KARL M. DALLENBACH

A CATALOGUE,

DESCRIPTIVE AND PHOTOGRAPHICAL,

—OF—

Philosophical Instruments,

DEVISED BY

JAMES McK. CATTELL,

Professor of Experimental Psychology,

COLUMBIA COLLEGE, NEW YORK,

For accurately measuring "The least noticeable differences of perceptions" in time, extent, and force of motions; sensations of pain; sensations of heat and cold; pulling strain; sense of weight; binocular vision; divisions of length; duration of the impressions of colors on the retina, etc., etc.,

AND

Manufactured by

J. D. BROWN,

No. 618 North Sixth Street,

Camden, N. J.

618 NORTH SIXTH STREET,

CAMDEN, N. J., 189

Prof.....

DEAR SIR :

In "Publications of the University of Pennsylvania," "Philosophical series No. 2," "May, 1892," "on the perception of small differences," etc: The Editors, Geo. S. Fullerton, Professor of Philosophy in the University of Pennsylvania, and Jas. McK. Cattell, Professor of Experimental Psychology in Columbia College, New York, treat of experiments on the line of "just noticeable differences" in respect to extent, force and time of motion.

The Editors speak on page 29, of accurately made instruments used in their investigations, for measuring "just perceptible differences," devised by Prof. Cattell, and made under his direction by Clay & Torbensen, of Camden, N. J.

These instruments were made by me, as, being at that time an employe of that firm, capable of doing this work, though it was out of their regular line of business. I am not now in their employ, but am engaged for myself, making fine and accurate instruments for experimental work. In doing Prof. Cattell's work I had quite frequent consultations with him, and he had ample chance to judge of my skill as a workman, quickness to understand what he aimed to do, and to assist in devising means to accomplish his wishes. He also understands the circumstances of my leaving Messrs. Clay & Torbensen, and considers it proper that I should seek to obtain contracts for making these various instruments, and therefore kindly gives me the following letter, with the considerate courtesy of sending also an extended list of addresses of Professors at the various Universities, of whom he speaks as interested in this line of investigation, by which I am able to address you:

A Copy of a Letter of Prof. Jas. McK. Cattell.

Columbia College,

New York, March 16, 1892.

During the past three years I have had a number of psychological instruments made in the workshop of Clay & Torbensen, Camden, N. J.

The work was carried out by Mr. J. D. Brown, and I believe the satisfactory results were due to his care and skill.

(Signed), J. McK. Cattell,

Professor of Experimental Psychology.

These above named Instruments are as follows:

No. 1. Is a Falling Weight Instrument.

On a triangular base, having adjusting screws so that they may be made exactly vertical, are two brass columns. These are rigidly attached, and have grooves their entire length, (7 feet,) in their adjacent sides, in which a weight of 9 lbs. is so arranged as to fall *as if in free air*. A handy devise draws the weight to the top of the instrument where it is suspended by an electro magnet. The face of one brass column is divided accurately two meters in length, in millimeters, ½ c. m. and centimeters, and numbered. On the face of the columns are placed, so as to be adjustable at any points, two make and break circuits, by touching the arms of which, the weight in falling, both starts and stops the chronoscope. The weight is stopped at the bottom by a devise which is practically noiseless and free from jar. The instrument is used to correct the chronoscope by the mathematically known time of free falling weight, and for a variety of uses apparent to an experimentor.

$ 22.5

No. 2. Is a Meter (dia.) Wheel.

This wheel is sustained in a substantial metallic frame having at its top an electro magnet; attached to the wheel is a bar weight, which, when the wheel is set for experiment, the magnet holds just off the point of equipoise of the wheel, so that when the magnet current is broken, the weight will cause the wheel to rotate. On the face of the wheel, which is 9 c m's wide, strips of various colors of papers are attached by clasps. These colored strips in passing, are seen through an opening in the upright plate, which has adjustable shutters to enable the experimentor to modify the size of the opening. There are also 2 make and break circuit commutators. This instrument is used to measure the minutest time of the duration of the impression of colors on the retina etc.

$ 125.

No. 3. Time and Extent of Motions.

The instrument is 1 meter long. Through *a*, *b*, *c*, *d*, and *e*, an electric current is passed, which is connected with the chronoscope. A carriage bearing the upright *f*, is adjustable to any place in the length of the instrument. Pressing back the upright, *b*, toward the left, the current is broken, and the chronoscope makes no record; but while a stroke is made from *b* to *f*, the current is connected again and the chronoscope will record, the record ceasing the instant *f* is hit, which breaks the current. The distance between *b* and *f* may be accurately measured, and minute measurements of the judgment of time of motions of a certain extent, can be obtained.

$ 45

No. 4. Extent and Force of Motions.

