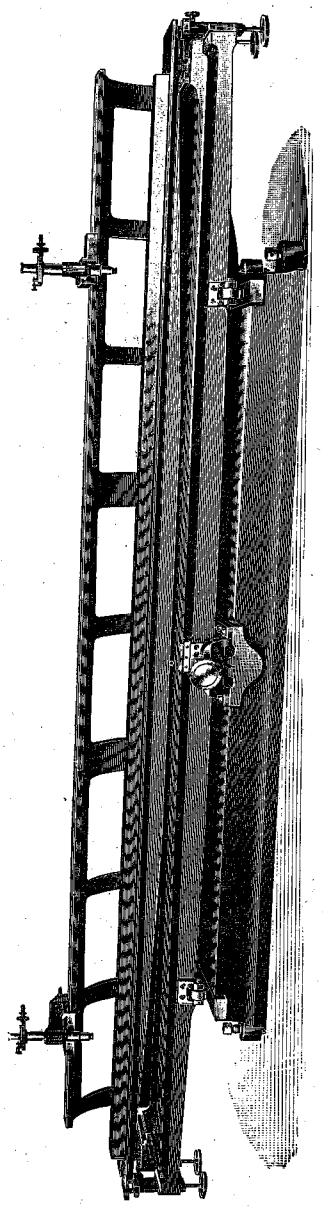
0205

0203. **Comparator for Line Measures,** allowing to compare rules of three metres long. Regulating organs in height and micrometric regulating in length for the setting on point of rules; cast-iron bench, rapid transversal movement, longitudinal bench on which microscopes can slide down the whole length; the transversal movement of the bench is given by a tangent screw; two micrometer microscopes *(fig.)* . . . 4200

Each micrometre microscope with its stand, in addition. 300

Nos | Francs

0205. **Comparator for Line Measures** for scales up to one metre long; iron bench with levelling screw, on which two microscopes capable of a transversal movement can slide longitudinally; these two microscopes are provided with an ocular micrometer with movable thread. The bench is surmounted by an iron shelf that shifts rapidly transversally. On the shelf two rules with adjusting screws for the vertical and longitudinal directions, are suitably fixed and designed to receive the measures to be compared. On demand, microscopes may be provided with Fraunhofer's micrometer instead of ocular micrometer with movable thread *(fig.)* 1100



0203

0206. **Rapid Comparator** for **verification office.** — This instrument which can measure one metre, allows to verify rapidly line measures and end measures as well as the study of division's errors of rules traced up to the edge. Measures are done in comparing directly the piece to be verified thanks to a division traced on the comparator's edge.

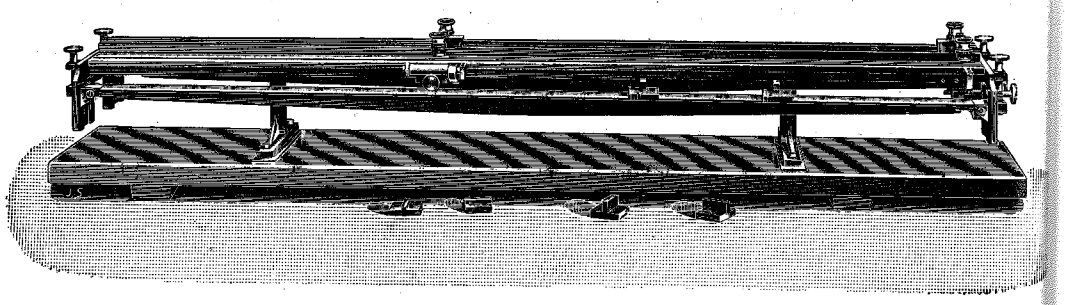
The comparator's rule is made of invar or nickel-steel at 42 % according to the demand *(fig.)* . . . 1700

0207. **Universal comparator** for rules up to 1.20 metre long, longitudinal- and transversal-movement of divisions to study, numerous sending back for allowing the operator the easy management of the different movements and organs of setting on point from any part of the comparator, insulating case with mirrors for the thermometres lecture 7000

0208. **Comparator** with **longitudinal** movement for the standard of rules subdivisions up to one metre or the cross calibre of two shorter

Nos | Francs

rules, three stands of different length in order to place rules to study, rapid translation motion of the guide by pinion and rack, one turn of the handle is equal to a decimetre, slow movement by helicoïdal gearing, whose turn is equal to a half-millimetre, microscopes may be at one decimetre of interval one another or be separate of one metre, insulating case *(fig.)* 3000



0206

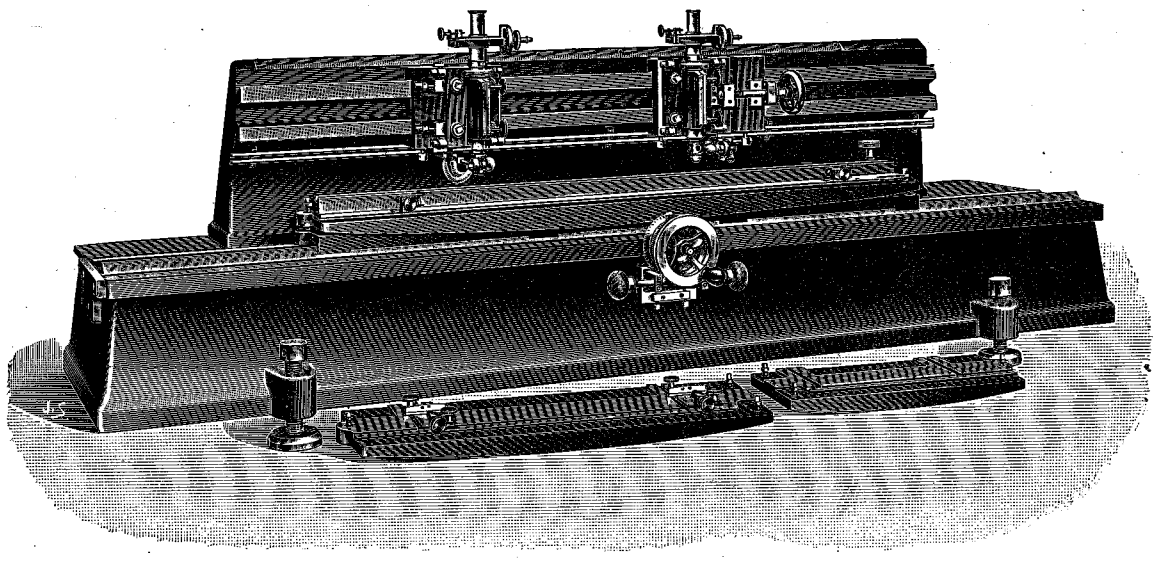
0209. **Comparator** for **astrographic negative plates.** — The measuring of the distance of stars is done in triangulation or in rectangular co-ordinate by direct comparision to a rule divided on specular polish, the rule has the same coefficient of dilatation that the glass of plates. Negative plates are adjusted on a turning platine with divided circle giving one minute and with transversal motion for the lining of stars by pair.

The bigger size of plates is 18×18 cm. Adapters for smaller size *(fig.)* 3200

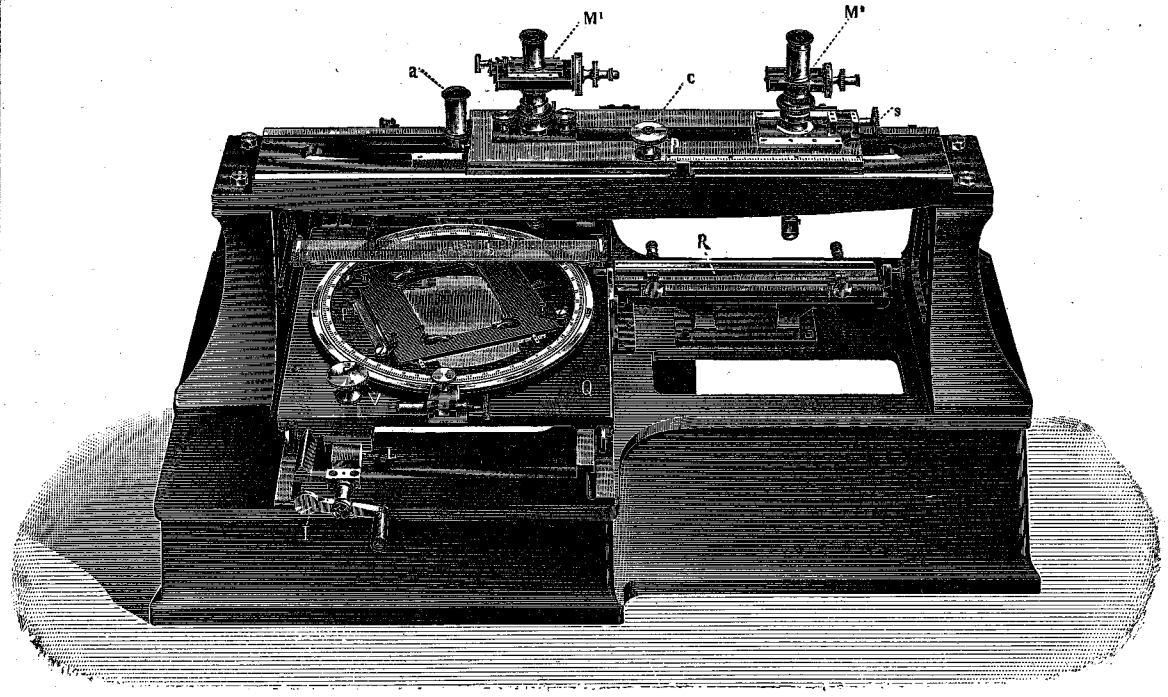
0211. **Comparator** for **spectographic negative plates.** — In order to prevent chances of errors due to the usury of micrometric screws, the measure of the removal of two spectral lines is done by direct comparision to a small rule divided into millimetres on specular polish, the coefficient of dilatation of this rule is equal to the one of the plate; the measure of the fraction of millimetre up to 0.001 mm. is done with the ocular micrometre whose error possible by usury of the screw is reduced of 5 times by the magnifying of the object-glass. This contrivance assure to this comparator a very long durability of exactness *(fig.)*.

For plates maximum 9×12 cm. 1340
» » » 13×18 cm. 2000

This construction is particulary good for rapid measures, because one can easily disengage the translation screw, of the truck and make large removals with the hand.



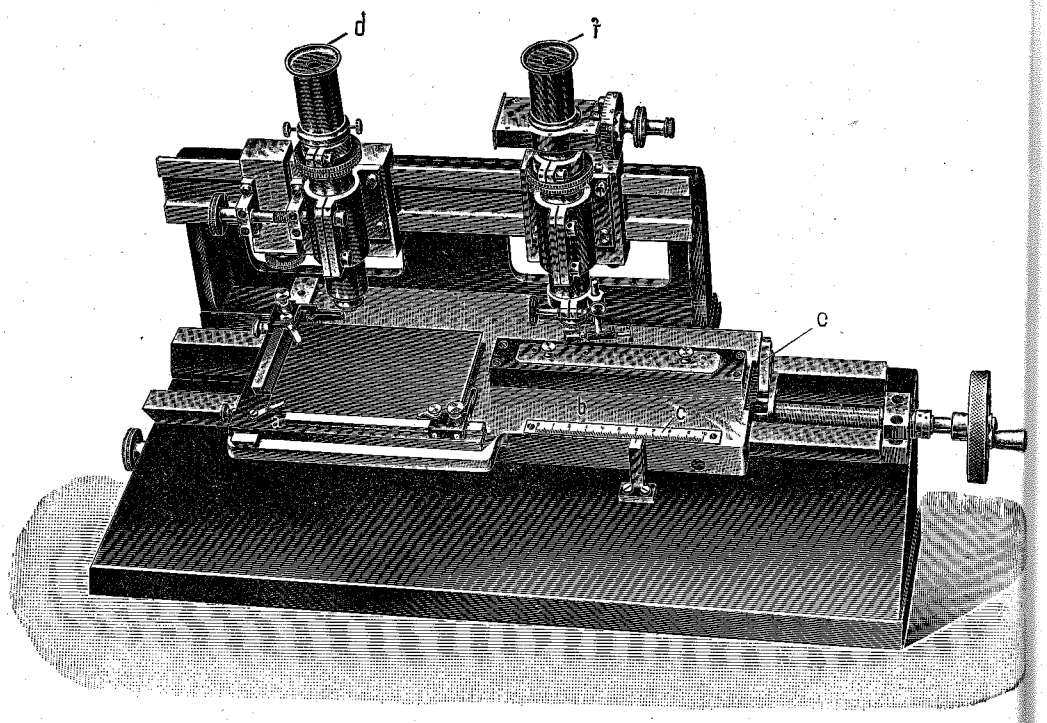
0208



0209

Nos | Francs

4130. **Comparator for determining the coefficients of dilatation of rods** up to one metre long. The apparatus is provided with two micrometre microscopes and with small telescopes for the reading of thermometres. Double bath with water circulation and regulating movement for adjusting it. Movable truck to shift the double bath. Section of the outer bath, 16 by 22 centimetres *(fig.)* 2700



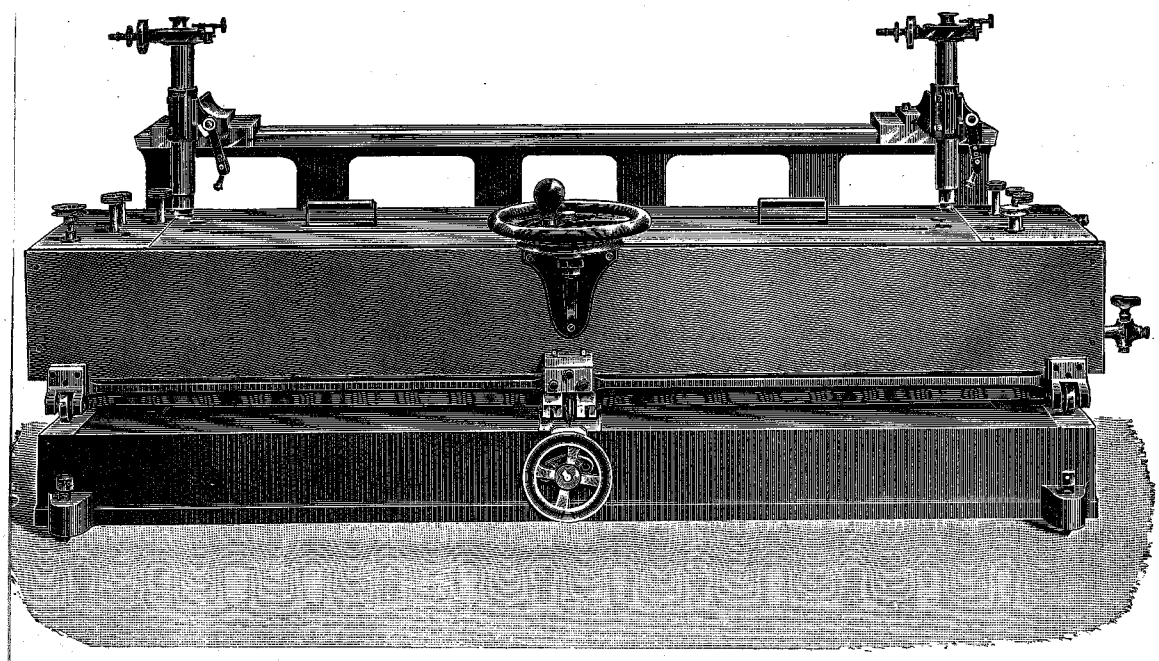
0211

4131. **Comparator for determining the coefficients of dilatation of rods** with larger sizes baths. Section of the outer bath 19 × 27 centimetres 3500

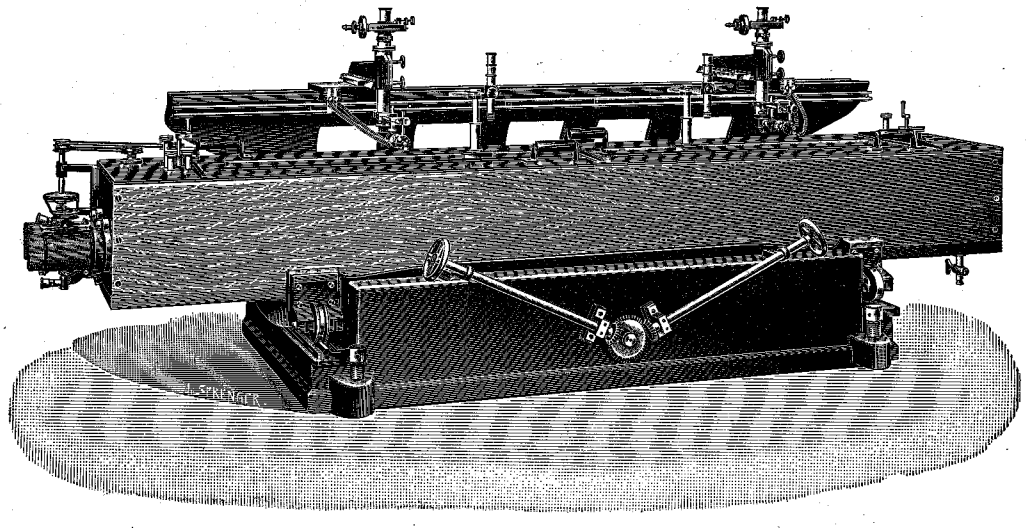
4132. **Comparator for dilatation of rules** up to 1 metre 50 long, section of the outer bath 19 × 27 centimetres, electric motor for baths agitation *(fig.)* 5200

4133. **Adjunction** to preceding comparators of a supplementary slide that allows to microscopes a longitudinal translation with steady intervals and transform them in universal comparators *(fig.)*. 600

Microscopes may be provided either on the supplementary slide or on the comparator's bench.



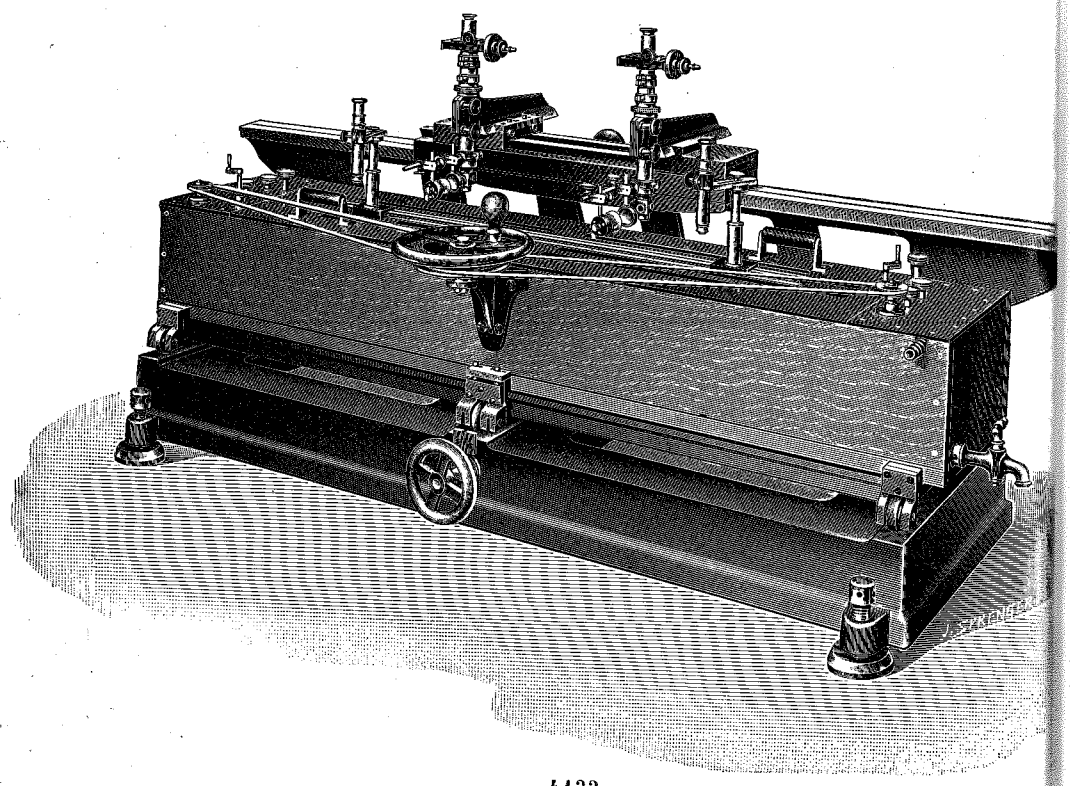
4130



4132

Nos | Francs

4134. **Large Comparator for dilatation of rods** up to 4 metres long, two double baths, electric motor for agitating the water in baths and the translation of tanks and the rolling floor, microscopes with long frontal distance, with stands. Estimate on demand.



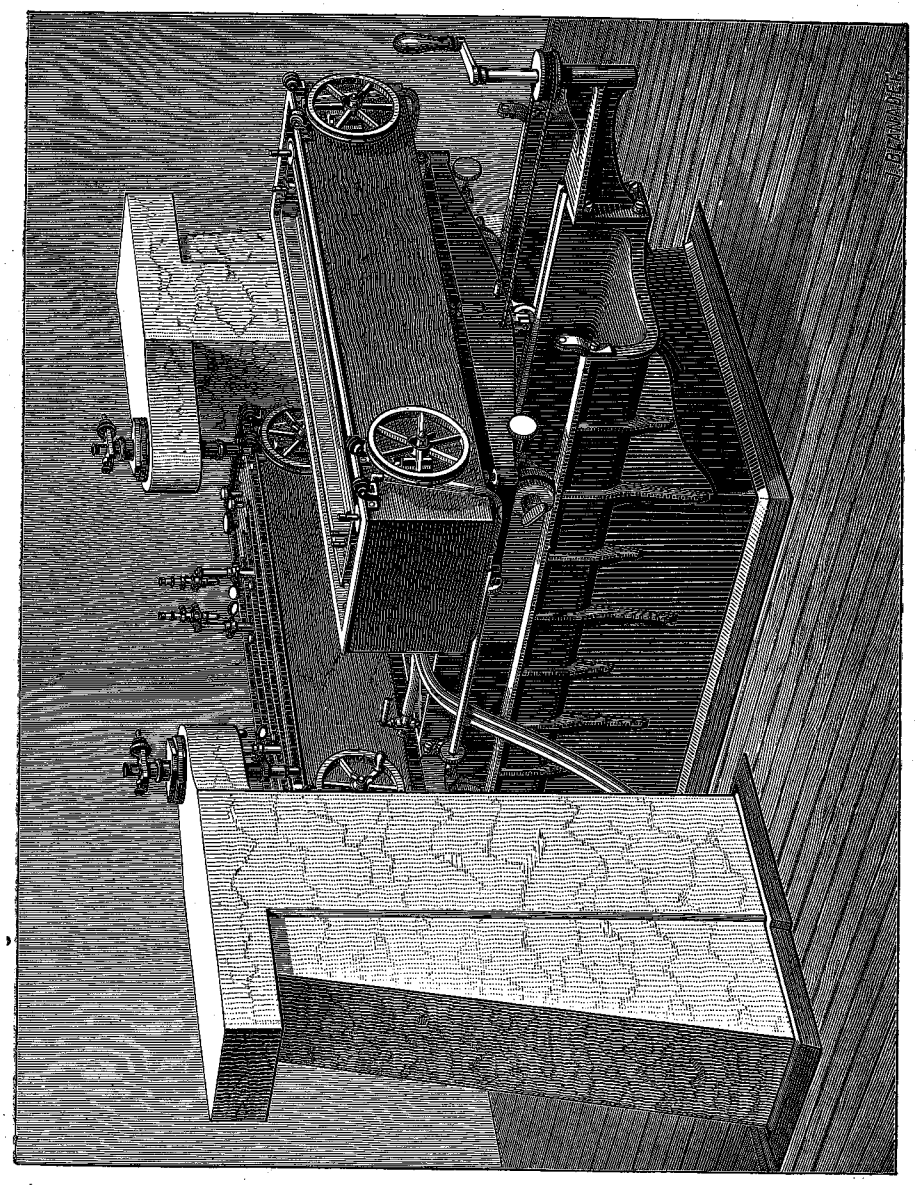
4133

4140. **Comparator for determining the Coefficients of dilatation with double baths.** — This apparatus is composed of a truck rolling either with a rapid or slow motion, supporting two double baths. One of the baths, contains two stands for divided rules, the other only one stand. These stands are provided with all the organs necessary for the setting on point in height, width and length of pieces to be compared.

Each bath support 4 telescopes for the observation of thermometres. The microscopes are fastened on stone pillars.

Nos | Francs

This apparatus was constructed, for the first time, for the « Bureau International des Poids et Mesures » and we give the illustration of this first execution, since then numerous improvements have been brought to its construction *(fig.)*. Estimate on demand.



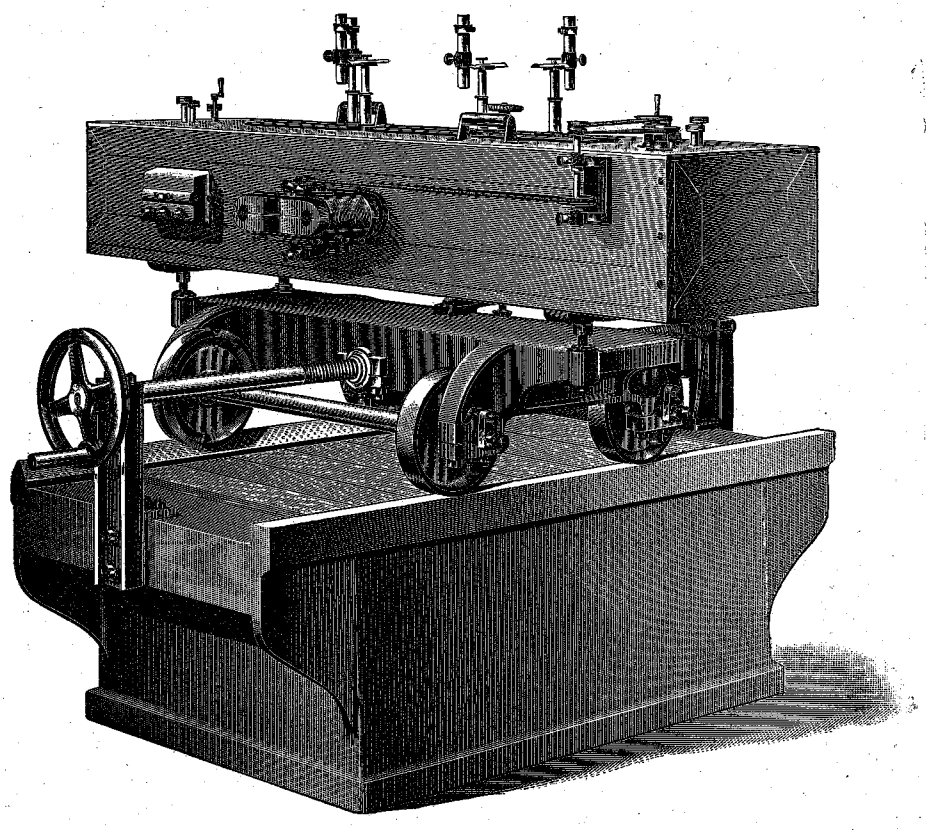
4140

Nos Francs

4145. **Comparator for determining the Coefficients of dilatation.** Same construction as the preceding, but with transversal bridge connecting the two stone pillars with two micrometre microscopes which can slide on this bridge, thus allowing the testing of rods of any size between one decimetre and one metre. Estimate on demand.

4150. **Adjunction** of two electric motors to keep the water in constant motion in each one of the double baths. Estimate on demand.

4151. **Do.** of a third motor for acting the transversal removal of baths. Estimate on demand.



4155

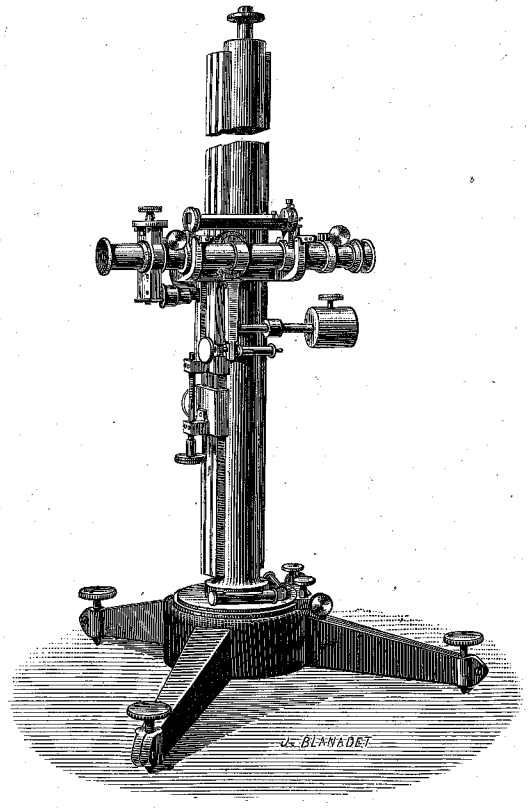
4155. **Comparator** for determining the Coefficients of dilatation, same as N° 4140, but with only one double bath. The standard metre and the rod to be tested are placed in the same bath *(fig.)*. Estimate on demand.

Nos | Francs

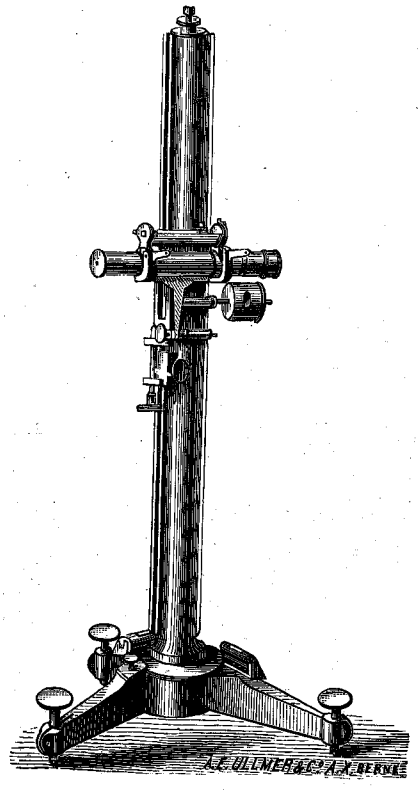
4156. **Adjunction** of an electric contrivance to keep the water in constant motion in the double bath. Estimate on demand.

Cathetometers.