This instrument consists of a brass base, in which there is a double grooved track, and adjusted to this track is a small, light, four wheeled carriage, the body of which, between the pair of wheels, carries a loop large enough for the insertion of the largest finger of the hand by which the carriage is moved in experimenting on judgment of small differences in *extent* of motion. The face of the brass base is divided accurately to millimeters, for the length of one meter from O point, and the divisions are numbered. A light, frictionless index point is attached, which is left at the point where motion ceases; *this* index is moved by an arm extending from the carriage. To test judg-

ment of relative *force* of motion two weights are used alternately, one of 100 grms. and one of 1 kilogram. These weights hang over the large pulley at the foot of the instrument, by a cord which is hooked to the carriage. $40

No. 5. Is a Falling Pendulum.

To test small differences in mental perception and muscular record of motion. The photo is perhaps description enough of this instrument. The pendulum is held in the position for dropping by an electro-magnet at the top, *a*, just off the line of equipoise. It falls by an opening, *b*, which is capable of adjustment to various forms and dimensions by shutters acting in 4 directions. At *c* is placed a make and break circuit commutator, which starts the chronoscope the instant the pendulum is central with the opening at *b*, then the chronoscope is stopped by the observer. $35.

No. 6. Is a 25 Kilogram Dynamometer.

This instrument is intended for measuring minute differences of judgment of pulling strain. It is essentially a specially accurately made spring balance. The draft is by the finger hook at *a*, or by handle *b* attached in its place, and is registered on the scale, *c*, to the amount of 10 kilograms. To avoid an inconveniently long pull for greater weight resistance, a rod is provided at *d* by which the *starting* pressure of the spring may be raised to any pressure from 0 to 15 kilograms, and indicated on the scale *e*. Then when the hook or handle are pulled, the pressure registered at *c* added to that at *e*, gives the total. An adjustable thumb-rest and stop for facilitating finger draft are provided at *g*. $45.

No. 7 Is a 10 Kilogram Dynamometer, of the same dimensions and workmanship as No. 6, except that it registers only on one scale which is 10 c. m. in length, and gives finer divisions of the kilogram for minuter and lighter tests.

No. 8. Is a 50 Centimeter Rule. $40.

This rule has on its divided side a carriage which is capable of being set with facility at any place. The reverse to the graduated side is made a uniform dead black, so that there are no catch points to guide the judgment. Across this surface at right angle to the length of the rule, is stretched, from points on the carriage, an extremely fine platinum wire. Now if a person with the black side toward him attempts to set the wire at any point, say ½, ¼, ⅓, or any other, the index point on the graduated side will record the measure of his judgment to a millimeter of length. $14.

No. 9. An Instrument to Test Small Differences in, Mono or Binocular Vision.

At one end of a box 7 inches square are eye holes, at which both eyes may be used at once or each singly, and a chin rest, adjustable, to hold the line of vision steady; at the other end a plain ground glass 7x7. Midway is placed a diaphragm orifice, 5 cms. square, so placed as to exactly include the 7 x 7 glass in the field of vision. Then on the upper and under sides of the box at the ground glass end, are two dark chambers, each enclosing a slit, 50 cms. long by 4 cm². wide, through into the main chamber of the 7 x 7 in. box. To each of these slits is attached a metal plate, having in it 4 fine slits cut through, each 1 m.m. wide, 50 cms. long, and 1 cm. apart, these are parallel with each other, above and below. In these slits are hung minute silk threads, suspended by a

button above, and drawn tight by a light weight at the lower end. The experimentee sees these threads against the ground glass, and as they may be set at an infinite variety of places without his knowledge of the direction or extent of change, a ratio of his judgment of relative place may be deduced by accurate measurements. $35.

No. 10 Is a Dynamometer to Measure Small Differences of Judgment of Intensity of Pain. *

A piston drives back an accurately made spring in the body of the instrument. The amount of pressure is indicated on a graduated scale by an independent index, which stops and stands where pressure stops, and the scale is capable of indicating the force used in ¼ kilograms up to 15 kilograms. The subject of the experiment is tested at centers of sensation. $15.

No. 11 Is an instrument to Test Minute Sensations of Heat and Cold.

A metallic chamber, made water tight, is enclosed in a dead black wooden case, packed between with asbestos. A point of the metal 1 mm. in diameter and turned to the form of ½ sphere, protrudes through the wood at the tip of the cone end. The experiments are made with ice or hot water in the chamber. $15.

No. 12 Is One Set of Light Weights.

These weights are of uniform size and appearance; but weigh, grms: 100, 101, 104, 112, 116, 120. They are designed for testing smallest perceptions of variations in weights. $10.

No. 13 Is a Set of Heavier Weights.

These are also uniform in size and appearance, and weigh respectively, grms: 1020, 1040, 1120, 1160, 1200. $12.

No. 14 Is a Hooded Lamp.

For use in dark room experiments. It throws light on a small spot for making records and reading instruments in dark room investigations. $10.

No. 15 Is a Seconds Pendulum. $15.