0215. **Large Cathetometer** for measuring one metre in height; millimetres divisions on silver; vernier reading to $^1/_{50}$ millimetre; well balanced prismatic cursor. The column is pivoted above on a central axis. Telescope and level may be turned end to end; two levels at right angles to each other on the base. One division of these levels is equal to 4 secondes about 1000

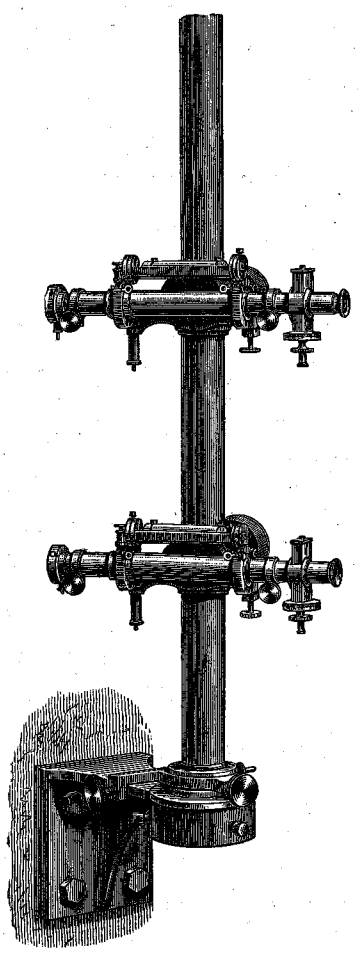


0220

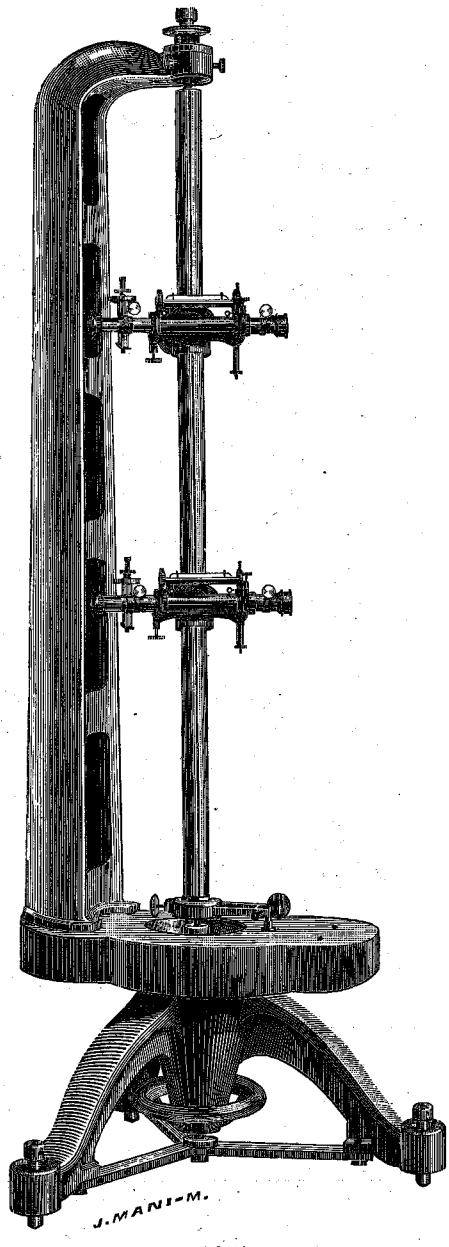


0230

0220. **Large Cathetometer** with adjunction of a second object glass for very short dis'ances and provided with an ocular micrometre with movable thread whose head bears divisions on silver *(fig.)* 1100



0245



0250

Nos | Francs

0225. **Cathetometer.** Same model as the preceding one, but provided with two telescopes. This arrangement including two ocular micrometres guarantees greater accuracy and permits measurement of a maximum distance of 116 centimetres 1400

0230. **Cathetometer,** smaller size, to measure a height of 50 centimetres, with one telescope only, vernier reading to $^1/_{50}$ millimetre *(fig.)*. . . 650

0235. **Do.** Same model, but with adjunction of an ocular micrometre with adjustable thread and a second object-glass 700

0240. **Do.** Same as N° 0235, but for measuring 70 centimetres in height 740

These models of cathetometers can be supplied with a rack on the whole length of the column, the cursors slide then more smoothly and the steadiness of the instrument is better secured.

0245. **Cathetometer with two Telescopes,** each provided with an ocular micrometre with adjustable thread. These telescopes can be shifted longitudinally on a steel or brass column, pivoting on its axis and suspended to a strong cast-iron support, which may be fixed against a pillar or wall; a second support, in the lower part, secures the verticality of the column. The maximum distance between the telescopes permits the measuring of a little more than one metre. The column is not graduated; measurements are taken on a standard metre placed beside the object to be measured *(fig.)*. 900

0246. **Do.** with a two metres high column 1020

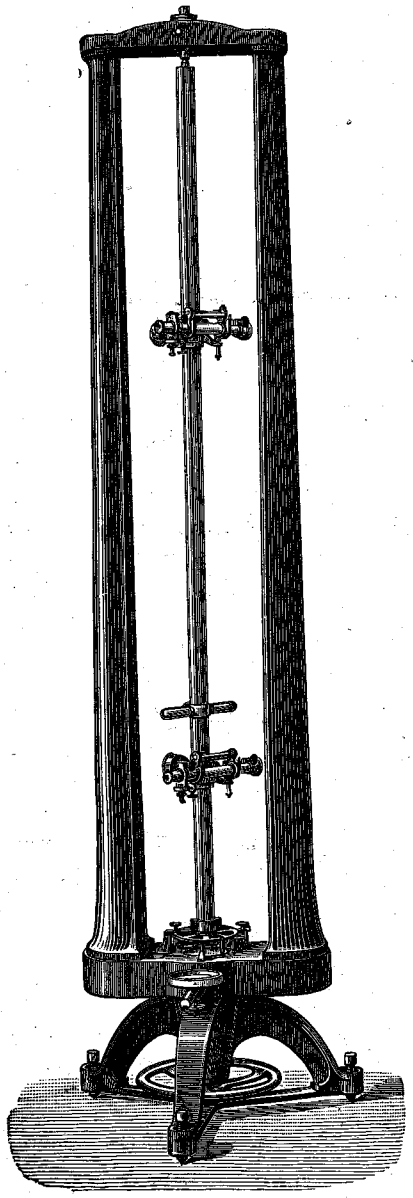
0250. **Cathetometer.** — Same column as N° 0245, mounted on a very firm cast-iron support, pivoted above on a strong tripod with levelling screws, and which may be fixed in any position by means of a screw. This arrangement presents the great advantage of rendering the instrument transportable and allowing any orientation very easily *(fig.)* . . 1350

0251. **Adjunction** to the lower part of the column, of a azimuthal circle with verniers 90

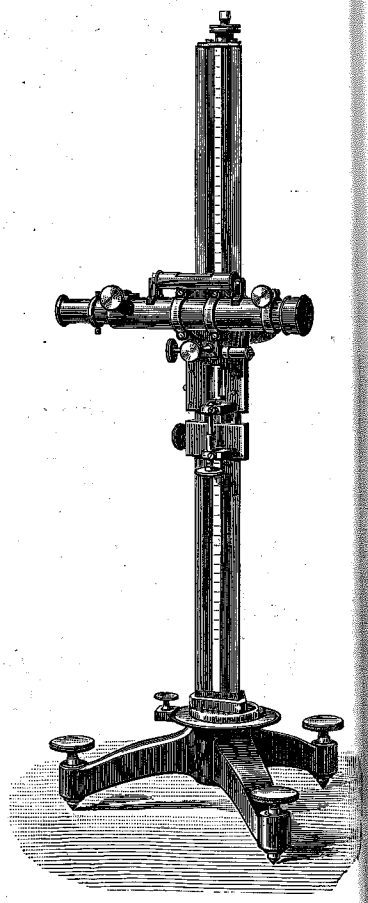
0255. **Cathetometer** like the preceding, to measure the height of two metres *(fig.)* 1850

0260. **Do.** with telescope 27 millimetres aperture without reversing movement although it can be turned on a horizontal axis provided with an adjusting screw, triangular brass column 65 centimetres high pivoted above on an internal axis. The brass column bears a millimetric division with vernier reading to $^1/_{20}$ millimetre spirit level indicating 10 secondes for a division *(fig.)*. 460

0265. **Cathetometer** of simpler construction, the column 115 centimetres high is divided into millimetres; vernier reading to $^1/_{20}$ millimetre. The



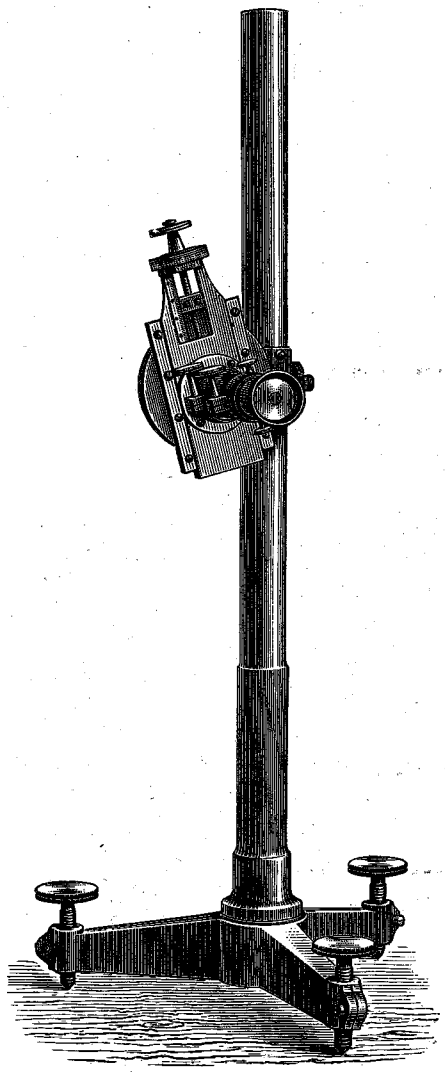
0155



0260

Nos | Francs

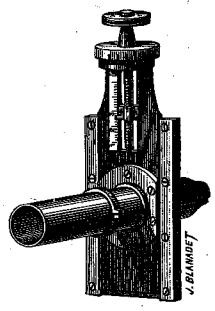
column turns on its axis of figure. The telescope 27 millimetres aperture permits reading distances varying between 0.60 to 10 metres; it may be inclined at any angle; spirit level on the telescope. 440



0276

0270. **Cathetometer.** Same instrument as the preceding one, but the telescope can only be used in a position nearly horizontal 380

The telescope of cathetometers Nos 0260, 0295 and 0270 may be provided on demand with an ocular micrometer for the price of . . 60



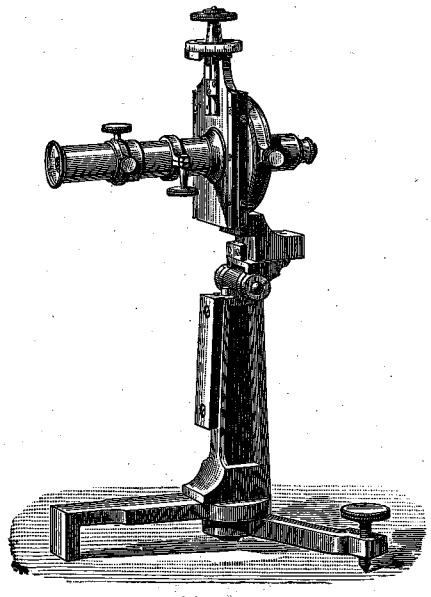
0275

0275. **Fraunhofer's Screw Micrometer,** measuring 20 millimetres in length, reading to $^1/_{200}$ millimetre *(fig.)* 170

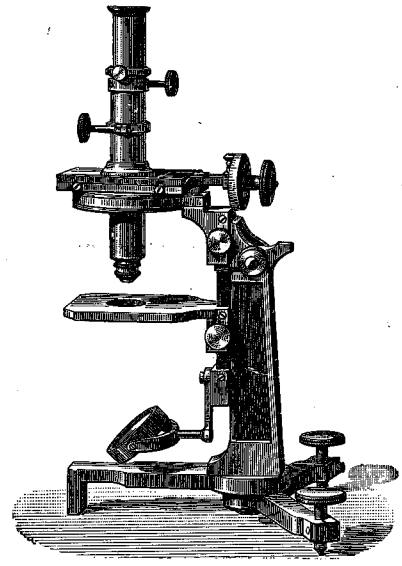
0276. **Do.** with telescope or microscope of low power. The instrument is mounted on a brass column and provided with a turning movement in a vertical plane, so that measurements can be taken in all directions. Cast-iron tripod *(fig.)* 280

0277. **Do.** mounted on a tripod and provided with a turning movement as the preceding, so that it can be used vertically *(fig. a)* and horizontally *(fig. b)*; the micrometer can change place with the shelf;

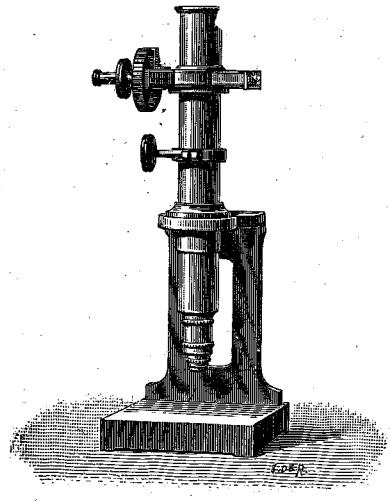
Nos		Francs
	the instrument may thus serve as microscope with micrometric shelf. The tripod folds up. The instrument in a box	350
0278.	**Do.** mounted vertically on a plain stand similar to the stand of N° 0285	220



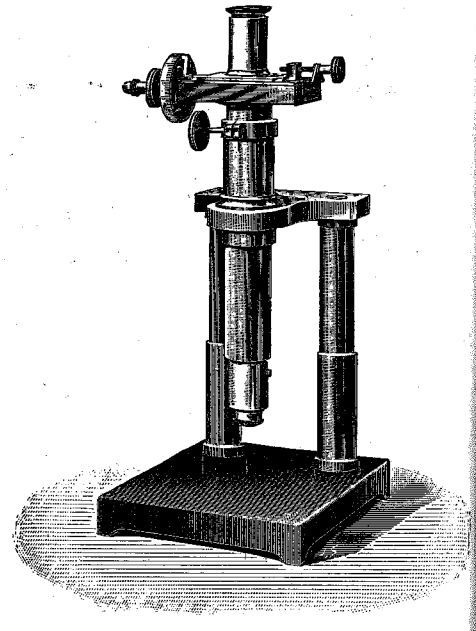
0277 a



0277 b

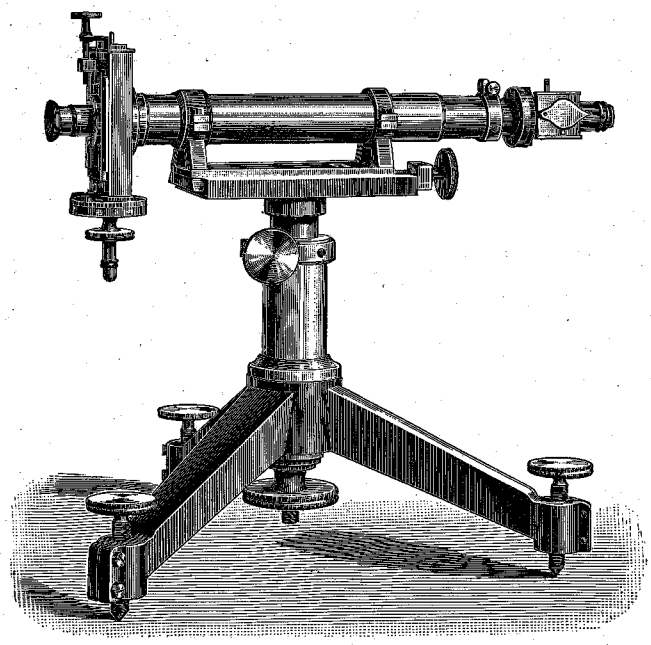


0285



0290

Nos		Francs
0280.	**Micrometer Microscope** with a movable thread at the focus of the ocular for subdividing spaces in line measures. Ocular field about 9 millimetres. Magnifies 30 to 40 times	105
0285.	**Do.** mounted on a stand *(fig.)*	140
0290.	**Do.** larger model for measuring a length of 14 millimetres in the focal plane. The eye-piece is regulated by a special screw with coarse thread to keep the image in the center of the field. Sliding objective to vary the magnifying power. Total length from object-glass to the micrometer's thread about 20 centimetres. Magnifies, unless otherwise specified, about 40 times *(fig)*	200



0295

0295.	**Micrometer Microscope,** same size as N° 0290 mounted on a tripod. The adjustement is obtained within the limits of about 20 millimeters by a vertical and horizontal regulating screw. Illuminated through the objective by a glass lamella inclined at 45 degrees; three oculars *(fig.)*	380

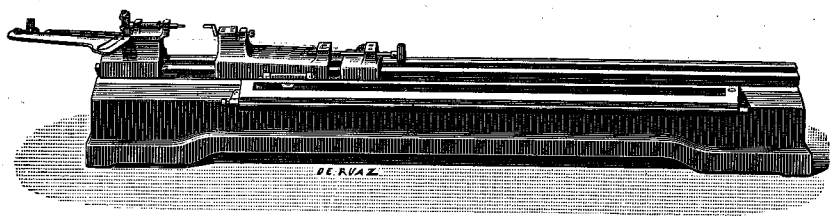
Microscopes, see Optics § 23, 24 and 25.

Micrometers, see Astronomy § 19.

Nos | Francs

§ 03. Measuring Machines, Various Compasses, Calibres.

0300. **Machine for measuring** lengths up to 50 centimetres. Approximation $^1/_{100}$ millimetre. A carefully erected cast-iron bench bears in one part a carriage with regulating screw, in the other a movable counterpoint, resting on amplifying levers, securing a constant pressure and the invariability of the zero point. Readings are made by means of a vernier and a magnifying glass, on a standard metre divided into fifths of a millimetre. 650



0300

0301. **Small Machine for line measures** up to 20 centimetres. Readings are made by means of a screw with divided head and a microscope. Approximation : $^1/_{100}$ millimetre. 400

Measuring Machines, Model 1910.

These machines, whose description more detailed is given in a special little book, assure to the measure of thickness under any shape they may be presented themselves (end standards, plugs, etc.) an incontestable exactness that not any other machines can reach. Their value rests on the fact that they allow by their own means the measure of the absolute value of any thickness with the same precision that the best comparators give comparing the unknown thickness to a known standard of a very near length, this oblige for these latter the expensive purchase of a great number of verified end standards.

We give here the result of a study made at the « Bureau International des Poids et Mesures » about the exactness of this apparatus :

Measured length.	Error of the apparatus.
200 millimetres.	+ 0,00069 millimetres.
300 »	+ 0,00046 »
400 »	+ 0,00050 »
500 »	— 0,00041 »
600 »	— 0,00094 »
700 »	+ 0,00133 »
800 »	+ 0,00059 »
900 »	+ 0,00076 »
1000 »	— 0,00025 »

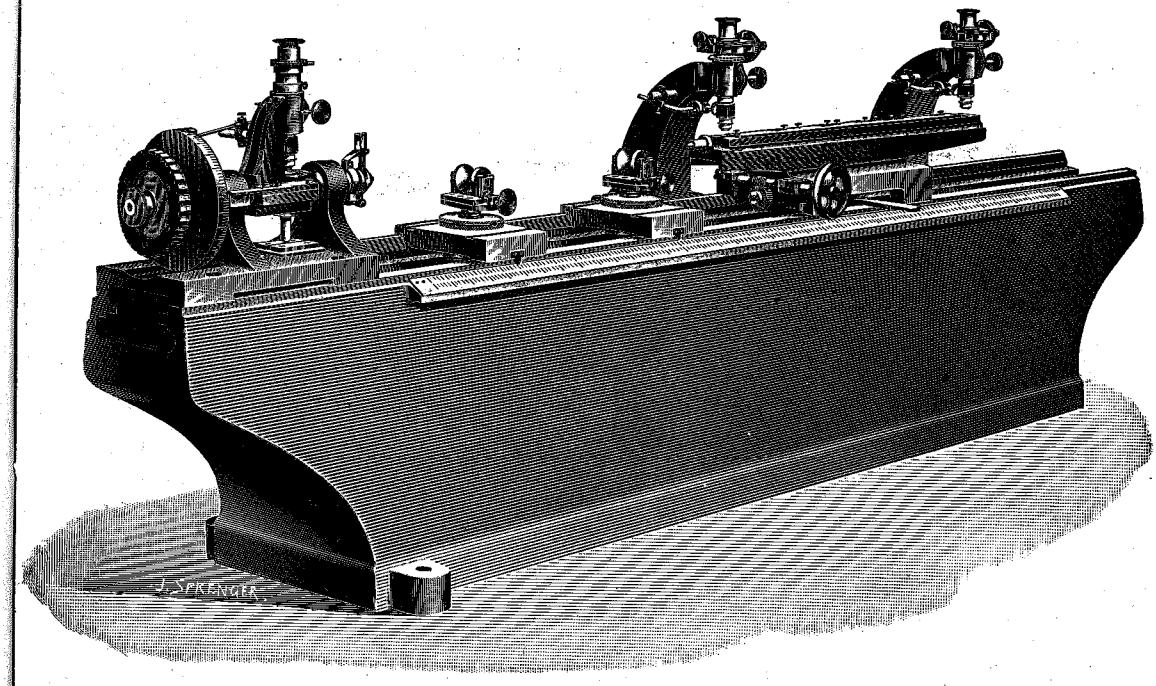
In these figures division errors of the machine's standard rule are comprised.

Measuring Machines S. G. 1910.

Number	Capacity of measure mm.	Prices Frs.	Weight kgs. net	Weight kgs. brut	Packing Frs.
10.001	500	3000.—	145	260	40.—
10.002 *(fig.)*	1000	4000.—	210	340	60.—
10.003	2000	5300.—	360	570	75.—

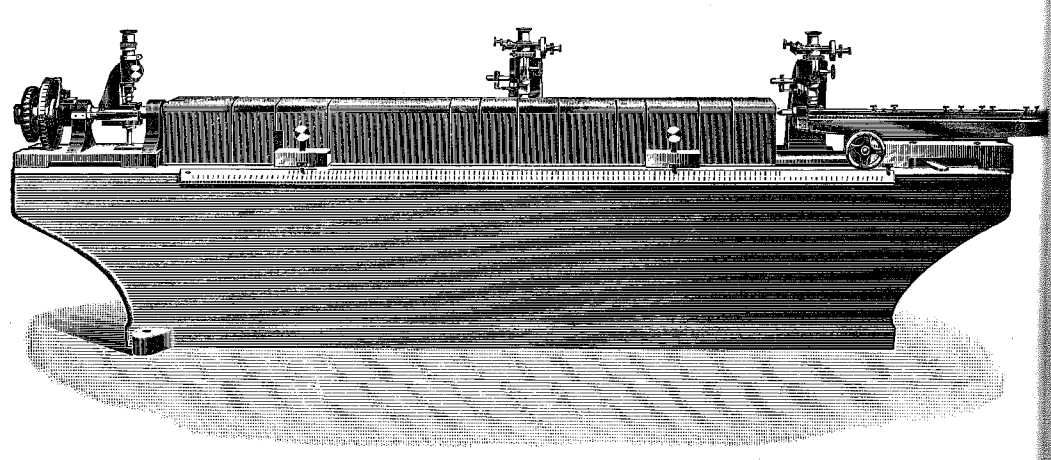
Accessories.

Number	Transporter semi-automatic Frs.	Insulating cover Frs.	Special stand for the centralizing of cylinders Frs
10.001	450.—	40.—	700.—
10.002	500.—	75.—	700.—
10.003	620.—	160.—	725.—

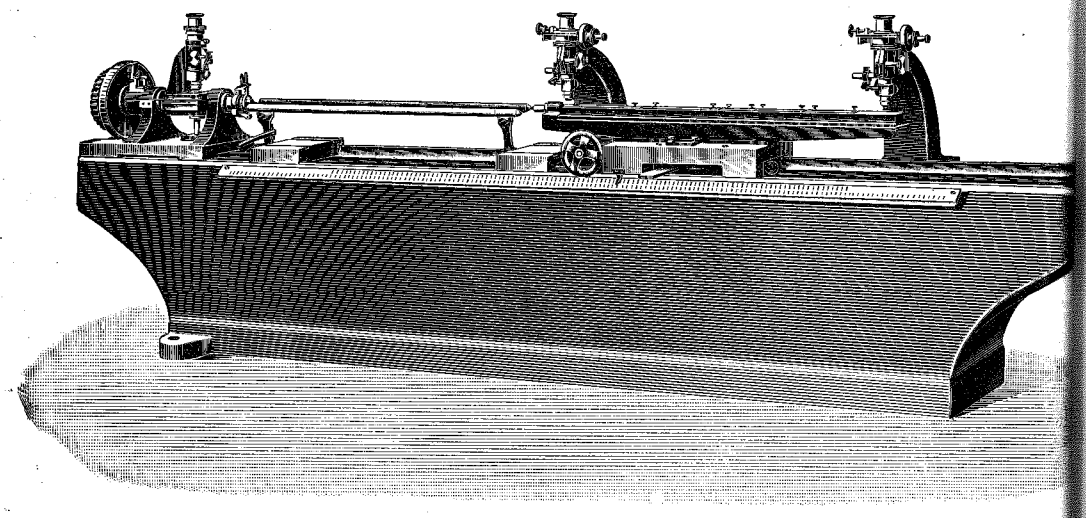


N° 10.002 with normal outfit.

Besides Machines S. G. 1910, the « Société Genevoise » constructs a small measuring machine more economical, giving a precision of $^{1}/_{1000}$ millimetre in comparison measures and of $^{5}/_{1000}$ millimetre in absolute value measures.



N° 10.002 with insulating cover.



N° 10.002 with semi-automatic transporter.

This machine allows to measure 300^{mm} to the maximum and is provided with same stands of centralizing that the machine S. G. 1910.

These machines are always in stock and rapidly deliverable.

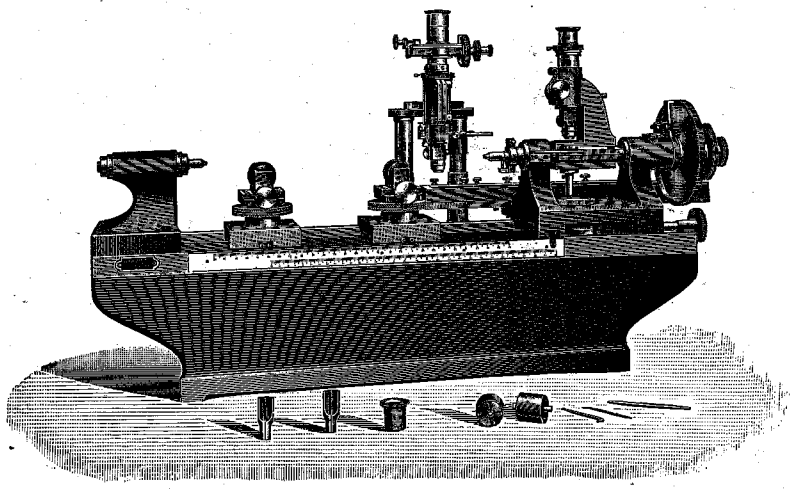
N° 0302,0. **Price : Fr. 2000**

Packing Fr. 30.— Net weight : 40 kg. Gross weight : 77 kg.

Nos | Francs

0303. **Measuring Machine for 4 metres of useful length.**

This machine constructed for an industrial purpose hold a steel rule bearing nickel-steel incrustations upon which is traced a decimetric division. — The reading microscope is mobile contrary to the preceding measuring machines and a very sensible level is used to control the parallel movement to itself from the microscope. The mobile puppet head with micrometric screw bears a centimetric division of a centimetre long on specular polish on which are made readings of centimetres;



0302,0

millimetres and fraction of millimetres are given by the micrometer screw. This machine allows to set gauges up to 4 metres long with an exactness of $^1/_{100}$ millimetre. Price on demand.

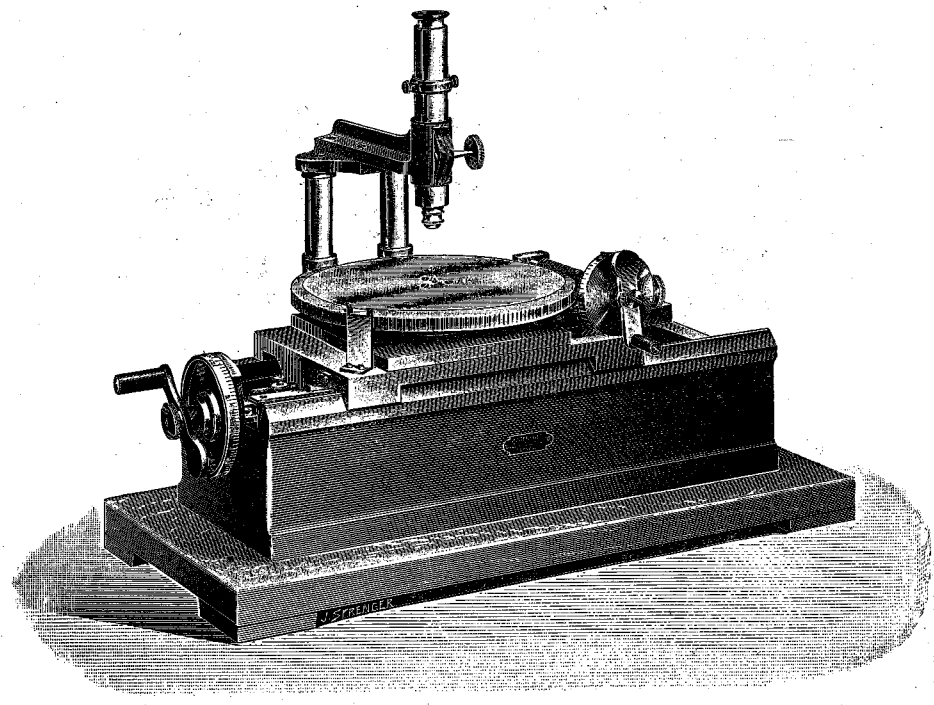
0304. **Pointing machine.** This apparatus allows to take exactly distances and angles between a fixed point (center of a turning plate or any other point) and points distributed of any way around a fixed point. It is of a very convenient use for watchmaking or all works where it is necessary to have the exact taking of a series of points distributed in a plan *(fig.)*. 820

0305. **Calliper, with micrometer screw,** millimetric thread, reading to $^1/_{100}$ millimetre by a graduated circle; measuring 35 millimetres *(fig.)* 35

0306. **Calliper, with micrometer screw.** Same model with spring to exert an uniform pressure on the object to be measured . . . 40

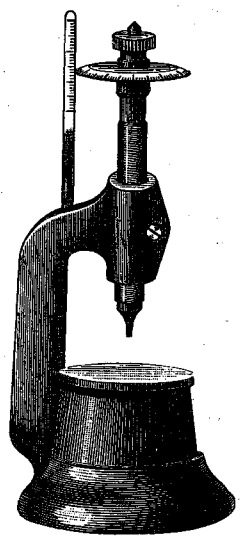
Nos		Francs
0310.	**Calliper, with micrometer screw,** of bronze, reading to $^1/_{100}$ millimetre; measuring 10 millimetres *(fig.)*	25
0311.	**Do.** with spring key in order to exert an uniform pressure on the object to be measured	35

Mounted on a cast-iron foot 3 fr. extra.