No. 16 Is a Whirling Table. $40.

No. 17 Is an Adjustable Strap,

With two insulated binding-posts having 5 mm. Dia. contact points, by which electric shocks can be given from opposite points on wrist, arm or leg. $10.

No. 18 Are Invisible Scalepans,

For facility in lifting experiments with the weights. $10.

No. 19 Is Hippe's Chronoscope.

I send Photo. of this instrument to show the cabinet with which I cover the clock work, which cabinet is baize lined to deaden the noise of the instrument's running. I also have devices to isolate the works so as to further decrease noise. Photo. also shows a key which I put on to start the instrument positively at its true speed tone. Prof. Cattell found it annoyingly uncertain starting it by the cord which the Swiss Makers provide, and this key was devised to make accurate starting certain. We also found it necessary to provide a means of securing the yoke which holds the spring escape-regulator, for its vibrations would loosen it, and spoil the speed rate.

about $87.

My improvements $ 10.

This instrument has a device by which experimentor experiences the same amount of stimulus which he is applying to the subject, and so can detect subject personal equation of judgment more accurately. and allows in Children for fear and in adults for inattention or deception. This was added for use of Mr McDonald the U.S. Government Expert investigator in criminal abnormalities

MAY 1, 1893.

Since the Spring of 1892. I have devised and made two new instruments for the University of Pennsylvania, for the use of Professor Lightner Witmer, in the Psychological Labratory, as follows:

NO. 20 A CHRONOGRAPH.

This instrument has a recording cylinder 25 centimeters in diameter, 30 centimeters long, actuated by clock work driven by weight, and having either a direct gear, or endless screw, fan-escapement, by which the cylinder can be given various rates of rotation from about 1 in 2 min. to about 4 per sec.; or it can be rotated independent of the clock work, by motor connecting with a grooved band wheel on the shaft, at such speed that the standard tuning-fork will write its vibrations on smoked paper, in waves 1 centimeter long.

The Pen Carriage is moved by a screw feed to form the spiral record on the cylinder, and can be adjusted to make any spiral gain per rotation, from 2 centimeters to 5 centimeters. There are two pens operated by electro-magnets, one to draw a continuous line, but jagged, to mark the pendulum beats, the other to make a broken record of dots or dashes, or both, as may be needed to mark the duration of the incident of experiment to be recorded. The pen carriage also carries a Screw Clamp of my devising, which opens its jaws parallel, and is fitted with double ball-joint so that it can be easily and accurately adjusted to any position. This clamp may carry a Sphygmograph or other instrument and at least 3 separate records can be made at one time. The instrument may also be run in either a horizontal or vertical position.

$ 160

NO. 21. TESTING PERCEPTION OF TINTS.

This is an instrument for measuring the least po sible perception of change in tint of colors.

Three cards, each of different color, rotate together on a shaft so as to blend their colors. While the necessary speed of rotation for blending is maintained, (so that the perception of the experimentee is not disturbed or broken by stopping the instrument) the proportion of the sector of either card, exposed, can be changed to an amount definitely known to the experimentor, and the perception of changes in tint can be read on the indices to 1° of the circle.

$ 85.

No. 22.

Pendulum Chronometer

$ 100.

No 23. No 24.
Special light-acting contact pieces.
$6. each

No 25.
Enlarged view of Pen Carriage of Chronoscope (No 20) $30.

No. 26.
Instrument for Study in Spots of heat and cold Sensation in the Skin.
$ 20.

No 27.
Instrument for stimulating and accurately measuring and recording the reaction kick of the knee muscle. $ 30.
with 2 devices for writing
records of reaction
Price ——

I am prepared to make these instruments, except No. 19, to which I merely make the attachments named; but will import it to order and attach my devices before delivering it.

Also, I neatly and accurately repair any philosophical and experimental instrument, and would like the chance to make any instruments you may devise for your use in scientific research, giving you any hints I may have toward the development in a practical instrument of any ideas you may have partly formed.

I can also import any instrument for you which can be gotten more cheaply abroad than here.

We have found that sometimes imported instruments get broken in transit. Such breakage I would repair, on the buyer's order, after notifying him of the extent of the damage.

Prof. Cattell found that parts of foreign instruments were sometimes unreliable through poor workmanship, such as contact points, adjusting points, etc., on make and break circuit devices, and I did much repairing of such for him. If you have such imperfect pieces which can be removed from the instrument and sent by express, I can repair them for you, or replace with new ones if you judge that best.

As my accompanying pictures are small you will be obliged to look for indexes and like minute parts referred to, with a simple microscope.

For instruments Nos. 1, 16, 17 and 18 I have not secured pictures, and so cannot send them, but I judge that you can understand the instruments and their use without.

I shall be glad to correspond with you, giving you further information about these instruments if you desire.

Very Respectfully, your Servant,

J. D. BROWN,