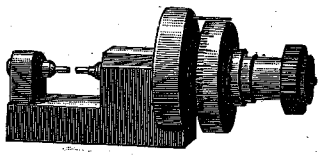


0304

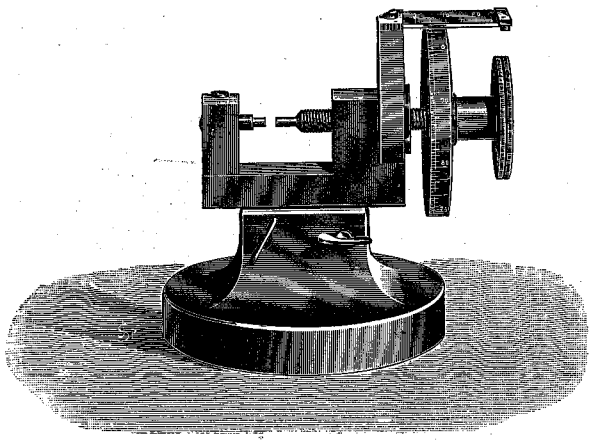
0312.	**Do.** larger size for measuring with an approximation of $^1/_{200}$ millimetre *(fig.)*	50
0315.	**Palmer's screw Calliper,** of steel, opening 30 millimetres, approximation $^1/_{20}$ millimetre	25
0316.	**Do.** of steel, opening 15 millimetres, approximation $^1/_{10}$ millimetre	22
0317.	**Do.** of bronze, giving $^1/_{20}$ millimetre, opening 25 millimetres; in a case	18
0318.	**Do.** of bronze, opening 10 millimetres *(fig.)*	15



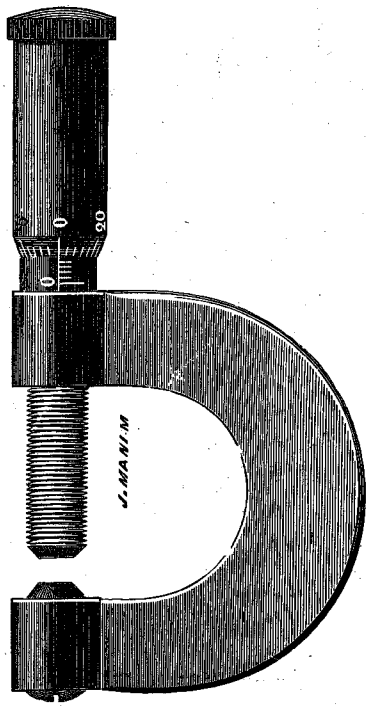
0305



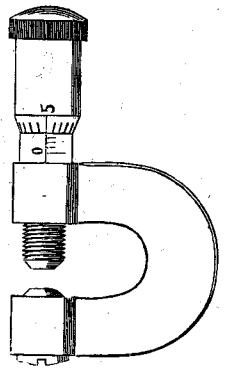
0310



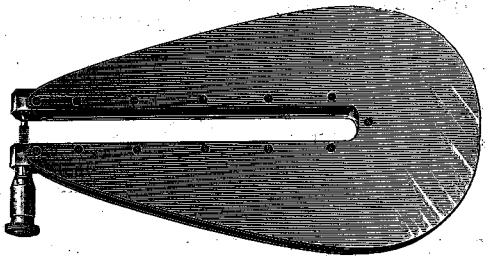
0312



0317

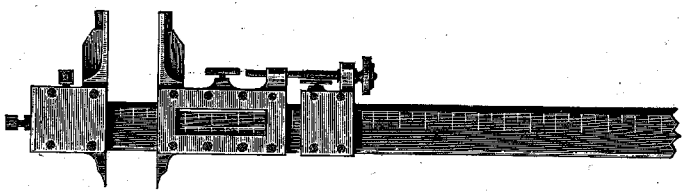


0318

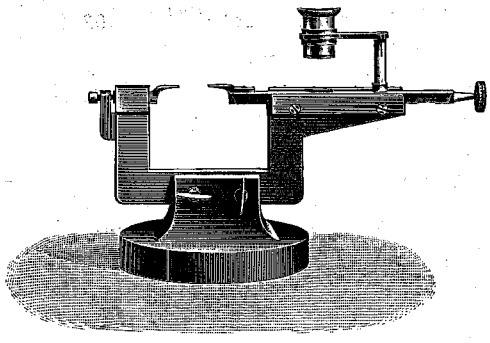


0319

Nos		Francs
0319.	**Screw Calliper for measuring plates;** price according to sizes *(fig.)*	
0320.	**Slide Calliper** of precision, for measuring up to 270 millimetres in length, rod of nickel-steel divided into $^1/_5$ millimetre, vernier giving $^1/_{100}$ millimetre. In a box *(fig.)*	200
0321.	**Do.** of German silver, 25 centimetres long, with vernier reading to $^1/_{20}$ millimetre and regulating screw	50



0320



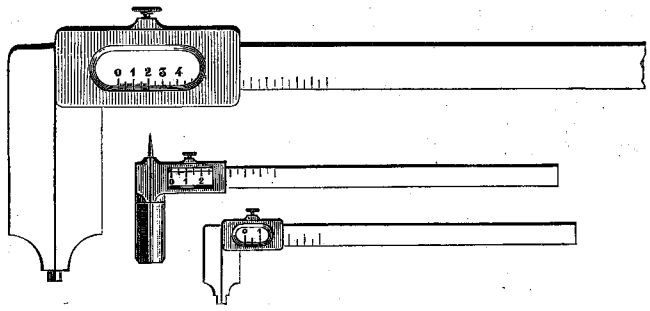
0330

0325.	**Slide Calliper Pin-footed,** for drawing, of steel, 30 centimetres long, divided into millimetres with vernier reading to $^1/_{20}$ millimeter *(fig.)*	40
0326.	**Do.** with regulating screw	45
0330.	**Do.** on stand, measuring up to 45 millimetres with an approximation of $^1/_{50}$ or $^1/_{100}$ millimetre according to order and designed to be used horizontally or vertically *(fig.)*	60
0331.	**Do.** same instrument than the preceding one, measuring up to 60 millimetres	90

Nos | Francs

0335. **Mechanician's inside Calliper** of steel, very useful size 25 centimetres long, scale divided into millimetres vernier reading to $^1/_{10}$ millimetre, length of nibs 45 millimetres. The tips are hardened and worked out exactly, 10 millimetres thick, which allows of taking inside measurements with accuracy 25

0336. **Do.** same model as the preceding one; the cursor is adjusted in such a way that it can be turned end to end for the measurement of heights. Scale on both sides 35



0345. **Large Calliper of steel for the workshop,** divided into millimetres with an allowance for the shrinking of cast-iron and brass; scale 500 millimetres long, nibs 125 millimetres *(fig.)*. . . . 100

0346. **Do.** The same 1 metre long; nibs 15 millimetres . . . 250

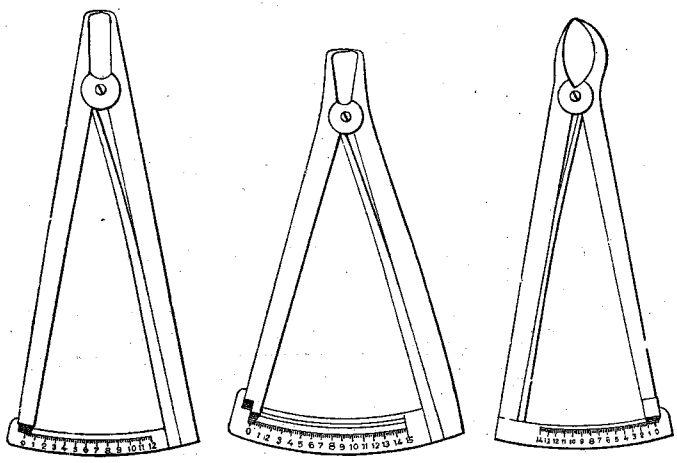
0355. **Double Compass, called twelfth's Measures.** Frequently employed in watchmaking. The scale is divided on one side into fifths of millimetre and on the other into $^1/_{12}$ of lines. Measures up to 12 millimetres. The scale corresponds exactly to the chord contained between the tips of the tool; these tips may be symmetrical or different *(fig.)* 17

0360. **Double Compass,** symmetrical nibs, similar to preceding, stronger construction, the tool is divided of the same side into $^1/_{24}$ of lines and into $^1/_{10}$ of millimetre *(fig.)* 19

0365. **Do.** with symmetrical points, reading to $^1/_{10}$ or $^1/_{20}$ millimetre *(fig.)*. 19

Nos | Francs

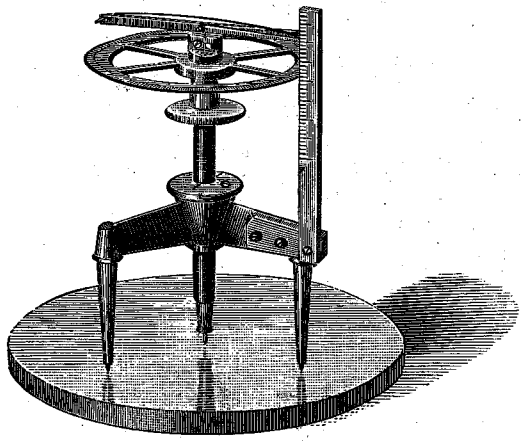
0380. **Cylindrical Calibers,** for inside and outside measurements, either of steel or cast-iron according to sizes. Price according to exactness and dimensions required.



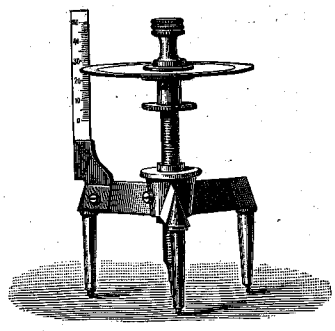
0355 0360 0365

0390. **Spherometer** with micrometer screw and with double index lever; the pitch of the screw is $^1/_2$ millimeter and the circle is divided into 500 divisions; with the glass stand *(fig.)* 135

0395. **Do.** of smaller dimensions than the preceding with index lever *(fig.)* 80



0390



0395

Nos | Francs

§ 04. Measurement of Angles, Areas and Volumes.

0400. **Protractor** in half circle of 18 millimetres with glass centre and alidade exceeding the circle, reading to $^1/_2$ minute 40

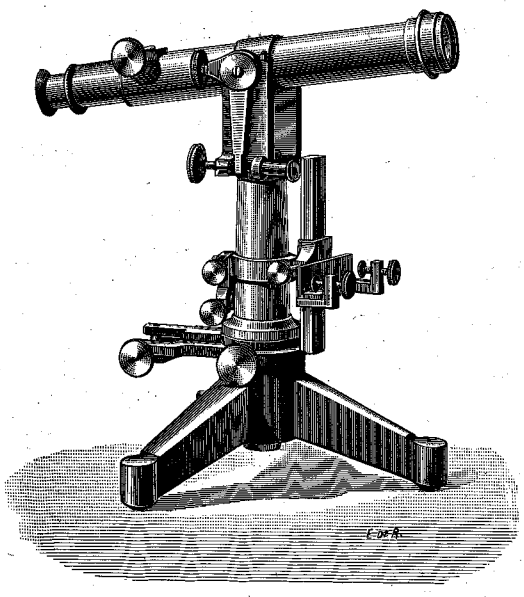
0401. **Do.** in half circle of 25 centimetres, reading to 1 minute . 60

0402. **Do.** with adjunction of a stop screw and a regulating screw on the alidade 76

0403. **Do.** as the preceding one but with a complete circle . . 86

0405. **Straight Vernier of wood,** lecture room model 10

0406. **Do.** circular 15



0420

0410. **Pointing Telescope.** The telescope is mounted on a round brass column, without scale, 35 millimetres in diameter, and 115 centimetres high; the telescope of 25 millimetres aperture can be pointed in all directions 160

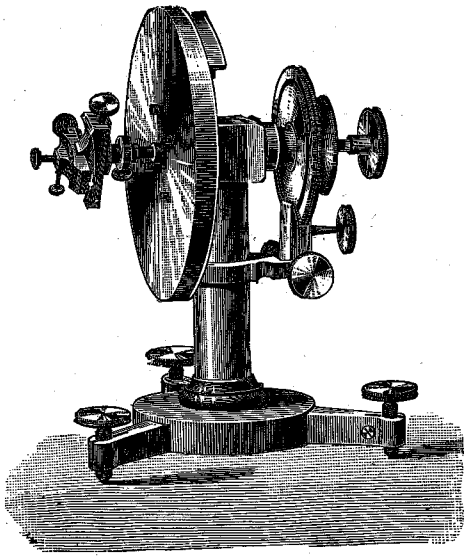
0415. **Do.** Same model, column 65 centimetres high 130

0416. **Adjunction** of a lens in front of telescope for short distances . . . 12

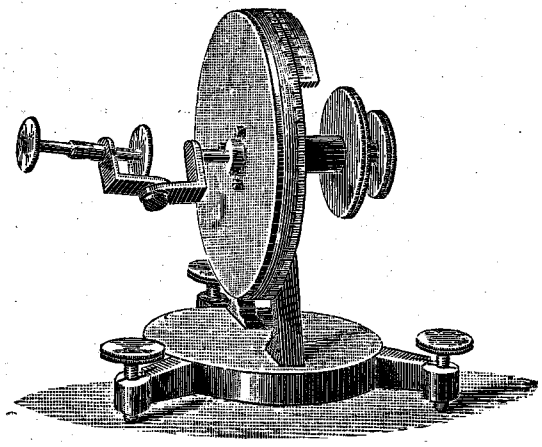
0418. **Do.** with steel column 140 centimetres high 320

0420. **Pointing Telescope,** with graduated paper scale to observe mirror instruments, 27 millimetres aperture *(fig.)* 150

Nos		Francs
0421.	**Pointing Telescope,** 33 millimetres aperture	185
0422.	**Do.** 40 » »	230
0423.	**Do.** of plainer construction, telescope of 27 millimetres aperture.	120
0430.	**Wollaston's Goniometer,** for measuring angles of crystals, on a stand with three levelling screws, vernier reading to one minute *(fig.)*	100
0431.	**Adjunction** of a black mirror on the foot of the instrument . . .	15



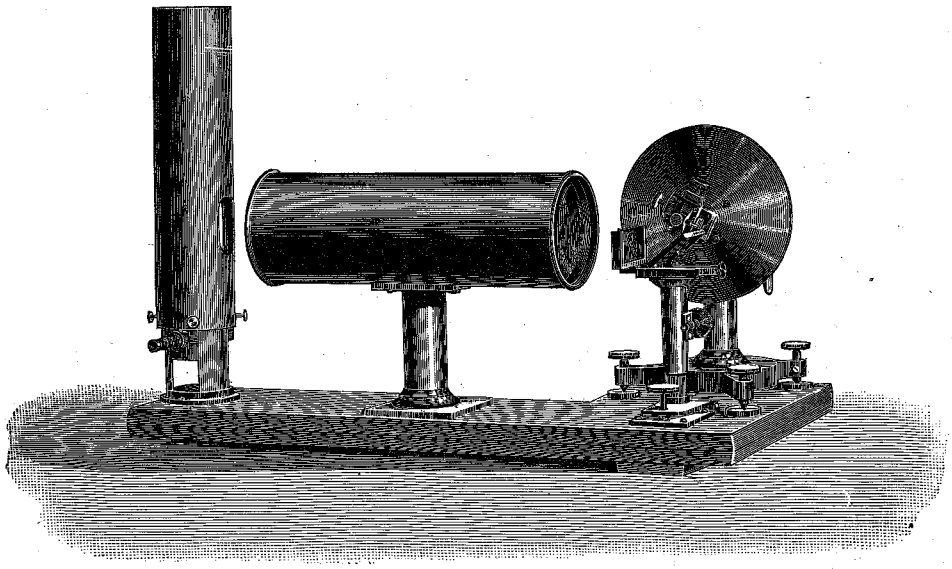
0435



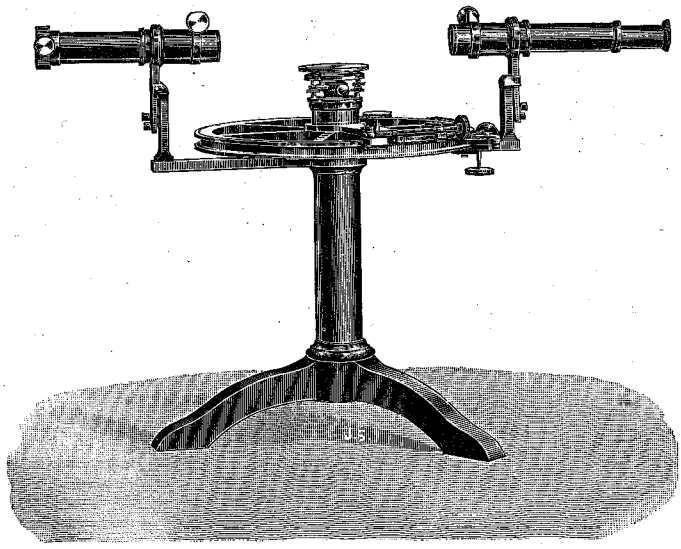
0430

0435.	**Wollaston's Goniometer,** larger model, circle 140 millimetres in diameter, with regulating screw, apparatus for centering crystals and vernier reading to 30 seconds *(fig.)*	230
0436.	**Do.** improved by Mallard. Same model as preceding with the addition of a collimator with slit of various forms and an adjustable support for the black mirror *(fig.)*	380
0440.	**Babinet's Goniometer,** classical model with circle 180 millimetres in diameter; vernier reading to one minute with prism. This instrument, provided with telescopes of 19 millimetres aperture and 135 millimetres of focal distance, may be used without modification as spectrometer	240

Nos Francs



0436



0440

0445. **Reflection Goniometer.** Large model with circle 230 millimetres in diameter divided on silver and reading to 10 seconds by two verniers. The circle and the observing telescope have each an independent movement round the central axis and are provided with regulating screws.

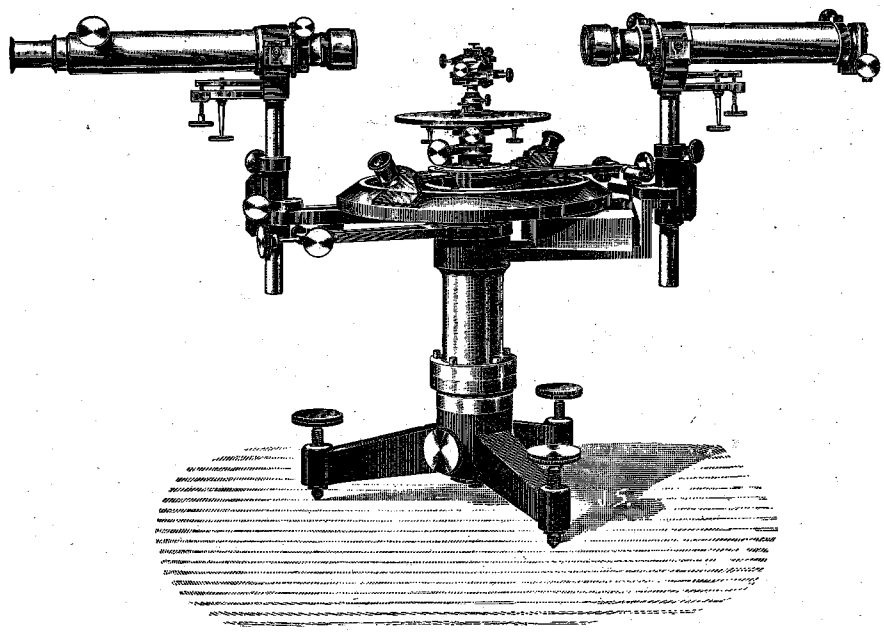
Nos | Francs

Measurement can thus be taken in the two following manners :

1° By clamping the circle, which bears the crystal and moving the telescope alidade;

2° By clamping the telescope alidade and moving the circle with the crystal.

Centering apparatus for crystals. The apparatus is provided with several oculars and several slits for the collimator; telescope of 31 millimetres aperture and 270 millimetres of focal distance; the observing telescope is provided with a complementary objective for the adjustment of objects to be examined *(fig.)*. 1000



0445

0450. **Reflection Goniometer.** Similar model as preceding; circle 150 millimetres in diameter, reading to 20 seconds. Telescope 27 millimetres aperture. Designed to be used also as spectroscope; with an ocular micrometer or a scale telescope *(fig.)* 600

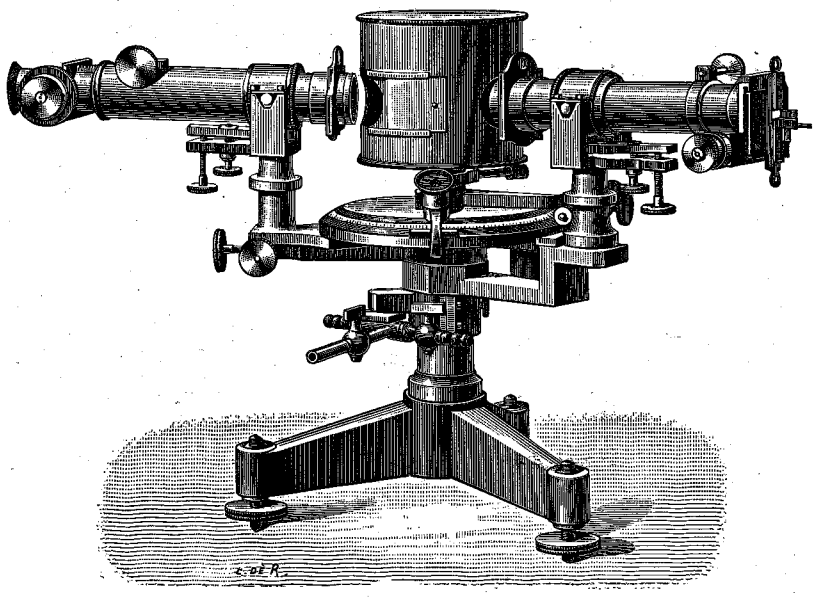
0451. **Reflection Goniometer,** without the ocular micrometer . . 550

0455. **Goniometer,** laboratory size with circle 15 centimetres in diameter, divided into thirds of degrees on German silver, verniers reading to 30 seconds, telescope 22 millimetres aperture and 160 millimetres of focal distance *(fig.)* 380

0456. **Adjunction** to three preceding models of a support for centering crystals 75

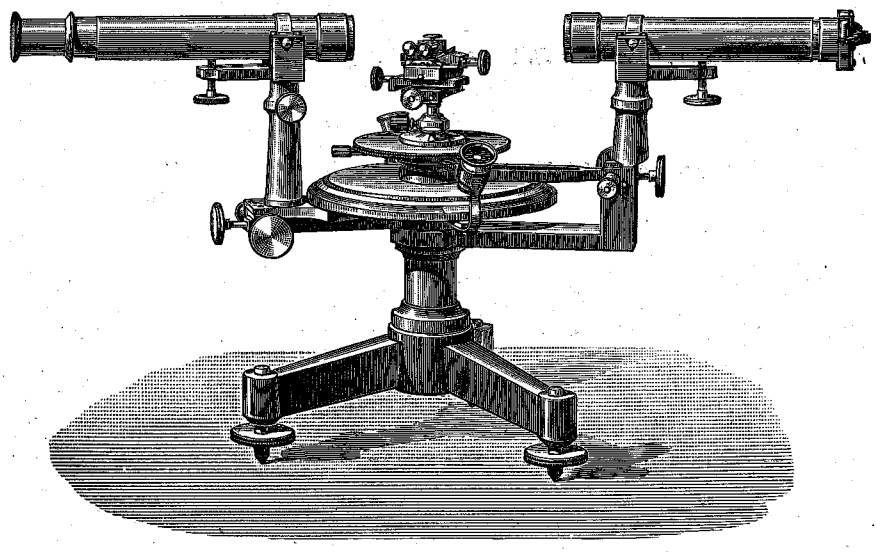
0457. **Do.** of a complementary objective facilitating the adjusting of the crystal 20

Nos Francs



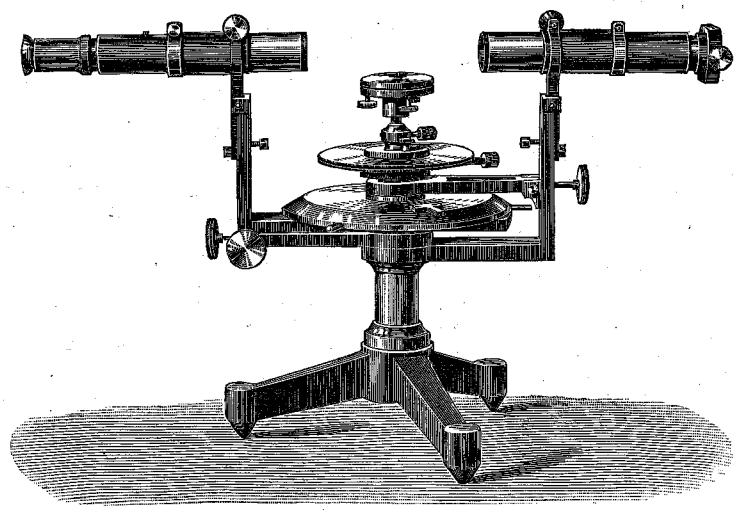
0450

0460. **Reflection Goniometer,** student model; divided on brass into $^1/_2$ degrees, vernier reading to one minute, telescope of 19 millimetres aperture and 135 millimetres of focal distance *(fig.)* 260



0455

Nos | Francs



0460

0465. **Amsler's Planimeter,** of German silver, giving the surface of a plane area of any shape in square centimetres or in square inches according to order. The largest area that can be measured at one time is that of a circle 62 centimetres in diameter 56

0466. **Do.** same instrument for measuring areas on a map drawn at any scale, without having to take the scale into account. Very convenient for surveyors and civil engineers. 70

0467. **Do.** for finding the mean ordinate of the steam engine diagrams 80

0490. **Regnault's Volumenometer** 120

§ 05. Dynamometers.

0500. **Poncelet's straight Spring Dynamometer.** Circular dial indicating up to 25 kilograms *(fig.)* 150

0510. **Spring Balance or Dynamometer,** with helicoidal spring, also designed for the lecture room and measuring up to $^1/_2$, 1, 2 or 3 kilograms *(fig.)* 18

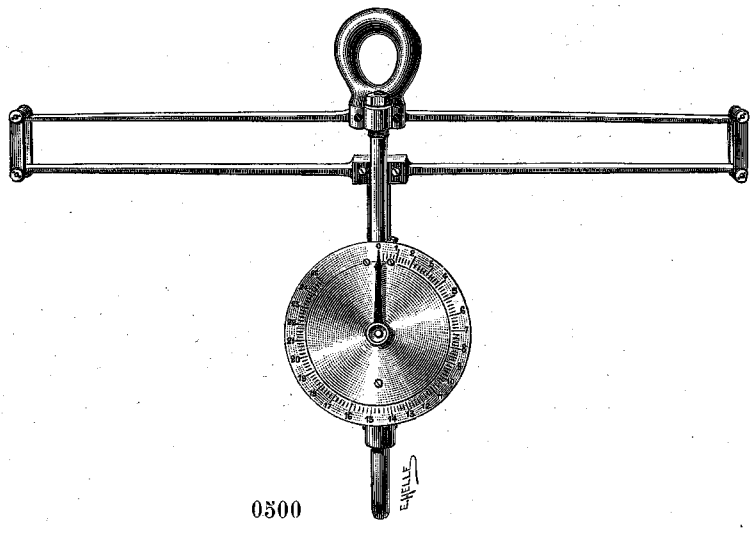
0520. **Dynamometer** with crank, model for lecture 200

0530. **Morin's Rotary Dynamometer,** with registering apparatus *(fig.)* 750

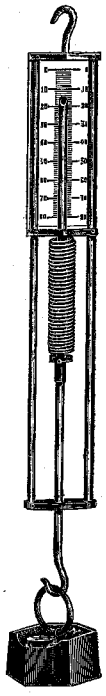
§ 06. Analytical Scales. Standard Weights.

0600. **Large analytical scales,** mounted on a cast-iron stand which makes the scales independent of its glass case. Length of beam 50 centi-

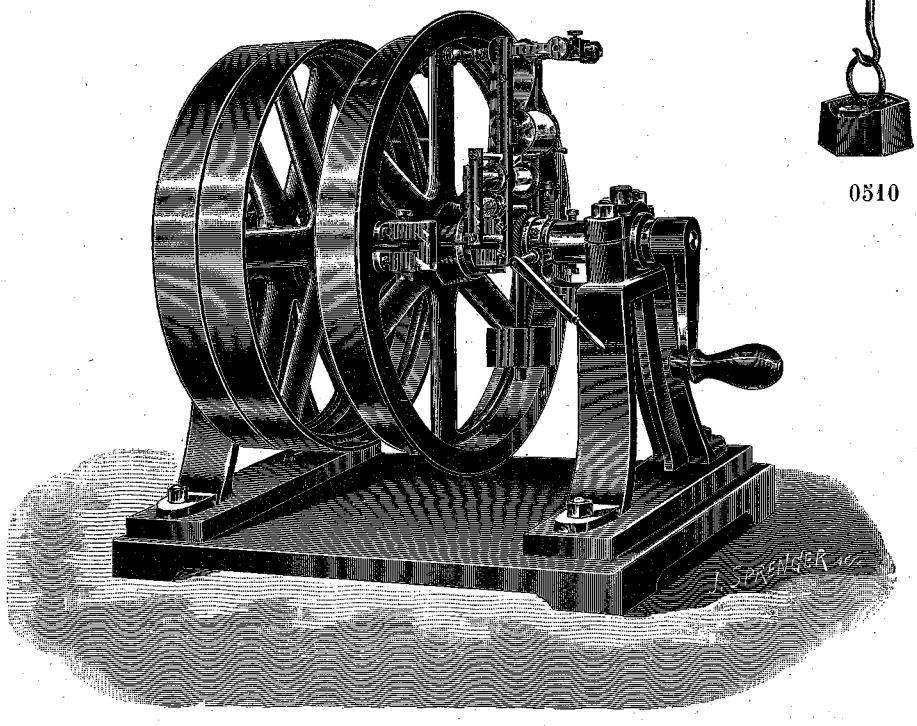
Nos		Francs
	metres, the knife edges are of steel and rest on agate bearings; sensitive to 0.2 milligrams with a maximum load of 1 kilogram in each pan; index for estimating fractions of a milligram; spirit level . . .	900



0500

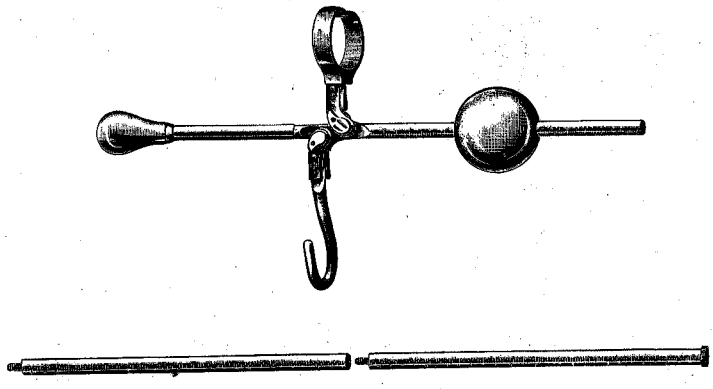


0510



0530

Nos		Francs
0605.	**Analytical and Assay Scales,** mounted in the same manner as the preceding one; beam 400 millimetres long; sensitive to 0.5 milligram with a maximum load of 500 grams in each pan; index, spirit level.	550
0610.	**Assay Scales for Chemists,** length of beam 200 millimetres; capacity 250 grams; sensitive to 0.5 milligram; case with glass doors .	280
0615.	**Do.** small size, length of beam 235 millimetres, capacity 200 grams, sensitive to 1 milligram; glase case.	170
0620.	**Small Roman or Pocket Scales,** for weighing children up to 10 kilograms	50



0620

0625.	**Hydrostatic Scales,** large model mounted on a cast-iron tripod, capacity 1.5 kilogram in each pan, sensitive to 1 milligram; beam 410 millimetres long. Height of shelf regulated by a rack and pinion within the limits of 15 centimetres; spirit level, two pairs of pans . .	300
0630.	**Do.** small model. Cast-iron tripod; capacity 0.75 kilogram in each pan; sensitive to 10 milligrams	220
0650.	**A Standard Kilogram** in a box	80
0655.	**Box containing a 500 grams Standard Weight,** and 500 grams in fractions; also the gram in fractions down to 1 milligram, of platinum.	100
0660.	**Box of 200 grams** in fractions as above	80
0661.	**Box of 100 grams** » »	60
0662.	**Box of 50 grams** » »	55
0663.	**Box of 20 grams** » »	50

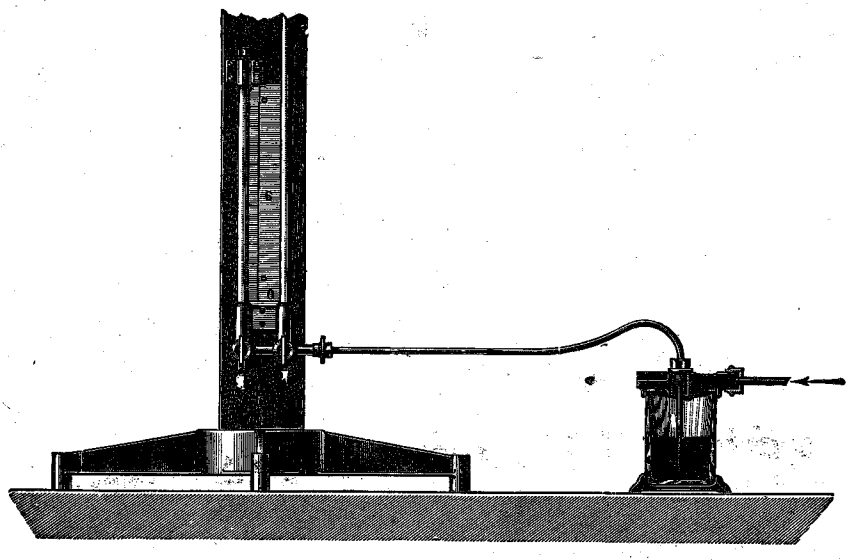
Weights heavier than one gram are made of golden or platined brass.

Nos | Francs

0665. **Box** containing only one gram and its fractions down to one milligram, in platinum, with ivory tipped plyers 30

§ 07. Manometers.

0700. **Mariotte's Apparatus** for pressures up to three atmospheres. This apparatus is designed to let the mercury rise in the tubes, by compressing the air above the mercury contained in a special recipient. Thus a column of mercury is obtained free from air bubbles and the operating is much more expeditious. If necessary the tube may be prolonged about 1 metre *(fig.)* 200



0700

0705. **Open Manometer** for the vacuum and pressures up to one atmosphere. Regnault's model with brass scale 130

0710. **Do.** for pressures up to two atmospheres 180

0715. **Do.** up to five atmospheres 300

0720. **Manometer for the Vacuum with Comparison Barometer.** The barometrical tubes are fixed parallelly on a support and plunge into the same bowl. The manometrical tube is provided with another tube and a cock for connecting it with various apparatus. A millimetric scale placed behind these tubes indicates the degree of rarefaction. Tripod with three levelling screws 120

0725. **Do.** of larger dimensions as the preceding number and

Nos | Francs

mounting entirely metallic; tubes 11 millimetres inside diameter, reads to $^1/_{20}$ millimetre 250

0730. **Precision Manometer,** with complete barometrical column, for pressures approaching vacuum. The comparison barometer and the manometrical tube plunge into the same bowl. The diametre of the mercurial columns is about 12 millimetres, the scale reads to $^1/_{20}$ millimetre by means of a vernier.

The scale may be regulated in height in order that its zero coincides with the quicksilver level of the bowl. 500

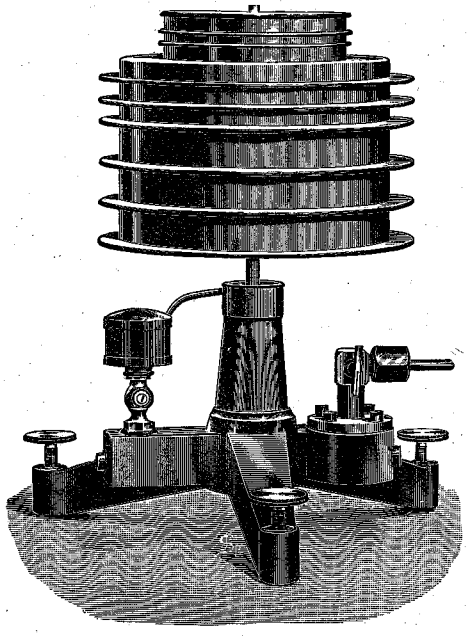
0735. **Closed Manometer for pressures,** up to nine atmospheres; lecture room model, crystal bowl, cast-iron mounting . . . 45

0740. **Manometer,** model like preceding fitted with an open tube. This model enables students to compare the two sorts of manometers . . . 60

0750. **Truncated Manometer,** can be placed under a pump receiver 20

0755. **Do.** on a pedestal, covered with a bell shaped glass tube and fitting to pneumatic pumps by means of a rubber or copper tube . 35

0760. **Marex's manometer;** the compressed gaz or the liquid is connected, by a cock, with the bottom of a vertical cylinder filled with oil; the upper part of the cylinder is closed by a plunging piston laden with weights for counterpoising the pressure of the fluid. The section is so calculated that one kilogram of the load corresponds to one atmosphere of pressure; for 25 atmospheres; with metallic manometer *(fig.)* 350

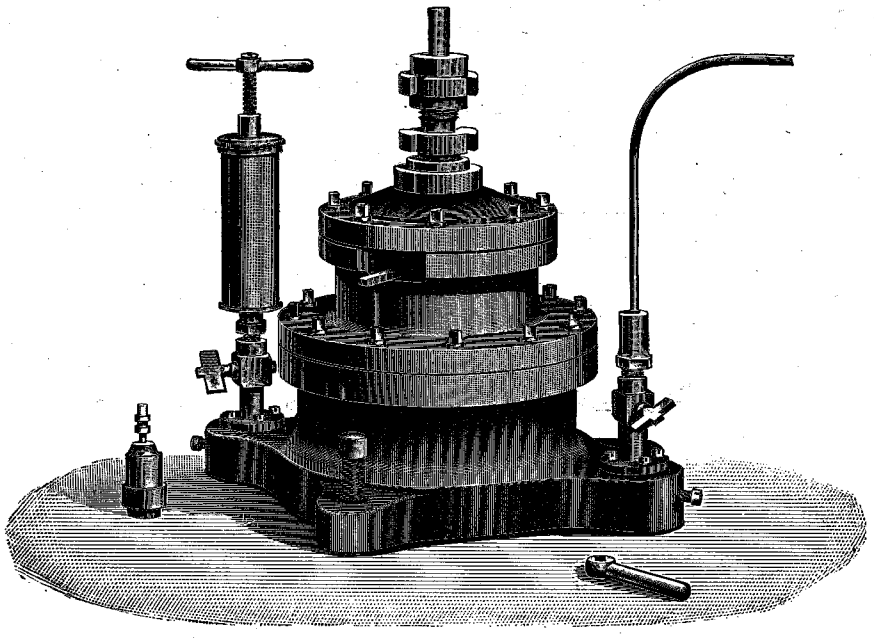


0760

0761. **Amagat's manometer,** allowing the measuring of pressures up to 2000 or 3000 atmospheres. The exactness of this manometer being the more great that the report of the two piston's section is small and that the height of the mercury manometer is bigger. It matters to know the maximum pressure which is

Nos | Francs

to be measured in order to built the manometer in the best conditions of sensibility *(fig.)*. 860



0761

§ 08. Pendulums.

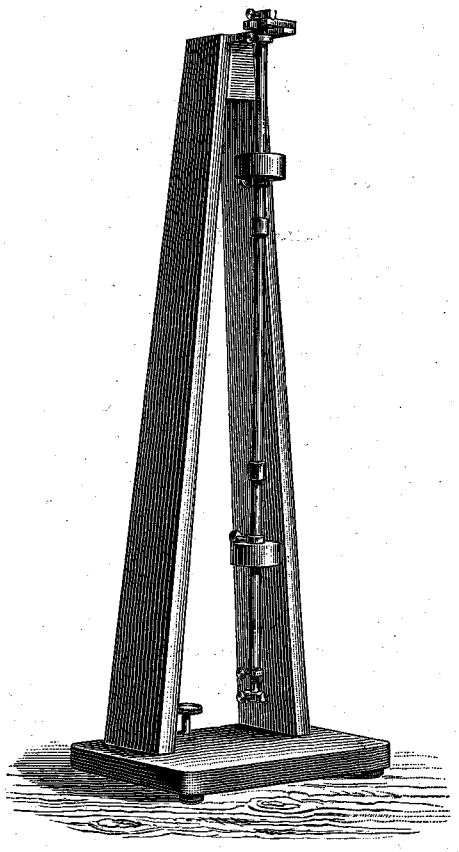
0800. **Support with four single pendulums** of different lengths and substances, the longest one beating seconds. 40

0805. **Reverting pendulum** for the lecture room with explanatory notice. The apparatus made entirely of brass and steel allows a complete verification of the general laws of the compound pendulum's motion on which rest all systems of reverting pendulum. The length of the apparatus is such as to produce an oscillation in $^3/_4$ of a second *(fig.)*. . . 125

0810. **Kater's pendulum.** Reversible pendulum beating seconds. Time of vibrations is measured by the method of coincidences; with case . . 280

Nos | Francs

0815. **Bessel's reverting pendulum.**
The time of a single vibration of the pendulum is about three quarters of a second *(fig.)*
Price on demand.

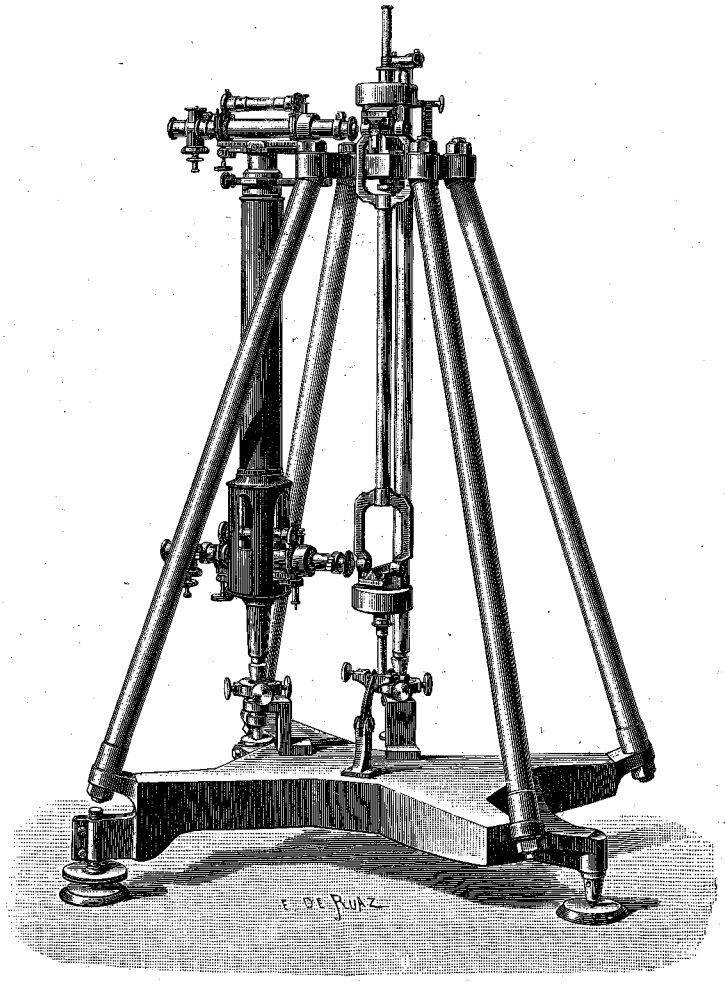


0805

0820. **Borda's compound pendulum** to determine the time of one vibration. Iron support fastened to the wall; agate bearings, levelling screws; spherical bronze bob 80 millimetres in diameter.
Without the clock 300

0825. **Pendulums** for lectures or for clocks.

Nos		Francs
	Mercurial compensation pendulum	120
	Leroy's pendulum	120
	Gridiron pendulum	120
	Deal and zinc compensation pendulum	80



0815

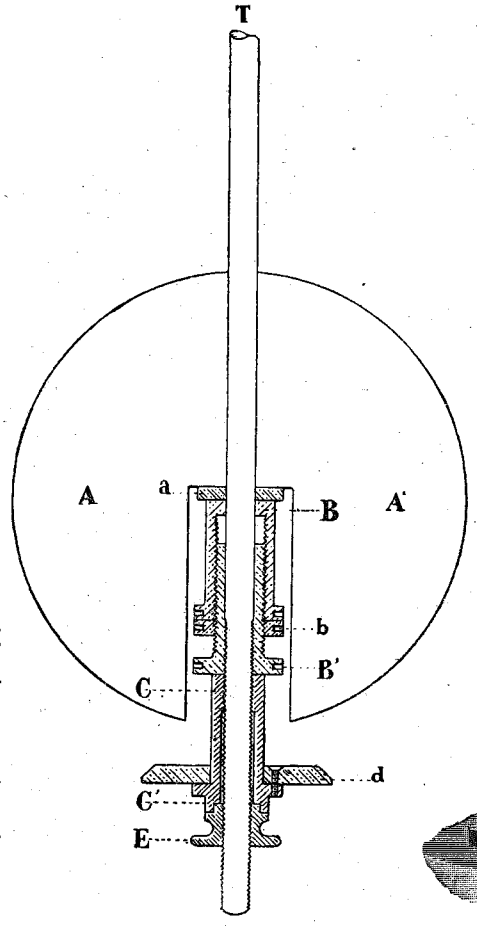
0835. **Pendulum of invar** (see page 28), brass compensating tube *(fig.)* 130

0840. **Graham's Anchor Escapement,** lecture room model. Escapement wheel 10 centimetres in diameter; pendulum beating seconds or half seconds *(fig.)* 170

Nos | Francs

0841. **Graham's Anchor Escapement,** the same, with iron support *(fig.)* 200

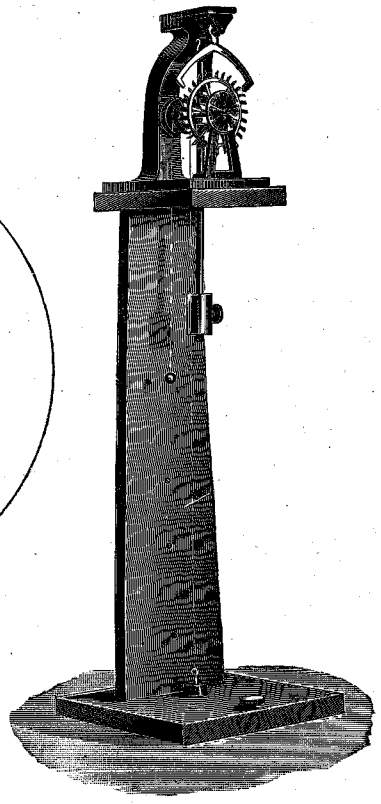
0845. **Lepaute's Peg Escapement.** Same dimensions as the preceding *(fig.)* 150



Explanation.

T. Cylindrical rod of the pendulum of invar alloy.
AA'. Bob of cast-iron.
a. Ring of the same metal.
BB'. Compensating tube of brass, of regulating length.
CC'. Regulating-nut with graduated disc.
E and b. Check-nuts.

0835

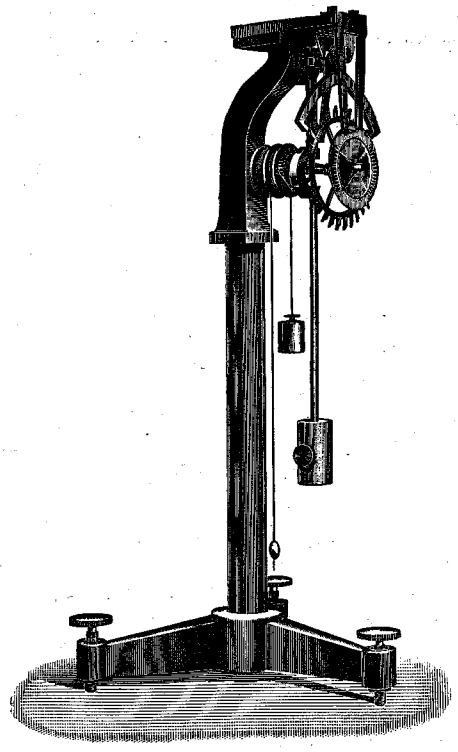


0840

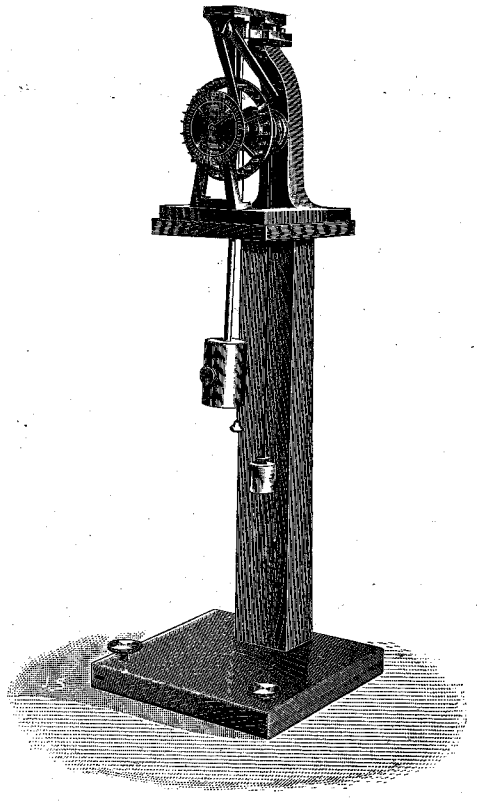
0850. **Model of Escapement** of wood of large dimensions. Cylinder, duplex, anchor, mainspring. Each 100

Electric Regulator, Campiche's system, see *Electricity,* chap. 3.

Nos | Francs



0841



0845

§ 09. Metronomes, Tuning Forks, Chronographs, Chronometers.

0900. **Metronome** 20

0905. **Tuning Fork** $ut_4 = 1024$ single vibrations, mounted on its resounding chest 45

0906. **Do.** $ut_3 = 512$ single vibrations, do 45

0907. **Do.** $ut_2 = 256$ » » do 110

0908. **Do.** $la_3 = 870$ vibrations. French official diapason . . . 45

0910. **Chronograph Diapason,** electrically supplied; used with registering apparatus.

of 100 single vibrations 120

0911. **Do.** 128 do 120

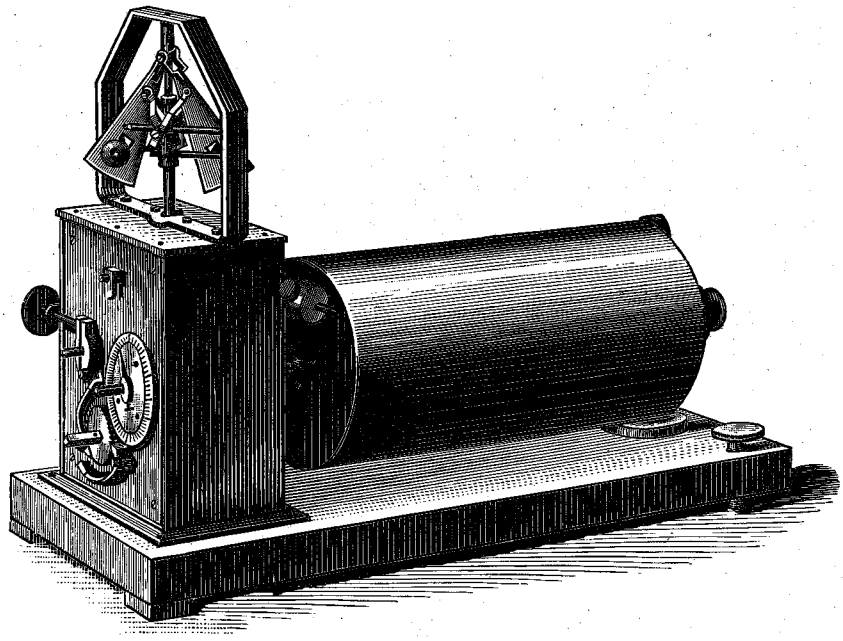
0912. **Do.** 200 do 110

0913. **Do.** 256 do 110

0914. **Do.** 500 do 110

0915. **Do.** 512 do 110

Nos		Francs
0920.	**Clock-work Movement** with registering cylinder and Foucault's regulator; with three rates of speed *(fig.)*	660
0921.	**Do.** with regulator of plainer construction	600
0925.	**Marey's Lever registering Drum**	50
0926.	**Do.** with a regulating screw	70



0920

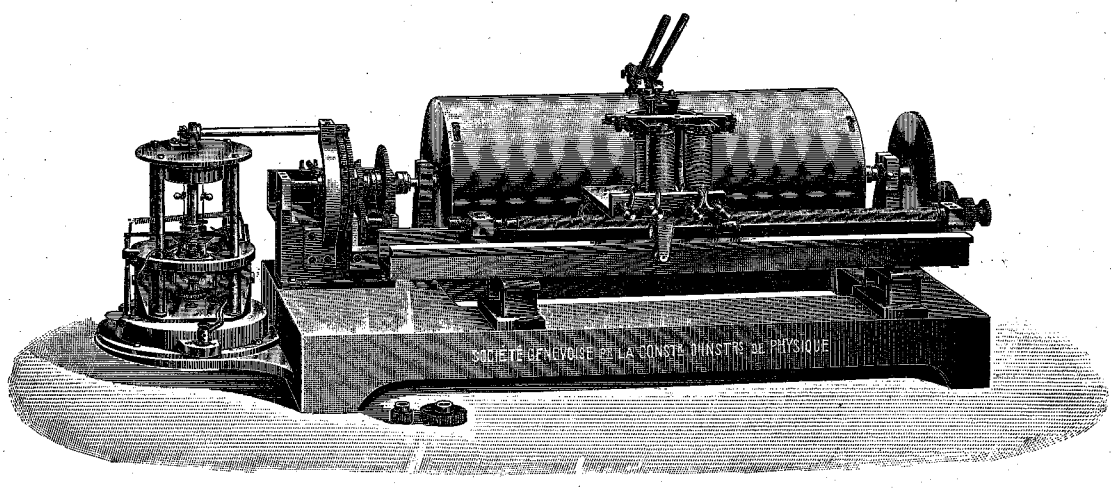
0930. **Chronograph,** with R. Thury's electric motor and regulator. Screw carriage with variable speed bearing two pens, which are run by electro-magnets. The speed of the cylinder can be easily changed : one turn of the cylinder every minute, every 10 seconds or every second *(fig.)* . 1250

0935. **Do.** the same instrument for two different speeds. The cylinder revolves in 1 minute or in 10 seconds 1200

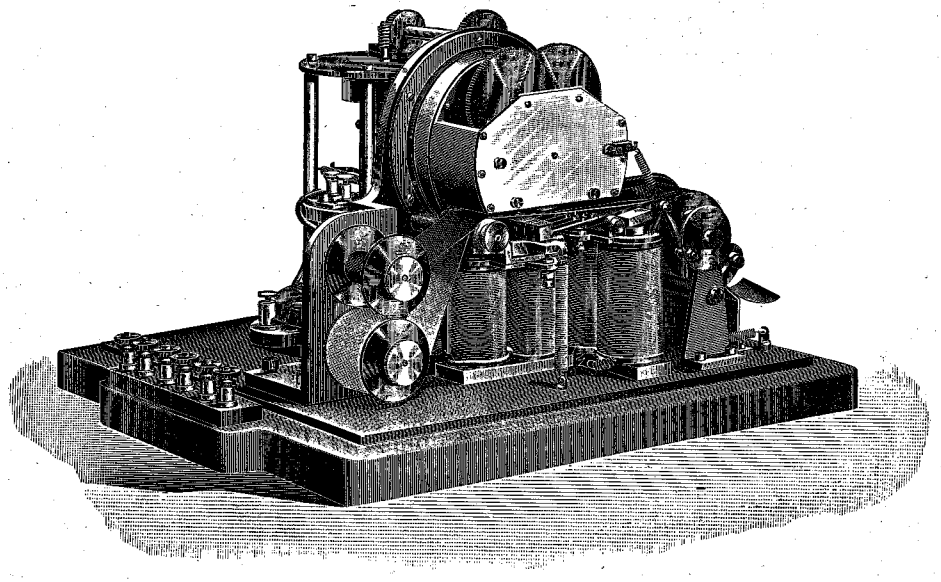
0940. **Printing Chronograph,** for observatories with a synchronisation contrivance which must be commanded by a sideral clock; the chronograph is provided with 3 discs ciphered at their periphery which print directly on a paper band minutes, seconds and hundredth of seconds, the advancement of the paper band is obtained automatically after each print. The chronograph is worked by means of a small R. Thury's electric motor, glass case in order to protect the mechanism from dust *(fig.)* 1700

(See more detailed description at the catalogue's end.)

Nos		Francs
0950.	**Model of the Regulator** of marine chronometers, comprising balance, hair-spring and escapement; to serve for the demonstration of laws of vibratory motion in chronometers. Balances of different weights and diameters. Hair-spring can be changed	1000

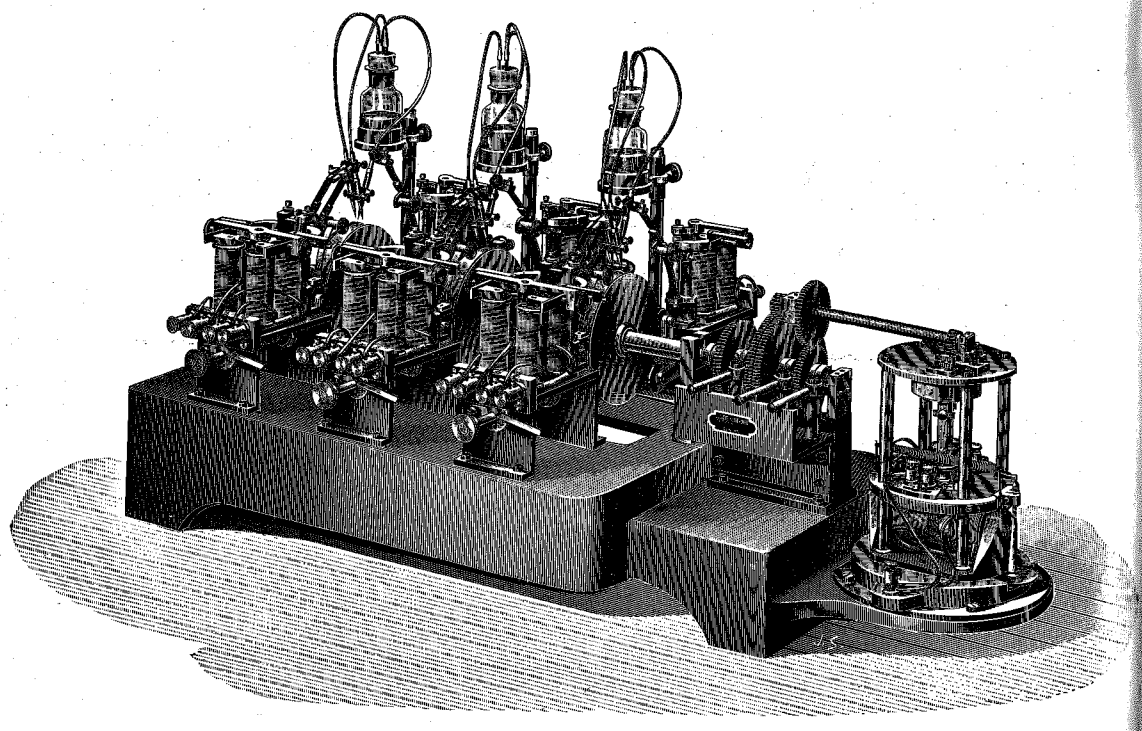


0930



0940

Nos		Francs
0955.	**Precision Clock,** mounted in a case, going eight days; Graham's escapement and mercurial compensation pendulum	800
0960.	**Chronographs** for registering several different phenomenons. Price on demand *(fig.)*. The chronograph that represents the design allows of registering 9 phenomenons.	



0960

0970.	**Portable Accumulator** of **4 volts,** capacity 20 Amperes-hours, may be used for working chronographs N° 0930 and following .	30
0990.	**Secondmeter** giving $^1/_{10}$ second and small dial of 5 minutes . .	55

PRINTING CHRONOGRAPH

This instrument destined to astronomic observations, rests upon the following principle : Three discs bearing at their periphery relief figures turn in front of a paper band receiving prints. The first disc ciphered from 0 up to 99 turns once a second. The fraction of the second is then noticed to one hundredth of second. The second disc gives the whole second, it turns once a minute and bears figures from 0 up to 59 ; the third is identical and turns once an hour it gives the whole minute. The latter is mounted at friction on its axis in order to be timed This chronograph is worked by means of a small direct current motor (8 volts) with a very sensible centrifugal regulator that gives to it a steady speed. The motor when going, is regulated for making turn the tambour giving the fraction of second with a speed of about one turn in 0.990 second. A special contrivance allows of synchronising the chronograph each second. It must be connected with a sideral clock giving or cutting a current each second which, by means of a click worked by an electro-magnet, disengage the motor's transmission to the discs during a very short time (0.010 sec. if the disc of second's fractions makes 1 turn in 0.990 second). In this manner the error between the real time and the time read to the printing chronograph never exceds 0.010 second. This error may be still diminished by a good regulating of the motor's speed. The print's mechanism is worked by a hand interruptor (an electric bells's button is enough) by means of which the oparator shuts the circuit of an electro-magnet whose armour throw light hammers pressing between them and the ciphered discs a band of white or carbon paper.

The contact of the paper against the discs is so instantaneous that figures are printed with a perfect clearness in spite of their rotation's speed.

The electro-magnet's armour taken back in its rest's position by means of a spring promotes automatically the advancement of the both bands of paper.

Prints appear as follow :

35	57		42	
34	58	—	43	read : 34 min. 57 sec. $^{43}/_{100}$
33	59		44	
	2			
23	3		74	
22	4	—	75	read : 22 min. 3 sec. $^{75}/_{100}$
21			76	

A stroke index printed at the same time that figures prevents any doubt when reading.

The apparatus is delivered with a glass case in which it must work for protecting it from dust; the paper is unrolled outside the case for allowing reading at any time.

With orders specify exactly if the pendulum with which the chronograph is to be synchronised opens or shuts a circuit each second and besides if it does at each second (some pendulums don't do it at the second 0 of each minute).

In return for a slight additional price of fr. 30.— the chronograph may be prepared for the synchronisation every two seconds. In this case a source of auxiliary current for the working must be foreseen.

ALPHABETICAL INDEX